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GCSE MATHS

Ratio, proportion and rates of change

Edexcel 1MA1 | Subtopic collection Topic 32

Percentages and reverse percentages

Higher tier

Answers and examiner comments

153	2003-2025	Higher
question groups	available papers	tier

Using this booklet

1. Answer numbers match the companion question booklet.
2. Follow the original question number on marking tables.
3. Examiner comments are included where available.

Name _____ **Date** _____

Some entries use full source marking material in an appendix. Any unavailable mark schemes are identified beside the relevant answer.

Original question 3

The full source mark scheme begins on page 224. Use the original paper code, tier and question number shown above.

Original question 18

The full source mark scheme begins on page 278. Use the original paper code, tier and question number shown above.

Original question 2

The full source mark scheme begins on page 329. Use the original paper code, tier and question number shown above.

Original question 7

The full source mark scheme begins on page 329. Use the original paper code, tier and question number shown above.

10		$360 + \frac{17.5}{100} \times 360$	423	3	M1 for $\frac{17.5}{100} \times 360$ oe or 10% + 5% + 2.5% oe (condone 1 calculation error) or 63 seen or 36, 18 and 9 seen M1 (dep) for 360 + '63' A1 for 423 OR M2 for 1.175×360 oe A1 for 423

21		$132.88 \div 88 \times 100$	151	3	M1 for recognising that 88% is equivalent to 132.88 M1 for $132.88 \div 88 \times 100$ oe A1 cao

9	$\frac{84}{350}\times 100$	24	2	M1 for $\frac{84}{350}\times 100$ A1 cao

Question	Working	Answer	Mark	Notes
11	600 + 300 + 150 6000 + 1050 7050 − 3000 4050 ÷ 10	405	6	M1 for 600 + 300 + 150 oe **or** 6000×0.175 oe **(NB** must be VAT of 6000) M1 for 6000 + "1050" A1 for 7050 cao M1 for "7050" − 3000 M1 for dividing by 10 A1 for 405 cao

3	B = 20 × 2 = 40 C = 3 ÷ 4 × 20 = 15 D = 10÷100×20+20 = 22 20 + 40 + 15 + 22	97	4	M1 for 20 × 2 or 40 seen M1 for 3 ÷ 4 × 20 or 15 seen M1 for 10 ÷ 100 × 20 + 20 oe or 22 seen or 1.1 × 20 A1 cao

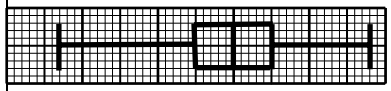
Original question 7

The full source mark scheme begins on page 390. Use the original paper code, tier and question number shown above.

Original question 2

The full source mark scheme begins on page 406. Use the original paper code, tier and question number shown above.

5MB1H/01

Question	Working	Answer	Mark	Notes
9 (a)		120	1	B1 for 119.5 – 120.5
(b)	$60-52=8$ 20% of $60=12$	Claim not true since 8 < 20% of 60	3	M1 for using graph at 130, may be implied by a value in the range 52 to 53 seen A1 for 8 (cars breaking speed limit) or 13.(3..)% (accept 7 or 11.(6..)%) A1 for correct conclusion with fully correct working OR M1 for using cf = 48 A1 for (20% of cars exceed) value in the range 126.5 to 127.5 km/h A1 for correct conclusion with fully correct working
(c)			3	B3 for complete box plot with all three aspects Aspect 1: ends of whiskers at 97 and 138 Aspect 2: ends of box at 115 and 125 Aspect 3: median marked at 120 or ft (a) (B2 for two aspects, B1 for one aspect) (Allow tolerance of $\frac{1}{2}$ square)

5MB1H_01
November 2010

5MB1H/01

3	$80 \div 100 \times 15$	12	2	M1 for $80 \div 100 \times 15$ **or** 8 and 4 seen **or** correct method to find 10% and 5% of 80 eg $80 \div 100 \times 10$ and $80 \div 100 \times 5$ oe A1 cao

5MB2H_01

5MB2H_01

Question	Working	Answer	Mark	Notes
9	$3600\times 4=14400$ $\frac{2}{5}=40\%$ $\frac{1}{4}=25$ $30+40+25=95\%$ Saved 5% 10% of $14400=1440$ 5% of $14400=1440\div 2$	£720	5	M1 $3600\times 4\ (=14400)$ B1 for $\frac{2}{5}=40\%$ **or** $\frac{1}{4}=25$ M1 for $30+40+25$ or 95 or 5 M1 for complete method to find 5% of 14400 A1 cao **or** M1 for $3600\times 4\ (=14400)$ B1 for $30\%=\frac{3}{10}$ oe M1 $\frac{3}{10}+\frac{2}{5}+\frac{1}{4}$ or $\frac{19}{20}$ or $\frac{1}{20}$ M1 for complete method to find $\frac{1}{20}$ of 14400 A1 cao **or** M1 $3600\times 4\ (=14400)$ M1 for 0.3×14400 oe $(=4320)$ M1 for $\frac{2}{5}\times 14400$ oe $(=5760)$ M1 $14400-3600-4320-5760$ A1 cao SC if no other marks awarded M1 for $0.3\times 3600\ (=1080)$ M1 for $\frac{2}{5}\times 3600\ (=14400)$

5MB2H_01

5MB2H_01

5MB1H_01

Question	Working	Answer	Mark	Notes
3 *(a)	140 × 5 ÷ 7 140 × 2 ÷ 7	100 40	3	M1 for 140 × 5 ÷ 7 or 140 × 2 ÷7 or 140 ÷ ("2 + 5") × 2 or 140 ÷ ("2 + 5") × 5 A1 for 100 and 40 cao C1 for linking "cooker(s)" and "freezer(s)" correctly to final answers.
(b)	$145 \times \frac{20}{100}$	29	2	M1 for 145 × 0.2 or $145 \times \frac{20}{100}$ or 14.5 × 2 or 145 ÷ 10 × 2 A1 for 29 SCB1 for 116 if no other marks have been awarded.

5MB1H_01

Question	Working	Answer	Mark	Notes
8	**Park Palace**: 810 + 80 + 80 = £970 per adult 1/5 of 970 = 194 970 – 194 = £776 per child 970 + 970 + 776 + 776 = **£3492** **Dubai Grand**: 854 + 53 + 53 = £960 per adult 10% + 5% of 960 = 96 + 48 = 144 960 – 144 = £816 per child 960 + 960 + 816 + 816 = **£3552**	Park Palace £3492	6	M1 for identifying correct week for holiday (eg use of 854 for DG, eg circle correct row) M1 for using 7 nights for at least one hotel M2 for complete correct method for **reduction** of 1/5 **and** 15% for at least 5 nights (M1 for correct method to get 1/5 or 15% or 4/5 or 85% of a total for at least 5 nights) A1 for one correct total (3492 or 3552) A1 for 34 92 and 3552, with Park Palace (or 3492) indicated as the best choice.

Question		Working	Answer	Mark	Notes
16		(100% – 10%)×Normal Price=£4.86 Normal Price = £4.86 ÷ 0.9	£5.40	3	M1for '4.86 is 90%' or (100% – 10%) × Normal Price = 4.86 or 4.86 ÷ 90 M1 for 4.86 ÷ 0.9 or 4.86 × 10 ÷ 9 oe A1 £5.40 (accept 5.4) OR M1 10% = £0.54 or £4.86 ÷ 9 M1 (dep) £4.86 + '£0.54' A1 £5.40 (accept 5.4)

Question	Working	Answer	Mark	Notes
3 (a)	$\frac{15}{100} \times 2400 = 360$ 2400 – 360 = 2040 2040 ÷ (1 + 2 + 5) = 255 255 × 1, 255 × 2, 255 × 5	Cement = 255 Sand = 510 Stone = 1275	4	M1 for $\frac{15}{100} \times 2400$ or $\frac{85}{100} \times 2400$ M1 for '2040' ÷ (1 + 2 + 5) M1 (dep on previous M1) for '255' × 1 or '255' × 2 or '255' × 5 either explicitly or with answer(s) on the answer line. A1 for all 3 correct masses
(b)*	255 × 30 – 6500 = 1150 so not enough OR 6500 ÷ 255 = 25.5 m^3 worth of cement Which is less than 30 so not enough OR 6.5 tonnes of concrete gives 6.5 × 8 = 52 tonnes of dry mixture 30 m^3 of concrete requires 30 × 2400 × 0.85 kg of dry mixture = 61200kg of dry mixture (=61.2 tonnes)	No, with justification	3	B1 for a correct conversion between kg and tonnes e.g. 6.5 tonnes = 6500 kg (but not 1 tonne = 1000 kg) M1 for '255' × 30 C1(dep on M1) for an answer of No (Yes), supported by (ft) calculations. OR B1 for a correct conversion between kg and tonnes e.g. 6.5 tonnes = 6500 kg (but not 1 tonne = 1000 kg) M1 for 6500 ÷ '255' C1(dep on M1) for an answer of No (Yes), supported by (ft) calculations OR M1 for 6.5 × 8 and 30 × 2400 × 0.85 B1 for a correct between kg and tonnes e.g. 61200 kg = 61.2 kg (but not 1 tonne = 1000 kg) C1 (dep on M1) for an answer of No (Yes), supported by (ft) calculations.

5MB1H_01

Original question 4

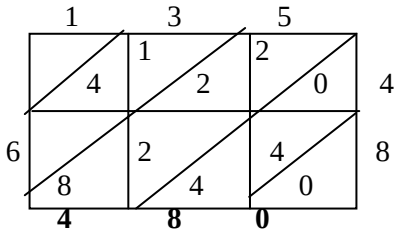
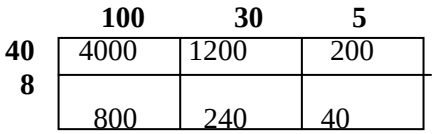
The full source mark scheme begins on page 422. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
1	(a)	$\frac{4}{20}=\frac{2}{10}$	$\frac{1}{5}$	2	M1 $\frac{4}{20}$ oe A1 cao [SC: B1 fo $\frac{16}{20}$ if M0 scored]
	(b)	$\frac{6}{20}\times 100$ or $\frac{6}{20}=\frac{5\times 6}{5\times 20}$	30	2	M1 $\frac{6}{20}\times 100$ A1 cao or M1 $\frac{6}{20}=\frac{5\times 6}{5\times 20}$ A1 cao
	(c)	$10 - 1.50 = 8.50$ $8.50 \div 2 = 4.25$ or $10 \div 2 = 5$ $1.50 \div 2 = 0.75$	5.75	2	M1 $10 - 1.50$ (= 8.50) and '8.50' ÷ 2 (= 4.25) or $10 + 1.50$ (=11.50) and '11.50' ÷ 2 or $10 \div 2$ and $1.50 \div 2$ or $2x \pm 1.5(0) = 10$ oe A1 cao

Question		Working	Answer	Mark	Notes
9		22.5% – 17.5% = 5% $180 \times \frac{5}{100}$ OR $180 \times \frac{22\frac{1}{2}}{100} = 40.50$ $180 \times \frac{17\frac{1}{2}}{100} = 31.50$ 40.50 – 31.50 OR 1.225 × 180 = 220.5 1.175 × 180 = 211.5 220.5 – 211.5	9	3	M1 22.5 – 17.5 M1 $180 \times$ '$\frac{5}{100}$' oe A1 cao OR M1 $180 \times \frac{22\frac{1}{2}}{100}$ oe or $180 \times \frac{17\frac{1}{2}}{100}$ oe M1 (dep) '40.50' – '31.50' A1 cao OR M1 1.225 × 180 or 1.175 × 180 M1 (dep) '220.5' – '211.5' A1 cao [SC: Award M2 A0 for an answer of 9 with 1 arithmetic error]

2		$\frac{3500\times2.5\times3}{100}$	262.50	3	M1 for $\frac{3500\times2.5}{100}$ oe (=87.5) **or** 3500×1.025^n M1 for '87.5' x 3 **or** 3500 + '87.5'×3 A1 for 262.5 or 262.50 SC: B2 for 3762.50 or 3762.5 if M0 scored SC : B2 for 269.12 or 269.11 (B1 for 3769.12 or 3769.11)

1380_4H

Question		Working	Answer	Mark	Notes
3		135 48 1080 5400 6480 Or  Or  4000 + 1200 + 200 + 800 + 240 + 40 = 6480 Or 48x1=48 48x0.30=14.4(0) 48x.05=2.4(0) Or 48x1=48 48x0.35=16.8(0)	55.08	6	M1 for a complete method with relative place value correct Condone 1 multiplication error, addition not necessary. Or M1 for a complete grid. Condone 1 multiplication error, addition not necessary. Or M1 for sight of a complete partitioning method. Condone 1 multiplication error, addition not necessary. Or M1 for sight of a complete partitioning method which partitions the money only and uses consistent units Condone 1 multiplication error, addition not necessary. A1 (dep on M1) for digits 648 seen M1 for 15 ÷ 100 × '64.8' oe eg 10% = 6.48 5% = 3.24 (done in pence or £) (= £9.72 oe) M1 for '64.8' – 15 ÷ 100 × '64.8' oe (done in pence or £) (or M2 for 85 ÷ 100 × '64.8' oe (done in pence or £)) A1 for digits 5508 seen A1 cao

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
		11475 48 91800 459000 550800 **1 1 4 7 5** **4** 4 4 16 28 20 **8** 8 8 32 56 40 5 5 0 8 0 0 10000 1000 400 70 5 40 400000 40000 16000 2800 200 8 80000 8000 3200 560 40 480000 48000 19200 3360 240 480000+48000+19200+3360+240= 550800			OR M1 for 15 ÷ 100 × 135 oe eg 10% = 13.5 5% = 6.75 (done in pence or £) (= 20.25p oe) M1 for 135 – '15 ÷ 100 × 135' oe (done in pence or £) (or M2 for 85 ÷ 100 × 135 oe (done in pence or £)) A1 for digits 11475 seen M1 for a complete method with relative place value correct Condone 1 multiplication error, addition not necessary. Or M1 for a complete grid. Condone 1 multiplication error, addition not necessary. Or M1 for sight of a complete partitioning method. Condone 1 multiplication error, addition not necessary. Or M1 for sight of a complete partitioning method which partitions the money only and uses consistent units Condone 1 multiplication error, addition not necessary. A1 digits 5508 seen A1 cao

5MB2H_01

Original question 4

The full source mark scheme begins on page 435. Use the original paper code, tier and question number shown above.

Original question 10

The full source mark scheme begins on page 448. Use the original paper code, tier and question number shown above.

Original question 4

The full source mark scheme begins on page 468. Use the original paper code, tier and question number shown above.

Original question 5

The full source mark scheme begins on page 489. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
4	(a)	650 × 0.2 (=130) 650 + 130 = 780 OR 650 × 1.2	780	3	M2 for 650 × 1.2 oe (M1 for 650 × 0.2 oe (=130)) A1 cao
	(b)	$\frac{39}{260} \times 100$ = 0.15 × 100 =	15	2	M1 for $\frac{39}{260} \times 100$ oe A1 cao
	(c)	44.79 ÷ 3 × 8	119.44	2	M1 for 44.79 ÷ 3 (=14.93) or 44.79 × 8 (=358.32) A1 cao

Original question 3

The full source mark scheme begins on page 508. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
16		$\frac{64.8-59.3}{64.8}\times 100$ (=8.487...) **OR** $\frac{59.3}{64.8}\times 100$ = 91.512 100 – '91.512' =8.487...)	8.49	3	M1 64.8 − 59.3 (=5.5) M1 (dep) $\frac{'5.5'}{64.8}\times 100$ oe A1 8.48 – 8.49 **OR** M1 $\frac{59.3}{64.8}\times 100$ oe (= 91.5(12...)) M1 (dep) 100 – '91.5' A1 8.48 – 8.49 **OR** M1 $\frac{59.3}{64.8}$ (=0.915(12...)) M1 (dep) 100 × (1 − '0.915') A1 8.48 − 8.49

1MA0_2H

Original question 8

The full source mark scheme begins on page 540. Use the original paper code, tier and question number shown above.

Original question 4

The full source mark scheme begins on page 554. Use the original paper code, tier and question number shown above.

Original question 8

The full source mark scheme begins on page 554. Use the original paper code, tier and question number shown above.

13		168000 = 112% (of original price) 168000 ÷ 112 × 100	150000	3	M1 168000 = 112% or 112 or 100 + 12 or 1.12 or 1 + 0.12 with an intention to divide M1 168000 ÷ 1.12 or 16800 ÷ 112 × 100 A1 cao

5MB3H_01

Question		Working	Answer	Mark	Notes
11			730	5	M1 for $\frac{5}{100}\times 200$ (= 10) oe M1 for $\frac{10}{100}\times 350$ (= 35) oe M1 for 6 × '10' **or** 4 × '35' M1 (dep on M1 earned for a correct method for a percentage calculation) for "60" + "140"+ 530 A1 cao **Or** M1 for 6 × 200 (= 1200) or 4 × 350 (= 1400) M1 for $\frac{5}{100}\times "1200" (= 60)$ oe M1 for $\frac{10}{100}\times "1400" (= 140)$ oe M1(dep on M1 earned for a correct method for a percentage calculation) for "60" + "140"+ 530 A1 cao

1MA0_1H

Question		Working	Answer	Mark	Notes
6			414.96	5	M1 for a correct method to work out the amount of oil required to fill the tank M1 for a correct method to find the cost of oil required before the discount M1 for a correct method of finding 5% of their calculated cost M1 (dep on previous M1) for a correct method to find the discounted cost A1 for correct answer of 414.96 or 41496p **OR** M1 for a correct method of finding 5% of the cost of 1 litre of oil M1 (dep on previous M1) for a correct method to find the discounted cost of 1 litre of oil M1 for a correct method to work out the amount of oil required to fill the tank M1 for a correct method to find the discounted cost of the oil required A1 for correct answer of 414.96 or 41496p **OR** M1 for a correct method to work out the amount of oil required to fill the tank M1 for a correct method of finding 5% of their calculated amount of oil M1 (dep on previous M1) for a correct method to find the reduced amount of oil M1 for a correct method to find the cost of the reduced amount of oil A1 for correct answer of 414.96 or 41496p

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
7*	(a)		2.5	2	M1 for 15 ÷ 6 oe A1 for 2.5 or $2\frac{1}{2}$
	*(b)		Yes + evidence	2	M1 for a correct method to change 15 miles into kilometres C1(dep M1) for 24 km **and** statement with correct conclusion [SC: B1 for "Yes" oe and 24 km shown if M0 scored] or M1 for a correct method to change 20 kilometres into miles C1(dep M1) for 12.5 miles **and** statement with correct conclusion [SC: B1 for "Yes" oe and 12.5 miles shown if M0 scored]

1MA0_2H

2		0.93×800	744	2	M1 0.93×800 oe or 744 A1 cao

Original question 5

The full source mark scheme begins on page 572. Use the original paper code, tier and question number shown above.

6			6400	4	M1 for correct method to work out 20% M1 for correct method to divide in the ratio 2:3 M1for complete and correct method A1 cao

5MB2H_01

Original question 8

The full source mark scheme begins on page 584. Use the original paper code, tier and question number shown above.

2			24	4	M1 for 0.15×240 (= 36) oe M1 for $\frac{3}{4} \times 240$ (= 180) oe M1 (dep on both prev M1) for 240 – "180" – "36" A1 cao **OR** M1 for 15(%) + 75(%) (= 90(%)) M1 for 100(%) – "90(%)" (= 10(%)) M1 (dep on both prev M1) for " $\frac{10}{100}$ " × 240 oe A1 cao **OR** M1 for 0.15 + 0.75(= 0.9) oe M1 for "0.9" × 240(= 216) oe M1 (dep on both prev M1) for 240 "216" A1 cao **OR** M1 for 0.15 + 0.75(= 0.9) oe M1 for 1 – "0.9"(= 0.1) oe M1 (dep on both prev M1) for "0.1" × 240 oe A1 cao

PAPER: 1MA0_1H

16			£500	3	M1 for 70% = 350 or $\frac{350}{70}$ M1 for $\frac{350}{70} \times 100$ oe A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17			1 hour 45 mins	6	M1 for method to find volume of pond, eg $\frac{1}{2}(1.3 + 0.5) \times 2 \times 1$ (= 1.8) M1 for method to find the volume of water emptied in 30 minutes, eg $1 \times 2 \times 0.2$ (= 0.4), $100 \times 200 \times 20$ (= 400000) A1 for correct rate, eg 0.8 m^3/hr, 0.4 m^3 in 30 minutes M1 for correct method to find total time taken to empty the pond, eg "1.8" ÷ "0.8" M1 for method to find extra time, eg 2 hrs 15 minutes − 30 minutes A1 for 1.75 hours, $1\frac{3}{4}$ hours, 1 hour 45 mins or 105 mins **OR** M1 for method to find volume of water emptied in 30 minutes,.eg. $1 \times 2 \times 0.2$ (= 0.4), $100 \times 200 \times 20$ (= 400000) M1 for method to work out rate of water loss eg. "0.4" × 2 A1 for correct rate, eg 0.8 m^3/hr M1 for correct method to work out remaining volume of water eg. $\frac{1}{2}(1.1 + 0.3) \times 2 \times 1$ (= 1.4) M1 for method to work out time, eg "1.4" ÷ "0.8" A1 for 1.75 hours, $1\frac{3}{4}$ hours, 1 hour 45 mins or 105 mins NB working could be in 3D or in 2D and in metres or cm throughout

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18		$12x + 21y = 3$ $12x + 40y = 60$ $19y = 57$ $y = 3$ $3x + 10\times 3 = 15$ $3x = -15$ Alternative method $x = \left(\frac{1-7y}{4}\right)$ $3\left(\frac{1-7y}{4}\right) + 10y = 15$ $3 - 21y + 40y = 60$ $19y = 57$ $x = \left(\frac{1-7\times 3}{4}\right)$	$x = -5$, $y = 3$	4	M1 for a correct process to eliminate either x or y or rearrangement of one equation leading to substitution (condone one arithmetic error) A1 for either $x = -5$ or $y = 3$ M1 (dep) for correct substitution of their found value A1 cao
19		$-5, 0.2, 0.5, 1$	$-5, 5^{-1}, 0.5, 5^{0}$	2	M1 for either 5^{-1} or 5^{0} evaluated correctly A1 for a fully correct list from correct working, accept original numbers or evaluated (SC B1 for one error in position or correct list in reverse order)

PAPER: 1MA0_1H

Original question 9

The full source mark scheme begins on page 599. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
1			42	3	M1 for correct method to find 20% of 35 (=7) M1 for correct method to increase 35 by 20% A1 cao

Question		Working	Answer	Mark	Notes
3			90	4	M1 for 200 ÷ 5 (=40) M1 for correct method to find 35% of 200 (=70) M1 (dep on M1) for 200 – "40" – "70" A1 cao OR M1 for 35(%) + 20(%) (=55%) M1 for a correct method to find "55%" of 200 (=110) or 100(%) − 55% (=45%) M1 (dep on M1) for 200 – "110" or a correct method to find "45%" of 200 A1 cao OR M1 for correct fractions with common denominator $\frac{35}{100}+\frac{20}{100}$ oe M1 for a correct method to find "$\frac{55}{100}$" oe of 200 (=110) or 1−"$\frac{55}{100}$"= "$\frac{45}{100}$" oe M1 (dep on M1) for 200−"110" or a correct method to find "$\frac{45}{100}$" oe of 200 A1 cao

Question		Working	Answer	Mark	Notes
7			550	5	M1 for a correct method to find 20% of an amount e.g. 3500 × 0.2 oe (= 700) M1 for a correct method to increase an amount by 20% e.g. 3500 × 1.2 oe (= 4200) M1 for subtracting 900 M1 for division by 6 A1 for 550 **NB** Operations may occur in any order as long as they could lead to the correct answer. Award marks until a breakdown in method occurs.

Original question 10

The full source mark scheme begins on page 616. Use the original paper code, tier and question number shown above.

11			164	5	M1 200 ÷ (3+2) (= 40) or an equivalent ratio seen M1 (dep) 3 ×‘40’ (= 120) or 2 ×‘40’ (= 80) or 120: 80 or 80:120 M1 a complete method to find 70% of their total number of large letters e.g. 0.7 × ‘80’ (=56) M1 multiplies their three totals by the correct unit price and adds, e.g. 60(p) × ‘120’ + (£)1 × ‘56’ + (£)1.50 × ‘24’ A1 164

PAPER: 1MA0_1H

PAPER: 1MA0_1H

Question		Working	Answer	Mark	Notes
18	(a)		68	1	B1 cao
	*(b)		Yes as 28 > 20 or 35% > 25% or 53 < 60	3	M1 for reading a value from graph at time = 60 (=28, accept 27 to 28) M1 for '28' ÷ 80 × 100 (= 35) or 25 ÷ 100 × 80 (= 20) C1 (dep on M2) for correct decision based on their figures OR M1 for 25 ÷ 100 × 80 (= 20) M1 for reading a value from graph at cf = 20 (=53, accept 52 to 54) C1 (dep on M2) for correct decision based on their figures
	(c)	28, 53, 68, 76, 96	Box plot plotted	3	B1 for ends of whiskers at 28 and 96 with a box B1 ft for median at '68' inside a box B1 for ends of box at 53 (accept 52 to 54) and 76

2	(a)		12	2	M1 for $32 \div 8$ (=4) **or** $\frac{3}{8} \times 32$ oe A1 for 12
	(b)		36	2	M1 for correct method to find 45% of 80 A1 cao

10		Merit	3	M1 for $\frac{62}{80}\times 100$ (=77.5) A1 for 77.5% **or** 78% B1 ft (dep on M1) for 'Merit' **OR** M1 for calculating a percentage between 70 and 85% of 80 eg 0.7×80 (=56) **or** 0.84 × 80 (=67.2) **or** 0.85 × 80 (=68) A1 for 56 **and** 67(.2) or 68 or for two appropriate values which can be compared with 62 B1 ft (dep on M1) for 'Merit'

PAPER: 1MA0_2H

20		116	3	M1 for 80% or 0.8 seen oe or $\frac{464}{0.8}$ (=580) M1 for $\frac{464}{0.8} - 464$ A1 cao **OR** M1 for 80% or 0.8 seen oe M1 for 464 ÷ 4 **or** 464 ÷ (80÷20) A1 cao

27	12×20 + 10.8×10 + 7×15 + 5×15 + 1.8×30 + 0.6×30 =240+108+105+75 +54+18 =528+72=600	12%	3	M1 for attempt to work out total area (eg =600) or area greater than 60 (eg =72) by using fd or counting squares M1 (dep) for $\frac{'72'}{'600'} \times 100$ oe (=12) A1 cao (must have % otherwise 2 marks)

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*28		Proof	3	M1 for one pair of equal angles or sides with reason M1 for second pair of equal angles or sides with reason C1 for proof completed correctly with full reasons and reason for congruence Acceptable reasons: *AD* common (oe eg both same) Angle *BAD* = angle *CDA* (angles in a semicircle are 90°) Angle *ABO* = angle *DCA* (angles in the same segment are equal) Triangle *ABD* and triangle *DCA* are congruent - ASA **OR** *BD* = *CA* (diameters of the circle) Angle *BAD* = angle *CDA* (angles in a semicircle are 90°.) *AD* common Triangle *ABD* and triangle *DCA* are congruent - RHS **OR** *BD* = *CA* (diameters of the circle) *AD* is common Angle *ADB* = angle *CAD* (base angles of an isosceles triangle are equal.) Triangle *ABD* and triangle *DCA* are congruent - SAS

Question 6:

	F	S	G	
W	12	55		96
M	**7**	**18**	9	**34**
	19	73		130

	F	S	G	
W	12	55	**29**	96
M			9	
	19	73	**38**	130

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q4		Model as well as diagram of prism provided. Question reversed.	Standard mark scheme
Q9		MLP – *a* changed to *x*	Standard mark scheme
Q11	(a) (c)	MLP – *x* changed to *y* MLP - *a* changed to *e*	 B2 for $3e^{-4}f^6$ **or** $\frac{3f^6}{e^4}$ (B1 for any two from 3, e^{-4} or $\frac{1}{e^4}$, f^6 in a product)
Q14	 (c)	Some frequencies changed: 6, 8, 14, 20, 2 Grid – *y* axis labelled in 4s up to 24. 2cm for 2. *x*- axis 2cm for 2	Standard mark scheme Standard mark scheme

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q15		Braille – information given about the diagram.	Standard mark scheme
Q17		Grid *x* 1.5 with 1.5 cm squares. For 36pt, squares will be close to 2cm.	Standard mark scheme
Q18		Braille – information given about the diagram.	Standard mark scheme
Q21	(b)	*a* changed to *f*	M1 for correct processes to isolate terms in *m* from other terms M1 for taking *m* out as a common factor A1 for $m = \frac{g-5}{f+3}$ **or** $m = \frac{5-g}{-f-3}$
Q22		MLP and Braille – diagram labelled clockwise from the top left. ABCD. *x* changed to *y*. Information given about the diagram.	Standard mark scheme
Q24		Model as well as diagram provided.	Standard mark scheme
Q26		MLP and Braille information given about the diagram.	Standard mark scheme
Q27		Diagram: 20-30 bar brought down to 9. 60-90 bar brought up to 2. 90-120 bar brought up to 1. 2cm grid.	Standard mark scheme

Original question 6

The full source mark scheme begins on page 637. Use the original paper code, tier and question number shown above.

15			55 - 56	3	M1 for attempt to find 0.25×total area, eg 0.25×(3.6+14+5.6+7.2+1.4) (=7.95) condone one error M1 for ('7.95' – '3.6') ÷ 7 (=0.621…) A1 for 55 – 56 OR M1 for for attempt to find 0.25×total squares, eg 0.25×(90+350+140+180+35) (=198.75) condone one error M1 for ('198.75 – '90') ÷ 35 (=3.107…) A1 for 55 – 56

5MB1H_01

2		1263	4	M1 for a correct method to find 65% (= 5473) of the customers M1 for a correct method to find $\frac{1}{5}$ (= 1684) of the customers M1 (dep on M2) for a correct method to find the remaining number of customers A1 cao OR M1 for a correct method of adding 65% and $\frac{1}{5}$ when both correctly written as percentages (= 85%) or decimals (= 0.85) or fractions (= $\frac{85}{100}$ oe) M1 ft for a correct method to find the percentage or decimal or fraction of the customers (= 7157) M1 (dep on M2) for a correct method to find the remaining number of customers A1 cao OR M1 for a correct method of adding 65% and $\frac{1}{5}$ when both correctly percentages (= 85%) or decimals (= 0.85) or fractions (= $\frac{85}{100}$ oe) M1 ft for a correct method to find the remaining percentage (= 15%) or

PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
				decimal (= 0.15) or fraction ($\frac{15}{100}$ oe) of the customers M1 (dep on M2) for a correct method to find the remaining number of customers A1 cao

Question	Working	Answer	Mark	Notes
6		58.05	4	B1 for identifying 19.5(0) and 15(.00) M1 for a correct method to find the total cost of their identified tickets for the family, or for a correct method to find the discounted cost of at least one of the identified tickets M1 for a correct method to find the total discounted cost of their identified tickets A1 cao

2		1263	4	M1 for a correct method to find 65% (= 5473) of the customers M1 for a correct method to find $\frac{1}{5}$ (= 1684) of the customers M1 (dep on M2) for a correct method to find the remaining number of customers A1 cao OR M1 for a correct method of adding 65% and $\frac{1}{5}$ when both correctly written as percentages (= 85%) or decimals (= 0.85) or fractions (= $\frac{85}{100}$ oe) M1 ft for a correct method to find the percentage or decimal or fraction of the customers (= 7157) M1 (dep on M2) for a correct method to find the remaining number of customers A1 cao OR M1 for a correct method of adding 65% and $\frac{1}{5}$ when both correctly percentages (= 85%) or decimals (= 0.85) or fractions (= $\frac{85}{100}$ oe) M1 ft for a correct method to find the remaining percentage (= 15%) or

PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
				decimal (= 0.15) or fraction ($\frac{15}{100}$ oe) of the customers M1 (dep on M2) for a correct method to find the remaining number of customers A1 cao

Question	Working	Answer	Mark	Notes
6		58.05	4	B1 for identifying 19.5(0) and 15(.00) M1 for a correct method to find the total cost of their identified tickets for the family, or for a correct method to find the discounted cost of at least one of the identified tickets M1 for a correct method to find the total discounted cost of their identified tickets A1 cao

4			25.60	4	M1 for a correct method to find $\frac{1}{3}$ of 24 (=8) or $\frac{2}{3}$ of 24 (=16) M1 for a correct method to find 60% (= 7.2) or 40% (= 4.8) of 12 or 60% (=14.4) or 40% (= 9.6) of 24 M1 (dep on at least M1) for a method to find the sum of their discounted adult ticket + 2 × their discounted child ticket A1 25.6(0)

PAPER: 1MA0_1H

11			186.20	5	M1 for use of consistent units to find volume, 11 × 4 × 0.06 (=2.64) or 1100× 400 × 6 (=2640000) M1 (dep on vol calculation) for attempt to find number of bags needed, eg "2.64" ÷ 0.4 (=6.6 →7) M1 for the cost of gravel before discount eg "6.6" × 38 or "7" × 38 M1 for attempt to find the total cost after discount"266" × 0.7 oe A1 for 186.2(0) OR M1 for cost of gravel per bag after discount, 38 × 0.7 (=26.60) M1 for use of consistent units to find volume, 11 × 4 × 0.06 (=2.64) or 1100× 400 × 6 (=2640000) M1 (dep on vol calculation) for attempt to find number of bags needed, eg "2.64" ÷ 0.4 M1 for total cost of gravel after discount "7" × "26.6" A1 for 186.2(0)

PAPER: 1MA0_2H

3			56	3	M1 for correct method to find 20% of 120 (=24) or $\frac{1}{3}$ of 120 (= 40) M1 (dep) for 120 − "24" − "40" A1 cao OR M1 for $1 - \frac{20}{100} - \frac{1}{3}$ $(= \frac{7}{15})$ oe or $\left\{\frac{20}{100} + \frac{1}{3}\right\} \times 120$ (= 64) oe M1 (dep) for "$\frac{7}{15}$" × 120 oe or 120 − "64" A1 cao (if M0, then SCB1 for 64)

Paper_5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*4			4	4	M1 for 200 ÷ (1 + 9) (= 20) M1 for 750 ÷ 20 (= 37.5) A1 for 3.7(3….) or $3\frac{11}{15}$ or 37.5 **and** 150 C1 ft (dep on M1) for clear statement of 4 bottles with working shown **OR** M1 for 750 × 10 (= 7500) M1 for 200 × 140 (= 28 000) A1 for 3.7(3….) or $3\frac{11}{15}$ or 28000 **and** 30000 C1 ft (dep on M1) for clear statement of 4 bottles with working shown **OR** M1 for 200 × 140 (= 28 000) M1 for 28 000 ÷ (9 + 1) (= 2800) A1 for 3.7(3….) or $3\frac{11}{15}$ or 2800 **and** 3000 C1 ft (dep on M1) for clear statement of 4 bottles with working shown **OR** M1 for 200 ÷ (1 + 9) (= 20) M1 for 140 × "20" = 2800 A1 for 3.7(3….) or $3\frac{11}{15}$ or 2800 **and** 3000 C1 ft (dep on M1) for clear statement of 4 bottles with working shown

Paper 5MB1H 01

PAPER: 5MB2H_01

Question		Working	Answer	Mark	Notes
1			350	3	M1 for finding 30% of 500 (=150) M1 dep for subtraction of discount from 500 A1 cao OR M1 for 1 − 0.3 (= 0.7) M1 dep for 500 × "0.7" A1 cao

Paper: 5MB3H_01

Question		Working	Answer	Mark	Notes
1			226.80	3	M1 for method to find 5% of 54 (= 2.7) or 5% of "54×4" (=10.8) or 105% of 54 (= 56.7) M1 for a complete method to find the total amount A1 for 226.8(0)

Original question 2

The full source mark scheme begins on page 650. Use the original paper code, tier and question number shown above.

11			900	4	M1 for 0.2 × 7000 (=1400) or 1.2 × 7000 (=8400) oe M1 for 7000 + "1400" − 3000 (=5400) oe M1 for "5400" ÷ 6 A1 cao

PAPER: 1MA0_1H

PAPER: 1MA0_1H

Question		Working	Answer	Mark	Notes
16	(a)		correct graph	2	M1 for 5 or 6 or 7 points plotted correctly at the ends of the intervals (overlay) A1 cao for correct graph with points joined by curve or straight line segments [SC: B1 if the shape of the graph is correct and 5 or 6 or 7 of their points are **not** at the ends but are plotted consistently within (10,20) (20,30) (30,40) etc.]
	(b)		No with supporting figures	2	M1 for 0.1 × 200 (=20) **or** 0.9×200 (=180) **or** sight of 180 used on cf axis **or** 200 – 186 (=14) A1 ft for correct decision with 20 and "9" **or** 20 and 14 **or** "age" from reading graph at 180 **OR** M1 for method to find percentage of workers who are over 65, eg $\frac{200-"191"}{200} \times 100$ (=4.5%) **or** method to find percentage of workers who are over 60 (from table), eg $\frac{200-186}{200} \times 100$ (=7%) or $\frac{200-190}{200} \times 100$ (=5%) A1 ft for correct decision with "4.5"% or 7% or 5%

PAPER: 1MA0_1H

Original question 9

The full source mark scheme begins on page 671. Use the original paper code, tier and question number shown above.

4			Shows sales target	3	M1 for 2150 – 1500 (= 650) M1 for "650"/1500 × 100 (= 43.3…) A1 for 43.3(3…)% OR M1 for 0.4 × 1500 (=600) oe M1 for 1500 + "600" (=2100) A1 for 2100 OR M1 for 2150 ÷ 1500 (= 1.433...) M1 for ("1.433..." – 1) × 100 A1 for 43.3(3…)%

PAPER: 5MB3H_01

Original question 8

The full source mark scheme begins on page 689. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
1	(a)		15 | 6 9 16 | 4 5 7 7 8 9 17 | 2 3 6 6 8 9 18 | 0 2 3 8 19 | 0 2 with key	3	B2 for a correct ordered stem and leaf diagram (B1 for fully correct unordered or ordered with one error or omission) B1 (indep) for key (units not required)
	(b)		15	2	M1 for a method to find "3" as a percentage of the total number of men, eg $\frac{"3"}{"20"}\times 100$ oe $\frac{"3"\times 5}{100}$ or ft from their diagram A1 for 15 cao

Original question 4

The full source mark scheme begins on page 703. Use the original paper code, tier and question number shown above.

Original question 10

The full source mark scheme begins on page 703. Use the original paper code, tier and question number shown above.

22			1.25	3	M1 100 – 12 (= 88) or 0.88 or 1.1 ÷ 88 (= 0.0125) M1 for complete method, eg 1.1 ÷ 0.88 A1 cao (SC B2 for 1250 as answer)

Question	Working	Answer	Mark	Notes
5		32.35	3	M1 for $109 \times \frac{15}{100}$ (=16.35) or 0.85 oe M1 (dep M1) for 109 – "16.35" or $109 \times \frac{85}{100}$ (=92.65) or 125 – "92.65" A1 cao

13	F 90 126 144 120 60 54	345	5	M1 for use of F = FD × Int width A1 for any 3 Fs correct M1 for $\frac{60}{100}\times(90+126+144+120)$ $(=288)$ or $\frac{60}{100}\times 480$ (=288) M1 $\frac{1}{2}\times"(60+54)"(=57)$ or $\frac{1}{2}\times 114$ (=57) A1 cao

Modifications to the mark scheme for Modified Large Print (MLP) papers.

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Measurements of length: ±5 mm

PAPER: 5MB1H_01			
Question		**Modification**	**Notes**
Q2	(a)	2 graphs provided, one for 'sandy soil' and one for 'clay soil'. Sandy soil graph line goes through (10, 25) and (20, 45) Clay soil graph line goes through (15, 20) and (25, 30) Points are moved to fit in with the new graph lines. Parts (b) and (c) have been reversed and relabelled.	B1 description eg Taller trees are older. Accept positive correlation.
Q2	(b)	2 graphs provided, one for 'sandy soil' and one for 'clay soil'. Sandy soil graph line goes through (10, 25) and (20, 45) Clay soil graph line goes through (15, 20) and (25, 30) Points are moved to fit in with the new graph lines. Parts (b) and (c) have been reversed and relabelled.	B1 19 – 21
Q2	(c)	2 graphs provided, one for 'sandy soil' and one for 'clay soil'. Sandy soil graph line goes through (10, 25) and (20, 45) Clay soil graph line goes through (15, 20) and (25, 30) Points are moved to fit in with the new graph lines. Parts (b) and (c) have been reversed and relabelled. 18 years has been changed to 15 years.	M1 for evidence of taking readings at two points from Sandy line, or increase excluding start eg 24÷10, 14÷5 A1 for answer 1.8 to 2.2 within given tolerance and adjusted appropriately.

PAPER: 5MB1H_01			
Question		**Modification**	**Notes**
Q2	(d)	2 graphs provided, one for 'sandy soil' and one for 'clay soil'. Sandy soil graph line goes through (10, 25) and (20, 45) Clay soil graph line goes through (15, 20) and (25, 30) Points are moved to fit in with the new graph lines. Parts (b) and (c) have been reversed and relabelled.	B2 for a complete explanation e.g.Trees grow at approximately twice the rate on sandy soil (B1 for a partial explanation e.g. Trees grow faster on sandy soil)
Q3	(a)	Question for questionnaire moved to the Diagram Book.	B1 e.g. people coming from the market are more likely to have used it.
Q3	(b)	Question for questionnaire moved to the Diagram Book.	B1 e.g. it's a leading question, "cheap" not defined, etc.
Q3	(c)	Question for questionnaire moved to the Diagram Book.	B1 for a suitable question e.g. How far have you travelled to get to the market? B1 for a set of at least 3 exhaustive, non-overlapping boxes with units, with no inequality symbols.
Q6	(a)	Bottom line has been drawn on the stem and leaf diagram.	B2 for a fully correct ordered stem and leaf diagram [B1 for a complete unordered diagram or for an ordered diagram with at most 2 errors] B1 (indep) key
Q6	(b)	Bottom line has been drawn on the stem and leaf diagram.	M1 for 36 ÷ (5 + 4) (=4) A1 cao

PAPER: 5MB1H_01			
Question		**Modification**	**Notes**
Q7	(a)	Frequency column on the table has been extended to allow room for working.	B1 cao
Q7	(b)	Frequency column on the table has been extended to allow room for working.	M1 for Σ(number of books × frequency) (=60) M1 for "60" ÷ "25" A1 cao SC B2 for an answer of 2.48
Q7	(c)	Frequency column on the table has been extended to allow room for working.	M1 for 15 × 4.4 (=66) M1 for a complete method eg ("60" + "66") ÷ (15 + "25") A1 cao

8	1.15 × 2000 (=2300) 1.10 × 2300	2530	3	M1 for a correct method to find the amount at the end of the first year M1(dep) for a correct method to find the amount at the end of the second year A1 cao

Question	Working	Answer	Mark	Notes
15		0.84	3	M2 for 2×0.75^3 (M1 for 2×0.75 (=1.5) or 2×0.25 (=0.5) and 2 – "0.5") A1 for $0.84 - 0.844$

1MA0 1H November 2015

Question		Working	Answer	Mark	Notes
1			69	4	M1 for finding 15% of £720 (=108) M1 (dep) for finding total of £720 plus interest (or 115% etc) (=828) M1 (dep on previous M1) dividing by 12 A1 cao OR M1 finding 720 ÷ 12 (=60) M1 (dep) finding 15% of "60" (=9) M1 (dep on previous M1) for adding, e.g. 60 + 9 A1 cao

1MA0 1H November 2015

Question		Working	Answer	Mark	Notes
15	(a)		19, 36, 51, 63, 73, 80	1	B1 cao
	(b)		cf graph	2	M1 for at least 5 of the 6 points plotted at each upper end of the interval (not joined) or 5 of the 6 points plotted consistently within interval (not upper end) and joined (dep on a cf table with no more than one arithmetic error) A1 correct graph
	*(c)		comparable value and conclusion	3	M1 for indication of a reading taken from a cf graph using weight = 3.4 kg or find UQ from 60 A1 for value given between 55 & 57 or 3.6 & 3.8 C1 (dep on at least M1) for conclusion (justified)

Question		Working	Answer	Mark	Notes
5		0.65×80 = 52 $\frac{5}{8}$×80 = 50 52 - 50 Or $\frac{5}{8}$=0.625 0.65 − 0.625=0.025 0.025×80	2	4	M1 for method to calculate the time Celina sings M1 for method to calculate the time Zoe sings M1(dep on at least M1) for finding the difference between two times A1 cao Or M1 for a conversion to a common representation M1 (dep on M1) for finding the difference in their chosen representation M1 for using their proportional difference multiplied by 80 A1 cao

14	(a)		76	3	M1 for 89% = 68 M1 for 68 ÷ 0.89 oe A1 for 76 – 76.41
	(b)		11.8	2	M1 for (68 − 60) ÷ 68 × 100 oe A1for 11.7 - 12

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*15	(a)			1	C1 for a complete reason eg Angles in a semicircle are 90°, alternate segment theorem
	(b)		2.75	4	M1 for $7 \times \sin 35$ M1 for $7 \times \sin 35 \times 2$ M1 (indep) for "*DB*"$\times \cos 70$ A1 2.74 - 2.75

Original question 4

The full source mark scheme begins on page 727. Use the original paper code, tier and question number shown above.

Original question 13

The full source mark scheme begins on page 741. Use the original paper code, tier and question number shown above.

Original question 3

The full source mark scheme begins on page 754. Use the original paper code, tier and question number shown above.

13		36	3	M1 for correct method to work out 20% of 30% (=6%) M1 for 30% + "6%" A1cao OR M1 for complete and correct method to find amount of money spent on rent eg 800 × 0.3 (=240) oe M1 for correct method to find rent next month (288) eg "240" × 1.2 (=288) oe or $\frac{"288"}{800} \times 100$ oe or 30 × 1.2 A1 cao

PAPER: 1MA0_1H

6	(a)		20.3	2	M1 for $\frac{50}{1.57^2}$ oe A1 for answer in range 20.2 to 20.3
	(b)		68.04	2	M1 for (m =) $1.8^2 \times 21$ oe A1 for 68.04
	(c)		2.61	3	M2 for a complete method to find 145% of 1.8, eg. $\frac{145}{100} \times 1.80$ oe (M1 for a method to find 45% of 1.8, eg. $\frac{45}{100} \times 1.80$ (= 0.81) or for a multiplication factor of 1.45) A1 cao

PAPER: 1MA0_2H

Question		Working	Answer	Mark	
1			132	3	M1 for 0.15 × 520 (=78) or 0.15 × 360 (=54) or for 520 + 360 (=880) M1 (dep) for "78" + "54" or for 0.15 × "880" A1 cao

Original question 7

The full source mark scheme begins on page 768. Use the original paper code, tier and question number shown above.

Original question 14

The full source mark scheme begins on page 768. Use the original paper code, tier and question number shown above.

Original question 8

The full source mark scheme begins on page 787. Use the original paper code, tier and question number shown above.

Question	Working	Answer	Mark	Notes
13 (a)		5, 30, 60, 75, 80	1	B1 for correct cumulative frequencies (may be implied by correct heights on the grid)
(b)		cf graph	2	M1 for at least 4 of the 5 points plotted correctly at the ends of the intervals or 4 of the 5 points plotted not at the ends but consistently within each interval and joined (dep on a cf table with no more than one arithmetic error) A1 for a fully correct cf graph (points may be joined by a curve or straight line segments)
(c)	IQR = UQ – LQ	26-28	2	M1 for reading values from their cf graph at cf = 20 or 20.25 **and** cf = 60 or 60.75 A1ft provided M1 is awarded in (b)
(d)		55-59	3	M1 for reading a value from their cf graph at weight 150 grams M1 for $\frac{"45"}{"80"} \times 100$ A1ft provided M1 is awarded in (b)

Original question 6

The full source mark scheme begins on page 807. Use the original paper code, tier and question number shown above.

3		74	4	M1 for $200 - \frac{10}{100} \times 200$ (=180) M1 for "180" ÷ (1 + 2 + 7) (= 18) M1 for "18" × (1 + 2) + 20 A1 cao OR M1 for $200 - \frac{1}{10} \times 200$ (=180) M1 for $\frac{7}{10} \times 180$ (=126) M1 for 200 – "126" + 20 A1 cao	E

PAPER: 5MB3H_01

Question	Working	Answer	Mark	Notes
1		67200	2	M1 for 0.12 × 60000 (= 7200) oe A1 cao

Original question 9

The full source mark scheme begins on page 818. Use the original paper code, tier and question number shown above.

Original question 2

The full source mark scheme begins on page 831. Use the original paper code, tier and question number shown above.

2		555	3	M1 for recognising that 1295 is 70% eg 70% = 1295 M1 for 10% = 1295 ÷ 7 (=185) or 1% = 1295 ÷ 70 (=18.5) or $1295 \times \frac{3}{7}$ oe or (1295 – 185) ÷ 2 or $1295 \times \frac{10}{7}$ oe (=1850) A1 cao

6		23	3	M1 for method to find difference in cost, eg $23\times24 - 425$ (= 127) or for $425 \div (23\times24)$ (= 0.7699...) or $24 - (425 \div 23)$ (=5.52…) M1 for $\frac{"127"}{"552"} \times 100$ oe or or $100 - "0.7699" \times 100$ or $\frac{"5.52"}{24} \times 100$ A1for answer in range 23 – 23.01

9		500	M1 A1	recognition of 1.2 or 120% oe eg 600 ÷ 1.2 oe or $x \times 1.2 = 600$ oe or 120%=600 cao

Question	Working	Answer	Mark	Notes
2		Yes	P1	for process to work out the total number of children, e.g. 117 × 4 (= 468)
		(supported)	P1	(dep P1) for process to work out total number of adults or the total number of people, e.g. "468" × 5 ÷ 2 (= 1170) or "468" × 7÷ 2 (= 1638)
			A1	for 1170 or 1638
			P1	for process to work out the percentage of theatre full, e.g. $\frac{"468"+"1170"}{2600} \times 100$ (= 63) or for a process to work out 60% of 2600 (= 1560)
			C1	for a correct conclusion supported by correct figures e.g. 63% or 1560 **and** 1638
				OR
			P1	for a process to work out 60% of 2600, eg. $\frac{60}{100} \times 2600$ (= 1560)
			P1	(dep P1) for process to work out this total number of children, e.g. "1560" × 2 ÷ 7 (= 445(.7…))
			A1	for 445(.7…)
			P1	for process to work out children in the circle, eg. "445(.7…)" ÷ 4 (= 111 to 112)
			C1	for a correct conclusion supported by correct figures e.g. 111 to 112 [Where appropriate accept rounded or truncated values]

Paper: 1MA1/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
2 cont.				OR
			P1	for a process to find the maximum number of children, eg. 2600 × 2 ÷ 7 (= 742(.8…))
			P1	for process to work out the total number of children, e.g. 117 × 4 (= 468)
			A1	for 468 and 742(.8…)
			P1	for $\frac{"468"}{"742(.8..)"} \times 100$ (= 63) or process to work out 60% of "742(.8...)" (= 445(.7…))
			C1	for a correct conclusion supported by correct figures e.g. 63% or 468 and 445(.7…) [Where appropriate accept rounded or truncated values]

13		7	P1 P1 A1	for correct process to find any frequency, eg. “1.1” × 10 (= 11) or “2.8” × 10 (= 28) or “2.3” × 20 (= 46) or “1.4” × 20 (= 28) or “1.4” × 10 (= 14) or “0.7” × 30 (= 21) or for a correct process to find the total area and an area of any block, eg. using 1 cm^2 = 1 unit of area to get 53.6 and one of 4.4, 11.2, 18.4, 11.2, 5.6, 8.4 (dep P1) for complete process to find 20% of (“1.4” × 10 + “0.7” × 30), eg. $\frac{20}{100} \times "35"$ or $\frac{"5.6"+"8.4"}{"53.6"} \times 134 \times \frac{20}{100}$ cao

Question	Working	Answer	Mark	Notes
17		66.5	B1	for recognising an angle of 60 at *AOB*
			P1	for a process to find the area of the sector, e.g. $\frac{"60"}{360} \times \pi \times 11^2$ (= 63.3.. or $\frac{121\pi}{6}$)
			P1	for a process to find the area of the triangle, e.g. $\frac{1}{2} \times 7^2 \times \sin "60"$ (=21.2.. or $\frac{49\sqrt{3}}{4}$)
			P1	for a process to find the required percentage, eg. $\frac{"63.3.."-"21.2.."}{"63.3.."} \times 100$
			A1	for answer in the range 66.5 to 66.6

Question	Working	Answer	Mark	Notes
4		68	P1	for a process to find the number of vanilla cakes, eg 420 × 2 ÷ 7 oe (= 120)
			P1	for a process to find the number of banana cakes, eg 420 × 0.35 oe (= 147)
			P1	(dep P1) for a full process to find the number of lemon/chocolate cakes eg 420 – (vanilla cakes) – (banana cakes) (= 153)
			P1	(dep on previous P1) for a process to find the number of lemon cakes eg "153" ÷ 9 × 4 oe (= 68)
			A1	cao
				OR
			P1	for writing two proportions in the same format
			P1	for combining the proportions of vanilla and banana cakes eg 2/7 + 7/20 (= 89/140)
			P1	(dep P1) for a full process to find the proportion or number of lemon/chocolate cakes eg 1 – "89/140" (= 51/140)
			P1	(dep on previous P1) for a process to find the number of lemon cakes eg "51/140" × 420 ÷ 9 × 4 (= 68)
			A1	cao

2	£6 − £5.64 = 36p or 50p – 47p = 3p	6.4	P1	for a strategy to compare the same number of bottles e.g. £5.64 ÷ 12 (= 47 or 0.47) or 12 × 50p (= 6 or 600) or 36 or 0.36 or 3 or 0.03
			P1	for start of process to find percentage profit e.g. $\frac{"36"}{564}$ or $\frac{"3"}{"47"}$ or $\frac{"6"}{5.64}$ or $\frac{50}{"47"}$ oe with consistent units
	6.3829787…%		A1	for answer in the range 6.3 to 6.4

Paper: 1MA1/2H

18		0.98	B1	cao

Paper: 1MA1/2H

9	(a)		5	M1	evaluates $(0.85)^n$ or $12\,500 \times (0.85)^n$ for at least one value of n
				A1	cao
	(b)		2.4	P1	for a process to find the amount of interest before tax, eg $79.20 \div 0.6$ (= 132)
				P1	for a process to find value of R, eg "132"÷5500×100
				A1	cao

Question	Working	Answer	Mark	Notes
11 (a)		57	B1	cao
(b)		Decision and reason	C1	Jamil might not be correct and reason, eg the maximum weight could be less than 80 or the minimum weight could be less than 40
(c)		Shown	C1	for evidence of reading from the graph at weight 65 (= 48 to 49) or at cf 45 (= 63)
			C1	eg 25% of 60 is 15 but only 11 potatoes have a weight greater than 65g or 25% of potatoes have a weight greater than 63g

Question	Answer	Mark	Mark scheme	Additional guidance
3	30	P1	for full process to find the number of bags sold eg 5 × 1000 ÷ 250 (= 20) **OR** for process to find selling price of 1 kg of sweets eg 0.65 × 4 (= 2.60)	This could be by repeated addition Calculations can be in £ or pence
		P1	for [number of bags] × 0.65 **or** "20" × 0.65 (= 13) **or** "2.60" × 5 (= 13) **OR** for 10 ÷ "20" oe (= 0.50) **OR** for 0.65 × 4 (= 2.60) **and** 10 ÷ 5 (= 2)	[number of bags] can only come from 5 × 10 ÷ 250 (= 0.2) or 5 × 100 ÷ 250 (= 2) or 5 ÷ 250 (= 0.02)
		P1	(dep on previous P1) for a process to find the percentage profit eg ("13" – 10) ÷ 10 × 100 **or** (0.65 – "0.50") ÷ "0.50" × 100 **or** ("2.60" – "2") ÷ "2" × 100 **OR** "13" ÷ 10 ×100 (= 130) oe	3/10 or 0.3 is not enough but should be awarded 2 marks Award P3 for 130(%)
		A1	cao	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
4	3 : 5	P1	for process to find 20% **or** 120% of the cost, eg 8500 × 0.2 (= 1700) oe **or** 8500 × 1.2 (= 10 200) oe	When partitioning all figures quoted must be correct or a full method shown eg 10% = 8500 ÷ 10 (=850) and 20% = "850" + "850" (=1700)
		P1	for process to find total cost of payments, eg 12 × 531.25 (= 6375)	
		P1	for complete process to find value of deposit, eg "10 200" – "6375" (= 3825) **or** 8500 – "6375" (=2125) **and** "2125" + "1700" (=3825) **OR** the deposit as a proportion of the total cost, eg $1 - \frac{"6375"}{"10200"}$ $(=\frac{3}{8})$	May be seen as a fraction of the total eg $\frac{3825}{10200}$ $(=\frac{3}{8})$
		P1	for finding a correct un-simplified ratio, eg "3825" : "6375" oe **or** 5:3 **or** $1.\dot{6} : 1$ **or** $\frac{5}{3} : 1$	Figures at this stage must be expressed as part of a ratio eg 51:85, $\frac{3}{8} : \frac{5}{8}$
		A1	Accept $1 : 1.\dot{6}$, $1 : \frac{5}{3}$	Ignore consistent units

Question	Answer	Mark	Mark scheme	Additional guidance
6	No (supported)	P1	For a process to calculate the initial or new pressure, eg (70 +10) ÷ (20+10) (=2.6 to 2.7) **or** 80 ÷ 30 (=2.6 to 2.7) **or** 70 ÷ 20 (=3.5)	Accept any value in the range 2.6 to 2.7 if unsupported by working
		P1	For a complete process to make a comparison eg. 0.8 × "3.5" (=2.8) **OR** $\frac{("3.5"-"2.6")}{"3.5"} \times 100$ (=22 to 26) **OR** "3.5" × 0.2 (=0.7) **and** 80 ÷ 30 (=2.6 to 2.7) **OR** $\frac{"2.6"}{"3.5"}$ (× 100) (=0.74 to 0.78 **or** 74 to 78)	
		A1	for a correct conclusion supported by accurate figures eg 2.8 **and** 2.6(6…) **OR** decrease is 24% (or 22% to 26%) **OR** 0.7 **and** 2.6 to 2.7 **and** 3.5 **OR** 0.7 **and** 0.9 **OR** 0.76 (or 0.74 to 0.78) **OR** 76% (or 74% to 78%)	Allow truncation or rounding of figures

Original question 9

The full source mark scheme begins on page 857. Use the original paper code, tier and question number shown above.

Question	Answer	Mark	Mark scheme	Additional guidance
11	150 000	P1	for process to find cost in 2007, eg 162 000 ÷ 0.9 (= 180 000) oe	
		P1	for process to find cost in 2003, eg [cost in 2007] ÷ 1.2 (= 150 000) oe	Award 2 marks for 162 000 ÷ 1.08 oe
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
3	No (supported)	P1	for start to process, eg. $2100 \times \frac{40}{100}$ (= 840) **or** 100 – 40 (= 60)	May compare bonus shares of a single salesman or total bonus share for all 7 salesmen.
		P1	for process to find the 7 salesmen's share of bonus, eg 2100 – "840" (= 1260) **or** $2100 \times \frac{"60"}{100}$ (= 1260)	
		P1	for process to find bonus amount each salesman gets eg "1260" ÷ 7 (= 180) **OR** process to find the total bonus for all salesmen if shared equally, eg $\frac{2100}{10} \times 7$ (= 1470)	
		P1	for process to compare what a single salesman gets under each scheme, eg "180" × $\frac{25}{100}$ (= 45) and "$\frac{2100}{10}$" – "180" (= 30) **or** "180" × $\frac{25}{100}$ (= 45) and "180" + "45" (= 225) oe and $\frac{2100}{10}$ (= 210) **or** ("$\frac{2100}{10}$" – "180") ÷ "180" × 100 (= 16.6...) **OR** process to compare what all salesmen gets under each scheme, eg "1260" × $\frac{25}{100}$ (= 315) and "1470" – "1260" (= 210) **or** "1260" × $\frac{25}{100}$ (= 315) and "1260" + "315" (= 1575) oe and "1470" **or** ("1470" – "1260") ÷ "1260" × 100 (= 16.6...)	
		A1	'No' supported by correct figures, eg 45 and 30, 225 and 210, 315 and 210 **or** 1575 and 1470 **or** 16.(6...)(% and 25%)	Do not award unless correct figures have been shown to support a statement made that the salesman was not correct.

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
11	20	P1	for start of process, eg $\frac{125}{100}$ oe or $\frac{100}{125}$ oe or $\frac{25}{125}$	Values of amount of cereal and cost may be used, eg. 100g of cereal costing £10 An acceptable start of a process would then be: 125g of cereal costing £10 using Jack's idea
		P1	for a suitable process to develop a percentage, either 80% or 20% eg. $\frac{100}{125} = \frac{x}{100}$ or $\frac{125-100}{125} = \frac{x}{100}$ **or** $\frac{p}{1.25m} = \frac{xp}{m}$ or $\frac{0.25p}{1.25m} = \frac{xp}{m}$	
		A1	cao	

10	35	P1 P1 A1 P1 A1	use of ratio 2:3 and tin quantities to find overall ratio of litres eg 4:3 or 4 tins : 3 tins **or** 20 litres (Y) & 30 litres (B) calculates total cost of making paint eg $4 \times 26 + 3 \times 48$ (50 litres) **or** 104+144 (=248) calculates comparable cost eg 10 litres (1 tin) green paint made as 49.6 **or** differences (profit) for 1 tin as 17.36 or 5 tins as 86.8 **or** total comparable costs for 50 litres as 334.8 **and** 248, for 25 litres as 167.4 **and** 124 or 1 litres as 33.48 **and** 24.8 for percentage calculation eg $\frac{1736}{4960} \times 100$, $\frac{"334.8" - "248"}{"248"} \times 100$ cao	Could be multiples 4 & 3 (for an amount which is a multiple of 50 litres). "248" is the total cost for making 50 litres "248" ÷ 5 = 49.6 for 10 litre (1 tin) green paint made Profit on 10 litres is 66.96 − 49.60 = 17.36 Profit on 50 litres is 304.8 − 248 = 86.8 334.8 comes from 5 × 66.96 and is the selling price for 50 litres green paint

Paper: 1MA1/2H

2	260 to 260.5	M1 M1 A1	for 883 – 245 (=638) **or** 883 ÷ 245 (=3.60..) **or** 883 ÷ 245 × 100 (=360(.408...)) oe for a complete method to find the percentage increase eg "638" ÷ 245 × 100 (=260(.408..)) **or** 883 ÷ 245 × 100 − 100 (=260(.408..)) oe Accept answers in the range 260 to 260.5	

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
4 (a)	5	M1	"2" ÷ 40 × 100	"2" comes from their reading of the height of the 20 to 24 column
		A1	cao	
(b)	9.5 shown	M1	for frequencies of 11, 8, 13, 6 and 2 (allow one error) **or** for midpoints 2, 7, 12, 17 and 22	May be seen on chart
		M1	for finding at least 4 products *fx* consistently within interval (including end points)	
		M1	for Σ"*fx*" ÷ ("11" + "8" + "13" + "6" + "2") **or** (11×2 + 8×7 + 13×12 + 6×17 + 2×22) ÷ 40 **or** Σ"*fx*" (=380) **and** 9.5 × ("11" + "8" + "13" + "6" + "2") (=380)	Evidence of two different calculations that should lead to 380 are required for this mark
		C1	for correct figures showing the answer or accurate figures to compare from correct working eg 380 from two calculations	

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
12	$\frac{4}{9}$	P1	for process to find link between volume of Q and volume of P **or** between volume of R and volume of Q, eg ratio 1.5 : 1 **or** Q = 1.5P **or** P = $\frac{2}{3}$Q **or** two values in the ratio 1 : 1.5 such as 100 and 150	
		P1	for process to find link between volume of R and volume of P eg 1.5^2 : 1 **or** two values in the ratio 1 : 2.25 such as 100 and 225	$1.5^2 (=\frac{9}{4})$ is enough for this mark, award P1P1
		A1	for $\frac{4}{9}$ oe fraction eg $\frac{100}{225}$	Accept P = $\frac{4}{9}$R

Question	Answer	Mark	Mark scheme	Additional guidance
9 (a)	100 : 81	M1	for a scale factor of 0.9 oe used; **OR** for 10 : 9 oe **OR** 81 : 100 oe **OR** 81%	
		A1	for 100 : 81 oe	eg. 1 : 0.81, accept 1.23(4...) : 1
(b)	6 : 5	P1	for 1.44 oe used as the scale factor **or** 1.2 oe **OR** for 144 : 100 oe or $\sqrt{144} : \sqrt{100}$ oe **OR** 5 : 6 oe	
		A1	for 6 : 5 oe	eg 1.2 : 1, accept 1 : 0.83(3...)

Question	Answer	Mark	Mark scheme	Additional guidance
11 (a)	5, 35, 55, 70, 78, 80	B1	cao	
(b)	cf graph	M1	for 5 or 6 of their points plotted correctly from a cf table	Ignore to the left of the first point and right of the last point
		A1	for a fully correct graph SCB1 if 5 or 6 of their points plotted not at end but consistent within each interval and joined by a curve or line segments providing no gradient is negative	Accept a smooth curve or line segments
(c)	7.5	M1	for a clear method to read off the cf graph at 90	Sight of 74 or 6 implies M1
		M1	for a full method to find the percentage eg (80 − "74") ÷ 80 × 100 (=7.5)	The following readings give the following percentages
		A1	for 7.5 **or** ft cf graph	72 = 10% 73 = 8.75% 74 = 7.5% 75 = 6.25% 76 = 5%

Paper: 1MA1/2H

10	1.8	P1 P1 A1	process to find the amount of interest before tax eg $28.80 \div 20 \times 100$ (= 144) OR for equation which would lead to (x =) 0.018, 1.8 or 1.018 eg $0.2 \times 8000 \times x = 28.8$ or $\frac{8000(100+x)}{100} = 8144$ process to find the interest rate eg $\frac{"144"}{8000}$ (= 0.018) or $\frac{"8144"}{8000}$ (= 1.018) cao	These numerical expressions may be seen multiplied by 100, eg $\frac{144}{8000} \times 100$

Paper: 1MA1/3H

18	Bar of height 3.2	M1 M1 C1	method to find any frequency eg 1.2 × 2.5 (= 3) or 2 × 2.5 (= 5) or 2.8 × 5 (= 14) or 0.8 × 12.5 (= 10) **or** method to use areas eg 12 × 5 (=60) or 20 × 5 (=100) or 28 × 10 (=280) or 8 × 25 (=200) complete method to find total frequency for the four intervals eg "3" + "5" + "14" + "10" (=32) **or** "60" + "100" + "280" + "200" (=640) cao	Accept equivalent methods proportional to those shown

Paper: 1MA1/2H

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
5	20	P1	for process to find SP of 24 chocolate bars, eg. 0.50×24 (= 12) oe **or** for process to find the overall profit eg $(24 \times 0.5) - 10$ (= 2) **or** for process to find CP of one chocolate bar, eg. $1000 \div 24$ (= 41.66…) oe	Working can be carried out in either pounds or pence.
		P1	(dep) for start to a process to find percentage profit, eg. using $\frac{"12"-10}{10}$ **or** $\frac{"12"}{10}$ **or** $\frac{50-"41.66..."}{"41.66..."}$ oe with consistent units	
		A1	cao	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	5,15,35,55,70,80	B1	cao	
(b)	Graph drawn	M1	for 5 or 6 of their points plotted correctly from a cf table	Ignore to the left of the first point and right of the last point
		A1	for a fully correct graph SC B1 if 5 or 6 of their points plotted not at end but consistent within each interval and joined by a curve or line segments providing no gradient is negative	If histograms drawn, points must be identified Accept a smooth curve or line segments
(c)	Correct decision and correct figures	M1	for 60 ÷ 100 × 80 (=48) oe	reading value from graph at wage = 360 (=40) **or** for 35 + $\frac{1}{5}$ × 20 (=39)
		M1	reading value from graph at cf = 48 (=380)	for "40" ÷ 80 × 100 (=50(%)) **or** for 60 ÷ 100 × 80 (=48)
		C1	ft for correct decision and correct figures, eg No with 48 and "380" **or** with "40" and "50"(%) **or** with "40" and 48	ft from a cum freq graph

18	20	P1 P1 A1	for a statement of proportionality eg $x = k\sqrt{y}$ **or** 1.44 oe for using $\sqrt{1.44}$ as multiplier eg $(x_2 =) k\sqrt{1.44y}$ **or** 1.2 oe cao	Must be written in the form of an equation with a constant term, accept $x \propto k\sqrt{y}$

Paper: 1MA1/1H

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
3	No	P1	for 3000 ÷ (2 + 3) (= 600)	
	(supported)	P1	for "600" × 2 (= 1200) **or** "600" × 3 (= 1800) **or** "600" ÷ 6 (= 100) **or** "600" ÷ 20 (= 30)	
		P1	for "1200" ÷ 6 (= 200) **or** "1800" ÷ 20 (= 90) **or** "100" × 2 (= 200) **or** "30" × 3 (= 90)	
		P1	for "90" ÷ ("200" + "90") × 100 (= 31.0...) oe **or** "90" ÷ ("200" + "90") (= 0.31...) **or** 0.3 × ("200" + "90") (= 87)oe	Full method to compare
		C1	correct conclusion **and** fully correct calculations with accurate figure eg No and 87 **or** No and 31% **or** No and 0.31	No working, answer only no marks No may be implied by a statement

Question	Answer	Mark	Mark scheme	Additional guidance
4	Rahim and correct figures	P1	for start to the process to find 20% for Tamara, eg 220000 × 0.2 oe (= 44000) **or** 30% for Rahim, eg 160000 × 0.3 oe (= 48000) **OR** for 1 – 0.2 (= 0.8) **or** 100 – 20 (= 80) **or** 1 + 0.3 (= 1.3) **or** 100 + 30 (= 130)	Build up processes are acceptable but must be complete and correct
		P1	for a complete process to find at least one new value, eg 220000 – “44000” (= 176 000) or 160000 + “48000” (=208 000) **OR** 220000 × “0.8” (=176 000) **or** 160000 × “1.3” (= 208 000)	
		A1	for one correct value, 176 000 **or** 208 000	
		C1	for correct conclusion supported by correct figures eg Rahim, 176 000 and 208 000	Award 0 marks for a correct answer with no supportive working

Question	Answer	Mark	Mark scheme	Additional guidance
9 (a)	138	M1	for upper quartile = 188 **or** lower quartile = 50 **or** an indication that they are trying UQ – LQ	Could be written on the grid
		A1	cao	
(b)	Yes, with reason	C1	Yes, with reason **Acceptable examples** Yes, because the median is at 2 hour (120 min) Yes, since 50% is at the 2 hour mark Yes, because the middle is at 2 hours **Not acceptable examples** No ….. The median is at the 2 hour mark Yes, because 50% is exactly half way between “188” and “50”	
(c)	statement	C1	**Acceptable examples** The median is lower on Tuesday (higher on Monday) The upper quartile is lower on Tuesday (higher on Monday) There may just have been one person waiting for 210 mins We don’t know how many people were waiting for each time **Not acceptable examples** The range is bigger for Tuesday (smaller for Monday) The IQR is smaller for Tuesday (bigger for Monday)	M T Shortest time 20 20 Lower quartile 50 50 Median 120 100 Upper quartile 188 140 Longest time 200 210 Range 180 190 IQR 138 90

Paper: 1MA1/2H

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
17	30	P1	for process to find one correct frequency, eg. 0.8 × 5 (= 4) or 1.6 × 10 (= 16) or 2.2 × 10 (= 22) or 1.2 × 15 (= 18) **or** to find one correct area eg 5 × 8 (=40) or 10 × 16 (=160) or 10 × 22 (=220) or 15 × 12 (=180)	Accept equivalent methods proportional to those shown.
		P1	for process to find total number of people, eg. “4” + “16” + “22” + “18” (= 60) **or** for process to find total area eg “40” + “160” + “220” + “180” (= 600)	Condone 1 error in reading from the graph for 2nd and 3rd P marks
		P1	for process to find 20% of the total number of people, eg. “60” × 0.2 oe (= 12) **or** for process to find 20% of the total area “600” × 0.2 oe (=120)	
		A1	cao	NB: correct answer without supportive working gets 0 marks

20	0.748	P1	for a process to find a correct probability product for 2 consecutive days, eg. 0.7 × 0.8 (rain M + T) **or** 0.7 × 0.2 (rain M + no rain T) **or** 0.3 × 0.6 (no rain M + rain on T) **or** 0.3 × 0.4 (no rain M + T)	Throughout accept probabilities given as fractions or percentages Could be for Tuesday and Wednesday also
		P1	for process to find a correct triple probability product for it raining on Wednesday, eg. 0.7 × 0.8 × 0.8 (rain M + T + W) (= 0.448 **or** $\frac{56}{125}$ oe) **or** 0.7 × 0.2 × 0.6 (rain M + no rain T + rain W) (= 0.084 **or** $\frac{21}{250}$ oe) **or** 0.3 × 0.6 × 0.8 (no rain M + rain T + rain W) (= 0.144 **or** $\frac{18}{125}$ oe) **or** 0.3 × 0.4 × 0.6 (no rain M + no rain T + rain W) (= 0.072 **or** $\frac{9}{125}$ oe)	
		P1	for complete process, eg. “0.448” + “0.084” + “0.144” + “0.072”	
		A1	oe eg, $\frac{187}{250}$	NB: correct answer without supportive working gets 0 marks

Paper: 1MA1/2H

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
3	30	P1	for $160 \div (3+7)$ (= 16) **or** $\frac{3}{3+7}$ (= $\frac{3}{10}$)	
		P1	for "16" × 3 (= 48) **or** "$\frac{3}{10}$" × 160 (= 48)	
		P1	for a correct step using 48 eg "48" ÷ 8 (= 6) **or** "48" × 25 ÷ 100 (= 12) **or** (indep) for combining $\frac{1}{8}$ and 25%, eg $\frac{1}{8} + \frac{1}{4}$ (= $\frac{3}{8}$) or "0.125" + "0.25" (= 0.375) or "12.5"(%) + 25(%) (= 37.5(%))	
		P1	for a complete process to find the number of petrol cars, eg "48" – "6" – "12" oe **or** (1 – "$\frac{3}{8}$") × "48" oe **or** "$\frac{3}{10}$" × (1 – "$\frac{3}{8}$") × 160 oe	
		A1	cao SC B2 for an answer of 100 if P0 scored	Award no marks for a correct answer with no supportive working

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
4	Chic Decor with correct supporting evidence	P1	for process to find cost of 15 rolls from Chic Decor, eg $\frac{15}{3} \times 36$ (= 180) or for process to find cost of 15 rolls from Style Papers at normal price, eg $\frac{15}{5} \times 70$ (= 210) or for process to find cost of 1 roll from Chic Decor, eg 36 ÷ 3 (= 12) or for process to find cost of 1 roll from Style Papers, eg 70 ÷ 5 (= 14) or for process to find the cost of 5 rolls from Chic Decor, eg $\frac{36}{3} \times 5$ (= 60)	Could compare the costs for any number of rolls
		P1	for any first step in using the discount at Style Papers, eg 0.12 × "210" (= 25.2(0)) or 0.12 × "14" (= 1.68) or 0.12 × 70 (= 8.4(0)) **or** 1 – 0.12 (= 0.88)	
		P1	for full process to find cost from Style Papers, eg. "210" – "25.2" oe (=184.8(0)) or "0.88" × "210" or for "14" – "1.68" oe (= 12.32) or "0.88" × "14" or for 70 – "8.4(0)" oe (= 61.6(0)) or "0.88" × 70	
		C1	for Chic Decor with fully correct figures eg 180 and 184.8(0) or 12 and 12.32 or 60 and 61.6(0)	

Paper: 1MA1/3H

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	$\frac{1}{16}$	M1	for method to find probability of getting a score of 5, eg $\frac{10}{6+8+9+7+10}$ $(=\frac{10}{40})$ oe	
		A1	for $\frac{1}{16}$ oe	Accept any equivalent fraction, decimal form 0.06(25) or 0.063, percentage form 6(.25)% or 6.3% Ignore subsequent incorrect attempts to write the correct answer in a different form.
(b)	15	M1	for method to find the proportion of 1s, eg $\frac{6}{40}$ oe	
		A1	cao	

8	12.5	M1 M1 A1	for $135 - 120$ (= 15) **or** $\frac{135}{120}$ (= 1.125) **or** $\frac{135}{120} \times 100$ (= 112.5) for "15" ÷ 120 × 100 **or** "112.5" – 100 **or** ("1.125" – 1) × 100 cao	

17	42 : 63 : 15 : 20	P1	for a first step to write a relationship between 2 weights, eg A + B : C + D = 3 : 1 or A : B = 2 : 3 or C : D = 3 : 4 or A + B = 3(C + D) or $A = \frac{2}{3}B$ or $C = \frac{3}{4}D$	
		P1	for giving all 3 relationships in the same form eg A + B : C + D = 3 : 1 and A : B = 2 : 3 and C : D = 3 : 4 or A + B = 3(C + D) and $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$	
		P1	for complete process to link all 4 weights, eg $\frac{2}{3}B + B = 3\left(\frac{3}{4}D + D\right)$ and $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$ or A : B : C : D = A : 63 : C : 20 and $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$ or C : D = 3 : 4 and A : B : D = 42 : 63 : 20	
		A1	oe	

Paper: 1MA1/3H

25	14.1	P1 P1 P1 P1 A1	for a process to find the volume of the top eg $92.8 \div 2.9$ (= 32) for finding total mass of P eg $92.8 + 972.8$ (= 1065.6) for finding total volume of P eg $\frac{"1065.6"}{4.7}$ (= 226.7234) (dep P2) for $\frac{"32"}{[\text{total volume}]} \times 100$ for answer in the range 14.1 to 14.2	Values can be truncated or rounded For this mark, [total volume] does not have to come from a correct process but is the value that the student believes is the total volume of the pyramid.

Paper: 1MA1/3H

7	1200	M1 A1	for a fully correct method, eg 240 ÷ 0.2 or 240 × 5 oe cao SC B1 for an answer of 960 or 1440 if M0 scored	

6	168	P1 P1 A1	for a start to the process, eg $\frac{57}{100} \times 800$ (= 456) or 57 ÷ (12 + 7) (= 3) or 800 ÷ (12 + 7) (= 42.1...) **or** [amount] × $\frac{57}{100}$ or [amount] × $\frac{7}{12+7}$ for a complete process to find the weight of glass, eg $\frac{57}{100} \times 800 \times \frac{7}{12+7}$ oe for an answer in the range 167.9 to 168 SCB2 for an answer of 288	May be seen as part of other calculations, eg $\frac{7}{12+7} \times 57$ (= 21) or $\frac{7}{12+7} \times 800$ (= 294.7...) [amount] can be any figure considered as being 57% of 800 or 43% of 800 calculated incorrectly or a figure calculated using a full or partial ratio incorrectly as a first step

Paper: 1MA1/2H

2 (a)	11533	P1	for working with 68%, eg 800 × 0.68 (= 544 people) oe or "16960" × 0.68 oe	Percentage calculation could be done at any stage
		P1	for a correct process, other than that of finding a %, eg "544" × 2 (= 1088) or 10.6 × 2 (= 21.2) or 800 × 2 (= 1600) or "544" × 10.6 (= 5766.4) or 800 × 10.6 (= 8480)	
		P1	for full process to find amount of coffee required eg "1088" × 10.6 or "544" × "21.2" or "5766.4" × 2 (= 11532.8) or for an answer of 11532	
		A1	for answer in the range 11532.5 to 11533	An answer within the range shown in working but incorrectly rounded gets full marks.
(b)	Statement	C1	for a correct statement **Acceptable examples** the amount will be more he will need more coffee it is an underestimate my answer in part (a) means there would not be enough for everyone he will need 12211(.2) needs 678(.4) more **Not acceptable examples** amount will decrease amount of coffee will change	If figures are given as part of the answer they must be correct, but can allow ft.

Paper: 1MA1/3H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
9	56	P1 A1	for 70 × 80 ÷ 100 oe or for the use of 0.7 × 0.8 (= 0.56) oe cao	

8	1100	M1 A1	for a complete method to find the original cost, eg 660 ÷ (100 – 40) × 100 or 660 ÷ 0.6 oe cao	

Paper: 1MA1/1H

2	35	P1 P1 P1 A1	for process to find income and outgoings, eg 7.5(0) × 54 (= 405) **and** 100 + 120 + 80 (= 300) For process to find the profit, eg "405" **–** "300" (= 105) **or** "405" ÷ "300" (= 1.35) **or** "405" ÷ "300" × 100 (= 135) for a full process to find percentage profit, eg ("105" ÷ "300") ×100 **or** ("1.35" – 1) × 100 **or** "135" − 100 cao	

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
7	7.5	P1	for process to find the number of empty jars eg $3 \div 8 \times 400$ oe (= 150)	
		P1	for start of process to deal with ratios eg 3 : 4 and 4 : 8 **or** 3 : 4 : 8 oe	
		P1	for process to find the number of empty small jars eg $\frac{3}{3+4+8} \times$ "150" oe (= 30) **or** 30 : 40 : 80	
		P1	for process to find percentage, eg $\frac{"30"}{400} \times 100$ oe or $\frac{"7.5"}{100}$	
		A1	for 7.5 or $7\frac{1}{2}$ oe **OR**	
		P1	for start of process to deal with ratios eg 3 : 4 and 4 : 8 **or** 3 : 4 : 8 oe	
		P1	for process to find the proportion of the empty jars that are small eg $\frac{3}{3+4+8}$ $(=\frac{1}{5})$	
		P1	for process to find the proportion of Kasim's jars that are empty small jars eg $\frac{3}{8} \times "\frac{1}{5}"$ $(=\frac{3}{40})$	
		P1	for process to find percentage, eg $"\frac{3}{40}" \times 100$ oe or $\frac{"7.5"}{100}$	
		A1	for 7.5 or $7\frac{1}{2}$ oe	

Paper: 1MA1/1H

9	30	B1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
6	Yes, supported by correct figures	P1	for a process to find the number of sweets Tina gives to Andy, eg $14 \div 7 \times 3 \ (=6)$ **or** for a process to work with fractions of the total to find fraction given to Andy, eg $\frac{14}{21} \times \frac{3}{7} \ \left(=\frac{2}{7}\right)$ **or** for dividing a given number (eg 441) in the ratio 1 : 6 : 14 (= 21 : 126 : 294)	May work with an equivalent ratio, eg 21 : 126 : 294 and do $294 \div 7 \times 3 (=126)$ as a first step May work in multiples of *x* for all marks
		P1	for a process to find number for Andy and Tina after first exchange, eg A = 1 + "6" (=7) **and** T = 14 – "6" (=8) **or** for a process to find the number of sweets Tina gives to Luke eg $(14 - "6") \times \frac{12.5}{100} \ (=1)$ **or** for a process to work with fractions of the total to find fraction given to Luke, eg for $\frac{(14 - "6")}{21} \times \frac{12.5}{100}$ **or** process to work out the number of sweets given to Andy **and** Luke for their total, eg "294" ÷ 7 × 3 (= 126) **and** $("294" - "126") \times \frac{12.5}{100}$ (= 21)	
		P1	for a process to find the final amounts or final shares for at least **two** of Andy, Luke and Tina eg two of 1 + "6" (= 7) , 6 + "1" (= 7) , 14 – "6" – "1" (= 7) **or** $\frac{1}{21} + \frac{"2"}{7} \left(=\frac{7}{21}\right), \frac{6}{21} + "\frac{1}{21}" \left(=\frac{7}{21}\right), \frac{14}{21} - "\frac{2}{7}" - "\frac{1}{21}" \left(=\frac{7}{21}\right)$ **or** "21" + "126" (= 147) , "126" + "21" (= 147) , "294" – "126" – "21" (= 147)	
		C1	Yes, supported by full working and accurate figures for Andy, Luke and Tina	Accurate figures with no supportive working scores 0

Paper: 1MA1/2H

9	(a)	Box plot	B3	for a fully correct box plot	Box can be any height. Accept ends that are marked (eg line, cross, dot) or defined by the ends of the whiskers if clear
			(B2	for a box drawn **and** at least **three** correctly plotted values from 8, 25, 34, 42, 74)	For LQ accept value in range 24 to 26
			(B1	for correctly identifying one of LQ (25), Median (34), UQ (42) from the cf graph)	May be implied by one of these values being correctly plotted
	(b)	Yes with supporting evidence	M1	for 30 ÷ 100 × 60 (= 18)	
			M1	for reading from the graph at cf = 60 – "18" (= 40)	
			C1	for correct decision and correct figures	
				Alternative	
			M1	for reading from the graph at mark = 40 (= 42)	
			M1	for (60 – "42") ÷ 60 × 100 (= 30) **or** for 60 – "42" (= 18) **and** 30 ÷ 100 × 60 (= 18)	
			C1	for correct decision and correct figures	

Paper: 1MA1/1H

12	64 : 25	P1	for start of process to find ratio of lengths of **A** to **B**, eg $\sqrt[3]{64}$ (= 4) **or** $\sqrt[3]{125}$ (= 5) **or** 4 : 5	
		P1	for $\sqrt[3]{125} \div 2$ (= 2.5) oe **or** $\left("\sqrt[3]{64}"\right)^2$ (= 16)	
		P1	for process to find ratio of areas of **A** to **C**, eg "4"^{2} : "2.5"^{2} (= 16 : 6.25)	
		A1	for 64 : 25 oe in form a : b where a and b are integers	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
6	Yes (supported)	P1	for start to a process to find a percentage increase, eg $87-76\ (=9)$ **or** $66-65\ (=1)$ **or** $\frac{85}{76}\ (=1.118...)$ **or** $\frac{66}{65}\ (=1.015...)$	Accept use of rounded and truncated figures for all marks
		P1	for process to find a % increase, eg $\frac{"9"}{76}\times 100\ (=11.84...)$ **or** $\frac{"1"}{65}\times 100\ (=1.53...)$ **or** $\frac{85}{76}\times 100-100\ (=11.(84...))$ oe **or** $\frac{66}{65}\times 100-100\ (=1.53...)$ oe	May work in decimals or equivalent proportions throughout
		P1	for processes to find both % increases, eg $\frac{"9"}{76}\times 100\ (=11.84...)$ **and** $\frac{"1"}{65}\times 100\ (=1.53...)$ **or** $\frac{85}{76}\times 100-100\ (=11.84...)$ oe **and** $\frac{66}{65}\times 100-100\ (=1.53...)$ oe	
		C1	for Yes supported by correct figures, eg 11(.842…) ÷ 1.5(38…) = 7.3 to 8 **or** 11(.842...) **and** 1.5(38…) × 7 = 10(.766…) **or** 11(.842…) ÷ 7 = 1.57 to 1.7 **and** 1.5(3…) **or** 0.11(842…) **and** 0.10(766…)	

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
5	45.6	P1	for a process to start to work with the ratio, eg 240 ÷ (3 + 5) (= 30) **or** pens = 3*n* and pencils = 5*n* where *n* is a positive integer	Can work in £ or pence but must be consistent, 90 or 150 imply P1 This mark can be awarded at any stage
		P1	for a complete process to find the number of pens and pencils, eg "30" × 3 (= 90) **and** "30" × 5 (= 150) **OR** for process to find one cost or amount to sell for one item eg [pens] × 9 (= 810) **or** [pens] × 11 (= 990) **or** [pencils] × 6 (= 900) **or** [pencils] × 10 (= 1500) **OR** process to find the profit for one pen or one pencil eg 11 – 9 (= 2) or 10 – 6 (= 4)	[pens] could be "30" × 3 or their number of pens [pencils] could be "30" × 5 or their number of pencils [pens] , [pencils] ≠ 1
		P1	for a process to find the total cost to buy or the total amount to sell for both, eg [pens] × 9 + [pencils] × 6 (=1710) **or** [pens] × 11 + [pencils] × 10 (= 2490) **OR** process to find the profit for one item eg [pens] × 11 – [pens] × 9 (= 180) or [pens] × (11 – 9) (= 180) **or** [pencils] × 10 – [pencils] × 6 (= 600) or [pencils] × (10 – 6) (= 600)	180 or 600 or 780 implies P3 [pens] could be "30" × 3 or their number of pens [pencils] could be "30" × 5 or their number of pencils [pens] , [pencils] ≠ 1
		P1	for a complete process to find the profit as a percentage or a decimal, eg $\frac{[2490]-[1710]}{[1710]}\times 100$ **or** $\frac{[2490]-[1710]}{[1710]}(=0.456...)$ **or** for a process to find the amount to sell as a percentage of the cost eg $\frac{[2490]}{[1710]}\times 100$ $(=145.6...)$	[2490] is their amount to sell for both pens and pencils [1710] is their cost of pens and pencils [2490] – [1710] may be [180] + [600]
		A1	answer in the range 45.6 to 45.62	If an answer is given in the range in working and then rounded incorrectly award full marks. A correct answer with no supportive working gets 0 marks

Paper: 1MA1/3H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
10	55	M1	for a complete method eg 46.75 ÷ 0.85 oe **or** for a correct equation eg $0.85x = 46.75$ oe **or** 55 seen, then used as part of an extended method eg 8.75 or 101.75	
		A1	accept trailing zeros eg 55.00	

Question	Answer	Mark	Mark scheme	Additional guidance
3	60	P1	for process to find SP of 200 oranges or number of bags, eg 200 ÷ 5 (= 40) oe **or** for process to find the overall profit, eg 200 ÷ 5 – 25 (= 15) oe **or** for process to find CP of 1 orange, eg 25 ÷ 200 (= 0.125) oe **or** SP of 1 orange, eg 1 ÷ 5 (= 0.2) oe **or** for process to find CP of 5 oranges, eg 25 ÷ (200 ÷ 5) (= 0.625) oe **or** for process to find number of oranges bought per £, eg 200 ÷ 25 (= 8)	Working can be in either pounds or pence SP = Selling Price CP = Cost Price 1.6 implies P1
		P1	(dep) for start to a process to find percentage profit, eg $\frac{"40"-25}{25}$ (= 0.6) oe **or** $\frac{"15"}{25}$ (= 0.6) oe **or** $\frac{"40"}{25} \times 100$ (= 160) oe **or** $\frac{"0.2"-"0.125"}{"0.125"}$ (= 0.6) oe **or** $\frac{1}{"0.625"} \times 100$ (= 160) oe **or** $\frac{1-"0.625"}{"0.625"}$ (= 0.6) oe **or** $\frac{"8"-5}{5}$ (= 0.6) oe **or** $\frac{"8"}{5} \times 100$ (= 160) oe **or** $\frac{"8" \times "15"}{200}$ (= 0.6) oe	
		A1	cao	

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	No with reason	C1	No with reason **Acceptable examples** It's 10% of the original price, not 10% of 440 He found the percentage of the new amount not the original amount He found 10% of the increased value The original price is £400 100% is £400 / 100% is not £440 / 110% is £440 10% is £40 / 10% is not £44 / 11% is £44 99% is 396 10% of 396 is 39.6(0) 110% of 396 is 435.6(0) He should have divided by 1.1 **Not acceptable examples** No, 440 minus 10% is not 396 100% is not £396 £440 is the price after the increase / The original price is not £440 He has to find 90% of 440 He has to find 110% of 440 It should be £484 Jim is correct / Yes ……..	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
(b)	160	P1	for process to find the number sold in November, eg 180 ÷ 150 × 100 or 180 ÷ 1.5 (= 120) oe or for 0.75 × 1.5 (= 1.125) oe or for 75 × 1.5 (= 112.5) oe	
		P1	for a process to find the number sold in October, eg “120” ÷ 75 × 100 oe eg “120” ÷ 0.75 or 180 ÷ “1.125” oe eg 180 ÷ “112.5” × 100 or [value] ÷ 0.75 oe	[value] can be any value they believe to be the number of bikes sold in November or 180
		A1	cao	

GCSE

Mark Scheme

Mathematics A (1387)

June 2003

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NOTES ON MARKING PRINCIPLES

NOTES ON MARKING PRINCIPLES

1 Three types of mark are available

M marks - awarded for correct working seen or implied.
A marks - conditional accuracy marks which are awarded for accurate working following the award of M marks.
B marks - unconditional accuracy marks (independent of M).

2 Abbreviations

cao - correct answer only.
ft - follow through.
√ - Denotes a "follow through" answer.

SC - special case.
isw - ignore subsequent working.
oe - or equivalent (and appropriate).
NB: a candidate cannot benefit from both isw and ft.

3 If no working shown, then

correct answers normally score full marks
incorrect (even though nearly correct) answers score no marks.

4 Marking instructions

Misread loses A marks (and sometimes B marks) on that part but ft can be allowed on subsequent parts. M marks can still be earned. If in doubt contact your team leader.
If there is a wrong answer in the answer space DO CHECK the working in the body of the script.

- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.
- If there is a wrong answer in the answer space DO CHECK the working in the body of the script.
- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.

5 Style of marking

Answer correct: tick and write part mark in margin NEXT TO BRACKETED MARK.
Answer incorrect: cross, but show M, A or B marks if any earned in body of script and transfer the total of these to the margin next to the bracket mark.
Total for each double page at bottom right page (except for back if used), FINAL TOTAL IN RELEVANT BOX ON FRONT COVER.
Nought in margin for fully incorrect question or page AND FOR NO ATTEMPT.
Where no attempt has been made a line should be put in the answer space and zero in the margin next to the bracketed mark
CHOICE OF METHOD – No marks unless one answer is in answer space – then mark that.
CROSSED OUT WORK - if not replaced this should be marked (if legible).
There must always be a mark next to bracketed mark in the margin/

6 Follow Through Marks

Follow throughs are guided by two principles:

(a) Follow throughs which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous, do not award.

(b) Follow throughs which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Probability

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least two decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

8 Linear Equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

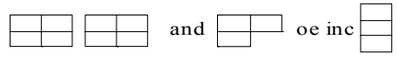
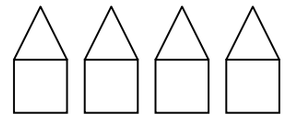
9 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

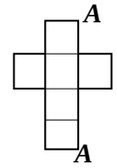
Paper 5501

No	Working	Answer	Mark	Notes
1 (a)		46	1	B1 cao
(b)		3.4	1	B1 oe
(c)		Arrow at 430	1	B1 allow ± half graduation
(d)		Arrow at 3.7	1	B1 allow ± half graduation Accept indications other than arrows as long as they are clear
2		1.60 2.05	2	B1) Condone B1) reversal
3 (a)	$\frac{18}{24}$ or $\frac{9}{12}$ or $\frac{6}{8}$	$\frac{3}{4}$	2	B2 for $\frac{3}{4}$ cao (B1 for $\frac{18}{24}$ or $\frac{9}{12}$ or $\frac{6}{8}$) SC B1 for $\frac{1}{4}$ only
(b)		16 squares shaded	1	B1 cao
4 (a)		line	1	B1 within overlay tolerance
(b)		midpoint	1	B1 within overlay tolerance ft from (a) ± 0.2cm
(c)		rectangle	1	B1 for rectangle 6 cm ± 0.2cm by 4 cm ± 0.2cm
5		kilograms, kg litre, *l* or cubic metres, m^3 inches, in	3	B1 B1 B1
6 (a)		parallel lines marked	1	B1
(b)		right angle marked	1	B1
(c)(i)		acute	1	B1
(ii)		reflex	1	B1

Paper 5501

No	Working	Answer	Mark	Notes
7 (i)		sphere	1	B1
(ii)		cylinder	1	B1 Accept circular prism
(iii)		pyramid	1	B1 Condone omission of "triangular" Accept tetrahedron
8 (a)(i)		40	2	B1 cao
(ii)		50		B1 cao
(b)		5 complete symbols	1	B1 cao
(c)			1	B1
9 (i)		9, 37, 56, 59, 75	5	B1 cao
(ii)		0.067, 0.56, 0.6, 0.605, 0.65		B1 cao Ignore trailing zeros
(iii)		–10, –6, –4, 2, 5		B1 cao
(iv)		$\frac{2}{5}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}$		B2 for all 4 correct (B1 for any 3 in correct order) SC B1 for all 4 in reverse order (applies to(iv) only)
10 (a)			1	B1
(b)		Plotting (4, 24)	1	B1 ft from their matchsticks
(c)		60	1	B1 cao
(d)		$m = 6n$	2	B2 for $m = 6n$ oe (B1 for $6n$ oe or m = multiple of n except $m = n$)
11 (i)		6, 12	4	B1 cao
(ii)		4, 16		B1 cao
(iii)		3, 4, 6 or 3, 4, 6, 12		B1 Condone omission of 12
(iv)		8, 27		B1 cao

Paper 5501

No	Working	Answer	Mark	Notes
12		2.43	4	B1 for 36 or 0.36 B1 for 96 or 0.96 B1 for 125 or 1.25 If none of first 3 B1s awarded then SC B1 for four 24s and five 25s seen OR 4 × 24 and 5 × 25 seen B1 for 2.43 cao
13 (a)(i)		Edinburgh and Plymouth	3	B1 for Edinburgh or −7 B1 for Plymouth or 5
(ii)		12		B1ft from (i) if one positive and one negative
(b)		Cardiff and Belfast London and Plymouth	2	B1 for Cardiff and Belfast OR −6 and −4 B1 for London and Plymouth OR 3 and 5
14		5 9 8	3	B1 cao B1 cao B1 cao
15 (a)			2	✓ × : 2 0 B2; 1 0 B1; 1 1 B1; 2 1 B1
(b)	$2 \times 2 \times 2$	8	2	M1 for $2 \times 2 \times 2$ A1 for 8 cao
16 (a)		30	1	B1 cao
(b)		3	1	B1 cao
(c)	$2 \times 29 = 58$ $5 \times 30 = 150$ $2 \times 31 = 62$ $1 \times 32 = 32$ $\frac{302}{10} = 30.2$	30.2	3	M1 for freq × no pins M1 (dep on 1st M1) for totalling and ÷ 10 A1 for 30.2 cao

Paper 5501

No	Working	Answer	Mark	Notes
17		7 5 5 13 33 52 23	3	B3 all correct (B2 for 4, 5 or 6 correct B1 for 2 or 3 correct)
18 (a)(i) (ii) (iii) (iv) (b)		$4c$ p^4 $8g$ $10pr$ OR $10rp$ $10y - 15$	4 1	B1 oe B1 cao B1 oe B1 B1 cao Accept $10y + - 15$
19		$\frac{2}{3}$	3	M1 for 3 rows (9 squares) shaded M1 for 2 columns (10 squares) shaded A1 for $\frac{2}{3}$
	$\frac{3}{5} = \frac{9}{15}$ $\frac{2}{3} = \frac{10}{15}$	$\frac{2}{3}$	3	M1 for $\frac{3}{5} = \frac{9}{15}$ M1 for $\frac{2}{3} = \frac{10}{15}$ A1 for $\frac{2}{3}$
	$\frac{3}{5} = 0.6$ $\frac{2}{3} = 0.66$ or 0.67 or better	$\frac{2}{3}$	3	M1 for $\frac{3}{5} = 0.6$) Accept M1 for $\frac{2}{3} = 0.66$ or 0.67 or better) percentages A1 for $\frac{2}{3}$

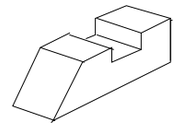
Paper 5501

No	Working	Answer	Mark	Notes
20 (a)	955 × 48 7640 38200 45840 OR 48 × 955 240 2400 43200 45840	458.40	3	M1 for complete correct method (condone one computational error) A2 for 458.40 cao (A1 for digits 4584 OR ft if M1 awarded)
(b)	14. 5 48 | 696. 0 48 216 192 24 0 24 0	14.50	3	M1 for 1 as first digit in answer and remainder 21 M1 (dep) 4 as second digit in answer A1 for 14.50 (Accept 14.5)
21 (a)		$12x$	1	B1 oe
(b)		$12x + 10y$	2	B2 oe ft from (a) (B1 $12x$ + multiple of y or $10y$ seen) SC B1 for $x = 12x + 10y$ OR $y = 12x + 10y$

Paper 5501

No	Working	Answer	Mark	Notes
22	$\frac{1}{3}+\frac{1}{4}=\frac{4}{12}+\frac{3}{12}=\frac{7}{12}$ $1-\frac{7}{12}=\frac{5}{12}$	$\frac{5}{12}$	3	M1 for $\frac{4}{12}$ **and** $\frac{3}{12}$ oe A2 for $\frac{5}{12}$ oe (A1 for $\frac{7}{12}$) B1 for 1–"$\left(\frac{1}{3}+\frac{1}{4}\right)$" correctly evaluated
	$1-\frac{1}{3}=\frac{2}{3}$, $1-\frac{1}{4}=\frac{3}{4}$ $\frac{8}{12}-\frac{3}{12}=\frac{5}{12}$ or $\frac{9}{12}-\frac{4}{12}=\frac{5}{12}$	$\frac{5}{12}$	3	B1 for $\frac{2}{3}$ or $\frac{3}{4}$ seen M1 for $\frac{8}{12}-\frac{3}{12}=\frac{5}{12}$ or $\frac{9}{12}-\frac{4}{12}=\frac{5}{12}$ A1 for $\frac{5}{12}$ oe
		$\frac{5}{12}$	3	M1 for 0.25 and 0.33 or better A1 for 0.58 or better A1 for $0.41\dot{6}$ or recurring
23 (a) (b)(i) (ii)	 180 – (54 + 54)	54 72 Reason	1 3	B1 cao M1 for 180 – (54 + 54) A1 ft from (a) if $x < 90$ B1 for mentioning isosceles and equal or base angles or equal sides and equal or base angles

Paper 5501

No	Working	Answer	Mark	Notes
24 (a)		Bryani	2	M1 for 4×9 or $4 \times 3 \times 3$ or $4 \times x \times x$ or square x first or square 3 first A1 SC 4×3^2 with Bryani scores B2
(b)		64	1	B1 cao
25 (a)		 dotted line may be solid	3	B2 for rectangle base 3 squares and height 4 squares (B1 for rectangle with one correct dimension) B1 for horizontal line 1 cm from top) SC B2 for completely correct elevation on its side
(b)			2	B2 for perspective drawing showing slant face and cutout B1 for perspective drawing with either slant face cutout omitted
26 (a)	20×2 or $\frac{20}{30} \times 60$ or $20 \div \frac{1}{2}$	40	2	M1 for 20×2 or $\frac{20}{30} \times 60$ or $20 \div \frac{1}{2}$ A1 cao
(b)	$\frac{20}{60}$ or $\frac{1}{3}$ or 20 minutes	line from (45, 20) to (65, 0)	2	M1 for $\frac{20}{60}$ or $\frac{1}{3}$ or 20 minutes seen A1 for correct line SC If M0, B1 for line from (45, 20) to (t, 0) where $t > 45$ or B1 for a line of the correct gradient.

Paper 5502

No		Working	Answer	Mark	Notes
1	(a)		$\frac{7}{100}$	1	B1 cao accept 0.07
	(b)		0.18	1	B1 cao
	(c)	20 in 100 oe	40	2	M1 for sight of 20 in 100 or 20 × 2 A1 cao
2	(a)		6cm	2	B1 for 6 ± 0.2 or 60 ± 2 B1 indep for cm or mm consistent with 1st B1
	(b)		At centre	1	B1 within overlay
	(c)		Circle drawn	1	B1 all within overlay
3			See diagram	3	B3 all correct – see separate sheet (B2 for 3 correct B1 for 2 correct)
4	(a)		$\frac{1}{4}$ oe	1	B1 cao
	(b)		0.75	1	B1 cao
	(c)		75%	1	B1 cao
	(d)(i)		9	2	B1 accept answer in range 9 - 9.2
	(ii)		15 - 16		B1 accept answers in range15 - 16
5	(a)		9:30	1	B1 cao
	(b)		2hrs 45 min	2	B2 for 2hr 45 min or 2 $\frac{3}{4}$ hr or 165 minutes B1 2:45 or 2.45 or 165 or 45min + 1hr + 1hr oe
	(c)		17	1	B1 cao
6	(a)	96 × 4	3.84	2	M1 for 96 × 4 or digits 384 A1 cao
	(b)	3 × 96 + 40 = 328	(0).56	2	M1 for 3 × 96 + 40 or digits 328 or digits 56 A1 cao accept 56p

Paper 5502

No	Working	Answer	Mark	Notes
7 (a)		54 000	1	B1 cao accept 54 thousand
(b)		50 000	1	B1 (accept ten thousand or 10 000) oe
8 (a)		14	1	B1 cao
(b)		6	1	B1 cao
(c)		Correct reflection	2	B2 fully correct (B1 correct reflection in a line parallel to the mirror line or condoning 1 block error in shape or position of shape)
9 (a)		Missing horiz label 1 (and 6) missing on vertical scale	2	B1 B1
(b)		Correct graph	2	B1 for bar up to 4 for yellow B1 for bar up to 2 for green
(c)		Blue	1	B1 cao
(d)	3 + 5 + 4 + 2	14	1	B1 ft from (b)
(e)		$\frac{3}{14}$	1	B1 ft on '14'
10	Barry (8) because you double Kath (7) because you add, 1,2,3		2	B1 oe B1 oe SC: B1 for correct rules only
11 (a)		$2n$	1	B1 for $2n$ or $n + n$ OR $2 \times n$ OR $n \times 2$ OR $n2$
(b)		$2n + 15$	1	B1 for "$2n$" + 15 oe
(c)		20q	1	B1 cao
12 (a)	1 + 3 + 5 + 8 + 5	22	2	M1 add frequencies A1 cao
(b)		No, is>no of cups of coffee in the table	1	B1 'average cannot be bigger than 6' oe OR 'Average must be less than 6 oe'
13 (a)		Trapezium	1	B1 cao ignore spelling
(b)		(2, 3)	1	B1 cao
(c)		Isosceles	1	B1 cao ignore spelling
(d)		Q correct	1	B1 cao

Paper 5502

No	Working	Answer	Mark	Notes
14 (a)		250 000	1	B1 cao
(b)	$\frac{28}{4}$	7	2	M1 for $\frac{28}{4}$ oe or "250000" × 28 A1 cao **SC** B1 for 7 000 000
15 (a)		10	1	B1 cao
(b)		5.5	1	B1 ±0.3 pounds
(c)	$\frac{110}{22}$	50	3	M1 for use of graph at 11 or $\frac{110}{22}$ A1 for 5 A1 cao **SC** B2 for 49.5 – 50.6

Paper 5502

No	Working	Answer	Mark	Notes
16 (a)	$269.30 - 56.80 = 212.50$ $\frac{212.50}{42.50}$	6	2	M1 for $\frac{269.30 - 56.80}{42.50}$ or 5 seen A1 cao
(b)	5% of £269.30 £269.30 – "£13.465" OR $\frac{95}{100} \times 269.30$	255.83 or 255.84	3	M1 for $(5 \div 100) \times 269.30$ M1 for $269.30 -$ "13.465" A1 cao OR M2 for $\frac{95}{100} \times 269.30$ A1 cao **Alternative Method:** M1 for $\frac{5}{100} \times 56.80$ $(= 2.84)$ and $\frac{5}{100} \times 42.50$ (=2.12(5)) (OR 53.96 AND 40.38 (40.375) seen M1 for $56.80 -$ "2.84" (= 53.96) $42.50 -$ "2.12(5)" (= 40.375 or 40.38) "5" × "40.375" + "53.96" A1 cao
17	$4.1^2 \times 1.07 = 16.81 \times 1.07$	17.9867	2	M1 for ("4.1") followed by squaring, or sight of 16.81 A1 cao SC: *B1 for 18 or better with no working*
18 (a)		60	1	B1 cao
(b)	$360 - 60 - 90 - 90$	120	2	M1 for $360 -$ " 60 " $- 90 - 90$ or $180 -$ "60" A1 cao
(c)	6×2	12	2	M1 for 6×2 A1 cao for 12

Paper 5502

No	Working	Answer	Mark	Notes
19 (a)(i)	$240 \times 5 = 1200$	1250	3	B1 cao 1250
(ii)	$\frac{50}{'1250'}$	$\frac{1}{25}$		M1 cao $\frac{50}{'1250'}$ A1 for $\frac{1}{25}$ in its simplest form
(b)	$\frac{60}{100} \times 1000 = 600$	12:5	3	M1 for $\frac{60}{100} \times 1000$ oe A1 for 600 A1 cao
20 (a)		$x + 2$	1	B1 accept $2 + x$ but not $x = x + 2$
(b)	$x + 5 + x + 5 + x + 2 + x + 2$	$4x + 14$	2	M1 adding 4 sides, two of which are '$x + 2$' (all sides to be linear expressions in x) **SC** $x + 5 + x + 2 \times 2$ gets M1 A1 for correct simplified answer or $(20 - 14) \div 4$ oe gets M1
(c)	'$4x + 14$' = 20	1.5 oe	2	M1 for equation A1 cao
21	$\sum f = 90$	Angles drawn, labelled	3	M1 for 1 person = 4°or one angle correct in table or pie chart A1 any 2 correctly drawn angles in pie chart A1 fully correct chart labelled
22 (a)		$2p - q$	2	B1 cao for $2p$ B1 cao for $-q$ accept $(-q + 2p)$, $2p - 1q$ and $2p + -q$
(b)	$5x = 3 + 4$	1.4	2	M1 for either (+3 or sight of 7) or (÷ 5 or sight of 0.8 and 0.6) A1 cao accept $\frac{7}{5}$ or $1\frac{2}{5}$

Paper 5502

No	Working	Answer	Mark	Notes
23 (a)		$\frac{4\times5}{2}$	1	B1 cao
(b)	$1+2+3+4+5+6+7+8$	$\frac{8\times9}{2}$	1	B1 cao
(c)	$\frac{100\times101}{2}$	5050	1	B1 cao
24	0 | 5 7 8 8 1 | 0 0 0 0 2 5 5 5 6 2 | 0 0 0 4 5 3 | 3 5 Key 1 | 2 = 12 (min)	See working	3	B1 for stem 0, 1, 2, 3 or 0, 10, 20, 30 B1 for accurate unordered leaves condone 1 error or omission B1 for key and ordered leaves all correct
25	$3.2\times2.8=8.96$ $2\times4.5\times2.8=25.2$ $2\times4.5\times28.8=28.8$ $\frac{62.96}{2.5}\times2.99$	£75.30	5	M1 for area of any face found correctly M1 for 2 areas found correctly A1 for 62.96 or 54 M1 for $\frac{'62.96'}{2.5}\times2.99$ Al cao Alternate method for candidates who round up $\frac{"62.92"}{2.5}$ M1 for "26" × 2.99 A1 for £77.74 cao **SC**: *for top included B2 for 71.92 m^2 seen or* B3 for £86.02 seen **SC** B4 for £64.58 or £65.78 seen
26	$2.5\times10\,000$	25 000	2	M1 for $2.5\times100\times100$ A1 cao

Paper 5503

No	Working	Answer	Mark	Notes
1 (a)(i)		$8g$	2	B1 oe
(ii)		$10rp$		B1 for $10pr$ or $10\ rp$
(b)		$10y - 15$	1	B1 cao accept $10y$ - + 15
(c)	$6x + 8 - 12x + 15$	$-6x + 23$	2	M1 for 3 correct terms out of 4 A1 cao
2		$m = 6n$	2	B2 for $m = 6n$ oe accept $6 \times n$, n 6 (B1 for $6n$ alone, or $6n$ +1 oe OR m = multiple of n except $m = n$)
3 (i)		0.067, 0.56, 0.6, 0.605, 0.65	1	B1 cao Ignore trailing zeros
(ii)		−10, −6, −4, 2, 5	1	B1 cao
(iii)		$\frac{2}{5}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}$	2	B2 all four correct (B1 any three in correct order) SC: B1 all 4 in reverse order
4		7 5 5 13 33 52 23	3	B3 all correct (B2 for 4, 5 or 6 correct entries) (B1 for 2, 3 correct entries)

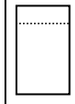
Paper 5503

No	Working	Answer	Mark	Notes
5		$\frac{2}{3}$	3	M1 for 3 rows (9 squares) shaded M1 for 2 columns (10 squares) shaded A1
	OR $\frac{3}{5} = \frac{9}{15}$ $\frac{2}{3} = \frac{10}{15}$ Therefore $\frac{2}{3} > \frac{3}{5}$	$\frac{2}{3}$		M1 for $\frac{3}{5} = \frac{9}{15}$ M1 for $\frac{2}{3} = \frac{10}{15}$ A1
	OR $\frac{3}{5} = 0.6$ or percent $\frac{2}{3} = 0.66$ or 0.67 or better Therefore $\frac{2}{3} > \frac{3}{5}$	$\frac{2}{3}$		M1 for $\frac{3}{5} = 0.6$ or percent M1 for $\frac{2}{3} = 0.66$ or 0.67 or better A1
6	$2 \times 29 = 58$ $5 \times 30 = 150$ $2 \times 31 = 62$ $1 \times 32 = 32$ $\frac{302}{10} = 30.2$	30.2	3	M1 for freq × no. pins (at least 3) M1 for totalling and for ÷ 10 (dep on 1st M1) A1 cao
7 (a)			2	B1 for 180° rotation (wrong centre) B1 cao
(b)			3	B1 for any enlargement sf other than 1 B1 for all sides halved B1 for position

Paper 5503

No	Working	Answer	Mark	Notes
8 (a)		$12x$	1	B1 oe
(b)		$12x + 10y$	2	B2 oe or ft from (a) (B1 for $12x$ + a multiple of y or $10y$ seen) **SC** B1 for $x = 12x + 10y$ or $y = 12x + 10y$
9	$\frac{1}{3}+\frac{1}{4}=\frac{4}{12}+\frac{3}{12}=\frac{7}{12}$ $1-\frac{7}{12}=\frac{5}{12}$ OR $1-\frac{1}{3}=\frac{2}{3}, 1-\frac{1}{4}=\frac{3}{4}$ $\frac{9}{12}-\frac{4}{12}=\frac{5}{12}, \frac{8}{12}-\frac{3}{12}=\frac{5}{12}$	$\frac{5}{12}$	3	M1 for $\frac{4}{12}$ and $\frac{3}{12}$ oe A2 for $\frac{5}{12}$ oe (A1 for getting $\frac{7}{12}$) (B1 for $1 - \frac{"1"}{3} + \frac{1"}{4}$ correctly evaluated) OR B1 for $\frac{2}{3}$ or $\frac{3}{4}$ seen M1 for $\frac{3}{4}-\frac{1}{3}=\frac{9}{12}-\frac{4}{12}$ or $\frac{2}{3}-\frac{1}{4}=\frac{8}{12}-\frac{3}{12}$ A1 for $\frac{5}{12}$ oe OR M1 0.25 and 0.33 or better A1 for 0.58 or better A1 for 0.416 *recurring*
10 (a)		54	1	B1 cao
(b)(i)	180 – (54 +54)	72	3	M1 for 180 – (“54” + “54”) A1 for 72° ft from (a) if $x < 90°$
(ii)				B1 for mentioning isosceles and equal or base angles or equal sides and equal or base angles

Paper 5503

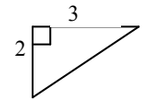
No	Working	Answer	Mark	Notes
11 (a)	Bryani was correct $4 \times 3^2 = 4 \times 9 = 36$	Bryani	2	M1 for 4×9 or $4 \times 3 \times 3$ or "square the three/x then multiply by four" A1 Bryani **SC** 4×3^2 with Bryani gets B2
(b)			1	B1 cao
12 (a)			3	B2 for rectangle height 4 squares, base 3 squares (B1 for rectangle with one correct dimension) B1for line 1 square from the top **SC** B2 for completely correct elevation on its side
(b)			2	B2 for perspective drawing showing slant face and cut out (B1 for perspective drawing with either slant face or cut out omitted or one aspect incorrect)
13 (a)	20×2 or $\frac{20}{30} \times 60$ or $20 \div \frac{1}{2}$	40	2	M1 for 20×2 or $\frac{20}{30} \times 60$ or $20 \div \frac{1}{2}$ A1 cao
(b)	$\frac{20}{60}$ or $\frac{1}{3}$ or 20 minutes seen	Line from (45, 20) to (65, 0)	2	M1 for $\frac{20}{60}$ or $\frac{1}{3}$ or 20 minutes seen A1 for correct line **SC** If M0, B1 for line from (45, 20) to (t, 0) where $t > 45$ or a line of the correct gradient
14 (i)		119.31	3	B1 cao
(ii)		119 310		B1 cao
(iii)		1.23		B1 cao

Paper 5503

No	Working	Answer	Mark	Notes
15	$\frac{10}{100}\times 12000$ 12 000 – 1200 = 10 800 $\frac{10800}{10}=1080$ 10 800 – 1080 = £9720	£9720	3	M1 for $\frac{10}{100}\times 12000$ or sight of 1200 or 2400 or 10 800 or 9600 M1 (dep) for $\frac{10}{100}\times(12\,000-\frac{10}{100}\times 12000)$ or sight of 1080 A1 cao Alternative mark scheme M2 for $12000\times(1-\frac{10}{100})^2$ (M1 for $12000\times(1-\frac{10}{100})$ A1 cao
16 (a)	$2p = 6$	$p = 3$	2	M1 for $7p - 5p = 8 - 2$ or $2p$ or 6 A1 cao
(b)	$7r - 5r = -20 - 2$	-11	2	M1 for $7r + 2 = 5r - 20$ or $\frac{7r}{5}+\frac{2}{5}=r-4$ or $7r - 5r = 20 - 2$ or $\frac{7r}{5}-r=-4-\frac{2}{5}$ A1 cao
17		$5n + 1$	2	B2 oe (B1 for $5n$ seen) NB: n = gets B1 max

Paper 5503

No	Working	Answer	Mark	Notes
18 (a)	–1, 0, 1		2	B2 for –1, 0, 1 (B1 for –1, 0 or 0,1 or –1,1 or –2, -1, 0, 1 only)
(b)	(–1, –1), (0, –1), (1, –1), (0, 0), (1, 0), (1, 1)		3	B3 for 6 points correct B2 for 3 points correct B1 for 1 point correct **NB** –B1 each additional point over six
19 (a)	Triangle with vertices at (0,0) (0,–2) and (3,0)		2	M1 for correct orientation A1 cao
(b)	Rotation, 180°, centre (0,1) Enlargement sf - 1 centre (0,1)		2	B2 for 180° 'rotation' centre (0, 1) B2 for Enlargement sf - 1 centre (0,1) (B1 for any two of the three parts) NB: B0 if additional transformation is included
20	Bisector of $\angle BAC$ Arc around A Region		3	B3 cao (B2 for either two correct boundaries, no shading/ wrong shading or one correct boundary, one incorrect boundary with valid shading) (B1 for either two incorrect boundaries but one drawn from A and one intersection, with valid shading or one correct boundary) Ignore shading outside the triangle
21		Length Volume Area	3	B1 for Length B1 for Volume B1 for Area
22 (a)	Unbiased question with choices		2	B1 for unbiased question B1 for at least 2 choices
(b)			2	Classification 1: A biased question Classification 2: A restricted sample of people Classification 3: Not specifying a range of foods Classification 4: Nothing to do with eating habits B2 reasons which satisfy 2 different classifications (B1 a reason which satisfies one classification)



Paper 5503

No	Working	Answer	Mark	Notes
23 (a)	$6 \times 10^2 \times 8 \times 10^4$ 48×10^6	4.8×10^7	3	M1 for $6 \times 10^a \times 8 \times 10^b$ oe, a and b integers including 0 A1 for 48×10^6 oe A1 cao
(b)	200 000 + 30 000	230000	2	B2 cao (B1 for sight of 200 000 or 30 000 or 2.3×10^5 or 23×10^4)
24 (i)		64	4	B1 cao
(ii)		3		B1 cao
(iii)	$\sqrt{16 \times 9} = \sqrt{144}$	12		B2 cao (B1 for sight of $\sqrt{2^4} \times \sqrt{9}$ or better, or 144 seen)
25 (i)	Tangent 90° to diameter /radius/ line from (through) centre	27°	4	B1 for 27° cao B1 for reason
(ii)	180 –(90+ "27") angle in semicircle (is 90°)/Alternate segments /angle at centre twice at circumference	63°		B1 ft for 90–"27" if not 63° B1 for reason
26 (a)(i)		152	2	B1 cao
(ii)		177		B1 cao
(b)			3	B1 for median marked at 167 B1 ft for postion of box with its ends at "152" and "177" B1 for position of whiskers with ends at 132 and 182 NB: For any points plotted between 141 and 149 give a tolerance of an extra ± 1 square
27	$x^2 + xy + xy + y^2$	$x^2 + 2xy + y^2$	2	M1 for at least 3 of the 4 terms correct A1 cao
		25	2	M1 for recognising 3.47 + 1.53 (= 5) A1 cao

Paper 5504

No	Working	Answer	Mark	Notes
1 (a)	$4.1^2 \times 1.07 = 16.81 \times 1.07$	17.9867	2	M1 for (4.1) followed by squaring, or sight of 16.81 A1 cao SC: B1 for 18 or better with no working
(b)		$(1.6 + 3.8 \times 2.4) \times 4.2$	1	B1 cao Allow additional brackets if they give an expression with value 45.024
2 (a)	269.30 – 56.80 = 212.50	6	2	M1 for $\frac{269.30 - 56.80}{42.50}$ or 5 seen A1 cao
(b)	5% of £269.30 £269.30 – "£13.465" OR $\frac{95}{100} \times 269.30$	255.83 or 255.84	3	M1 for (5 ÷ 100) × 269.30 M1 (dep) for 269.30 – "13.465" A1 cao OR M2 for $\frac{95}{100} \times 269.30$ A1 cao **Alternative Method:** M1 for $\frac{5}{100} \times 56.80$ (= 2.84) and $\frac{5}{100} \times 42.50$ (=2.12(5)) (OR 53.96 AND 40.38 (40.375) seen M1 for 56.80 – "2.84" (= 53.96) 42.50 – "2.12(5)" (= 40.375 or 40.38) "5" × "40.375" + "53.96" A1 cao

Paper 5504

No	Working	Answer	Mark	Notes
3 (a)		60	1	B1 cao
(b)	360 – 60 – 90 – 90	120	2	M1 for 360 – "60" – 90 – 90 or 180 – "60" A1 cao
(c)	6 × 2	12	2	M1 for 6 × 2 A1 cao 12
(d)		Correct drawing	2	B2 for triangle and construction lines (see overlay) (B1 for 1 line of length 4cm and correct arcs crossing OR for correct triangle with either no arcs or incorrect arcs) SC: B1 similar triangle drawn with construction lines
4 a(i)	240 × 5 = 1200	1250	3	B1 cao 1250
(ii)	$\frac{50}{1250}$	$\frac{1}{25}$		M1 $\frac{50}{"1250"}$ A1 oe in its simplest form
(b)	$\frac{60}{100} \times 1000 = 600$ 600: 250	12:5	3	M1 for $\frac{60}{100} \times 1000$ oe A1 for 600 A1 cao
5 (a)		$x + 2$	1	B1
(b)	$x + 5 + x + 5 + x + 2 + x + 2$	$4x + 14$	2	M1 adding 4 sides, two of which must be '$x + 2$' (all sides to be linear expressions in x) A1 for correct simplified answer
(c)	"$4x + 14$" = 20	1.5	2	M1 for equation "$4x + 14$" = 20 OR $\frac{20-14}{4}$ oe A1 cao

Paper 5504

No	Working	Answer	Mark	Notes
6 (a)		$2p - q$	2	B1 cao for $2p$ B1 cao for $-q$ accept $-q + 2p$ and $2p - 1q$
(b)	$5x = 3 + 4$	1.4	2	M1 for either (+3 or sight of 7) or (÷ 5 or sight of 0.8 and 0.6) A1 cao accept $\frac{7}{5}$ or $1\frac{2}{5}$
7 (a)		$\frac{4\times5}{2}$	1	B1 cao
(b)	$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8$	$\frac{8\times9}{2}$	1	B1 cao
(c)	$\frac{100\times101}{2}$	5050	1	B1 cao
(d)		$\frac{n(n+1)}{2}$	2	B2 cao (B1 for any quadratic in n)
8	$3.2 \times 2.8 = 8.96$ $2 \times 4.5 \times 2.8 = 25.2$ $2 \times 4.5 \times 3.2 = 28.8$ $\frac{62.96}{2.5} \times 2.99$	75.30	5	M1 for area of any face found correctly M1 for 2 areas seen A1 for 62.96 or 54 M1 for $\frac{'62.96'}{2.5} \times 2.99$ A1 cao Alternate method for candidates who round up $\frac{"62.96"}{2.5}$ M1 for "26" x 2.99 A1 for £77.74 cao SC: for top included B2 for 71.92 m^2 seen or B3 for £86.02 or £86.71 SC: B4 for £64.58 or £65.78 seen

Paper 5504

No	Working	Answer	Mark	Notes
9	2.5 × 10000	25000	2	M1 for 2.5 × 10000 or 2.5.× 100 ×100 A1 cao
10 (a)	∑f = 90 (88), 144, 32, 96	Angles drawn, labelled	3	M1 for 1 person = 4°or one angle correct in table or pie chart A1 any 2 angles correctly drawn in pie chart A1 fully correct chart labelled
(b)	0.38 + 0.27 + 0.15	0.20	2	M1 1 – sum A1 cao
11	0 | 5 7 8 8 1 | 0 0 0 0 2 5 5 5 6 2 | 0 0 0 4 5 3 | 3 5 Key 1 | 3 = 13 (min)	See working column	3	B1 for stem 0, 1, 2, 3 or 0, 10, 20, 30 B1 for accurate unordered leaves condone 1 error or omission B1 for key and ordered leaves all correct
12 (a)	$V = \pi \times 4^2 \times 10$	502 – 503	2	M1 for $\pi \times 4^2 \times 10$ A1 502 – 503
(b)	$P^2 = 10^2 + 8^2$ $P = \sqrt{164}$	$\sqrt{164} < 13$	3	M1 for sight of a correct right-angled triangle M1 for $10^2 + 8^2$ A1 for conclusion based on a correct calculation or 12.8 seen
13 (a)	2 × 30	2 × 2 × 3 × 5	4	M1 for systematic method, eg division, factor trees (at least one prime) A1 cao
	2 × 48	$2^5 \times 3$		M1 for systematic method, eg division, factor trees (at least one prime) A1 cao
(b)		12	1	B1 cao
(c)	$2^5 \times 3 \times 5$	480	2	B2 cao B1 for $2^5 \times 3 \times 5$ or any correct common multiple

Paper 5504

No	Working	Answer	Mark	Notes
14 (a)		$150 < C \leq 200$	2	M1 use of cum freq to find the cost of the 20th or 20.5^{th} car OR $\frac{1}{2}\Sigma f$ or $\frac{1}{2}(\Sigma f + 1)$ A1 eg 150 to 200
(b)		No, because the 21st value is in the same interval	1	B1 20.5^{th} or 21st in same interval or an alternative correct explanation
(c)	80% = 5200 $\frac{5200}{80} \times 100$	6500	3	M1 for (100 – 20) % = 5200 M1 for $\frac{5200}{"80"} \times 100$ A1 cao
15 (a)	$x^2(x + 1) = 230$	AG	2	M1 for $x \times x \times (x+1)$ or $x \times x \times x + 1$ oe A1 cao from $x \times x \times (x+1)$
(b)	'5 – 150 5.1 – 158.7 5.2 – 167.6 5.3 – 177.0 5.4 – 186.6 5.5 – 196.6 5.6 – 207.0 5.7 – 217.7 5.8 – 228.8 5.9 –240.2 5.85 – 234.4	5.8	4	B 2 for trial between 5.8 and 5.9 inclusive (B1 for different trial between 5 and 6 inclusive) B1 for different trial between 5.8 and 5.85 (not including 5.8) B1 (dep on at least one previous B1) cao for 5.8, 5.81, 5.811

Paper 5504

No	Working	Answer	Mark	Notes
16	$\pi \times \left(\frac{15}{2}\right)^2 = 176.715$	88.4cm^2	3	M1 for $\pi \times \left(\frac{15}{2}\right)^2$ A1 88.3 – 88.4 B1(ind) for cm²
17 (a)	$5 = 0.5x + 1$	8	2	M1 for $5 = 0.5x + 1$ A1 cao
(b)		$y = \frac{1}{2}x + c$	1	B1 $y = \frac{1}{2}x + c$, c ≠ 1, oe
(c)		$x = 2y - 2$ OR $x = 2(y - 1)$	2	M1 for correctly multiplying both sides by 2 or correctly isolating $\frac{x}{2}$ A1 for $x = 2(y - 1)$, $x = \frac{y-1}{0.5}$, $x = \frac{y-1}{\frac{1}{2}}$ oe SC: B1 for $x = 2y - 1$
18	$4x - 6y = 22$ $15x + 6y = 54$ $19x = 76$	$x = 4,\ y = -1$	4	M1 for coefficients of x or y the same followed by correct operation , one arithmetical error A1 cao M1(dep on previous M mark) for sub for other variable A1 cao Trial and improvement –0 unless both x and y correct values found

Paper 5504

No	Working	Answer	Mark	Notes
19 (a)	$SF = \frac{10}{6}$ $\frac{10}{6} \times 4.8 = 8$	8	2	M1 for sight of $\frac{10}{6}$ or $\frac{6}{10}$ or 1.67 or better or $\frac{CD}{10} = \frac{4.8}{6}$ A1 cao
(b)	$\frac{10}{6} \times 4.5 - 4.5 = 3$	19.8	2	M1 for use of SF from (a) to find *BC* or *AC* and adding 4 sides A1 cao
20	$\frac{6 \times 10^{15}}{3.2 \times 10^{8}}$ 1.875×10^{7}	4.3×10^{3}	3	B3 for 4.3×10^{3} to 4.34×10^{3} (B2 for 1.875×10^{7} oe or 4300 to 4340 or final answer of 1.9×10^{7}) (B1 for sight of 6×10^{15} oe or 3.2×10^{8} oe)
21	$8.5 \times \tan 38 = 8.5 \times 0.7813$	6.64	3	M1 for correct use of trig, eg $\tan 38 = \frac{opp}{8.5}$ M1 for 8.5 × tan38 A1 6.64 – 6.641

Paper 5504

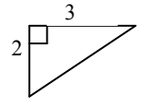
No	Working	Answer	Mark	Notes
22 (a)		No, as you would expect about 100. Yes, as it is possible to get 200 sixes with a fair dice	1	B1 for a consistent answer
(b)	$\frac{1}{6}, \frac{5}{6}$ + labels		3	B1 for $\frac{5}{6}$ on the red dice, *not six* branch B1 for a fully complete tree diagram with all branches labelled B1 for $\frac{1}{6}$, $\frac{5}{6}$ on all remaining branches as appropriate

Paper 5505

No	Working	Answer	Mark	Notes
1 (i) (ii) (iii)		119.31 119310 1.23	3	B1 cao B1 cao B1 cao
2	$\frac{10}{100}\times 12000 = 1200$ 12 000 – 1200 = 10 800 10 800 ÷ 10 =1080 10 800 – 1080 = £9720	9720	3	M1 for $\frac{10}{100}\times 12\,000$ or sight of 1200 or 2400 or 10 800 or 9600 M1 (dep) for $\frac{10}{100}\times(12\,000 - \frac{10}{100}\times 12\,000)$ or sight of 1080 A1 cao Alternative markscheme M2 for $12000\times\left(1-\frac{10}{100}\right)^2$ (M1 for $12000\times\left(1-\frac{10}{100}\right)$) A1 cao
3	$7r - 5r = -20 - 2$	–11	2	M1 for $7r + 2 = 5r - 20$ or $\frac{7r}{5} + \frac{2}{5} = r - 4$ or $7r - 5r = -20 - 2$ or $\frac{7r}{5} - r = -4 - \frac{2}{5}$ A1 cao

Paper 5505

No	Working	Answer	Mark	Notes
4 (a)		–1, 0, 1	2	B2 for –1, 0, 1 only (B1 for –1, 0 or 0,1 or –1, 1 or –2, -1, 0, 1 only)
(b)		(–1,–1)(0,–1) (1,–1) (0, 0) (1, 0) (1, 1)	3	B3 for 6 points correct (B2 for 3 points correct) (B1 for 1 point correct) *NB: –B1 for each additional point over six*
5		$5n + 1$	2	B2 oe (B1 for $5n$ seen) NB: n = gets B1 max
6 (a)	Triangle with vertices at (0,0) (0,–2) and (3,0)		2	M1 for correct orientation A1 cao
(b)	Rotation, 180°, centre (0,1) Enlargement sf –1 centre (0,1)		2	B2 for 180° 'rotation' centre (0, 1) or for Enlargement sf - 1 centre (0,1) (B1 for any two of the three parts) NB: B0 if additional transformation is included
7	Bisector of $\angle BAC$ Arc around A Region	See overlay	3	B3 cao (B2 for either two correct boundaries, no shading/ wrong shading or one correct boundary, one incorrect boundary with valid shading) (B1 for either two incorrect boundaries but one drawn from A and one intersection, with valid shading or one correct boundary) Ignore shading outside the triangle
8		Length Volume Area	3	B1 for Length B1 for Volume B1 for Area



Paper 5505

No		Working	Answer	Mark	Notes
9	(a)	Unbiased question with choices		2	B1 for unbiased question B1 for at least 2 choices
	(b)	Leading question and a restricted sample		2	Classification 1: A biased question Classification 2: A restricted sample of people Classification 3: Not specifying a range of foods Classification 4: Nothing to do with eating habits B2 reasons which satisfy 2 different classifications (B1 a reason which satisfies one classification)
10	(a)	$6 \times 10^2 \times 8 \times 10^4$ $48 \times 10^6 = 4.8 \times 10^7$	4.8×10^7	3	M1 for $6 \times 10^a \times 8 \times 10^b$ oe, a and b integers including 0 A1 for 48×10^6 oe A1 cao
	(b)	200 000 + 30 000 = 230 000	230 000	2	B2 cao (B1 for sight of 200 000 or 30 000 or 2.3×10^5 or 23×10^4)
11	(a)	$x^2 + xy + xy + y^2$	$x^2 + 2xy + y^2$	2	M1 for at least 3 of the 4 terms correct A1 cao
	(b)		25	2	M1 for recognising 3.47 + 1.53 (= 5) A1 cao
12	(i)	Tangent 90° to diameter /radius/ line from (through) centre	27°	4	B1 for 27° cao B1 for reason
	(ii)	180 –(90+ "27") angle in semicircle (is 90°)/Alternate segments /angle at centre twice at circumference	63°		B1 ft for 90–"27" if not 63° B1 for reason
13	(i)		p^9	1	B1 cao
	(ii)		$6q^6$	2	B2 for $6q^6$ (B1 for sight of $\frac{6q^9}{q^3}$ or $3q \times 2q^5$ or $3q^4 \times 2q^2$ or $6 \times q \times q \times q \times q \times q \times q$ or final answer of the form kq^6, $k > 0$)

Paper 5505

No	Working	Answer	Mark	Notes
14 (a)(i)		152	2	B1 cao
(ii)		177		B1 cao
(b)			3	B1 for median marked at 167 B1 ft for postion of box with its ends at "152" and "177" B1 for position of whiskers with ends at 132 and 182 NB: For any points plotted between 141 and 149 give a tolerance of an extra ± 1 square
15	(arc =) $\frac{40}{360} \times 2\pi \times 9$ $= 2\pi$	$2\pi + 18$	4	M1 for $\frac{40}{360} \times$ M1 for $2\pi \times 9$ M1 (dep) for $\frac{40}{360} \times 2\pi \times 9$ oe A1 for $\frac{18 \times \pi}{9} + 18$ oe exact form
16 (i)		1	1	B1 cao
(ii)		$\frac{1}{16}$	1	B1 cao accept 0.0625
(iii)		64	1	B1 cao condone ± 64

Paper 5505

No	Working	Answer	Mark	Notes
17 (a)	$F \propto 1/x^2$ $F = k/x^2$ $4 = k / 3^2$ $F = 36/x^2$	$F = \frac{36}{x^2}$	3	M1 for $F = k/x^2$ seen or implied. ($k \neq 1$) M1 (dep) for subst. or sight of $k = 36$ A1 for $F = 36/x^2$
(b)		9	1	B1 ft for 9 (ft on $F = kx^n$, $n \neq 0$)
(c)	$64 = \frac{36}{x^2}$ $x^2 = \frac{36}{64}$ $x = \pm\frac{3}{4}$	$\frac{6}{8}$	2	M1 for $x^2 = \frac{"36"}{64}$ A1 for $\frac{6}{8}$ oe (condone $\pm$) *SC: Use of $F = kx^2$ max M1 M1 A0 B1 ft M0 A0* *SC: Use of* $F = \frac{k}{\sqrt{x}}$ *max M1 M1 A0 B0 M1* ($\sqrt{x} = \frac{4\sqrt{3}}{64}$) *A0*
18	$(5+\sqrt{3})(5-\sqrt{3}) = 5\times5 - 5\sqrt{3} + 5\sqrt{3} - \sqrt{3}\sqrt{3}$ $= 5\times5 - 3$ $\frac{22}{\sqrt{22}} = \frac{22\sqrt{22}}{22}$	$\sqrt{22}$	3	B1 for correct expansion 25 - $5\sqrt{3}$ + $5\sqrt{3}$ - $\sqrt{3}$ $\sqrt{3}$ with 1st three terms reducing to 25 **without** any errors seen B1 (indep) for $\sqrt{3}$ $\sqrt{3}$ = 3 B1 for $\sqrt{22}$ coming from $\frac{22}{\sqrt{22}}$ (S.C $\frac{(5+\sqrt{3})(5-\sqrt{3})\sqrt{22}}{22}$ gets B1)

Paper 5505

No	Working	Answer	Mark	Notes
19 (a)		60 40	2	B1 cao B1 cao
(b)		correct bars	2	B1 for $30 < x \leq 40$ with an area of 2½ squares B1 for $40 < x \leq 70$ with an area of 3 squares *SC:* $\frac{0}{4}$ *give M1 if clearly using area or frequency density*
20 (a)	$6x + 8 - 12x + 15$	$-6x + 23$	2	M1 for 3 of the 4 terms $6x$, $+8$, $-12x$, $+15$ correct A1 cao
(b)		$32x^5y^{15}$	2	B2 cao (B1 for two of 32, x^5, y^{15})
(c)	$\frac{(n+1)(n-1)}{n+1} \times \frac{2}{n-2}$ $\frac{2(n-1)}{n-2}$	$\frac{2(n-1)}{n-2}$	3	M1 for $k(n + 1)(n - 1)$ M1 dep for $\frac{(n+1)(n-1)}{(n+1)} = n - 1$ A1 for $\frac{2(n-1)}{n-2}$
21	Vertices at $(-3, -1\frac{1}{2}), (-4\frac{1}{2}, -1\frac{1}{2}), (-3, -4\frac{1}{2})$		3	B1 for all sides $\times 1\frac{1}{2}$ B1 for correct orientation with 2 vertices almost correct B1 cao

Paper 5505

No	Working	Answer	Mark	Notes
22	Total = 3 + 5 + 2 (=10) $\frac{3}{10}\times\frac{3}{10}\times\frac{5}{10}\left(=\frac{45}{1000}\right), \frac{3}{10}\times\frac{3}{10}\times\frac{2}{10}\left(=\frac{18}{1000}\right)$ $\frac{5}{10}\times\frac{5}{10}\times\frac{3}{10}\left(=\frac{75}{1000}\right), \frac{5}{10}\times\frac{5}{10}\times\frac{2}{10}\left(=\frac{50}{1000}\right)$ $\frac{2}{10}\times\frac{2}{10}\times\frac{3}{10}\left(=\frac{12}{1000}\right), \frac{2}{10}\times\frac{2}{10}\times\frac{5}{10}\left(=\frac{20}{1000}\right)$ $3\times\left(\frac{"45"}{1000}+\frac{"18"}{1000}+\frac{"75"}{1000}+\frac{"50"}{1000}+\frac{"12"}{1000}+\frac{"20"}{1000}\right)$ $\frac{660}{1000}$	$\frac{660}{1000}$ oe	5	M3 for all six expressions seen OR their combined equivalents (M2 for four expressions seen OR their combined equivalents) (M1 for two expressions seen OR their combined equivalents) M1 sum of 18 relevant products condone 1 slip A1 for $\frac{660}{1000}$ oe *SC: without replacement maximum M4 A0* SC: Just 2 beads: Answer either $\frac{38}{100}$ oe OR $\frac{28}{90}$ oe B1

Paper 5505

No	Working	Answer	Mark	Notes
23 (a)(i)		$6\mathbf{b} - 6\mathbf{a}$	2	B1 for $6\mathbf{b} - 6\mathbf{a}$ oe
(ii)		$6\mathbf{a}$		B1 for $6\mathbf{a}$ oe
(b)	$\overrightarrow{EX} = \overrightarrow{EB} + \overrightarrow{BX}$ $= 12\mathbf{b} + \frac{1}{2}\overrightarrow{BC}$	$12\mathbf{b} - 3\mathbf{a}$	2	M1 for $\overrightarrow{EX} = \overrightarrow{EB} + \overrightarrow{BX}$ oe vector journey in a form ready for straightforward substitution A1 for $12\mathbf{b} - 3\mathbf{a}$ oe
(c)	$\overrightarrow{AY} = \frac{5}{3}\overrightarrow{AB}$ or $\overrightarrow{BY} = \frac{2}{3}\overrightarrow{AB}$ $\overrightarrow{EY} = 16\mathbf{b} - 4\mathbf{a}$ or $\overrightarrow{XY} = 4\mathbf{b} - \mathbf{a}$ $\overrightarrow{EY} = 4\overrightarrow{XY}$ or $\overrightarrow{EX} = 3\overrightarrow{XY}$ or $\overrightarrow{EY} = \frac{4}{3}\overrightarrow{EX}$	Printer Answer	3	B1 for either $\overrightarrow{AY} = \frac{5}{3}\overrightarrow{AB}$ or $\overrightarrow{BY} = \frac{2}{3}\overrightarrow{AB}$ oe B1 ft for either $\overrightarrow{EY} = 16\mathbf{b} - 4\mathbf{a}$ or $\overrightarrow{XY} = 4\mathbf{b} - \mathbf{a}$ ft only on parts (*a*) and (*b*) B1 for either $\overrightarrow{EY} = 4\overrightarrow{XY}$ or $\overrightarrow{EX} = 3\overrightarrow{XY}$ or $\overrightarrow{EY} = \frac{4}{3}\overrightarrow{EX}$ oe **plus** conclusion of *E*, *X*, *Y* on the same straight line
24 (a)(i)		$(5, -4)$	4	B1 cao
(ii)		$(2, -9)$		B1 cao
(iii)		$(2, 4)$		B1 cao
(iv)		$(1, -4)$		B1 cao
(b)		$(x-2)^2 - 4$	4	B4 for $(x-2)^2 - 4$ oe eg. $x^2 - 4x$ (B3 for $(x+2)^2 - 4$ or $(x-2)^2 + 4$) (B2 for $x^2 - 4$ or $(x-2)^2$ OR $x^2 + bx$, $b \neq 0$ OR $(x+2)^2 + 4$ OR $f(x-2) - 4$) (B1 for $x^2 + 4$ or $(x+2)^2$ or $ax^2 + bx$ or $x^2 + bx + c$ OR $x - 2 - 4$ or $x^2 - 2 - 4$, $a, b, c \neq 0$)

Paper 5506

No	Working	Answer	Mark	Notes
1 (a)	$V = \pi \times 4^2 \times 10$	502 – 503 cm^3	2	M1 for $\pi \times 4^2 \times 10$ A1 502 – 503
(b)	$P^2 = 10^2 + 8^2$ $P = \sqrt{164}$	$\sqrt{164} < 13$	3	M1 for sight of correct right angled triangle M1 for $10^2 + 8^2$ A1 for conclusion based on a correct calculation Or 12.8 seen
2 (a)(i)	2×30	$2 \times 2 \times 3 \times 5$	4	M1 for systematic method, eg division, factor trees (at least one prime) A1 cao
(ii)	2×48	$2^5 \times 3$		M1 for systematic method, division, factor trees (at least one prime) A1 cao
(b)		12	1	B1 cao
(c)	$2^5 \times 3 \times 5$	480	2	B2 cao B1 for $2^5 \times 3 \times 5$ or any correct common multiple

Paper 5506

No	Working	Answer	Mark	Notes
3 (a)		$150 < C \leq 200$	2	M1 use of cum freq to find the cost of the 20th or 20.5^{th} car OR $\frac{1}{2}\Sigma f$ th or $\frac{1}{2}(\Sigma f + 1)$ th car. A1 eg 150 to 200, 150 – 200
(b)		No, because the 21st value is in the same interval	1	B1 for 20.5^{th} or 21st value in the same internal consistent with 'a' OR Refers to the median value being low in the interval (statement to be mathematically correct) See additional sheet
(c)	80% = 5200 $\frac{5200}{80} \times 100$	6500	3	M1 for (100 – 20)% = 5200 M1 for $\frac{5200}{"80"} \times 100$ A1 cao

Paper 5506

No	Working	Answer	Mark	Notes
4 (a)	$x^2(x+1) = 230$	AG	2	M1 for $x \times x \times (x+1)$ or $x \times x \times x + 1$ oe, $x^2(x+1)$, $x^2 \times x + 1$ A1 cao from $x \times x \times (x+1)$, no need to see 230
(b)	5 – 150 6 – 252 5.1 – 158.7 5.2 – 167.6 5.3 – 177.0 5.4 – 186.6 5.5 – 196.6 5.6 – 207.0 5.7 – 217.7 5.8 – 228.8 5.9 –240.2 5.85 – 234.4	5.8	4	B2 for trial between 5.8 and 5.9 inclusive evaluated (B1 for trial between 5 and 6 inclusive evaluated) B1 for different trial between 5.8 and 5.85 (not including 5.8) B1 dep on at least are previous B1 5.8, 5.81, 5.811
5	$\pi \times \left(\frac{15}{2}\right)^2 = 176.715$	88.4 cm^2	3	M1 for $\pi \times \left(\frac{15}{2}\right)^2$ seen A1 88.3 – 88.4 B1 for cm² (independent)

Paper 5506

No	Working	Answer	Mark	Notes
6 (a)	$5 = 0.5x + 1$	8	2	M1 for $5 = 0.5x + 1$ A1 cao
(b)		$y = \frac{1}{2}x + c$	1	B1for $y = \frac{1}{2}x + c$, $c \neq 1$, oe
(c)		$x = 2y - 2$ OR $x = 2(y - 1)$	2	M1for correctly multiplying both sides by 2 or correctly isolating $\frac{x}{2}$ A1 for $x = 2(y - 1)$, $x = \frac{y-1}{0.5}$, $\frac{y-1}{\frac{1}{2}}$ oe SC B1 for x= 2y -1
7	$4x - 6y = 22$ $15x + 6y = 54$ $19x = 76$	$x = 4,\ y = -1$	4	M1 for coefficients of x or y the same followed by correct operation, allow one arithmetical error A1 cao M1 (dep) for correct sub for other variable A1 cao Trial and improvement 0 marks unless both correct values of x and y found
8 (a)	SF = $\frac{10}{6}$ $\frac{10}{6} \times 4.8 = 8$	8	2	M1 for sight of $\frac{10}{6}$ or $\frac{6}{10}$ or 1.67 or better or $\frac{CD}{10} = \frac{4.8}{6}$ A1 cao
(b)	$\frac{10}{6} \times 4.5 - 4.5 = 3$	19.8	2	M1 for use of SF from "a" to find AC or BC or $\frac{BC}{4.5} = \frac{4}{6}$ and adding 4 sides A1 cao

Paper 5506

No	Working	Answer	Mark	Notes
9	$\frac{6\times10^{15}}{3.2\times10^{8}}$ 1.875×10^{7}	4.3×10^{3}	3	B3 for 4.3×10^{3} to 4.34×10^{3} (B2 for 1.875×10^{7} oe or 4300 to 4340, final answer of 1.9×10^{7} B1 for sight of 6×10^{15} oe or 3.2×10^{8} oe)
10	$8.5\times\tan38$ $=8.5\times0.7813$ $\frac{8.5}{\sin(90-38)}=\frac{AB}{\sin38}$ $AB=\frac{8.5\times\sin38}{\sin(90-38)}$ $=\frac{5.2331}{0.788}=6.64$	6.64	3	M1 for correct use of trig, eg $\tan 38=\frac{opp}{8.5}$ M1 for $8.5\times\tan38$ A1 6.64 – 6.641 OR M1 for correct substitution into the sine rule M1 (dep) for correct rearrangement for AB= A1 6.64 – 6.641
11 (a)		No, as you would expect about 100. Yes, as it is possible to get 200 sixes with a fair dice	1	B1 for a consistent answer See additional sheet

Paper 5506

No	Working	Answer	Mark	Notes
(b)	$\frac{1}{6}, \frac{5}{6}$ + labels		3	B1 for $\frac{5}{6}$ on the red dice, *not six* branch B1 for a fully complete tree diagram with all branches labelled B1 for $\frac{1}{6}$ and $\frac{5}{6}$ on all remaining branches as appropriate
(c)(i)	$\left(\frac{1}{6}\right)^2$	$\frac{1}{36}$	2	M1 $\left(\frac{1}{6}\right)^2$ or $\frac{1}{6}\times\frac{1}{6}$ only or 0.28 A1 $\frac{1}{36}$ or 0.03 or better
(ii)	$1-\left(\frac{5}{6}\right)^2$ OR $\frac{1}{6}\times\frac{5}{6}+\frac{5}{6}\times\frac{1}{6}+\frac{1}{6}\times\frac{1}{6}$	$\frac{11}{36}$	3	M2 for $1-\left(\frac{5}{6}\right)^2$ or $1-\frac{5}{6}\times\frac{5}{6}$ A1 cao OR M1 for $\frac{1}{6}\times\frac{5}{6}$ oe M1 for 2 or 3 only of $\frac{1}{6}\times\frac{5}{6}, \frac{5}{6}\times\frac{1}{6}$, "a" A1 for $\frac{11}{36}$ or 0.31 or better

Paper 5506

No	Working	Answer	Mark	Notes
12 (a)	$\pi \times 30 \times \frac{7.5^2}{3} - \pi \times 10 \times \frac{2.5^2}{3} = 1767 - 65$	1700	3	M1 for either $\pi \times 30 \times \frac{7.5^2}{3}$ or $\pi \times 10 \times \frac{2.5^2}{3}$ M1 (dep) for difference A1 1700 – 1702 **SC** B1 Using d instead of r, 6800 – 6808
(b)	$\frac{S}{2\pi d} = \sqrt{h^2 + d^2}$ $\left(\frac{S}{2\pi d}\right)^2 = h^2 + d^2$	$h = \sqrt{\frac{S^2 - 4\pi^2 d}{4\pi^2 d^2}}$	3	M1 for correctly isolating $\sqrt{h^2 + d^2}$ or $h^2 + d^2$ or $h + d$ or kh^2 or kh M1(indep) squaring both sides A1 $h = \sqrt{\frac{S^2 - 4\pi^2 d^4}{4\pi^2 d^2}}$, $h = \frac{\sqrt{S^2 - 4\pi^2 d^4}}{2\pi d}$ $h = \sqrt{\left(\frac{S}{2\pi d}\right)^2 - d^2}$
(c)	$\left(\frac{30}{20}\right)^2 \times 450$ or $450 \div \left(\frac{20}{30}\right)^2$	1012.5	2	M1 for sight of correct SF^2 including 4:9 A1 1010 to 1013

Paper 5506

No	Working	Answer	Mark	Notes
13 (a)	$\frac{2x(x+20)}{2} = 400$	As given	2	M1 $\frac{2x(x+20)}{2}$ or $\frac{2x \times x + 20}{2}$ or $2x(x + 20) = 800$ A1 cao following correct working, no need for = 400 *SC B1* $2x \times x + \frac{1}{2} \times 2x(10 - \frac{x}{2}) \times 2$
(b)	$\frac{-20 \pm \sqrt{20^2 - 4 \times 1 \times (-400)}}{2}$ $= \frac{-20 \pm 44.721}{2}$	12.361	3	M1 for correct sub, up to signs, in the quad formula A1 for 44.7 or $\sqrt{2000}$ A1 for 12.3606 – 12.361, ignore negative solution T.I B3 for 12.361 OR Completing the square M1 for $(x+10)^2$ seen A1 for $-10 \pm \sqrt{500}$ A1 for 12.3606 – 12.361 ignore negative solution

Paper 5506

No	Working	Answer	Mark	Notes
14 (a)	$0.5\times 8\times 15\times \sin 70^0$	56.4	2	M1 for correct sub into area formula A1 56.38 – 56.4
(b)	$AB^2 = 8^2 + 15^2 - 2\times 8\times 15\times \cos 70^0 = 206.9$ EITHER $0.5\times AB\times CX = '56.38'$ OR $\frac{\sin B}{8} = \frac{\sin 70}{\sqrt{'206.9'}}$ $B = 31.5$ 15 sin '31.5'	7.84	4	M1 for correct sub into cos rule A1 for 206.9 - 207 or 14.38 – 14.4 EITHER M1 for use of area rule to find CX A1 7.83 – 7.84 OR M1 for correct use of sine rule to find sin B or sin A and then sight of 15sin B *or* 8 sin A A1 7.83 – 7.84

Paper 5506

No	Working	Answer	Mark	Notes
15 (a)	$4a^2 - 4a + 1 - (4b^2 - 4b + 1) =$ $4(a^2 - b^2) - 4(a - b)$ $4(a - b)(a + b - 1)$ OR $((2a - 1) - (2b - 1))((2a - 1) + (2b - 1))$ $(2a - 2b)(2a + 2b - 2)$	AG	3	Expansion Method M1 for a correct expansion of any one of the three terms M1(dep) on an attempt to expand all 3 terms and show LHS = RHS A1 fully correct algebra RHS exp is $4(a^2 + ab - a - ba - b^2 + b)$ OR Factorisation Method M1 for attempt to use difference of 2 squares on LHS M1 for one bracket correctly simplified A1 fully correct
(b)	Any 2 odd square numbers have the above form If a and b are both even or odd then $a - b$ is even, so $4(a - b)$ is a multiple of 8 If one of a,b is odd, then $a + b - 1$ is even, so $4(a + b - 1)$ is a multiple of 8		3	B1 'any 2 square nos have the above form' (may be implied by sight of $(2a - 1)^2 - (2b - 1)^2$ in part (b)) B1 first reason B1 second reason SC B1 for $(2r + 1)^2 - (2r - 1)^2$ B1 for 8r
16 (a)	$g_L = \frac{2 \times 4.495}{1.35^2 \times \sin 30.5}$ $g_u = \frac{2 \times 4.505}{1.25^2 \times \sin 29.5}$	9.719 11.710	4	B2 for any 4 of 4.505, 1.25, 29.5, 4.495, 1.35, 30.5 seen (B1 for any two or three seen) B1 for 11.710 – 11.7103 B1 cao 9.719 – 9.71904
(b)	Round, until lower and upper bounds agree	10	1	B1 for 10 + reason " they agree to this level of accuracy"

Paper 5506

No	Working	Answer	Mark	Notes
17 (a)(i)		xy	3	B1 cao
(ii)		y^2		B1 for y^2 or $y \times y$
(iii)		$\frac{x}{2}$		B1 for $\frac{x}{2}$ or $0.5x$ or $2^{-1}x$
(b)	Divide to get $2y = 1$	$q = -1$	2	M1 for $2y = 1$ or $\frac{x}{2} = 32$ or $p + q = 5$ or $1 + p + 2q = 5$
		$p = 6$		A1 cao
18 (a)	$x^2 - 2mx + m^2 - k$	$k = m^2$	2	M1 for correct exp of $(x - m)^2$ or correct completion of the square eg $\left(x - \frac{2m}{2}\right)^2 - \left(\frac{2m}{2}\right)^2$
				A1 cao
				SC B1 for $k = -m^2$
(b)(i)	Min value is $-m^2$	$-m^2$	3	M1 for recognition that min value occurs when $(x - m)^2 = 0$ (either (b)(i) or (b)(ii) correct implies this M1)
(ii)	$x = m$	m		A1 ft on 'k', " $-k$" gets M1 A0
				A1 cao
19	$0.06 \times 0.05 = 0.003$	No	2	M1 for 0.06×0.05
				A1 correct conclusion based on 0.003 or 0.06 x 0.05 stated as $\neq 0.0011$
				OR M1 for statement that for the two events to be independent P (BL and CL) = P(BL) × P(CL)

Paper 5506				
No	**Working**	**Answer**	**Mark**	**Notes**
20		50 50 4	3	B1 50 or $\frac{100}{2}$ B1 for 50 or "a" B1 4 or $\frac{360}{90}$ oe

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NOTES ON MARKING PRINCIPLES

NOTES ON MARKING PRINCIPLES

1 Three types of mark are available

M marks - awarded for correct working seen or implied.
A marks - conditional accuracy marks which are awarded for accurate working following the award of M marks.
B marks - unconditional accuracy marks (independent of M).

2 Abbreviations

cao - correct answer only.
ft - follow through.
$\surd$ - Denotes a "follow through" answer.

SC - special case.
isw - ignore subsequent working.
oe - or equivalent (and appropriate).
NB: a candidate cannot benefit from both isw and ft.

3 If no working shown, then

correct answers normally score full marks
incorrect (even though nearly correct) answers score no marks.

4 Marking instructions

Misread loses A marks (and sometimes B marks) on that part but ft can be allowed on subsequent parts. M marks can still be earned. If in doubt contact your team leader.
If there is a wrong answer in the answer space DO CHECK the working in the body of the script.

- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.
- If there is a wrong answer in the answer space DO CHECK the working in the body of the script.
- If it is clear from working that the "correct" answer has been obtained from incorrect working, award no marks. If in doubt contact your team leader.

5 Style of marking

Answer correct: tick and write part mark in margin NEXT TO BRACKETED MARK.
Answer incorrect: cross, but show M, A or B marks if any earned in body of script and transfer the total of these to the margin next to the bracket mark.
Total for each double page at bottom right page (except for back if used), FINAL TOTAL IN RELEVANT BOX ON FRONT COVER.
Nought in margin for fully incorrect question or page AND FOR NO ATTEMPT.
Where no attempt has been made a line should be put in the answer space and zero in the margin next to the bracketed mark
CHOICE OF METHOD – No marks unless one answer is in answer space – then mark that.
CROSSED OUT WORK - if not replaced this should be marked (if legible).
There must always be a mark next to bracketed mark in the margin/

6 Follow Through Marks

Follow throughs are guided by two principles:

(a) Follow throughs which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous, do not award.
(b) Follow throughs which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Probability

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least two decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

6 Linear Equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

8 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

PAPER 5501					
No		**Working**	**Answer**	**Mark**	**Notes**
1			K: 1020 L: 8.06	2	B1 for 1020 or 1,020 B1 for 8.06 Accept £8.06p and £8,06
2	(a)		28, 33	2	B1, B1 (B1 ft for "28" + 5 if both numbers >25)
	(b)			1	B1 for add 5, +5, for going up in 5's the difference is 5 oe
	(c)			1	B1 for they end in 3 and 8, it ends in 7; or refers to 383 and 388 are in sequence
3	(a)(i)		$\frac{1}{2}$	2	B2 for ½ accept half (B1 for an equivalent unsimplified fraction eg 4/8 or 50% or 0.5)
	(ii)		2 rectangles shaded	1	B1 for correct shading (any 2 rectangles)
	(b)(i)		40	4	B1 for 40 cao
	(ii)		150 000		B1 for 150 000 cao (accept 150,000 not 150.000)
	(iii)		6.55		B1 for 6.55 cao not $6.5^{½}$
	(iv)		$\frac{3}{8}$		B1 for $\frac{3}{8}$ oe accept 0.375
	(c)		Cross 3cm from *A*	1	B1 mark a cross 3 cm (±2 mm) from *A*
4	(a)(i)		metres	2	B1 for metres (m)
	(ii)		grams		B1 for grams (g)
	(b)		miles	1	B1 for miles
5	(a)		(3, 2)	1	B1 for (3, 2)
	(b)(i)		*Q* at (0, 3)	1	B1 for *Q* plotted correctly on *y*-axis at (0, 3) ±2mm
	(ii)		*R* at (−2, −3)	1	B1 for *R* plotted correctly at (−2, −3) ±2mm
6	(a)(i)		30	2	B1 for 30
	(ii)		25		B1 for 25
	(b)(i)		4 shapes	2	B1 for drawing 4 shapes
	(ii)		1½ shapes		B1 for drawing 1½ shapes

PAPER 5501					
	No	Working	Answer	Mark	Notes
7	(a)		30	1	B1 for 30
	(b)	$20 \times 3 + 5$	65	2	M1 for $20 \times 3 + 5$ oe A1 for 65
8	(a)		Draws perp.	1	B1 for correctly drawing perp must touch line or cut line *AB* ± 2mm
	(b)		Sketches a cylinder	1	B1 for sketching cylinder
9	(a)	1974 6580 8554	855.4	3	M1 for complete method with relative place value correct, condone 1 error in multiplication A2 cao (A1 for digits 8554 seen or A1 for "855.4" dependent on 1 arithmetic error)
	(b)	990 ÷ 69 = 14.3…. or 14 rem 24	14	4	Method 1 - Everything excluding long division M2 for a valid method with no errors …need to see 966 or 1035 (M1 for a valid method, including estimation, that reaches an answer between 901 and 1099 inclusive. Ignore errors.) A2 for 14 with a fully correct method (A1 (dep on 1st M1) for an answer between 14 and 15 inclusive. Ignore errors. Cannot have used estimation.) Note: Estimation can only score a maximum of M1 unless accompanied by another method or 966 or 1035 see (award M2) Method 2 – long division method M2 for 990 ÷ 69 = integer answer between 12 and 19 inclusive and rem 30 seen (M1 for 990 ÷ 69 with 1 in tens column.) A2 for 14 with fully correct method (A1 (dep on 1st M1) for an answer between 14 and 15 inclusive.)

PAPER 5501					
	No	Working	Answer	Mark	Notes
10	(a)(i)		7	2	B1 for 7
	(ii)		−10		B1 for −10
	(b)(i)		6	2	B1 for 6 (accept −6)
	(ii)		8		B1 for 8 (accept −8)
	(c)		−7	1	B1 for −7 cao
11	(a)		B and D	2	B1, B1 (–1 each extra)
	(b)(i)		A	2	B1 for A
	(ii)		3		B1 for 3
12	(a)	800 − 144	656	2	M1 for at least 1 digit correct and in correct position needs to be 3 digit number A1 for 656
	(b)	144 is less than 200 so Trudy is wrong		2	B1 for 200 B1ft for 'correct' explanation based on cand's "200"
	(c)	$\frac{45\times800}{100}$	360	2	M1 for 45 × 800 ÷ 100 oe A1 for 360
	(d)	$\frac{176}{800}\times100$	22	2	M1 for $\frac{176}{800}\times100$ oe A1 for 22
13	(a)(i)		25	4	B1 for 25
	(ii)		28		B1 for 28
	(iii)		5 and 20		B1 for 5 and 20
	(iv)		26 and 33		B1 for 26 and 33
	(b)	$2^3 = 8$ or $2^3 = 2 \times 2 \times 2$ (which is not 6)		1	B1 for valid 'explanation'
14			10 m^2	2	B1 for 10 B1 indep for m^2.

PAPER 5501					
No		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	$\frac{11}{12}-\frac{10}{12}$	$\frac{1}{12}$	2	M1 for correctly writing both fractions to a common denominator A1 for $\frac{1}{12}$ oe
	(b)	$\frac{70\times400}{200}$	140	2	B2 for 140 (accept 136) (B1 for sight of any two of 70, 400 or 200)
16	(a)		$2y$	1	B1 for $2y$ or $2\times y$, $y2$, $y\times2$
	(b)		$3p^2$.	1	B1 for $3p^2$ or $3\times p^2$ or $p^2\times3$ or $p^2 3$
	(c)		$x(x-3)$	2	B2 for $x(x-3)$ (B1 for x (x…….)) $\frac{25}{60}$ wrongly cancelled gets B1 ISW
17	(a)		2 23 9 34 15 2 9 26 17 25 18 60	3	B3 for all correct (B2 for 4 or 5 entries correct) (B1 for 2 or 3 entries correct)
	(b)		$\frac{25}{60}$	1	B1 for $\frac{25}{60}$ or $\frac{5}{12}$ oe $\frac{25}{60}$ wrongly cancelled gets B1 ISW

PAPER 5501					
	No	**Working**	**Answer**	**Mark**	**Notes**
18	(a)(i)		60	2	B1 for 60
	(ii)				B1 for all **angles equal** so equilateral triangle oe
	(b)(i)		130	3	B1 for 130
	(ii)				B1 for isosceles triangle oe or 2 angles equal accept $\angle Q = \angle R$ B1 for angles on a straight **line** add up to **180°**oe (180° could be in working)
	(c)		64	1	B1 for 64
19	(a)		1	1	B1 for 1
	(b)		3	1	B1 for 3
	(c)	$9\times1+3\times2+5\times3+3\times4$ (= 42) "42" ÷ 20	2.1	3	M1 for 9×1, 3×2, 5×3, 3×4 or for 42 seen M1 (dep) for "42" ÷ 20 A1 for 2.1 or $2\frac{1}{10}$ or $2\frac{2}{20}$
20	(a)		09 05	1	B1 for 09 05 oe
	(b)		7	1	B1 for 7
	(c)		10	1	B1 for 10
	(d)	7km in 20 mins	21	3	B1 for 20 (minutes) oe or $\times3$ seen M1 for $\frac{"7"}{"20"}$ A1 cao [SC: "7" × 3 seen gets B1 M1]

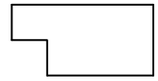
PAPER 5501				
No	**Working**	**Answer**	**Mark**	**Notes**
21	Vertices of new triangle at (2, −2) (2, 6) and (6, −2)	Correct triangle drawn	3	B3 cao (B2 for either correct triangle in wrong translated position or for 2 vertices correct) (B1 a right angled triangle with horizontal length 4 or vertical length 8 in the same orientation as the shaded triangle) SC B2 for s + 3 totally correct
22 (a) (b) (c)	 8560 ÷ (10 × 10)	8 Pentagon 85.6	1 1 2	B1 for 8 B1 for pentagon M1 for 8560 ÷ (10 × 10) oe A1 for 85.6
23	$2x + x + 100 + 47 = 360$ $2x + x = 360 - 100 - 47$ $x = 71$ Largest angle = $2x$ =	142	4	M1 for $2x + x + 100 + 47 = 360$ or 360 – 147 or 213 seen M1 dep for correctly separating x-terms and non x terms or "360 – 147" ÷ 3 A1 for $x = 71$provided M2 awarded A1 ft for 142

PAPER 5502					
	No	**Working**	**Answer**	**Mark**	**Notes**
1	(a)		Diagram	1	B1 cao
	(b)		22, 26	1	B1 cao
	(c)		46	1	B1 cao
2	(a)	£5.95 + £1.62 + 25p + 2 × 48p = £8.78	1.22	3	M1 for 3 of £5.95, £1.62, 25p, 48p seen with intention to add or 170 seen A1 for £8.78 A1 ft from " 8.78"
	(b)	160 ÷ 12 = 13.(333…)	14	2	M1 for 160 ÷ 12, or 13 or better or 12 × 13 or 12 × 14 A1 14 cao
	(c)	"14" × £12.20 = £170.8**0**	170.80	2	M1 for "14" × 12.20 A1 for 170.8**0** or 158.6**0** if 13 in (b) NB: 170.8 or 158.6 gets M1 A0
3	(a)(i)		1459	1	B1 cao
	(ii)		9541	1	B1 cao
	(b)		9 + 5 = 14	1	B1 cao
	(c)		0	1	B1 cao
4	(a)		1123	1	B1 cao
	(b)		1125	1	B1 cao
	(c)		43	1	B1 cao
	(d)	67 – "43"	24	2	M1 for 67 – "43" A1 ft from "43"
	(e)(i)		80	2	B1 cao
	(ii)		56 – 58		B1 answer in range 56 to 58 inc
	(f)		Completes graph	2	B2 for (Apr , 70) and (May , 60 < p < 65) plotted and joined (B1 for one point plotted)

PAPER 5502					
	No	Working	Answer	Mark	Notes
5	(a)(i)		4	1	B1 cao
	(ii)		10	1	B1 cao
	(b)		28	2	B2 for 28 (B1 for 29 or 14×2)
6	(a)		$\frac{3}{4}$	1	B1 accept 0.75, 75%
	(b)	$\frac{3}{4} \times 28 = 21$	15.54	3	M1 for $\frac{3}{4} \times 28$ or 21 seen M1 for "21" $\times$ 74 or 28×74 or 7×74 A1 cao
	(c)(i)		44 – 46	2	B1 44 – 46 inc
	(ii)		5.2 – 5.4		B1 5.2 – 5.4 inc
7	(a)		Correct shape	1	B1
	(b)		Correct shape	1	B1
8	(a)		Hexagon	1	B1
	(b)		Right	1	B1 cao
	(c)		Drawing	2	B2 for 7 additional hexagons with at least 2 points at which 3 hexagons meet (B1 for one point at which 3 hexagons meet)
9	(a)		$\frac{3}{4}$	2	M1 $\frac{80-20}{80}$ or $\frac{60}{80}$ or 0.75 (oe) A1 cao Do not accept equivalents
	(b)		15	1	B1 cao
	(c)		Iron and Cook set	1	B1 for both Accept mixer and fryer
	(d)		Microwave	1	B1 cao
	(e)		Bar chart	2	B1 one column (mixer): 70, 90 B1 second column (fryer): 70, 85 [SC: B1 columns correct but reversed]

PAPER 5502					
No		**Working**	**Answer**	**Mark**	**Notes**
10	(a)		Acute	1	B1
	(b)		Reflex	1	B1
	(c)		reason	1	B1 reason eg 120 + 230 = 350 ≠ 360
11	(a)		$\frac{1}{2}$	1	B1 for $\frac{1}{2}$ oe
	(b)		reason	1	B1 for reason e.g could get 30 heads
12	(a)	7.5×4	30	2	M1 for 7.5×4 or $7\frac{1}{2} \times 4$ A1 cao
	(b)	$\sqrt{(42.25)}$	6.5	2	B2 for 6.5 (B1 for 42.25)
13	(a)		$6x$	1	B1 accept $6 \times x$, $x6$ oe
	(b)		$x - 4$	1	B1 cao
	(c)		$12(x - 4)$	1	B1 for $12(x - 4)$ or $12x - 48$ or $12 \times x - 48$ oe
	(d)		$18x - 48$	2	M1 for "$6x$" + "$12(x-4)$" or "$6x$" + "$12x - 48$" oe A1 ft $18x - 48$, $2(9x - 24)$, $3(6x - 16)$, $6(3x - 8)$
14	(a)		90	2	B2 for 90 ± 2 (B1 for 9 ± 0.2)
	(b)		317	1	B1 for 317 ± 4
15	(a)	Accurate drawing of triangle		2	B1 cao for 38° (±2°) B1 cao (indep) for BC drawn 7.3 cm (±2mm) and completing the triangle.
	(b)	Measure angle A	63°	1	B1 for 63° (±2°) or ft their diagram (±2°)

PAPER 5502					
	No	Working	Answer	Mark	Notes
16	(a)	0 × 1 = 0 1 × 1 = 1 2 × 4 = 8 3 × 8 = 24 4 × 8 = 32 5 × 7 = 35	100	3	M1 col 1 × col 2 (at least 3 shown) M1 (dep) sum of totals A1 cao SC: M1 M1 A0 for 101
	(b)	Either 35.50 ÷ 1.42 = 25; 26.99 – 25 = 1.99 Cheaper in the USA Or 26.99 × 1.42 = 38.33; 38.33 – 35.50 = 2.83 Cheaper in the USA		3	M1 35.50 ÷ 1.42 A1 25 seen B1 ft (dep on M1) £1.99 with conclusion (must have units) **OR** M1 26.99 × 1.42 A1 38.32 or 38.33… seen B1 ft (dep on M1) $2.83 or $2.82 with conclusion (must have units) must be to 2dp
17	(a)		-1, (1), (3), 5, 7, 9	2	B2 cao (B1 for 2 values)
	(b)		Graph	2	B1 ft for plotting points ±1/2 square B1 cao for line between $x = -2$ and $x = 3$
	(c)(i)		0.4	2	B1 for 0.4 or ft from single straight line with positive gradient
	(ii)		1.2		B1 for 1.2 or ft from single straight line with positive gradient

PAPER 5502					
	No	Working	Answer	Mark	Notes
18	(a)		Plots	1	B1 cao
	(b)		description	1	B1 dynamic relationship or "positive" (correlation)
	(c)		line of best fit	1	Line within overlay region, and to the extent of.
	(d)(i)	280 g →	reading	2	B1 ft from single straight line of positive gradient (±1/2 square)
	(ii)	120 pages →	reading		B1 ft from single straight line of positive gradient (±1/2 square)
19			200 150 225 150 10	3	B3 cao (B2 for three correct, or B1 for one correct)
20	(a)			2	B1 B1 for correct sketch – ignore additional internal lines B1 B0 for rectangle or right-angled triangle or correct shape without line NB 3-D sketch gets B0 B0
	(b)			2	B1 B1 for correct plan – ignore internal lines – accept a rotated plan, not reflected B1 B0 for a single rectangle drawn NB 3-D sketch gets B0 B0
21	(a)	163.25 – 35.50 = 127.75 127.75 ÷ 18.25 = 7	8	3	M1 163.25 – 35.50 (or sight of 127.75) M1 (dep) "127.75" ÷ 18.25 A1 cao SC: M2 for 7 days
	(b)	1.175 × £64 or $\frac{17.5}{100}$ × 64 or £11.20 seen	75.20	2	M1 1.175 × 64, 0.175 × 64 oe or 11.20 or 75.2 seen or 6.40, 3.20 and 1.60 seen A1 cao

PAPER 5502					
	No	Working	Answer	Mark	Notes
22	(a)		6	1	B1 cao
	(b)		$t^2 - 2t$	1	B1 oe
	(c)		$3(y - 4)$	1	B1 Accept $3 \times (y - 4)$ or $3(y - 4$
23	(a)		Reason	1	B1 Makes some mention of bias either directly or making reference to an insufficient or biased range of responses
	(b)		Reason	1	B1 (a) an insufficient range of responses (b) No mention of money (c) No time frame in the question (d) Misunderstanding of "A lot" and "Not much"

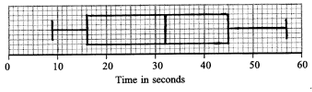
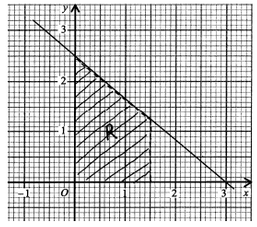
PAPER 5503					
No		**Working**	**Answer**	**Mark**	**Notes**
1			10.	1	B1 for 10
2	(a)(i)		$3e + 2f$	2	B1 for $3e + 2f$
	(ii)		$3p^2$		B1 for $3p^2$
	(b)	$5 \times -3 + 1$	-14	2	M1 for $5 \times -3 + 1$ A1 for -14
3		1974 $\frac{6580}{8554}$	855.4	3	M1 for complete correct method with relative place value correct, condone 1 error in multiplication. A2 cao (A1 for digits 8554 seen or A1 ft for "855.4" dependent on one arithmetic error only)
4	(a)		2 23 9 34 15 2 9 26 17 25 18 60	3	B3 all correct (B2 for 4 or 5 entries correct) (B1 for 2 or 3 entries correct)
	(b)		$\frac{25}{60}$	1	B1 for $\frac{25}{60}$ or $\frac{5}{12}$ oe
5	(a)	$\frac{45}{100} \times 800$	360	2	M1 for $\frac{45}{100} \times 800$ oe A1 for 360
	(b)	$\frac{176}{800} \times 100$	22	2	M1 for $\frac{176}{800} \times 100$ oe A1 for 22

PAPER 5503					
	No	Working	Answer	Mark	Notes
6	(a)	$\frac{11}{12}-\frac{10}{12}$	$\frac{1}{12}$	2	M1 for correctly writing both fractions to a common denominator A1 for $\frac{1}{12}$ oe
	(b)	$\frac{70\times400}{200}$	140	2	B2 for 140 (accept 136) (B1 for sight of any two of 70, 400 or 200)
7	(a)(i)		60	2	B1 for 60
	(ii)				B1 for all angles equal so equilateral triangle oe
	(b)(i)		130	3	B1 for 130
	(ii)				B1 for isosceles triangle oe B1 for angles on a straight line add up to 180°oe
	(c)		64	1	B1 for 64
8		$9\times1+3\times2+5\times3+3\times4$ (=42) "42" ÷ 20	2.1	3	M1 for 9×1, 3×2, 5×3, 3×4 or for 42 seen M1 (dep) "42" ÷ 20 A1 for 2.1 or $2\frac{1}{10}$ or $2\frac{2}{20}$
9	(a)		09 05	1	B1 for 09 05 oe
	(b)		7	1	B1 for 7
	(c)		10	1	B1 for 10
	(d)	7 km in 20 minutes	21	3	B1 for 20 (minutes) oe or $\times3$ seen M1 for $\frac{"7"}{"20"}$ A1 cao SC: "7" $\times3$ gets B1 M1

PAPER 5503					
No		**Working**	**Answer**	**Mark**	**Notes**
10		Vertices of new triangle at (2, −2) (2, 6) and (6, −2)	Correct triangle drawn	3	B3 cao (B2 for either correct triangle in wrong translated position or for 2 vertices correct) (B1 for a right-angled triangle with horizontal length 4 or vertical length 8 in the same orientation as shaded triangle) SC B2 for scale factor 3, totally correct
11		$2^2 + 3 =$	7 which is not even	2	B2 (B1 for correctly evaluating $n^2 + 3$ with a prime number value for n.)
12	(a)	360 ÷ 5	72	2	M1 for 360 ÷ 5 oe A1 for 72
	(b)	8560 ÷ (10 × 10)	85.6	2	M1 for 8560 ÷ (10 × 10) oe A1 for 85.6
	(c)(i)	Least length = 100.5	100.5	2	B1 for 100.5
	(ii)	Greatest length = 101.5	101.5		B1 for 101.5 or 101.499 or better
13		$2x + x + 100 + 47 = 360$ $2x + x = 360 - 100 - 47$ $x = 71$ Largest angle = $2x$ =	142	4	M1 for $2x + x + 100 + 47 = 360$ or 360 – 147 or 213 seen M1 (dep) for correctly separating x-terms and non x terms or $\frac{"360-147"}{3}$ A1 for $x = 71$ A1 ft (provided M2 awarded) for "142"
14	(a)(i)		2.21	2	B1 for 2.21
	(ii)		0.013		B1 for 0.013
	(b)	LCM = 3 × 13 × 17 = 3 × 221	663	2	M1 for 3 × 13 × 17 oe A1 for 663

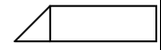
PAPER 5503				
No	**Working**	**Answer**	**Mark**	**Notes**
15		Tick boxes 1,3 & 6	3	B1 for $\frac{\pi abc}{2d}$; B1 for $2a^2$; B1 for $2\left(c^2+d^2\right)$ (−B1 for each additional expression ticked (>3) to a minimum of 0)
16	200×0.2	40	2	M1 for 200×0.2 or $\frac{40}{200}$ seen A1 for 40
17 (a)	eg 2 | 108 2 | 54 3 | 27 3 | 9 3	$2^2 \times 3^3$	3	M2 for full systematic method of at least 4 divisions by prime numbers oe factor trees; condone 1 calculation error (M1 for 108 written as a correct product(s) with only one non-prime or equivalent division or a full process with 2 calculation errors.) A1 for $2^2 \times 3^3$ (accept $2 \times 2 \times 3 \times 3 \times 3$)
(b)		12	1	B1 for 12
18	Perpendicular from P to intersecting arcs (within tramlines); perpendicular at least 2cm long		2	M1 relevant pair of arcs crossing within tramlines A1 SC M1 AO for a full construction of a perpendicular to AB not passing through P.
19	15×10	150 cm^3.	3	M1 for 15×10 A1 for 150 B1 for cm^3.

PAPER 5503					
No		**Working**	**Answer**	**Mark**	**Notes**
20			$y = 2x + 6$	2	B2 for $y = 2x + 6$ (B1 for $y = 2x + k$, $k \neq 1$ or for $y = mx + 6$, m $\neq 0$ or for $2x + 6$)
21		$6\frac{2}{5} = \frac{32}{5}$ Area of triangle = $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ (=2) Length of a side of sq. = $\sqrt{18 \times "2"}$ (=6) Perimeter of square = 4 × 6	24	5	B1 for $6\frac{2}{5} = \frac{32}{5}$ oe or $3\frac{1}{5} = \frac{16}{5}$ or $\frac{30}{8} + \frac{2}{8}$ oe (or implied by area of triangle=2) M1 for $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ oe M1 for area of square = 18 × product of two lengths A1 for $\sqrt{18 \times "2"}$ A1 for 24
22	(a)		$x(x-3)$	2	B2 for $x(x-3)$ (B1 for x (…….))
	(b)		k^3.	1	B1 for k^3.
	(c)(i)	$4x + 20 + 3x - 21$	$7x - 1$	4	M1 for **three** of 4 terms $4x + 20 + 3x - 21$ (or better) A1 for $7x - 1$
	(ii)	$x^2 + 3yx + 2xy + 6y^2$	$x^2 + 5xy + 6y^2$		M1 for **three** of 4 terms $x^2 + 3yx + 2xy + 6y^2$ A1 for $x^2 + 5xy + 6y^2$
	(d)		$(p+q)(p+q+5)$	1	B1 for $(p+q)(p+q+5)$

PAPER 5503					
	No	Working	Answer	Mark	Notes
23	(a)		32	1	B1 for 32 (accept 31.5 to 33.5 inclusive)
	(b)			3	B1 for ends of whiskers at 9 and 57, (with a box) B1 for ends of box at 16 and 45 (± 0.5) B1 for median marked at 32 or a complete box and whisker diagram drawn with a median inside the box
	(c)	Median(B)>Median(G); on average boys take longer IQR(B)>IQR(G); times for boys have a greater spread		2	B1 eg for comparison of medians B1 eg for comparison of (interquartile) ranges
24	(a)	$6y = 15 - 5x$	$y = \frac{15-5x}{6}$	2	M1 for either $6y = 15 - 5x$ or -6 $y = 5x - 15$ or for $\frac{5x}{6} + y = \frac{15}{6}$ or a correct ft on sign error to $y=$ A1 for $y = \frac{15-5x}{6}$ oe
	(b)	$6k + 5(-21) = 15$	20	2	M1 for substitution of $x = -21$ (or $x = 21$) into given equation or candidate's answer to (a) A1 for $k = 20$
	(c)(i)		Region R indicated	3	B2 correct region shaded (accept unshaded if R clear) (B1 shaded or R region satisfies 3 of the 4 given inequalities with same boundaries)
	(ii)		(1,1)		B1 for (1,1)

PAPER 5503					
	No	Working	Answer	Mark	Notes
25	(a)		60	1	B1 for 60 B1 for *BDC* = 25
	(b)	eg Angle *BDC* = 25 *ADB* = 60 − 25	35	2	[Award the mark for equivalent approaches] B1 ft for (a) − 25
	(c)	Ben is correct; angle *DAB* = 65 + 25 = 90 and since angle in a semi-circle is 90°, *BD* must be a diameter		1	B1 for full valid justification

PAPER 5504					
	No	Working	Answer	Mark	Notes
1	(a)	Accurate drawing of triangle		2	B1 cao for 38º (±2º) B1 cao (indep) for BC drawn 7.3 cm (±2mm) and completing the triangle.
	(b)	Measure angle A	63º	1	B1 for 63º (±2º) or ft their diagram (±2º)
2	(a)	0 × 1 = 0 1 × 1 = 1 2 × 4 = 8 3 × 8 = 24 4 × 8 = 32 5 × 7 = 35	100	3	M1 col 1 × col 2 (at least 3 shown) could be implied by answers. M1 (dep) sum of totals A1 cao SC: M1 M1 A0 for 101
	(b)	Either $35.50 ÷ 1.42 = £25; £26.99 - £25 = £1.99 Cheaper in the USA Or £26.99 × 1.42= $38.33; $38.33 - $35.50 = $2.83 Cheaper in the USA		3	M1 35.50 ÷ 1.42 A1 25 seen B1 ft (dep on M1) £1.99 with conclusion; units needed OR: M1 26.99 × 1.42 A1 38.33 or 38.32…seen B1 ft (dep on M1) $2.83 or $2.82 with conclusion; units needed
3	(a)		-1, (1), (3), 5, 7, 9	2	B2 cao (B1 for 2 values)
	(b)		Graph	2	B1 ft for plotting points ±1/2 square B1 cao for line between $x = -2$ and $x = 3$
	(c)(i)		0.4	2	B1 0.4 or ft single straight line with positive gradient
	(ii)		1.2		B1 1.2 or ft single straight line with positive gradient

PAPER 5504					
	No	Working	Answer	Mark	Notes
4	(a)			2	B1 Rectangle drawn B1 Triangle attached Ignore additional internal lines; 3D sketch gets B0
	(b)			2	B1 single Rectangle drawn B1 Attached smaller rectangle drawn Accept rotated plan, Ignore internal lines down; Nets get B0
5	(a)	£163.25 - £35.50 = £127.75 £127.75 ÷ £18.25 = 7	8	3	M1 163.25 – £35.50 (or sight of £127.75) M1 (dep) "127.75" ÷ 18.25 A1 cao SC: M2 for 7 days
	(b)	1.175 × £64 or $\frac{17.5}{100}$ × 64 or £11.20 seen	75.20	2	M1 1.175 × 64.00 0.175 × 64 oe or 11.20 or 75.2 seen OR 6.40, 3.20, and 1.60 seen A1 cao
	(c)	54 × £2.38 =	128.52	2	M1 54 × £2.38 A1 cao
6		Tessellation	Drawing	2	B2 seven additional hexagons, with at least 2 points at which 3 hexagons meet (B1 one point at which 3 hexagons meet).
7			200 150 225 150 10	3	B3 cao (B2 for three correct, or B1 for one correct)
8	(a)(i)	Bearing measured	70	2	B1 70 ± 4
	(ii)	Bearing measured	317		B1 317 ± 4
	(b)	Locus (circle) drawn & shaded		2	B1 circle ±2 mm centre Manchester B1 shading with accurate or approximate circle within tolerance

PAPER 5504					
	No	Working	Answer	Mark	Notes
9	(a)		Plots	1	B1 cao
	(b)		Description	1	B1 dynamic relationship or "positive" (correlation)
	(c)		Line of best fit	1	Line within overlay region, and to the extent of.
	(d)(i)	280 g →	Reading	2	B1 ft from single straight line of positive gradient (±1/2 square) B1 ft from single straight line of positive gradient (±1/2 square)
	(ii)	120 pages →	Reading		
10	(a)	$\frac{1}{6}, \frac{3}{8}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}$		2	B2 for all correct (B1 for 1 error or all correct but wrong order, or use of a common denominator decimals).
	(b)	3/5, 65%, 2/3, 0.72, 3/4		2	B2 for all correct (B1 for 1 error or all correct but wrong order or conversions to decimals oe)
11	(a)		182, 178, 180, 184	2	M1 mean of any three consecutive months, eg (147 + 161 + 238) ÷ 3 oe A1 cao
	(b)	Sale price = 80% Fun Friday price = 70% of 80% = 56% (oe)		2	B1 B1 for a fully correct explanation involving a worked example (oe) B1 a partially complete explanation

PAPER 5504					
	No	Working	Answer	Mark	Notes
12	(a)		Reason	1	B1 makes a mention of bias, either directly, or making reference to an insufficient or biased range of responses.
	(b)(i)		Reason	1	B1 make some mention of any one of (a) an insufficient range of responses (b) no mention of money (c) no time frame in the question (d) misunderstanding of "a lot" or "not much"
	(ii)		Question	2	B2 B1 for each of the following upto B2 (a) an improved question eg time frame made clear (b) response boxes (imperfect) (c) response boxes no errors OR For suggesting a generally improved question (a) a question clearly in the context of changes to the canteen (b) at least 3 boxes showing a full range of responses
13	(a)	$20y - 18y = 16 - 9$ oe $2y = 7$	$3\frac{1}{2}$ oe	3	M1 $20y - 18y = 16 - 9$ oe M1 $2y = 7$ A1 cao
	(b)	$40 - x = 3(4 + x)$ $40 - x = 12 + 3x$ $40 - 12 = x + 3x$ $4x = 28$	7	3	M1 multiplying through by 3: $3 \times \frac{40 - x}{3} = 3 \times 4 + 3 \times x$ A1 $40 - 12 = x + 3x$ A1 cao
14	(a)		$12(x\text{-}4)$	1	B1 for $12(x - 4)$ or $12x - 48$ or $12 \times x - 48$ oe $x = 12(x - 4)$ gets B0
	(b)		$18x\text{-}48$	2	M1 $6x +$ "$12(x - 4)$" or $6x +$ "$12x - 48$" A1 ft a linear expression $18x - 48$, $2(9x - 24)$, $3(6x - 16)$, $6(3x - 8)$

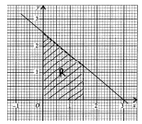
PAPER 5504					
No		**Working**	**Answer**	**Mark**	**Notes**
15		x $x^3 - 2x$ 4.1 60.7(21) 4.2 65.6(88) 4.3 70.9(07) Accept answer to 1 dp 4.22 66.7(114) or more 4.23 67.2(269) 4.24 67.7(45) 4.25 68.2(656)	4.2	4	B2 for trial $4.1 \leq x \leq 4.3$ evaluated (B1 for trial $4 < x < 5$ evaluated) B1 for different trial $4.225 \leq x \leq 4.25$ evaluated B1 (dep on at least one previous B1) for 4.2 cao
16	(a)		1.0×10^{-9}	1	B1 accept 1×10^{-9} or just 10^{-9}
	(b)	$1 \div 5 \times 10^{-9}$	2×10^{8}	2	M1 for $1 \div$ ("5×10^{-9}") or digit 2 with zeros only seen Condone omission of bracket for M1. A1 cao
17	(a)	$\frac{6.27 \times 4.52}{4.81 + 9.63} = \frac{28.3404}{14.44} = 1.962631579$	1.9626…	2	B2 for 1.9626… (B1 for 28.34 or 14.44)
	(b)		1.96	1	B1 ft from (a) as rounded to 1dp or 2dp. Do not accept 2, 2.00, but accept 2.0
18			$d = 4n + 6$	2	B2 $d = 4n + 6$ oe (B1 $d = 4n + k$, k an integer or 0, $4n + 6$, $n = 4n + 6$)
19		Vol = $\pi \times 3.8^2 \times 2.5 = \pi \times 14.44 \times 2.5$ = 45.36… × 2.5 = 113.411 Mass = "113" × 1.5 = 170.1165	170	4	M1 for $\pi \times r^2 \times 2.5$ where r = is 3.8 or 7.6 A1 if $r = 3.8$ M1 for "113" × 1.5 A1 for 169.5 – 170.3 cao

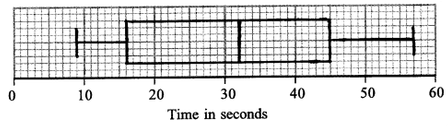
PAPER 5504					
	No	Working	Answer	Mark	Notes
20	(a)	$10^2 + 6^2$ or 136 $\sqrt{(100+36)}$ or $\sqrt{136} = 11.66\ldots$	11.7	3	M1 $10^2 + 6^2$ or 136 seen M1 (dep) $\sqrt{100+36}$ or $\sqrt{136}$ A1 11.66 – 11.7
	(b)	$\cos x = \frac{8}{10}$ or 0.8 $x = \cos^{-1} 0.8 = 36.869^\circ$	36.9	3	M1 for $\cos = \frac{8}{10}$, cos = 0.8 (oe) M1 (dep) for $\cos^{-1}$ (oe) A1 for 36.86 – 36.9
21		$18x - 6y = 99$ $\quad 12x - 4y = 66$ $8x + 6y = 18$ $\quad 12x + 9y = 27$ $26x = 117$ $\quad -13y = 39$	$x = 4\frac{1}{2}$ $y = -3$	4	M1 correct process to eliminate either x or y (condone one error) A1 cao for non – eliminated one. M1 (dep on 1st M1) for correct substitution of their found value. A1 cao (need both)
22		$\frac{133}{72} = 1.8472, \frac{160}{82} = 1.9512$ OR $\frac{72}{133} = 0.54135, \frac{82}{160} = 0.5125$ OR $\frac{160}{133} = 1.203...., \frac{82}{72} = 1.1388....$ OR $\frac{133}{160} = 0.83125...., \frac{72}{82} = 0.878$	1.84..≠ 1.95.. 1.20..≠ 1.13..	3	M1 for $\frac{133}{72}$ (= 1.8472…) oe Accept 1.8, 1.85 M1 for $\frac{160}{82}$ (=1.9512…) oe consistent pairing Accept 2.0, 1.9 **OR** M1 for $\frac{160}{133}$ (= 1.203…) oe M1 for $\frac{82}{72}$ (=1.1388) oe A1 for enough decimal places to show that the ratios are not equal; since the scale factors are different the shapes cannot be similar. NB Do Not need conclusion

PAPER 5504					
	No	Working	Answer	Mark	Notes
23	(a)		0.4, 0.6 0.4, 0.6, 0.4	2	B1 for LHS: (0.6), 0.4 B1 for RHS: 0.6, 0.4, 0.6, 0.4
	(b)	(30 × 42) – (25 × 42.8) = 1260 – 1070 = 190 190 ÷ 5 =	38	3	M1 for (30 × 42) – (25 × 42.8) or 1260 – 1070 or 190 seen M1 (dep) for "190" ÷ 5 A1 cao
24	(a)	£12000 × 0.25 = £3000; £12000 – £3000 = £9000 £9000 × 0.25 = £2250; £9000 – £2250 = £6750 £6750 × 0.25 = £1687.50; £6750 – £1687.50 =	£5062.50	3	M1 for 12000 × 0.75 (=9000) oe or £3000 or £23437.50 seen M1 (dep) for at least two further depreciation calculations (complete steps) A1 cao **OR** M2 for $12000 \times (0.75)^3$ or 5062.50 seen (M1 for $12000 \times (0.75)^n$, $n = 2$ or 4)
	(b)	0.8 × 0.8 × 0.8 × 0.8 (oe)	0.4096	2	M1 0.8^4 (oe) A1 cao

PAPER 5505					
	No	Working	Answer	Mark	Notes
1	(a)(i) (ii) (b)	 LCM = 3 × 13 × 17 = 3 × 221	2.21 0.013 663	2 2	B1 for 2.21 B1 for 0.013 M1 for 3 × 13 × 17 oe A1 for 663
2			Tick boxes 1,3 & 6	3	B1 for $\frac{\pi abc}{2d}$; B1 for $2a^2$; B1 for $2(c^2 + d^2)$ (−B1 for each additional expression ticked (>3) to a minimum of 0)
3	(a) (b)	200 × 0.2 0.2 + 0.4	40 0.6	2 2	M1 for 200 × 0.2 or $\frac{40}{200}$ seen A1 for 40 M1 for 0.2 + 0.4 A1 for 0.6
4	(a) (b)	eg 2 | 108 2 | 54 3 | 27 3 | 9 3 12	$2^2 \times 3^3$ 12	3 1	M2 for full systematic method of at least 4 divisions by prime numbers oe factor trees; condone 1 calculation error (M1 for 108 written as a correct product with only one non-prime or equivalent division or a full process with 2 calculation errors.) A1 for $2^2 \times 3^3$ (accept 2 × 2 × 3 × 3 × 3) B1 for 12
5		Perpendicular from P to intersecting arcs (within tramlines); perpendicular at least 2 cm long		2	M1 relevant pair of arcs crossing within tramlines A1 SC M1A0 for full construction of a line perpendicular to AB not through P
6		15 × 10	150 cm^3.	3	M1 for 15 × 10 A1 for 150 B1 for cm^3

PAPER 5505					
	No	Working	Answer	Mark	Notes
7	(a)		k^3.	1	B1 for k^3.
	(b)(i)	$4x + 20 + 3x - 21$	$7x - 1$	4	M1 for **three** of 4 terms $4x + 20 + 3x - 21$ (or better) A1 for $7x - 1$
	(ii)	$x^2 + 3yx + 2xy + 6y^2$	$x^2 + 5xy + 6y^2$		M1 for **three** of 4 terms $x^2 + 3yx + 2xy + 6y^2$ A1 for $x^2 + 5xy + 6y^2$
	(c)		$(p+q)(p+q+5)$	1	B1 for $(p+q)(p+q+5)$
	(d)		m^8	1	B1 for m^8.
	(e)		$6r^3t^6$	2	B2 for $6r^3t^6$ (B1 for $.....r^3t^6$ or for $6....t^6$)
8	(i)	Least length = 100.5	100.5	2	B1 for 100.5
	(ii)	Greatest length = 101.5	101.5		B1 for 101.5; ACCEPT 101.499 or better
9		$6\frac{2}{5} = \frac{32}{5}$ Area of triangle = $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ (= 2) Length of a side of sq. = $\sqrt{18 \times "2"}$ (=6) Perimeter of square = 4 × 6	24	5	B1 for $6\frac{2}{5} = \frac{32}{5}$ oe or $3\frac{1}{5} = \frac{16}{5}$ oe or $\frac{30}{8} + \frac{2}{8}$ oe (or implied by area of triangle=2) M1 for $\frac{1}{2} \times \frac{5}{8} \times 6\frac{2}{5}$ oe M1 for (area of square) = 18 × product of two lengths A1 = $\sqrt{18 \times "2"}$ A1 for 24

PAPER 5505					
	No	Working	Answer	Mark	Notes
10	(a)	$6y = 15 - 5x$	$y = \frac{15-5x}{6}$	2	M1 for either $6y = 15 - 5x$ or for $\frac{5x}{6} + y = \frac{15}{6}$ or $-6y = 5x - 15$ or a correct ft on sign error to $y =$ A1 for $y = \frac{15-5x}{6}$ oe
	(b)	$6k + 5(-21) = 15$	20	2	M1 for subst. of $x = -21$ (or $x = 21$) into given eq^n or answer to (a) A1 for $k = 20$
	(c)(i)		Region R indicated	3	B2 correct region shaded (accept unshaded if R clear) (B1 shaded (R) region satisfies 3 of the 4 given inequalities with same boundaries)
	(ii)		(1,1)		B1 for (1,1)
11	(a)		$y = 2x + 6$	2	B2 for $y = 2x + 6$ (B1 for $y = 2x + k$, $k \neq 1$ or for $y = mx + 6$, $m \neq 0$ or for $2x+6$)
	(b)	Grad of $AB = 2$; Grad of $BC = \frac{-1}{"2"}$	$y = -\frac{1}{2}x + 6$	2	M1 for Grad of $BC = \frac{-1}{"2"}, -\frac{1}{2}$ or grad of $BC = -\frac{1}{\text{grad of AB}}$ A1 ft for $y = -\frac{1}{2}x + 6$ oe ft on wrong coeff. of x in (a)
	(c)	Eg A rectangle is always a cyclic quadrilateral because the opposite angles of a rectangle always add up to 180° (90+90)		1	B1 for valid explanation. (eg lines from the pt of int. of diagonals of rect to all 4 vertices are equal(radii))
12		Vertices of new triangle at $(-1, -4)$ $(-4, 2)$ and $(2, 2)$	Correct triangle drawn	3	B3 cao (B2 for 3 correct vertices no triangle or triangle with 2 correct vertices (B1 for triangle with two of six co-ordinates correct from using P as centre or any isosceles triangle with base 6 and height 6)

PAPER 5505					
	No	Working	Answer	Mark	Notes
13	(a)		32	1	B1 for 32 (accept 31.5 to 33.5 inclusive)
	(b)			3	B1 for ends of whiskers at 9 and 57 (with a box) B1 for ends of box at 16 and 45/46 ($\pm$ 0.5) B1for median marked at "32"or complete box and whisker diagram drawn with a median inside the box
	(c)	Median(B)>Median(G); on average boys take longer IQR(B)>IQR(G); times for boys have a greater spread		2	B1 eg for comparison of medians (ft on diagrams) B1 eg for comparison of (interquartile) ranges (ft on diagram)
14		Reading top to bottom frequencies are 20; 18; 45; 52		2	B2 all correct (B1 for one frequency correct)
15	(a)	$1600 = p\,q^0$.; $400 = pq^2$ $q^2 = 0.25$	$p = 1600$ $q = 0.5$	3	M1 for either $400 = pq^2$ or $1600 = pq^0$ B1 for $p = 1600$ A1 for $q = 0.5$
	(b)	$V = pq^{-2}$	6400	2	M1 for recognition that t = –2 A1 for 6 400

PAPER 5505					
	No	Working	Answer	Mark	Notes
16	(a)	(I) $AB = AC$ (triangle ABC is isosceles) (II) PB = PC tangents (from a point to a circle are) equal (III) AP = AP (common side) so the 2 triangles are congruent ,SSS.		3	B3 for I, II, III with congruency reason (B2 for any two of I, II or III) (B1 for any one of the I, II or III)
	(b)	$BPC = 20°$ PBC (or PCB) = 90-1/2 "20" (= 80°) $BAC = PBC$ = "80"	50°	4	B4 for 50° (B3 for $BAC = 80°$) (B2 for $PBC = 80°$ or $PCB = 80°$) (B1 for $APC = 10°$ or $BPC = 20°$ or a middle angle = 90°) SC if clear numerical slip seen eg "PBC = 180 – 90 – 10 = 70" then goes on to get correct ft angle $ABC = 55$ deduct 1 from total so this cand would get B4–1 = B3
17	(a)	$\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ $= \overrightarrow{OA} + \frac{2}{3}(6\mathbf{c} - 6\mathbf{a})$ $= 6\mathbf{a} + 4\mathbf{c} - 4\mathbf{a}$	$2\mathbf{a} + 4\mathbf{c}$	3	M1 for $\overrightarrow{OP} = \overrightarrow{OA} + \overrightarrow{AP}$ or any correct vector journey involving $\overrightarrow{OP}$ M1 for $\overrightarrow{AP} = \frac{2}{3}(6\mathbf{c} - 6\mathbf{a})$ oe or $\overrightarrow{CP} = \frac{1}{3}(-6\mathbf{c} + 6\mathbf{a})$ oe or reverse vectors A1 for $2\mathbf{a} + 4\mathbf{c}$ oe (accept unsimplified)
	(b)	Eg $\overrightarrow{OM} = \overrightarrow{OC} + \overrightarrow{CM} = 6\mathbf{c} + 3\mathbf{a}$ $\overrightarrow{OM} = 1.5\overrightarrow{OP}$	$\overrightarrow{OM} = 1.5\overrightarrow{OP}$ so OPM is a straight line	2	B1 for $\overrightarrow{OM} = 6\mathbf{c} + \frac{1}{2}(6\mathbf{a})$ or $\overrightarrow{PM} = 2\mathbf{c} + \mathbf{a}$ unsimplified or reverse vectors B1 for a fully correct proof.

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	No	Working	Answer	Mark	Notes
18	(a)		4	1	B1 for 4 condone $\pm$ 4
	(b)		2	1	B1 for 2 condone ± 2
	(c)	$\sqrt{160} = 4\sqrt{10}$; $\left[\frac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right]\times 100$ $\left[\frac{6\sqrt{10}-\sqrt{10}}{6\sqrt{10}}\right]\times 100$	$\frac{500}{6}$	4	B1 for **either** $\sqrt{160} = 4\sqrt{10}$ or $\sqrt{8} = 2\sqrt{2}$ **or** $\sqrt{20} = 2\sqrt{5}$ M1 for $\left[\frac{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)-\sqrt{2}\times\sqrt{5}}{\sqrt{8}\left(\sqrt{5}+\sqrt{20}\right)}\right]$ oe $(\times 100)$ B1 for either $6\sqrt{10} - \sqrt{10}$ or $6\sqrt{10}$ A1 for $\frac{500}{6}$ (accept 83.3 if no obvious earlier error)

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	No	Working	Answer	Mark	Notes
19	(a)(i)		$(2x-7)(x-14)$	3	M1 x^2 term and constant term (± 98) obtained or $2x(x-14) - 7(x-14)$ or $x(2x-7) - 14(2x-7)$ A1 for $(2x-7)(x-14)$
	(ii)		$x = \frac{7}{2}$; $x = 14$		B1ft ft (i) provided of form $(2x\pm a)(x\pm b)$
	(b)(i)		$\frac{7}{n+7}$	3	B1 for $\frac{7}{n+7}$ oe
	(ii)	$\frac{7}{n+7} = \frac{2}{5} \Rightarrow 2(n+7) = 5 \times 7$ $2n = 21$	$n=10.5$ is not possible since n has to be an integer		M1 for $2(n+7) = 5\times 7$ or $n+7=5\times 3.5$ (can be implied) ft (b)(i) fractional in terms of n and < 1 A1 ft for $n=10.5$ not possible (since n not integer) oe
	(c)	$2\times\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right) = \frac{4}{9}$ $14n\times 9 = 4(n+7)^2$ $14n\times 9 = 4(n^2+14n+49)$ $4n^2+56n+196-126n = 0$	$2n^2 - 35n + 98 = 0$	5	M1 for $\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right)$ seen M1 for $2\times\left(\frac{n}{n+7}\right)\times\left(\frac{7}{n+7}\right)$ oe $(=\frac{4}{9})$ M1(dep on 1st M) elimination of fractions within an equation B1 3 terms correct in expansion of $(n+7)^2 = n^2 + 7n + 7n + 49$ A1 full valid completion to printed answer

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	No	Working	Answer	Mark	Notes
	(d)	$\frac{7}{n+7}\times\frac{7}{n+7}=\frac{7}{21}\times\frac{7}{21}=$	$\frac{1}{9}$	2	M1 for $\frac{7}{n+7}\times\frac{7}{n+7}$ or better or ft [answer (b)(i)]^2 or $1-\frac{4}{9}-(\frac{n}{n+7})^2$ A1 for $\frac{1}{9}$ oe cao
20	(a)(i)		$y=1+\sin x$	2	B1 for $y=1+\sin x$
	(ii)		$y=2\sin x$		B1 for $y=2\sin x$ SC both (i) f(x) + 1, (ii) 2f(x) B1
	(b)	Stretch parallel to y-axis scale factor 3 Stretch parallel to x-axis scale factor $\frac{1}{2}$		3	M1 for 'stretch' A1 for Stretch parallel to y-axis scale factor 3 oe A1 for Stretch parallel to x-axis scale factor $\frac{1}{2}$ oe SC if M0 award BI for "sf 3 vertically" **and** "sf $\frac{1}{2}$ horizon."

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No	**Working**	**Answer**	**Mark**	**Notes**
1		Question	2	B1 for each of the following upto B2 (a) an improved question eg time frame made clear (b) response boxes (imperfect) (c) response boxes no errors OR For suggesting a generally improved question (a) a question clearly in the context of changes to the canteen (b) at least 3 boxes showing a full range of responses
2	Locus (circle) drawn & shaded		2	B1 circle centre Manchester ±2mm B1 shading with accurate or approximate circle within tolerance
3 (a)		182, 178, 180, 184	2	M1 mean of any three consecutive months, eg (147 + 161 + 238) ÷ 3 oe A1 cao
(b)	Sale price = 80% Fun Friday price = 70% of 80% = 56% (oe)		2	B1 B1 for a fully correct explanation involving a worked example (oe) B1 a partially complete explanation
4	x $x^3 - 2x$ 4.1 60.7(21) 4.2 65.6(88) 4.3 70.9(07) 4.22 66.7(114) 4.23 67.2(269) 4.24 67.7(45) 4.25 68.2(656)	4.2	4	B2 for trial $4.1 \leq x \leq 4.3$ evaluated (B1 for trial $4 < x < 5$ evaluated) B1 for different trial $4.225 \leq x \leq 4.25$ evaluated B1 (dep on at least one previous B1) for 4.2 cao

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	No	Working	Answer	Mark	Notes
5	(a)		1.0×10^{-9}	1	B1 accept 1×10^{-9} or just 10^{-9}
	(b)	$1 \div (5 \times 10^{-9})$	2×10^{8}	2	M1 for $1 \div$ ("5×10^{-9}") or digit 2 with zeros only seen Condone omission of bracket for M1. A1 cao
6	(a)	$\frac{6.27 \times 4.52}{4.81 + 9.63} = \frac{28.3404}{14.44} = 1.962631579$	1.9626…	2	B2 for 1.9626… (B1 for 28.34… or 14.44)
	(b)		1.96	1	B1 ft from (a) as rounded to 1dp or 2dp. Do not accept 2, 2.00, but accept 2.0
7			$d = 4n + 6$	2	B2 $d = 4n + 6$ oe (B1 $d = 4n + k$, k an integer $\neq 6$, $4n + 6$, $n = 4n + 6$)
8		Vol = $\pi \times 3.8^2 \times 2.5 = \pi \times 14.44 \times 2.5$ $= 45.36\ldots \times 2.5 = 113.411$ Mass = "113" × 1.5 = 170.1165	170	4	M1 for $\pi \times r^2 \times 2.5$ where r = is 3.8 or 7.6 A1 if $r = 3.8$ M1 for "113" × 1.5 A1 for 169.5 – 170.3 cao

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	No	Working	Answer	Mark	Notes
9	(a)	$10^2 + 6^2$ or 136 $\sqrt{(100 + 36)}$ or $\sqrt{136} = 11.66\ldots$	11.7	3	M1 for $10^2 + 6^2$ or 136 seen M1 (dep) $\sqrt{100+36}$ or $\sqrt{136}$ A1 11.66 – 11.7
	(b)	Cos x = 8/10 or 0.8 $x = \cos^{-1} 0.8 = 36.869^o$	36.9	3	M1 for cos = $\frac{8}{10}$, cos = 0.8(oe) M1 (dep) for $\cos^{-1}$ (oe) A1 for 36.86 – 36.9 M1 Use of sine rule and x found M1 for $x = 90 - \sin^{-1}$("0.8") A1 for 36.86 – 36.9
10		$18x - 6y = 99$ $12x - 4y = 66$ $8x + 6y = 18$ $12x + 9y = 27$ $26x = 117$ $-13y = 39$	$x = 4\frac{1}{2}$ $y = -3$	4	M1 correct process to eliminate either x or y (condone one error) A1 cao for non – eliminated one. M1 (dep on 1st M1) for correct substitution of their found value. A1 cao (need both)

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	No	Working	Answer	Mark	Notes
11		$\frac{133}{72} = 1.8472\,,\ \frac{160}{82} = 1.9512$ OR $\frac{72}{133} = 0.54135, \frac{82}{160} = 0.5125$ OR $\frac{160}{133} = 1.203...., \frac{82}{72} = 1.1388....$ OR $\frac{133}{160} = 0.83125...., \frac{72}{82} = 0.878$	1.84..≠ 1.95.. 1.20..≠ 1.13..	3	M1 for $\frac{133}{72}$ (= 1.8472…) oe Accept 1.8, 1.85 M1 for $\frac{160}{82}$ (=1.9512…) oe consistent pairing Accept 2.0, 1.9 **OR** M1 for $\frac{160}{133}$ (= 1.203…) oe M1 for $\frac{82}{72}$ (=1.1388) oe A1 for enough decimal places to show that the ratios are not equal; since the scale factors are different the shapes cannot be similar. NB Do Not need conclusion
12	(a)	£12000 × 0.25 = £3000; £12000 – £3000 = £9000 £9000 × 0.25 = £2250; £9000 – £2250 = £6750 £6750 × 0.25 = £1687.50; £6750 – £1687.50 =	£5062.50	3	M1 for 12000 × 0.75 (=9000) oe or £3000 or £23437.50 seen M1 (dep) for at least two further depreciation calculations (complete steps) A1 cao **OR** M2 for 12000 × $(0.75)^3$ or 5062.50 seen (M1 for 12000 × $(0.75)^n$, $n = 2$ or 4)
	(b)	0.8 × 0.8 × 0.8 × 0.8 (oe)	0.4096	2	M1 0.8^4 (oe) A1 cao

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No		**Working**	**Answer**	**Mark**	**Notes**
13		$r^2 = \frac{3\times10}{\pi h} = \frac{3\times10}{\pi 1.5} = \frac{3\times10}{4.712..} = 6.36, 6.37$ $r = \sqrt{6.366\ldots}$	2.52-2.54	3	M1 for correct rearrangement to give $r^2 = \frac{3V}{\pi h}$ or $30 \div 4.712..$ or $6.36 - 6.37$ *Allow 0.3, 0.33 for* $\frac{1}{3}$ M1 (dep) for $\sqrt{}$ A1 cao 2.52 – 2.54
14	(a)		0.4 0.6,0.4, 0.6,0.4	2	B1 for LHS: (0.6), 0.4 B1 for RHS: 0.6, 0.4, 0.6, 0.4
	(b)	0.6×0.6	0.36	2	M1 $0.6 \times$ "0.6" [0 < "0.6" < 1] A1 cao
	(c)	$(30 \times 42) - (25 \times 42.8) = (1260 - 1070 = 190$ $190 \div 5 =$	38	3	M1 for $(30 \times 42) - (25 \times 42.8)$ or $1260 - 1070$ or 190 seen M1(dep) for "190" ÷ 5 A1 cao 38

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	No	Working	Answer	Mark	Notes
15	(a)	$S = \frac{k}{f^2};\ 125 = \frac{k}{8^2};\ k = 8000$	$S = \frac{8000}{f^2}$	3	M1 for $S = \frac{k}{f^2}$ M1 for $125 = \frac{k}{8^2}$ A1 cao These marks can be awarded if the full formula appears in part (b), rather than in part (a). [SC: $S = \frac{125}{64} f^2$ M1 M0 A0, $S = 1.95(3125) f^2$ M1 M0 A0 $S = \frac{1000}{f}$ M1 M0 A0]
	(b)		500	1	B1 cao

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No	**Working**	**Answer**	**Mark**	**Notes**
16	$0.5 \times 3.2 \times 8.4 \times \text{Sin } B = 10$ $\sin B = 0.74404\ldots$ 48.077 $AC^2 = 3.2^2 + 8.4^2 - 2 \times 3.2 \times 8.4 \times \cos B$ $AC^2 = 44.8815\ldots..$ $AC = 6.69\ (936\ldots)$ Perimeter = 18.3 Use the altitude AD, $\frac{h \times 8.4}{2} = 10 \Rightarrow h = (2.381)$ $BD = \sqrt{3.2^2 - h^2} = 2.139$ $DC = 6.261$ $AC = \sqrt{2.38^2 + '6.261'^2} = 6.69(936)$ Perimeter = 18.3	18.3	6	M1 for $0.5 \times 3.2 \times 8.4 \times \sin B$ (= 10) A1 for sin B = 0.74(404…) or B = 47.7 – 48.1 M1 for $3.2^2 + 8.4^2 - 2 \times 3.2 \times 8.4 \times \cos$ "48.077" M1(dep) for AC^2 = "44.8(815)"….. with correct order of evaluation A1 AC = 6.69 – 6.7 A1 18.29 – 18.3 **for** $\frac{h \times 8.4}{2} = 10 \Rightarrow h = (2.381)$ M1 for $BD^2 = 3.2^2 - "2.381"^2$ A1 BD = 2.1 – 2.2 M1 (dep) $AC^2 = "2.381"^2 + "6.261"^2$ A1 AC = 6.69 – 6.7 A1 18.29 – 18.3

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	No	Working	Answer	Mark	Notes
17	(a)	$(x + 8)^2 = x^2 + (x + 5)^2$ $x^2 + 16x + 64 = 2x^2 + 10x + 25$		4	B1 for angle $OTA = 90°$ (implied by use of Pythagoras with OA as hypotenuse) M1 $(x + 8)^2 = x^2 + (x + 5)^2$ oe M1 for correct squaring of x+8 or x+5 A1 for completion following correct working
	(b)	$(+6 + \sqrt{(6^2 - - 4\times39)})/2$ $= (6 \pm \sqrt{(36 + 156)})/2$ $= (6 \pm \sqrt{192})/2 = (6 + 13.856)/2$	9.93	3	M1 for substitution into quadratic formula, allow sign errors in b and c M1 for $x = (6 \pm \sqrt{192})/2$ [+ alone will do] A1 for 9.92 – 9.93
					M1 for $(x-3)^2-9-39$ M1 for $x = 3 \pm \sqrt{48}$ [+ alone will do it] A1 for 9.92 – 9.93 T&I= 9.93 gets M1,M0,A0
18		$EB = 60 \times \tan 30°$ $BD = \sqrt{(60^2 + 60^2)}$ $\tan BDE = 34.64 \div 84.85$	22.2°	4	M1 for $EB = 60\times\tan30$ M1 for $BD = \sqrt{(60^2 + 60^2)}$ M1 for $\tan BDE =$ "34.64" ÷ "84.85" A1 22.17 – 22.21
		$EB = 60 \times \tan 30°$ (= 34.64) $ED^2 = 60^2 + \left(\frac{60}{\cos 30}\right)^2$ $ED = \sqrt{8400} = (91.65)$ $\text{Angle} = \sin^{-1}\left(\frac{EB}{\sqrt{8400}}\right) = 22.2$			M1 for $EB = 60 \times \tan 30°$ oe M1 for fully correct method for ED M1 for $\sin BDE = \left(\frac{'34.84'}{'\sqrt{8400}'}\right)$ (oe) A1 22.17 – 22.21

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	No	Working	Answer	Mark	Notes
19	(a)	$x^2 + 6^2 = 25$ $x^2 = -11$		2	M1 substitutes y=6 to get x^2+36 = 25 A1 deduces x^2=25-36<0; impossible, (so line does not intersect curve)
	(b)	$y^2 = (2x - 2)^2$ $x^2 + (2x - 2)^2 = 25$ $x^2 + 4x^2 - 8x + 4 = 25$ $5x^2 - 8x + 4 - 25 = 0$ $5x^2 - 8x - 21 = 0$ $(5x + 7)(x - 3) = 0$ or $x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4 \times 5 \times (-21)}}{10} = \frac{8 \pm \sqrt{484}}{10}$ So $x = 3$, or $x = -1.4$ Subs into either equation gives: $y = 4$, or $y = -4.8$	$x = 3$ $y = 4$ $x = -1.4$ $y = -4.8$	6	M1 $y^2=(2x-2)^2$ seen or implied A1 $x^2 + 4x^2 - 8x + 4 = 25$ (oe expanded form) M1 correct attempt to solve 3 term quadratic equation A1 $x = 3$, $x = -1.4$ M1 (dep on previous Ms) Sub one value of x into either equation gives: A1 $y = 4$, $y = -4.8$ NB: incorrectly matched pairs loses the final A1.

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	No	Working	Answer	Mark	Notes
20	(a)	400.005 ÷ 59.95 = 6.672310 6.672310 ÷ 1000 × 3600 = 24.02032 399.995 ÷ 60.05 = 6.661032 6.661032 ÷ 1000 × 3600 = 23.97972	24.020 23.980	5	B1 for 400.005 or 59.95 seen oe M1 for "400.005" ÷ "59.95" where "400.005" ∈ [400.005,400.5] and "59.95" ∈ [59.5,59.95] oe B1 for 399.995 or 60.05 seen oe M1 for "399.995" ÷ "60.05" where "399.995" ∈ [399.5,399.95] and "60.05" ∈ [60.05,60.5] oe A1 23.979-23.980 and 24.020-24.0204
	(b)	24.0 because to 1dp the answers are the same		1	B1cao for 24.0 with reason
	(c)	177 × 50/477 = 18.553 → 19 → 18 111 × 50/477 = 11.635 → 12 86 × 50/477 = 9.0147 → 9 82 × 50/477 = 8.595 → 9 21 × 50/477 = 2.201 → 2	18 12 9 9 2	3	M1 for $\frac{50}{"477"} \times 177$ or 111 or 86 or 82 or 21 A1 for all integers or better answers, at least 3 correct A1 cao
21	(a)	$40 - x = 3(4 + x)$ $40 - x = 12 + 3x$ $40 - 12 = x + 3x$ $4x = 28$	7	3	M1 multiplying through by 3: $3 \times \frac{40 - x}{3} = 3 \times 4 + 3 \times x$ A1 $40 - 12 = x + 3x$ A1 cao
	(b)	$\frac{2x(2x - 3)}{(2x - 3)(2x + 3)} = \frac{2x}{2x + 3}$	$\frac{2x}{2x + 3}$	3	B1 for $(2x-3)(2x+3)$ B1 for $2x(2x-3)$ or $(2x + 0)(2x + 3)$ B1 cao

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No	**Working**	**Answer**	**Mark**	**Notes**
22	Distance from x axis is y. Distance from (0, 2) is $\sqrt{(x^2+(y-2)^2)}$ $y^2 = x^2 + (y-2)^2$ $y^2 = x^2 + y^2 - 4y + 4$ $0 = x^2 - 4y + 4$ $4y = x^2 + 4$ and finish		4	B1 for $(x-0)^2 + (y-2)^2$ or $\sqrt{((x-0)^2+(y-2)^2)}$ oe seen B1 for $y = \sqrt{(x-0)^2+(y-2)^2}$ or $y^2 = (x-0)^2 + (y-2)^2$ oe B1 $(y-2)^2 = y^2 - 4y + 4$ seen B1 for $4y = x^2 + 4$ and finish

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NOTES ON MARKING PRINCIPLES

1 Types of mark

- M marks: method marks
- A marks: accuracy marks
- B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only
ft – follow through
isw – ignore subsequent working
SC: special case
oe – or equivalent (and appropriate)
dep – dependent
indep - independent

3 No working

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

4 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.
If there is no answer on the answer line then check the working for an obvious answer.

5 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

6 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

8 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

9 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

Paper 5521/01					
No		Working	Answer	Mark	Notes
1	(a)		17252	1	B1 cao
	(b)		5400	1	B1 cao
	(c)		thousands, 1000, 4000	1	B1
2	(a)		grams, g	3	B1 oe spelling
			centimetres, cm		B1 oe spelling
			millilitres, m*l*, cm^3		B1 oe spelling
	(b)		5	1	B1 cao
3	(a)		106, 102	1	B1 cao ignore extras
	(b)		eg take away 4	1	B1 could be indicated on the diagram
	(c)		46	1	B1 cao

Paper 5521/01

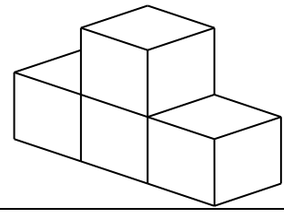
No	Working	Answer	Mark	Notes
4	286 × 43 = 11440 + 12298 = 12298 43 × 286 = 258 + 3440 + 8600 = 12298 286 × 40 = 1140 286 × 3 = 858 1140+858=12298 x | 40 | 3 | 200 | 8000 | 600 | 8600 80 | 3200 | 240 | 3440 6 | 240 | 18 | 258 | | | 12298 2 8 6 1 | 0 8 | 3 2 | 2 4 | 4 2 | 0 6 | 2 4 | 1 8 | 3 2 9 8	12298	3	M2 for complete correct method (condone one computational error) (M1 for complete correct method with two computational errors) A1 cao OR B2 inside of grid completed (condone missing zeros and one error) (B1 2 or 3 errors) B1 cao
5 (a)		18, 69	1	B1
(b)(i)		18 or 36	1	B1
(ii)		16 or 36	1	B1
(c)		factor	1	B1
(d)(i)		18	3	B1 cao
(ii)		11 or 88		B1
(iii)		69		B1 cao

Paper 5521/01					
No		**Working**	**Answer**	**Mark**	**Notes**
6	(a)		April & May	1	B1 for both
	(b)		Daffodil	1	B1
	(c)		Feb	1	B1
	(d)		Crocus	1	B1
	(e)(i)		$\frac{1}{5}$	2	B1 for $\frac{1}{5}$ oe
	(ii)		× from 56 mm to 64 mm from 0		B1 A single mark on the line, between 56 mm and 64 mm measured from end 0
7	(a)	$\frac{40}{100}$	$\frac{2}{5}$	2	B2 for $\frac{2}{5}$ B1 for $\frac{40}{100}$ or $\frac{4}{10}$ or $\frac{20}{50}$ or $\frac{8}{20}$
	(b)		0.98	1	B1 cao
	(c)		7 500 000	1	B1 cao
	(d)		25	1	B1 cao
	(e)		60	1	B1 cao

Paper 5521/01					
No		**Working**	**Answer**	**Mark**	**Notes**
8	(a)(i)		(0, 2)	2	B1 cao
	(ii)		(4, 1)		B1 cao
	(b)		$(2, 1\frac{1}{2})$ marked	1	B1 Allow 2mm tolerance from $(2, 1\frac{1}{2})$
9	(a)		2.40	1	B1 cao could be indicated on the diagram
	(b)	1.60 + 0.40	2.00	2	M1 for appropriate sum or product in £ or p or 200 seen eg 1.60 + 0.40, 160 + 40, 0.80 + 0.80 + 0.40, 80 + 80 + 40, 0.08×25, 0.80×2.5, 200 A1 cao
	(c)	$1\div0.8$ or $2.50\div2$	1.25	2	M1 for $1.00\div0.8$ or $2.50\div2$ or 125 or appropriate combination eg $1+\frac{1}{2}\times0.50$ A1 cao
10	(a)		hexagon	1	B1 Condone spelling error
	(b)		Sum of angles at a point is 360°	2	B1 for 360 seen B1 for "point", "complete turn" or "a circle" or similar unless accompanied by an incorrect angle SC If neither B1 scored, award B1 for a clear indication that the size of an angle, other than *x*, is 90° or a right angle (may be on diagram)
	(c)	$30\times4+8\times2$	136	2	M1 $30\times4+8\times2$ or attempt to sum 5 or 6 lengths A1 cao

Paper 5521/01					
No		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		13, 67, 76, 103, 130	5	B1 cao
	(b)		$-7, -3, -1, 0, 5$		B1 cao
	(c)		0.07, 0.072,0.7, 0.702, 0.72		B1 cao
	(d)		0.6, $\frac{2}{3}$, 70%, $\frac{3}{4}$		B2 (B1 for any 3 in correct order)
12	(a)		16 30	1	B1 Accept 4 30 pm Do not accept 4 30
	(b)(i)	$33.56 \div 4$ oe	8.39	3	M1 for $33.56 \div 4$ oe eg $3356 \div 4$, division by 2 twice A1 cao
	(ii)		9		B1 ft from "8.39" unless whole number of pounds
13	(a)		6 cm^2	3	B2 for 6 cao for numerical answer (B1 for $5.5 < \text{Area} \leq 7$) then B1 (indep) for cm^2 with or without numerical answer
	(b)	See diagram	Correct shape	2	B2 (B1 for any 2 sides correct or a correct enlargement scale factor $\neq 1$ or 2)

Paper 5521/01				
No	**Working**	**Answer**	**Mark**	**Notes**
14 (a)	$(4+3)\times10$	70	2	M1 for (4 + 3) × 10 A1 cao
(b)	$120\div10-3$	9	2	M1 for $\frac{120}{10}$ or 12 seen eg $12\times10=120$ A1 cao
(c)		$C=10(n+3)$	3	B3 for $C=10(n+3)$ oe such as $C=(n+3)\times10$ (B2 for correct RHS or $C=n+3\times10$, $C=10n+3$ oe B1 for C = some other linear expression in n or for $n+3\times10$, $10n+3$ etc) Note: $C = n$ scores no marks
15		11 13 16 8 21	2	B2 all correct (B1 for 2 correct)

Paper 5521/01					
No		**Working**	**Answer**	**Mark**	**Notes**
16	(a)		$2p + 4q$	2	B2 for $2p + 4q$ (accept $2 \times p$ etc) (B1 for $2p$ or $4q$)
	(b)		$2y^2$	1	B1 accept $2 \times y^2$ oe inc $2 \times y \times y$
	(c)		$3c + 4d$	2	B2 for $3c + 4d$ (accept $3 \times c$ etc) (B1 for $3c$ or $4d$)
	(d)		$8pq$	1	B1 accept in any order but must not include $\times$ sign
17	(a)(i)		60	2	B1 cao
	(ii)		eg top triangle is equilateral		B1 for reason
	(b)		150	2	M1 for $\frac{180-"60"}{2} + 90$ A1 ft from (a)(i) if $x < 90$ SC B1 for "60" + 90 if $x < 90$
18			40	2	M1 for 60×2 or 120 or $60 \div 3$ or 20 or $\frac{120}{180}$ A1 cao
19			correct drawing	2	B2 Condone hidden detail shown with solid lines and missing lines on front face (B1 for a correct sketch with other incorrect sketch(es) or for prism with correct cross section >1 cube wide or for attempt to draw prism with correct cross section or prism with correct plan and side elevation)

Paper 5521/01					
No		**Working**	**Answer**	**Mark**	**Notes**
20		$\frac{600}{3\times10}$ or $\frac{640}{3.2\times10}$	$20\text{-}21\frac{1}{3}$	2	M1 for rounding at least two of the numbers to 1 sf or for sight of 640, 3.2 or 640, 32 or 600, 32 or 30 seen A1 for $20\text{-}21\frac{1}{3}$ Note: 20.3125 scores M0 A0
21	(a)		Points plotted	1	B1 $\pm$ 1 full (2 mm) square
	(b)		positive	1	B1 cao
	(c)		Line of best fit	1	B1 Must pass through (42.5, 1.45), (42.5, 1.55) AND (67.5, 1.75), (67.5, 1.85)
	(d)		~ 1.65	1	B1 ft from single line segment with positive gradient $\pm$ 1 full (2 mm) square
22	(a)	eg $50\times\frac{2000}{500}$	200	2	M1 for $\frac{2000}{500}$ or 4 seen A1 cao
	(b)	eg $400\times\frac{750}{500}$	600	2	M1 for $\frac{750}{500}$ or 1.5 seen or 400 + 200 A1 cao

Paper 5521/01					
No		**Working**	**Answer**	**Mark**	**Notes**
23	(a)	$4\times3-2\times1$ $12-2$	10	3	M1 for 3×4 (=12) or 1×2 or attempt to divide diagram up into rectangles M1 "12"– "2" or sum of areas of rectangles A1 cao
	(b)(i)	$\frac{10}{100}\times680$ or $680\div10$ 680 + 68	748	5	M1 $\frac{10}{100}\times680$ or 680÷10 or 68 seen M1 (dep) 680 + "68" or M2 for 680×1.10 A1 cao
	(ii)	"748"÷50 or 14.96	15		M1 For "748"÷50 or 14.96 Accept "748" rounded up or down to next 50 followed by $\div50$ A1 ft from (b)(i) rounded up SC B1 for 680 (seen) leading to 14

Paper 5521/02					
No		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	Plain llll lll 8 Chicken lll 3 Bovril llll 5 S & Vin llll 4		3	M1 for attempt to tally A1 for 1 frequency correct or all tallies correct A1 for all frequencies correct (accept for /20)
	(b)		4	1	B1 ft
	(c)		Plain or 8	1	B1 ft
2	(a)(i)		11	2	B1 cao
	(ii)		16		B1 cao
	(b)	See diagram	Correct lines	2	B2 cao for both lines correct (B1 for one line correct)
	(c)		12	2	B2 cao (B1 for 11 or 13)
3	(a)		580	1	B1 for 580 (± 2) could be written on line
	(b)		7.2	1	B1 for 7.2 ± 0.02 could be written on line
	(c)		Arrow at 48	1	B1 allow ± half graduation
	(d)		Arrow at 6.7	1	B1 allow ± half graduation
4	(i)		Cylinder	2	B1 ignore spelling
	(ii)		Cuboid		B1 ignore spelling
5	(a)	£10 – (£2.15 + £2.30)	5.55	4	M1 £2.15 + £2.30 A1 for 4.45 M1 £10 – "4.45" A1 cao
	(b)	£60 ÷ £2.80 = 21.42857	21	2	M1 for £60 ÷ 2.80 or sight of digits 214… A1 for 21
	(c)	$120 \times 25 \div 100$	30	2	M1 ¼ of £120 (oe) A1 cao SC B2 for £90

Paper 5521/02					
No		Working	Answer	Mark	Notes
6	(a)(i)		143^0	2	B1 for 143 ($\pm 2^0$)
	(ii)		Obtuse		B1 for obtuse (ignore spelling)
	(b)	See diagram	Accurate drawing	1	B1 for accurate drawing ± 2mm
7	(a)(i)		5	2	B1 cao
	(ii)		23		B1 cao
	(b)	$\times 2 - 1$		1	B1 for explaining a suitable method
	(c)	See their diagram		1	B1 for a correct diagram
	(d)		14, 17	2	B2 cao for both (B1 for one only ft from their 14)
8	(a)		90	1	B1 accept –90
	(b)		540	1	B1 accept –540
	(c)		Jupiter	1	B1 accept –150
	(d)		- 230	1	B1 cao

Paper 5521/02					
No		Working	Answer	Mark	Notes
9	(a)	2658 – 2430 = 228 "228" × 32	72.96	4	M1 2658 – 2430 A1 228 M1 "228" × 32 or "228" × 0.32 or digits 7296 seen A1 cao **Or** M1 for 2430 × 32 (or digits 77760 seen) or 2658 × 32 (or digits 85056 seen) A1 if 1 correct M1 for "85056" – "77760" or 7296 seen A1 cao
	(b)	$\frac{2}{5} \times 145 = 58$ 145 – "58"	87	3	M1 $\frac{2}{5} \times 145$ (or M1 $\frac{3}{5}$ seen) A1 58 (or M1 $\frac{3}{5} \times 145$) A1 for 87 ft
	(c)(i) (ii)		80 125	2	B1 for 80 (± 1) B1 125 (± 3)

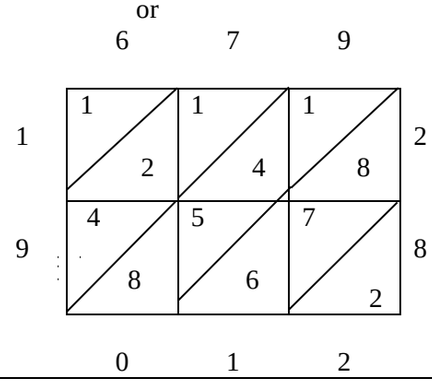
Paper 5521/02					
No		**Working**	**Answer**	**Mark**	**Notes**
10	(a)		1.5 – 2.0	1	B1 for height between 1.5m – 2.0m inclusive
	(b)	Height of man × "2.5"	3 – 6	3	B3 for height between 3m – 6m inclusive (B2 for multiplying (a) by a number between 2 and 3 inclusive) (B1 for multiplying (a) by a number)
11		61 – 19 = 42 42 ÷ 3 = 14	14	2	M1 for – 19 or 42 seen A1 cao
12	(a)		5	1	B1
	(b)	4+5+5+5+4+3+2+1+4+5 = 38 mean = 38 ÷ 10 = 3.8	3.8	2	M1 for attempt to add and ÷ 10 or 3.7 or 3.9 seen A1 for 3.8 SC B1 for 33.5 seen
13	(a)		$3x$	1	B1 cao Accept $3 \times x$, $x3$, $x \times 3$, $x + x + x$
	(b)		x - 9	1	B1 for x – 9 cao
14	(a)	14.44 – 8.660254038	5.77974(…)	2	M1 for 14.44 seen or 8.66(…) or 5.7 or 5.8 or better rounded or truncated
	(b)		6	1	A1 cao B1 ft
15		15 ÷ 24	62.5	2	M1 for 15 ÷ 24 or 1500 ÷ 24 or sight of digits 625 A1 cao
16		2.10 × 450	945	2	M1 for digits 210 × 450 or sight of digits 945 A1 cao
17		See diagram	$2(y + y)$ $2y + 2y$	2	B1 for $2(y + y)$ B1 for $2y + 2y$ (Deduct B1 for each additional tick (>2) to min 0)
18		360° ÷ 18 (=20) Sector angles: G= 60; S= 80; B=220; Correct sectors labelled correctly Use angle measurer	Angles drawn, labelled	4	B4 for fully correct and labelled pie chart (B3 for all angles correct or for a labelled pie chart with 2 correct angles) (B2 for labelled pie chart with 1 correct angle drawn) (B1 for 360° ÷ 18 or 20 seen or implied)

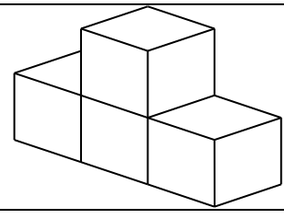
Paper 5521/02					
No		Working	Answer	Mark	Notes
19	(a)		Correct plane	2	B2 for a correct plane defined by showing at least 2 lines. (B1 for a line of symmetry on one face)
	(b)		Correct net	2	B2 cao (B1 for 2 equilateral triangles joined appropriately to at least one rectangle or for 1 equilateral triangle joined appropriately to one of 3 rectangles)
	(c)		Correct drawing	2	B1 for two extra sides of length 6cm (± 2mm) B1 for construction arcs 6cm from each of the ends of the given line.
20	(a)		15	1	B1 for 15 (± 1)
	(b)		15	1	B1 for 15 (± 0.4)
	(c)			2	B1 horiz. line from (2, 20) to (3, 20) B1 line from (3, 20) to (5,0) or horizontal translation of it SC B1 for any journey ending at (5,0)
21	(a)	$x+4+x+x+4+x$	$4x+8$	2	M1 for attempting to add x, $x + 4$, x, $x + 4$ may be implied by $4x + a$ ($a > 0$) A1 for $4x + 8$ or $4(x + 2)$
	(b)	$4x + 8 = 54$ $4x = 46$ $x = 11.5$ Length = "11.5" + 4	15.5	3	M1 for "$4x + 8$" = 54 A1 cao for 11.5 seen B1 ft for "11.5" + 4
22		0.4 + 0.15 1 – "0.55"	0.45	2	M1 for 1 – sum A1 for 0.45 o.e. SC B1 for 0.81
23	(a)		3:1	1	B1 cao
	(b)	$\pi \times 2.45$	7.7	2	M1 for $\pi \times 2.45$ (accept π as 3.1 or better) A1 for 7.59 to 7.70

Paper 5521/02					
No		**Working**	**Answer**	**Mark**	**Notes**
24		7×10000	70 000	2	M1 for 7 X 10 000 or 7 X 100 X 100 A1 cao
25		5.40 ÷ 3 × 7	12.60	3	M1 for 5.40 ÷ 3 or sight of 1.8 M1 dep for "1.80" × 7 A1 for 12.6 or equivalent
26		7.60 x $\frac{17.5}{100}$ = 1.33 7.60 + 1.33 = 8.93 1650 x "8.93"	£14 734.50	4	M1 for 7.60 x $\frac{17.5}{100}$ or 1.33 seen or 7.60 x 1.175 (oe) (Award M1 for 10%, 5% and 2½% correctly calculated) A1 for 8.93 or 893 M1 for 1650 x "8.93" or digits 147345 seen A1 cao Accept 14734.5 **Alternative** M1 for 1650 × 7.6(0) or 12540 seen M1 for "12540" × $\frac{17.5}{100}$ or 2194.5 seen or "12540"× 1.175 (oe) (Award M1 for 10%, 5% and 2½% correctly calculated) M1 for "12540" + "2194.5" (dep on both previous method marks) or digits 147345 seen A1 cao accept 14 734.5

Paper 5523/03				
No	**Working**	**Answer**	**Mark**	**Notes**
1		Correct shape	2	B2 B1 for any 2 sides correct, or a correct enlargement scale factor ≠1 or 2.
2 (a)		11 13 16 8 21	2	B2 all correct (B1 for 2 correct) sign
(b)		$\frac{31}{80}$	1	B1 oe
3 (a)		$2p+3q$	2	B2 for $2p+3q$ (accept $2\times p$ etc) (B1 for $2p$ or $3q$ or $2p3q$)
(b)		$2y^2$	1	B1 accept $2\times y^2$ or $2\times y\times y$
(c)		$3c+4d$	2	B2 for $3c+4d$ (accept $3\times c$ etc) (B1 for $3c$ or $4d$ or $3c4d$)
(d)		$8pq$	1	B1 accept in any order but must not include ×
4 (a)(i)		60	2	B1 cao
(ii)		eg top triangle is equilateral		B1 for reason
(b)		150	2	M1 $\frac{(180-"60")}{2}+90$ A1 ft from (a)(i) if $x < 90°$ SC:B1 for answer from "60" + 90 if $x < 90°$

Paper 5523/03					
No		**Working**	**Answer**	**Mark**	**Notes**
5	(a)	$4\times3-2\times1$ $12-2$	10	3	M1 for 3×4 (=12) or 1×2 or attempt to divide diagram up into rectangles M1 "12" – "2" A1 cao
	(b)(i)	$\frac{10}{100}\times680$ or $680\div10$ 680 + 68	748	5	M1 $\frac{10}{100}\times680$ or $680\div10$ or 68 seen M1 (dep) 680 +"68" (or M2 for 680×1.10) A1 cao
	(ii)	"748" ÷ 50 or 14.96	15		M1 for "748" $\div50$ or 14.96; accept "748" rounded up or down to next 50 followed by $\div50$ A1 ft from (b)(i) rounded up SC B1 for 680 (seen) leading to 14
6	(a)	$2\times5+5\times-3=10-15=$	-5	2	M1 substitute e.g 2×5 and 5×-3 or 10 and -15 A1 cao
	(b)	$5\times4^2-7$ $5\times16-7$	73	3	M1 substitution e.g $5\times4^2-7$; do not accept 54^2-7 M1 $5\times16-7$ or $5\times4\times4-7$ or $80-7$ (NB 4^2 as 4×4) A1 cao

Paper 5523/03					
No		**Working**	**Answer**	**Mark**	**Notes**
7		679 × 28 = 5432 + 13580 = 19012 or 28 × 679 = 252 + 1960 + 16800 = 19012 or  	190.12	3	M1 for an attempt to multiply the units and tens, or correct partitioning M1 complete correct method (condone one arithmetic error) A1 for 190.12 cao OR M1 for putting the numbers in a grid M1 for multiplying out and addition (condone one error) A1 answer shown with point OR M1 for correct partitioning M1 679×20 and 679×8 calculated oe (condone one error) A1 cao
8	(a)		Points plotted	1	B1 ±1 full (2mm) square
	(b)		positive	1	B1 cao
	(c)		Line of best fit	1	B1 must pass through (42.5, 1.45), (42.5, 1.55) AND (67.5, 1.75), (67.5, 1.85)
	(d)		approx 1.65	1	B1 ft from single line segment with positive gradient ± 1 full (2mm) square

Paper 5523/03					
No		**Working**	**Answer**	**Mark**	**Notes**
9	(a)	eg $50 \times \frac{2000}{500}$	200	2	M1 $2000 \div 500$ or 4 seen A1 cao
	(b)	eg $400 \times \frac{750}{500}$	600	2	M1 $750 \div 500$ or 1.5 seen or 400 + 200 A1 cao
10			$C = 10(n+3)$	3	B3 for $C = 10(n+3)$ oe such as $C = (n+3) \times 10$ (B2 for correct RHS or $C = n + 3 \times 10$, $C = 10n + 3$ etc B1 for C = some other linear expression in n or $n + 3 \times 10$, $10n + 3$ etc) NB: C=n scores no marks
11	(a)		$p(p+6)$	2	B2 for $p(p+6)$ or $p \times (p+6)$ (B1 for $p(ap+b)$ where a,b are numbers or $p+6$ seen on it's own, or part of an expression)
	(b)	$x^2 - 4x + 7x - 28$	$x^2 + 3x - 28$	2	M1 for 4 terms correct ignoring signs (e.g $x^2, 4x, 7x, 28$) or 3 terms with correct signs (e.g $x^2, -4x, 7x, -28$) A1 cao
12			correct drawing	2	B2. Condone hidden detail shown with solid lines, or missing lines on front face. (B1 for : one sketch correct with other sketches incorrect cross-section correct with depth > 1 cube, correct plan and side elevation)

Paper 5523/03					
No		**Working**	**Answer**	**Mark**	**Notes**
13		$\frac{600}{3\times10}$ or $\frac{640}{3.2\times10}$	20 to 21 $\frac{1}{3}$	2	M1 For rounding at least two of the numbers to 1 sf, or for sight of 640, 3.2 or 640, 32 or 600, 32 or 30 seen A1 for 20 to 21 $\frac{1}{3}$ NB: 20.3125 scores M0 A0
14	(a)		correct reflection	2	B2 (B1 reflection in line other than x=3)
	(b)		reflection in $y = x$	2	B2 cao Accept the word "reflected" (B1 any statement including the word "reflection")
15	(a)(i)		5^6	1	B1 accept 15125, 5^{4+2}
	(ii)		5^3	1	B1 accept 125, 5^{9-6}
	(b)	$x + y = 10$ and $x - y = 4$	$x = 7$ $y = 3$	3	M1 for either $x + y = 10$ or $x - y = 4$ A2 for both values correct [(A1 for one value correct) If M0, award B3 for both values correct or B2 for one value correct, otherwise B0] SC B2 for $x = 3$ and $y = 7$

Paper 5523/03				
No	**Working**	**Answer**	**Mark**	**Notes**
16 (a)	$5-3x=2x+2$ $5-2=2x+3x$	$\frac{3}{5}$	3	B1 for $2x+2$ seen OR $2.5-1.5x=x+1$ M1 for correct rearrangement of 4 terms A1 for $\frac{3}{5}$ oe
(b)		$-3,-2,-1,0,1,2$	2	B2 (B1 for 5 correct and not more than one incorrect integers)
17		question + response boxes oe	2	1st aspect: One question with time period (eg each night); ignore other questions. 2nd aspect: Response list (at least two), not overlapping.* 3rd aspect: Some mention of units (eg hours) in either question or responses Award B2 for all three aspects, or B1 for just two aspects. * 0-1, 2-3, 4-5 is OK, but 0-1, 1-2, 2-3 is not OK.

Paper 5523/03				
No	**Working**	**Answer**	**Mark**	**Notes**
18 (a)	$\frac{2}{3}\times\frac{3}{4}=\frac{6}{12}$	$\frac{1}{2}$	2	M1 for $\frac{6}{12}$ or $\frac{3}{6}$ or $\frac{2\times3}{3\times4}$ A1 accept 0.5
(b)	$1+2+\frac{8}{12}+\frac{9}{12}$	$4\frac{5}{12}$	3	M1 for attempt to convert to fractions with common denominator e.g two fractions, denominator of 12 A1 correct conversion : $\frac{8}{12}$ and $\frac{9}{12}$, or $\frac{20}{12}$ and $\frac{33}{12}$ seen (oe) A1 cao for $4\frac{5}{12}$ OR attempts to convert to decimals: must use at least 2dp M1 0.66+0.75 (or 1.66+2.75) or 0.67+0.75 etc A1 4.41, 4.417, 4.416 A1 4.416 (*recurring*)
19	$2\times\frac{1}{2}\times6\times8$ or 48 $8\times9+6\times9+10\times9$ or 72 +54 + 90	264 cm^2	4	M1 attempt to find the area of one face; $\frac{1}{2}\times6\times8$ or (8×9) or (6×9) or (10×9) or 72 or 54 or 90 or 24 M1 all five faces with an intention to add A1 cao numerical answer of 264 B1 (indep) cm^2 with or without numerical answer

Paper 5523/03					
No		**Working**	**Answer**	**Mark**	**Notes**
20			$\frac{\pi ab^3}{3d}$ $3(c+d)^3$ $3\pi bc^2$	3	B3 (B1 for each one correct) Nb –B1 for each of the 4th,5th,6th tick
21	(a)	$x+0.3+0.2+x=1$	0.25	2	M1 for $x+0.3+0.2+x=1$ oe, or $0.5\div 2$ A1 oe
	(b)	0.3×200	60	2	M1 0.3×200 A1 cao Accept 60 out of 200 (in words) SC B1 for $\frac{60}{200}$
22	(a)		$(-12)-4\quad -2\quad (0)8$	3	B3 for all correct [(B1 for each one correct)
	(b)		points plotted accurately points joined with smooth curve	2	B1 ± 1 full (2mm) square ft table if at least B1 awarded (all 5 points plotted) B1 ft for any smooth curve if previous B1 gained NB: curve must pass within 1 full square of the points
23			$\frac{1}{4}$ on LH branch $\frac{2}{3}$ & $\frac{1}{3}$ & $\frac{2}{3}$ on RH branches	2	B1 B1
24			m=3 n=5	2	B1 for 3 B1 for 5 (B2 for $2^3\times 5$ or $2\times 2\times 2\times 5$) SC: award B1 only if m=5, n=3 or for 8×5 seen

Paper 5523/03					
No		Working	Answer	Mark	Notes
25		$\frac{5--1}{-1-2} = -2$	$y = -2x + 5$	4	M1 for clear attempt to find gradient eg fraction with -1,5 in numerator, 2,-1 in denominator A1 for -2 B2 ft for $y =$"-2"$x + 5$ oe (eg $y = \frac{-6}{3}x + 5$) (B1 for $y = mx + 5$ or , $-2x+5$ or $y =$"-2"$x + c$)
26	(a)(i)		150	2	B1 accept 150 or 210
	(ii)				B1 for angle at the centre is twice the angle at the circumference
	(b)	$360 - 90 - 90 -$"150"	30	3	B1 identifies angle between radius and tangent as $90°$ (may be in working or on diagram) M1 $360° - 90 - 90 -$"150" A1 ft from (a)(i) excluding a negative answer OR B1 for 90 M1 for $2 \times (180 - 90 -$"$\frac{150}{2}$"$)$ A1 ft from (a)(i) excluding a negative answer OR B3 for $180 -$(a)

Paper 5523/04					
No		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	14.44 – 8.660254038	5.77974(….)	2	M1 for 14.44 seen or 8.66(……) seen or 5.7 or 5.8 or better, rounded or truncated A1 cao
	(b)		6	1	B1 ft
2		15 ÷ 24	62.5	2	M1 for 15 ÷ 24 or 1500 ÷ 24 or sight of digits 625 A1 cao
3	(a)	2.10 × 450	945	2	M1 for digits 210 × 450 or sight of digits 945 A1 cao
	(b)	63÷2.10	30	2	M1 for 63 ÷ digits 210 A1 cao
4		See diagram	$2(y + y)$ $2y + 2y$	2	B1 for $2(y + y)$ B1 for $2y + 2y$ (Deduct B1 for each additional tick (>2) to min 0)
5		$360^o \div 18$ (=20) Sector angles: G= 60; S= 80; B=220; Correct sectors labelled correctly Use angle measurer	Angles drawn, labelled	4	B4 for fully correct and labelled pie chart (B3 for all angles correct or for a labelled pie chart with two angles correct) (B2 for labelled pie chart with one correct angle drawn) (B1 for $360 \div 18$ or 20 seen or implied)
6	(a)		Correct plane	2	B2 for a correct plane defined by showing at least 2 lines. (B1 for a line of symmetry on one face)
	(b)		Correct net	2	B2 cao (B1 for 2 equilateral triangles joined appropriately to at least one rectangle or for 1 equilateral triangle joined appropriately to one of the three rectangles)
	(c)		Correct drawing	2	B1 for two extra sides of length 6 cm (± 2mm) B1 for construction arcs 6cm from each of the ends of the given line
7		61 – 19 = 42 42 ÷ 3 = 14	14	2	M1 for –19 or 42 seen or $3x + 19$ A1 cao

Paper 5523/04					
No		Working	Answer	Mark	Notes
8	(a) (b) (c)		15 15	1 1 2	B1 cao for $15(\pm 1)$ B1 cao for $15(\pm 0.4)$ B1 horiz. line from (2,20) to (3,20) B1 line from (3,20) to (5,0) or horiz. translation of it SC: B1 for any journey ending at (5,0)
9	(a)	$x+4+x+x+4+x$	$4x+8$	2	M1 for attempting to add $x+4, x, x+4, x$ may be implied by $4x+a$, $a>0$ A1 for $4x+8$ or $4(x+2)$
	(b)	$4x + 8 = 54$ $4x = 46$ $x = 11.5$ Length = "11.5" + 4	15.5	3	M1 for "$4x + 8$" = 54 A1 cao for 11.5 seen B1 ft for "11.5"+ 4
10		0.4 + 0.15 1 – 0.55	0.45	2	M1 for 1 – sum A1 for 0.45 oe SC: B1 for 0.81
11	(a) (b)	 $\pi \times 2.45$	3:1 7.7	1 2	B1 cao M1 for $\pi \times 2.45$ (accept π as 3.1 or better) A1 for 7.59 to 7.70
12		7×10000	70000	2	M1 for 7×10000 or $7 \times 100 \times 100$ A1 cao
13		$5.40 \div 3 \times 7$	12.60	3	M1 for $5.40 \div 3$ or sight of 1.8 M1 (dep) for "1.80" × 7 A1 for 12.6 or equivalent

Paper 5523/04				
No	**Working**	**Answer**	**Mark**	**Notes**
14	$7.60 \times \frac{17.5}{100} = 1.33$ 7.60 + 1.33 = 8.93 1650 × "8.93"	£14734.50	4	M1 for $7.60 \times \frac{17.5}{100}$ or 1.33 seen or 7.60 ×1.175 (oe) (Award M1 for 10%, 5% and 2½% correctly calculated) A1 for 8.93 or 893 M1 for 1650 × "8.93" or digits 147345 seen A1 cao Accept 14734.5 OR M1 for 1650×7.6 or 12540 seen M1 for "12540" $\times \frac{17.5}{100}$ or 2194.5 seen or "12540"×1.175 (oe) (Award M1 for 10%, 5%, and 2½% correctly calculated) M1 for "12540" + "2194.5" (dep on both previous M marks) or digits 147345 seen A1 cao accept 14734.5

Paper 5523/04					
No		**Working**	**Answer**	**Mark**	**Notes**
15		$285 \times 1000/(60 \times 60) = 79.1\dot{6}$		3	M2 for $285 \times 1000 \div 60 \div 60$ or $80 \times 60 \times 60 \div 1000$ or for a correct method to obtain two comparable values e.g $80 \times 60 \times 60$ and 285×1000 (M1 for $285 \div 60 \div 60$ or 0.079(….) seen or $80 \times 60 \times 60$ or 288000 seen or for 285×1000 or 285000 seen or $80 \div 1000$ or 0.08 seen) A1 for 288 or 79.(….) or for two correctly calculated comparable values e.g 288000 and 285000
16	(a)	$4x + 12 = 6$ $4x = -6$	-1.5	3	B1 for $4x + 12$ or $x + 3 = \frac{6}{4}$ M1 for a correct re-arrangement of their 3 terms to isolate $4x$ or x A1 for -1.5 oe
	(b)	$v - u = 5t$	$\frac{v-u}{5}$	2	M1 for isolating $\pm 5t$ or $\pm t$ or for dividing through by 5 A1 oe

Paper 5523/04					
No		**Working**	**Answer**	**Mark**	**Notes**
17		3→15 4→48 3.1→17.3(91) 3.2→19.9(68) 3.3→22.7(37) 3.4→25.7(04) 3.5→28.8(75) 3.4→25.7(04) 3.3→22.7(37) 3.35→24.1(95375)	3.3	4	B2 for trial between 3.3 and 3.4 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.3 and 3.4 exclusive B1 (dep on at least one previous B1) for 3.3 NB trials should be evaluated to at least 1 dp truncated or rounded
18	(a)	36 ÷ (7+3+2) "3" × 7	21	3	M1 for 36 ÷ (7+3+2) M1 (dep) for "3" × 7 or 3 or 2 A1 cao
	(b)	$51.5 \times \frac{8.5}{100} = 4.3775$ 51.5 – 4.3775 = 47.1225	47 or 47.1 or 47.12	4	M1 for $51.5 \times \frac{8.5}{100}$ or 4.37(75) seen M1 (dep) for 51.5 – "4.37(75)" A1 for 47 or better B1 (indep) for rounding their answer correctly to the nearest whole number or 1 or 2 d.p OR M1 for $51.5 \times \frac{100-8.5}{100}$ M1 for $51.5 \times$"0.915" or 0.515 × "91.5" A1 for 47 or better B1 (indep) for rounding their answer correct to the nearest whole number or 1 or 2 d.p

Paper 5523/04					
No		**Working**	**Answer**	**Mark**	**Notes**
19	(a)		Angle in a semicircle	1	B1 oe
	(b)	$12^2 + 16^2 = 400$ $\sqrt{400} = 20$	20	3	M1 for $12^2 + 16^2$ M1 for $\sqrt{144+256}$ A1 cao
	(c)	$\pi \times 10^2$	314	3	M1 for $\pi \times \left(\frac{"20"}{2}\right)^2$ M1 (indep) for correct order of evaluation of $\pi \times r^2$ for any r A1 for 314 – 315 inclusive

Paper 5523/04					
No		Working	Answer	Mark	Notes
20	(a)	$(1 \times 10)+(3 \times 15)+(5 \times 30)+(7 \times 35)+(9 \times 25)+(11 \times 5) = 730$ "730" ÷ 120 = 6.08333	6.08	4	M1 for use of *fx* with *x* consistent within intervals (including end points) M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\frac{\sum fx}{\sum f}$ A1 6.08 to 6.085
	(b)		(10),25,55,90,115, 120	1	B1 for all correct
	(c)		graph	2	B1 ft for 5 or 6 points plotted correctly ± 1 full (2mm) square at the end of interval dep on sensible table (condone 1 addition error) B1(dep) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points. (SC: B1 if 5 or 6 points plotted not at end but consistent within each interval and joined)

Paper 5523/04				
No	**Working**	**Answer**	**Mark**	**Notes**
(d)		72–74	2	M1 (ft dep on graph being cf) for reading from graph at 7 A1 ft ±1 full (2 mm) square Or B2 for $72-74$
21 (a) (b) (c) (d)		a^7 $15x^3y^4$ $x-1$ $(x+3)(x-3)$	1 2 1 1	B1 accept a^{4+3} B2 cao (B1 for two of 15, x^3, y^4 in a product) B1 cao B1 cao
22	80% = 220 $220 \div 80 \times 100$	275	3	M1 for recognising that 80% is equivalent to 220 M1 for $220 \div 80 \times 100$ oe A1 cao

Paper 5523/04					
No		**Working**	**Answer**	**Mark**	**Notes**
23			$x = 3$ $y = 0.5$	3	M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error M1 (dep) for substituting found value in one equation A1 cao SC: B1 for one correct answer only if M's not awarded
24			1.4×10^{10}	2	B2 for 1.4×10^{10} or 1.44×10^{10} (B1 for 14.4×10^{9} or 14400,000,000 or 14000,000,000 or 14×10^{9})
25	(a)	$\tan x = \frac{1.9}{3.2}$ $x = \tan^{-1}\left(\frac{1.9}{3.2}\right) = 30.7$	30.7	3	M1 for $\tan x = \frac{1.9}{3.2}$ or $\tan \frac{1.9}{3.2}$ M1 for $\tan^{-1}\left(\frac{1.9}{3.2}\right)$ A1 for 30.6 – 30.7
	(b)	90 + "30.7"	121	1	B1 (indep) ft for 90 + "30.7" rounded to 3 or 4 s.f

Paper 5523/04				
No	**Working**	**Answer**	**Mark**	**Notes**
26	SF$=\frac{12}{9}$ $\frac{12}{9} \times 6=8$	2	2	M1 for $\frac{12}{9}$ or $\frac{9}{12}$ or 1.33… seen or 0.75 seen or 8 seen or $\frac{6}{9}$ or $\frac{9}{6}$ or 0.66… or 1.5 or $\frac{1}{3}$ or 3 oe seen A1 cao

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	$x^2-4x+7x-28$	$x^2+3x-28$	2	M1 for 4 terms correct ignoring signs (e.g $x^2,4x,7x,28$) or 3 terms with correct signs (e.g $x^2,-4x,7x,-28$) A1 cao
	(b)		y^4+2y^2	2	B2 cao B1 for y^4 or $2y^2$
	(c)		$p(p+6)$	2	B2 for $p(p+6)$ or $p\times(p+6)$ (B1 for $p(ap+b)$ where a,b are numbers or $p+6$ seen on it's own, or part of an expression)
	(d)		$3x(2x-3y)$	2	B2 (B1 for $3(2x^2-3xy)$ or $x(6x-9y)$ or $3x(...)$)
2			question + response boxes oe	2	1st aspect: One question with time period (eg each night); ignore other questions. 2nd aspect: Response list (at least two), not overlapping.* 3rd aspect: Some mention of units (eg hours) in either question or responses Award B2 for all three aspects, or B1 for just two aspects. * 0-1, 2-3, 4-5 is OK, but 0-1, 1-2, 2-3 is not OK.
3	(b)		reflection in $y=x$	2	B2 cao accept the word "reflected" (B1 any statement including the word "reflection")
4	(a)	$5-3x=2x+2$ $5-2=2x+3x$	$\frac{3}{5}$	3	B1 for $2x+2$ seen OR $2.5-1.5x=x+1$ M1 for correct rearrangement of 4 terms A1 for $\frac{3}{5}$ oe
	(b)		$-3,-2,-1,0,1,2$	2	B2 (B1 for 5 correct and not more than one incorrect integers)

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
5	(a)	$\frac{2}{3}\times\frac{3}{4}=\frac{6}{12}$	$\frac{1}{2}$	2	M1 for $\frac{6}{12}$ or $\frac{3}{6}$ or $\frac{2\times3}{3\times4}$ A1 accept 0.5
	(b)	$1+2+\frac{8}{12}+\frac{9}{12}$	$4\frac{5}{12}$	2	M1 for attempt to convert to fractions with common denominator e.g two fractions, denominator of 12 A1 correct conversion : $\frac{8}{12}$ and $\frac{9}{12}$, or $\frac{20}{12}$ and $\frac{33}{12}$ seen (oe) A1 cao for $4\frac{5}{12}$ OR attempts to convert to decimals: must use at least 2dp M1 0.66+0.75 (or 1.66+2.75) or 0.67+0.75 etc A1 4.41, 4.417, 4.416 or 0.41, 0.417, 0.416 or 0.42, 4.42 A1 4.416 (*recurring*)
6	(a)(i)		5^6	1	B1 accept 15625, 5^{4+2}
	(ii)		5^3	1	B1 accept 125, 5^{9-6}
	(b)	$x+y=10$ and $x-y=4$	$x = 7$ $y = 3$	3	M1 for either $x + y = 10$ or $x-y=4$ A2 for both values correct [(A1 for one value correct) If M0, award B3 for both values correct or B2 for one value correct, otherwise B0] SC B2 for $x = 3$ or $y = 7$

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
7		$2\times\frac{1}{2}\times6\times8$ or 48 $8\times9+6\times9+10\times9$ or 72 +54 + 90	264 cm^2	4	M1 attempt to find the area of one face; $\frac{1}{2}\times6\times8$ or (8×9) or (6×9) or (10×9) or 72 or 54 or 90 or 24 or 48 M1 all five faces with an intention to add A1 cao numerical answer of 264 B1 (indep) cm^2 with or without numerical answer
8			$\frac{\pi ab^3}{3d}$ $3(c+d)^3$ $3\pi bc^2$	3	B3 (B1 for each one correct) Nb –B1 for each of the 4th,5th,6th tick
9	(a)	$x+0.3+0.2+x=1$	0.25	2	M1 for $x+0.3+0.2+x=1$ oe, or 0.5 ÷ 2 A1 oe
	(b)	0.3×200	60	2	M1 0.3×200 A1 cao Accept 60 out of 200 (in words) SC B1 for $\frac{60}{200}$
10	(a)		$(-12)-4\quad-2\quad(0)8$ 5 points plotted accurately points joined with smooth curve	3 2	B3 for all correct [(B1 for each one correct) B1 ±1 full (2mm) square ft table if at least B1 awarded (all 5 points plotted) B1 ft for any smooth curve if previous B1 gained NB: curve must pass within 1 full square of the points
	(b)				
11			m=3 n=5	2	B1 for 3 B1 for 5 (B2 for $2^3\times5$ or $2\times2\times2\times5$) SC: award B1 only if m=3, n=3, for 8×5 seen

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
12		$\frac{5--1}{-1-2}$ = -2	$y=-2x+5$	4	M1 for clear attempt to find gradient eg fraction with -1,5 in numerator, 2,-1 in denominator A1 for -2 cao B2 ft for $y=''-2''x+5$ oe (eg $y=\frac{-6}{3}x+5$) (B1 for $y=mx+5$ or , -2x+5 or $y=''-2''x+c$)
13	(a)		$\frac{1}{4}$ on LH branch $\frac{2}{3}$ & $\frac{1}{3}$ & $\frac{2}{3}$ on RH branches	2	B1 cao B1
	(b)	$\frac{3}{4}\times\frac{2}{3}+\frac{1}{4}\times\frac{1}{3}=\frac{6}{12}+\frac{1}{12}$	$\frac{7}{12}$	3	M1 for $\frac{3}{4}\times\frac{2}{3}$ or $\frac{1}{4}\times\frac{1}{3}$ from their tree diagram M1 for sum of two products A1 for $\frac{7}{12}$ oe
	(c)	$n=21\times4$ or $\frac{1}{6}:\frac{1}{4}$ oe $\frac{1}{6}\times84$ or $21\times\frac{2}{3}$	14	3	M1 for either $\frac{1}{3}\times\frac{3}{4}\left(=\frac{1}{4}\right)$ or $\frac{2}{3}\times\frac{1}{4}\left(=\frac{1}{6}\right)$ from their tree diagram M1 for 21×4 (=84) or $\frac{21}{3}\times2$ A1 for 14 cao SC: B2 for 63 seen in fraction or ratio

Paper 5525/05					
No		Working	Answer	Mark	Notes
14	(a)(i)		150	2	B1 accept 150 or 210
	(ii)				B1 for angle at the centre is twice the angle at the circumference
	(b)		30	3	B1 identifies angle between radius and tangent as 90° (may be in working or on diagram) M1 $360^\circ - 90 - 90 - "150"$ A1 ft from (a)(i) excluding a negative answer Or B1 for 90 M1 for $2 \times (180 - 90 - "\frac{150}{2}")$ A1 ft from (a)(i) excluding a negative answer Or B3 for $180 - (a)$ SC: 180 – "210" can get B1 for 90° and/or B1 for "cyclic quadrilateral"
		$360 - 90 - 90 - "150"$ or $180 - "150"$			
15	(a)		0.2727…	1	B1 for 2.27 recurring or 0.2727…. oe or 0.273
	(b)	eg $x = 0.3939\ldots$ so $100x = 39.3939\ldots$ $99x = 39$ so $x = \frac{39}{99} = \frac{13}{33}$		3	M1 for $100x = 39.39\ldots$ M1 dep for subtraction of both sides A1 for $\frac{13}{33}$ from correct proof **Alternative method** M1 for $13.000 \div 33$ M1 for remainders 31 and 13 A1 for 0.39 recurring SC:B1 for $\frac{39}{99}$

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	$d = kt^2$ $80 = k \times 4^2$	$d = 5t^2$	3	M1 for $d = kt^2$ or $d \propto t^2$ M1 sub d=80 and t=4 into their equation A1 for $d = 5t^2$ oe (cao)
	(b)		245	1	B1 ft from (a) using "k"
	(c)	$45 = 5t^2$	3	2	M1 ft from (a) for substituting d=45 into their equation A1 for 3 cao (condone inclusion of -3)
17	(a)(i) (ii)		(0, 9) (8, 25)	3	B1 cao B1 for $x = 8$ cao B1 for $y = 25$ cao SC: B1 for (25, 8)
	(b)	LHS = $\left(\frac{100-(x^2-16x+64)}{4}\right)$ = $\left(\frac{36+16x-x^2}{4}\right)$ RHS = $\left(\frac{36-2x+18x-x^2}{4}\right)$ = LHS		3	M1 for expansion of either set of brackets with at least 3 of 4 terms correct M1 for common denominator of 4 or multiplying through by 4 or reducing each numerator to a single term A1 for fully correct solution **Alternative method** M1 for $(5-\frac{(x-8)}{2})(5+\frac{(x-8)}{2})$ M1 for $(\frac{2\times5-(x-8)}{2})(\frac{2\times5+(x-8)}{2})$ A1 for $\frac{(18-x)(x+2)}{4}$

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
18	(a)	$\frac{810\pi}{90\pi}$ or 9 $\sqrt{9}$ or 3	12	3	M1 for $\frac{810\pi}{90\pi}$ or 9 or $\frac{1}{9}$ or 1:9 oe M1 for $\sqrt{\frac{810\pi}{90\pi}}$ or $\sqrt{9}$ or 3 or $\frac{1}{3}$ or $\sqrt{9}:\sqrt{1}$ oe A1 cao SC:B1 for answer of 36
	(b)	3^3 or 27 or 2700	2700π	2	M1 for "3"^{3} or 27 or $\left(\sqrt{9}\right)^3 : (\sqrt{81})^3$ oe or 9^3 or 2700– A1 cao
19	(a)(i)		1	1	B1 cao
	(ii)		8	1	B1 cao
	(iii)	$64^{-\frac{2}{3}} = \frac{1}{64^{\frac{2}{3}}}$ or $64^{-\frac{2}{3}} = (4^2)^{-1}$	$\frac{1}{16}$	2	M1 for knowing negative power is a reciprocal or power of $\frac{1}{3}$ root is a cube root A1 cao for $\frac{1}{16}$
	(b)	$\sqrt{27} = \sqrt{9\times3}$ or $\sqrt{27} = 3\sqrt{3}$ or $\sqrt{27} = 3^{3/2}$	$\frac{5}{2}$ oe	2	M1 for $\sqrt{27} = \sqrt{9\times3}$ or $\sqrt{27} = 3^{3/2}$ A1 for $\frac{5}{2}$ oe (cao) **Alternative method** M1 for $9\times27 = 3^{2n}$ A1 for $\frac{5}{2}$ oe (cao)

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
20	(a)(i) (ii) (b)(i) (ii)		(90, 1) (180, 0) (45, 0) (90, -3)	2 2 	B1 cao could be indicated on diagram B1 cao could be indicated on diagram B1 cao could be indicated on diagram B1 cao could be indicated on diagram
21		$\frac{1}{3}\pi x^2 h = \frac{4}{3}\pi(2x)^3$ $x^2 h = 4\times 8x^3$	$32x$	3	M1 for substitution in correct formulae M1 (dep.) for correct unsimplified expression eg $h = \frac{\frac{4}{3}\pi(2x)^3}{\frac{1}{3}\pi x^2}$ oe or $h = 8x$ oe A1 for $32x$ cao
22	(a)	$\left(\overline{OM} =\right)\ \boldsymbol{a} + 2\boldsymbol{b}$ $\left(\overline{ON} =\right) 3\boldsymbol{a}$ or $\frac{6}{2}\boldsymbol{a}$ $\left(\overline{MN} =\right)\ -\boldsymbol{a} - 2\boldsymbol{b} + 3\boldsymbol{a}$	$2\boldsymbol{a} - 2\boldsymbol{b}$	2	B2 (B1 for either $\overline{OM}$ or $\overline{ON}$ or $-\boldsymbol{a} - 2\boldsymbol{b} + 3\boldsymbol{a}$ SC: B1 for $2\boldsymbol{b} - 2\boldsymbol{a}$
	(b)	$\left(\overline{OX} =\right)\ 2\boldsymbol{a} + \boldsymbol{b}$ $\left(\overline{OY} =\right)\boldsymbol{b} + 4\boldsymbol{a}$ (½ $\overline{QR}$ =) $2\mathbf{a} - \boldsymbol{b}$ or (½ $\overline{RQ}$ =) $\boldsymbol{b} - 2\boldsymbol{a}$	$\overline{XY} = 2\boldsymbol{a}$ (hence parallel)	2	B1 for either $\overline{OX}$ or $\overline{OY}$ or (½ $\overline{QR}$) B1 for $\overline{XY} = 2\boldsymbol{a}$ or $\overline{YX} = -2\boldsymbol{a}$

Paper 5525/06					
No		Working	Answer	Mark	Notes
1	(a)	$v - u = 5t$	$\frac{v-u}{5}$	2	M1 for isolating $\pm 5t$ or $\pm t$ or for dividing through by 5 A1 oe
	(b)	$x - 3 = 5x - 25$ $22 = 4x$	$5\frac{1}{2}$	3	M1 for $x - 3 = 5(x-5)$ or $\frac{x}{5} - \frac{3}{5} = x - 5$ M1 for isolating terms in x correctly from $ax + b = cx + d$ A1 cao accept $5\frac{1}{2}$, $\frac{11}{2}$, 5.5
2	(a)	$36 \div (7+3+2)$ "3" $\times 7$	21	3	M1 for $36 \div (7+3+2)$ M1 (dep) for "3" $\times 7$ or 3 or 2 A1 cao
	(b)	$51.5 \times \frac{8.5}{100} = 4.3775$ $51.5 - 4.3775 = 47.1225$	47 or 47.1 or 47.12	4	M1 for $51.5 \times \frac{8.5}{100}$ or 4.37(75) seen M1 (dep) for 51.5 – "4.37(75)" A1 for 47 or better B1 (indep) for rounding their answer correctly to the nearest whole number or 1 or 2 d.p OR M1 for $51.5 \times \frac{100 - 8.5}{100}$ M1 for $51.5 \times$"0.915" or 0.515 ×"91.5" A1 for 47 or better B1 (indep) for rounding their answer correct to the nearest whole number or 1 or 2 d.p

Paper 5525/06					
No		**Working**	**Answer**	**Mark**	**Notes**
3		3→15 4→48 3.1→17.3(91) 3.2→19.9(68) 3.3→22.7(37) 3.4→25.7(04) 3.5→28.8(75) 3.4→25.7(04) 3.3→22.7(37) 3.35→24.1(95375)	3.3	4	B2 for trial between 3.3 and 3.4 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.3 and 3.4 exclusive B1 (dep on at least one previous B1) for 3.3 NB trials should be evaluated to at least 1 dp truncated or rounded
4	(a)		Angle in a semicircle	1	B1 oe
	(b)	$12^2 + 16^2 = 400$ $\sqrt{400} = 20$	20	3	M1 for $12^2 + 16^2$ M1 for $\sqrt{144+256}$ A1 cao
	(c)	$\pi \times 10^2$	314	3	M1 for $\pi \times \left(\frac{"20"}{2}\right)^2$ M1 (indep) for correct order of evaluation of $\pi \times r^2$ for any r A1 for 314 – 315 inclusive

Paper 5525/06					
No		Working	Answer	Mark	Notes
5	(a)	$(1 \times 10)+(3 \times 15)+(5 \times 30)+(7 \times 35)+(9 \times 25)+(11 \times 5) = 730$ "730" ÷ 120 = 6.08333	6.08	4	M1 for use of *fx* with *x* consistent within intervals (including end points) M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\frac{\sum fx}{\sum f}$ A1 6.08 to 6.085
	(b)		(10),25,55,90, 115,120	1	B1 for all correct
	(c)		graph	2	B1 ft for 5 or 6 points plotted correctly ± 1 full (2mm) square at the end of interval dep on sensible table (condone 1 addition error) B1(dep) for points joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points. (SC: B1 if 5 or 6 points plotted not at end but consistent within each interval and joined)
	(d)		72 – 74	2	M1 (ft dep on graph being cf) for reading from graph at 7 A1 ft ±1 full (2 mm) square Or B2 for 72 – 74

Paper 5525/06					
No		Working	Answer	Mark	Notes
6	(a)		a^7	1	B1 accept a^{4+3}
	(b)		$15x^3y^4$	2	B2 cao (B1 for two of 15, x^3, y^4 in a product)
	(c)		$x-1$	1	B1 cao
	(d)		$(a + 3b)(a - 3b)$	2	B2 for $(a + 3b)(a - 3b)$ (B1 for $(a \pm 3b)(a \pm 3b)$
7		80% = 220 $220 \div 80 \times 100$	275	3	M1 for recognising that 80% is equivalent to 220 M1 for $220 \div 80 \times 100$ oe A1 cao
8			$x = 3$ $y = 0.5$	3	M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error M1 (dep) for substituting found value in one equation A1 cao SC: B1 for one correct answer only if Ms not awarded
9			1.4×10^{10}	2	B2 for 1.4×10^{10} or 1.44×10^{10} (B1 for 14.4×10^9 or 14400,000,000 or 14000,000,000 or 14×10^9)

Paper 5525/06					
No		Working	Answer	Mark	Notes
10	(a)	$\tan x = \frac{1.9}{3.2}$ $x = \tan^{-1}\left(\frac{1.9}{3.2}\right) = 30.7$	30.7	3	M1 for $\tan x = \frac{1.9}{3.2}$ or $\tan \frac{1.9}{3.2}$ M1 for $\tan^{-1}\left(\frac{1.9}{3.2}\right)$ A1 for 30.6 – 30.7
	(b)	90 + "30.7"	121	1	B1 (indep) ft for 90 + "30.7" rounded to 3 or 4 s.f
11	(a)	$SF = \frac{12}{9}$ $\frac{12}{9} \times 6 = 8$	2	2	M1 for $\frac{12}{9}$ or $\frac{9}{12}$ or 1.33… seen or 0.75 seen or 8 seen or $\frac{6}{9}$ or $\frac{9}{6}$ or 0.66… or 1.5 or $\frac{1}{3}$ or 3 oe seen A1 cao
	(b)	$SF = \frac{9}{12}, \frac{9}{12} \times 7 = 5.25$	5.25	2	M1 for $\frac{BE}{7} = \frac{9}{12}$ oe A1 cao

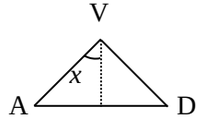
Paper 5525/06					
No		**Working**	**Answer**	**Mark**	**Notes**
12	(a)	$84 = 6.7\pi + 2 \times 6.7 + 2a$ $2a + 13.4 = 62.95\ldots$ or $2a + 34.44 = 84$	24.8	3	M1 for substituting correctly, π may be left M1 for correct rearrangement as far as $\pm 2a$ A1 for $24.7 - 24.8$
	(b)	$P = \pi r + 2r + 2a$ $P - 2a = \pi r + 2r$ $P - 2a = (\pi + 2)r$	$\frac{P-2a}{\pi+2}$	3	M1 subtracting $2a$ from each side M1 for factorising to get $(\pi+2)r$ A1 for $\frac{P-2a}{\pi+2}$ oe S.C $\frac{p-2a}{5.14}$ oe is M1 M1 A0
13		Area $\Delta ABC = \frac{1}{2} \times 14 \times 8 \times \sin 106$ (= 53.8)	53.8	3	M1 for $\frac{1}{2} \times 14 \times 8 \times \sin 106$ M1 (dep) for $56 \times 0.961(26..)$ or $107.6\ldots$ A1 $53.8 - 53.9$ SC 107.6 is B2
14	(a)		4.5	1	B1 cao
	(b)	$500 \times 1.045^{20} = 1205.857\ldots\ldots$	1205.86	2	M1 for 500×1.045^{20} A1 for $1205.85 - 1206$ (SC:B1 for $705.85 - 706$ no working)

Paper 5525/06				
No	**Working**	**Answer**	**Mark**	**Notes**
15 (a)	$6x^2 + 11x - 10 + 6x - 4 = 25$ $6x^2 + 17x - 39 = 0$		3	M1 for an expression for the area involving either $(3x-2)(2x+5)+2(3x-2)$ or $3x(3x-2)+(3x-2)(7-x)$ or $3x(2x+5)-2(7-x)$ or $(3x-2)^2 + 2(3x-2) + (3x-2)(7-x)$ where in each case at least one of 2 or 3 product terms must be correct M1 (indep) for one correct expansion involving x^2 A1 for simplification to final answer

Paper 5525/06					
No		Working	Answer	Mark	Notes
15	(b)(i)	$x = \frac{-17 \pm \sqrt{17^2 - 4\times 6\times(-39)}}{2\times 6}$ $= \frac{-17 \pm \sqrt{289+936}}{12}$ $x = +\frac{18}{12}$ or -4.33	1.5, $-\frac{13}{3}$	4	M1 for $x = \frac{-17 \pm \sqrt{17^2 - 4\times 6\times(-39)}}{2\times 6}$ up to signs in b & c M1 for $x = \frac{-17 \pm \sqrt{1225}}{12}$ A1 $x = 1.5$ or -4.33, or better OR M2 for $(3x+13)(2x-3)$ (M1 for $(3x \pm a)(2x \pm b)$ with ab = ±39 A1 x = 1.5 or – 4.33, or better
		$x^2 + \frac{17}{6}x - \frac{39}{6} = 0$ $\left(x+\frac{17}{12}\right)^2 - \left(\frac{17}{12}\right)^2 - \frac{39}{6} = 0$ $\left(x+\frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$			OR M1 for $\left(x+\frac{17}{12}\right)^2$ *seen* M1 $\left(x+\frac{17}{12}\right)^2 = \left(\frac{17}{12}\right)^2 + \frac{39}{6}$ A1 x = 1.5 or – 4.33, or better SC:M1 for answer "1.5" with no working or T & I
	(ii)		8		B1 cao length = 8

Paper 5525/06					
No		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	P(win) = $\frac{2}{5}\times\frac{3}{5}+\frac{2}{5}\times\frac{1}{5}(=\frac{8}{25})$	$\frac{8}{25}$	3	M1 for $\frac{2}{5}\times\frac{3}{5}$ or $\frac{2}{5}\times\frac{1}{5}$ or for clearly identifying in P(R) $\times$P(R) + P(B) $\times$ P(B) M1 for P(win) = " $\frac{2}{5}$ " $\times$ " $\frac{3}{5}$ " + " $\frac{2}{5}$ " $\times$ " $\frac{1}{5}$ " A1 for $\frac{8}{25}$, oe
	(b)	$\frac{8}{25}$ $\times$ 100 (=32) 100 $\times$ 20 – "32" $\times$ 50	£4	2	M1 for (" $\frac{8}{25}$ " $\times$100)$\times$50 or $\times$ 0.5 A1 cao

Paper 5525/06					
No		**Working**	**Answer**	**Mark**	**Notes**
17		Lower bound of 1200 is 1150 Upper bound of 60 is 65 $1150 \div 65$	17	4	B1 for 1150 or 1250 seen B1 for 65 or 55 seen M1 (Lower bound of load) ÷ (Upper bound of weight) Where 1150 ≤ LB load < 1200 and 60 < UB Weight ≤ 65 A1 for 17 requires fully correct working OR B1 for 1150 or 1250 seen B1 for 65 or 55 seen M1 (upper bound of load) ÷(lower bound of weight) Where 1200 ‹ UB load ≤ 1250 and 55 ≤ LB weight < 60 A1 for 22 requires fully correct working OR M2 $1200 \div 55$ A1 21.8 A1 21 requires fully correct working OR M2 $1200 \div 65$ A1 18.4(6) A1 18 requires fully correct working
18	(a)	$3^4 x^4 y^8$	$81x^4y^8$	2	B2 for $81x^4y^8$ (B1 for 2 of 81, x^4, y^8)
	(b)	$\frac{x(x-3)}{(x-5)(x-3)}$	$\frac{x}{x-5}$	3	B1 for $x(x-3)$ B1 for $(x-5)(x-3)$ B1 cao

Paper 5525/06					
No		Working	Answer	Mark	Notes
19	(a)	$6^2 - 2^2 = 32$	5.66	2	M1 for $6^2 - 2^2$ (= 32) A1 5.65 – 5.66
	(b)	V  $DVA = 2 \times \sin^{-1}(\frac{2}{6})$ OR $\cos DVA = \frac{6^2 + 6^2 - 16}{2 \times 6 \times 6}$ $= \frac{56}{72}$ $DVA = \cos^{-1}\left(\frac{56}{72}\right) = 38.94$	38.9	3	M1 $\sin x = \frac{2}{6}$ oe M1 for $DVA = 2 \times \sin^{-1}(\frac{2}{6})$ A1 38.9 – 38.95 OR M1 for $(\cos DVA =) \frac{6^2 + 6^2 - 4^2}{2 \times 6 \times 6}$ M1 for $DVA = \cos^{-1}\left(\frac{56}{72}\right)$ A1 38.9 – 38.95

Paper 5525/06				
No	**Working**	**Answer**	**Mark**	**Notes**
19 (c)	$AC^2 = 2^2 + 2^2 - 2 \times 2 \times 2 \times \cos 120^o$ $AC = \sqrt{12}$ **OR** $AN = 2 \times \sin 60 = \sqrt{3}$ **OR** VN = $\sqrt{"32"+1} = \sqrt{33}$ $\cos AVC = \frac{6^2 + 6^2 - 12}{2 \times 6 \times 6}$ $\cos AVC = \frac{60}{72}$ **OR** $AVC = 2 \times \sin^{-1}\frac{\sqrt{3}}{6}$, using AN **OR** $AVC = 2 \times \cos^{-1}\frac{\sqrt{33}}{6}$, using VN	33.6	4	M1 for any valid method for AC or AN or VN where N is the midpoint of AC A1 for $AC^2 = 12$ or $AC = \sqrt{12}$ (= 3.46…) or $AN = \sqrt{3}$ (=1.73…)or $VN = \sqrt{33}$ (=5.74…) M1 (indep) for correct method to find angle AVC A1 33.55 – 33.6

Paper 5525/06					
No		**Working**	**Answer**	**Mark**	**Notes**
20	(a)	Graph translated 1 unit to the right passing through the points (-1,0), (1,2) and (2,0)		2	M1 for translation of $\begin{pmatrix}1\\0\end{pmatrix}$ or $\begin{pmatrix}-1\\0\end{pmatrix}$ A1 for right through the 3 points, $\pm\frac{1}{4}$ sq
	(b)	Graph stretched 2 units parallel to y-axis; passing through the points (-2,0), (0,4) and (1,0)		2	M1 for graph stretched parallel to the y-axis by scale factor 2 A1 through all 3 points; $\pm\frac{1}{4}$ sq not on grid at $x = 2$

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Mark Scheme (Results)

November 2010

GCSE

GCSE Mathematics (1380)
Paper 4H

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GCSE MATHEMATICS 1380 (LINEAR)

NOTES ON MARKING PRINCIPLES

1 Types of mark

M marks: method marks A marks: accuracy marks
B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only
SC: special case
indep - independent
ft – follow through
dep – dependent
isw – ignore subsequent working
oe – or equivalent (and appropriate)

3 No working

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

4 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

5 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

6 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

7 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

8 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

9 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

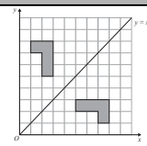
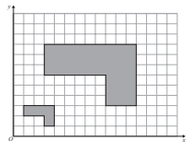
10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

GCSE MATHEMATICS 1380 (LINEAR)

1380/4H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1	$5 \times 8 \div 2$	20	2	M1 for $5 \times 8 \div 2$ oe A1 cao
2	$1 - 0.58 - 0.3$ $= 1 - 0.88$	0.12	2	M1 for $1 - 0.58 - 0.3$ oe A1 for 0.12 oe
3	B = 20×2 = 40 C = $3 \div 4 \times 20$ = 15 D = $10 \div 100 \times 20 + 20$ = 22 20 + 40 + 15 + 22	97	4	M1 for 20×2 or 40 seen M1 for $3 \div 4 \times 20$ or 15 seen M1 for $10 \div 100 \times 20 + 20$ oe or 22 seen or 1.1×20 A1 cao
4 (a)	3×100	300	2	M1 for 3×100 or $100 \div 6 \times 18$ oe A1 cao
(b)	$2 \div ½ \times 6$	24	2	M1 for $2 \div ½ \times 6$ oe A1 cao

GCSE MATHEMATICS 1380 (LINEAR)

1380/4H					
Question		Working	Answer	Mark	Notes
5	(a)			2	B2 cao (B1 for shape in the correct orientation above the line y = *x* or for shape elongated or shortened by one square but with either top or bottom in the correct position and in the correct orientation)
	(b)			3	B3 for correct enlargement in correct position (B2 for enlargement SF 3 in incorrect position or enlargement, centre *O*, but different scale factor) (B1 for 4 lines enlarged by SF 3 or enlargement, not from *O*, different scale factor)
6	(a)		$6x + 5y$	2	B2 (B1 for either $6x$ or $5y$ seen)
	(b)	$2x = 10 - 3 = 7$ $x = 7 \div 2$	3.5	2	M1 for $2x = 10 - 3$ or $2x = 7$ or $(10 - 3) \div 2$ A1 for 3.5 oe
	(c)(i)		c^{11}	2	B1 accept c^{5+6}
	(ii)		e^{8}		B1 accept e^{12-4}

GCSE MATHEMATICS 1380 (LINEAR)

1380/4H					
Question		Working	Answer	Mark	Notes
7		8 ÷ 20 × 100	40	2	M1 for 8 ÷ 20 × 100 or $\frac{8}{20}=\frac{8\times5}{20\times5}$ oe or $\frac{40}{100}$ A1 cao
8	(a)		10 to 19	1	B1 cao
	(b)		20 to 29	1	B1 for acceptable reason eg correct answer is 20 to 29 eg 30th/31st person not in this interval
	(c)			2	B2 for complete polygon (ignore histograms and any lines below an age of 4.5 or above an age of 65, but award B1 if there is a line joining the first to the last point.) (B1 for one vertical or horizontal error OR incorrect but consistent error in placing the midpoints horizontally OR correct plotting but not joined. In this case ignore a line joining the first to the last.) Plotting tolerance: ± 1 square Points to be joined by lines (ruled or handdrawn, but not curves.)

GCSE MATHEMATICS 1380 (LINEAR)

1380/4H				
Question	**Working**	**Answer**	**Mark**	**Notes**
9		2.42927(0474)	2	B2 for 2.42927 or better (B1 for 19.56 or 8.0518 seen or 2.43 or 2.429 or 2.4292 or 2.4293 or digits 242927… or $\frac{97800}{40259}$ seen)
10 (a)		−2, −1, 0, 1, 2	2	B2 for −2, −1, 0, 1, 2 (B1 for one extra or one missing)
(b)	$2x < 30$	$x < 15$	2	M1 for $2x < 30$ or $\frac{x}{3} < 5$ or $x = 15$ or $x > 15$ A1 cao
11		A and 3 B and 2 C and 4 D and 1	2	B2 for all 4 correct (B1 for 2 correct)
12		$T = 7x + 5y$	3	B3 for $T = 7x + 5y$ oe (B2 for $7x + 5y$ oe or $T = 7x + …$ or $T = … + 5y$) (B1 for T = an expression in x and y or $7x$ or $5y$ seen)
13	$7120 \div 8$	890	2	M1 for 7120 ÷ 8 or 7120 ÷ 480 A1 cao

GCSE MATHEMATICS 1380 (LINEAR)

1380/4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)			2	B2 for correct front elevation (B1 for the correct diagram with extra row or extra column) Internal lines need not be drawn
	(b)			2	B2 for correct plan - it can be rotated (B1 for any rectangle that is not a square) Internal lines need not be drawn
15	(a)		Reason	1	B1 for valid reason eg only best students, biased, sample is too small
	(b)		Wrong	1	B1 for valid thing wrong eg the choices are all positive, question does not reference liking
	(c)		Question	2	B1 for one question which includes a time frame or reference to 'normal' homework B1 for at least 3 valid non-overlapping boxes, need not be inclusive NB response boxes must be intervals but allow 0 on its own
16	(a)		(0, 3, 2)	1	B1 cao
	(b)		(5, 3, 0)	1	B1 cao
17	(a)	8.25×10^7	8.25×10^7	1	B1 cao
	(b)	$= 14.56 \times 10^{-16}$	1.456×10^{-15}	2	M1 for digits 1456×10^n or $A \times 10^{-15}$, $1 < A < 2$ A1 for 1.456×10^{-15}

GCSE MATHEMATICS 1380 (LINEAR)

1380/4H					
Question		Working	Answer	Mark	Notes
18		19.5 × 1000 ÷ 210 = 19500 ÷ 210 = 92.8(5714…) or 92 × 210 = 19320 = 19.32 / 93 × 210 = 19530 = 19.53 / or 19500 ÷ 92 = 211.95 19500 ÷ 93 = 209.67	Explanation	3	M1 for converting between m/ and / correctly or for 0.21 or 19500 seen M1 for "19500" ÷ "210" or 92 × "210" or 93 × "210" or "19500" ÷ 92 A1 for a worded explanation with correct calculations
19	(a)		61, 82, 94, 100	1	B1 cao
	(b)		Points plotted and joined	2	B2 ft (dep on sensible table - condone 1 addition error) for 5 points plotted correctly, ± 1 square, at ends of interval **and** joined by curve or line segments provided no gradient is negative – ignore any part of graph outside range of their points (B1 ft for 4 points plotted correctly **and** joined or for 5 points plotted correctly) (SC B1 if 5 points plotted not at end but consistent within each interval **and** joined)

1380/4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
19	(c)		36 – 38	1	B1 for answer in range 36 – 38 or ft (± 1square) from cf graph using cf = 50 or 50.5
	(d)		9 – 11	2	B2 for answer in range 9 – 11 OR M1 ft from cf graph for valid reading (± 1square) from 56 or 57 or vertical line drawn from age = 56 or 57 and horizontal line drawn to '*y*'-axis A1 ft (± 1square) for 100 – "reading from 56 or 57"
20	(a)	2) 56 2) 28 2) 14 7	$2 \times 2 \times 2 \times 7$	2	M1 for a systematic method of at least 2 correct divisions by a prime number oe factor tree, can be implied by digits 2, 2, 2, 7 on answer line A1 for $2 \times 2 \times 2 \times 7$ or $2^3 \times 7$
	(b)	$42 = 2 \times 3 \times 7$	14	2	M1 for attempt to find the common factor (by 2 lists or otherwise) or for answer of 7 A1 cao

1380/4H				
Question	**Working**	**Answer**	**Mark**	**Notes**
21	AB = 8 cos 37° = 8 (0.7986...) = 6.389...	6.39	3	M1 for cos37 = $\frac{AB}{8}$ M1 for AB = 8 cos 37° or 6.4 seen (dep on 1st M1) A1 for 6.38 - 6.39 OR M1 for $\frac{AB}{Sin53} = \frac{8}{Sin90}$ M1 for $AB = \frac{8Sin53}{Sin90}AB$ or 6.4 seen (dep on 1st M1) A1 for for 6.38 - 6.39 SC M2A0 for 6.12 (radians) or 6.69 (grad)
22 (a)		−15, (−8), −7, −6, 1, (20)	2	B2 for all 4 correct (B1 for 2 or 3 correct)
(b)			2	B2 for fully correct graph OR B1 ft for 6 'points' plotted correctly ± 1square B1 for smooth curve through all their 5 or 6 plotted points provided B1 awarded in (a)

1380/4H					
Question		Working	Answer	Mark	Notes
23		Angle ADC = 180 − 128 = 52° x = 2 × 52° or Reflex angle AOC = 256° x = 360 − 256	104	2	M1 for valid method to get angle ADC or 128 × 2 or 256° seen … can be on the diagram A1 cao
24		35.5 × 26.5	940.75	3	B1 for sight of 35.5 or 26.5 or 35.4999(…) or 26.4999(…) M1 for UB length × UB width where 35.49 ≤ UB length ≤ 35.5 26.49 ≤ UB width ≤ 26.5 A1 for 940.74 - 940.75 (or $\frac{3763}{4}$)
25	(a)	$(2x + 4y)(4x - 5y)$ = $8x^2 - 10xy + 16xy - 20y^2$	$8x^2 + 6xy - 20y^2$	2	B2 cao (B1 for 3 out of 4 terms correct or all 4 correct ignoring signs)
	(b)		$x + 10$	1	B1 for $x + 10$ or $(x + 10)$ or $(x + 10)^1$
	(c)	= $\frac{(x+5)(x-5)}{(x+5)(x+2)}$	$\frac{x-5}{x+2}$	3	M1 for $(x+5)(x-5)$ M1 (indep) for $(x+5)(x+2)$ A1 cao
	(d)	$x^2 + 6x - 2 = (x + 3)^2 - 9 - 2$	$p = 3$ $q = -11$	2	M1 for $(x + 3)^2 \pm k$ or $x^2 + 2px + p^2 + q$ oe or $p = 3$ or $q = -11$ A1 cao

GCSE MATHEMATICS 1380 (LINEAR)

1380/4H					
Question		Working	Answer	Mark	Notes
26		$\frac{7}{11}\times\frac{4}{10}+\frac{4}{11}\times\frac{7}{10}$ $=\frac{28}{55}+\frac{28}{55}$	$\frac{28}{55}$	3	M1 for $\frac{4}{10}$ and $\frac{7}{10}$ as second probabilities, may be seen on a tree diagram, or for $\frac{7}{11}\times\frac{4}{10}$ or $\frac{4}{11}\times\frac{7}{10}$ M1 (dep) for $\frac{7}{11}\times\frac{"4"}{10}+\frac{4}{11}\times\frac{"7"}{10}$ A1 for $\frac{28}{55}$ oe SC B2 for an answer of $\frac{56}{121}$ oe
27	(a)	Graph translated 3 units to the right through points (1, 6), (7, 6), (2, 0), (6, 0), (4, –2.5)	sketch	2	M1 for a horizontal translation with at least three of the points (–1, 0), (3, 0), (1, –2.5) translated by the same amount A1 for a curve through the points (1, 6), (7, 6), (2, 0), (6, 0), (4, –2.5) ± ½ square
	(b)	Graph reflected in the *x*-axis through points (–1, 0), (3, 0), (1, 2.5), (–2, –6), (4, –6)	sketch	2	M1 for a reflection in *x*-axis through (–1, 0), (3, 0) or in *y*-axis through (0, –2) A1 for a curve through the points (–1, 0), (3, 0), (1, 2.5), (–2, –6), (4, –6) ± ½ square

1380/4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
28	(a)	Area = ½ (8.3 × 10.5) sin 62° = 43.575 × 0.88294... = 38.47444136	38.5	2	M1 for ½ (8.3 × 10.5) sin 62° A1 for 38.4 – 38.5 SC M1A0 for ±32.2 (radians) or 36.0 (grad)
	(b)	$QR^2 = 8.3^2 + 10.5^2$ $- 2(8.3)(10.5) \cos 62$ = 68.89 + 110.25 $- 174.3 \times 0.46947...$ = 179.14 – 81.828... $QR = \sqrt{97.3111...}$ = 9.86463920	9.86		M1 for correct substitution into cosine rule M1 (dep) for correct order of evaluation (excluding square root) A1 for 9.86 – 9.865 SC M2A0 for 7.86 (radians) or 9.01 (grad)

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November 2010

GCSE

GCSE Mathematics (Modular) 5MB1H
Unit 1 - Higher

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GCSE MATHEMATICS 5MB01

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Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

GCSE MATHEMATICS 5MB01

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

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11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

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5MB1H/01				
Question	**Working**	**Answer**	**Mark**	**Notes**
1 (a)	$1-0.25$	0.75	2	M1 for $1-0.25$ or 0.2 + 0.2 + 0.35 A1 for 0.75 oe
(b)	$(1-0.25-0.35)\div 2$	0.2	2	M1 for $(1-0.25-0.35)\div 2$ A1 for 0.2 oe
2*	714 × 2 =1428 714 × 0.95 = 678.30 678.30 × 2 = 1356.60 1428 + 1356.60 = 2784.60 802 × 2 = 1604 802 × 0.85 = 681.70 681.70 × 2 = 1363.40 1604 + 1363.40 = 2967.40	Comparison	5	B1 for identifying 714 and 802 M1 for $\frac{95}{100}\times'714'$ oe or $\frac{85}{100}\times'802'$ oe M1 for 2 × "adult" + 2 × "child" oe for at least one holiday A1 for 2784.6(0) and 2967.4(0) or 2785 and 2967 C1 for comparing the costs of their two holidays for 2 adults and 2 children and clearly indicating which is cheaper. Conclusion must clearly follow from working. QWC: Decision and justification should be clear with working clearly presented and attributable. (allow full marks for a candidate who has calculated the cost per day for each holiday (397.8(0) and 211.95(7..)) and compares these costs accordingly.)
3		Types Tally Frequency	3	B3 for correct table with all three aspects **Aspect 1**:'method of travel' or for at least 3 of bus, car, walk, other etc. **Aspect 2**: 'tally' or tally marks or 'frequency' or 'number of people' **Aspect 3**: 'frequency' or frequencies or 'total' or totals or 'number of people' (B2 for two aspects, B1 for one aspect)

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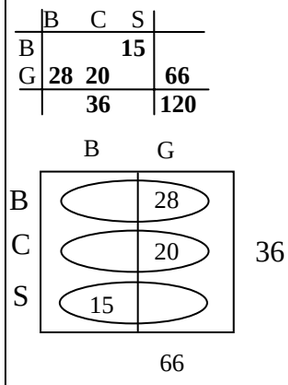
5MB1H/01				
Question	**Working**	**Answer**	**Mark**	**Notes**
4	Median (before) $= 67$ Median (after) $= 78$ Mean (before) = 69.6 Mean (after) = 80.8(6...) Range (before) $= 84 - 58 = 26$ Range (after) $= 102 - 65 = 37$ IQR (before) $= 78 - 61 = 17$ IQR (after) $= 91 - 69 = 22$	Comparison of 1. medians / means 2. range / IQR	6	B2 for median (before) = 67 and median (after) = 78 (B1 for one correct median) OR B2 for mean (before) = 69.6 and mean (after) = 80.9 /80.8(6..) (B1 for one correct mean) B2 for range (before) = 26 and range (after) = 37 OR B2 for IQR (before) = 17 and IQR (after) = 22 (B1 for one correct range/IQR) OR B2 for fully correct diagram/chart to compare, e.g. box plots, cumulative frequency diagrams, etc (B1 for diagram/chart with one error in presentation) C1 for median (after) > median (before) oe or ft their medians OR for mean (after) > mean (before) oe or ft their means OR C1 for range (after) > range (before) oe or ft their ranges OR for IQR (after) > IQR (before) oe or ft their IQRs

GCSE MATHEMATICS 5MB01

5MB1H/01				
Question	**Working**	**Answer**	**Mark**	**Notes**
4				C1 for comments, in context, relating to an average and to the spread of the data (dep on B3). QWC: Decisions should be justified and calculations attributable SC If no marks scored, B1 for a correct comparison (eg Heart rates are faster after walking up the stairs)
5* (a)	13.55 × 1.65 = 22.3575 3.10 ÷ 160 × 1000 = 19.375 OR 13.55 × 1.65 = 22.3575 22.3575 ÷ 1000 × 160 = 3.5772 OR 3.10 ÷ 1.65 = 1.8787… 1.8787…÷ 160 × 1000per kg OR $1355 \div 1000 = 1.355 \text{p/g}$ 3.10 ÷ 1.65 = 187.87…p 187.87…÷ 160 = 1.1742…p/g OR 3.10 ÷ 160 = 0.019375 SF/g 13.55 × 1.65 ÷ 1000 =0.0223575SF/g	Switzerland, with correct explanation	4	M1 for a correct method to obtain two comparable weights e.g. cost of 1kg in Switzerland, ÷ 160 × 1000, × 6.25 (cost of 1 kg in England given) or cost of 160g in England, ÷ 1000 × 160 (cost of 160g in Switzerland given) or cost per gram in each country, ÷ 160 and ÷ 1000 or cost of 800g in each country M1 for converting £ to Swiss francs or Swiss francs to £ (other than £1 = 1.65 SFr) A1 for two correct values (using same units) for comparison. C1 for country identified from a clear attempt to use comparable weights and prices. QWC: Decision must be stated, with calculations clearly attributable

GCSE MATHEMATICS 5MB01

5MB1H/01				
Question	**Working**	**Answer**	**Mark**	**Notes**
6		51	4	M1 for a two-way table or Venn diagram with bowling, cinema, skating, boys and girls labelled or list of at least two combinations clearly labelled. M1 for attempt to find the value of an unknown entry in the table oe eg 66 – 28 – 20, 120 – 66, 36 – 20 A1 for 16 or 18 or 54 or 23 or 33 A1 cao (Note: 36 + 15 = 51 scores no marks)
7	$420 \div 7 = 60$ $5 \times 60 = 300$ $2 \times 60 = 120$ $120 \div 3 \times 2 = 80$ $0.32 \times 300 + 1.17 \times 80 + 1.51 \times 40$ 96 + 93.60 + 60.40	250	5	M1 for $420 \div (5+2)$ or 60 seen M1 (dep) for $5 \times$ '60' or $2 \times$'60' or 300 or 120 seen M1 for '120'$\div 3 \times 2$ oe M1 for $32\text{p} \times$'300'+£1.17$\times$'80'+£1.51$\times$'40' A1 for 250.00 or 250 SC B1 for £539
8 (a)		– 4	2	M1 for 'difference in *y*' / 'difference in *x*' or 4 seen A1 for – 4 SC If no marks scored allow B1 for $y = 40 - 4x$, $y = -4x$, $40 - 4x$ or $-4x$
(b)		Practical interpretation	1	B1 ft for depth decreases by "4" cm each hour oe or enables you to work out that the tank will be empty in 10 hours.

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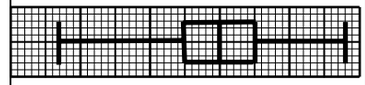
GCSE MATHEMATICS 5MB01

5MB1H/01					
Question		Working	Answer	Mark	Notes
9	(a)		120	1	B1 for 119.5 – 120.5
	(b)	$60 - 52 = 8$ 20% of $60 = 12$	Claim not true since 8 < 20% of 60	3	M1 for using graph at 130, may be implied by a value in the range 52 to 53 seen A1 for 8 (cars breaking speed limit) or 13.(3..)% (accept 7 or 11.(6..)%) A1 for correct conclusion with fully correct working OR M1 for using cf = 48 A1 for (20% of cars exceed) value in the range 126.5 to 127.5 km/h A1 for correct conclusion with fully correct working
	(c)			3	B3 for complete box plot with all three aspects Aspect 1: ends of whiskers at 97 and 138 Aspect 2: ends of box at 115 and 125 Aspect 3: median marked at 120 or ft (a) (B2 for two aspects, B1 for one aspect) (Allow tolerance of $\frac{1}{2}$ square)

GCSE MATHEMATICS 5MB01

5MB1H/01				
Question	**Working**	**Answer**	**Mark**	**Notes**
10 (a)	$5\times16=80$ $12.5\times18=225$ $17.5\times10=175$ $27.5\times6=165$ $645\div50=12.9$ or $5.5\times16=88$ $13\times18=234$ $18\times10=180$ $28\times6=168$ $670\div50=13.4$	12.9	4	M1 for fx consistently within interval including ends (allow 1 error) M1 consistently using appropriate midpoints M1 (dep on first M1) for $\sum fx\div\sum f$ A1 for 12.9 or 13.4
(b)	$\frac{6}{50}\times\frac{5}{49}=\frac{30}{2450}$	$\frac{3}{245}$	2	M1 for $\frac{6}{50}\times\frac{5}{49}$ A1 for $\frac{3}{245}$ oe If M0A0, SC B1 for $\frac{9}{625}$ oe
(c)	$0\le d<10$ fd 1.6 $10\le d<15$ fd 3.6 $15\le d<20$ fd 2 $20\le d<35$ fd 0.4	Correct histogram	3	B2 for 4 correct histogram bars (± ½`square) (B1 for 2 or 3 histogram bars of different widths correct) B1 for frequency density label or key and consistent scaling SC if B0 then M1 for clear attempt to use frequency density or area

GCSE MATHEMATICS 5MB01

5MB1H/01					
Question		Working	Answer	Mark	Notes
11	(a)		Correct method to choose a random sample	1	B1 for equal chance of selection, e.g. number each laptop and then use the random number function on a calculator or pick the numbers out of a bag.
	(b)	$\frac{3}{80}\times 600 = 22.5$	22.5	2	M1 for $\frac{3}{80}\times 600$ A1 for 22.5 or 22 or 23 SC B1 for $\frac{22.5}{600}$ or $\frac{22}{600}$ or $\frac{23}{600}$
12	(a)		$\frac{3}{10}$ $\frac{6}{9}, \frac{3}{9}, \frac{7}{9}, \frac{2}{9}$	2	B1 for $\frac{3}{10}$ correct for 1st sock B1 for $\frac{6}{9}, \frac{3}{9}, \frac{7}{9}, \frac{2}{9}$ correct for 2nd sock
	(b)	$\frac{7}{10}\times\frac{6}{9}+\frac{3}{10}\times\frac{2}{9}$	$\frac{48}{90}$	3	M1 ft for $\frac{7}{10}\times'\frac{6}{9}'$ or $'\frac{3}{10}'\times'\frac{2}{9}'$ M1 for $\frac{7}{10}\times'\frac{6}{9}'+'\frac{3}{10}'\times'\frac{2}{9}'$ A1 for $\frac{48}{90}$ oe SC B2 for $\frac{58}{100}$ oe seen

GCSE MATHEMATICS 5MB01

5MB1H/01				
Question	**Working**	**Answer**	**Mark**	**Notes**
13	$\frac{127}{370}\times 50 = 17.16...$ = 17.1.... OR $243+370+127=740$ $\frac{370}{740}=0.5$ so sample size = 100 $\frac{127}{740}\times 100 = 17.1....$	17	2	M1 for $\frac{127}{370}\times 50$ oe A1 for 17 (accept 18) SC B1 for $\frac{17}{127}$ or $\frac{18}{127}$ (Note: 50 ÷ 3 = 16.6(...) = 17 scores no marks)

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Unit 2: 5MB2H_01 (Higher)

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Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		$5 \times 6 \div 2$	15cm^2	3	M1 $5 \times 6 \div 2$ oe seen A1 15 B1 cm^2
2	(a)		$3y + 7x + 3$	1	B1 cao
	(b)		$2x(x - 2)$	2	B2 for $2x(x - 2)$. Accept $2x(x + -2)$. (B1 for $x(2x - 4)$ or $2(x^2 - 2x)$ or $2x$(linear expression in x) or $(x - 2)$(linear expression in x)
	(c)	$11-3x - 6$	$5-3x$	2	M1 for expansion of $-3(x + 2)$ A1 cao
	(d)	$3x^2+7x-18x-42$	$3x^2- 11x - 42$	2	M1 for 4 terms correct with or without signs or 3 out of exactly 4 terms correct (the terms may be in an expression or table) **OR** $x(3x+7)-6(3x+7)$ or $3x(x - 6) + 7(x - 6)$ A1 cao

PMT

5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
3 (a)	48=2 × 24 = 2 × 2 × 12 = 2 × 2 × 2 × 6 =2 × 2 × 2× 2 × 3 **OR** Use of factor trees	2 × 2 × 2 × 2 × 3	2	M1 for a systematic method that isolates 2 correct prime numbers correct divisions by a prime number **OR** an equivalent factor tree A1 for 2 × 2 × 2 × 2 × 3 or $2^4 \times 3$
(b)	Exeter coach after 20, 40, 60, 80, 100… Plymouth coach after 16, 32, 48, 64, 80, 96, … **OR** Timetable schedule for the coaches Exeter coach at 8.00, 8.20, 8.40, 9.00, 9.20… Plymouth coach at 8.00, 8.16, 8.32, 8.48, 9.04, 9.20… **OR** LCM of 16 and 20 is 80	9:20(am)	3	M1 for attempt to list multiples of 16 and 20 (at least first 3 of each, condone 1 addition error) M1(dep) for identifying their LCM A1 9:20 am (accept 9:20) **OR** M1 for attempt to draw up a timetable showing when the coaches will run (at least 3 extra times for each, condone 1 addition error) M1(dep) for identifying the first time common to both timetables A1 9:20 oe (do not accept 9:20pm) **OR** M1 attempt to find the LCM M1 for 2 × 2 × 2 × 2 × 5 oe seen A1 9:20 oe (do not accept 9:20pm)
4	10% = 6 6 × 4 = 24	24	2	M1 40 ÷ 100 × 60 oe or any complete method, eg 10% = 6, 6 × 4 A1 cao SC B1 for 36 or 84

5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
5 (a)	Table of values x = -1 0 1 2 3 y = 2 2 6 10 14 OR Using $y = mx + c$, gradient = 4, y intercept = 2	Line from (1, 2) to (3,14)	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x. M1 ft for plotting at least 2 of their points (any points plotted from their table must be correct) A1 for correct line between 1 and 3 **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 4x + 2$ drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points with no more than 2 incorrect points) A1 for correct line between -1 and 3 **(Use of $y = mx + c$)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 4x + 2$ drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient 4 OR line drawn with a y intercept of 2) A1 for correct line between 1 and 3
(b)(i)		$y = 4x + c$, $c \neq 2$	1	B1 Correct equation given.
(ii)		– 0.25	1	B1 Correct gradient given. Note – 0.25 could be written as $-\frac{1}{4}$ oe

PMT

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6		$6 \times 2 + 3 \times 2 = 12 + 6 = 18$ or $2 \times 5 + 4 \times 2 = 18$ $18 \div 2.5 = 7.2$ or $2.5 \times 7 = 17.5$ or $2.5 \times 8 = 20$ OR $6 \times 5 - 4 \times 3 = 18$ $18 \div 2.5 = 7.2$ or $2.5 \times 7 = 17.5$ or $2.5 \times 8 = 20$	8 packs	4	M2 for a complete method for finding the total area (can be implied by 18) (M1 for attempt to calculate at least one area, 6×2(=12) or 3×2 or 2×5(=10) or 4×2(=8) or 2×2 or 6×5 (=30) or 3×4(=12)) M1 for their area $\div 2.5$ or repeated addition of 2.5 to within 2.5 of their area C1 for clear communication that 8 full packs are required supported by their calculations, provided at least one of the first two method marks awarded SC B3 for 8 identified as the answer to the problem.
7		$\frac{3+7}{2}, \frac{8+5}{2}$	$(5, 6\frac{1}{2})$	2	M1 for either x or y coordinate correct or $\frac{3+7}{2}, \frac{8+5}{2}$, both seen but not correctly evaluated Al for $(5, 6\frac{1}{2})$ oe
8	(a)		p^8	3	B1 for p^8
	(b)		h^5		B1 for h^5
	(c)		x^6		B1 for x^6

5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
9	24 × 2 = 48 56 ÷ 8 × 5 = 35 or 24 × 2 = 48 48 ÷ 5 × 8 = 76.8	Monday	4	M1 for a correct method to obtain two comparable time periods or speeds. eg 24 × 2 (= 48 miles), 56 ÷ 2 (= 28 km) M1 for a correct method to convert between miles and km or mph and km/h eg –, – – – A1 for two correct values (using same units) for comparison C1 for day identified from a clear attempt to use comparable time periods and speeds/distances Note: day alone scores zero
10 (a)		$4n + 2$	2	B2 for oe (B1 for $4n+k$ where $k \neq 2$)
(b)	$2 \times 3^2 - 4$ 18 - 4	14	2	M1 for $2 \times 3^2 - 4$ A1 cao
11	360 ÷ 10 36 ÷ 2	18°	4	M1 for correct method to find the size of an exterior angle eg 360 ÷ 10 A1 for 36 M1 for '36' ÷ 2 or (180 – (180 – 36)) ÷ 2 A1 cao OR M1 for correct method to find the size of an interior angle eg(180 × 8) ÷ 10 A1 144 M1 (180 '144') ÷ 2 A1 cao

5MB2H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
12	$n^2 - 2n + 1 + n^2 + n^2 + 2n + 1 \equiv 3n^2 + 2$	Proof	2	M1 for correct expansion of either $(n - 1)^2$ or $(n + 1)^2$ or $n^2 - 2n + 1$ or $n^2 + 2n + 1$ seen A1 for $3n^2 + 2$ from correct working
13	$42 \div 2 = 21$ $180 - 90 - 21 = 69$ $69 \times 2 = 138$	138°	3	M1 for 90 seen. A1 for 138 (accept 222) C1 for The tangent to a circle is perpendicular (90°) to the radius (diameter) and Angles in a triangle add up to 180° **OR** The tangent to a circle is perpendicular (90°) to the radius (diameter) and Angles in a quadrilateral (4 sided shape) add up to 360°
14 (a)	$5\sqrt{9\times3}$	$15\sqrt{3}$	2	M1 for sight of $\sqrt{9\times3}$ or $\sqrt{9}\ \sqrt{3}$ or $3\sqrt{3}$ A1 for $15\sqrt{3}$ (accept $n = 15$)
(b)		$7\sqrt{3}$	2	M1 for $\frac{21\sqrt{3}}{\sqrt{3}\sqrt{3}}$ A1 for $7\sqrt{3}$ (accept $\frac{21\sqrt{3}}{3}$)

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5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)		3	1	B1 cao
	(b)		$\frac{1}{5}$	2	M1 $\frac{1}{25^{\frac{1}{2}}}$ or $\sqrt{25} = 5$ A1 $\frac{1}{5}$ or 5^{-1} or 0.2
16	(a)	$\frac{2(y-6)}{(y-6)(y-2)}$	$\frac{2}{y-2}$	3	M1 $2(y-6)$ M1 $(y-6)(y-2)$ A1 cao
	(b)	$\frac{3(x+5)-(x-4)}{(x-4)(x+5)}$	$\frac{3(x+5)-(x-4)}{(x-4)(x+5)}$	2	M1 for $3(x+5)$ or $3x+15$ or $3x+5$ or $-(x-4)$ or $-x+4$ or $-x-4$ or $(x-4)(x+5)$ A1 for $\frac{3(x+5)-(x-4)}{(x-4)(x+5)}$ oe

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March 2012

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Paper 5MB1H_01 (Calculator)

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		(6 × 0) + (9 × 1) + (7 × 2) + (3 × 3) + (2 × 4) + (1 × 5)	45	2	M1 for attempt to multiply the number of cans by the frequency and add the results (condone one arithmetic error) A1 cao
2*		120 ÷ 15 120 + 8 3 × 42	No + correct statement	4	M1 for 120 ÷ 15 (=8) or 1×8 (teachers) to 15× 8 (students) oe M1 for 42 × 3 (=126) M1 for 120 + '120 ÷ 15 ' (=128) or difference of 2 oe C1 (dep on all three Ms) for 126 and 128 or 'difference of 2' oe AND for a correct statement that uses correct values **OR** M1 for 120 ÷ 15 (=8) or 1×8 (teachers) to 15× 8 (students) oe M1 for 120 + '120 ÷ 15' (=128) M1 for (120 + '8') ÷ 3 (=42.66…) C1 (dep on all three Ms) for answer in range 42.6–42.7 AND for a correct statement that uses correct values **OR** M1 for 120 ÷ 15 (=8) or 1×8 (teachers) to 15× 8 (students) oe M1 for 120 + '120 ÷ 15 ' (=128) M1 for (120 + '8') ÷ 42 (=3.047…) or successive subtraction of 42 from '128' C1 (dep on all three Ms) for answer in range 3.04–3.05 or remainder 2 oe AND for correct statement that uses correct values

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)	0.10 + 0.25 + 0.30 OR 1 − (0.15 + 0.20)	0.65	2	M1 for 0.10 + 0.25 + 0.30 or 1−(0.15 + 0.20) A1 for 0.65 oe (SC B1 for 0.85oe)
	(b)	200 × 0.30	60	2	M1 for 200 × 0.30 A1 cao
4*		2329×0.9 =2096.1 2147×0.95 =2039.65 OR 4658×0.9 =4192.2 294×0.95 =4079.3	Royal European	5	M1 for use of 2329 or 2147 (or sight of 4658 or 4294), ie selection of correct column M1 for attempting to calculate the discount for both their figures, eg 2329×0.1 (=232.90) oe AND 2147×0.05 (=107.35) oe or 4658×0.1 (=465.8) oe AND 4294×0.05 (=214.7) oe) OR for attempting to find the discounted price for one, eg 2329×0.9 (=2096.1) oe or 2147×0.95 (=2039.65) oe or 4658×0.9 (=4192.2) oe or 4294×0.95 (=4079.3) oe M1 for attempting to find the discounted price for both, eg 2329×0.9 (=2096.1) oe AND 2147×0.95 (=2039.65) oe or 4658×0.9 (=4192.2) oe AND 4294×0.95 (=4079.3) oe A1 for 2096(.1) and 2039(.65) OR 4192(.2) and 4079(.3) figures rounded or truncated C1 (dep on at least M1) for a statement deducing the cheapest company, but figures used for the comparison must also be stated somewhere, and a clear association with the name of each company

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		7 | 1 3 8 8 | 1 4 4 7 8 9 | 1 2 3 5 6 6 6 8 10 | 0 1 3 4 Key: 7 | 1 means 71cm	3	B2 for fully correct diagram accept a stem of 70, 80, 90, 100 (the order of the numbers in the stem may be reversed) (B1 for ordered leaves or unordered leaves (with one error or omission)) B1 for a correct key (units may be omitted)
	(b)		92.5	1	B1 for 92.5 or ft from ordered diagram
6	(a)	−14 ÷ 40	−0.35	2	M1 for method shown to work out the gradient, eg right-angled triangle drawn or 14÷40 or 0.35 or $\frac{14}{40}$ oe A1 for −0.35 or $-\frac{14}{40}$oe
	b(i)		*P* + reason	2	B1 for *P* with reason eg takes only 40 seconds or crosses time axis first, takes 10 second less oe
	(ii)		2		B1 cao
7		900 ÷ 360 2.5 × 100 900 − 250 − 225 − 125 − 162.50	£250, £137.50	3	M1 for (900÷360) × 100 or (100÷360)×900oe or (55÷360) × 900oe or implied by one correct value A1 for (£)250 or (£)137.5(0) seen A1 for (£)250 and (£)137.5(0) in correct positions

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(a)		83	1	B1 for answer in range 82 – 83
	(b)		9	2	M1 for lines drawn to graph at 22 and 66 (tolerance one 2mm square) A1 for answer in range 8 – 10
	(c)	88 − 78	10	2	M1 for 88 – '78' or 5 × 2 or 5 seen A1 for 10 or 11
9	(a)		0.6, 0.4, 0.3, 0.7, 0.3, 0.7	2	B2 for 6 correct probabilities in the correct positions (B1 for 2, 3, 4 or 5 correct)
	(b)	0.6 × 0.7 + 0.4 × 0.3	0.54	3	M1 for '0.6' ×' 0.7' or '0.4' × '0.3' (may be awarded in tree diagram if selected) M1 for '0.6' × '0.7' + '0.4' × '0.3' A1 cao OR M1 for '0.6' × '0.3' + '0.4' × '0.7'(may be awarded in tree diagram if selected) M1 for 1 –('0.6' × '0.3' + '0.4' × '0.7') A1 cao

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)	125 × 50.2 50 × 48.7 6275 – 2435 3840 ÷ 75	51.2	3	M1 for 125 × 50.2(=6275) or 50×48.7(=2435) M1 for (125 × 50.2 − 50 × 48.7) ÷ 75 A1 cao
	(b)		completed box plot	3	B3 for box plot with all three aspects (overlay) aspect 1: ends of whiskers at 18 and 96 aspect 2: ends of box at 32 and 72 aspect 3: median marked at 56 (B2 for box plot with two aspects, B1 for box plot with one aspect or correct quartiles and median identified)
11	(a)		eg How many times do you go out to eat each month? 0, 1, 2, 3 or more	2	B1 for a suitable question including a time period (may appear with response boxes) B1 for at least 3 non-overlapping boxes which are exhaustive for their question
	(b)	$\frac{10}{127} \times 50$	4	2	M1 for $\frac{10}{127} \times 50$ (=3.937…) oe A1 for 3 or 4
	(c)		2 valid reasons	2	B2 for 2 reasons, eg not able to get a zero response oe, ages/genders not representive oe, only does it on one day/evening oe (B1 for 1 reason)

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		Histogram	3	B3 for fully correct histogram (overlay) (B2 for 4 correct blocks B1 for 3 correct blocks) SC B1 for correct key, eg $1cm^2$=5(men) or correct freq÷ class interval for at least three frequencies
	(b)	$2x + 1.4x + x + 0.4x + 0.2x$	$5x$	2	M1 for finding total area of histogram, eg $20(cm^2)$, or fd for 10 to 20 ($0.1x$ oe) or area of one block in terms of x A1 for $5x$ oe
13	(a)	$1 – 0.1$ $0.9 \div 3$	0.3	2	M1 for $(1 – 0.1) \div 3$ or $0.1+0.3+0.6(=1)$ or $0.6 \div 2$ A1 for 0.3 oe
	(b)	$0.1 \times 0.1 \times 0.1$	0.001	2	M1 for $0.1 \times 0.1 \times 0.1$ oe A1 for 0.001 oe

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
	(c)	1 − (0.7 × 0.7 × 0.7) OR 3 × 0.3 × 0.3 × 0.7 + 3 × 0.3 × 0.7 × 0.7 + 0.3 × 0.3 × 0.3 OR 3 × 0.3 × 0.3 × (0.1 + 0,6) + 3 × 0.3 × (0.1 + 0.6) × (0.1 + 0.6) + 0.3 × 0.3 × 0.3 OR 0.3 × 0.3 × 0.3 + 3 × 0.3 × 0.3 × 0.6 + 3 × 0.3 × 0.3 × 0.1 + 3 × 0.3 × 0.6 × 0.6 + 3 × 0.3 × 0.1 × 0.1 + 6 × 0.3 × 0.6 × 0.1	0.657	3	M1 for 0.7×0.7×0.7 or ft (1 – 'a')×(1 – 'a')×(1 – 'a') M1 for 1 – 0.7×0.7×0.7 or ft 1 – (1 – 'a')×(1 – 'a')×(1 – 'a') oe A1 for 0.657 oe (SC B1 for 0.784 oe) OR M1 for 0.3 × 0.3 × 0.7(=0.063) or 0.3 × 0.7 × 0.7(=0.147) or 0.3 × 0.3 × 0.3(=0.027) oe M1 for 3 × 0.3 × 0.3 × 0.7+ 3 × 0.3 × 0.7 × 0.7+ 0.3 × 0.3 × 0.3 oe A1 for 0.657 oe (SC B1 for 0.784 oe) OR M1 for 0.6 × 0.6 × 0.6(=0.216) or 0.1 × 0.6 × 0.6(=0.036) or 0.1 × 0.1 × 0.6(=0.006) or 0.1 × 0.1 × 0.1(=0.001)oe M1 for 1− (0.6 × 0.6 × 0.6 + 3 × 0.1 × 0.6 × 0.6 + 3 × 0.1 × 0.1 × 0.6 + 0.1 × 0.1 × 0.1) oe A1 for 0.657 oe (SC B1 for 0.784 oe) OR M1 for 0.3 × 0.3 × 0.3 or 0.3 × 0.3 × 0.6 or 0.3 × 0.3 × 0.1 or 0.3 × 0.6 × 0.6 or 0.3 × 0.1 × 0.1 or 0.3 × 0.6 × 0.1 oe M1 for 0.3 × 0.3 × 0.3 + 3 × 0.3 × 0.3 × 0.6 + 3 × 0.3 × 0.3 × 0.1 + 3 × 0.3 × 0.6 × 0.6 + 3 × 0.3 × 0.1 × 0.1 + 6 × 0.3 × 0.6 × 0.1 oe A1 for 0.657 oe (SC B1 for 0.784 oe)

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NOTES ON MARKING PRINCIPLES

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2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

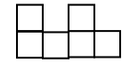
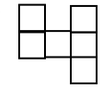
12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

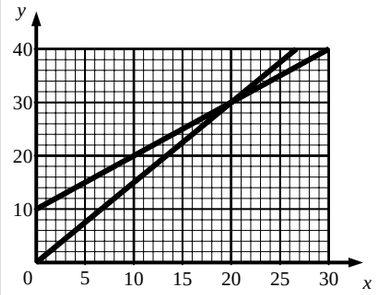
1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		380	1	B1 cao
	(b)		6.2	1	B1 cao
	(c)		Arrow at 34	1	B1 cao
2	(a)		8	1	B1 for 8 ± 0.2
	(b)		35	1	B1 for 35 ± 2°
	(c)		Circle drawn	1	B1 for all parts within ± 2mm, (use overlay)
3	(a)		4, 7, 4, 3, 2	2	M1 for at least 3 correct tallies **or** at least 3 correct frequencies A1 for all frequencies correct
	(b)		7	1	B1 for 7 **or** ft from frequencies in (a) or tallies if no frequencies
	(c)		Diagram drawn	3	M1 for bar chart or other suitable chart with at least 3 correct heights for their scale (can f.t.) A1 for all 5 bars correctly labelled and vertical axis correctly scaled A1 for fully correct **or** ft frequencies in (a) **OR** M1 for pictogram with at least 3 correct rows (can f.t.) A1 for correct labels on all 5 rows and correctly key A1 for fully correct **or** ft frequencies in (a) **OR** M1 for pie chart with at least 3 correct sectors ± 2° (can f.t.) A1 for all 5 sectors correctly labelled A1 for fully correct **or** ft frequencies in (a)

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
4		£1.18 + 94p = £2.12 £5 – £2.12 – 30p = £2.58 £2.58 ÷ 2 =	1.29	3	M2 for (5 – 1.18 – 0.94 – 0.30) ÷ 2 oe **or** digits 129 (M1 for 1.18 + 0.94 **or** 2.12 seen **or** 1.18 + 0.94 + 0.30 oe **or** 2.42 seen **or** 5 – 1.18 – 0.94 oe **or** 2.88 seen **or** (5 – 1.18 – 0.94) ÷ 2 **or** 1.44 seen **or** 5 – 1.18 – 0.94 – 0.30 oe **or** 2.58 seen) A1 cao **NOTE**: Accept working in £ or pence
5	(a)(i)		(2, 3)	2	B1 cao
	(ii)		(–3, 1)		B1 cao
	(b)		Point plotted at (3, –4)	1	B1 cao
6	(a)		– 5	1	B1 cao
	(b)		6	1	B1 for 6 or – 6
	(c)		3	1	B1 cao
7			(P, B), (P, S), (P, L) (M, B), (M, S), (M, L) (H, B), (H, S), (H, L)	2	M1 for any 3 combinations with no incorrect combinations A1 for all 9 combinations with no duplicates or extras
8	(a)		Walk	1	B1 cao
	(b)	24 ÷ 4 =	6	2	M1 for 24 ÷ 4 oe or ¼ oe seen A1 cao

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)		Isosceles triangle	1	B1 for isosceles triangle
	(b)		Rectangle with area 12 cm^2	2	M1 for rectangle drawn A1 cao
10	(a)		A marked at 0	1	B1 for A marked at 0 (within overlay)
	(b)		B marked at 1/4	1	B1 for B marked at 1/4 (within overlay)
11	(a)		9	1	B1 cao
	(b)		33	2	M1 for 5 × 5 **or** 25 seen in the working **or** 2 × 2 × 2 **or** 8 seen in the working A1 cao
12	(a)		20	2	M1 3 × 3 × 3 oe seen or drawn or 27 seen or use of 3 layers A1 cao
	(b)			2	B2 for correct view (B1 for  or )
13	(a)(i)		07 29	2	B1 for 07 29
	(ii)		36		B1 for 36 or ft difference between (i) and 06 53
	(b)		07 51	1	B1 cao
	(c)		09 55	1	B1 for 09 55 or 9 55 or five to ten

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		2 + 8 + 2 + 8 = 20 20 ÷ 4 =	5	4	M2 for 2 + 8 + 2 + 8 oe **or** 20 seen **or** (2 + 8) ÷ 2 oe (M1 for the sum of 3 sides of the rectangle) M1 (dep) for the sum of 3 or 4 sides of the rectangle ÷ 4 **or** an attempt to evaluate (2 + 8) ÷ 2 oe to get the length of one side A1 cao **SC**: B1 for an answer of 4 coming from $\sqrt{2\times 8}$ oe
15	(a)		4	1	B1 cao
	(b)	9.5 – 4.75 = **OR** 9.5 ÷ 2 =	4.75	2	M1 for 9.5 – 4.75 **or** 9.5 ÷ 2 **or** 4.75 – 9.5 A1 cao
	(c)		6	1	B1 cao
	(d)	12 × 4 =	48	2	M1 for × 4 seen **or** identifying + 0.5 for every 2 inches **or** 12 + 12 + 12 + 12 oe **or** build up method eg 12, 24, 36, 48 allow one error A1 cao
16	(a)		trapezium	1	B1 for trapezium or isosceles trapezium
	(b)			2	B2 for correct tessellation (at least 5 more shapes) (B1 for at least 4 shapes (including initial shape) correctly tessellating)

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
17*		S: 35 ÷ 100 × 40 = 14 W: 40 ÷ 8 × 3 = 15 **OR** D: 16 ÷ 40 (× 100) = 0.4 (40%) W: 3 ÷ 8 (× 100) = 0.375 (37.5%) **OR** D: $\frac{16}{40} = \frac{80}{200}$ S: $\frac{35}{100} = \frac{70}{200}$ W: $\frac{3}{8} = \frac{75}{200}$	Debbie and correct calculations	4	**Compares Marks out of 40 or fractions with denominator of 40** M1 for 35 ÷ 100 × 40 oe **or** 14 seen (or 14/40 seen) M1 for 40 ÷ 8 × 3 **or** 15 seen (or 15/40 seen) A1 for 14 and 15 **or** $\frac{14}{40}$ and $\frac{15}{40}$ C1 (dep on M1) for correct conclusion for their working QWC with 3 comparable marks: Decision and justification should be clear with working clearly presented and attributable. **OR Decimals (or Percentages)** M1 for 16 ÷ 40 (× 100) oe **or** 0.4 (or 40) seen M1 for 3 ÷ 8 (× 100) oe **or** 0.375 (or 37.5) seen A1 for 0.4 and 0.375 (**or** 40 and 37.5) C1 (dep on M1) for correct conclusion for their working QWC: with 3 comparable decimals (or percentages: Decision and justification should be clear with working clearly presented and attributable. **OR Compares Fractions with denominator other than 40** M1 for attempt to convert all to fractions with a common denominator other than 40 M1 for at least 1 correct A1 for $\frac{80}{200}$ and $\frac{70}{200}$ and $\frac{75}{200}$ oe C1 (dep on M1) for correct conclusion for their working QWC with 3 comparable fractions: Decision and justification should be clear with working clearly presented and attributable.

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
18*	(a)		10	1	B1 cao
	(b)	 **Miles** 0 10 20 30 40 50 **Ed** 0 15 30 45 60 75 **Bill** 10 20 30 40 50 60	Ed is cheaper up to 20 miles, Bill is cheaper for more than 20 miles	3	M1 for correct line for Ed intersecting at (20,30) ±1 sq tolerance **or** $10 + x = 1.5x$ oe C2 (dep on M1) for a correct full statement ft from graph eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles (C1 (dep on M1) for a correct conclusion ft from graph eg. cheaper at 10 miles with Ed ; eg. cheaper at 50 miles with Bill eg. same cost at 20 miles; eg for £5 go further with Bill **or** A general statement covering short **and** long distances eg. Ed is cheaper for shorter distances **and** Bill is cheaper for long distances) **OR** (continued on next page)

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
18 (contd)					**OR** M1 for correct method to work out Ed's delivery cost for at least 2 values of n miles where $0 < n \leq 50$ **or** for correct method to work out Ed and Bill's delivery cost for n miles where $0 < n \leq 50$ C2 (dep on M1) for 20 miles linked with £30 for Ed and Bill with correct full statement eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles (C1 (dep on M1) for a correct conclusion eg. cheaper at 10 miles with Ed; eg. cheaper at 50 miles with Bill eg. same cost at 20 miles; eg for £5 go further with Bill **or** A general statement covering short **and** long distances eg. Ed is cheaper for shorter distances **and** Bill is cheaper for long distances) SC: B1 for correct full statement seen with no working eg. Ed cheaper up to 20 miles **and** Bill cheaper for more than 20 miles QWC Decision and justification should be clear with working clearly presented and attributable

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
19		1,96 × 2.25 = 4.41 **OR** 4.23 ÷ 9 = 0.47 1.96 ÷ 4 = 0.49 **OR** 4.23 × 4 = 16.92 1.96 × 9 = 17.64 **OR** 4.23 ÷ 9 = 0.47 0.47 × 4 = 1.88 **OR** 1.96 ÷ 4 = 0.49 0.49 × 9 = 4.41 **OR** 9 ÷ 4.23 = 2.12 4 ÷ 1.96 = 2.04	Pack of 9	3	M2 for a fully correct method to enable a conclusion eg 1.96 × 2¼ **OR** M1 for 4.23 ÷ 9 or 423 ÷ 9 **or** 0.47 seen **or** 47 seen M1 for 1.96 ÷ 4 or 196 ÷ 4 or 0.49 seen or 49 seen **OR** M1 for 4.23 × 4 **or** 423 × 4 **or** 16.92 seen **or** 1692 seen M1 for 1.96 × 9 **or** 196 × 9 **or** 17.64 seen **or** 1764 seen **OR** M1 for 4.23 ÷ 9 **or** 423 ÷ 9 **or** 0.47 seen **or** 47 seen M1 for 0.47 × 4 **or** 47 × 4 **or** 1.88 seen **or** 188 seen **OR** M1 for 1.96 ÷ 4 **or** 196 ÷ 4 **or** 0.49 seen **or** 49 seen M1 for 0.49 × 9 **or** 49 × 9 **or** 4.41 seen **or** 441 seen **OR** M1 for 9 ÷ 4.23 **or** 2.12(...) seen **or** 2.13 seen M1 for 4 ÷ 1.96 **or** 2.04(...) seen A1 for Pack of 9 and fully correct calculations **NOTE:** B0 for an answer of 9 not supported by working.
20	(a)		6	1	B1 cao
	(b)		44	1	B1 cao
	(c)		31	2	M1 for 60 – 29 **or** 29 – 60 **or** any correct method that is attempting to find the difference between 29 and 60 (allow 1 arithmetic error) A1 cao

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
21*		Angle *DBC* = (180 – 50) ÷ 2 Base angles of isosceles triangle are equal Angle *ABD* = 180 – 65 Angles on a straight line add up to 180 *x* = 180 – 20 – 115 Angles in a triangle add up to 180 **OR** Angle *DBC* = (180 – 50) ÷ 2 Base angles of isosceles triangle are equal *x* = 65 – 20 Exterior angle of triangle is equal to sum of interior opposite angles **OR** Angle *DCB* = (180 – 50) ÷ 2 Base angles of isosceles triangle are equal *x* = 180 – 50 – 20 – 65 Angles in a triangle add up to 180	45 with reasons	4	M1 for (180 – 50) ÷ 2 oe **or** 65 seen M1 for 180 – 20 – (180 – "65") **or** "65" – 20 or 180 – 50 – 20 –'65' oe C2 for *x* identified as 45 with full reasons QWC: Reasons clearly laid out with correct geometrical language used (C1 (dep on M1) for one reason QWC: Reasons clearly laid out with correct geometrical language used) NOTE: *x* = 45 with no working or without any correct angles marked on the diagram cannot score.

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
22	(a)	360 ÷ 60 = 6 300 ÷ 60 = 5 6 × 5 =	Yes and 30	3	M1 for dividing side of patio by side of paving slab eg 360 ÷ 60 **or** 300 ÷ 60 **or** 3.6 ÷ 0.6 **or** 3 ÷ 0.6 **or** 6 and 5 seen **or** 6 divisions seen on length of diagram **or** 5 divisions seen on width of diagram M1 for correct method to find number of paving slabs eg (360 ÷ 60) × (300 ÷ 60) oe **or** 6 × 5 **or** 30 squares seen on diagram (units may not be consistent) A1 for Yes **and** 30 (or 2 extra) with correct calculations **OR** M1 for correct method to find area of patio **or** paving slab eg 360 × 300 **or** 108000 seen **or** 60 × 60 **or** 3600 seen **or** 3.6 × 3 **or** 10.8 seen **or** 0.6 × 0.6 **or** 0.36 seen M1 for dividing area of patio by area of a paving slab eg. (3.6 × 3) ÷ (0.6 × 0.6) oe (units may not be consistent) A1 for Yes **and** 30 (or 2 extra) with correct calculations **OR** M1 for method to find area of patio and area of 32 slabs eg. 60 × 60 × 32 **or** 360 × 300 M1 for method to find both areas eg. 60 × 60 × 32 **and** 360 × 300 (units may not be consistent) A1 for Yes **and** 115200 **and** 108000 **OR** Yes **and** 11.52 **and** 10.8 **NB :** Throughout the question, candidates could be working in metres or centimetres

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
22	(b)	1726 25890 27616 **8 6 3** **2** 2 4 1 8 9 **3** **7** 1 6 1 2 6 **2** 6 1 6 800 60 3 30 24000 1800 90 2 1600 120 6 24000 + 1800 + 90 + 1600 + 120 + 6 = 27616	276.16	3	M1 for complete correct method with relative place value correct. Condone 1 multiplication error, addition not necessary. **OR** M1 for a complete grid. Condone 1 multiplication error, addition not necessary. **OR** M1 for sight of a complete partitioning method, condone 1 multiplication error. Final addition not necessary. A1 for digits 27616 A1 ft (dep on M1) for correct placement of decimal point after addition (of appropriate values) (SC: B1 for attempting to add 32 lots of 8.63)
23	(a)		30	2	M1 for 25 ÷ 10 **or** 2.5 seen **or** 10 ÷ 25 **or** 0.4 seen **or** 12+12+6 oe **or** a complete method eg. 25×12÷10 oe A1 cao
	(b)	1000 ÷ 200 × 12	60	2	M1 for 500 ÷ 50 **or** 1000 ÷ 200 **or** 500 ÷ 10 **or** correct scale factor clearly linked with one ingredient eg 10 with sugar or 5 with butter or flour or 50 with milk **or** an answer of 120 or 600 A1 cao

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
24		Acton after 24, 48, 72, 96, .. Barton after 20, 40, 60, 80, .. LCM of 20 and 24 is 120 9:00 am + 120 minutes **OR** Acton after 24, 48, 1h 12 min... Barton after 20, 40, 1 h LCM is 2 hours 9:00 am + 2 hours **OR** Times from 9:00 am when each service leaves the bus station Acton at 9:24, 9:48, 10:12.. Barton at 9:20, 9:40, 10:00.. **OR** 20 = 2 × 2 × 5 24 = 2 × 2 × 2 × 3 2 × 2 × 2 × 3 × 5 = 120	11:00 am	3	M1 for listing multiples of 20 and 24 with at least 3 numbers in each list ; multiples could be given in minutes or in hours and minutes (condone one addition error in total in first 3 numbers in lists) A1 identify 120 (mins) **or** 2 (hours) as LCM A1 for 11:00 (am) **or** 11(am) **or** 11 o'clock **OR** M1 for listing times after 9am when each bus leaves the bus station, with at least 3 times in each list (condone one addition error in total in first 3 times after 9am in lists) A1 for correct times in each list up to and including 11:00 A1 for 11:00 (am) **or** 11(am) **or** 11 o'clock **OR** M1 for correct method to write 20 and 24 in terms of their prime factors 2, 2, 5 and 2, 2, 2, 3 (condone one error) A1 identify 120 as LCM A1 for 11:00 (am) **or** 11(am) **or** 11 o'clock

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
25	(a)		$6y - 15$	1	B1 cao
	(b)		$4x(2x + y)$	2	B2 cao (B1 for $x(8x + 4y)$ **or** $2x(4x + 2y)$ **or** $4(2x^2 + xy)$ **or** $4x(ax + by)$ where a, b are positive integers **or** $ax(2x + y)$ where a is a positive integer **or** $4x(2x \quad y)$)
	(c)	$10t = gh$ $h = \frac{10t}{g}$	$\frac{10t}{g}$	2	M1 for clear intention to multiply both sides of the equation by 10 (eg. ×10 seen on both sides of equation) **or** clear intention to divide both sides of the equation by g (eg. ÷ g seen on both sides of equation) **or** $10t = gh$ **or** $\frac{t}{g} = \frac{h}{10}$ **or** fully correct reverse flow diagram eg. ← ×10 ← ÷g ← A1 for $\frac{10t}{g}$ oe

1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
26	(a)	$2 \times 5 \times 2 = 20$ $300 \div 20 =$	15	3	M2 for $300 \div (2 \times 5 \times 2)$ oe (M1 for $2 \times 5 \times 2$ **or** 20 seen **or** $300 \div (2 \times 5)$ **or** 30 seen A1 cao
	(b)	$c = \frac{30 \times 40}{150}$ =	8	2	M1 for $\frac{30 \times 40}{150}$ **or** 1200 seen A1 cao
27		$3x - 15 = 2x + 24$ $x = 39$ **OR** $2x + 3x - 15 + 2x + 2x + 24 = 360$ $9x + 9 = 360$ $9x = 351$ $x = 39$ **OR** $2x + 2x + 24 = 180$ $4x + 24 = 180$ $4x = 156$ $x = 39$ **OR** $2x + 3x - 15 = 180$ $5x - 15 = 180$ $5x = 195$ $x = 39$	39	3	M1 for forming an appropriate equation eg $3x - 15 = 2x + 24$ **or** $2x + 3x - 15 + 2x + 2x + 24 = 360$ oe **or** $2x + 2x + 24 = 180$ oe **or** $2x + 3x - 15 = 180$ oe **or** $2x + 3x - 15 = 2x + 2x + 24$ M1 (dep) for correct operation(s) to isolate x and non-x terms in an equation to get $ax = b$ A1 cao **OR** M2 for $\frac{351}{9}$ **or** $\frac{195}{5}$ **or** $\frac{156}{4}$ oe A1 cao

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Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

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Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	1 – (0.15 + 0.32 + 0.27) 1 – (15 + 32 + 27) $1 - (\frac{15}{100} + \frac{32}{100} + \frac{27}{100})$	0.26 26% $\frac{26}{100}$ (oe)	2	M1 for 1 – "(0.15 + 0.32 + 0.27)" oe A1 for 0.26 or $\frac{26}{100}$ (oe) or 26% (must include the % sign) [Note: 0.26 seen in the table and contradicted by an incorrect answer on the answer line gets M1A0]
	(b)	0.15 × 300	45	2	M1 for 0.15 × 300 (= 45) oe A1 cao

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
2	(a)	96 ÷1.20 OR 1÷1.2 = 0.833… 96 × 0.833…	80	2	M1 for 96 ÷1.20 or 1÷1.2 (= 0.833…) and 96 × "0.833…" A1 cao
	(b)	64.80 ÷1.20 = £54 OR 52.50 × 1.20 = €63 OR 64.80 ÷ 52.50 = 1.23(428….)	Comparison	3	M1 for 64.80÷1.20 A1 for £54 ('£' sign must be included although this could be quoted in their comparison, eg difference of £1.50) C1 (dep on M1) for more (expensive) in Paris oe or ft from their '£54' (the difference in cost is not required but one of the values compared must be one of the values given) OR M1 for 52.50 × 1.2 A1 for €63 ('€' sign must be included although this could be quoted in their comparison, eg difference of €1.80) C1 (dep on M1) for less (expensive) in Manchester oe or ft from their '€63' (the difference in cost is not required but one of the values compared must be one of the values given) OR M1 for 64.80 ÷ 52.50 A1 for 1.23(428….) C1 (dep on M1) for more expensive in Paris since the exchange rate of 1.23(428…) is greater than the given exchange rate of 1.20

PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)		(5, 300) plotted	1	B1 for points plotted at (5, 300) allow ± ½ square tolerance
	(b)		The greater the age the less the value	1	B1 for the greater the age the less the value (price, cost etc.) oe Accept negative correlation, but "negative" or "negative relationship" gets B0
	(c)		500 to 800 inc.	2	B2 for an answer in the range 500 to 800 (inc.) OR M1 for a single straight line segment with negative gradient that could be used as a line of best fit A1 ft reading from their line of best fit at Age = 4 [SC: B1 ft reading from their single line of best fit (must be of negative gradient) at Age = 4 if M0 scored]

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*4		2 × 39.50 + 3 × 23.75 = 150.25 150.25 ÷ 3 = 50.08(33..) 150.25 – 50.08(33..) = 100.16(66..) 2 × 40.25 + 3 × 21.85 = 146.05 146.05 ÷ 4 = 36.51(25) 146.05 – 36.51(25) = 109.53(7) $2 \times (1 - \frac{1}{3}) \times 39.50$ $+ 3 \times (1 - \frac{1}{3}) \times 23.75$ + 2 × 0.75 × 40.25 + 3 × 0.75 × 21.85	Easy ferry	5	M1 for 2×39.50 (=79) or 3×23.75 (= 71.25) or 2×40.25 (= 80.50) or 3×21.85 (= 65.55) M1 for 2×39.50+3×23.75 (=150.25) and 2×40.25+3×21.85 (=146.05) M1 for $(1 - \frac{1}{3})$ × '150.25' oe or (100 – 25)% × '146.05' oe A1 for (£)100.16 to (£)100.17 and (£)109.53 to (£)109.54 C1 for "Easy Ferry is cheaper" oe or ft from their 2 totals provided at least 2 Ms scored and it is clearly stated which total relates to which ferry company OR M1 for $(1 - \frac{1}{3})$ × 39.50 oe (= 26.33) or $(1 - \frac{1}{3})$ × 23.75 oe (=15.83) or (100 – 25)% × 40.25 oe (= 30.19) or (100 – 25)% × 21.85 oe (= 16.39) M1 for 2×"26.33" (= 52.66) or 3×"15.83" (= 47.50) or 2×"30.19" (= 60.38) or 3×"16.39 (= 49.17) M1 for 2×"26.33" + 3×"15.83" and 2×"30.19" + 3×"16.39 A1 for (£)100.15 to (£)100.16 and (£)109.55 C1 for "Easy Ferry is cheaper" oe or ft from their 2 totals provided at least 2 Ms scored and it is clearly stated which total relates to which ferry company

5MB1H_01

Question		Working	Answer	Mark	Notes
5	(a)		5 | 9 6 | 3 5 6 6 7 | 1 2 5 5 6 7 9 9 8 | 3 9 Key: eg, 7/2 represents 72	3	M1 for at least 2 correct 'rows' with correct stem and correct ordered or unordered leaf Note: stem could be 5,6,7,8 or 50,60,70,80 A1 for a fully correct ordered stem and leaf diagram B1 for a key [Ignore spacing on leaves provided the order is` correct]
	(*b)	Gill: HV 95 >, LV 75 >, Mean 80 >, Range 20 < Jamal: HV 89, LV 59, Mean 73, Range 30	Comparison	5	M1 for '72+59+76+...'÷15 or 1095 ÷ 15 (= 73) M1 for 95 – 75 (=20**) or** '89' – '59' (= 30) or '89' and '59' seen ft from their stem and leaf diagram in (a) A1 for mean of Jamal's scores is 73 cao or for ranges of 20 and 30 cao C1 (dep on first M1) ft for a correct comparison of mean scores, e.g. Gill's mean score > Jamal's mean score oe C1 ft for a correct comparison of ranges, (dep on M1 awarded for correct method to find range) e.g. The range of Gill's scores < The range of Jamal's scores **or** a correct comparison of both end values (dep on M1 awarded for '89' and '59' seen) , e.g. Gill's lowest score > Jamal's lowest score and Gill's highest score > Jamal's highest score. oe [For the award of C2, the word 'score' must be explicitly stated. If not deduct 1 mark]

PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6		(7×35 + 22×45 + 34×55 + 12×65) ÷75 = (245 +990 + 1870 + 780) ÷75 = 3885 ÷75	51.8	4	M1 for use of *fs* with *s* consistent within intervals (including end points) accept one error M1 (dep) for use of *s* as the correct midpoints [Note: ∑*fs* = 3885 seen automatically gets the first two method marks] M1 (dep on 1st M1) for use of ∑"*fs*" ÷75 (or divided by their total of 7+22+34+12 if 75 not used) A1 cao
7	(a)		(4), 11, 24, 36, 40	1	B1 for all correct
	(b)			2	B1 ft for 4 or 5 "points" plotted correctly ± ½ full (2mm) square at the end of interval dep on sensible table (condone 1 addition error) B1 (dep) for points joined by curve or line segments provided no gradient is negative Ignore any part of graph outside the range of their points (SC: B1 if 4 or 5 points plotted not at end but consistent within each interval and joined)
	(c)		36.5 to 38 (inc.)	1	B1 for an answer in the range 36.5 to 38 (inc.) or ft (dep on graph being cf) for reading from graph at 20 ± 1 full (2mm) square

PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8		(23×153 + 17×165) ÷ (23+17)	158.1	3	M1 for 23×153 (= 3519) or 17×165 (= 2805) M1 for '3519' + '2805' (= 6324) ÷ '40' (= 23+17) A1 cao [An answer of 158 with no working gets no marks]
9	(a)		Box plot	2	B2 for correct box plot (B1 for box plot with at least 3 pieces of information correctly plotted) Note: There must be a box
	(b)	75% × 60	45	2	M1 for 0.75 × 60 oe A1 cao [SC: B1 for an answer of 15 if M0 scored]

PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)		e.g. How often do you visit the sport centre each week? 0, 1, 2, 3 more	2	B1 for an appropriate question with reference to a time period or a question with time period implied by responses B1 for at least 3 non-overlapping boxes (ignore if not exhaustive) **or** for at least 3 exhaustive boxes (ignore if any overlapping) [Note: labels on response boxes must **not** be inequalites] Do not accept frequency tables or data collection sheets
	(b)		Reason	1	B1 for a correct reason, e.g. may be biased, sample too small, not a random sample, ……
	(c)	e.g. 45/365 × 50 = 6.16...	6	2	M1 for 45/365 × 50 (= 6.16….) oe A1 for 6 OR M1 for an attempt to divide 50 in the ratio 45:320 oe A1 for 6

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11		$\frac{40}{N} = \frac{5}{50}$	400	2	M1 for an attempt to compare fractions, e.g. $\frac{40}{N} = \frac{5}{50}$ or $40\times50 = 5\times N$ or $40:N = 5:50$ A1 cao OR M1 for an attempt to compare percentages, e.g. $\frac{5}{50}\times100 = 10\%$ or $10\%\times N = 40$ A1 cao [SC: B1 for sight of $\frac{40}{N}$ or $\frac{5}{50}$ if M0 scored]

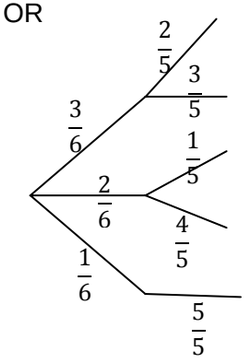
PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		Tree diagram with p and $1 - p$ on branches	2	B2 cao (B1 for $1 - p$ seen on at least one branch)
	(b)		$p \times p$	1	B1 for $p \times p$ or p^2 or pp oe
	(c)		$p \times (1 - p) + p \times (1 - p)$	2	M1 for $p \times$ '$(1 - p)$' oe, provided the expression is in terms of p only OR ft from their tree diagram where the expressions must be algebraic in terms of p only A1 for $2 \times p \times (1 - p)$ oe but must be algebraically the correct answer OR M1 for $1 - p \times p -$ '$(1 - p)$' $\times$ '$(1 - p)$' oe OR ft from their tree diagram where the expressions must be algebraic in terms of p only A1 for $2 \times p \times (1 - p)$ oe but must be algebraically the correct answer [SC B1 for $2 \times f \times (1 - f)$, where f is a fraction or decimal less than 1 used as a value for p in tree diagram]

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
13		$\frac{17.24}{57} \times 285 = 86.2$ $\frac{86.2}{285} \times 285 = 86.2$ $\frac{431}{1425} \times 285 = 86.2$	86 or 87 .	3	M1 for an attempt to relate total area to total frequency. Eg. using a fd scale of **1cm = 0.2** 285 ÷ [21+9.8+11.2+10+5 (=57)] (= 5) At least 3 of these 5 frequency values must be correct M1 for ('2.24'+10+5) × '5' A1 for 86 or 87 (accept 86.2) OR M1 for an attempt to relate total area to total frequency. Eg. using a fd scale of **1cm = 1** 285 ÷ [105+49+56+50+25 (=285)] (= 1) At least 3 of these 5 frequency values must be correct M1 for ('11.2'+50+25) × '1' A1 for 86 or 87 (accept 86.2) [SC: B1 can be awarded for correct labelling of fd axis using the scale of 1cm = 1 if M0 scored] OR M1 for an attempt to relate total area to total frequency. Eg. using a fd scale of **1cm = 5** 285 ÷ [525+245+280+250+125 (=1425)] (= 0.2) At least 3 of these 5 frequency values must be correct M1 for ('56'+250+125) × '0.2' A1 for 86 or 87 (accept 86.2)

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
		(2.24+10+5) × 5 = for 17.24 × 5 = 86.2			OR M1 for 1 cm^2 = 5 farms M1 for ('2.24'+10+5) × 5 A1 for 86 or 87 (accept 86.2)

PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		$\frac{3}{6}\times\frac{2}{5}+\frac{2}{6}\times\frac{1}{5}$ = 8/30 $1-\frac{8}{30}=\frac{22}{30}$ OR $2\times\frac{3}{6}\times\frac{2}{5}+2\times\frac{3}{6}\times\frac{1}{5}+2\times\frac{2}{6}\times\frac{1}{5}$ OR  	$\frac{22}{30}=\frac{11}{15}$	4	M1 for $\frac{3}{6}\times\frac{2}{5}$ or $\frac{2}{6}\times\frac{1}{5}$ M1 for $\frac{3}{6}\times\frac{2}{5}+\frac{2}{6}\times\frac{1}{5}$ M1 for $1-(\frac{3}{6}\times\frac{2}{5}+\frac{2}{6}\times\frac{1}{5})$ A1 for $\frac{22}{30}$ oe OR M1 for $\frac{3}{6}\times\frac{2}{5}$ or $\frac{3}{6}\times\frac{1}{5}$ or $\frac{2}{6}\times\frac{1}{5}$ M1 for $\frac{3}{6}\times\frac{2}{5}+\frac{3}{6}\times\frac{1}{5}+\frac{2}{6}\times\frac{1}{5}$ M1 for $2\times(\frac{3}{6}\times\frac{2}{5}+\frac{3}{6}\times\frac{1}{5}+\frac{2}{6}\times\frac{1}{5})$ A1 for $\frac{22}{30}$ oe OR M2 for $\frac{3}{6}\times\frac{3}{5}$ or $\frac{2}{6}\times\frac{4}{5}$ or $\frac{1}{6}\times\frac{5}{5}$ M1 for $\frac{3}{6}\times\frac{3}{5}+\frac{2}{6}\times\frac{4}{5}+\frac{1}{6}\times\frac{5}{5}$ A1 for $\frac{22}{30}$ oe

		OR A^1A^2 A^1A^3 $\mathbf{A^1B^1}$ $\mathbf{A^1B^2}$ $\mathbf{A^1C}$ A^2A^1 A^2A^3 $\mathbf{A^2B^1}$ $\mathbf{A^2B^2}$ $\mathbf{A^2C}$ A^3A^1 A^3A^{32} $\mathbf{A^3B^1}$ $\mathbf{A^3B^2}$ $\mathbf{A^3C}$ $\mathbf{B^1A^1}$ $\mathbf{B^1A^2}$ $\mathbf{B^1A^3}$ B^1B^2 $\mathbf{B^1C}$ $\mathbf{B^2A^1}$ $\mathbf{B^2A^2}$ $\mathbf{B^2A^3}$ B^2B^1 $\mathbf{B^2C}$ $\mathbf{CA^1}$ $\mathbf{CA^2}$ $\mathbf{CA^3}$ $\mathbf{CB^2}$ $\mathbf{CB^2}$			OR M2 for diagram showing all 30 possible outcomes (M1 for diagram showing 15 possible outcomes. ie without any repeats) M1 (dep) for identifying all outcomes in their diagram with different letters (underlining, circling, etc.) Or 30 – all outcomes where the letters are the same A1 for $\frac{22}{30}$ oe **Alternative scheme for replacement** M1 for $\frac{3}{6}\times\frac{3}{6}$ or $\frac{2}{6}\times\frac{2}{6}$ or $\frac{1}{6}\times\frac{1}{6}$ M1 for $1-(\frac{3}{6}\times\frac{3}{6}+\frac{2}{6}\times\frac{2}{6}+\frac{1}{6}\times\frac{1}{6})$ OR M1 for $\frac{3}{6}\times\frac{2}{6}$ or $\frac{3}{6}\times\frac{1}{6}$ or $\frac{2}{6}\times\frac{1}{6}$ M1 for $2\times(\frac{3}{6}\times\frac{2}{6}+\frac{3}{6}\times\frac{1}{6}+\frac{2}{6}\times\frac{1}{6})$

					OR M1 for a diagram showing all 36 ‘possible’ outcomes A1 for $\frac{22}{36}$ (= 0.6111…) **Special cases:** B2 for $\frac{22}{36}$ (= 0.6111…) or $\frac{28}{36}$ (= 0.777..) or $\frac{16}{30}$ (= 0.533..) if M0 scored

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PMT

NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

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If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
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Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*1		Angle *BED* = 68° 180 – (68 + 68) OR Angle *BEF* = 180 – 68 = 112 Angle *BED* = 180= 112 = 68 180 – (68 + 68)	x = 44°	4	M1 for Angle *BED* = 68° seen in the diagram or correctly used in the working space M1 for 180 – 2 × "68" A1 for x = 44° (accept angle *BDE* = 44°) [Note: 44° only seen in the body of the script without the "x =" gets M1M1A0] C1 (dep on at least M1) for alternate angles are equal (or equivalent) and one other reason; either angles in a triangle add to 180° or base angles of an isosceles triangle are equal OR for allied angles (or equivalent, eg co-interior) add up to 180° and angles on a straight line add up to 180° and one other reason; either angles in a triangle add to 180° or base angles of an isosceles triangle are equal
2			$4n + 2$	2	B2 for $4n + 2$ oe (eg $4 \times n + 2$ or $n4 + 2$, …) or nth = $4n + 2$ (B1 for a linear expression in $4n$ e.g. $4n + a$ ($a \neq 2$) or $n = 4n + 2$) (B0 for $n = 4n$ and $n + 4$)

PMT

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3		35 ÷ (5 + 2) = 5 5 × 5 OR 5 2 10 4 15 6 20 8 25 10	25	2	M1 for 35 ÷ (5 + 2) or 35 ÷ 7 or 35 × $\frac{5}{7}$ A1 for 25 cao OR M1 for listing 5, 10, 15, ….. and 2, 4, 6, ….. to at least 15 and 6 A1 for 25 cao [SC: B1 for an answer of 25:10 if M0 scored]
4		$\frac{16}{40} + \frac{15}{40} = \frac{31}{40}$ OR | | 2 | 5 | | 3 | | 15 | | 8 | 16 | 40 | OR 0.4 + 0.375	$\frac{31}{40}$ or 0.775	2	M1 for attempt to write both fractions with a common denominator (a multiple of 40) with at least one of them correct A1 for $\frac{31}{40}$ oe OR M1 for 40 in the correct cell and 15 or 16 in the correct cell A1 for $\frac{31}{40}$ oe OR M1 for changing both fractions to decimals with both 0.4 and 0.375 seen A1 for 0.775

PMT

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5		$\frac{15}{100} \times 400 = 60$ $400 - 60 =$ OR $\frac{85}{100} \times 400$	340	3	M1 for $\frac{15}{100} \times 400$ (= 60) oe or 40 + 20 or 400 × 0.15 M1 (dep) for 400 – "60" A1 for 340 cao OR M1 for 100–15 (=85) M1 (dep) for $\frac{'85'}{100} \times 400$ or '0.85' × 400 A1 for 340 [SC: B1 for an answer of 460 if M0 scored]
6	(a)		$5(2a + 1)$	1	B1 for $5(2a + 1)$ or $5\times(2a + 1)$ or $(2a + 1)5$ or $5(1 + 2a)$, etc
	(b)	$5x + 35 + 3x - 6$	$8x + 29$	2	M1 for $5x + 35$ or $3x - 6$ or $8x$ or 29 A1 for $8x + 29$
	(c)		$3ab(a + 2b)$	2	B2 for $3ab(a + 2b)$ (B1 for correct partial factorisation $a(3ab + 6b^2)$ or $b(3a^2 + 6ab)$ or $3a(ab + 2b^2)$ or $3b(a^2 + 2ab)$ or $ab(3a + 6b)$ OR $3ab(ma + 2b)$ or $3ab(a + nb)$ where $m \neq 1$, $n \neq 2$) [B0 for partial factorisation using only an integer e.g. $3(a^2b + 2ab^2)$]

5MB2H_01

Question		Working	Answer	Mark	Notes
7		515 × 35 2575 15450 18025 10 × 515 = 5150 10 × 515 = 5150 10 × 515 = 5150 5 × 515 = 2575 18025 15000 + 2500 + 300 + 50 + 150 + 25 =18025	£180.25	4	M1 for 515 × 0.35 or 515 × 35 This may be implied from an incomplete method of multiplication M1 for a complete method with relative place value correct. Condone one multiplication error, addition not necessary Or for a complete grid, condone one multiplication error, addition not necessary Or for sight of a complete partitioning method. Condone one multiplication error final addition not necessary M1 (dep on the previous M1) for addition of appropriate elements of the calculation A1 for £180.25(p) or 18025p (with '£' sign deleted)

	5	1	5	×
	1 / 5	0 / 3	1 / 5	3
1	2 / 5	0 / 5	2 / 5	5
8	0	2	5	

	500	10	5
30	15000	300	150
5	2500	50	25

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
		OR 3307 × 35 = 115 745 2792 × 35 = 97720 115745 – 97720			OR M1 for 3307 × 0.35 − 2792 × 0.35 or 3307 × 35 − 2792 × 35 M1 for a correct method of multiplication of at least one product, using digits 3307 and 35 or 2792 and 35 Condone one multiplication error, addition not necessary M1 (dep on the previous M1) for addition of appropriate elements of the calculation A1 for £180.25 or 18025p (with '£' sign deleted)

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8		**Triangular ends** $\frac{1}{2} \times 5 \times 12 = 30$ $\frac{1}{2} \times 5 \times 12 = 30$ **Base** $20 \times 5 = 100$ **Vertical face** $20 \times 12 = 240$ **Slant face** $20 \times 13 = 260$ **Total area** $= 30 + 30 + 100 + 240 + 260$ OR $(5 + 12 + 13) \times 20 + 2 \times \frac{1}{2} \times 5 \times 12$	660	3	M1 for $\frac{1}{2} \times 5 \times 12$ (= 30) or 20×5 (= 100) or 20×12 (= 240) or 20×13 (= 260) M1 (dep) for adding at least 3 areas found from correct methods (of no more than 5 faces) A1 cao OR M1 for $(5 + 12 + 13) \times 20$ or $\frac{1}{2} \times 5 \times 12$ (= 30) M1 (dep) for adding "$(5 + 12 + 13) \times 20$" to at least "$1 \times \frac{1}{2} \times 5 \times 12$" A1 cao Note: Sight of $\frac{1}{2} \times 5 \times 12 \times 20$ or 600 (ie a volume calculation) scores no marks

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		Table of values x : –2, –1, 0, 1, 2 y : –7, –5, –3, –1, 1 OR Using $y = mx + c$ Gradient 2 intercept –3	Single line drawn from (–2, –7) to (2, 1)	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x. M1 (dep) ft for correctly plotting at least 2 of their points (any points plotted from their table must be plotted correctly) A1 for the correct line from (-2, -7) to (2, 1) OR **(No table of values)** M2 for at least 2 correct points (and no incorrect points) correctly plotted or for a line segment of the graph of $y = 2x – 3$ drawn (ignore any additional incorrect line segments) [M1 for at least 3 correct points plotted with no more than 2 incorrect points] A1 for the correct line from (-2, -7) to (2, 1) OR **(Use of $y = mx + c$)** M2 for a single straight line of gradient 2, passing through (0, -3) [M1 for a single straight line of gradient 2 or for a single straight line passing through (0, -3)] A1 for the correct line from (-2, -7) to (2, 1)

PMT

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10		$\frac{1}{2}$ (6 + 4) × 3 OR 6 × 3 – $\frac{1}{2}$ × 2 × 3 OR 4 × 3 + $\frac{1}{2}$ × 2 × 3	15 cm²	4	M2 for $\frac{1}{2}$ (6 + 4) × 3 oe A1 for 15 cao B1 for cm² OR M1 for 6 × 3 (=18) or $\frac{1}{2}$ × 2 × 3 (=3) M1 (dep on "6 × 3" and "$\frac{1}{2}$ × 2 × 3") for "18" – "3" from correct methods A1 for 15 cao B1 for cm² OR M1 for 4×3 (=12) or $\frac{1}{2}$ × 2 × 3 (=3) M1 (dep on "4×3" and "$\frac{1}{2}$ × 2 × 3") for "12" + "3" from correct methods A1 for 15 cao B1 for cm^2

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11		10 000 × 0.8 8000 × 0.9 = 7200 OR 10 000 – $\frac{20}{100}$ × 10 000 = 8000 8000 – $\frac{10}{100}$ × 8 000 OR 10 000 × 0.8 × 0.9	7200	3	M1 for 10 000 × 0.8 (= 8000) M1 (dep) for "8000" × 0.9 (= 7200) A1 for £7200 cao OR M1 for 10 000 – $\frac{20}{100}$ × 10 000 oe M1 (dep) for "8000" – $\frac{10}{100}$ × "8 000" oe A1 7200 cao OR M1 for 0.8 × 0.9 (=0.72) M1 (dep)for 10 000 × "0.72" A1 for 7200 cao [SC: B1 for an answer of 7000 if M0 scored]
12	(a)		$x^2 - 3x - 40$	2	M1 for 3 terms correct (out of no more than 4 terms) from x^2, $5x$, $-8x$ and -40 or 4 terms x^2, $5x$, $8x$ and 40 (ignoring signs) A1 for $x^2 - 3x - 40$ [Note: $x^2 - 3x + 40$ and $x^2 + 3x - 40$ with no working get M0A0]
	(b)		$(x + 4)(x - 4)$	1	B1 for $(x + 4)(x - 4)$ oe
13	(a)		(0, 2, 4)	1	B1 cao
	(b)	$\left(\frac{0+6}{2}, \frac{2+2}{2}, \frac{4+4}{2}\right)$	(3, 2, 4)	2	M1 for an answer of (a, 2, 4) or (3, b, 4) or (3, 2, c) or for[("0" + 6) ÷2, ("2" + 2) ÷2, ("4" + 4) ÷2] This may be implied by their answer with no working seen A1 for (3, 2, 4) cao

PMT

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)	$x = 0.25555\ldots$ $10x = 2.555\ldots$ $100x = 25.5555\ldots$ $90x = 25 - 2 = 23$ OR $x = 0.25555\ldots$ $10x = 2.555\ldots$ $100x = 25.5555\ldots$ $9x = 2.3$ OR $0.2 + (x = 0.0555\ldots.)$ $10x = 0.555\ldots$ $100x = 5.5555\ldots$ $0.2 + 5/90$	$\frac{23}{90}$	3	M1 for $0.255(5\ldots.)$ or $0.2 + 0.055(5\ldots)$ This can be implied in subsequent working M1 for 2 correct recurring decimals which when subtracted will leave an integer or a terminating decimal number A1 for $\frac{23}{90}$ [Note: $\frac{2.3}{9}$ gets A0] [SC: B1 for an answer of $\frac{25}{99}$ oe $(= 0.\dot{2}\dot{5})$, with or without working if M0 scored]
	(b)	$\frac{12}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{12\sqrt{6}}{6}$	$2\sqrt{6}$	2	M1 for multiplying numerator and denominator by $\sqrt{6}$ A1 for $2\sqrt{6}$ (accept $\frac{2\sqrt{6}}{1}$)

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*15		180 –(90 + 20) = 70 2 × 70 = 140 (180 – 40)÷2 =70 180 – 2×(90 –70) = 140	Angle *TOR* =140º	4	M1 for angle *PTO* (*PRO*) = 90º or seeing it marked on the diagram with a right angle or as 90° M1 (dep) for 180 –(90 + 20) (=70°) or for 360 – (90 + 90 + 40) (=140) A1 for (angle) *TOR* = 140º or for 140º seen in the correct place in the diagram [140º alone without the '*TOR* =' gets A0] C1 (dep on at least M1) for angle between a tangent and a radius = 90° plus at least one other correct reason from: Sum of angles in a triangle is 180º Sum of angles in a quadrilateral is 360º Triangles *PTO* and *PRO* are congruent Tangents from a point are equal in length OR M1 for angle *PTO* (*PRO*) = 90º or seeing it marked on the diagram with a right angle or as 90° M1 for (180 – 40)÷2 (=70) and [180 – 2×(90 –"70")] (=140) A1 for (angle) *TOR* = 140º or for 140º seen in the correct place in the diagram [140º alone without the '*TOR* =' gets A0] C1 (dep on at least M1) for angle between a tangent and a radius = 90° plus at least one other correct reason from: Sum of angles in a triangle is 180º Base angles of an isosceles triangle are equal Triangles *PTO* and *PRO* are congruent Tangents from a point are equal in length

PMT

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16		$80 \times \frac{5}{8} = 50$ 50×2.75 OR $80 \times 2.75 = 220$ $220 \times \frac{5}{8}$	136 to 138 inc.	3	M1 for $80 \times \frac{5}{8}$ or $80 \div 1.6$ oe (= 50) M1 (indep) for "50" × 2.75 [accept "50"× 165 (=8250)] or "50" + "50" + "50"÷2 (=25) + "25" ÷2 (=12.5) Note: "50" is what is considered to be their speed in miles per hour calculated using an explicitly stated conversion factor A1 for an answer in the range 136 to 138 inc. OR M1 for 80 × 2.75 (=220) [accept 80 × 165 (=13200)] or 80 + 80 + 80÷2 (=40) + "40"÷2 (=20) M1 (indep) for "220" × $\frac{5}{8}$ Note: "220" is what is considered to be their distance in kilometres calculated using an explicitly stated conversion factor A1 for an answer in the range 136 to 138 inc.
17		$y = -\frac{1}{2}x + 2.5$ *mm'* = –1 shows gradient is 2 $y = 2x + c$ goes through (3, 7) $7 = 2 \times 3 + c$	$y = 2x + 1$	4	M1 for establishing gradient of original line is $-\frac{1}{2}$ or sight of $y = -\frac{1}{2}x + c$ M1 (indep) for (gradient of perpendicular) × "$-\frac{1}{2}$" = –1 This can be implied by a gradient of 2 or ft on "$-\frac{1}{2}$" M1 (dep on the previous M1) for substituting (3, 7) into y = "2"x + c A1 for $y = 2x + 1$ (or equivalent algebraic equation)

PMT

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
18		$\frac{2x^2-9x-5}{4x^3+2x^2}$ $\frac{(2x+1)(x-5)}{2x^2(2x+1)}$	$\frac{x-5}{2x^2}$	3	M1 for factorising the numerator correctly M1 for fully factorising the denominator correctly A1 for $\frac{x-5}{2x^2}$ oe eg. $\frac{-5+x}{2x^2}$

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

PMT

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		$\frac{\sqrt{20.4}}{6.2\times0.48}=\frac{4.5166359}{2.976}$	1.5176(868)	2	B2 for 1.5176… (B1 for sight of 4.51(66359..) **or** 4.52 **or** 2.97(6) **or** 2.98 **or** 1.51 **or** 1.52 **or** 1.518 **or** 1.517 **or** 1.5177**or** $\frac{\sqrt{510}}{5}$)
2	(a)		Triangle with vertices (1, 5) (4, 5) (4,7)	2	B2 correct reflection (B1 a translation of the correct answer with the final shape above $y = x$ **or** any two correct vertices) SC : B1 for a triangle with vertices at (2, 5) (4, 5) (4, 8)
	(b)		Translation by $\begin{pmatrix}-2\\-4\end{pmatrix}$	2	B1 Translation B1 $\begin{pmatrix}-2\\-4\end{pmatrix}$ NB. Award no marks for a combination of transformations

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*3		3×£193.86 = £581.58 £581.58 ×0.85=£494.343	£494.34	5	M1 3 × 193.86 (= 581.58) B1 ft correct discount % identified or used in working (may be identified in table) M1 '581.58'× '0.15' (=87.23(7)) M1 (dep on the previous M1) '581.58' − '87.23(7)' (= 494.34(3) **or** 494.35) C1 (dep on all method marks) for £494.34 **or** £494.35 identified as final answer with correct money notation **OR** M1 3 × 193.86 (= 581.58) B1 ft correct discount % identified or used in working (may be identified in table) M2 '581.58'× '0.85' **(=** 494.34(3)) (M1 '581.58' × '1.15' (=668.81(7)) C1 (dep on all method marks) for £494.34 **or** £494.35 identified as final answer with correct money notation **NB. Throughout, values may be rounded or truncated to 2 decimal places**

1MA0_2H

Question		Working	Answer	Mark	Notes
4		<table><tr><th>Bird</th><th>Frequency</th><th>Angles</th></tr><tr><td>Magpie</td><td>15</td><td>75</td></tr><tr><td>Thrush</td><td>10</td><td>50</td></tr><tr><td>Starling</td><td>20</td><td>100</td></tr><tr><td>Sparrow</td><td>27</td><td>135</td></tr></table> Angles $\frac{15}{72}\times 360$, $\frac{10}{72}\times 360$, $\frac{20}{72}\times 360$, $\frac{27}{72}\times 360$ OR 360 ÷ 72 = 5 5 ×15 = 75 etc	Correct pie chart	3	M1 for any one of $\frac{15}{'72'}\times 360$, $\frac{10}{'72'}\times 360$, $\frac{20}{'72'}\times 360$, $\frac{27}{'72'}\times 360$ oe ('72' must clearly come from adding frequencies) A1 for 75 seen from correct working **or** 50 seen **or** 100 seen **or** 135 seen **or** one sector of angle 50° or 100° or 135° labelled correctly with bird's name **or** all sectors correctly drawn A1 for correct pie chart fully labelled with birds' names **OR** M1 for $\frac{'75'}{15}\times 10$ **or** $\frac{'75'}{15}\times 20$ **or** $\frac{'75'}{15}\times 27$ ('75' should be in the range 73 - 77) A1 for 50 seen **or** 100 seen **or** 135 seen **or** one sector of angle 50° or 100° or 135° labelled correctly with bird's name **or** all sectors correctly drawn A1 for correct pie chart fully labelled with birds' names **NB. Allow a tolerance of ±2° on all drawn angles**

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5		25 ÷ 50 = 0.5 h = 30 min 25 ÷ 60 = 0.416 h = 25 min	5	3	M1 for 25 ÷ 50 **or** $\frac{60}{50}\times 25$ **or** 30 (min) **or** 0.5(h) **or** 25 ÷ 60 **or** $\frac{60}{60}\times 25$ **or** 25 (min) **or** 0.41(6)(h) **or** 0.42 (h) M1(dep) '0.5' –' 0.416 '**or** '30' – '25' A1 cao **OR** M1 for 60 ÷ 25 (= 2.4) **and** 60 ÷ "2.4" **or** 50 ÷ 25 (= 2) **and** 60 ÷ "2" M1(dep) '30' – '25' A1 cao

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
6		Angle *DEC* = 180 – 41 =139 Angles on a straight line sum to 180° Angle *EDC* = 60 – 38 **or** Angle *ABD* = 180 – 120 – 38 (=22) Co-interior/allied angles of parallel lines sum to 180° **or** Angles in a triangle sum to 180° **and** Alternate angles *x* =)180 – '139' – '22' (=19) Angles in a triangle sum to 180° **OR** Angle *ADC* = 180° – 120° = 60° Co-interior/allied angles of parallel lines sum to 180° Angle *EDC* = 22° Angle *ECD* = 41° – 22° = 19° Exterior angle of triangle equals sum of the two opposite interior angles **OR** Angle *DBC* = 38° Alternate angles Angle *BCE* = 101° Angle sum of a triangle is 180° Angle *BCD* = 120° Opposite angles of a parallelogram are equal Angle *ECD* = 120° – 101° = 19°	*x* = 19° and reasons	4	M1 for *DBC* = 38° **or** *ADC* = 60°(can be implied by *BDC* = 22°) **or** *ABC* = 60° **or** *DCB* = 120° **or** (*ABD* =) 180 – 120 –38 (=22) M1 for (*BDC* =) 60 − 38 (=22) **or** *BDC* = '22' **or** (*DEC* =) 180 − 41 (=139) **or** (*BCE* =) 180 −41 − 38 (=101) M1 (dep on both previous M1) for complete correct method to find *x* **or** (*x* =) 19 C1 for *x* = 19° **AND** Co-interior/allied angles of parallel lines sum to 180° **or** Opposite angles of a parallelogram are equal **or** Alternate angles **AND** Angles on a straight line sum to 180° **or** Angles in a triangle sum to 180° **or** Exterior angle of triangle equals sum of the two opposite interior angles **or** Angles in a quadrilateral sum to 360°

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
7		17.8 ÷ 160 × 210 = 0.11125 × 210 = 23.3625 g **OR** 210 ÷ 160 × 17.8 = 1.3125 × 17.8 = 23.3625 g **OR** 210 − 160 (=50) $\frac{17.8}{160} \times '50' (= 5.5625)$ 17.8 + 5.5625	23.3(625)	3	M1 17.8 ÷ 160 (=0.11125) **or** 17.8 × 210 (=3738) **or** 210 ÷ 160 (=1.3125) M1 (dep) '0.11125' × 210 **or** '3738'÷160 **or** '1.3125'× 17.8 A1 for answer in range 23.3 - 23.4 **OR** M1 for $\frac{17.8}{160} \times (210 - 160) (= 5.5625)$ M1 (dep) for 17.8 + '5.5625' A1 for answer in range 23.3 - 23.4 **OR** M1 for correct method to find weight of 2 cm **or** 5 cm **or** 10 cm M1 (dep) for complete method A1 for answer in range 23.3 - 23.4

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(a)		–1, 0, 1, 2, 3	2	B2 for all 5 correct values; ignore repeats, any order (B1 for 4 correct (and no incorrect values) eg. 0, 1, 2, 3 **or** one additional value, eg –1, 0, 1, 2, 3, 4)
	(b)		$-4 < x \leq 3$	2	B2 for $-4 < x \leq 3$ **or** > -4 **and** ≤ 3 (B1 for $-4 < x$ **or** $x > -4$ **or** $x \leq 3$ **or** $3 \geq x$ **or** > -4 **or** ≤ 3 **or** $-4 \leq x < 3$) NB : Accept the use of any letter
	(c)	$3y - 2 > 5$ $3y > 7$	$y > \frac{7}{3}$	2	M1 for clear intention to add 2 to both sides (of inequality or equation) or clear intention to divide all three terms by 3 **or** $3y > 7$ **or** $3y < 7$ **or** $3y = 7$ A1 $y > \frac{7}{3}$ **or** $y > 2\frac{1}{3}$ **or** $y > 2.\dot{3}$ NB. final answer **must** be an inequality (SC B1 for $\frac{7}{3}$ oe seen if M0 scored)
9	(a)		32	1	B1 cao
	(b)	LQ = 21 UQ = 45	24	2	M1 for 45 **or** 21 **or** 43.5 **or** 19.5 **or** 7.75^{th} **or** 8th **or** 23.25^{th} **or** 24th (all of above may be seen in working space or indicated on S&L) **or** clear attempt to find UQ and LQ from a list of values or in stem and leaf diagram A1 cao

<table>
<tr><th colspan="6">1MA0_2H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>10</td><td></td><td>For example
<table>
<tr><th></th><th>UK</th><th>USA</th></tr>
<tr><td>$ per US gal</td><td>($)6.90(8412)</td><td>[$3.15]</td></tr>
<tr><td>£ per litre</td><td>[£1.24]</td><td>(£)0.56(53...)</td></tr>
<tr><td>£ per US gal</td><td>(£)4.69(96)</td><td>(£)2.14(28...)</td></tr>
<tr><td>$ per litre</td><td>($)1.82(28)</td><td>($)0.83(11...)</td></tr>
</table>
Cost in £ per US gal of UK fuel= £1.24 × 3.79 = £4.6996
Cost in $ per US gal of UK fuel = $1.47 × 4.6996 = $6.908412

OR
Cost in £ of 1 US gal of US fuel = $3.15 ÷ 1.47 = £2.14
Cost in £ per litre of US fuel = £2.14 ÷ 3.79 =£0. 56(5..

OR
Cost in UK in £ per US gal = £1.24 × 3.79 (=£4.6996)
Cost in USA in £ per US gal = £3.15 ÷ 1.47 (=2.1428)

OR
Cost in UK is $ per litre = £1.24 × 1.47 (=1.8228)
Cost in USA in $ per litre = 3.15 ÷ 3.79 (=0.8311...)</td><td>Cheaper in US</td><td>4</td><td>M1 for 1.24 × 3.79 (= 4.6996) or
1.24 × 1.47 (=1.8228)
M1 for 1.47 × ‘4.6996’ or 3.79 × '1.8228'
A1 for 6.90(8412)
C1 (dep on M2) for $’6.90(8412)’ or $'6.91' and reaching a conclusion consistent with their calculation

OR
M1 for 3.15 ÷ 1.47 (=2.1428..) or
3.15 ÷ 3.79 (=0.8311)
M1 for ‘2.14’ ÷ 3.79 or '0.8311' ÷ 1.47
A1 for 0. 56(53…)
C1 (dep on M2) for £’0. 56(53...)’ or '£0.57' and reaching a conclusion consistent with their calculation

OR
M1 1.24 × 3.79 (= 4.6996)
M1 3.15 ÷ 1.47 (=2.1428..)
A1 4.69(96) and 2.14(28...)
C1 (dep on M2) for £'4.69(96)' or £'4.70’ AND £‘2.14(28...)’ and reaching a conclusion consistent with their calculation

OR
M1 for 1.24 × 1.47 (=1.8228)
M1 for 3.15 ÷ 3.79 (=0.8311...)
A1 for 1.82(28) and 0.83(11...)
C1 (dep on M2) for $'1.82(28)' and $'0.83(11...)' and reaching a conclusion consistent with their calculation

NB: Throughout values can be rounded or truncated to 1 or more decimal places. In order to award the communication mark, correct currency must be shown with the calculated value(s) but these can still be rounded or truncated to one or more decimal places as they are being used for comparison.</td></tr>
</table>

<table>
<tr><th colspan="5">1MA0_2H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>11</td><td>(a)</td><td></td><td>show</td><td>2</td><td>M1 for $x\times x\times x$ or $2\times 5\times x$ or vol of cube = x^3 or vol cuboid = $10x$
A1 correct completion leading to
$x^3 - 10x = 100$</td></tr>
<tr><td></td><td>(b)</td><td><table>
<tr><td>$x = 1$</td><td>−9</td></tr>
<tr><td>$x = 2$</td><td>−2</td></tr>
<tr><td>$x = 3$</td><td>−3</td></tr>
<tr><td>$x = 4$</td><td>24</td></tr>
<tr><td>$x = 5$</td><td>75</td></tr>
<tr><td>$x = 6$</td><td>156</td></tr>
<tr><td>$x = 10$</td><td>900</td></tr>
<tr><td>$x = 5.1$</td><td>81.(651)</td></tr>
<tr><td>$x = 5.2$</td><td>88.(608)</td></tr>
<tr><td>$x = 5.3$</td><td>95.(877)</td></tr>
<tr><td>$x = 5.4$</td><td>103.(464)</td></tr>
<tr><td>$x = 5.5$</td><td>111.(375)</td></tr>
<tr><td>$x = 5.6$</td><td>119.(616)</td></tr>
<tr><td>$x = 5.7$</td><td>128.(193)</td></tr>
<tr><td>$x = 5.8$</td><td>137.(112)</td></tr>
<tr><td>$x = 5.9$</td><td>146.(379)</td></tr>
<tr><td>$x = 5.35$</td><td>99.6(30375)</td></tr>
<tr><td>$x = 5.36$</td><td>100.3(90656)</td></tr>
<tr><td>$x = 5.355$</td><td>100.0(101139)</td></tr>
</table></td><td>5.4</td><td>4</td><td>B2 for a trial $5 \le x \le 6$ evaluated correctly
(B1 for any two trials evaluated correctly for positive values of x)
B1 for a different trial $5.3 < x < 5.4$ evaluated correctly
B1 (dep on at least one previous B1) for 5.4

Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1 d.p., but correct to 1 d.p. (rounded or truncated) if the value of x is to 2 or more d.p.

NB. Allow 100 for a trial of $x = 5.355$</td></tr>
</table>

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		Correct Frequency Polygon	2	B2 Fully correct polygon. Points plotted at the midpoint (B1 All points plotted accurately not joined, **or** one error in plotting but joined **or** all points plotted accurately and joined with, additionally, first joined to last **or** all points at the correct heights and consistently within or at the ends of the intervals **and** joined (Includes joining last to first to make a polygon)) NB: ignore polygon before 1st point, and after last point. Ignore any histograms.
	(b)		$30 < t \leq 40$	1	B1 Allow any notation eg, 30-40 ft polygon
	(c)	(6 +2) = 8, (4 + 8 + 14 + 16 + 6 + 2) = 50	$\frac{8}{50}$ oe	2	M1 (6 +2)÷ (4 + 8 + 14 + 16 + 6 + 2) **or** ft figures from polygon **or** $\frac{8}{a}$ with $a > 8$ **or** $\frac{c}{50}$ with $c < 50$ **or** 8 and 50 used but notation incorrect (eg. 8:50 , 8 out of 50) A1 $\frac{8}{50}$ oe (eg. 0.16) **or** ft figures from polygon

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
13		Volume = $\frac{5\times12}{2}\times15$ Mass = $\frac{5\times12}{2}\times15\times6.6$	2970	3	M1 $\frac{5\times12}{2}\times15$ (=450) M1 (dep on 1st M1) '450'$\times6.6$ A1 cao SC: If no marks awarded then award B1 for an answer of 5940
14	(a)		$x(x+7)$	1	B1 cao
	(b)		$(y-8)(y-2)$	2	M1 $(y \pm 8)(y \pm 2)$ **or** $y(y-2) - 8(y-2)$ **or** $y(y-8) - 2(y-8)$ A1 cao
	(c)(i)	$2t^2+5t+2 = (2t+1)(t+2)$	$(2t+1)(t+2)$	3	M1 $(2t+2)(t+1)$ oe **or** $2t(t+2) + 1(t+2)$ **or** $t(2t+1) + 2(2t+1)$ A1 $(2t+1)(t+2)$
	(ii)	This is always a product of two whole numbers each of which is greater than 1	Correct explanation		B1 ft from (i) for a convincing explanation referring to factors found in (i)
15		$9 - 3 = 6$ $10^2 - 6^2 = 64$ $BC = 8$ $AC^2 = 9^2 + 8^2 = 145$	12.0	5	M2 $10^2 - (9-3)^2$ (=64) **or** $BC = 8$ (M1 $9 - 3$ (= 6) may be seen on diagram) M1 (indep) $9^2 + 'BC'^2$ where BC is a numerical value M1 (dep on previous M1) $\sqrt{81+'64'}$ A1 12.0 – 12.042

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16		$\frac{64.8-59.3}{64.8}\times 100$ (=8.487...) **OR** $\frac{59.3}{64.8}\times 100$ = 91.512 100 – '91.512' =8.487...)	8.49	3	M1 64.8 − 59.3 (=5.5) M1 (dep) $\frac{'5.5'}{64.8}\times 100$ oe A1 8.48 – 8.49 **OR** M1 $\frac{59.3}{64.8}\times 100$ oe (= 91.5(12...)) M1 (dep) 100 – '91.5' A1 8.48 – 8.49 **OR** M1 $\frac{59.3}{64.8}$ (=0.915(12...)) M1 (dep) 100 × (1 − '0.915') A1 8.48 − 8.49

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17		$\sin 60^o = \frac{x}{32}$ $x = 32 \times \sin 60$ (=27.712...)	27.7	3	M1 $\sin 60 = \frac{x}{32}$ **or** $\frac{x}{\sin 60} = \frac{32}{\sin 90}$ oe M1 (x =) 32 × sin 60 **or** (x =) $\frac{32}{\sin 90} \times \sin 60$ A1 27.7 − 27.72 **OR** M1 cos(90 − 60) = $\frac{x}{32}$ M1 (x =) 32 × cos(90 − 60) A1 27.7 − 27.72 Radians : − 9.7539398... Gradians : 25.888554... SC : B2 for an answer in the range (−) 9.75 to (−)9.754 **or** 25.8 to 25.9
18	(a)	x | 0.5 | 1 | 2 | 3 | 4 | 5 | 6 y | 12 | (6) | (3) | 2 | (1.5) | 1.2 | (1)	Correct table	2	B2 all 3 correct (B1 1 or 2 correct)
	(b)		Correct graph	2	M1 at least 6 points plotted correctly from their table A1 cao for correct curve drawn from (0.5, 12) to (6, 1)

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
19		16 metres: 8×10^8 km. 16: $8 \times 10^8 \times 1000$ 16: 8×10^{11} 1: 5×10^{10} **OR** 2 m to 10^8 km 2m to 100 000 000 000m 1m to 50 000 000 000m	1: 5×10^{10}	3	M1 (indep) correct method to convert to consistent units M1 $\frac{'8\times10^8'}{'16'}$ (units may not be consistent) **or** 5×10^{10} oe **or** 5×10^7 oe A1 1: 5×10^{10} **or** 1: 50 000 000 000 **OR** M1 (indep) correct method to convert to consistent units M1 $\frac{'16'}{8}$ to '10^8' A1 1: 5×10^{10} **or** 1: 50 000 000 000
20		$\frac{3(x+1)}{6}+\frac{2(x+3)}{6}=\frac{3x+3+2x+6}{6}$	$\frac{5x+9}{6}$	3	M1 Use of common denominator of 6 (**or** any other multiple of 6) and at least one numerator correct Eg. $\frac{3(x+1)}{6}$ or $\frac{2(x+3)}{6}$ M1 $\frac{3(x+1)}{6}+\frac{2(x+3)}{6}$ oe A1 cao

<table>
<tr><th colspan="5">1MA0_2H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>21</td><td>(a)</td><td>$\frac{2}{7}\times\frac{1}{6}$

OR

<table>
<tr><td></td><td>1</td><td>1</td><td>2</td><td>2</td><td>2</td><td>3</td><td>3</td></tr>
<tr><td>1</td><td>X</td><td>√</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>1</td><td>√</td><td>X</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td>X</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td><td></td><td></td><td>X</td><td></td><td></td></tr>
<tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td>X</td><td></td></tr>
<tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>X</td></tr>
</table></td><td>$\frac{2}{42}$</td><td>2</td><td>M1 $\frac{2}{7}\times\frac{1}{6}$
A1 $\frac{2}{42}$ oe

OR

M1 Fully correct sample space with the correct cases identified
A1 $\frac{2}{42}$ oe

SC : B1 for an answer of $\frac{4}{49}$</td></tr>
</table>

1MA0_2H

Question		Working	Answer	Mark	Notes
21	(b)	$\frac{2}{7}\times\frac{5}{6}+\frac{3}{7}\times\frac{2}{6}$ **OR** (table below)	$\frac{16}{42}$	3	M1 for identifying all 3 possibilities of (1,2) and (1,3) and (2,3) **OR** at least one of $\frac{2}{7}\times\frac{3}{6}$ (1, 2) **or** $\frac{2}{7}\times\frac{2}{6}$ (1, 3) **or** $\frac{3}{7}\times\frac{2}{6}$ (2, 3) **or** $\frac{2}{7}\times\frac{5}{6}$ (1, 2 or 3) M1 $\frac{2}{7}\times\frac{5}{6}+\frac{3}{7}\times\frac{2}{6}$ **or** $\frac{2}{7}\times\frac{3}{6}+\frac{2}{7}\times\frac{2}{6}+\frac{3}{7}\times\frac{2}{6}$ A1 $\frac{16}{42}$ oe **OR** M2 Fully correct sample space with the correct cases identified (M1 for 1,2 and 1,3 and 2,3 identified on a sample space) A1 $\frac{16}{42}$ oe SC: B2 for an answer of $\frac{16}{49}$

	1	**1**	**2**	**2**	**2**	**3**	**3**
1	X		√	√	√	√	√
1		X	√	√	√	√	√
2			X			√	√
2				X		√	√
2					X	√	√
3						X	
3							X

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
22	(a)	$x = \frac{-9 \pm \sqrt{9^2 - 4\times 2\times -7}}{2\times 2} = \frac{-9 \pm \sqrt{137}}{4}$	0.676, − 5.18	3	M1 $\frac{-9 \pm \sqrt{9^2 - 4\times 2\times -7}}{2\times 2}$ allow substitution of ±7 for c M1 $\frac{-9 \pm \sqrt{137}}{4}$ A1 answers in ranges 0.67 - 0.68 **and** − 5.17 to − 5.18 **OR** M1 $(x + \frac{9}{4})^2$ oe M1 for method leading to $\pm\sqrt{\frac{137}{16}} - \frac{9}{4}$ A1 answers in ranges 0.67 - 0.68 **and** − 5.17 to − 5.18
	(b)	Put $y = \frac{1}{x}$ and use part (a) Or $7y^2 - 9y - 2 = 0$ $y = \frac{--9 \pm \sqrt{(-9)^2 - 4\times 7\times (-2)}}{2\times 7}$ $\frac{9 \pm \sqrt{137}}{14}$	1.48, − 0.193	2	M1 $y = \frac{1}{x}$ **or** $x = \frac{1}{y}$ A1 (ft) answers in range 1.47 - 1.48 **and** − 0.19 to − 0.194 **OR** M1 fully correct method which leads to $7y^2 - 9y - 2 = 0$ **or** $-7y^2 + 9y + 2 = 0$ with correct method to solve (condone sign errors in substitution) A1 (ft) answers in range 1.47 - 1.48 **and** − 0.19 to − 0.194

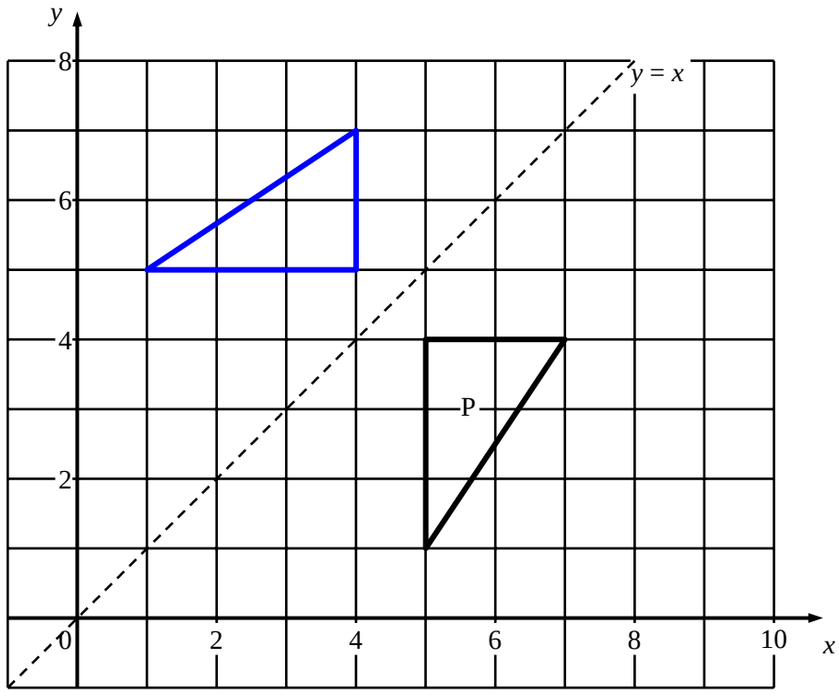
1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23	(a)	Let O be the centre of the base. $OB^2 + OC^2 = 10^2$; $OB^2 = 50$ $AO^2 = AB^2 - OB^2 = 50$ Vol = $\frac{1}{3}\times 10^2 \times \sqrt{50}$ **OR** Let M be the midpt of side BC and let O be the centre of the base. $AM^2+MC^2 = 10^2$; $AM^2 = 75$ $AO^2 = AM^2 - MO^2 = 50$ Vol = $\frac{1}{3}\times 10^2 \times \sqrt{50}$	236	4	M1 correct method to start to find BD or BO using triangle OBC or triangle BCD (oe) Eg. $OB^2 + OC^2 = 10^2$ **or** $BO^2 = 50$ **or** $BO = \sqrt{50}$ (=7.07..) **or** $BO = \frac{\sqrt{200}}{2}$ **or** $10^2 + 10^2 = BD^2$ **or** $BD^2 = 200$ **or** $BD = \sqrt{200}$ (=14.1..) M1 (dep) correct method to find height of pyramid using triangle AOB Eg. $AO^2 = 10^2 - '\sqrt{50}'^2$ **or** $AO^2 = 50$ **or** $AO = \sqrt{50}$ (=7.07..) M1 (indep) $\frac{1}{3}\times 10^2 \times '\sqrt{50}'$ (but **not** $\frac{1}{3}\times 10^2 \times 10$) A1 235 – 236 **OR** M1 correct method to start to find height of a face using triangle AMC (oe) Eg. $AM^2 + 5^2 = 10^2$ **or** $AM^2 = 75$ **or** $AM = \sqrt{75}$ (=8.66...) M1 (dep) correct method to find height of pyramid using triangle AOM Eg. $AO^2 = '\sqrt{75}'^2 - 5^2$ **or** $AO^2 = 50$ **or** $AO = \sqrt{50}$ (=7.07..) M1 (indep) $\frac{1}{3}\times 10^2 \times '\sqrt{50}'$ (but **not** $\frac{1}{3}\times 10^2 \times 10$) A1 235 – 236

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23 cont.	(a)				**OR** M1 for $\sin 45 = \frac{x}{10}$ **or** $\cos 45 = \frac{x}{10}$ M1 for $h = 10 \times \sin 45$ **or** $h = 10 \times \cos 45$ (=7.07..) M1 (indep) $\frac{1}{3} \times 10^2 \times$ '7.07...' (but **not** $\frac{1}{3} \times 10^2 \times 10$) A1 235 – 236

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23	(b)	Angle $ABO = 45^o$ Angle $DAB = 180 – 45 – 45$ **OR** In ΔBAD, $\cos A = \frac{10^2 + 10^2 - '\sqrt{200}'^2}{2 \times 10 \times 10} = 0$ **OR** In ΔBOA, $\cos B = \frac{'\sqrt{50}'}{10}$ Angle $BAD = 180 – '45' – '45'$ **OR** $\sin A = \frac{'\sqrt{50}'}{10}$ $A = 45$ Angle $BAD = 2 \times '45'$	90	2	M1 Angle $DAB = 180 – 2 \times '45'$ A1 89.98 - 90 **OR** M1 $\cos BAD = \frac{10^2 + 10^2 - '\sqrt{200}'^2}{2 \times 10 \times 10}$ A1 89.98 - 90 **OR** M1 $\sin A = \frac{'\sqrt{50}'}{10}$ A1 89.98 - 90

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
24		<table><tr><th>Height *h* m</th><th>Freq</th><th>FD</th></tr><tr><td>$0 < h \leq 2$</td><td>7</td><td>3.5</td></tr><tr><td>$2 < h \leq 4$</td><td>14</td><td>7</td></tr><tr><td>$4 < h \leq 8$</td><td>18</td><td>4.5</td></tr><tr><td>$8 < h \leq 16$</td><td>24</td><td>3</td></tr><tr><td>$16 < h \leq 20$</td><td>10</td><td>2.5</td></tr></table>	3	3	B3 fully correct histogram with horizontal axis correctly scaled (B2 for 4 correct blocks **or** 5 correct blocks with incorrect or no scale) (B1 for 2 correct blocks of different widths **or** any 3 correct blocks) SC : B1 for key, eg. 1 cm^2 = 2 (trees) **or** correct values shown for (freq ÷ class interval) for at least 3 frequencies (3.5, 7, 4.5, 3, 2.5)
25		$A = \frac{1}{2} \times x \times 2x \times \sin 30^o$ $A = \frac{1}{2} \times 2x^2 \times 0.5$ **OR** Height = $2x \sin 30^o = x$ $A = \frac{x \times x}{2} = \frac{x^2}{2}$ **OR** Height = x sin 30 = $\frac{x}{2}$ $A = \frac{1}{2} \times 2x \times \frac{x}{2} = \frac{x^2}{2}$	$x = \sqrt{2A}$ shown	3	M1 $(A =) \frac{1}{2} \times x \times 2x \times \sin 30^o$ A1 $A = x^2 \times 0.5$ **or** $A = \frac{x^2}{2}$ C1 for completion with all steps shown **OR** M1 height = $2x \sin 30$ (= x) A1 $A = x^2 \times 0.5$ **or** $A = \frac{x^2}{2}$ C1 for completion with all steps shown **OR** M1 for height = x sin 30 (= $\frac{x}{2}$) A1 $A = x^2 \times 0.5$ **or** $A = \frac{x^2}{2}$ C1 for completion with all steps shown

2.



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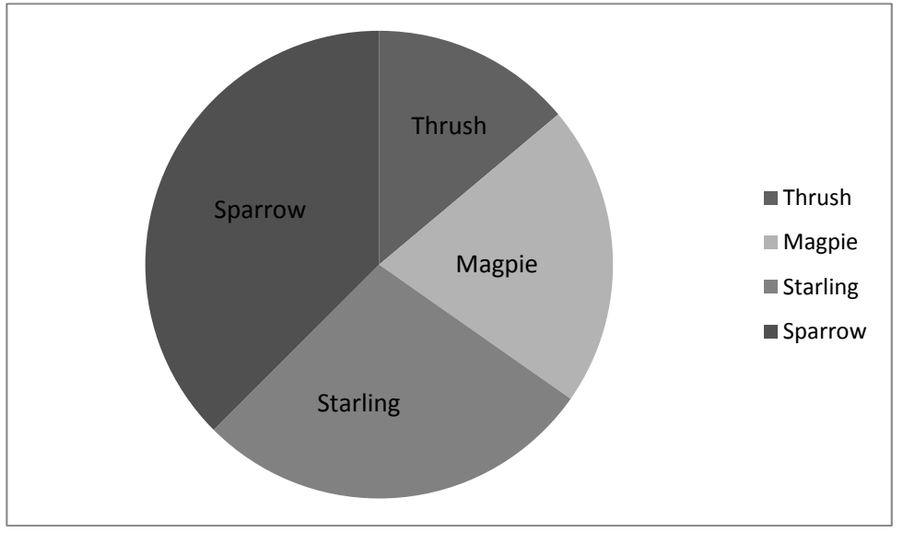
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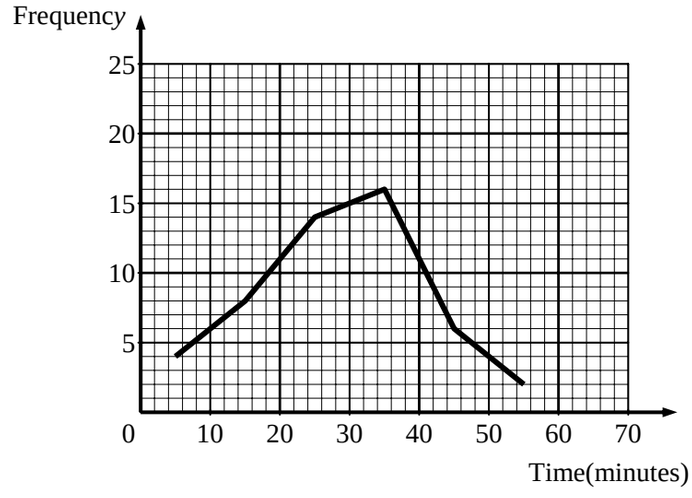
Magpie
Starling
Sparrow
Thrush
Magpie
Starling
Sparrow

12.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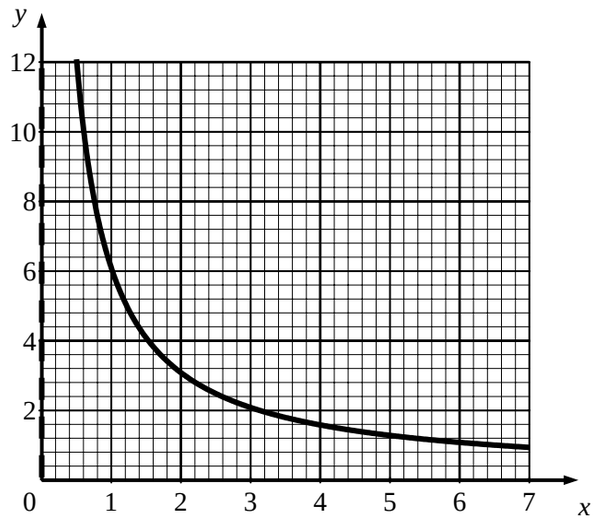
10
5
0
10
20
30
40
50
60
70
Time(minutes)

18.



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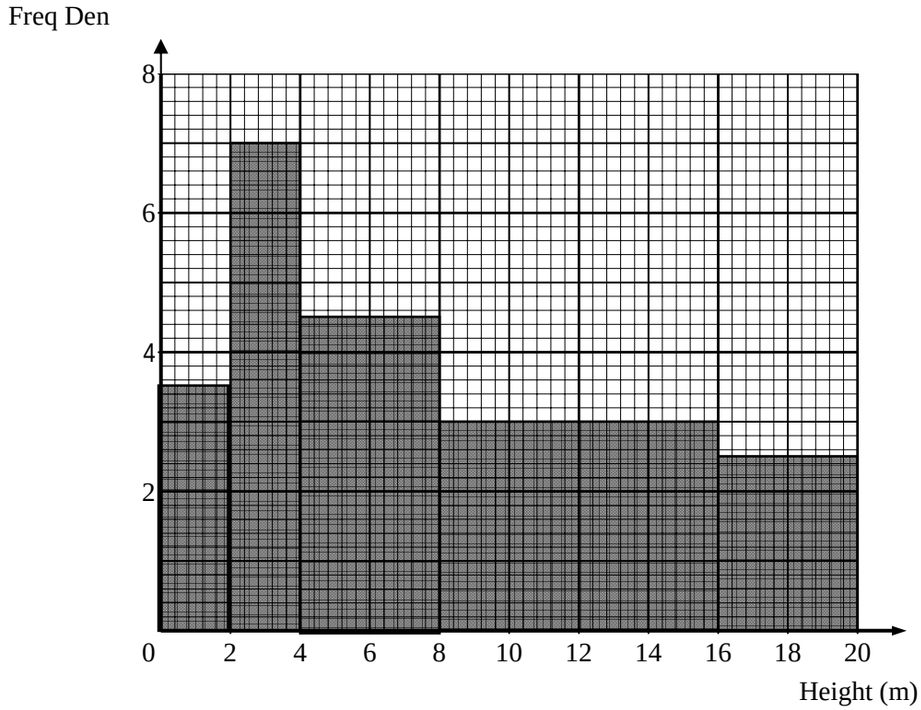

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

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Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

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Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			18 | 9 9 19 | 0 3 5 8 20 | 0 5 6 7 7 21 | 1 2 8 22 | 3 Key	3	B2 for a correct ordered diagram (B1 for an unordered diagram with at most1 error or omission OR for an ordered diagram with 1 or 2 errors or omissions Note: 1 error can look like 2 in the diagram when 1 value is misplaced B1 (indep) for a correct key eg Key: 18| 7 represents 187 (g) NB for an ordered diagram of the form 1 | 89 89 90 93 95 98 2 | 00 05 06 07 07 11 12 18 23 award a maximum of B1 for an ordered diagram with 1 or 2 errors or omissions The B1 for a key can still be earned.
2	(a)	1 – (0.12 + 0.39 + 0.18) 1 0.69	0.31	2	M1 for 1 – (0.12 + 0.39 + 0.18) or 1 "0.69" A1 cao
	(b)	50 × 0.12	6	2	M1 for 50 × 0.12 seen or for $\frac{6}{50}$ A1cao

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3		(2 × 11) + (6 × 23) + (10 × 14) + (14 × 2) = 22 + 138 + 140 + 28 = 328 328 ÷ 50	6.56	4	M2 for use of midpoints accept one error or three of 22, 138, 140, 28 seen or three of 2×11, 6×23, 10×14, 14×2 seen (M1 for use of *fw* with *w* consistent within intervals (including end points) accept one error) M1 (**dep** on M1) for use of "Σ*fw*" ÷ 50 or "328" ÷ 50 A1 cao
4		Top Cat = 35 × 4 = 140° Katkins = 30 × 4 = 120° Coolkat = 15 × 4 = 60°	Pie chart	3	M1 for 360 ÷ 90 or 4 seen or one angle (TC or Ka or Co) correct in pie chart ± 2° ignore labels, or one correct angle calculated A1 for any two angles (TC or Ka or Co) correct in pie chart. ± 2° ignore labels A1 for fully correct and labelled pie chart. All angles ±2°
5	(a)		positive	1	B1 Accept with 'positive' valid extra words eg strong positive
	(b)		46 – 54	2	B2 46 – 54 Or M1 for a single line segment with positive gradient that could be used as a line of best fit or a vertical line from 44 A1 for given answer in the range 46 – 54

<table>
<tr><th colspan="6">5MB1H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>6</td><td></td><td><table>
<tr><td></td><td>A</td><td>G</td><td>T</td><td>total</td></tr>
<tr><td>F</td><td>77</td><td>(26)</td><td>13</td><td>(116)</td></tr>
<tr><td>M</td><td>53</td><td>9</td><td>(22)</td><td>84</td></tr>
<tr><td>total</td><td>(130)</td><td>35</td><td>35</td><td>(200)</td></tr>
</table>
( ) value given</td><td>53</td><td>4</td><td>M1 for calculation of total male students 200 – 116 or 84 seen
M1 for Graphics total or Textiles total = (200 – 130) ÷ 2
or 70 ÷ 2 or 35 seen
M1 for calculation of male students choosing Graphics,
"35" – 26 or male Graphics 9
or female students choosing Art,
116 – 26 – ("35" – 22) or " 90" – "13" or 77
A1 cao
or
Answers may appear in a two-way table with no methods seen
B1 for male total, 84
B1 for Graphics total or Textiles total, 35
M1 for male Graphics, 9
or (dep on B1) for a table that balances (condone 77 and/or 13 missing or 9 missing)
A1 in table or on answer line</td></tr>
<tr><td>7</td><td></td><td>P(F) = $\frac{3}{5}$ $\frac{3}{5}$ students = 96
Total = 96 ÷ 3 × 5 = 32 × 5
or
F : M = 3 : 2 = 96 : x
M = 96 ÷ 3 × 2 = 32 × 2 = 64
Total = 96 + 64</td><td>160</td><td>3</td><td>M1 for P(F) = $\frac{3}{5}$ or 96 ÷ 3 or $\frac{3}{5}$(students) = 96 oe or 32 seen
M1 for 96 ÷ 3 × 5 or "32" × 5 or "480" ÷ 3
A1 cao
or
M1 for F : M = 3 : 2 oe or 3 : 2 = 96 : ? oe or 96:64 or 64 seen
M1 for 96 ÷ 3 × 2 + 96 or "32" × 2 + 96 or "192" ÷ 3 + 96
or "64" + 96
A1 cao</td></tr>
</table>

<table>
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<tr><td>8*</td><td></td><td>A = (78 + 52 + 165) × 2 + 236
= 295 × 2 + 236 = 590 + 236
= 826

826 × 0.95 = 784.70

B = (68 + 48 + 160) × 2 + 242
= 276 × 2 + 242 = 552 + 242
=794
794 × 0.97 = 770.18

<table><tr><th>Shop</th><th>A</th><th>B</th></tr><tr><td>Skis</td><td>156</td><td>136</td></tr><tr><td>Boots</td><td>104</td><td>96</td></tr><tr><td>S & B</td><td>260</td><td>232</td></tr><tr><td>Lift(Ch)</td><td>330</td><td>320</td></tr><tr><td>Lift (Ad)</td><td>236</td><td>242</td></tr><tr><td>Lift total</td><td>566</td><td>562</td></tr><tr><td>Total</td><td>826</td><td>794</td></tr><tr><td>%age off</td><td>41.3</td><td>23.82</td></tr></table></td><td>Shop B</td><td>5</td><td>M1 for finding the total cost for 1adult and 2 children for lift passes for 6 days in either shop A or shop B
e.g 236 + 2 × 165 or 242 + 2 or 2× 160 or 236 + “330” or 242 + “320” or 566 seen or 562 seen
or the total cost of 2 children only for ski hire and boot hire for 6 days in either shop A or shop B
e.g. 2× 78 + 2 × 52 or 2× 68 + 2 × 48 or “156” + “104” or “136” + “96” or 260 seen or 232 seen

M1 for a complete calculation of cost for shop A or shop B
Eg (78 + 52 + 165) × 2 + 236 or (68 + 48 + 160) × 2 + 242 or “295” × 2 + 236 or “276” × 2 + 242 or 826 or 794 seen
M1 for a correct method to find the reduced cost for shop A or for shop B
e.g. “826” × 0.95 or “794” × 0.97
A1 for (€)784(.70) or (€)785 and (€)770(.18)
C1 (dep on M1 scored) ft for ‘cheaper shop’ identified</td></tr>
<tr><td>9</td><td>(a)</td><td></td><td>2 reasons

2 statements</td><td>2

2</td><td>B1 only asked females oe
B1 recognition of why only asking people in one store is biased or for the need to ask people in a different location
B1 for overlapping numbers oe
B1 for not exhaustive oe</td></tr>
<tr><td>10</td><td></td><td>$(5 \times x + 7 \times y) \div 12$</td><td>$\frac{5x+7y}{12}$</td><td>2</td><td>M1 for $5 \times x$ or $7 \times y$ oe seen
A1 for $\frac{5x+7y}{12}$ oe (ignore kg units)</td></tr>
</table>

PMT

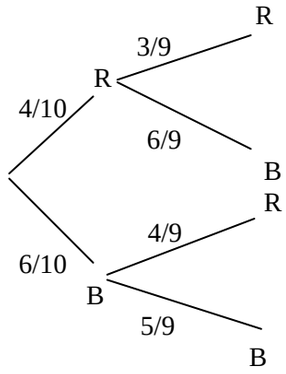
5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11		1700 + 1700 × 4 ÷ 100 = 1700 + 68 = 1768 1768 + 1768 × 4 ÷ 100 = 1768 + 70.72	1838.72	3	M1 for 1700 × 1.04 or 1700 + 0.04 × 1700 or for 1768 or 68 or 136 or 1836 seen M1 (**dep**) for "1768" × 1.04 or for "1768" + 0.04 × "1768" or "1768" + "70.72" A1 for 1838.72 cao (If correct answer seen then ignore any extra years) **Alternative method** M2 for 1700×1.04^2 or 1700×1.04^n $n > 2$ or digits 183872 seen A1 for 1838.72 cao [**SC**: Award B2 for 138.72 seen]
12			BFACED	3	B3 for all 6 correct (B2 for 4 or 5 correct) (B1 for 2 or 3 correct)

PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
13	(a)	244 ÷ 740 × 60 = 19.78378… 315 ÷ 740 × 60 = 25.54054… 181 ÷ 740 × 60 = 14.6756	20, 25, 15	3	M1 for 244 ÷ 740 × 60 or 315 ÷ 740 × 60 or 181 ÷ 740 × 60 A1 (**dep** on method shown for their answer) 19.7… or 19.8 or 20 or 25.5… or 25 or 26 or 14.6… or 14.7 or 15 seen B1 (**indep**) for 20, 25, 15 or 20, 26, 14
	(b)(i)		random	2	B1 for all have an equal chance oe
	(ii)		method		C1 for valid method eg put all names in a hat and pull out 20, 25, 15 **ft** from (a) or 60 eg number each person and use random numbers on calculator or table to select 20, 25, 15 **ft** from (a) or 60
14	(a)(i)	Line drawn at 10, Median = 46	45 - 46	3	B1 answer in range 45 to 46 inclusive
	(ii)	Line drawn at 5(or 4.75) LQ = 30 ± 1 Line drawn at 15 (or 14.25) UQ = 56 ± 1 IQR = 56 30	26		M1 for lines drawn to the graph at 5 and 15 or at 4.75 and 14.25, (tolerance $\pm\frac{1}{2}$ square) or LQ = 30± 1 seen or UQ = 56± 1 seen A1 for answer in range 26 ± 2
	(b) *	IQR Wilson = 64 – 28 = 36	comment	2	B1 for Wilson IQR = 64 – 28 or 36 seen C1 (dep on B1) (**ft** from 14aii) for a valid statement that compares the two classes e.g. Mr W's class has greater IQR than Mrs A's class

PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	f.d. = 2, 12, 10, 3 e.g. each square = 4 people 1:15:10:1.5 e.g. each square = 2 people 2:30:20:3	histogram	3	B2 for all 4 bars fully correct with areas in the ratio 1:15:10:1.5 or 2:30:20:3 oe (B1 for 2 or 3 bars drawn in the correct ratio to each other) B1 for labelling the vertical axis f.d and consistent scaling or for a key
	(b)	Monday 40 + 6 = 46 more than 7 hours Tuesday One square = 12 ÷ 6 = 2 2 × 3.5 × 7 = 49 more than 7 hours	No with reason	2	M1 for a valid method to work out the frequency for more than 7 hours on Tuesday, (12 ÷ 6) × 3.5 × 7 or 2 × 3.5 × 7 or 7 × 7 or 2 × 24.5 or 49 A1 No with 46 and 49 seen

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16		 $\frac{4}{10}\times\frac{6}{9}+\frac{6}{10}\times\frac{4}{9}$ $=\frac{24}{90}+\frac{24}{90}$ OR $1-(\frac{4}{10}\times\frac{3}{9}+\frac{6}{10}\times\frac{5}{9})$ $=1\quad(\frac{12}{90}+\frac{30}{90})$ $=1\quad\frac{42}{90}$	$\frac{8}{15}$	4	M2 for $\frac{4}{10}\times\frac{6}{9}$ or $\frac{6}{10}\times\frac{4}{9}$ or $\frac{24}{90}$ oe (M1 for $\frac{6}{9}$ or $\frac{3}{9}$ or $\frac{5}{9}$ or $\frac{4}{9}$ seen on diagram or in a calculation) M1for $\frac{4}{10}\times\frac{6}{9}+\frac{6}{10}\times\frac{4}{9}$ or "$\frac{24}{90}$" + "$\frac{24}{90}$"oe A1 for $\frac{8}{15}$ oe **OR** M2 for $\frac{4}{10}\times\frac{3}{9}$ or $\frac{6}{10}\times\frac{5}{9}$ or $\frac{12}{90}$ or $\frac{30}{90}$ or $\frac{42}{90}$ oe (M1 for $\frac{6}{9}$ or $\frac{3}{9}$ or $\frac{5}{9}$ or $\frac{4}{9}$ seen on diagram or in a calculation) M1 for $1-(\frac{4}{10}\times\frac{3}{9}+\frac{6}{10}\times\frac{5}{9})$ or 1 ("$\frac{12}{90}$" + "$\frac{30}{90}$") or 1 "$\frac{42}{90}$" oe A1 for $\frac{8}{15}$ oe **SC** (if no marks scored) B1for $\frac{4}{10}\times\frac{6}{10}+\frac{6}{10}\times\frac{4}{10}$ or $\frac{24}{100}+\frac{24}{100}$ or $\frac{48}{100}$

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Mark Scheme (Results)

November 2012

GCSE Mathematics (2MB01) Higher
5MB3H (Calculator) Paper 01

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PMT

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		$3x > 11$ $x > \frac{11}{3}$ or 3.66.. OR $(16 - 5) \div 3$ $\frac{11}{3}$ or 3.66..	4	3	M1 $3x > 11$ or $3x > 16 - 5$ or $3x + 5 - 5 > 16 - 5$ A1 $\frac{11}{3}$ or 3.6(66..) or 3.7 (Accept = or $\geq$ in place of >) B1 ft OR M1 $(16 - 5) \div 3$ A1 $\frac{11}{3}$ or 3.6(66..) or 3.7 B1 ft
2		$x + x + 4 + x - 2 = 26$ $3x + 2 = 26$ $3x = 24$ $x = 8$ OR $26 - 4 = 22$ $22 + 2 = 24$ $24 \div 3$	8	4	M1 $x + x + 4$ or $x + x - 2$ or $x + 4 + x - 2$ or "expression in x" + $x + 4 = 26$ or "expression in x" + $x - 2 = 26$ M1(dep) "3"x + "2" = 26 M1 "3"x = 26 - "2" A1 cao OR M1 $26 - 4$ or $26 + 2$ M1 "22" + 2 or "28" - 4 M1 "24" ÷ 3 A1 cao OR M3 6 + 8 + 12 seen (M2 three ages that meet the criteria x, $x + 4$ and $x - 2$) (M1 two trials of three ages added or a set of three ages that would add to 26) A1 cao

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3		$\pi \times 20$	62.8 cm	3	M1 $\pi \times 20$ or $\pi \times 19.5$ or $\pi \times 19.95$ A1 62.8 – 63 B1(indep) for units consistent with answer
4*		1.22 + 0.96 + 2.42 = 4.60 1.15 + 0.86 + 2.28 = 4.29 4.60 × 0.95 = 4.37 4.37 > 4.29 OR 1.22 ×0.95 = 1.159 0.96 × 0.95= 0.912 2.42 × 0.95 = 229.9 1.159 + 0. 912 + 2.299 = 4.37 OR 1.22 ×0.95 = 1.159 0.96 × 0.95= 0.912 2.42 × 0.95 = 229.9 1.159>1.15 and 0.912>0.86 and 2.229>2.28	no 5% reduction will not be enough	3	M1 1.22 + 0.96 + 2.42 or 4.60 or 1.15 + 0.86 + 2.28 or 4.29 A1 4.37 and 4.29 C1 (dep on M1) ft clear statement of comparison based on their answers OR M1 1.22 ×0.95 oe or 0.96 × 0.95 oe or 2.42 × 0.95 oe A1 4.37 and 4.29 C1 (dep on M1) ft clear statement of comparison based on their answers OR M1 1.22 ×0.95 oe or 0.96 × 0.95 oe or 2.42 × 0.95 oe A1 115.9 or 116 or 115 **and** 91.2 or 91 or 92 **and** 229.9 or 229 or 230 C1(dep on M1) ft clear statement of comparison based on their answers NB Allow working throughout in pence or pounds

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5		64 ÷ 10 = 6.4 arc of radius 6.4cm drawn with cross at 70° OR 64 ÷ 10 = 6.4 line drawn at 70° with cross at 6.4cm	Town *B* marked	2	B2 town *B* marked in correct place (B1 bearing $070^o \pm 2^o$ or 6.4 ± 0.2cm)
6	(a)	$6p - 15 = 21$ $6p = 36$ OR $2p - 5 = 7$ $2p = 12$	6	3	M1 $3 \times 2p - 3 \times 5$ or $6p - 15$ M1 "6"p - "15" + "15" = 21 + "15" A1 cao OR M1 $2p - 5 = 21 \div 3$ M1 $2p$ - 5 + 5 = 5 + "7" A1 cao
	(b)	$9x - 11 = 5x + 7$ $9x - 5x = 7 + 11$ $4x = 18$	4.5	3	M1 correct method to isolate either the term in x or the numerical term e.g $9x - 5x - 11 = 5x - 5x + 7$ or $9x = 5x + 18$ A1 $4x = 18$ or $-18 = -4x$ A1 4.5 oe
7		$9^2 + 14^2 = 81 + 196 = 277$ $AB = \sqrt{277}$	16.6	3	M1 $9^2 + 14^2$ or $81 + 196$ or 277 M1 $\sqrt{277}$ or $\sqrt{81+196}$ or A1 16.6 -16.644

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8*		Paint for You 7.5 ÷ 2.5 = 3 tins 3 × 8.35 = £25.05 25.05 × 1.20 = £30.06 Paul's paints 7.5 ÷ 0.75 = 10 tins 10 × 3.15 = £31.50 OR Paint for You 8.35× 1.20 = £10.02 10.02 ÷ 2.5 = £4.008 per litre Paul's Paints 3.15 ÷ 0.75 = £4.20 per litre There is no wastage	Paint for You (2.5 litre tins)	4	M1 7.5 ÷ 2.5 or 3 seen or 7.5 ÷ 0.75 or 10 seen M1 8.35× 1.2(0) oe or 10.02 or "25.05" × 1.2(0)oe M1 "3" × 8.35 or "3" × "10.02" **and** "10" × 3.15 C1 for both 30.06 and 31.5(0) and correct conclusion OR M1 7.5 ÷ 2.5 or 3 seen or 7.5 ÷ 0.75 or 10 seen M1 8.35× 1.2(0) oe or 10.02 or 8.35÷2.5 × 1.2(0)oe or 3.34 × 1.2(0) oe M1 "10.02" ÷ 2.5 or 4.008 or 4.01 **and** 3.15 ÷ 0.75 or 4.20 C1 for both 4.008 (or 4.01) and 4.2(0) and correct conclusion OR M1 7.5 ÷ 2.5 or 3 seen or 7.5 ÷ 0.75 or 10 seen M1 8.35× 1.2(0) oe or 10.02 M1 2.5 ÷ 0.75 **and** "10.02" ÷ 3.15 C1 for both 3.3(3.. and 3.1(8...) and correct conclusion OR any equivalent process using correct methods which leads to two values that can be compared

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		9 × 7 – 4 × 5 = 43 43 × 8 OR 9 × 7 × 8 = 504 5×4 × 8 = 160 504 - 160 OR 9 × 2 + 5 × 5 43 × 8 OR 9 × 2 × 8 = 144 5 × 5 × 8 = 200 144 + 200 OR 7 × 5 × 8 = 280 2 × 4 × 8 = 64 280 + 64	344	3	M1 9 × 7 – 4 × 5 or 43 M1 “43” × 8 A1 cao OR M1 9 ×7 × 8 or 504 or 5×4 × 8 or 160 M1 9 ×7 × 8 or 504 - 5×4 × 8 or 160 A1 cao OR M1 9 × 2 + 5 × 5 or 43 M1 "43" × 8 A1 cao OR M1 9 × 2 × 8 or 144 or 5 × 5 × 8 or 200 M1 9 × 2 × 8 or 144 + 5 × 5 × 8 or 200 A1 cao OR M1 7 × 5 × 8 or 280 or 2 × 4 × 8 or 64 M1 7 × 5 × 8 or 280 + 2 × 4 × 8 or 64 A1 cao

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)		reflected shape	2	B2 correct triangle drawn with vertices (4,4), (5,4) and (5,6) (B1 for a correct reflection in $x = a$)
	(b)		rotation centre (0,1) 90° anti-clockwise or 270° clockwise	3	B1 rotation B1 about the centre (0,1) B1 90° anticlockwise or 270° clockwise **NB** If more than one transformation seen then B0
11		x | $x^3 - x$ 3.1 | 26.(691) 3.2 | 29.(568) 3.3 | 32.(637) 3.4 | 35.(904) 3.5 | 39.(375) 3.6 | 43.(056) 3.7 | 46.(953) 3.8 | 51.(072) 3.9 | 55.(419) 3.25 | 31.(078) 3.26 | 31.3(85) 3.27 | 31.6(95) 3.28 | 32.0(07) 3.29 | 32.3(21)	3.3	4	B2 for trial $3.2 \leq x \leq 3.3$ (B1 for trial $3 < x < 4$) B1 for different trial $3.25 \leq x < 3.3$ B1 cao (dep on at least one previous B1) Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1dp but correct to 1dp (rounded or truncated) if the value of x is to 2dp

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12		½litre = 500ml $500 = \pi \times 4^2 \times h$ $h = 500 \div (\pi \times 4^2)$	9.95	5	B1 ½litre = 500ml or 500 seen M1 $\pi \times 4^2 \times h$ (= 50.2.×.h)or $\pi \times 4^2$ (= 50.2..) M1 "500" = $\pi \times 4^2 \times h$ oe M1 (h =) "500" ÷ ($\pi \times 4^2$) oe A1 9.9 – 10.0
13		168000 = 112% (of original price) 168000 ÷ 112 × 100	150000	3	M1 168000 = 112% or 112 or 100 + 12 or 1.12 or 1 + 0.12 with an intention to divide M1 168000 ÷ 1.12 or 16800 ÷ 112 × 100 A1 cao

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		$AB = 5 \quad \sin 36 = \frac{5}{AD}$ $AD = \frac{5}{\sin 36}$ Or $\sin 36 = \frac{5}{BC}$ $BC = \frac{5}{\sin 36}$ $AD = BC$ OR $\cos 54 = \frac{5}{BC}$ $BC = \frac{5}{\cos 54}$	8.51	4	B1 $AB = 5$ M1 $\sin 36 = \frac{5}{AD}$ or $\frac{\sin 36}{5} = \frac{\sin 90}{AD}$ M1 $AD = \frac{5}{\sin 36}$ or $AD = \frac{5 \sin 90}{\sin 36}$ A1 8.5 – 8.51 OR M1 $\sin 36 = \frac{5}{BC}$ or $\frac{\sin 36}{5} = \frac{\sin 90}{BC}$ M1 $BC = \frac{5}{\sin 36}$ or $BC = \frac{5 \sin 90}{\sin 36}$ B1 $AD = 'BC'$ A1 8.5 – 8.51 OR B1 angle $DCB = 54$ or angle $DBC = 36$ M1 $\cos 54 = \frac{5}{BC}$ M1 $BC = \frac{5}{\cos 54}$ A1 8.5 – 8.51 NB Other methods such as tan + Pythagoras must be complete methods and will earn M2

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15		$m^2 = \frac{k}{6}$	$m = \sqrt{\frac{k}{6}}$	2	M1 $m^2 = \frac{k}{6}$ or $\frac{6m^2}{6} = \frac{k}{6}$ or $\sqrt{6m^2} = \sqrt{k}$ or $\sqrt{6}\, m = \sqrt{k}$ A1 $m = \sqrt{\frac{k}{6}}$ or $m = \pm\sqrt{\frac{k}{6}}$ or $m = -\sqrt{\frac{k}{6}}$
16	(a)		2.5	1	B1 cao
	(b)	$500 \times (1.025)^{12}$	672.44	2	M1 ft $500 \times$ ("1.025") ^{12} or 1.34… seen A1 672 or 672.44
17	(a)		5.5×10^4	1	B1 cao
	(b)		1 800 000	2	M1 1.8×10^n or $18(0.....) \times 10^n$ or $3600000000 \times 0.00005$ A1 cao
18	(a)	$\begin{pmatrix}4\\8\end{pmatrix} - \begin{pmatrix}2\\4\end{pmatrix}$	$\begin{pmatrix}2\\4\end{pmatrix}$	2	M1 $\overrightarrow{OQ} - \overrightarrow{OP}$ in co-ordinates or vectors or $\begin{pmatrix}2\\y\end{pmatrix}$ or $\begin{pmatrix}x\\4\end{pmatrix}$ A1 cao [SC If no marks then B1 $\begin{pmatrix}4\\2\end{pmatrix}$ or $\begin{pmatrix}-2\\-4\end{pmatrix}$

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(b)	$M = (3, 6)$ $N = (4, 8) + ½ (6, –4) = (7, 6)$ $\overrightarrow{MN} = \begin{pmatrix}7\\6\end{pmatrix} - \begin{pmatrix}3\\6\end{pmatrix}$ OR $\overrightarrow{MN} = ½\overrightarrow{PR}$ $\overrightarrow{PR} = \begin{pmatrix}6\\-4\end{pmatrix} + \begin{pmatrix}2\\4\end{pmatrix} = \begin{pmatrix}8\\0\end{pmatrix}$ OR $\overrightarrow{MN} = ½\overrightarrow{PQ} + ½\overrightarrow{QR}$ $\overrightarrow{MN} = ½ \begin{pmatrix}2\\4\end{pmatrix} + ½\begin{pmatrix}6\\-4\end{pmatrix}$	$\begin{pmatrix}4\\0\end{pmatrix}$	3	B1 $M = (3, 6)$ M1 $N = (4, 8) + ½ (6, –4)$ or $(7, 6)$ or $\overrightarrow{MN} = \begin{pmatrix}7\\6\end{pmatrix} - \begin{pmatrix}3\\6\end{pmatrix}$ A1 cao OR B1 $\overrightarrow{MN} = ½\overrightarrow{PR}$ M1 ft $\overrightarrow{PR} = \begin{pmatrix}6\\-4\end{pmatrix} + \begin{pmatrix}'2'\\'4'\end{pmatrix}$ or $\begin{pmatrix}8\\0\end{pmatrix}$ A1 cao OR B1 $\overrightarrow{MN} = ½\overrightarrow{PQ} + ½\overrightarrow{QR}$ M1 ft $\overrightarrow{MN} = ½ \begin{pmatrix}'2'\\'4'\end{pmatrix} + ½\begin{pmatrix}6\\-4\end{pmatrix}$ A1 cao
19	(a)	$½ \times 9.2 \times 14.6 \times \sin 64$	60.4	2	M1 $½ \times 9.2 \times 14.6 \times \sin 64$ A1 60.3 – 60.4
	(b)	$AB^2 = 9.2^2 + 14.6^2 – 2 \times 9.2 \times 14. 6 \times \cos 64$ $AB^2 = 297.8 – 268.64 \cos 64° = 297.8 - 268.64 \times 0.43837..$ $AB^2 = 297.8 – 117.76..$ $AB^2 = 180.03$ $AB = \sqrt{180.03}$	13.4	3	M1 $9.2^2 + 14.6^2 – 2 \times 9.2 \times 14. 6 \times \cos 64°$ M1 (dep) for correct order of evaluation e.g. 297.(8) – 117.(7..) A1 13.4 – 13.42

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
20		SF = $(x^2 - 1) \div 2\,(x - 1)$ = $(x - 1) \times (x + 1) \div 2\,(x - 1)$ = ½ $(x + 1)$ Area *DEF* = $4 \times \left[\frac{1}{2}(x+1)\right]^2$ = $(x + 1)^2$ = $x^2 + 2x + 1$		4	M1 $(x^2 - 1) \div 2\,(x - 1)$ or SF × $2\,(x - 1) = (x^2 - 1)$ M1 ½ $(x + 1)$ or $(x - 1) \times (x + 1) \div 2\,(x - 1)$ M1 $4 \times \left(\frac{x+1}{2}\right)^2$ or $4 \times \left(\frac{x^2-1}{2(x-1)}\right)^2$ C1 fully correct convincing process OR M1 $(x^2 + 2x + 1) \div 4$ M1 $\sqrt{(x^2 + 2x + 1) \div 4}$ or $\sqrt{(x+1)(x+1) \div 4}$ or $(x + 1) \div 2$ M1 $2\,(x - 1) \times (x + 1) \div 2$ C1 fully correct convincing process
21		$x^2 + (2x + 5)^2 = 25$ $x^2 + 4x^2 + 20x + 25 = 25$ $5x^2 + 20x = 0$ $5x\,(x + 4) = 0$ $x = 0,\ x = -4$ $y = 2 \times 0 + 5$ $y = 2 \times -4 + 5$	$x = 0$, $y = 5$ or $x = -4$, $y = -3$	6	M1 $x^2 + (2x + 5)^2\ (= 25)$ A1 $x^2 + 4x^2 + 10x + 10x + 25\ (= 25)$ M1 Use of factorisation or correct substitution into quadratic formula or completing the square to solve an equation of the form $ax^2 + bx + c = 0,\ a \neq 0$ A1 $x = 0,\ x = -4$ M1 substitution of an x value into an original equation A1 $y = 5,\ y = -3$ correctly matched to x values SC (If M0M0M0 then B1 for one pair (x, y) of correct answers)

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Mark Scheme (Results)

March 2013

GCSE Mathematics (2MB01) Higher
5MB1H (Calculator) Paper 01

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4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		105 ÷ 7 × 4	60	2	M1 105 ÷ (4+3) or a complete build up method A1 cao
2		0.93×800	744	2	M1 0.93×800 oe or 744 A1 cao
3	(a)		Two different reasons	2	B2 for TWO aspects from No time frame given Non-exhaustive responses Responses not specific (B1 ONE correct aspect)
	(b)		Question	2	B1 for a question with a time frame for frequency of use B1 for at least 3 correctly labelled response boxes (non-overlapping, need not be exhaustive) OR for a set of response boxes that are exhaustive (could be overlapping) [Do not allow inequalities in response boxes]
	(c)		Two different reasons	2	B2 for TWO different aspects (B1 for ONE aspect) Too small a sample, time of day, specific day, place, same type of people, not random

5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
4	<table><tr><td></td><td>TT</td><td>D</td><td>S</td><td></td></tr><tr><td>B</td><td>**7**</td><td>12</td><td>4</td><td>**23**</td></tr><tr><td>G</td><td>4</td><td>**8**</td><td>**5**</td><td>17</td></tr><tr><td></td><td>11</td><td>20</td><td>9</td><td>**40**</td></tr></table>	11	4	M1 for a 2-way table or diagram showing at least 3 pieces of information correctly placed M1 17 girls or 4 boys with slalom skis M1 12 boys with downhill skis or 4 girls with twin tips A1 cao OR M1 for 40-23 (=17) M1 for one part subtraction ie ‘17’-8 or ‘17’-5 M1 for ('17'-8) -5 or ('17' - 5) - 8 A1 cao
*5		Yes and £1562	6	B1 283 or 285 M1 for working out the total cost of 2 adults 1 way or 1 adult both ways M1 for a correct method for calculating 75% of an adult fare for 1 journey or for 1 journey there and back. M1 for working out the total cost of 2 adults and 1 child A1 1562 or 38 C1 Dep on a previous M1, correct conclusion ft for their total cost (identified) providing it is written with a £ sign

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6		2 | 6 7 9 3 | 0 4 4 | 2 2 4 7 7 5 | 3 6 7 8 8 6 | 3 4 6	Stem and leaf 2 | 6 means 26 Key	3	B2 for a fully correct ordered diagram (B1 for a correct unordered diagram or ordered with at most two errors or omissions) B1 for a correct key Accept stem written as 20,30 etc but key only acceptable if consistent with this.
7	(a)		64.5	1	B1 cao
	(b)		65.5 or 65.49̇	1	B1 for 65.5 or 65.49̇ or 65.499 oe
8			Box plot drawn	3	B3 for fully correct box plot (B2 for 3 correctly plotted values including box and tails) (B1 for 2 correctly plotted values including box or tails)
*9		Ranges 50 and 46 IQR s 19 -21 and 19-21 Medians 47 and **44**	Comparison of data	4	B1 Correct calculation of the median B1 Correct calculation of the ranges or the IQRs C1 for a correct comparison (ft) of medians C1 for a correct comparison of ranges or IQRs (ft) with interpretation or B1 Correct calculation of the median (47) B1 Correct calculation of the ranges or the IQRs C1 for a correct comparison of ranges or IQRs (ft) C1 for a correct comparison of medians (ft) with interpretation

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)	$20\times12 + 30\times27+40\times18 + 50\times 23+60\times10$ $3520 \div 90$	39(.11111)	4	M1 for finding at least 4 products fx consistently within interval (including end points) M1 (dep) for use of at least 4 correct midpoints M1 for $\sum fx \div 90$ A1 39.(1...)
	(b)		12,39,57,80,90	1	B1 cao
	(c)			2	B1 for at least 4 of "5 points" plotted correctly ± 0.5 full square B1 (dep) for points joined by curve or line segments providing no gradient is negative. (SC: B1 if 4 or 5 points plotted not at end but consistent within each interval and joined)
	(d)(i)		36-39	3	B1 answer within the range 36-39 or ft cf graph
	(ii)		19-23		B2 answer within 19-23 Or M1 for reading off from 50 on a cf graph A1 ft (± 0.5 square)
11		1200×0.8^4	4	3	M1 0.8 or 960 or 2160 seen M1 for 0.8^n where n is 2 or greater or for 768 or 614.40 A1 cao and supported by working

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12		$\frac{140}{420}\times 135$	45	2	M1 $\frac{140}{420}\times 135$ oe A1 cao
13	(a)		10 and 18	2	B2 Two correct values (B1 one correct value)
	(b)		Bars at heights 3cm and 2cm	2	B2 for two correct bars (B1 for one correct bar)
14			A and $y = x^2+4$ B and $y = x^3$ C and $y = 2^x$	3	B3 for all correct (B2 for 2 correct) (B1 for 1 correct)

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	Tree diagram Or 1-0.6 = 0.4 1-0.8 = 0.2 0.4×0.2	0.08	3	B1 for 0.4 or 0.2 seen oe M1 Indication of correct branch formed on tree diagram (or otherwise) leading to 0.4×0.2 or "0.4" ×" 0.2" A1 0.08 oe
	(b)	0.4×0.2 + 0.6×0.8	0.56	3	M1 0.6×0.8 or "0.4" × "0.2" M1 0.6×0.8 + "0.4" × "0.2" or "0.08" + "0.48" A1 0.56 oe

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Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

PMT

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*1			small and correct answers	3	M1 for 4.2 ÷ 1.75 (=2.4(0)) **or** 8.68 ÷ 3.5 (=2.48) M1 for 4.2 ÷ 1.75 (=2.4(0)) **and** 8.68 ÷ 3.5 (=2.48) C1 (dep on at least M1) for small and (£)2.4(0) and (£)2.48 **OR** M1 for 1.75 ÷ 4.2 (=0.41(6)) **or** 3.5 ÷ 8.68 (=0.40(3)) M1 for 1.75 ÷ 4.2 (=0.41(6)) **and** 3.5 ÷ 8.68 (=0.40(3)) C1 (dep on at least M1) for small and 0.41(6)(kg) and 0.40(3)(kg) **OR** M1 for 4.2 ÷ 1.75 (=2.4(0)) **or** 8.68 ÷ 3.5 (=2.48) M1 for (4.2 ÷ 1.75) × 3.5 (=8.4(0)) or (8.68 ÷ 3.5) × 1.75 (=4.34) C1 (dep on at least M1) for small and (£)8.4(0) or for small and (£)4.34 **OR** M1 for 1.75 ÷ 4.2 (=0.41(6)) or 3.5 ÷ 8.68 (=0.40(3)) M1 for (1.75 ÷ 4.2) × 8.68 (=3.61(6)) or (3.5 ÷ 8.68) × 4.2 (=1.69(3)) C1 (dep on at least M1) for small and 3.61(6)(kg) or 1.69(3)(kg) **OR** M2 for 8.68 ÷ 2 (=4.34) or 4.20 × 2 (=8.40) C1 (dep on at least M1) for small and (£)4.34 or (£8.40) **OR** Any other method considered equivalent. Figures may be truncated or rounded as long as their method is clear.

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
2		$7 \times 8^2 + 320 = 448 + 320$ 768p = 7.68	£7.68	3	M1 for 7×8^2 or 448 seen A1 for 768 B1 for correct monetary answer written correctly eg £7.68 or 768p
3			correct shaded region	2	B1 for arc of circle, centre oak tree, radius 4cm(±2mm) B1 for shaded region where the tree can be planted, bounded by sides of garden and arc of circle centre oak tree
4	(a)		−3, −2, −1,0,1	2	B2 for all 5 values and no others (B1 for 4 correct values and no others or -4,-3,-2,-1,0,1 or -3,-2,-1,0,1,2
	(b)		$-2 \leq x < 4$	2	B2 for $-2 \leq x < 4$ (B1 for $-2 \leq x$ or $x < 4$ or $-2 < x \leq 4$) [Note: accept the use of any letter other than x throughout and ignore any attempt to list integer values]
5			25.1-25.2	2	M1 for $2 \times 3.142 \times 4$ or 8π oe A1 for 25.1 – 25. 2
6	(a)		5, −4, −3	2	B2 for 5, −4 and −3 (B1 for 5 or −4 or −3)
	(b)		correct curve	2	B2 for fully correct curve (B1 ft for at least 5 points plotted correctly)

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
7			enlargement, scale factor 2, centre (6, −5)	3	B1 for enlargement B1 for (scale) factor 2 or ×2 or sf 2 B1 for (6, −5) NB: award 0 marks for an explanation that includes reference to more than one transformation.
*8		Cost of wages, rent and other expenses last year 92 000+10 800+7000=109 800 Cost of wages, rent and other expenses this year $1.075\times92\,000 + \frac{7}{9} \times 10$ 800 + 7000÷2 = 98 900+8400+3500 = 110 800 Costs are more this year, so she cannot increase the amount she spends on goods	no, with working and reason	4	M1 for an attempt to calculate using 7.5% and 92000 (eg 7.5% of 92000 or increase of 7.5%) eg 92000 + 6900 or 98900 M1 for an attempt to find a fractional amount of 10800 (eg $\frac{7}{9}$ × 10800 or 8400 or $\frac{2}{9}$ × 10800 or 2400) M1 for complete method of increasing 92000 by 7.5%, finding $\frac{7}{9}$ of 10800, and halving 7000, with at least all of these three added together. C1 for statement eg "no" with both 110800 & 109800 seen, OR "no" with "1000 more" OR "no" and compares 181800 with 182800, oe.
9	(a)	$\sqrt{30} = 5.4772255\ldots$ $2.5^2 = 6.25$ 5.4772255...÷ 6.25 =	0.876	2	M1 for $\sqrt{30} \div 6.25$ or $5.4(7\ldots) \div 2.5^2$ A1 for any answer in the range 0.876 to 0.877
	(b)	4.5 × 1000 × 1000	4 500 000	2	M1 for complete method equivalent to 4.5 × 1000 × 1000 A1 for 4 500 000 oe

PMT

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10		3 → 21 4 → 56 3.1 → 23.5(9) 3.2 → 26.3(6) 3.3 → 29.3(3) 3.4 → 32.5(0) 3.5 → 35.8(7) 3.6 → 39.4(5) 3.7 → 43.2(5) 3.8 → 47.2(7) 3.9 → 51.(5) 3.35 → 30.8(9)	3.3	4	B2 for a trial between 3.3 and 3.4 inclusive (B1 for a trial between 3 and 4 inclusive) B1 for a different trial between 3.3 and 3.4 exclusive B1 (dep on at least one previous B1) for 3.3 NB trials should be evaluated to at least 1dp truncated or rounded
11			45	3	M1 for 60000 × 0.75 or ÷1000 or digits 45 or the numbers 60 or 0.00075) M1 for the complete method 60 000 × 0.75 ÷ 1000 oe A1 cao
12	(a)		−7	2	M1 for an attempt to get *x*s on one side or number terms on one side A1 cao
	(b)		8.5	2	M1 for an attempt to divide each side by 4 or an attempt to expand the bracket eg $4 \times x - 4 \times 5$ A1 for 8.5 oe

PMT

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*13		2500×0.04×2 =£200 2500×$(1.039)^2$ = £2698.80 £2698.80 – £2500 = £198.80 Scheme A gives £1.20 more	statement	4	M1 for a correct method to find 4% of 2500 or 3.9% of 2500 A1 for a correctly calculated amount 2700 or 2698.8(0) or 200 or 198.8(0); or percentage rate calculated over the 2 years for comparison: 3.93% or 3.976% oe M1 for a correct compound interest method using 3.9% and 2500 over 2 years C1 for statement of scheme A, with two correct comparable figures.
14		$3x - 2y = 7$ $7x + 2y = 13$ $10x = 20$ $x = 2$ $3\times2 - 2y = 7$ $-2y = 1$ $y = -0.5$	2, −0.5	3	M1 for a correct process to eliminate either x or y (allow one arithmetic error) M1 (dep) for correct substitution of their found variable or an otherwise correct method to eliminate the other variable A1 for 2 and −0.5 oe
15	(a)		3.7×10^{-3}	1	B1 cao
	(b)		49 000	1	B1 cao
	(c)	500 ÷ 250 000 [= 0.002] OR $(5 \times 10^2) \div (2.5 \times 10^5)$ [= $(5\div2.5)\times10^{2-5}$] OR $\frac{500}{250} \times \frac{1}{10^3}$ [= 2×10^{-3}] OR $\frac{500\div100}{250000\div100} = \frac{5}{2500}$ [= 0.002]	2×10^{-3}	2	M1 for an attempt to divide using two numbers that are in consistent form eg following an attempt to convert to ordinary numbers, or standard form numbers. A1 for 2×10^{-3}

PMT

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16			12.7	3	M1 for 3.142 × 5 × 5 oe or 3.142 × 5 × 5 × '*h*' (=78.5 – 78.55) M1 for 1000 ÷ (3.142 × 5 × 5) A1 for 12.7 – 12.8 NB: multiples of π acceptable for M marks
17		$4x - 3 = 2x + 2y$ $2x - 3 = 2y$ $2x = 2y + 3$ $x = y + 1.5$	$x = y + 1.5$	3	M1 for attempt to expand brackets eg $2\times x+2\times y$ or divide through by 2 (each term). M1 for attempt to get x on one side of equation. A1 for $(x =) y + 1.5$, $\frac{2y + 3}{2}$, oe
18			(11, 21)	3	M1 for 5 – 2 or 9 – 3 OR 3 or 6 as long as these are not related to the 3 from *A* or multiple 3 or 9,18 M1 for 2 + 3 × "3" and 3 + 3 × "6" OR for 5 + 2 × "3" and 9 + 2 × "6" OR for 2 + 3 × "3" (=11) and (y=) 2 × '11' – 1 A1 cao SC: B1 if no method shown and answer shows x coordinate as 11 or y coordinate as 21.

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
19			4.6	5	M1 for $AC = \sqrt{(3^2+4^2)}$ (=5) or $DA = \sqrt{(5^2+2^2)}$ M1 for tan BAC = 0.75 oe or (BAC=) 36.8(6) or 36.9 M1 for tan DAC = 0.4 oe or (DAC=) 21.8(0) M1 for $\sqrt{'5'^2+2^2}$ × sin("36.8(6)"+"21.8(0)") or 5.385 × sin 58.7 A1 for 4.59 – 4.61 OR M1 for $AC = \sqrt{3^2+4^2}(=5)$ or $DP = \sqrt{(29 - AP^2)}$ M1 for cos BAC = 0.8 oe or (BAC=) 36.8(6) oe M1 for angle CDP = angle BAC M1 for (DP=) 3 + 2×cos CDP or (AP=) 4 – 2×sin CDP A1 for 4.59 – 4.61
20			0.5, −3	3	M1 for $(2x \pm 1)(x \pm 3)$ M1 for $(2x - 1)(x + 3)$ A1 cao OR M1 for $\frac{-5 \pm \sqrt{5^2 - 4 \times 2 \times -3}}{2 \times 2}$ allow sub. of $c = \pm 3$ M1 for $\frac{-5 \pm \sqrt{49}}{4}$ A1 cao NB: any other method put in review.

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5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
21		$1180.5 \div \frac{4}{3}\pi(6.15)^3$	1.21	4	M1 for 1180 ± 0.5 or 6.2 ± 0.05 M1 for 'max. mass' ÷ 'min. volume' where "min volume" is defined as any expression involving 6.15 M1 for $1180.5 \div \frac{4}{3}\pi(6.15)^3$ A1 for 1.21 – 1.22
22			proof	3	B1 for *AD* = *AB* and *AE* = *AG* B1 for angle *EAB* = angle *DAG* (= 90 + angle *DAE*) B1 (dep on previous B marks) for 2 sides and included angle (SAS) oe
23	(a)		$3\boldsymbol{a} + \boldsymbol{b}$	1	B1 oe
	(b)		3**c**	4	M1 for writing *QB* as a combination of vectors eg $\frac{1}{2}$ ('3**a** + **b**') + **b** or 3**a** + 2**b** – $\frac{1}{2}$ ('3**a** + **b**') or 2**a** + 2**b** − **c** oe M1 for equating **a** + **b** = 2**c** or writing *PQ* in terms of vectors **a** and **b** eg −**a** + $\frac{1}{2}$ ('3**a** + **b**') or 2**a** + **b** – $\frac{1}{2}$ ('3**a** + **b**') A1 for (*PQ*=) $\frac{1}{2}$**a** + $\frac{1}{2}$**b or** (*QB*=) $\frac{3}{2}$**a** + $\frac{3}{2}$**b** or (*QB*=) 2**c**−**a** + **a** + **c** A1 cao NB: accept equivalent expressions throughout

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Summer 2013

GCSE Mathematics (2MB01) Higher
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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

PMT

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
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11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

PMT

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			600, 150, 75, 375	3	M2 a complete correct method seen to calculate the required ingredients (M1 for a method to find a scale factor or the weight of one scone or dividing ALL by the same number or multiplying by 30) A1 cao **SC** B2 for three out of four ingredients correct
2		0 5 5 8 2 4 5 7 9 2 5 8 4 6 2 5	Ordered stem and leaf diagram	3	M1 for an unordered stem and leaf diagram with no errors or omissions **OR** an ordered stem and leaf diagram condoning two errors or omissions A1 for a correctly ordered stem and leaf diagram B1 for an appropriate key
3	(a)		Point plotted	1	B1 for point plotted
	(b)		Negative	1	B1 for Negative (correlation)
	(c)		Correct line	1	B1 for a straight line that lies between (1, 40) to (1, 48) and (5.5, 6) to (5.5, 14)
	(d)		30 – 34	1	B1 30-34 or ft lobf (dep on single str line segment with a negative gradient)

PMT

PAPER: 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		Two reasons	2	B1 for no time scale e.g. day, week etc B1 for vague times e.g don't know how long a little is, no units
	(b)		Better question	2	B1 for stem which must include a time scale B1 for at least 3 non overlapping response boxes (not necessarily exhaustive) or at least 3 boxes that are exhaustive (but could be overlapping) **NB** Units must be included in either stem or response boxes to score full marks
	(c)		Biased sample	1	B1 for biased or not representative sample eg could all be too similar
5			Points plotted at (5, 6), (15, 9), (25, 8), (35, 7), (45,5) and joined with line segments	2	B2 for correct plotting of 5 points and joining with line segments (B1 for points plotted correctly at midpoints of intervals **OR** joining points with line segments at the correct heights and consistent within the class interval (including end values) **OR** correct frequency polygon with one point incorrect **OR** correct frequency polygon with first and last points joined) NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted

PAPER: 5MB1H_01

<table>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>6</td><td>(a)
(b)</td><td></td><td>16.5
17.5</td><td>1
1</td><td>B1 cao

B1 for 17.5 accept 17.499(9…) or $17.4\dot{9}$</td></tr>
<tr><td>7</td><td></td><td></td><td>0.5</td><td>2</td><td>M1 for any suitable right angled triangle drawn against the given line with lengths indicated or used
or for use of $\frac{y_2 - y_1}{x_2 - x_1}$ oe
A1 for 0.5 oe
SC B1 y=0.5x+1</td></tr>
<tr><td>8</td><td></td><td>
<table>
<tr><td></td><td>B</td><td>G</td><td>Tot</td></tr>
<tr><td>F</td><td>10</td><td>35</td><td>45</td></tr>
<tr><td>H</td><td>12</td><td>26</td><td>38</td></tr>
<tr><td>T</td><td>8</td><td>29</td><td>37</td></tr>
<tr><td>Tot</td><td>30</td><td>90</td><td>120</td></tr>
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<table>
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<tr><td>B</td><td>10</td><td>12</td><td>8</td><td>30</td></tr>
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<tr><td>Tot</td><td>45</td><td>38</td><td>37</td><td>120</td></tr>
</table>
</td><td>29</td><td>4</td><td>M1 for a complete correct method to find the total number of girls eg 120 – 30 (=90)
M1 for complete correct method to find the number of girls who play football or hockey eg 26 + 35 (=61)
M1 for ‘90’ – ‘61’
A1 for identifying 29 as the answer
OR
M1 for a complete correct method to find the total number playing tennis
M1 for a complete correct method to find the number of boys playing tennis
M1 for ‘total for tennis’-‘boys playing tennis’
A1 for identifying 29 as the answer</td></tr>
</table>

PMT

PAPER: 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*9		**Cost of villa** 2600 + 200 = £2800 **Cost of hotel** 180 × 7×2 = 2520 $\frac{40}{100}\times 180 = 72$ 72 × 7 = 504 2520 + 504 = 3024	Comparison	6	B1 for identifying 2600 or 180 from the table M1 for a complete correct method to find 40% of their adult price for either one day or one week. **OR** the total cost of the adult(s) at the hotel ie 2×'180' or 7×'180' or 2×7×'180' M1 for a complete correct method to find the total price of the hotel for their two adults and their one child (40% of adult) for either a week or a day M1 for finding the total of the villa ie '2600'+200 A1 for 2800 and 3024 **OR** 400 and 432 C1 (Dep on M2) for a clear conclusion from comparing their results.
10		20 000×0.85 = 17 000 17 000×0.9 = 15 300 15 300×0.9 = 13 770	3	4	M1 for a complete correct method to find 15% of 20 000 (=3000) or 100-15 (=85) M1 for a complete correct method to find 85% of 20 000 e.g. 20 000 – '3000' (=17000) or 20 000 × '0.85' (=17000) M1 for a complete method to find 90% of '17 000' A1 cao but MUST be supported: 3 without working scores 0 marks and 3 from incorrect working may gain some method marks.

PMT

PAPER: 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		42	2	M1 for realising that the weight is three quarters of the total number of trees (=¾ × 56 or ¾ × 57 oe) A1 for 42 or 43
	(b)		Correct box plot	2	M1 for with at least 3 elements correctly plotted but must at least have a box. A1 for fully correct box plot
	*(c)	Median Jodie = 40 Median Tom = 29 Range Jodie = 30 Range Tom = 40 IQR Jodie = 10 IQR of Tom = 22	Comparison	2	C2 two relevant comparisons one spread (IQR or range) and one about the median (C1 one comparison made)
12	(a)		Cf graph drawn	2	M1 for 5 or 6 points plotted correctly at the end of intervals or 5 or 6 points plotted not at ends but consistent within each interval and joined. A1 cao
	(b)		8-9	2	M1 ft UQ-LQ seen A1 ft from their cf graph
	(c)	65 – '59'	6-9	2	M1 method shown to read off from t=45 from their cf graph or linear interpolation from the table A1 ft from their cf graph

PAPER: 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
13		$\frac{15+18}{160}\times 30$	6	3	M1 for finding the proportion of the stratum e.g. $\frac{15}{160}$ or $\frac{18}{160}$ or $\frac{15+18}{160}$ OR for finding the proportion of the population eg $\frac{30}{160}\times 100$ or 18.75% M1 for completing their method to find the sample size e.g $\frac{15+18}{160}\times 30$ oe or 18.75÷100×(15+18) or sight of 6.1(875) A1 cao

PMT

PAPER: 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)	0.016 × 500 = 8 0.03 × 500 = 15 0.08 × 250 = 20 0.096 × 250 = 24 0.026 × 1000 = 26	(8), 15, 20, 24, 26	2	M1 for correct calculation to find one frequency e.g. 0.03 × 500 or 0.08 × 250 or 0.096 × 250 or 0.026 × 1000 or for one frequency correct or establishing that 1 cm^2 = 2.5 fish A1 for all frequencies correct
	(b)	0.026 × 500 = 13 8 + 15 + 20 + 24 + 26 = 93	13 : 93	2	M1 ft for a complete correct method to find the number of fish over 2000 g ie 0.026 × 500 (=13) or '26'÷2 A1ft for 13 : 93 or '0.026 × 500' : 'total for all their fish' or '26'÷2 : 'total for all their fish' SCB1 for 93:13 given as the answer
	(c)	47th item needed	1292	2	M1 for a complete correct method to divide the area of the histogram into two equal parts **OR** for a complete correct method to interpolate for the 47th value A1 for answer in range 1290 to 1300

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PAPER: 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15		$\frac{6}{10}\times\frac{5}{9}+\frac{2}{10}\times\frac{1}{9}+\frac{2}{10}+\frac{1}{9}$ $\frac{30}{90}+\frac{2}{90}+\frac{2}{90}$	$\frac{34}{90}$	4	B1 for $\frac{5}{9}$ *or* $\frac{1}{9}$ *or* $\frac{1}{9}$ seen as 2nd probability M1 for $(\frac{6}{10}\times\frac{5}{9})$ or $(\frac{2}{10}\times\frac{1}{9})$ or $(\frac{2}{10}\times\frac{1}{9})$ M1 for $(\frac{6}{10}\times\frac{5}{9})+(\frac{2}{10}\times\frac{1}{9})+(\frac{2}{10}\times\frac{1}{9})$ A1 for $\frac{34}{90}$ oe **With replacement** B0 for $\frac{6}{10}$ or $\frac{2}{10}$ or $\frac{2}{10}$ seen as 2nd probability M1 for $(\frac{6}{10}\times\frac{6}{10})$ or $(\frac{2}{10}\times\frac{2}{10})$ or $(\frac{2}{10}\times\frac{2}{10})$ M1for $(\frac{6}{10}\times\frac{6}{10})+(\frac{2}{10}\times\frac{2}{10})+(\frac{2}{10}\times\frac{2}{10})$ A0 for $\frac{44}{100}$ S.C award B2 for $\frac{44}{100}$ or $\frac{34}{100}$ or $\frac{44}{90}$ oe

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 5MB1H_01			
Question		**Modifications**	**Notes**
2		Stem and leaf diagram horizontal line inserted at the bottom	Standard mark scheme
3		*x*-axis 2cm for $\frac{1}{2}$ *y*-axis 2cm to for 5. Cross changed to filled in circles. In (a) points (1.8,42) is now point (2,40) In (d) reading is now from 3 litres; use a range of 26 – 32	Standard mark scheme
5		*x*-axis 2cm for 5 *y*-axis 2cm for 1	Standard mark scheme
7		2cm grid	Standard mark scheme

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PAPER: 5MB1H_01			
Question		**Modifications**	**Notes**
9		Top two rows in the table removed	Standard mark scheme
11		Tom's boxplot : LQ changed to 20 median changed to 30 which could affect slightly the answers (comparisons) in (d).	Standard mark scheme
12		Both axes: 1.5 cm for 5. Cumulative frequencies changed : 0 5 15 50 60 65	*This will affect all parts of this question; follow through accordingly.*
14		In table. weight 0 to 500 changed to 10 In Graph: 0 -500: up to 0.02, 1250 – 1500: up to 0.1, 1500 – 2500: up to 0.03.	The answers are therefore (10), 15, 20, 25, 30; density still $1cm^2 = 2.5$

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Mark Scheme (Results)

November 2013

Pearson Edexcel GCSE
in Mathematics Linear (1MA0)
Higher (Non-Calculator) Paper 1H

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			90 450 225 1.5 960	3	M1 for 6 ÷ 4 (= 1.5) or 4 ÷ 6 (= 0.66..) or ÷4 × 6 oe or sight of any one of the correct answers A1 for three correct A1 for all correct
2	(a)		Plot (90,17)	1	B1 cao
	(b)		Positive	1	B1 Positive
	(c)		In range 16 to 20	2	M1 for a single straight line segment with positive gradient that could be used as a line of best fit or a vertical line from 110 or a point plotted at (110, *y*) where *y* is in the range 16 to 20 A1 for an answer in the range 16 to 20 inclusive
3			120 cm^3	4	M1 for $\frac{1}{2} \times 3 \times 4$ M1 (dep) for '$\frac{1}{2} \times 3 \times 4$' × 20 A1 for 120 B1 (indep) for cm^3

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		$4y + 5x + 5$	2	M1 $5x$ or 5 seen A1 cao
	(b)		$3x(3x - 2y)$	2	B2 for $3x(3x - 2y)$ (B1 for $x(9x - 6y)$ or $3(3x^2 - 2xy)$ or $3x(ax - by)$ where a and b are integers not equal to zero)
	(c)		$4x + 8$	1	B1 cao
	(d)		$x^2 - 2x - 15$	2	M1 for 4 terms correct with or without signs or 3 out of no more than 4 terms correct with correct signs A1 cao
5	(a)		0.25	1	B1 oe
	(b)		150	2	M1 for 0.75×200 oe A1 cao
6	(a)		Shape with vertices at (–1, 3), (0, 6), (2, 6), (1, 3)	1	B1 for correct shape in correct position
	(b)		Rotation centre (0,0) 90° anticlockwise	3	B1 rotation B1 (centre) (0,0) B1 90° anticlockwise or 270° clockwise Note: award no marks if more than one transformation is given

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
7	(i)	20, 40, 60 12, 24, 36, 48, 60	3 and 5 or any multiple of 3, 5	4	M1 attempts multiples of both 20 and 12 (at least 3 of each shown but condone errors if intention is clear) or identifies 60 or a multiple of 60 M1 (dep on M1) for a division by 20 or 12 or counts up 'multiples' or identifies a common multiple (implied if one answer is correct or answers reversed) A1 cheese slices (packets) 3, burgers (boxes) 5 or any multiple of 3, 5 OR M1 for expansion of either 20 or 12 into factors M1 for demonstration that both expansions include 4 (or 2 × 2) A1 cao for cheese slices (packets) 3, burgers (boxes) 5
		20 = 4×5 = 2×2×5 12 = 4×3 = 2×2×3			
	(ii)		60		B1 for 60 or ft from their correct answer in (i) or ft 'common multiple'
8			38	5	M1 $3x - 5 = 19 - x$ M1 for a correct operation to collect the x terms or the number terms on one side of an equation of the form $ax + b = cx + d$ A1 for $x = 6$ M1 for substituting their value of x in the three expressions and adding **or** substituting their value of x after adding the three expressions A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)		Criticisms	2	B1 Qu 1 Overlapping boxes, no units B1 Qu 2 e.g. no time frame, non-specific responses, no number quantities, open to interpretation, no option for those who do not exercise
	(b)		Question given	2	B1 for a correct question with a time frame B1 for at least 3 correctly labelled non-overlapping response boxes (need not be exhaustive) or at least 3 response boxes that are exhaustive for all integer values of their time unit (could be overlapping) NB Units must be included in either question or response boxes to score full marks [Do not allow inequalities in response boxes]

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*10			Not enough, needs £133	5	M1 for splitting the shape (or showing recognition of the "absent" rectangle) and using a correct method to find the area of one shape M1 for a complete and correct method to find the total area M1 for a complete method to find 70% of 19 (= 13.3) or 70% of their total cost or 70% of their area A1 114(m^2) and (£)133 **or** 114(m^2) and (£)13.3(0) and 108(m^2) C1 (dep on M2) for a conclusion supported by their calculations OR M1 for a complete method for the number of tins required for one section of the area of the floor M1 for a complete method to find the number of tins for the whole floor M1 for a complete method to find 70% of their total number of tins and multiply by 19 A1 (£)133 C1 (dep on M2) for a conclusion supported by their calculations
11			164	5	M1 200 ÷ (3+2) (= 40) or an equivalent ratio seen M1 (dep) 3 ×'40' (= 120) or 2 ×'40' (= 80) or 120: 80 or 80:120 M1 a complete method to find 70% of their total number of large letters e.g. 0.7 × '80' (=56) M1 multiplies their three totals by the correct unit price and adds, e.g. 60(p) × '120' + (£)1 × '56' + (£)1.50 × '24' A1 164

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12		<table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>–4</td><td>–1</td><td>2</td><td>5</td><td>8</td></tr></table>	$y = 3x + 2$ drawn	4	B1 for axes scaled and labelled **(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x M1 ft for plotting at least 2 of their points (any points from their table must be correctly plotted) A1 for correct line between $x = –2$ and $x = 2$ **(No table of values)** M1 for at least 2 correct points with no more than 2 incorrect points M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3x + 2$ drawn A1 for correct line between $x = –2$ and $x = 2$ **(Use of $y = mx + c$)** M1 for line drawn with gradient of 3 **OR** line drawn with y intercept at 2 M1 for line drawn with gradient of 3 **AND** with y intercept at 2 A1 for correct line between $x = –2$ and $x = 2$ SC B2 (indep of B1) for correct line segment between $x = 0$ and $x = 2$ (ignore any additional incorrect line segment(s))

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
13		$35 \times 10 = 350$ $33 \times 11 = 363$ $363 - 350 = 13$ OR $10\times(35-33) = 20$ $33 - 20 = 13$	13	3	M1 35×10 (= 350) or 33×11 (= 363) M1 (dep) finding the difference in their totals e.g. '363' – '350' A1 cao OR M1 $10\times(35 - 33)$ (=20) or $11\times(35 - 33)$ (=22) M1 (dep) 33 – '20' or 35 – '22' A1 cao
14	(a)		$\frac{1}{5}$	1	B1 oe
	(b)		$\frac{1}{9}$	1	B1 cao
	(c)	$9\times10^4\times3\times10^3$	2.7×10^8	2	M1 27×10^7 oe or $9\times3\times10^{4+3}$ A1 cao

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PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15		$6x + 8y = 10$ $6x - 9y = 27$ $y = -1$ $3x - 4 = 5$ $3x = 9$ $x = 3$ OR $9x + 12y = 15$ $8x - 12y = 36$ $x = 3$ $9 + 4y = 5$ $4y = -4$ $y = -1$	$x = 3$, $y = -1$	4	M1 for a correct process to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao OR M1 for full method to rearrange and substitute to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao Trial and improvement scores 0 marks unless both x and y are correct
16		$120 \div 20 = 6$ $6^2 = 36$ $36 \times 300 = 10\,800$	10 800	3	M1 $120 \div 20$ (= 6) oe, can be implied by $120^2 \div 20^2$ M1 '$6'^2 \times 300$ A1 cao
17		(3,6,7) to (–2,2,5) (–5, –4, –2) (–2– 5, 2 – 4, 5 – 2)	(–7, –2, 3)	2	M1 for midpoint plus change or complete method for 2 out of 3 coordinates, can be implied by 2 correct values A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		68	1	B1 cao
	*(b)		Yes as 28 > 20 or 35% > 25% or 53 < 60	3	M1 for reading a value from graph at time = 60 (=28, accept 27 to 28) M1 for '28' ÷ 80 × 100 (= 35) or 25 ÷ 100 × 80 (= 20) C1 (dep on M2) for correct decision based on their figures OR M1 for 25 ÷ 100 × 80 (= 20) M1 for reading a value from graph at cf = 20 (=53, accept 52 to 54) C1 (dep on M2) for correct decision based on their figures
	(c)	28, 53, 68, 76, 96	Box plot plotted	3	B1 for ends of whiskers at 28 and 96 with a box B1 ft for median at '68' inside a box B1 for ends of box at 53 (accept 52 to 54) and 76
19			0.82	3	M1 for 1 – 0.7 (= 0.3) or 1 – 0.4 (= 0.6) M1for 1– '0.3'×'0.6' A1 for 0.82 oe OR M1 for 1 – 0.7 (= 0.3) or 1 – 0.4 (= 0.6) M1 (0.7 × 0.4) + (0.7 × '0.6') + ('0.3'× 0.4) A1 for 0.82 oe

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20	(a)		4	3	M1 for correct expansion to $32x - 8$ or multiplying both sides by $3x$ or dividing both sides by 4 M1 for a compete and correct method to isolate the x terms and the number terms (condone one arithmetic error in multiplying out the bracket) A1 cao
	(b)	$\frac{2(y-6)-(y+3)}{(y+3)(y-6)}$	$\frac{y-15}{(y+3)(y-6)}$	3	M1 for common denominator of $(y+3)(y-6)$ M1 for $\frac{2(y-6)}{(y+3)(y-6)} - \frac{y+3}{(y+3)(y-6)}$ oe or $\frac{2(y-6)-(y+3)}{(y+3)(y-6)}$ oe A1 for $\frac{y-15}{(y+3)(y-6)}$ or $\frac{y-15}{y^2-3y-18}$
21			100	4	M1 $y = kx^2$ oe or $36 = k \times 3^2$ A1 $k = 4$ M1 (dep on M1) ($y =$) '4' $\times 5^2$ A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*22		$360 - y$	$180 - \frac{y}{2}$	4	M1 $ADC = \frac{y}{2}$ A1 $180 - \frac{y}{2}$ C2 (dep on M1) for both reasons Angle at centre is twice the angle at the circumference Opposite angles in cyclic quadrilateral add to 180° (C1 (dep on M1) for one appropriate circle theorem reason) OR M1 reflex $AOC = 360 - y$ A1 $\frac{360 - y}{2}$ oe C2 (dep on M1) for both reasons Angles around a point add up to 360° Angle at centre is twice the angle at the circumference (C1 (dep on M1) for one appropriate circle theorem reason)
23			Triangle with vertices at (–1,–4), (–1,–5), (–3,–4.5)	2	M1 for correct shape and size and the correct orientation in the wrong position or two vertices correct A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
24	(a)	$\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ $\overrightarrow{ON} = \overrightarrow{OA} + \frac{2}{3}\overrightarrow{AB}$ $\overrightarrow{ON} = \mathbf{a} + \frac{2}{3}(-\mathbf{a} + \mathbf{b})$ $= \frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$ OR $\overrightarrow{ON} = \overrightarrow{OB} + \frac{1}{3}\overrightarrow{BA}$ $\overrightarrow{ON} = \mathbf{b} + \frac{1}{3}(-\mathbf{b} + \mathbf{a})$ $= \frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$	$\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$	3	M1 for correct vector equation involving $\overrightarrow{ON}$, eg. $\overrightarrow{ON} = \overrightarrow{OA} + \overrightarrow{AN}$, may be written, partially or fully, in terms of **a** and **b**, e.g. $(\overrightarrow{ON} =)$ $\mathbf{a} + \frac{2}{3}\overrightarrow{AB}$ M1 for showing answer requires $\overrightarrow{AN} = \frac{2}{3}\overrightarrow{AB}$ or $\overrightarrow{BN} = \frac{1}{3}\overrightarrow{BA}$ A1 $\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$ oe
	(b)	$\overrightarrow{OD} = \overrightarrow{OA} + \overrightarrow{AC} + \overrightarrow{CD}$ $= \mathbf{a} + \mathbf{b} + \mathbf{b}$ $= \mathbf{a} + 2\mathbf{b}$ $\overrightarrow{OD} = 3(\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b})$ $\overrightarrow{OD} = 3\overrightarrow{ON}$	Proof	3	M1 for a correct vector statement for $\overrightarrow{OD}$ or $\overrightarrow{ND}$ in terms of **a** and **b**, e.g. $\overrightarrow{OD} = \mathbf{a} + \mathbf{b} + \mathbf{b}$ oe or $\overrightarrow{ND} = \frac{2}{3}(-\mathbf{b} + \mathbf{a}) + \mathbf{b} + \mathbf{b}$ oe A1 for correct and fully simplified vectors for $\overrightarrow{ON}$ (may be seen in (a)) **and** for $\overrightarrow{OD}$ $(= \mathbf{a} + 2\mathbf{b})$ or $\overrightarrow{ND}$ $(= \frac{2}{3}\mathbf{a} + \frac{4}{3}\mathbf{b})$ C1 (dep on A1) for statement that $\overrightarrow{OD}$ or $\overrightarrow{ND}$ is a multiple of $\overrightarrow{ON}$ (+ common point)

Modifications to the mark scheme for Modified Large Print (MLP) papers.

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Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
2		*x* axis 2cm for 10,*y* axis 2cm for 2 ½ . Crosses changed to filled in circles. Right axis labelled.	Standard mark scheme
3		Model as well as diagram	Standard mark scheme
4	(a)	*x* changed to *e*. *y* changed to *f*.	M1 5*e* or 5 seen A1 cao
	(c)	*x* changed to *y*	Standard mark scheme
	(d)	*x* changed to *y*	Standard mark scheme

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PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
6	(a)	Move shape A two squares to the right. Cut left axis at -5. 2cm grid.	B1 for correct shape in correct position
	(b)	2cm grid. *x* axis -6 to +7. *y* axis -3 to +7.	Standard mark scheme
Q11		Remove 501 – 750g row. .	Standard mark scheme
Q12		2 cm grid. Axes drawn but not labelled	Standard mark scheme
Q18		Change line so it goes through (20, 0) (50, 20) (60, 30) (70, 40) (80,60) (100, 80). *x* axis 2cm for 10, *y* axis 2cm for 5.	B1 for 70 (accept 68 to 72) M1 for reading a value from graph at time = 60 (=30, accept 28 to 32) M1 for '30' ÷ 80 × 100 (= 37.5) or 25 ÷ 100 × 80 (= 20) C1 (dep on M2) for correct decision based on their figures OR M1 for 25 ÷ 100 × 80 (= 20) M1 for reading a value from graph at cf = 20 (=50, accept 48 to 52) C1 (dep on M2) for correct decision based on their figures
	(c)	28 seconds changed to 30 seconds. 96 seconds changed to 100 seconds. Boxplot *x* axis 3cm for 10 in an intermediate line.	B1 for ends of whiskers at 30 and 100 with a box B1 ft for median at '70' inside a box B1 for ends of box at 50 (accept 52 to 54) and 80 (accept 78 to 82)

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q23		Triangle A (the image) moved down 1 square. Triangle B (the enlargement) given scale factor $-\frac{1}{2}$ centre (0, -1). Wording: 'Describe fully the single transformation that will map Triangle A onto Triangle B'.	B1 for enlargement scale factor $-\frac{1}{2}$ B1 for (centre) (0, –1)
Q24		Vectors increased in size.	Standard mark scheme

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November 2013

Pearson Edexcel GCSE
In Mathematics Modular (2MB01)
Unit 1: (5MB1H_01) Higher (Calculator)

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		question + response boxes	2	B1 for appropriate question with time period B1 for at least 3 boxes that are either non-overlapping but not necessarily exhaustive, or exhaustive but not necessarily non-overlapping **NB** time period and/or unit of time may appear in either the question or with the response boxes; but award a maximum of B1 if no units are given.
	(b)		two correct reasons	2	B2 for 2 correct reasons from, eg only girls, (all about) the same age, same year group, same school (B1 for 1 correct reason)
2	(a)		$0.75 - x$	2	M1 for or $1 - 0.25 + x$ or $0.25 + x$ A1 for $0.75 - x$ oe
	(b)		60	2	M1 for 0.25×240 oe A1 cao
3	(a)		14 | 8 9 15 | 0 2 4 6 8 16 | 1 3 5 6 7 17 | 0 1 4	3	B2 for fully correct diagram (The order of the numbers in the stem may be reversed) (B1 for ordered or unordered leaves with one error or omission) B1 for correct key (units may be omitted)
	(b)		15	2	M1 for 167 – 152 or 167 or 152 identified A1 for 15 or ft their stem and leaf diagram

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*4			Jack with comparison	3	M1 for per gallon cost: 52÷8 (=6.50) or 58÷8.8 (=6.59) A1 for 6.50 and 6.59 C1 (dep on M1) for correct decision from their figures if comparable OR M1 for per litre cost: 8÷40 (=1.45) or 52÷36 (=1.44) A1 for 1.45 and 1.40−1.44 C1 (dep on M1) for correct decision from their figures if comparable NB accept equivalent methods
5	(a) (b)		Positive correlation 52 – 60	1 2	B1 for positive correlation or the greater the rainfall the more umbrellas sold oe M1 for a single straight line segment with positive gradient that could be used as a line of best fit or an indication on the diagram from 28 on the *x*-axis (point or line) A1 for an answer in the range of 52 – 60
*6		2×462+251 =1175, 0.95×1175 = £1116.25 2×485+218 =1188, 1188 – 75 = £1113.00	Jetstream	5	M1 for identifying correct costs for either Highway Airlines or Jetstream Airlines M1 for attempt to calculate the costs for the family eg 2×"462"+"251" or 2×"485"+"218" M1 for a correct method to work out the discount for one company eg 0.95 × "1175" or 0.05 × "1175" or "1188" – 75 oe A1 for (£)1116.25 and (£)1113.00 C1 (dep on M1) calculations clearly identified with each airline and correct decision from their figures

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
7	(a)		167.5	1	B1 cao
	(b)		168.5	1	B1 cao accept 168.499...
8		425× 9 475×15 525×12 575×4 19 550 ÷ 40	488 - 489	4	M1 for *fx* with *x* consistent within intervals (including the end points) allow one error M1 (dep) for use of all correct mid-interval values M1 (dep on first M1) for $\sum fx \div 40$ A1 for 488 – 489
9	(a)(i)		11, 22	3	B3 for all of: median 11 drawn, greatest number 22 drawn, smallest number 3 in table, upper quartile 17 in table
	(ii)		3, 17		(B2 for 3 correct, B1 for 2 correct)
	(b)		45	2	M1 for 0.75×60 or 60 – 0.25×60 oe or 15 seen (may be seen in diagram) A1 cao
10			30	3	M1 for 32.4×32 (=1036.8) or 28.4×48 (=1363.2) M1 for (1036.8+1363.2)÷80 A1 cao OR M1 for $\frac{32}{80} \times (32.4 - 28.4)$ or for $\frac{48}{80} \times (32.4 - 28.4)$ M1 for $28.4 + \frac{32}{80} \times (32.4 - 28.4)$ or for $32.4 - \frac{48}{80} \times (32.4 - 28.4)$ A1 cao
11			two comparisons	2	B1 for one correct complex comparison which summaries the data, with supporting correct numerical values B1 for a different correct complex comparison which summarises the data, with supporting correct numerical values and given in context

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		0.28	2	M1 for method shown to work out the gradient for car A A1 for 0.27 – 0.29
	(b)		35.5	1	B1 for 35.1 – 35.9
13	(a)		0.7, 0.4, 0.6 0.4	2	B2 for fully correct tree diagram (B1 for 0.7 or 0.4 in correct position)
	(b)		0.54	2	M1 for 0.3×0.4 or 0.7×0.6 A1 for 0.54 oe or ft their tree diagram
14			7	2	M1 for $\frac{35}{156}\times 30$ (=6.7….) A1 for 6 or 7
15			55 - 56	3	M1 for attempt to find 0.25×total area, eg 0.25×(3.6+14+5.6+7.2+1.4) (=7.95) condone one error M1 for (‘7.95’ – ‘3.6’) ÷ 7 (=0.621…) A1 for 55 – 56 OR M1 for for attempt to find 0.25×total squares, eg 0.25×(90+350+140+180+35) (=198.75) condone one error M1 for (‘198.75 – ‘90’) ÷ 35 (=3.107…) A1 for 55 – 56

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16			$\frac{83}{171}$	4	M1 for use of 18 as denominator of second probability M1 for $\frac{11}{19}\times\frac{10}{18}$ or $\frac{8}{19}\times\frac{7}{18}$ M1 for $\frac{11}{19}\times\frac{10}{18}+\frac{8}{19}\times\frac{7}{18}$ A1 for $\frac{83}{171}$ oe Special cases (with replacement) M1 for $\frac{11}{19}\times\frac{10}{19}$ or $\frac{8}{19}\times\frac{7}{19}$ M1 for $\frac{11}{19}\times\frac{10}{19}+\frac{8}{19}\times\frac{7}{19}$ OR M1 for $\frac{11}{19}\times\frac{11}{18}$ or $\frac{8}{19}\times\frac{8}{18}$ M1 for $\frac{11}{19}\times\frac{11}{18}+\frac{8}{19}\times\frac{8}{18}$ OR B2 for $\frac{185}{361}$ oe
17	(i)		250	4	M1 for 50/8 (=6.25) or 8/50 (=0.16) or 40/8 (=5) or 8/40 (=0.2) or $\frac{50}{n}=\frac{8}{40}$ oe M1 for 50×40÷8 or 50×5 or 6.25×40 or 50÷0.2 oe A1 cao
	(ii)		assumption		B1 for correct mathematical assumption, eg fixed population, takes random sample

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

PAPER: 5MB1H_01			
Question		**Modification**	**Notes**
Q4		*x* axis 2cm for 5, *y* axis 2cm for 2. Right axis labelled.	Standard mark scheme
Q5	(a) (b)	*x* axis 2cm for 5, *y* axis 2cm for 10. *x* changed to filled in circles on scatter graph. 28mm changed to 30mm. Right axis labelled.	Standard mark scheme M1 for a single straight line segment with positive gradient that could be used as a line of best fit or an indication on the diagram from 30 on the *x*-axis (point or line) A1 for an answer in the range of 52 – 605
Q6		Tables – top 2 rows and bottom 2 rows removed from both tables.	Standard mark scheme
Q8		Frequency column widened to allow for working.	Standard mark scheme

PMT

PAPER: 5MB1H_01			
Question		**Modification**	**Notes**
Q9	(a)	60 lemon trees changed to 90. In table Lower Quartile changed to 10, Median changed to 20 and Greatest number changed to 30. Box plot is changed accordingly and extended to 35. 2cm squares.	B3 for all of: median 20 drawn, greatest number 22 drawn, smallest number 3 in table, upper quartile 17 in table (B2 for 3 correct, B1 for 2 correct)
	(b)	60 lemon trees changed to 90. 8 lemons changed to 10.	M1 for 0.75×90 or $90 - 0.25\times90$ oe or 22.5 (22-23) seen (may be seen in diagram) A1 67.7, which could be rounded to 67 or 68
Q11		*x* axis 2cm for 2.5, *y* axis 2cm for 10. Right axis labelled.	Standard mark scheme
Q12		*x* axis 2cm for 5, *y* axis 2cm for 2½.	Standard mark scheme
Q13		Probability tree diagram size × 1½.	Standard mark scheme
Q15		Width and height of bars modified.	Standard mark scheme

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Mark Scheme (Results)

November 2014

Pearson Edexcel GCSE
In Mathematics A (1MA0)
Higher (Non-Calculator) Paper 1H

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4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme
M1 – method mark for appropriate method in the context of the question A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(i)		3484	1	B1 cao
	(ii)		34.84	1	B1 cao
	(iii)		670	1	B1 cao
*2			Maths with correct comparative figure(s)	2	M1 for correct method to find figure(s) to compare, eg $\frac{32}{80}\times 100$ (=40) oe **or** 0.38×80 oe (=30.4) C1 for maths with 40% or 30.4 or $\frac{40}{100}$ and $\frac{38}{100}$ oe
3		8 | 4 8 9 9 | 0 0 1 1 2 3 5 7 8 10 | 2 3 6 8 11 | 0 5 8 | 4 represents 84(cm)	correct stem and leaf with key	3	B2 for a fully correct ordered diagram (B1 for a correct unordered diagram or ordered with at most two errors or omissions with stems 8, 9, 10 and 11 present) B1 for a correct key (units not necessary) Accept stem written as 80, 90, etc. but key only if consistent with this
4			$T = 6x + 8y$	3	M1 for $6x$ **or** $8y$ oe **or** $T=$ (a linear expression in x and y) M1 for $6x + 8y$ oe or $T = 6x$ $(+ay)$ oe or $T = 8y$ $(+bx)$ oe A1 for $T = 6x + 8y$ oe

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		$y > 0.5$	2	M1 for clear intention to subtract 5 from both sides of inequality or equation **or** divide all terms of the inequality or equation by 6 **or** $6y > 3$ **or** 0.5 oe seen A1 for $y > 0.5$ oe as final answer
	(b)		$-3 < x \leq 4$	2	B2 for $-3 < x \leq 4$ oe (B1 for one correct inequality, eg $-3 < x$ **or** $x > -3$ **or** $x \leq 4$ **or** $4 \geq x$ **or** $-3 \leq x < 4$) NB Accept the use of any letter
*6		554 ×27 3878 11080 14958 1 0 1 0 0 8 3 5 3 5 2 8 1 4 9 5 8	Yes with correct working	4	M1 for a complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation. A1 for £149.58 or 42p (spare) C1 ft (dep on M1) for correct decision for their total cost **OR** M1 for a complete grid with not more than 1 multiplication error, addition not necessary M1 (dep) for addition of all the appropriate elements of the calculation A1 for £149.58 or 42p (spare) C1 ft (dep on M1) for correct decision for their total cost **PTO**

		<table><tr><th>500</th><th>50</th><th>4</th><th>×</th></tr><tr><td>10 000</td><td>1000</td><td>80</td><td>2 0</td></tr><tr><td>3500</td><td>350</td><td>28</td><td>7</td></tr></table> 10000 1000 3500 350 80 28 14958			**OR** M1 for sight of a complete partitioning method, condone 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation. A1 for £149.58 or 42p (spare) C1 ft (dep on M1) for correct decision for their total cost **OR** M1 for 150.0... ÷ 27 at least 5 seen and 15 carried or $\frac{50}{9}$ M1 (dep) for full correct process to divide 150 by 27 or $5\frac{5}{9}$ A1 for £5.55 or £5.56 o**r** £5.55... C1 ft (dep on M1) for correct decision for their plant cost **OR** M1 for 150.0…÷ 5.54 at least 2 seen and 392 carried M1 (dep) for full correct process to divide 150 by 5.54 A1 for 27 (.07…) C1 ft (dep on M1) for correct decision for their number of plants

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
7			9	4	M1 for method to find area of one rectangle, eg 15 × 8 (=120) or 15 × 11 (=165) M1 (dep) for subtracting from/by given area, eg (138 – "120") (=18) or "165" – 138 (=27) M1 for final step from complete method shown, eg 15 − "18"÷ 3 or "27" ÷ 3 A1 cao **OR** M1 for a correct expression for the area of one rectangle, eg (8 + 3) × (15 − x) or 8 × x M1 (dep) for a correct equation eg (8 + 3) × (15 − x) + 8 × x = 138 M1 for correct method to isolate x, eg 3x = 27 A1 cao
*8			x = 130 + correct reasons	4	M1 for angle BFG = 65 may be seen on diagram M1 (dep) for correct method to calculate x, eg (x=) 65 + 65 (=130) **or** (x=) 180 − (180 – 2 × 65) (=130) C2 for x = 130 **and** full appropriate reasons related to method shown (C1 (dep on M1) for any one appropriate reason related to method shown) eg alternate angles; base angles in an isosceles triangle are equal; angles in a triangle add up to 180°; angles on a straight line add up to 180°; exterior angle of triangle = sum of two interior opposite angles; co-interior angles add up to 180° (allied angles) NB Any reasons stated **must** be used

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)		2 reasons	2	B2 for two different reasons (B1 for 1 reason) eg No units (of distance) eg Overlapping intervals or boxes or 2 and/or 3 in two boxes eg Missing box (no box for more than 6 (km/miles) or "other" or 4.5 (km/miles))
	(b)		question	2	B1 for a suitable question which includes a time frame (time frame could appear with response boxes) B1 for at least 3 relevant non-overlapping response boxes and exhaustive [Do not allow inequalities in response boxes]
10			construction	2	M1 for a pair of arcs or a single arc, centre C, that cut line AB **and** at least one pair of arcs not at C within guidelines A1 for perpendicular within guidelines with appropriate construction arcs **OR** M1 for an arc, centre A radius AC **and** an arc centre B radius BC. The two arcs must intersect below AB A1 for perpendicular within guidelines with appropriate construction arcs (SC If M0 scored, B1 for correct perpendicular line within guidelines)
11			900	4	M1 for 0.2×7000 (=1400) or 1.2×7000 (=8400) oe M1 for $7000 +$ "1400" $-$ 3000 (=5400) oe M1 for "5400" $\div 6$ A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		$e(3e + 5)$	1	B1 for $e(3e + 5)$
	(b)		4	3	M1 for intention to expand brackets, eg $7k - 21$ or division of all terms on RHS by 7 as first step, eg $\frac{3}{7}k - \frac{5}{7}$ M1 for correct method to isolate terms in k in an equation A1 cao
	(c)		$2x^2 - 13x - 24$	2	M1 for 4 terms correct ignoring signs or 3 out of no more than 4 terms correct A1 cao
	(d)		$-\frac{1}{3}$	3	M1 for clear intention to multiply both sides by 4 or split into individual fractions on LHS M1 for correct method to isolate term in f in an equation, ft from equations of form $a + bf = c$, where $a, b, c \neq 0$ A1 cao
13	(a)		$2\times2\times3\times3\times5$	3	M1 for a continual prime factorisation (at least two consecutive steps correct) or at least two stages of a factor tree correct M1 for a fully correct factor tree or list 2,2,3,3,5 A1 for $2\times2\times3\times3\times5$ or $2^2\times3^2\times5$
	(b)		Eg 6, 30	2	M1 for two numbers with an HCF of 6 **or** for two numbers with a LCM a multiple of 15 A1 for two numbers with an HCF of 6 **and** a LCM a multiple of 15 (eg (6, 30), (12, 30), …) **OR** M1 for 2×3 **and** 3×5 **or** for $2\times3\times5$ A1 for two numbers with an HCF of 6 **and** a LCM a multiple of 15 eg (6, 30) (12, 30) …

<table>
<tr><th colspan="6">PAPER: 1MA0_1H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>14</td><td></td><td></td><td>25</td><td>4</td><td>M1 for 600 ÷ 4 (=150)
M1 for 4500 ÷ “150” (=30)
M1 for 750 ÷ “30”
A1 for 25 with supporting working

OR
M1 for 4500 ÷ 750 (=6) or 750 ÷ 4500 (=$\frac{1}{6}$)
M1 for 600 ÷ 4 (=150) or 600 ÷ “6” (=100) or 600 × "$\frac{1}{6}$" (=100)
M1 for “150” ÷ “6” or “100” ÷ 4 or 150 × "$\frac{1}{6}$"
A1 for 25 with supporting working

OR
M1 for 4500 ÷ 750 (=6) or 750 ÷ 4500 (=$\frac{1}{6}$)
M1 for $\frac{1}{4} \times \frac{1}{"6"} \left(=\frac{1}{24}\right)$
M1 for "$\frac{1}{24}$" × 600
A1 for 25 with supporting working</td></tr>
<tr><td>15</td><td>(a)</td><td></td><td>correct box plot</td><td>2</td><td>M1 for a box drawn with at least 2 correct points from LQ, Median and UQ or with maximum value of 290 plotted
A1 for a fully correct box plot</td></tr>
<tr><td></td><td>*(b)</td><td><table><tr><td></td><td>girls</td><td>boys</td></tr><tr><td>Med</td><td>170</td><td>190</td></tr><tr><td>Range</td><td>230</td><td>210</td></tr><tr><td>IQR</td><td>120</td><td>100</td></tr></table></td><td>2 comparisons</td><td>2</td><td>C1 for a correct comparison of a measure of spread (using either range or IQR) or ft their box plot
C1 for a correct comparison of medians (accept averages)

For the award of both marks at least one of these comparisons must be in the context of the question.</td></tr>
</table>

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)		correct graph	2	M1 for 5 or 6 or 7 points plotted correctly at the ends of the intervals (overlay) A1 cao for correct graph with points joined by curve or straight line segments [SC: B1 if the shape of the graph is correct and 5 or 6 or 7 of their points are **not** at the ends but are plotted consistently within (10,20) (20,30) (30,40) etc.]
	(b)		No with supporting figures	2	M1 for 0.1 × 200 (=20) **or** 0.9×200 (=180) **or** sight of 180 used on cf axis **or** 200 – 186 (=14) A1 ft for correct decision with 20 and "9" **or** 20 and 14 **or** "age" from reading graph at 180 **OR** M1 for method to find percentage of workers who are over 65, eg $\frac{200-"191"}{200} \times 100$ (=4.5%) **or** method to find percentage of workers who are over 60 (from table), eg $\frac{200-186}{200} \times 100$ (=7%) or $\frac{200-190}{200} \times 100$ (=5%) A1 ft for correct decision with "4.5"% or 7% or 5%

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
17			25	4	M1 for complete method to work out interior angle of a regular octagon **or** 135° identified as an interior angle of the octagon M1 for complete method to work out angle *KFG* or angle *KFG* identified as 110° M1 (dep on M2) for complete method to work out angle *KFE*, eg "135" − "110" or (8×"135" − 4×"135" − 4×"110") ÷ 4 or (3×180 − 2×"135" − 2×"110") ÷ 2 A1 for 25 with supporting working **OR** M1 for complete method to work out the exterior angle of a regular octagon **or** 45° identified as an exterior angle of the octagon M1 for complete method to work out angle *KFG* or angle *KFG* identified as 110° M1 (dep on M2) for complete method to work out angle *KFE*, eg 180 − "45" − "110" A1 for 25 with supporting working **OR** M1 for complete method to work out the exterior angle of a regular octagon **or** 45° identified as an exterior angle of the octagon M1 for complete method to work out angle *JKF* or angle *JKF* identified as 70° M1 (dep on M2) for complete method to work out angle *KFE*, eg "70" − "45" A1 for 25 with supporting working

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		7.5	2	M1 for $\frac{12}{18}$ oe **or** $\frac{18}{12}$ oe **or** $\frac{12}{5}$ oe **or** $\frac{5}{12}$ oe A1 cao
	(b)		45	3	M1 for $\left("\frac{3}{2}"\right)^2$ oe or $\left("\frac{2}{3}"\right)^2$ oe M1 for complete method to find area of shaded region, eg $36 \times "1.5"^2 - 36$ A1 cao (SC B2 for 81)
19	(a)		8, (4), (2), 1, 0.8, 0.5	2	B2 all 4 correct Accept $\frac{4}{5}$ in place of 0.8 and $\frac{1}{2}$ in place of 0.5 (B1 for 2 or 3 correct)
	(b)		correct graph	2	M1 (ft dep on B1) for 5 or 6 points plotted correctly from their table (overlay) A1 cao for correct curve drawn from (0.5,8) to (8, 0.5)
20			128π	5	M1 for $\frac{4\pi r^2}{2} = 32\pi$ oe A1 for (r =) 4 M1 for $2\times\pi\times"4"\times10$ (=80π) **or** $\pi\times"4"^2$ (=16π) or ft their r M1 for 32π + "80π" + "16π" oe or 402.1 −402.3 or ft their r A1 cao
21		$3 - \sqrt{2} + 3\sqrt{2} - \sqrt{2}\sqrt{2}$	$1 + 2\sqrt{2}$	2	M1 for 4 terms correct ignoring signs or 3 out of no more than 4 terms correct A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
22	(a)		1	1	B1 cao
	(b)		$\frac{5y}{8x^3}$	2	M1 for correct square root or correct use of reciprocal eg $\frac{8x^3}{5y}$ **or** $\frac{25y^2}{64x^6}$ A1 for $\frac{5y}{8x^3}$ **or** $\frac{5}{8}yx^{-3}$ oe
	(c)		$\frac{x+27}{(x-3)(x+3)}$	3	M1 for denominator $(x-3)(x+3)$ **or** x^2-9 M1 for $\frac{5(x+3)}{(x-3)(x+3)}$ oe **or** $\frac{4(x-3)}{(x-3)(x+3)}$ oe (NB The denominator must be $(x-3)(x+3)$ or x^2-9 **or** another suitable common denominator) A1 for $\frac{x+27}{(x-3)(x+3)}$ **or** $\frac{x+27}{x^2-9}$

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23			$\frac{156}{336}$	4	**Method 1 (Combinations for odd T)** M1 for one probability for odd T, eg $P(2,3,4) = \frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}$ or $P(2,4,5) = \frac{1}{8} \times \frac{1}{7} \times \frac{4}{6}$ or $P(3,3,5) = \frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}$ or $P(3,5,5) = \frac{2}{8} \times \frac{4}{7} \times \frac{3}{6}$ or $P(5,5,5) = \frac{4}{8} \times \frac{3}{7} \times \frac{2}{6}$ M1 for adding at least two probabilities for odd T, eg $\frac{1}{8} \times \frac{2}{7} \times \frac{1}{6} + \frac{1}{8} \times \frac{1}{7} \times \frac{4}{6}$ or $3\left(\frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}\right)$ M1 for completely correct method, ie $6\left(\frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}\right) + 6\left(\frac{1}{8} \times \frac{1}{7} \times \frac{4}{6}\right) + 3\left(\frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}\right) + 3\left(\frac{2}{8} \times \frac{4}{7} \times \frac{3}{6}\right) + \left(\frac{4}{8} \times \frac{3}{7} \times \frac{2}{6}\right)$ oe A1 for $\frac{156}{336}$ oe, eg $\frac{13}{28}$ or 0.46(4…) **OR** **Method 2 (Combinations for even T)** M1 for one probability for even T, eg $P(3,4,5) = \frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}$ or $P(2,3,3) = \frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}$ or $P(2,5,5) = \frac{1}{8} \times \frac{4}{7} \times \frac{3}{6}$ or $P(2,3,5) = \frac{1}{8} \times \frac{2}{7} \times \frac{4}{6}$ or $P(4,5,5) = \frac{1}{8} \times \frac{4}{7} \times \frac{3}{6}$ or $P(3,3,4) = \frac{2}{8} \times \frac{1}{7} \times \frac{1}{6}$ M1 for adding at least two probabilities for even T, eg $\frac{2}{8} \times \frac{1}{7} \times \frac{4}{6} + \frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}$ or $3\left(\frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}\right)$ M1 for completely correct method, ie $1 - [6\left(\frac{2}{8} \times \frac{1}{7} \times \frac{4}{6}\right) + 3\left(\frac{1}{8} \times \frac{2}{7} \times \frac{1}{6}\right) + 3\left(\frac{1}{8} \times \frac{4}{7} \times \frac{3}{6}\right) + 6\left(\frac{1}{8} \times \frac{2}{7} \times \frac{4}{6}\right) + 3\left(\frac{1}{8} \times \frac{4}{7} \times \frac{3}{6}\right) + 3\left(\frac{2}{8} \times \frac{1}{7} \times \frac{1}{6}\right)$ oe A1 for $\frac{156}{336}$ oe, eg $\frac{13}{28}$ or 0.46(4…) **PTO**

					Method 3 (Combinations of odd and even numbers- odd totals) M1 for one probability for odd T, eg P(E,E,O) =. $\frac{2}{8}\times\frac{1}{7}\times\frac{6}{6}$ or P(O,O,O) = $\frac{6}{8}\times\frac{5}{7}\times\frac{4}{6}$ M1for adding at least two probabilities for odd *T,* eg 3 $\left(\frac{2}{8}\times\frac{1}{7}\times\frac{6}{6}\right)$ or $\left(\frac{2}{8}\times\frac{1}{7}\times\frac{6}{6}\right)+\left(\frac{6}{8}\times\frac{5}{7}\times\frac{4}{6}\right)$ M1 for completely correct method, ie 3 $\left(\frac{2}{8}\times\frac{1}{7}\times\frac{6}{6}\right)+\left(\frac{6}{8}\times\frac{5}{7}\times\frac{4}{6}\right)$ A1 for $\frac{156}{336}$ oe, eg $\frac{13}{28}$ or 0.46(4…) **OR** **Method 4 (combinations of odd and even numbers- even totals)** M1 for probability for even T, ie = $\frac{2}{8}\times\frac{6}{7}\times\frac{5}{6}$ M1 for adding at least two probabilities for even *T,* eg 3 $\left(\frac{2}{8}\times\frac{6}{7}\times\frac{5}{6}\right)$ M1 for completely correct method, ie $1-3\left(\frac{2}{8}\times\frac{6}{7}\times\frac{5}{6}\right)$ A1 for $\frac{156}{336}$ oe, eg $\frac{13}{28}$ or 0.46(4…) **SC (with replacement)** For example, M0 M1 for adding at least two probabilities for odd or even *T,* eg P(E,E,O) = $\frac{2}{8}\times\frac{2}{8}\times\frac{6}{8}$ or P(O,O,O) = $\frac{6}{8}\times\frac{6}{8}\times\frac{6}{8}$ M1 for completely correct method, eg 3 $\left(\frac{2}{8}\times\frac{2}{8}\times\frac{6}{8}\right)+\left(\frac{6}{8}\times\frac{6}{8}\times\frac{6}{8}\right)$ or $\frac{288}{512}$ oe, eg $\frac{9}{16}$ or 0.56(25) A0

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*24		$2y = 3x - 4$ $y = \frac{3}{2}x - 2$; $m = \frac{3}{2}$ $\frac{3--1}{1-4} = -\frac{4}{3}$ $\frac{3}{2} \times -\frac{4}{3} = -2$	No with reason	4	M1 for $\frac{3}{2}$ oe or $y = \frac{3}{2}x\left(-\frac{4}{2}\right)$ oe M1 for method to find gradient of AB, eg $\frac{3--1}{1-4}$ **or** $\frac{-1-3}{4-1}$ **or** $-\frac{4}{3}$ oe A1 for identifying gradients as $\frac{3}{2}$ oe **and** $-\frac{4}{3}$ oe C1 (dep on M1) for a conclusion with a correct reason, eg No as product of $\frac{3}{2}$ and $-\frac{4}{3}$ is not −1, ft from their two gradients
25	(i)		(3, −1)	3	B1 cao
	(ii)		(1.5, −4)		B1 for (1.5, −4) accept 1.5 or $1\frac{1}{2}$ or $\frac{3}{2}$ for x coordinate
	(iii)		(−3, −4)		B1 cao

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
3		Stem and leaf diagram – extra line put in at the bottom	
5		Larger gaps between numbers	
10		Line AB put horizontal Small vertical line at either end of line AB	
12	(c)	*x* changed to *y*	
15	(b)	Table changed 50, 250, 175, 100, 225 Box plots labeled – Box plot (a) and Box plot (b) and both extended to 400 with a 2 cm grid Lines moved to 25, 125, 200, 225, 250	
16		Table changed to 20, 70, 140, 170, 185, 195, 200 Grid 1½ cm for 10 on y axis (this one gives 10 people over 60): x axis is 3cm for 10 years. Age (years) 90 column removed	
18		Shading reversed – AEFG is shaded Question wording altered to reflect this	

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Mark Scheme (Results)

November 2014

Pearson Edexcel GCSE
In Mathematics A (1MA0)
Higher (Calculator) Paper 2H

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme
M1 – method mark for appropriate method in the context of the question A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		360	2	M1 30 ÷ 10 (= 3) or 120 ÷ 10 (=12) or 120 + 120 + 120 oe A1 cao
	(b)		25	2	M1 for $\frac{750}{300}$ (=2.5) oe A1 cao
2	(a)		Relationship	1	B1 for description of relationship eg "As the length of the pine cone increases the width increases" oe (accept positive correlation)
	(b)		6.1 to 6.4	2	M1 for a single straight line segment with positive gradient that could be used as a line of best fit or a vertical line from 8.4 or a point at (8.4, y) where y is from 6.1 to 6.4 A1 for given answer in the range 6.1 to 6.4
3	(a)		–1	2	M1 for $3 \times -5 + 7 \times 2$ A1 cao
	(b)		$3(x + 2)$	1	B1 cao
	(c)		$7y - 16$	2	M1 for intention to expand a bracket eg $5y - 10$ or $2y - 6$ A1 cao
	(d)		m^8	1	B1 cao
	(e)		p^4	1	B1 cao

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		Correct shape	2	B2 cao (B1 for shape in the correct orientation below the line $y = x$ or for 2 vertices correct) with vertices at (2, 1), (4, 1), (4, 0), (3, 0)
	(b)		Translation by $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$	2	B1 for translation B1 for $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$ NB: B0 if more than one transformation given
5	(a)		0.2	2	M1 for 1 – 0.16 – 0.4 – 0.24 oe A1 cao
	(b)		20	2	M1 for 0.16 × 125 oe A1 cao
6			2.10 euros or £1.81	3	M1 for 2.5 × 1.16 (= 2.9) M1 (dep) for 5 – "2.9" (=2.1) A1 for 2.1(0) euros OR M1 for 5 ÷ 1.16 (= 4.31...) M1 (dep) for "4.31" – 2.50 (=1.81) A1 for £1.81
7	(a)		$4n - 2$	2	B2 for $4n - 2$ oe (B1 for $4n + k$, $k \neq -2$ or k is absent, or $n = 4n - 2$)
	*(b)		Yes + reason	1	C1 ft from (a) for decision and explanation, e.g. equating 86 with nth term **and** "Yes, its the 22nd term" or continuing the sequence up to 86 **and** "Yes, 86 is in the sequence" oe

PAPER: 1MA0_2H					
Question		Working	Answer	Mark	Notes
8			Polygon drawn	2	B2 for fully correct frequency polygon - points plotted at the midpoint (B1 for all points plotted accurately but not joined with straight line segments) **or** all points plotted accurately and joined with last joined to first to make a polygon **or** all points at the correct heights and consistently within or at the ends of the intervals and joined (can include joining last to first to make a polygon) NB: ignore parts of graph drawn to the left of the 1st point or the right of the last point; ignore any histograms drawn.

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*9			Decision (No the attendance target was not met)	3	M1 for attempting to find total number of students or 1210 seen M1 for $\frac{'1092'}{'1210'} \times 100$ oe or $\frac{'118'}{'1210'} \times 100$ oe C1 for correct decision with 90.(2479...) or correct decision with 6 and 9.(752...) **OR** M1 for attempting to find total number of students or 1210 seen M1 for $\frac{94}{100} \times$ '1210' oe C1 for correct decision with 1137 (.4) and 1092 or correct decision with 72(.6) and 118 **OR** M1 for a correct % method for one year, e.g. $\frac{192}{208} \times 100$ or $\frac{94}{100} \times 208$ M1 for a correct % method for each year C1 for correct decision with 92.(30...), 90.(87...), 89.(31...), 89.(27...), 89.(91...) or 195(.5..), 226.(9…), 246.(2..), 245.(3…), 223.(7…)

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
10		5 115 6 204 5.1 122.(451) 5.2 130.(208) 5.3 138.(277) 5.4 146.(664) 5.5 155.(375) 5.6 164.(416) 5.7 173.(793) 5.8 183.(512) 5.9 193.(579) 5.11 123.2(12..) 5.12 123.9(77..) 5.13 124.7(45..) 5.14 125.5(16..) 5.15 126.2(90..)	5.1	4	B2 for a trial $5.1 \leq x \leq 5.2$ evaluated (B1 for a trial $5 \leq x \leq 6$ evaluated) B1 for a different trial $5.1 < x \leq 5.15$ evaluated B1 (dep on at least one previous B1) for 5.1 Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1 dp but correct to 1dp (rounded or truncated) if the value of x is to 2 dp. (Accept 124 for $x = 5.12$) NB : no working scores no marks even if the answer is correct.
*11			No + reason	4	M1 for intention to find the circumference eg $140 \times \pi$ (= 439.82...) A1 for circumference = 439 - 440 M1 (dep on M1) for a complete method shown that could arrive at two figures that are comparable eg "C"÷60×12 (=87.96..) , 90÷12×60 (=450) , 90×60÷"C" (=12.27), "C"÷90×12 (=58.64..) C1 (dep on both M marks) for No and explanation that shows a correct comparison eg only 84 people could sit around the tables or that 13 tables are needed or that 480 cm is needed.

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12		<table><tr><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>-7</td><td>-5</td><td>-3</td><td>-1</td><td>1</td><td>3</td></tr></table>	Straight line from (–2, –7) to (3, 3)	4	**(Table of values)** C1 for axes scaled and labelled M1 for at least 2 correct attempts to find points by substituting values of x M1 ft for plotting at least 2 of their points (any points plotted from their table must be plotted correctly) A1 for correct line between $x = -2$ and $x = 3$ **(No table of values)** C1 for axes scaled and labelled M1 for at least 2 correct points with no more than 2 incorrect points M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 2x - 3$ drawn A1 for correct line between $x = -2$ and $x = 3$ **(Use of $y = mx+c$)** C1 for axes scaled and labelled M1 for line drawn with gradient of 2 OR line drawn with a y intercept of –3 M1 for line drawn with gradient of 2 AND with a y intercept of –3 A1 for correct line between $x = -2$ and $x = 3$ SC : B2 for the correct line from $x = 0$ to $x = 3$

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
13	(a)		65	5	M1 for splitting up the cross section into separate areas and a method to find the area of one part OR for splitting up the pool into smaller prisms and a method to find the volume of one small prism, e.g. a cuboid M1 (dep) for a complete method to find the area of the cross section [with correct dimensions] OR for a method to find the total volume of more than one correct prism M1 (dep) for a complete method to find the volume of the pool [with correct dimensions] (= 195) M1 for "195" × 1000 ÷ 50 (=3900) oe where "195" comes from a volume A1 cao
	(b)		C	1	B1 cao
*14		$1.025^2 = 1.050625$ 1.04×1.015 $= 1.0556$	Bonus Saver with correct comparable values	4	M1 for a method to calculate 4% or 2.5% of 20000 (= 800 or 20800 or 500 or 20500) M1 for a method to calculate using a compound interest method, eg 1.025^2 oe or 1.04 followed by 1.015 oe A1 for 1.050625 or 1.0556 or 10556 or 556 or 21112 or 21012.5 or 1112 or 1012.5 C1 for a correct decision in a statement with two correct comparable values. **NB** all final money values can be rounded or truncated to nearest integer or left unrounded.

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PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15		$3x + y = 30$ $x + 3y = 22$	8.50 4.50	4	M1 for forming two algebraic equations M1 for a correct process to eliminate one variable (condone one arithmetic error) M1 (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error) A1 for 8.5(0) and 4.5(0)
16		$AC^2 = 5^2 + 3^2$ $AC = \sqrt{25+9}$ (=5.83) $\frac{5}{5.83} = \frac{DB}{3}$ $DB = \frac{5}{5.83} \times 3$ (= 2.57) 5 + 3 + 5.83 + 2.57 = **OR** $AC = \sqrt{25+9}$ (=5.83) $\tan A = \frac{3}{5}$ $A = 30.96$ $\sin 30.96 = \frac{DB}{5}$ $DB = 5 \times \sin 30.96$ (= 2.57) 5 + 3 + 5.83 + 2.57 =	16.4	5	M1 for $(AC^2) = 5^2 + 3^2$ (=34) M1 for $\sqrt{25+9}$ or $\sqrt{34}$ (=5.83) M1 for $\frac{5}{'5.83'} = \frac{DB}{3}$ or $DB \times AC = 5 \times 3$ M1 for $(DB =) \frac{5}{'5.83'} \times 3$ A1 for 16.4 to 16.41 **OR** M1 for $(AC^2) = 5^2 + 3^2$ (=34) M1 for $\sqrt{25+9}$ or $\sqrt{34}$ (=5.83) M1 for using a correct trig ratio in an attempt to find angle A or angle C, e.g. $\tan A = \frac{3}{5}$, $\sin A = \frac{3}{'5.83'}$, $\cos C = \frac{3}{'5.83'}$ M1 for using DB in a a correct trig ratio, e.g. sin'30.96' = $\frac{DB}{5}$ A1 for 16.4 to 16.41

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PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17			35°	4	M1 for $ABC = 90$ M1 for ($ACB =$) $180 - 90 - 25$ (= 65) M1 for ($DBC =$) 180 – '65' – 80 (=35) A1 cao supported by working OR M1 for ($AOB =$) $180 - 2 \times 25$ (= 130) M1 for ($ADB =$) $130 \div 2$ (=65) M1 for ($DAC =$) 180 – 65 – 80 A1 cao supported by working.
18	(a)	$5 \times 8 = 40$ $12.5 \times 15 = 187.5$ $17.5 \times 11 = 192.5$ $25 \times 10 = 250$ $40 \times 6 = 240$ $910 \div 50 = 18.2$	18.2	4	M1 for fx consistently within interval including ends (allow 1 error) M1 consistently using appropriate midpoints M1 (dep on first M1) for $\Sigma fx \div \Sigma f$ A1 for 18.2 cao
	(b)	$0 \leq t < 10$ fd 0.8 $10 \leq t < 15$ fd 3 $15 \leq t < 20$ fd 2.2 $20 \leq t < 30$ fd 1 $30 \leq t < 50$ fd 0.3	Correct histogram	3	B3 fully correct histogram with vertical axis correctly scaled. (B2 for 4 correct blocks or 5 correct blocks with incorrect or no scale) (B1 for 2 correct blocks of different widths or any 3 correct blocks or correct FD values for at least 3 frequencies) eg fd of 0.8, 3, 2.2, 1, 0.3
19	(a)		0.3 0.3, 0.7, 0.3	2	B1 for 0.3 as first spin oe B1 for 0.3, 0.7, 0.3 in correct positions for second spin oe
	(b)		0.42	3	M1 for '0.3' × '0.7' or 0.7 × '0.3' (=0.21) M1 for '0.3' × '0.7 + 0.7 × '0.3 (OR M2 for $1 - 0.7^2 - 0.3^2$) A1 for 0.42 oe

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20			1.85 and – 0.180	3	M1 for $\frac{--5\pm\sqrt{-5^2-4\times3\times-1}}{2\times3}$ (condone one sign error) M1 for $\frac{5\pm\sqrt{37}}{6}$ (=1.8 to1.85 or −0.18 to −0.181) A1 for answers in the ranges 1.8 to1.85, and −0.18 to −0.181
21			8.52	5	M1 for $\frac{BD}{\sin45}=\frac{7.4}{\sin80}$ oe M1 for $(BD=)\frac{7.4}{\sin80}\times\sin45$ (= 5.3133..) M1 for 5.8^2 + '5.31'^{2} – 2 × 5.8 × '5.31' cos100 M1 (dep) for correct order of evaluation or 72.5(73...) A1 for 8.51 – 8.52 OR M1 for $\frac{AD}{\sin(180-80-45)}=\frac{7.4}{\sin80}$ oe M1 for $(AD=)\frac{7.4}{\sin80}\times\sin(180-80-45)$ (= 6.15...) M1 for 7.4^2+ ('6.15' + 5.8)^2 – 2 × 7.4 × ('6.15' + 5.8) × cos45 M1 (dep) for correct order of evaluation or 72.5(7398...) A1 for 8.51 – 8.52

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
22	(a)	$\frac{(2x-3)(x-1)}{(x+6)(x-1)}$	$\frac{2x-3}{x+6}$	3	M1 for $(2x-3)(x-1)$ M1 for $(x+6)(x-1)$ A1 cao
	(b)	$\frac{mb-tv}{vb}=\frac{m-t}{R}$ $mbR-tvR=mvb-tvb$ $mbR-mvb=tvR-tvb$ $m(bR-vb)=tvR-tvb$ OR $\frac{m}{v}-\frac{t}{b}=\frac{m}{R}-\frac{t}{R}$ $\frac{m}{v}-\frac{m}{R}=\frac{t}{b}-\frac{t}{R}$ $\frac{mR-mv}{vR}=\frac{tR-tb}{bR}$ $\frac{m(R-v)}{vR}=\frac{tR-tb}{bR}$	$m=\frac{tv(R-b)}{b(R-v)}$	4	M1 for putting LHS over a common denominator with at least one correct numerator (ignore signs) or for showing an intention to multiply each term on both sides by R or v or b M1 for rearranging correctly to isolate terms in m M1 for factorising with common factor m from 2 terms A1 for $m=\frac{tv(R-b)}{b(R-v)}$ oe
*23			Yes, average speed could have been as high as 80.622...	5	B1 for 4535 or 4534.999... or 202.5 M1 for 4535 (oe) ÷ 202.5 M1 for ×3600 and ÷1000 A1 for 80.622... C1 (dep on first M1) for correct conclusion from their calculations

Modifications to the mark scheme for Modified Large Print (MLP) papers.

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PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
2	(b)	2 cm grid 8.4 changed to 8.5	
3	(b)	MLP – *x* changed to *y*	
4	(a) (b)	2 cm grid 2 cm grid	
8		Table frequencies changed: 2 5 10 25 15 5 Grid – X axis 3 cm for 5 with an intermediate line Y axis 1.5 cm for 5	
11		No model – table top only drawn showing the diameter	
12		2 cm grid Braille axes put on grid and labelled	

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Mark Scheme (Results)

November 2014

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Calculator) Unit 3

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The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

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If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
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If there is no answer on the answer line then check the working for an obvious answer.
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Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

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It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

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Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
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Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

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Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme
M1 – method mark for appropriate method in the context of the question A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		0.8	1	B1 for 0.8 or $\frac{4}{5}$
	(b)		17.90 – 17.91	2	B2 for 17.90 – 17.91 (B1 for 0.53...)
*2			Medium	4	M1 for 52 ÷ 23 (= 2.26…) **or** 170 ÷ 72 (= 2.36...) **or** 960 ÷ 416 (= 2.30…) **or** 23 ÷ 52 (= 0.44...) **or** 72 ÷ 170 (= 0.42...) **or** 416 ÷ 960 (= 0.43...) M1 for 52 ÷ 23 (=2.26…) **and** 170 ÷ 72 (= 2.36...) **and** 960 ÷ 416 (= 2.3…) OR 23 ÷ 52 (= 0.44...) **and** 72 ÷ 170 (=0.42...) **and** 416 ÷ 960 (= 0.43...) A1 for 2.26… **and** 2.36…**and** 2.3… OR 0.44... **and** 0.42... **and** 0.43... C1 (dep on M1) for conclusion ft from three comparable figures [could use different figures relating to the three boxes]
3			21	2	M1 for 120 ÷ 30 (= 4) or 30 ÷ 120 (= 0.25) or w/30 = 84/120 oe A1 cao
4			Shows sales target	3	M1 for 2150 – 1500 (= 650) M1 for "650"/1500 × 100 (= 43.3…) A1 for 43.3(3…)% OR M1 for 0.4 × 1500 (=600) oe M1 for 1500 + "600" (=2100) A1 for 2100 OR M1 for 2150 ÷ 1500 (= 1.433...) M1 for ("1.433..." – 1) × 100 A1 for 43.3(3…)%

PAPER: 5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5			Region shaded	3	B1 for circle centre f radius 3.5cm B1 for circle centre b radius 6cm B1 for correct region shaded
6			261 cm^3	4	M1 for complete method to find the area of cross section or to find the volume of a cuboid of depth 9 M1 for complete method to find the volume of the prism eg $(5 \times 7 - 2 \times 3) \times 9$ or $(35 - 6) \times 9$ A1 for 261 B1 (indep) for cm^3
7	(a)		reflection	2	B2 cao (B1 for reflection in vertical line)
	(b)		enlargement sf 2 centre (−6,2)	3	B1 for enlargement B1 for (scale) factor 2 or ×2 B1 for (−6, 2) (NB B0 if not single transformation)
*8		1.2 × (550 ÷ 50) × £4.15 = £54.78 4 × £2.95 × 4 + 2 × £2.95 =£53.10	Hammer company	5	M1 for 20% of a cost in Nail Company, eg 4.15 × 0.2 (= 0.83) oe M1(dep) for adding their 20% to their cost, eg 4.15 × 1.2 (= 4.98) oe M1 for using special offer in Hammer Company M1 for 4 × 125 and 2 × 25 in Hammer Company C1 for Hammer Company and figures 54.78 [Nail Company] and 53.1(0) [Hammer Company]

PAPER: 5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		2 62 2.1 65(.961) 2.2 70(.048) 2.3 74(.267) 2.4 78(.624) 2.5 83(.125) 2.6 87(.776) 2.7 92(.583) 2.8 97(.552) 2.9 102.689 3 108 2.61 88.2(49...) 2.62 88.7(24...) 2.63 89.2(01...) 2.64 89.6(79...) 2.65 90.1(59...) 2.66 90.6(41...) 2.67 91.1(24...) 2.68 91.6(08...) 2.69 92.0(95...)	2.6	4	B2 for a correct trial $2.6 \leq x \leq 2.7$ evaluated (B1 for a correct trial $2 \leq x \leq 3$ evaluated) B1 for a different correct trial $2.6 < x < 2.7$ evaluated B1 (dep on at least one previous B1) for 2.6 Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1 dp but correct to 1 dp (rounded or truncated) if the value of x is to 2 dp NB: no working scores no marks even if answer is correct
10			43	3	M1 for $\pi \times 40$ or $2 \times \pi \times 20$ M1 for $34 \times 2 \times \pi \times 20$ A1 for 42.7 – 43
11			9.54	4	M1 for $10^2 - 5^2$ (= 75) or (BD =) $10 \times \cos 30$ (= 8.66...) M1 for "75" + 4^2 (= 91) or "8.66..."^{2} + 4^2 (= 91) M1 for $\sqrt{(10^2 - 5^2 + 4^2)}$ or $\sqrt{(\text{"8.66..."}^2 + 4^2)}$ A1 for 9.53 − 9.54

PAPER: 5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		$-2, -1, 0, 1, 2$	2	B2 for $-2, -1, 0, 1, 2$ (B1 for one error or omission)
	(b)		$x > 3$	2	M1 for isolating either the constant terms or algebraic terms or for $x = 3$ A1 cao
13			5	2	M1 for 1.15^n for integer $n > 1$ or 2.01...seen (may be as part of a calculation using a starting value, eg '1000'×1.15×1.15×1.15×1.15×1.15 or 2011.3...) A1 for 4.95 – 5
14	(a)		± 7	2	M1 for $147 \div 3$ (= 49) or 7 A1 cao
	(b)		18.2	3	M1 for correct method to deal with denominators (condone one error in arithmetic) M1 (dep) for correct method to write in the form $ay = b$ A1 for 18.2 or $18\frac{1}{5}$
15	(a)		4.5×10^5	1	B1 cao
	(b)		0.00032	1	B1 cao
	(c)		4000	1	B1 for 4000 oe

PAPER: 5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16			$q=\frac{3r+4}{2}$	3	M1 for multiplying both sides by 3 M1 (dep) for isolating the term in q A1 for $q=\frac{3r+4}{2}$ oe OR M1 for $(r=)\ \frac{2q}{3}-\frac{4}{3}$ oe M1 (dep) for isolating the term in q A1 for $q=\frac{3}{2}\left(r+\frac{4}{3}\right)$ oe
17			curve	3	M1 for calculating at least 3 values of $y=\frac{1}{x}$ in the interval M1 for plotting at least 4 correct points (condone one error) A1 cao
18			−2.87, 0.87	3	M1 for substitution into formula; allow sign errors in b and c M1 for reduction to $\frac{-4-\sqrt{56}}{4}$ or $\frac{-4+\sqrt{56}}{4}$ A1 for 0.87 to 0.88 and −2.87 to −2.88 OR M1 for $(x+1)^2$ M1 for reduction to $\sqrt{\frac{7}{2}}-1$ or $-\sqrt{\frac{7}{2}}-1$ A1 for 0.87 to 0.88 and −2.87 to −2.88

PAPER: 5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*19		eg $2a + 3c = 28.2$ $3a + 5c = 44.75$ $6a + 9c = 84.6$ $6a + 10c = 89.5$ $c = 4.9$ $2a + 14.7 = 28.2$ $2a = 13.5$ $a = 6.75$	Adult ticket £6.75 Child ticket £4.90	5	M1 for correctly stating both equations algebraically M1 for correct process to eliminate one variable (condone one arithmetic error) M1 (dep) for correct substitution of their found value to find other variable OR (indep) correct process to eliminate second variable (condone one error in arithmetic) A1 for 6.75 or 4.9 C1 for Adult ticket £6.75 and Child ticket £4.90 in correct money notation
20			82.5	4	B1 for 70.5 M1 for $\sqrt[3]{(3 \times \text{“}70.5\text{”} \div 4 \div \pi)}$ (= 2.56…) M1 for $4 \times \pi \times \text{“}2.56\ldots\text{”}^2$ A1 for 82.5 – 82.6
21	(a)		$\frac{3}{2}\mathbf{a}$	3	M1 for (eg $\overrightarrow{EO}$ or $\overrightarrow{CB}$ =) $\mathbf{a} - \mathbf{b}$ M1 for correct vector expression for $\overrightarrow{MN}$, eg $\overrightarrow{MO} + \mathbf{a} + \frac{1}{2}\mathbf{b}$ or $\overrightarrow{ME} + 2\mathbf{a} - \frac{1}{2}\mathbf{b}$ A1 for $\frac{3}{2}\mathbf{a}$ oe
	(b)		*MN* is parallel to *OA* and $\frac{3}{2}\times$ length of *OA*	2	B1 for *MN* is parallel to *OA* B1 for $MN = \frac{3}{2} \times$ length *OA* oe or ft part (a)
22	(a)		(0,–1)	1	B1 cao
	(b)		Straight line drawn	2	M1 for a horizontal translation of 1 unit. A1 for straight line drawn parallel to $y = f(x)$ through *O* from (–1.5, 3) to (1.5, –3)

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PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
2		No diagrams	
3		Wording changed to: Work out the length of the side labelled w cm on the first diagram.	
5		Garden enlarged – fountain to bench is 9.5 cm North lines put in from fountain and bench. Line joins fountain to bench. Change 7 metres to 11 metres. Change 12 metres to 14 metres.	

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
6		Model – MLP 2 diagrams as well.	
	(i)	Full diagram given without 3 cm and 2 cm measurements put on.	
	(ii)	End face only with all measurements. Wording inserted 'The length of the prism is 9 cm'	
7	(a)	2 cm grid. Shape A coordinates (1, 1) (3, 1) (4, 3) (2, 3)	
10		Ground labelled at each end.	
16		*q* changed to *y*	
		r changed to e	
17		*y* axis 2 cm for 0.1 *x* axis 2 cm for 1 Right axis labelled – leeway will be needed in plotting of some points.	
22		2 cm grid	

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Mark Scheme (Results)

Summer 2015

Pearson Edexcel GCSE
In Mathematics A (1MA0)
Higher (Non-Calculator) Paper 1H

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14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme
M1 – method mark for appropriate method in the context of the question A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PMT

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		15 | 6 9 16 | 4 5 7 7 8 9 17 | 2 3 6 6 8 9 18 | 0 2 3 8 19 | 0 2 with key	3	B2 for a correct ordered stem and leaf diagram (B1 for fully correct unordered or ordered with one error or omission) B1 (indep) for key (units not required)
	(b)		15	2	M1 for a method to find "3" as a percentage of the total number of men, eg $\frac{"3"}{"20"}\times 100$ oe $\frac{"3"\times 5}{100}$ or ft from their diagram A1 for 15 cao
2	(a)		36	1	B1 cao
	(b)		2.5 oe	2	M1 for collecting the terms in x or the number terms in an equation, eg. $5x - x + 4 = 14$ or $5x = 14 - 4 + x$ A1 for 2.5 oe (accept $\frac{10}{4}$)
3			Question	2	B1 for a question with a time frame for frequency of use B1 for at least 3 correctly labelled response boxes (non-overlapping and exhaustive) [Do not allow inequalities in response boxes]

PMT

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*4		1195 4780 + 5975 2 3 9 0 4 / 0 6 / 1 8 2 5 1 0 / 1 5 / 4 5 5 9 7 5 | | 200 | 30 | 9 | | 20 | 4000 | 600 | 180 | | 5 | 1000 | 150 | 45 | 4000 + 1000 + 600 + 150 + 180 + 45 = 5975	Kirsty's Plants with correct calculations	5	M1 for complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation or digits 5975 M1 for a complete method to find 120% of £52.50 A1 for 59.75 and 63(.00) C1 (dep on M2) for correct conclusion for their figures **OR** M1 for the start of a method to divide £52.50 by 25, eg. 2 rem 2 M1 for a complete method to divide £52.50 by 25, condone one arithmetic error, or digits 21 M1 for a complete method to find 120% of '£2.10' A1 for 2.52 C1 (dep on M2) for correct conclusion for their figures **OR** M1 for a complete method to find 120% of £52.50 M1 for the start of a method to divide '63' by 25, eg. 2 rem 13 M1 for a complete method to divide '63' by 25, condone one arithmetic error, or digits 252 A1 for 2.52 C1 (dep on M2) for correct conclusion for their figures

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5			12	3	M1 for a method to find volume of a cuboid, eg. 2 × 10 × 15 (= 300) or 5 × 5 × x (= 25x) M1 (dep) for "300" ÷ "25" oe A1 cao OR M1 for 10 ÷5 (= 2) and 15 ÷ 5 (= 3) or 10 ÷5 (= 2) and 2 ÷ 5 (= 0.4) M1 (dep) for 2 × "2" × "3" or 15 × "2" × "0.4" A1 cao
6	(a)		Relationship	1	B1 for a description of a dynamic relationship eg "The older the car the lower the price" or "The newer the car the greater the price" oe (accept negative correlation)
	(b)		6400 to 7000	2	M1 for a single straight line segment with negative gradient that could be used as a line of best fit or vert. line from 3.5 or a point plotted at (3.5, y), where y is in the range 6400 to 7000 A1 for 6400 - 7000
7	(a)		Triangle with vertices at (–3, 3), (–3, 4) and (–1, 4)	2	B2 for a triangle with vertices at (–3, 3), (–3, 4), (–1, 4) (B1 for triangle in correct orientation and size or rotated 90° clockwise about centre O or three correct vertices without joining)
	(b)		Reflection in line $y = x$	2	B1 for reflection B1 for (in the line) $y = x$ Note: award no marks if more than one transformation is given

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(a)		$2g - 3h$	2	M1 for $2g$ or $-3h$ A1 for $2g - 3h$ or $-3h + 2g$
	(b)		$y(y - 2)$	1	B1
	(c)		p^5	2	M1 for $\frac{p^{3+4}}{p^2}\left(=\frac{p^7}{p^2}\right)$ or $p^{3-2} \times p^4$ $(= p^1 \times p^4)$ or $p^3 \times p^{4-2}$ $(= p^3 \times p^2)$ A1 cao
9		40, 80, 120 15, 30, 45, 60, 75, 90, 105, 120 40 = 2 × 2 × 2 × 5 15 = 3 × 5	3 and 8 or any multiple of 3, 8	3	M1 for multiples of both 40 and 15 (at least 2 of each shown but condone errors if intention is clear) or for 40 × 15 M1 (dep on M1) for a complete method to find a common multiple of 40 and 15, eg. 120, 240, 600 condoning one arithmetic error in any lists of multiples shown A1 for 3, 8 or any multiple of 3, 8 OR M1 for factors 2,2,2,5 and factors 3,5 M1 (dep on M1) for a complete method to find a common multiple of 40 and 15 A1 for 3, 8 or any multiple of 3, 8

PMT

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*10			Has enough (with evidence)	5	M1 for splitting the shape (or showing recognition of the "absent" triangles) and using a method to find the area of one shape M1 for a complete method to find the total area, (= 9 m^2) M1 (dep on M1) for a method to find the number of packs required from their total area, eg. "9" ÷ 2 = 4.5 rounded up to 5 M1 for a method to find 75% of 24.80 or 75% of the cost of their total number of packs, eg. 24.80 × "5" × $\frac{75}{100}$ (= 93) or 24.80 × $\frac{75}{100}$ (= 18.6) C1 for a conclusion supported by fully correct answers, eg. showing 9 (m^2), 5 (packs) and 93 or 7 (from 100 – 93) OR M1 for method to find 75% of £24.80, eg. 24.80 × $\frac{75}{100}$ (= 18.6) M1 for method to find total number of packs Mary can buy, eg. 100 ÷ "18.60" = 5.3.... truncated to 5 or 10 (m^2) M1 for finding area of one relevant shape or showing how one pack (2 m^2) can fit in the diagram M1 (dep on previous M1) for complete method to show that 5 packs can cover the floor C1 for a conclusion supported by fully correct answers, showing the capacity (10) greater than total area (9)

PMT

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		$\frac{2}{10}$	2	M1 for $\frac{2}{a}$ with a > 2 or $\frac{b}{10}$ with $b < 10$ A1 for $\frac{2}{10}$ oe
	(b)		£10 or 1000p	3	M1 for "$\frac{2}{10}$" × 100 (= 20) or 30(p) × 100 (= 3000p or £30) M1 (dep) for "30(p) × 100" – (£)1 × "20" oe A1 ft from (a), provided the answer is not negative. Units must be shown
*12			40° with reasons	4	M1 for finding one related angle using parallel lines A1 for $x = 40(^o)$ C2 for full reasons linked to appropriate method eg. alternate angles are equal **and** angles in a triangle add up to 180° eg. angles on a straight line add up to 180° **and** corresponding angles are equal **and** alternate angles are equal eg. co-interior (allied) angles add up to 180° **and** exterior angle of a triangle is equal to sum of interior opposite angles Other solutions may include reasons such as: vertically opposite angles are equal the sum of angles at a point is equal to 360° (C1 (dep on M1) for one appropriate reason linked to parallel lines)
13			48	5	M1 for 8 – 2 (= 6) M1 (indep) for $x^2 + 8^2$ (provided $x \leq 8$) M1 (dep on previous M1) fo $\sqrt{"x"^2 + 8^2}$ or $\sqrt{"100"}$ M1 (dep on M2) for 4 × 2 + 4 × "10" A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14			54	3	M1 for any correct use of distance, speed, time formulae, eg.10 ÷ 40 (=0.25) or 15 min M1 (dep) for a complete method to find speed from G to H, eg.18 ÷ (35 – "15") × 60 oe. A1 cao
15	(a)		(3, 6.5)	2	M1 for a method to find either the *x* coordinate or the *y* coordinate of the midpoint or $x = 3$ or $y = 6.5$ oe A1 cao [SC: B1 for (6.5, 3)]
	*(b)		No and correct working	3	M1 for a method to work out a gradient between any relevant pair of points (ie 2 of points A, B, C or D), eg. $\frac{9-4}{8--2}\left(=\frac{5}{10}\right)$ M1(dep) for a method to work out the gradient between another pair of points which can be used for comparison; one gradient must be through D. C1 for "no" and a correct explanation based on two correct gradients OR M1 for a method to work out a gradient between any relevant pair of points (ie 2 of points A, B, C or D), eg. $\frac{9-4}{8--2}\left(=\frac{5}{10}\right)$ M1 (dep) for using their gradient to work out an equation of a straight line in the form $y = mx + c$ and substituting in an appropriate point C1 for "no" and a correct explanation based on correct working OR M2 for (100, 55) or (102, 56) C1 for "no" and a correct explanation based on correct coordinates.

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)		4, 20, 56, 80, 94, 100	1	B1 cao
	(b)		graph	2	M1 ft from their table for at least 5 points plotted correctly at the ends of the intervals provided table values are cumulative, condoning one arithmetic error, or if the shape of the graph is correct for 5 or 6 points plotted not at the ends but consistently within each interval and joined A1 cao for correct graph with points joined by curve or straight line segments
	(c)		47 to 49	1	B1 for 47 to 49 or ft their cf graph at cf = 50
	(d)		13 to 16	2	M1 for reading a value from their cf graph at time = 63 (84 to 87) A1 for answer in the range 13 to 16 or ft from their graph
17			18	4	M1 for a method to find the exterior angle of a pentagon eg. $360 \div 5$ (=72) or the interior angle of a pentagon, eg. $180 - 360 \div 5$ (= 108) A1 for 72 or 108 M1 (dep M1) for a fully complete method to find the required angle, *DCF* A1 for 18 or ft their interior or exterior angle

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18			Region identified	4	M1 for the graph of $x + y = 7$ or $y = 2x$ drawn M1 for the graphs of $x + y = 7$, $y = 2x$ and $y = 3$ drawn M1 for any correct shading (in or out), satisfying at least two correct inequalities where the shading must extend from the appropriate lines. A1 for correct region identified by either shading in, or shading out; the letter R is not required. Accept without shading only with the correct region indicated by R. NB accept lines that are solid or dotted/dashed etc or lines defined by unambiguous shading
19	(a)		Proof	3	M1 for $\frac{6}{n}$ or $\frac{5}{n-1}$ M1 for $\frac{6}{n} \times \frac{5}{n-1} \left(= \frac{1}{3}\right)$ A1 for fully correct algebra leading to $n^2 - n - 90 = 0$
	(b)		10	3	M1 for correct start to a solution, eg. $(n \pm 10)(n \pm 9)$ or substitution into the quadratic formula, condoning one sign error or $(n - 0.5)^2 - 0.25 - 90$ A1 for $(n - 10)(n + 9)$ or for 10 and –9 or $\frac{1 \mp 19}{2}$ oe A1 for 10 only
20			$a = \frac{4p - 5}{3 + p}$ or	4	M1 for multiplying both sides by $4 - a$ as the first step M1 (dep) for isolating their two terms in a M1 (dep) for factorising their two term expression in a A1 for $a = \frac{4p - 5}{3 + p}$ or $a = \frac{5 - 4p}{-p - 3}$

PMT

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
21			Proof	3	M1 for (x =) 0.04545(...) or $1000x$ = 45.4545(...), accept $1000x = 45.\dot{4}\dot{5}$ or $100x$ = 4.54545(...), accept $100x = 4.\dot{5}\dot{4}$ or $10x$ = 0.4545(...) ,accept $10x = 0.\dot{4}\dot{5}$ M1 for finding the difference between two correct, relevant recurring decimals for which the answer is a terminating decimal A1 (dep on M2) for completing the proof by subtracting and cancelling to give a correct fraction eg $\frac{45}{990} = \frac{1}{22}$ or $\frac{4.5}{99} = \frac{1}{22}$
22	(a)		$\frac{1}{8}$	1	B1 for $\frac{1}{8}$ oe
	(b)		1.5	1	B1 for 1.5 oe
	(c)		3	2	M1 for √12×√12 – √12×√3 – √3×√12 + √3×√3 or √144 – √36 – √36 + √9 oe. with no more than one sign error A1 cao OR M1 for writing (√12 – √3) as (2√3 – √3) (= √3) A1cao

PMT

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23			$\frac{14}{3}$	5	M1 for correct substitution into a volume formula for a cylinder or a cone, eg. $\frac{1}{3}\times\pi\times3^2\times4$ (= 12π) or $\pi\times3^2\times(6-4)$ (= 18π) or $\pi\times3^2\times h$ (= $9\pi h$) or $\pi\times3^2\times(h-2)$ M1 for method to find volume after 5 hours, eg. "12π" + "18π" (= 30π) M1 (dep on M1) for use of a correct ratio, eg. "30π" $\times\frac{9}{5}$ (= 54π) or "30π" $\times\frac{4}{5}$ (= 24π) M1 for deriving an equation in h, eg. "54π" = "$9\pi h$" + "12π" A1 for $\frac{14}{3}$ or equivalent fraction
24	(a) (i)		(0, 5)	3	B1 cao
	(ii)		(3, 10)		B1 cao
	(iii)		(1, 5)		B1 cao
	(b)		Translation of $\begin{pmatrix}0\\-4\end{pmatrix}$ oe	1	B1 for a correct transformation, eg. translation of $\begin{pmatrix}0\\-4\end{pmatrix}$ or translation of 4 units in the negative y-direction, oe.

PMT

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q1	(a)	An extra horizontal line has been added at the bottom of the diagram.	B2 for a correct ordered stem and leaf diagram (B1 for fully correct unordered or ordered with one error or omission) B1 (indep) for key (units not required)
Q1	(b)	An extra horizontal line has been added at the bottom of the diagram.	M1 for a method to find "3" as a percentage of the total number of men, eg $\frac{"3"}{"20"}\times 100$ oe $\frac{"3"\times 5}{100}$ or ft from their diagram A1 for 15 cao
Q2	(b)	MLP only: *x* changed to *y*	M1 for collecting the terms in *y* or the number terms in an equation, eg. $5y - y + 4 = 14$ or $5y = 14 - 4 + y$ A1 for 2.5 oe (accept $\frac{10}{4}$)

PMT

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q5		2 models provided for all candidates. MLP also have diagrams. In text, wording is added to give the dimensions of the first cheese.	M1 for a method to find volume of a cuboid, eg. 2 × 10 × 15 (= 300) or 5 × 5 × x (= 25x) M1 (dep) for "300" ÷ "25" oe A1 cao OR M1 for 10 ÷5 (= 2) and 15 ÷ 5 (= 3) or 10 ÷5 (= 2) and 2 ÷ 5 (= 0.4) M1 (dep) for 2 × "2" × "3" or 15 × "2" × "0.4" A1 cao
Q6	(a)	Diagram enlarged. Crosses changed to filled in circles. Label for horizontal axis left aligned. Label for vertical axis placed above the axis. Right axis is labelled.	B1 for a description of a dynamic relationship eg "The older the car the lower the price" or "The newer the car the greater the price" oe (accept negative correlation)
Q6	(b)	Diagram enlarged. Crosses changed to filled in circles. Label for horizontal axis left aligned. Label for vertical axis placed above the axis. Right axis is labelled.	M1 for a single straight line segment with negative gradient that could be used as a line of best fit or vert. line from 3.5 or a point plotted at (3.5, y), where y is in the range 6400 to 7000 A1 for 6400 - 7000
Q7	(a)	Grids enlarged. Triangles A, B and C have dotty shading.	B2 for a triangle with vertices at (–3, 3), (–3, 4), (–1, 4) (B1 for triangle in correct orientation and size or rotated 90º clockwise about centre O or three correct vertices without joinin
Q7	(b)	Grids enlarged. Triangles A, B and C have dotty shading.	B1 for reflection B1 for (in the line) $y = x$ Note: award no marks if more than one transformation is given

PMT

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q10		Diagram enlarged. Measurement lines for 1 metre and 2.2 metres are removed. Dashed measurement line for 3.4 metres.	M1 for splitting the shape (or showing recognition of the "absent" triangles) and using a method to find the area of one shape M1 for a complete method to find the total area, (= 9 m^2) M1 (dep on M1) for a method to find the number of packs required from their total area, eg. "9" ÷ 2 = 4.5 rounded up to 5 M1 for a method to find 75% of 24.80 or 75% of the cost of their total number of packs, eg. 24.80 × "5" × $\frac{75}{100}$ (= 93) or 24.80 × $\frac{75}{100}$ (= 18.6) C1 for a conclusion supported by fully correct answers, eg. showing 9 (m^2), 5 (packs) and 93 or 7 (from 100 – 93) OR M1 for method to find 75% of £24.80, eg. 24.80 × $\frac{75}{100}$ (= 18.6) M1 for method to find total number of packs Mary can buy, eg. 100 ÷ "18.60" = 5.3.... truncated to 5 or 10 (m^2) M1 for finding area of one relevant shape or showing how one pack (2 m^2) can fit in the diagram M1 (dep on previous M1) for complete method to show that 5 packs can cover the floor C1 for a conclusion supported by fully correct answers, showing the capacity (10) greater than total area (9)

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q12		Diagram enlarged. AC, DF and PS made the same length. Angle arc put inside the angle size.	M1 for finding one related angle using parallel lines A1 for $x = 40(^{o})$ C2 for full reasons linked to appropriate method eg. alternate angles are equal **and** angles in a triangle add up to 180° eg. angles on a straight line add up to 180° **and** corresponding angles are equal **and** alternate angles are equal eg. co-interior (allied) angles add up to 180° **and** exterior angle of a triangle is equal to sum of interior opposite angles Other solutions may include reasons such as: vertically opposite angles are equal the sum of angles at a point is equal to 360° (C1 (dep on M1) for one appropriate reason linked to parallel lines)
Q13		Diagrams enlarged. 8 cm moved above the diagram. In text, wording gives the dimensions.	M1 for 8 – 2 (= 6) M1 (indep) for $x^2 + 8^2$ (provided $x \leq 8$) M1 (dep on previous M1) fo $\sqrt{"x"^2 + 8^2}$ or $\sqrt{"100"}$ M1 (dep on M2) for 4 × 2 + 4 × "10" A1 cao

PMT

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q16	(a)	Frequencies changed to 5, 15, 35, 25, 25, 15, 5.	B1 cao
Q16	(b)	Frequencies changed to 5, 15, 35, 25, 25, 15, 5. Grid enlarged. Both axes 3 cm for 20 with an intermediate line. Label for horizontal axis left aligned. Label for vertical axis placed above the axis. Right axis is labelled.	M1 ft from their table for at least 5 points plotted correctly at the ends of the intervals provided table values are cumulative, condoning one arithmetic error, or if the shape of the graph is correct for 5 or 6 points plotted not at the ends but consistently within each interval and joined A1 cao for correct graph with points joined by curve or straight line segments
Q16	(c)	Frequencies changed to 5, 15, 35, 25, 25, 15, 5.	B1 for 47 to 49 or ft their cf graph at cf = 50
Q16	(d)	Frequencies changed to 5, 15, 35, 25, 25, 15, 5. 63 minutes changed to 65.	M1 for reading a value from their cf graph at time = 63 (85 to 90) A1 for answer in the range 10 to 15 or ft from their graph
Q17		Diagram enlarged.	M1 for a method to find the exterior angle of a pentagon eg. 360 ÷ 5 (=72) or the interior angle of a pentagon, eg. 180 – 360 ÷ 5 (= 108) A1 for 72 or 108 M1 (dep M1) for a fully complete method to find the required angle, *DCF* A1 for 18 or ft their interior or exterior angle

PMT

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q18		Grid enlarged.	M1 for the graph of $x + y = 7$ or $y = 2x$ drawn M1 for the graphs of $x + y = 7$, $y = 2x$ and $y = 3$ drawn M1 for any correct shading (in or out), satisfying at least two correct inequalities where the shading must extend from the appropriate lines. A1 for correct region identified by either shading in, or shading out; the letter R is not required. Accept without shading only with the correct region indicated by R. NB accept lines that are solid or dotted/dashed etc or lines defined by unambiguous shading
Q20		MLP only: a changed to m.	M1 for multiplying both sides by $4 – m$ as the first step M1 (dep) for isolating their two terms in m M1 (dep) for factorising their two term expression in m A1 for $m = \frac{4p-5}{3+p}$ or $m = \frac{5-4p}{-p-3}$
Q23		Model provided for all candidates. Diagram also for MLP.	M1 for correct substitution into a volume formula for a cylinder or a cone, eg. $\frac{1}{3}\times\pi\times3^2\times4$ (= 12π) or $\pi\times3^2\times(6-4)$ (= 18π) or $\pi\times3^2\times h$ (= 9πh) or $\pi\times3^2\times(h-2)$ M1 for method to find volume after 5 hours, eg. "12π" + "18π" (= 30π) M1 (dep on M1) for use of a correct ratio, eg. "30π" × $\frac{9}{5}$ (= 54π) or "30π" × $\frac{4}{5}$ (= 24π) M1 for deriving an equation in h, eg. "54π" = "9πh" + "12π" A1 for $\frac{14}{3}$ or equivalent fraction

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q24	(a) (i)	Diagram enlarged. Cross changed to filled in circle.	B1 cao
Q24	(a)(ii)	Diagram enlarged. Cross changed to filled in circle.	B1 cao
Q24	(a)(iii)	Diagram enlarged. Cross changed to filled in circle.	B1 cao
Q24	(b)	Diagram enlarged. Cross changed to filled in circle.	B1 for a correct transformation, eg. translation of $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$ or translation of 4 units in the negative y-direction, oe.

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Mark Scheme (Results)

November 2015

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Calculator) Unit 1

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate.*
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

10 Probability

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Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

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M1 – method mark for appropriate method in the context of the question A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PMT

5MB1H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
1.	(a)		0.2	2	M1 for 1 – (0.15 + 0.41 + 0.24) A1 cao
	(b)		12	2	M1 for 50 × 0.24 oe A1 cao
2.	(a)		(146, 41)	1	B1 for point plotted
	(b)		Description	1	B1 for description of dynamic relationship or statement of positive correlation
	(c)		155 – 158	2	M1 for a single straight line segment with positive gradient that could be used as a line of best fit or a horizontal line from 47.5 A1 answer in the range 155 – 158 or ft from line

PMT

<table>
<tr><th colspan="5">5MB1H_01 November 2015</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>3.</td><td></td><td><table><tr><td></td><td>Bus</td><td>Pre</td><td>Ec</td><td>Tot</td></tr><tr><td>M</td><td>(30)</td><td>28</td><td>34</td><td>(92)</td></tr><tr><td>F</td><td>14</td><td>32</td><td>(62)</td><td>108</td></tr><tr><td>Total</td><td>(44)</td><td>(60)</td><td>96</td><td>(200)</td></tr></table>( ) value given</td><td>28</td><td>4</td><td>M1 for total female students 200 – 92 or 108 seen; or for total Economy passengers 200 – 44 – 60 or 96 seen.
M1 for total male passengers in Economy “96”-62 or 34 seen; or for total female Premium “108” – 62 – (44-30) or 32 seen
M1 for 92 – 30 – “34” or for 60 – “32”
A1 cao

OR

Answers may appear in a two-way table with no other method seen
B1 for Female total 108 or Total Economy 96
M1 for “96” – 62 or 34 seen in Male Economy;
or “108” – 62 – (44 –30) or 32 seen in Female Premium
M1 for 92 – 30 – “34” or for 60 – “32”
A1 cao</td></tr>
<tr><td>4.</td><td>(a)</td><td></td><td>Out: 1023/1148
Return: 1737/1918
in Colwyn 5h 49min</td><td>4</td><td>B1 for selecting 1023 train (cheapest out)
B1 for selecting 1737
B1 for 5h 49min (spent in Colwyn)
C1 (dep on at least B1) clearly stating departure and arrival times of both trains used and correct time in Colwyn for their trains</td></tr>
<tr><td></td><td>(b)</td><td></td><td>133.40</td><td>3</td><td>M1 for 30% of any adult fare
M1 for 2 × adult fare + 3 × child fare for at least one of their chosen trains
A1 (accept 133.4)

(SC B2 for £188.60)</td></tr>
</table>

5MB1H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
5.			Reasons	2	B1 for one reason eg no quantity (units), no time frame, overlapping intervals, not exhaustive B1 for second (different) reason
6.			$\frac{5x + 4}{3}$	2	M1 $x + x + 4 + 3x$ $(= 5x + 4)$ A1 for $(x + x + 4 + 3x) \div 3$ oe
7.		2500 + 2500 × 3.5÷100 = 2500 + 87.50 = 2587.50 2587.50 + 2587.50 × 3.5 ÷ 100 = 2587.50 + 90.5625	2678.06	3	M1 for 2500 × 1.035 or 2500 + 2500 × 0.035 oe or for 2587.5(0) or 87.5(0) or 8750 or 2412.5(0) M1 (dep) for "2587.5" × 1.035 or for "2587.5" + "2587.5" × 0.035 or for "2578.5" + "90.56(25)" or for 2678 or 2678.1(0) or 2678.07 or 2678.06… A1 cao NB: if correct answer seen then ignore any extra years Alternative method: M2 for 2500 × 1.035^n where $n \geq 2$ or for 2678 or 2678.07 or 2678.06… A1 cao

5MB1H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
8.	(a)		$10 < n \leq 20$	2	M1 for use of cf to find the 20.5^{th} or 21st value A1 cao
	(b)	$(5 \times 14) + (15 \times 13) + (25 \times 8)$ $+ (35 \times 4) + (45 \times 2)$ $70 + 195 + 200 + 140 + 90$ $695 \div 41$	16.95	4	M1 for $\sum fx$ with consistent values within interval (including end points); accept one error M1 for $\sum fx$ with correct midpoint values M1 (dep M1) for "$\sum fx$" $\div 41$ or "695" $\div 41$ A1 for 16.95(12….)
9.			Box plot	3	M1 for UQ = 1.7 + 2.7 (= 4.4) or 4.4 shown on box plot B1 for box plot with at least 3 pieces of information correctly plotted B1 for fully correct box plot NB: there must be a box
10.	(a)		5, 23, 35, 39, 40	1	B1 for all correct
	(b)		cf graph	2	B1 for 4 or 5 "points" plotted consistently dep on sensible table (condone 1 addition error) B1 correct graph
	(c)		3	2	M1 for evidence of reading off from 187 (eg vertical line) on cf graph or $35 + \frac{2}{5} \times 4$ A1 ft from cf graph

5MB1H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
11.			20 shown	5	B1 for 3 combinations (1 + 8, 5 + 4, 7 + 2) spacing amended M1 for partial working $\frac{3}{20}\times 80$ or $\frac{3}{20}\times 3$ oe or 80 × 3 (= 240) M1 for complete working $\frac{3}{20}\times 80\times 3$ oe M1 (income) 80 × 70 (= 5600) or 80 × 0.7 (= 56) C1 for "56 – 36=20" clearly stated
12.	(a)		3	2	M1 for $\frac{50}{600}\times 40$ oe or for 3.33… oe A1 cao
	(b)		75	2	M1 for $\frac{n}{600}\times 40$ or for $\frac{5\times 600}{40}$ where '5' can be 4.5 to 5.5 A1 for 75; accept answers in the range 68 – 82 supported by working.

5MB1H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
13.			400 and correct assumption	4	M1 for partial working eg $\frac{60}{12}$ oe or 20% or $\frac{1}{5}$ seen or 80 ÷ 12 (= 6.66..) or $\frac{12}{80}$ oe M1 for complete method eg $\frac{80\times 60}{12}$ or 80 × 5 or 6.66..× 60 or $\frac{12}{60}=\frac{80}{n}$ oe or 80 ÷ 0.2 oe A1 cao C1 for a correct mathematical assumption eg population has not changed overnight or mark which does not wear off or sample is random etc

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5MB1H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
14.			$\frac{56}{110}$	4	M1 for use of 10 as denominator of second probability M1 for a correct method to find the probability of at least one possible combination, $\frac{4}{11}\times\frac{7}{10}$ or $\frac{7}{11}\times\frac{4}{10}$ M1 for complete and correct method shown, eg $\frac{4}{11}\times\frac{7}{10}+\frac{7}{11}\times\frac{4}{10}$ A1 for $\frac{56}{110}$ oe **Alternative scheme for replacement** M1 for $\frac{4}{11}\times\frac{7}{11}$ or $\frac{7}{11}\times\frac{4}{11}$ M1 for $\frac{4}{11}\times\frac{7}{11}+\frac{7}{11}\times\frac{4}{11}$ OR B2 for $\frac{56}{121}$
15.		Frequency densities of 8 ÷ 10 = 0.8 16 ÷ 10 = 1.6 15 ÷ 5 = 3 12 ÷ 5 = 2.4 6 ÷ 20 = 0.3	Fully labelled histogram	3	B3 for fully correct histogram (B2 for 4 correct blocks) (B1 for 3 correct blocks) (If B0 then SC B1 for correct key eg $1cm^2$=2 birds or frequency ÷ class interval for at least 3 frequencies) NB apply the same mark scheme if a different frequency density is used

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 5MB1H_01			
Question		**Modification**	**Notes**
Q02	(a)	Grid enlarged. Crosses changed to filled in circles. 146 cm changed to 150 cm. 41 kg changed to 40 kg.	
Q04		Crewe to Colwyn – First 2 columns removed. Colwyn to Crewe – First and last columns removed.	
Q06		MLP only: x → f.	
Q09		Weights changed to 1.5 kg, 6.5 kg, 2.5 kg, 1.5 kg, 3.5 kg. Grid enlarged.	
Q10	(b) (c)	Frequencies changed to 5, 15, 10, 5, 5. Grid enlarged. 187 cm changed to 182.5 cm.	
Q15		Frequencies changed to 5, 15, 15, 10, 10. Grid enlarged.	

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Mark Scheme (Results)

November 2015

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Non-Calculator) Unit 2

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ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

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PMT

5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
1.			6 525 900 450	3	M1 for × 6 ÷ 4 oe or $\frac{6}{4}$ or 1.5 or 1 correct answer A2 for all correct (A1 for 2 or 3 correct)
2.			$8n + 24$	3	M1 for generating at least 3 terms of sequence 32, 40, 48 or sequence 4, 5, 6 M1 for $8n \pm k$ or $8(n \pm m)$ where $k \neq 24$, $m \neq 3$ A1 for $8n + 24$ or $8(n + 3)$ oe
3.			105 cm^3	4	M1 for writing factor pairs of 35, 21 or 15 M1 for "3" × "5" × "7" using their lengths dep on one at least one correct factor pair A1 ft for 105 (dep on one correct factor pair) B1 for cm^3

5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
4.		$y = \frac{1}{2}x + 3$ x : −2, −1, 0, 1, 2, 3, 4 y : 2, 2.5, 3, 3.5, 4, 4.5, 5	Correct line from (−2, 2) to (4, 5)	3	**(Table of values / calculation of values)** M1 for at least 2 correct attempts to find points by substituting values of x. M1 ft for plotting at least 2 of their points (any points plotted from their table must be correctly plotted) A1 for correct line between $x = -2$ and $x = 4$ **(No table of values)** M1 for at least 2 correct points with no more than 2 incorrect points plotted M1 for at least 2 correct points (and no incorrect points) plotted **OR** line segment of $y = \frac{1}{2}x + 3$ drawn A1 for correct line between $x = -2$ and $x = 4$ **(Use of $y = mx + c$)** M1 for line drawn with gradient of $\frac{1}{2}$ **OR** line drawn with a y intercept of 3 M1 for line drawn with gradient of $\frac{1}{2}$ **AND** line drawn with a y intercept of 3 A1 for correct line between $x = -2$ and $x = 4$ **SC** : B2 for correct line from $x = 0$ to $x = 4$

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5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
5.			68	5	B1 for correct conversion of units M1 for 250 ÷ 25 (= 10) or 300 ÷ 20 (= 15) M1 for "10" × "15" M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0) A1 for 68 OR B1 for correct conversion of units M1 for 250 ÷ 20 (= 12.5) or 300 ÷ 25 (= 12) M1 for "12.5" × "12" M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0) A1 for 68 OR B1 for correct conversion of units M1 for 3 × 2.5 (= 7 .5) or 20 × 25 (= 500) M1 for "3 × 2.5" ÷ "0.2 × 0.25" or "300 × 250" ÷ "20 × 25" M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0) A1 for 68
*6		1, 4, 7, 10, 13 8, 6, 4, 2, 0	Explanation	2	M1 for listing at least 3 terms of both sequences C1 for Yes and explanation from fully correct working that 4 is in both sequences; numbers in A are increasing; numbers in B are decreasing

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5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
7			7.21 (am)	3	M1 for listing multiples 9,18,27,36 and 12,24,36 (condone 1 arithmetic error) or method to find LCM M1 for identifying 36 as LCM A1 cao OR M1 for listing times 6.54, 7.03, 7.12, 7.21 or for listing times 6.57, 7.09, 7.21 (condone one arithmetic error) M1 for listing times 6.54, 7.03, 7.12, 7.21 **and** 6.57, 7.09, 7.21 (condone one arithmetic error) A1 cao
8	(a)		$4(3e+1)$	1	B1 cao
	(b)		$15c - 10d$	1	B1 cao
	(c)		$28a^4b^3$	2	B2 for $28a^4b^3$ (B1 for two of 28, a^4 , b^3 as a product)
	(d)		$(x + 7)(x - 7)$	1	B1 cao
	(e)	$2y^2 - 6y + 7y - 21$	$2y^2 + y - 21$	2	M1 for 3 out of no more than 4 terms correct with correct signs or the 4 terms $2y^2$, $6y$, $7y$ and 21 seen, ignoring signs A1 cao

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5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		360 – 64 140 + 40 + 296 + 40 = 516 540 − 516 = 24	24°	4	M1 for 1 correct relevant angle calculation A1 for 24 cao C2 for all reasons (C1 (dep M1) for reason relating to parallel lines or parallelogram which is relevant to their chosen method) eg angles on a straight line add to 180° angles at a point add to 360° angles in a triangle add to 180° angles in a quadrilateral add to 360° alternate angles are equal corresponding angles are equal allied angles / co-interior angles add up to 180° opposite angles in a parallelogram are equal
10			$4\frac{8}{35}$	3	M1 for converting both fractions to get a common denominator of a multiple of 35 with at least one correctly converted. M1 (dep on M1) for $3+\frac{"28"}{35}+\frac{"15"}{35}(=3\frac{43}{35})$ oe A1 for $4\frac{8}{35}$ cao

5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		7.8×10^{-3}	1	B1 cao
	(b)		6 710 000	1	B1 cao
	(c)	$-9,\ 0.9,\ 1,\ 3$	$-9,\ 0.9,\ 9^0,\ 9^{\frac{1}{2}}$	2	M1 for either $9^{\frac{1}{2}}$ or 9^0 evaluated correctly A1 for fully correct list from correct working, accept original numbers or evaluated. (SC: B1 for 1 error in position or a correct list in reverse order)
12.	(a)		$(0, 5, 5)$	1	B1 cao
	(b)		$(2\frac{1}{2}, 5, 2\frac{1}{2})$	1	B1 for $(2\frac{1}{2}, 5, 2\frac{1}{2})$ oe
13.			120	3	M1 for $80\% = 480$ or $\frac{480}{80} (= 6)$ or $\frac{480}{80} \times 100\ (= 600)$ oe M1 for $600 - 480$ or $\frac{480}{80} \times 20$ oe A1 cao
14.			$A = 9x^2 + 19x - 6$	4	B1 for one of $5x - 2$ or x found M1 for correct method to find area of one relevant rectangle. M1 for complete method to find whole area or simplified expression $9x^2 + 19x - 6$ or correct but not simplified formula A1 for correct, simplified formula $A = 9x^2 + 19x - 6$

5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
15.			$y = \frac{3}{2}x - \frac{5}{2}$	4	M1 for attempt to find gradient of AB M1 (dep) for attempt to find gradient of perpendicular line eg use of $-\frac{1}{m}$ M1 for substituting $x = 3, y = 2$ into $y =$ "m" $x + c$ A1 for complete correct equation $y = \frac{3}{2}x - \frac{5}{2}$ oe
16.			$2\sqrt{7}$	3	M1 for multiplying numerator and denominator by $\sqrt{7}$ M1 for correct method to expand $(4+\sqrt{2})(4-\sqrt{2})$ with 3 out of no more than 4 terms correct with correct signs or the 4 terms seen, ignoring signs A1 for $2\sqrt{7}$ (accept $\sqrt{28}$)
17.		$\frac{(x-5)(x+3)}{(x+3)(2x+1)}$	$\frac{x-5}{2x+1}$	3	M1 for correct factorisation of numerator M1 for correct factorisation of denominator A1 for $\frac{x-5}{2x+1}$

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In Mathematics B (2MB01)
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12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme
M1 – method mark for appropriate method in the context of the question A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

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Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		2.47	2	M1 for 7.66… A1 for 2.47 – 2.48
	(b)		400	1	B1 for 400 or 4×10^2
2	(a)		Correct point marked	3	M1 for line bearing 300° M1 for line bearing 40° A1 cao
	(b)		4.15	2	M1 for "8.3" × 50 000 (=415 000) A1 for 4.10 – 4.25
*3			Bottle with reason	5	**Cans** M1 for 30×0.28 – 10×0.25 (=5.9) oe **Bottles** M1 0.15 × 1.60 (=£0.24) oe or 0.15 × 6.40 (=0.96) oe M1 (dep) for 1.60 – 0.24 (=£1.36 per bottle, or £5.44 for 4 bottles) oe **Best value** M1 for "1.36" ÷ 2.5 (=0.544 £/litre) and "5.9" ÷ 9.9 (=0.595…£/litre) oe C1 (dep on M1) for 0.544 and 0.595… and bottle identified OR M1 for 2.5 ÷ "1.36 (=1.83… litres/£) and 9.9 ÷"5.9" (=1.67… litres/£) C1 (dep on M1) for 1.67... and 1.83… and bottle identified
4	(a)		translation $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$	2	B1 for translation B1 for $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$ (B0 if not single transformation)
	(b)		Triangle	2	B2 cao (B1 for rotation a 180 degrees about any point or for a rotation about (0, 1))

<table>
<tr><th colspan="5">5MB3H_01 November 2015</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>5</td><td></td><td></td><td>17.6</td><td>3</td><td>M1 for 8 ÷ 5 (=1.6) or 5÷8 (=0.625)
M1 for (16 – 5) × “1.6” or for (16 – 5) ÷ “0.625” oe
A1 cao</td></tr>
<tr><td>6</td><td></td><td></td><td>bisector</td><td>2</td><td>M1 for an appropriate pair of arcs or correct line drawn without construction arcs
A1 for perpendicular bisector of AB drawn with a pair of construction arcs</td></tr>
<tr><td>7</td><td></td><td>
<table>
<tr><th>x</th><th>$x^3 - 9x$</th></tr>
<tr><td>4</td><td>28</td></tr>
<tr><td>4.1</td><td>32.(021)</td></tr>
<tr><td>4.2</td><td>36.(288)</td></tr>
<tr><td>4.3</td><td>40.(807)</td></tr>
<tr><td>4.4</td><td>45.(584)</td></tr>
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<tr><td>4.6</td><td>55.(936)</td></tr>
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<tr><td>4.8</td><td>67.(392)</td></tr>
<tr><td>4.9</td><td>73.(549)</td></tr>
<tr><td>5</td><td>80</td></tr>
<tr><td>4.41</td><td>46.0(7612)</td></tr>
<tr><td>4.42</td><td>46.5(7089)</td></tr>
<tr><td>4.43</td><td>47.0(6831)</td></tr>
<tr><td>4.44</td><td>47.5(6838)</td></tr>
<tr><td>4.45</td><td>48.0(7113)</td></tr>
</table>
</td><td>4.4</td><td>4</td><td>B2 for a trial $4.4 \le x \le 4.5$
(B1 for a trial evaluated correctly for $4 \le x \le 5$)
B1 for a different trial evaluated correctly for $4.41 \le x \le 4.5$
B1 (dep on at least one previous B1) for 4.4

[Note trials should be evaluated to at least accuracy indicated in the table, truncated or rounded]

[NB B0 No working scores 0 marks]</td></tr>
</table>

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Question		**Working**	**Answer**	**Mark**	**Notes**
8			180	3	M1 for area of cross section, eg 3×2 + 3×4 + 3×6 (=36) or 9×6 − 3×3×2 (=36) M1 for "36" ×5 A1 cao OR M1 for area of one cuboid eg 3 × 2 × 5 (=30) M1 for 6 × "30" A1 cao OR M1 for 4.5 × 8 (=36) M1 for "36" × 5 A1 cao
9	(a)		0, 4, 3, −5	2	M1 for one correct value, could be taken from graph A1 cao
	(b)		correct curve	2	M1 for at least 4 points plotted correctly from table A1 for correct curve drawn
10			11	4	M1 for introducing variable eg x or $x+3$ or $2x+6$ M1 (dep) for "x" + "$(x+3)$" + "$(2x+)$" = 53 M1 for complete method to isolate x A1 cao
11	(a)		$x > -4$	1	B1 cao
	(b)		$y \leq 3$	2	M1 for intention to isolate y or for $y = 3$ or $y < 3$ A1 cao
	(c)		−1,0,1	2	M1 for listing −3, −2, −1,0,1 or −1, 0,1,2,3 or for $-2 < ? < 2$ A1 for −1,0,1
12			1.01	3	M1 for 1.2 × 15 (= 18) or 1 × 250 clearly defined as mass M1 for $\frac{"18" + "250"}{15+250}$ A1 for 1.01(1…)

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Question		**Working**	**Answer**	**Mark**	**Notes**
*13			36% depreciation	3	M1 for 0.8 × 0.8 (=0.64) M1 for 1 – "0.64" (=0.36) C1 for 36% (depreciation) oe or compares cost with 40% reduction OR (uses a trial value, eg 1000) M1 for $1000\times(0.8)^2$ (=640) M1 for (1000 – 640) ÷ 1000 (=0.36) C1 for 36% (depreciation) oe or compares cost with 40% reduction OR M1 for 0.2 × 0.2 (=0.04) M1 for 0.2 + 0.2 – "0.04" (=0.36) C1 for 36% (depreciation) oe or compares cost with 40% reduction OR C1 only for identifying the 2nd 20% reduction is off the reduced amount at the end of the first year
14			$t = \frac{ap^2}{3}$	3	M1 for squaring both sides of the equation as the first step M1 (dep) for isolating the *t* term A1 for $t = \frac{ap^2}{3}$ oe
15			20.94	5	M1 for method to find circumference of circle, eg. $2\times\pi\times2.45$ or $\pi\times4.9$ (= 15.393....) M1 (dep) for $\frac{105}{360}\times$ "15.393 ... (= 4.4898...) M1 for "4.4898.." ÷ 1.75 (= 2.565...) or "4.9" ÷ 1.75 (= 2.8) oe or "9.3898…" ÷ 1.75 (=5.3656…) M1 for total cost = "6" × 3.49 (=20.94) or cost of arc or straight edges = "3" × 3.49 (=10.47) A1 cao

5MB3H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
16			$\frac{4}{7}$	4	M1 for multiplication of all terms by a multiple of 6 eg $3(x+1) + 2(2x-1) = 5$ M1 for $3\times x+3\times 1$ $(=3x+3) + 2\times 2x - 2\times 1$ $(=4x-2)$ oe or $3x+3+4x-2=5$ M1 (dep) for collecting like terms on each side of the equation eg $3x+4x = 5 - 3 + 2$ or $7x + 1 = 5$ or $7x = 4$ A1 for $\frac{4}{7}$ or 0.57…
*17			56 supported	3	M1 for 180 – 85 (=95) A1 for 56 C1 for opposite angles of a cyclic quadrilateral add up to 180
18			$-\frac{3}{2}, \frac{5}{3}$	3	M1 for $(2x \pm 3)(3x \pm 5)$ M1 for $(2x + 3)(3x - 5)$ A1 for $-\frac{3}{2}$ and $\frac{5}{3}$ oe accept 1.66 – 1.67 OR M1 for $\frac{-(-1)\pm\sqrt{(-1)^2-4\times 6\times -15}}{2\times 6}$, condone one sign error M1 for $\frac{1\pm\sqrt{361}}{12}$ A1 for $-\frac{3}{2}$ and $\frac{5}{3}$ oe accept 1.66 – 1.67 OR M1 for $\left(x-\frac{1}{12}\right)^2 \pm \left(\frac{1}{12}\right)^2 \pm a = 0$ M1 for $\left(x-\frac{1}{12}\right)^2 = b$ A1 for $-\frac{3}{2}$ and $\frac{5}{3}$ oe accept 1.66 – 1.67
19			36	3	M1 for $100 = k \times 5^2$ oe or $(k=)$ 4 M1 for $(y =) \frac{100}{5^2} \times 3^2$ or "4" $\times 3^2$ A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
20			0.063	3	B1 for 252.5 or 247.5 or 3950 or 3850 M1 for 247.5 ÷ 3950 or ft "lower bound for 250" ÷ "upper bound for 3900" A1 for 0.062−0.063 (from correct working)
21		Eg $BQ=\sqrt{(5^2+6^2)}=\sqrt{61}$ Angle $ABQ=\tan^{-1}(6\div5)=50.194^o$ $BP=\sqrt{61}\div\cos30=9.018$ cm Angle $PBC=90–30–50.194^o=9.806^o$ $BC=9.018\times\cos9.806=8.886...$ **OR** $BQ=\sqrt{(5^2+6^2)}=\sqrt{61}$ $PQ=\sqrt{61}\tan30=4.509$ Angle $BQA=\tan^{-1}(5\div6)=39.806$ Angle $PQD=180–90–39.806=50.194^o$ $QD=4.509\times\cos50.194=2.886...$	8.89	5	M1 for correct use of Pythagoras M1 for correct use of appropriate trig ratio M1 for correct use of appropriate inverse trig ratio M1 for correct method to calculate angle *CBP* or *PQD* A1 for 8.88 – 8.89
22	(a)		(0, 1)	1	B1 cao
	(b)	P(−1, 0), Q(1, 0)	2	2	M1 for "a" – "$-a$" or (x =) –1 or (x =) 1 or "8" ÷ 4 A1 cao

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q02		Harbour to Lighthouse = 10 cm. Harbour and Lighthouse are joined with a dashed line. North line extended.	
Q04	(a)	Grid enlarged.	
Q04	(b)	Question reversed. Triangle W given on grid. Candidates asked to describe the transformation of triangle T to triangle W.	
Q06		AB = 8 cm.	
Q08		Model provided for all candidates. MLP also given an enlarged diagram.	
Q09	(a)	Wording added above the table. There are four spaces to fill.	
Q09	(b)	Grid enlarged.	
Q11	(a)	Diagram enlarged.	

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q14		All candidates, a changed to n.	
Q15		Diagram enlarged.	
Q16		MLP only: x changed to y.	
Q17		Diagram enlarged. Wording added: “Angle BAP is marked x.”	
Q21		Diagram enlarged. Wording added: “BA = 5 cm. AQ = 6 cm. Angle PBQ = $30°$.	
Q22		Diagram enlarged.	

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Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Calculator) Unit 3

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 **With working**

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 **Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 **Ignoring subsequent work**

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

10 **Probability**

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 5MB3H/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1*			Decision (supported)	3	M1 for correct first step e.g. 15 ÷ 3 M1 for complete method C1 for correct decision with accurate figures
2	(a)		Correct diagram	2	B2 cao (B1 for correct orientation)
	(b)		Enlargement, sf 4, centre (0, 1)	3	B1 for enlargement B1 for scale factor 4 B1 for centre (0, 1)
3			$w = \frac{d+5}{2}$	2	M1 for attempt to add 5 to both sides or divide both sides by 2 as a first step, eg $d + 5 = 2w$ oe or $\frac{d}{2} = w - \frac{5}{2}$ oe A1 for $w = \frac{d+5}{2}$ oe

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PAPER: 5MB3H/01					
Question		Working	Answer	Mark	Notes
4			22.5	4	M1 for $4(x - 8) = 2x + 13$ M1 for expansion of bracket or division of all terms by 4, eg $4x - 32 = 2x + 13$, or $x - 8 = \frac{2x}{4} + \frac{13}{4}$ M1 for isolating x and number terms eg $2x = 45$, $\frac{x}{2} = \frac{45}{4}$ A1 for $\frac{45}{2}$ or 22.5 OR M1 for $(180 - 64) \div 2$ (= 58) M1 for $4(x - 8)$ = "58" or $2x + 13$ = "58" or "58" – 13 (= 45) M1 for isolating x and number terms eg $4x = 90$, $2x = 45$ or "45" ÷ 2 A1 for $\frac{45}{2}$ or 22.5 OR M1 for $64 + 4(x - 8) + 2x + 13$ M1 for $64 + 4(x - 8) + 2x + 13 = 180$ M1 for isolating x and number terms eg $6x = 135$ A1 for $\frac{45}{2}$ or 22.5
5			Correct region shaded	3	M1 for a circle centre M or N (accept arc of sufficient length to define the region) M1 for circle centre M radius 5 cm **and** circle centre N radius 3 cm (accept arc of sufficient length to define the region) A1 for correct region shaded

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PAPER: 5MB3H/01					
Question		Working	Answer	Mark	Notes
*6			Conclusion (supported)	4	M1 for $\pi \times 120^2$ (= 45 216 – 45 249) M1 for "$\pi \times 120^2$" ÷ 1800 A1 for 25 – 25.2 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for $\pi \times 120^2$ (= 45 216 – 45 249) M1 for 20 × 1800 A1 for 36 000 and 45 216 – 45 249 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for $\pi \times 120^2$ (= 45 216 – 45 249) M1 for "$\pi \times 120^2$" ÷ 20 A1 for 2260 – 2263 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for 1800 × 20 M1 for 36 000 ÷ π (=11 457 – 11 465) A1 for 107(.0…) C1 ft (dep on M2) for appropriate conclusion from their figures
7			161.50	5	M2 for a correct method to decrease 6720 by 20%, eg 6720 × 0.8 (= 5376) or 6720 × 0.2 (= 1344 and 6720 – 1344 (= 5376)) (M1 for a correct method to find 20% of 6720 eg 6720 × 0.2 or $\frac{20}{100} \times 6720$ (= 1344)) M1 for subtracting 1500 (= 3876) after a percentage calculation M1 "3876" ÷ 24 after the subtraction of 1500 A1 for 161.5(0)

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PAPER: 5MB3H/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8		3 42 3.1 45.(291) 3.2 48.(768) 3.3 52.(437) 3.4 56.(304) 3.5 60.(375) 3.6 64.(656) 3.7 69.(153) 3.8 73.(872) 3.9 78.(819) 4 84 3.71 69.6(14811) 3.72 70.(078848) 3.73 70.5(45117) 3.74 71.(013624) 3.75 71.4(84375)	3.7	4	B2 for a trial between 3 and 4 exclusive (B1 for a trial at 3 or 4) B1 for a different trial of $3.7 < x \leq 3.75$ B1 (dep on at least one previous B1) for 3.7 NB. Trials should be evaluated to at least 2 sf truncated or rounded for values of x correct to 1 decimal place. Trials should be evaluated to at least 1 dp truncated or rounded for values of x correct to 2dp. **NB** No working scores 0 marks even if answer is correct
9			618	4	M1 for a method to find an area which is part of the cross section M1 (dep) for a complete method to find the total area of the cross section M1 (dep M1) for their cross sectional area × 12 A1 cao **OR** M1 for a method to find the volume of cuboid, 8 × 8 × 12 (= 768) M1 for a method to find the volume of the triangular prism, ½ ×5 × 5 × 12(= 150) M1 (dep M2) for a complete method for the volume of the prism A1 cao

5MB3H_01					
Question		Working	Answer	Mark	Notes
10	(a)		15.2	3	M1 for $12.7^2 + 8.3^2$ or 161.29 + 68.89 or 230.18 M1 for √"$(12.7^2 + 8.3^2)$" or √"161.29 + 68.89" or $\sqrt{230.18}$ A1 for 15.2 or 15.17(168…)
	(b)		16.1	3	M1 for $\sin 40° = \frac{DE}{25}$ oe or $\frac{DE}{\sin 40} = \frac{25}{\sin 90}$ oe M1 for 25 sin 40° A1 for 16.1 or 16.06(969…)
11	(a)		4.081	2	M1 for 8.875 or $\frac{71}{8}$ or 2.979…or 4.08 A1 for 4.081 or 4.0809(5…)…
	(b)		4×10^{-3}	2	M1 for 4×10^n, $n \neq -3$ or $a \times 10^{-3}$, $a \neq 4$ or 0.004 or 0.4×10^{-2} or 1/250 A1 cao
12			$x < 2$	2	M1 for an attempt to isolate x and number terms or multiply all terms by 2, or for $\frac{3}{2}x < 3$ or $-\frac{3}{2}x < -3$ or $x = 2$ A1 cao
13	(a)		0, 6, 4, –6	2	B2 for all values correct (B1 for any one value correct)
	(b)		Graph drawn	2	M1 ft (provided B1 in (a) for at least 6 points plotted correctly from their table A1 cao for correct curve drawn from (–4, –6) to (3, –6)
	(c)		1.5 to 1.6 and –2.5 to –2.6	2	M1 for correct use $y = 2$ (may be implied by one correct estimate) or correct use of formula. A1 for 1.5 to 1.6 and –2.5 to –2.6

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14*		Sher Yas **Old 19300 12560** New 20265 13502 **Inc 965 942**	Correct comparison (supported)	3	M1 for a correct method to calculate the population at the beginning of the 10 year period for at least one place. eg $\frac{20265}{1.05}$ (= 19 300) oe or $\frac{13502}{1.075}$ (= 12 560) oe A1 for 965 (Sherbury) **and** 942(Yaston) C1 (dep on M1) ft for statement comparing increases leading to conclusion based on two comparable amounts eg increase in Sherbury is greater than increase in Yaston
15		$20x + 10y = 35$ $6x - 10y = -48$ $x = -\frac{1}{2}$ $y = \frac{9}{2}$ OR $12x + 6y = 21$ $12x - 20y = -96$ $26y = 117$ $y = \frac{9}{2}$ $x = -\frac{1}{2}$	$-\frac{1}{2}, \frac{9}{2}$	4	M1 for a correct process to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao OR M1 for full method to rearrange and substitute to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao **NB** Trial and improvement methods score 0 marks unless both x and y are correct
16			226	2	M1 for angle $ABC = 180 - 67$ (= 113) A1 cao OR M1 for obtuse angle $AOC = 2 \times 67$ (= 134) A1 cao

5MB3H_01					
Question		Working	Answer	Mark	Notes
17			– 2.82, 19.82	3	M1 for $\frac{--17 \pm \sqrt{(-17)^2 - 4\times1\times-56}}{2\times1}$ (condone one sign error) or $\left(x - \frac{17}{2}\right)^2$ oe M1 for $\frac{17 \pm \sqrt{513}}{2}$ or for method leading to $\frac{17}{2} \pm \sqrt{\frac{513}{4}}$ oe A1 for answers in the range 19.82 to 19.825; – 2.82 to –2.825
18			21.2	4	M1 for correct use of sine rule to find *AB* or *BC*, eg $\frac{6}{\sin 25} = \frac{AB}{\sin 120}$ or $\frac{6}{\sin 25} = \frac{BC}{\sin(180-120-25)}$ M1 for (*AB* =) $\frac{6}{\sin 25} \times \sin 120$ (= 12.2(951…)) or (*BC* =) $\frac{6}{\sin 25} \times \sin 35$ (= 8.1(431…) M1(dep M2) for method to find area, eg 0.5 × 6 × "*AB*" sin35 or 0.5 × 6 × "*BC*" sin 120 A1 for answer in the range 21.1 – 21.2 OR (with perpendicular from *A* meeting *BC* extended at a point *X*) M1 for method to find *AX* M1 for method to find *BX* M1(dep M2) for 0.5 × "*AX*" × "*BC*" A1 for answer in the range 21.1 – 21.2
*19			0.38 because the LB and UB agree to that number of figures	5	B1 for 10.75 or 10.85 or 10.84999… B1 for 75.055 or 75.065 or 75.064999… M1 for $\sqrt{\frac{10.85}{75.055}}$ as UB **OR** $\sqrt{\frac{10.75}{75.065}}$ as LB A1 (dep on all previous marks) for both 0.3802… and 0.3784 must clearly come from working with correct values C1 for 0.38 from 0.3784… and 0.3802 … **and** "both LB and UB round to 0.38" **NB** An answer of 038(932….) without working scores no marks

5MB3H_01					
Question		Working	**Answer**	**Mark**	**Notes**
20			7.35	3	M1 for $y \propto \frac{1}{\sqrt{x}}$ or $y = \frac{k}{\sqrt{x}}$ or $9 = \frac{k}{\sqrt{4}}$ M1 for $k = 9\sqrt{4}$ (=18) A1 for 7.35 or 7.348…
*21			$\frac{2}{3}$ (7**a** + 3**b**) and correct conclusion	4	M1 for correct vector for $\overrightarrow{OY}$, or $\overrightarrow{AP}$ eg $(\overrightarrow{OY}) = \overrightarrow{OA} + \overrightarrow{AY}$, or $\overrightarrow{OY} = \overrightarrow{OA} + \frac{2}{3}\overrightarrow{AP}$ may include terms in **a** and **b,** eg. 6**a** + $\overrightarrow{AY}$, 4**b** + 4**a** – **b** + $\overrightarrow{PY}$ or $\overrightarrow{AP} = \overrightarrow{AO} + \overrightarrow{OB} + \overrightarrow{BP}$ or –6**a** + 4**b** + 4**a** – **b** or – 2**a** + 3**b** M1 for $(\overrightarrow{AY}) = \frac{2}{3}\overrightarrow{AP}$ or ⅔(–6**a** + 4**b** + 4**a** – **b**) or ⅔(–2**a** + 3**b**) or $(\overrightarrow{PY} = \frac{1}{3}\overrightarrow{PA}$ or ⅓(– 4**a** + **b** – 4**b** + 6**a**) or ⅓(2**a** – 3**b**) M1 for correct expression for $\overrightarrow{OY}$ in terms of **a** and **b,** eg $\frac{14}{3}$ **a** + 2**b** C1 for $\frac{2}{3}$ (7**a** + 3**b**) and "$\overrightarrow{OY}$ is parallel to the vector 7**a** +3**b**" **oe**

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q2	(a)	Grid enlarged. Shading changed to dotty shading. Labels added to shapes. Image labelled shape A. Rotation given and labelled shape B. Question changed to 'Describe fully the single transformation which maps shape A to shape B. One row top and bottom, one column left and right has been removed. Three answer lines given.	2 cao (B1 for correct orientation in third quadrant or correct quarter turn)
Q2	(b)	Grid enlarged. Shading changed to dotty shading. Labels added next to the triangles 'triangle P' and 'triangle Q'. One column removed from the left.	B1 for enlargement B1 for scale factor 4 B1 for centre (0, 1)

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PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q4		Diagram enlarged. MLP only – x changed to y. Braille only – measurements given in the text.	M1 for $4(x - 8) = 2x + 13$ M1 for expansion of bracket or division of all terms by 4, eg $4x - 32 = 2x + 13$, $x - 8 = 2x/4 + 13/4$ M1 for isolating x and number terms eg $2x = 45$, $x/2 = 45/4$ A1 for 45/2 or 22.5 OR M1 for $(180 - 64) \div 2$ (= 58) M1 for $4(x - 8) = 58$ or $2x + 13 = 58$ M1 for isolating x and number terms eg $4x = 90$, $2x = 45$ A1 for 45/2 or 22.5 OR M1 for $64 + 4(x - 8) + 2x + 13$ M1 for $64 + 4(x - 8) + 2x + 13 = 180$ M1 for isolating x and number terms eg $6x = 135$ A1 for 45/2 or 22.5
Q5		Diagram kept the same size as original. Scale moved above the diagram and also put in the question paper.	B1 for circle centre M radius 5 cm B1 for circle centre N radius 3 cm B1 for correct region shaded

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q6		Diagram enlarged. Cross changed to a filled in circle. Arrow heads removed.	M1 for $\pi \times 120^2$ (= 45238….) M1 for "$\pi \times 120^2$" ÷ 1800 A1 for 25.0 – 25.2 C1 for "surface is large enough as 25 > 20" oe OR M1 for $\pi \times 120^2$ (= 45238….) M1 for 20 × 1800 A1 for 36000 C1 for "surface is large enough as 36000 < 45238..." oe OR M1 for $\pi \times r^2 = 1800 \times 20$ M1 for 36000 ÷ π (=11459..) A1 for 107.0… C1 for "surface is large enough as 107…< 120" oe
Q9		Model provided for all candidates. Diagram enlarged and provided for MLP.	M1 for a method to find an area which is part of the cross section M1 (dep) for a complete method to find the total area of the cross section M1 (dep M2) for a complete method for the volume of the prism A1 cao OR M1 for a method to find the volume of cuboid, 8 × 8 × 12 M1 for a method to find the volume of the triangular prism M1 (depM2) for a complete method for the volume of the prism A1 cao

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PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q10	(a)	Diagram enlarged. Braille only: measurements given in the text.	M1 for $12.7^2 + 8.3^2$ or $161.29 + 68.89$ or 230.18 M1 for $\sqrt{161.29 + 68.89}$ or $\sqrt{230.18}$ A1 for 15.2 or 15.17(168…)
Q10	(b)	Diagram enlarged. Braille only – measurements given in the text.	M1 for $\sin 40° = \frac{DE}{25}$ oe M1 for $25 \sin 40°$ A1 for 16.1 or 16.06(969…)
Q13	(a)	Wording added 'There are four spaces to fill.'	B2 for all values correct (B1 for any one value correct)
Q13	(b)	Grid enlarged.	M1 ft for at least 6 points plotted correctly from their table A1 cao for correct curve drawn from (–4, –6) to (3, –6)
Q16		Diagram enlarged. Dot added at centre.	M1 for angle ABC = 180 – 67 (= 113) A1 cao OR M1 for obtuse angle AOC = 2 × 67 (= 134) A1 cao

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PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q18		Diagram enlarged.	M1 for correct use of sine rule to find *AB* or *BC*, eg $\frac{6}{\sin 25} = \frac{AB}{\sin 120}$ M1 for (*AB* =) $\frac{6}{\sin 25} \times \sin 120$ or (*BC* =) $\frac{6}{\sin 25} \times \sin 35$ M1(dep M2) for method to find area, eg 0.5×6×*AB*sin35 or 0.5×6×*BC* sin 120 A1 for answer in the range 21.1 – 21.2 OR (with perpendicular from *A* meeting *BC* extended at a point *X*) M1 for method to find *AX* M1 for method to find *BX* M1(dep M2) for 0.5 × "*AX*" × "*BC*" A1 for answer in the range 21.1 – 21.2
Q21		Diagram enlarged.	M1 for correct vector for $\overrightarrow{OY}$, eg $(\overrightarrow{OY}) = \overrightarrow{OA} + \overrightarrow{AY}$, may include terms in **a** and **b,** eg. 6**a** + $\overrightarrow{AY}$, 4**b** + 4**a** – **b** + $\overrightarrow{PY}$ M1 for $(\overrightarrow{AY} =) \frac{2}{3}\vec{A}P$ or $(\overrightarrow{PY} =) \frac{1}{3}\overrightarrow{PA}$ M1 for correct expression for $\overrightarrow{OY}$ in terms of **a** and **b,** eg $\frac{14}{3}$**a** + 2**b** C1 for $\frac{2}{3}$(7**a** + 3**b)** and "$\overrightarrow{OY}$ is parallel to the vector 7**a** +3**b" oe**

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Mark Scheme (Results)

November 2016

Pearson Edexcel GCSE
In Mathematic A (1MA0)
Higher (Non-Calculator) Paper 1H

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

12 Parts of questions

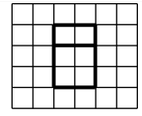
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 − 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme
M1 − method mark for appropriate method in the context of the question A1 − accuracy mark B1 − Working mark C1 − communication mark QWC − quality of written communication oe − or equivalent cao − correct answer only ft − follow through sc − special case dep − dependent (on a previous mark or conclusion) indep − independent isw − ignore subsequent working

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1		Diagram drawn	3	B3 for fully correct shape (B2 for 3 or 4 vertices correct or enlargement scale factor 3 in wrong position or enlargement, centre *A*, with different scale factor) (B1 for 2 vertices correct or enlargement, not from *A*, with different scale factor)
2		17.6(0)	4	M1 18 × 6.45 (= 116.1(0)) or 18 × 645 = (11610) M1 for 18 × 6.45 – 98.50 in the correct order but units may not be consistent A1 for digits 1760 A1 (dep on M2) for correct placement of decimal point after subtraction (of appropriate values)
3 (a)		4	2	M1 for 20 ÷ 5 (=4) Allow build up method to 4 lots of 1:5 A1 cao
(b)		6	2	M1 for a full method to find the number of red counters needed eg 20 ÷ 2 – "4" A1 ft from (a)
4 (a)		5	1	B1 cao
(b)		Lines added	2	B1 for a horizontal line from (5, 8) to (6.30, 8) B1 for a single straight line with the correct gradient and length, down to the time axis eg (6.30, 8) to (8.30, 0)
5			2	B2 for correct side elevation (B1 for a rectangle with base 2 squares or height 3 squares)

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
6 (a)		$50 < a \leq 60$	1	B1 for correctly identifying the modal class interval e.g. 50 – 60 oe
(b)		Polygon	2	B2 for fully correct frequency polygon - points plotted at the midpoint (B1 for all points plotted accurately but not joined with straight line segments **or** all points plotted accurately and joined with last joined to first to make a polygon **or** all points at the correct heights and consistently within or at the ends of the intervals **and** joined (can include joining last to first to make a polygon)) NB: ignore parts of graph drawn to the left of the 1st point or the right of the last point; ignore any histograms drawn.
7	$(7 + 3 + 3) \times (4 + 3 + 3) - 7 \times 4 = 102$ OR $2 \times 7 \times 3 + 2 \times 4 \times 3 + 4 \times 3 \times 3 = 102$	11	4	M1 for a correct method to find the area of one appropriate rectangle M1 for a complete method to find the area of the path M1 (dep on M1) for "102" ÷ 10 A1 cao from correct working
*8		Bathroom Mart and correct figures	4	M1 for $\frac{1}{3} \times 1500$ (= 500) or $\frac{2}{3} \times 1500$ (= 1000) M2 for a correct method to reduce 1500 by 60% and then by a further 15% eg 1500 × "0.4" × "0.85" (= 510) oe (M1 for method to find 60% or 40% of 1500 e.g. $\frac{60}{100} \times 1500$ (= 900) C1 for 510 **and** 500 with a correct conclusion.

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*9		95° with reasons	4	M1 for angle *DBC* = 180 – 125 (= 55) **or** angle *EAC* = 180 – 125 (=55) (May be on diagram) A1 for *x* = 95 C2 (dep on M1) with full reasons for their given method, e.g. angles on a straight line add up to 180° **and** angles in a triangle add up to 180° **and** corresponding angles are equal **or** allied angles / co-interior angles add up to 180° **and** angles in a triangle add up to 180° (C1 (dep on M1) for one appropriate reason linked to parallel lines) M1 for angle *CDB* = 125 – 30 (= 95)) (May be on diagram) A1 for *x* = 95 C2 (dep on M1) for full reasons, for their given method, e.g. exterior angles are equal to the sum of the interior opposite angles **and** corresponding angles are equal (C1 (dep on M1) for one of these appropriate reasons linked to parallel lines)
10 (a)		Diagram	2	B2 for fully correct solution with all three aspects with no ambiguity Aspect 1: circle at 3 Aspect 2: circle not shaded Aspect 3: arrow pointing left indicating extension beyond −4 or line extending beyond −4 (B1 for any two aspects)
(b)		$x \geq 5$	2	M1 for intention to add 7 to both sides (of inequality or equation) or to divide all 3 terms by 4 as a first step, or (*x* =) 5 A1 for $x \geq 5$ oe
11		125 miles or 200 km	3	B1 for 5 miles = 8 km or equivalent statement or for $\frac{5}{8}$ or $\frac{8}{5}$ used correctly M1 for method to use the correct conversion to find 40 (km) or 150 (miles) or $240 \times r$ with $0.6 \leq r \leq 0.7$ or $25 \times s$ with $1.5 \leq s \leq 1.7$ A1 for 200 km or 125 miles (units must be given)

PAPER: 1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		049	1	B1 for answer in range 47 to 51
	(b)		12	2	M1 for line drawn on a bearing of 320° ±2° A1 for answer in range 10 to 14
13	(a)		75	2	M1 for $3 \times 5 \times 5$ oe A1 cao
	(b)	$108 = 3t^2$ $t^2 = \frac{108}{3} = 36$	± 6	2	M1 for $(t^2 =) \frac{108}{3} (= 36)$ A1 for 6 or –6 or both
	(c)		$a = \frac{v-u}{t}$	2	M1 for subtracting u from both sides or dividing both sides by t as a first step A1 for $a = \frac{v-u}{t}$ oe
14		**B** at (1, 0), (1, –1), (3, –2) **C** at (–2, –1), (–2, –2), (0, –3) Rotation 90° clockwise (or 270° anti-clockwise) about (–2, 2)	Rotation 90° clockwise centre (–2, 2)	3	M2 for stating rotation 90° clockwise (or 270° anti-clockwise) or centre (–2, 2) (M1 for showing **B** and **C** correctly on the grid) A1 for a fully correct description NB Award a maximum of M1 if more than one transformation is given
15	(a)		–3, 8	2	M1 for $3 + (3 - 9) (= -3)$ oe or $5 + (5 - 2) (= 8)$ oe or $\frac{x+9}{2} = 3$ or $\frac{y+2}{2} = 5$ A1 cao
	(b)		$y = -0.5x + 6.5$	3	M1 for a correct method to find the gradient (= –0.5), ft the possible use of coordinates in part (a) M1 for method to find c eg substituting into $y =$ "–0.5"$x + c$ A1 for $y = -0.5x + 6.5$ oe

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
16		10	3	M1 for 15×7 (= 105) or 9×5 (= 45) M1 for $(15 \times 7 - 9 \times 5) \div (15 - 9)$ A1 cao
17 (a)	<table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>0.25</td><td>**0.5**</td><td>**1**</td><td>2</td><td>**4**</td><td>**8**</td></tr></table>	0.5, 1, 4, 8	2	B2 for all 4 correct (B1 for 2 or 3 correct)
(b)		Correct graph	2	M1 for at least 5 points plotted correctly from their table, provided at least B1 scored in part (a) A1 cao for a correct graph drawn from (–2, 0.25) to (3, 8)
*18	Boys Girls Median: 115 112 Range: 41 33 IQR: 17 9	Comparison of data	4	B1 for correct median for girls or boys B1 for any correct range or IQR C1 for a correct comparison of the medians C1 ft for a correct comparison of the ranges or IQRs For the award of both C marks at least one of the comparisons made must be in the context of the question and all figures used for comparisons correct. OR B2 for an accurately drawn boxplot (superimposed) C1 for a correct comparison of the medians C1 for a correct comparison of the ranges or IQRs For the award of both C marks at least one of the comparisons made must be in the context of the question

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
19	$4x - 2y = 26$ $x - 2y = 11$ $3x = 15$ $2x - y = 13$ $2x - 4y = 22$ $3y = -9$	$x = 5$ $y = -3$	3	M1 for correct process to eliminate one variable (condone one arithmetic error) M1 (dep) for substituting found value in one of the equations or appropriate method after starting again (condone one arithmetic error) A1 for $x = 5$ and $y = -3$
20 (a)		1.21×10^4	2	M1 for 12.1×1000 (= 12100) oe A1 cao
(b)		4.5	3	M1 for $4.503 \times 10^9 \div 10^6$ (= 4503) oe or for $4.503 \times 10^9 \div 10^3$ (= 4503000) oe M1 for $4.503 \times 10^9 \div 10^6 \div 10^3$ (=4.503 with no other digits) A1 for cao
21		3.75 oe	3	M1 for a correct scale factor or ratio using two corresponding sides from similar triangles or two sides from the same triangle (may be seen in an equation) e.g $\frac{6}{1.5}$ oe or $\frac{1.5}{6}$ oe or $\frac{5}{6}$ or $\frac{6}{5}$ etc. (accept these written as ratios) M1 for a complete method to find ED A1

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
22		$9x^2 + 7x - 2$	4	M1 for finding an expression for a missing length eg $4x - 1 - x - x$ $(=2x - 1)$ or $x + 2 - 2x$ $(=2 - x)$ M1 for a correct expression for one area from the cross-section, eg. $x \times 2x$ or $(4x - 1)(x + 2 - 2x)$ or for one volume of cuboid(s), eg. $x \times 2x \times (x + 1)$ M1 for a complete method to find the volume A1 for $9x^2 + 7x - 2$ or $(9x - 2)(x + 1)$ oe
23 (i)		38 30	3	M1 for evidence of frequency density calculation, eg 6 on the frequency density axis for the height of the first column or 5 is 1 cm² can be implied by 30 as the second missing frequency A1 for 38 and 30
(ii)		30–50 bar height 0.8 cm		B1 for 30 – 50 bar of height 0.8 cm
24		1.2	3	M1 for $I \propto \frac{1}{d^2}$ or $I = \frac{k}{d^2}$ or $k = Id^2$ or $30 = \frac{k}{2^2}$ or $k = 120$ M1 (dep) for $I = \frac{"120"}{10^2}$ A1 cao

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
25		$\frac{52}{72}$	4	B1 for $\frac{3}{8}$ or $\frac{2}{8}$ or $\frac{1}{8}$ seen as second probability M1 for $\frac{4}{9}\times\frac{3}{8}$ or $\frac{3}{9}\times\frac{2}{8}$ or $\frac{2}{9}\times\frac{1}{8}$ M1 for $1-(\frac{4}{9}\times\frac{3}{8}+\frac{3}{9}\times\frac{2}{8}+\frac{2}{9}\times\frac{1}{8})$ or $\frac{4}{9}\times\frac{3}{8}+\frac{4}{9}\times\frac{2}{8}+\frac{3}{9}\times\frac{4}{8}+\frac{3}{9}\times\frac{2}{8}+\frac{2}{9}\times\frac{4}{8}+\frac{2}{9}\times\frac{3}{8}$ A1 for $\frac{52}{72}$ oe OR B1 for $\frac{5}{8}$ or $\frac{6}{8}$ or $\frac{7}{8}$ seen as second probability M1 for $\frac{4}{9}\times\frac{5}{8}$ or $\frac{3}{9}\times\frac{6}{8}$ or $\frac{2}{9}\times\frac{7}{8}$ M1 for $\frac{4}{9}\times\frac{5}{8}+\frac{3}{9}\times\frac{6}{8}+\frac{2}{9}\times\frac{7}{8}$ A1 for $\frac{52}{72}$ oe SCB2 $\frac{52}{81}$ oe

PAPER: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
26		8	4	M1 for $(2\sqrt{10})^2 - 2^2$ (= 36) A1 for (CD =) 6 M1 (dep on M1) for '6' × 4 – $\frac{1}{2}$ × '6' × 2 – $\frac{1}{2}$ × 2 × 2 – $\frac{1}{2}$ × ('6' – 2) × 4 C1 for area of 8 from fully correct working
27		32 : 45	5	M1 for a correct expression for surface area of the cylinder (=$2\times\pi\times3^2 + 6\pi h$) or surface area of the sphere (=$4\times\pi\times6^2$) M1 (dep) for equating 'surface area of cylinder' and '2 × surface area of sphere', $2\times\pi\times3^2 + 6\pi h = 2\times4\times\pi\times6^2$ M1 (dep) for a method to isolate h M1 for $\pi\times3^2\times$'45' oe and $\frac{4}{3}\times\pi\times6^3$ oe A1 cao

Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
1		The enlargement has been drawn on the grid. Grid has been enlarged. Wording has been changed to: 'On the grid there are two shapes, shape X and shape Y. A point A is marked on the grid. Describe fully the transformation that maps shape X onto shape Y.'	B3 for an enlargement of scale factor 3 with centre A (B2 for 2 aspects described) (B1 for 1 aspect described)
4		Diagram enlarged. Axes labels have been moved to the top of the vertical axis and to the left of the horizontal axis. Right axis has been labelled.	As standard mark scheme
5		Model provided for all candidates. Diagram enlarged and also provided for MLP. Wording has been changed to: 'They show a prism. An arrow points to the side elevation of the prism. Now look at the three shapes below the diagram of the prism, shape A, shape B and shape C. Which shape A, B or C shows the view from the direction of the arrow? [The three diagrams show: A the front elevation, B the plan and C the side elevation].	B2 for shape C only indicated (B1 for shape C and one other shown)

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PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
6	(a) (b)	The letter 'a' has been changed to 't' for all candidates. Frequency numbers have been changed to 5, 15, 15, 20, 5. Grid has been enlarged. Axes labels have been moved to the top of the vertical axis and to the left of the horizontal axis. Right axis has been labelled.	Standard mark scheme with letter change Standard mark scheme Tolerance to **within** half a square
7		Diagram enlarged. Shading changed to dotty shading.	Standard mark scheme
9		Diagram has been enlarged. Wording added 'Angle CEA is marked x.'	Standard mark scheme
10	(a)	Diagram enlarged.	Standard mark scheme
12	(b)	North lines have been extended to 9cm. A line has been added between Y and L and this line has been extended to 9cm. The distance from point Y to T is now 10.8 cm. [Leeway will be needed for answering the question]. '80 km' changed to '100 km'.	M1 for line drawn on a bearing of 320 ±5 drawn A1 for an answer in the range 20 to 30

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
14		Grid has been enlarged. Triangle B and Triangle C have been drawn on the grid. Question changed to: 'A cut out shape has been provided.' '(a) Describe fully the transformation that maps triangle A onto triangle B. (b) Describe fully the single transformation that maps triangle B onto triangle C. (c) Describe fully the single transformation that maps triangle A onto triangle C.	(a) B1 for one aspect of rotation 90°clockwise or centre (0,1) (b) B1 for translation or vector $\begin{pmatrix}-3\\-1\end{pmatrix}$ (c) B1 for rotation of 90°clockwise with centre (−2,2)
	(a) (b)	The table has been turned to vertical format and left aligned. Wording added 'There are four spaces to fill.' Grid has been enlarged.	(a) Standard Mark scheme (b) Standard mark scheme- Allow extra tolerance
18		Diagram enlarged. Lines on the box plot have changed to, '95, 105, 115, 120, 135.'	Boys :Range 40, IQR 15 Standard Mark scheme
21		Diagram enlarged.	Standard Mark scheme

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
22		Model provided for all candidates. Diagram enlarged and also provided for MLP. MLP only: x changed to y.	M1 for finding an expression for a missing length eg $4y - 1 - y - y$ ($=2y - 1$) or $y + 2 - 2y$ ($=2 - y$) M1 for a correct eypression for one area from the cross-section, eg. $y \times 2y$ or $(4y - 1)(y + 2 - 2y)$ or for one volume of cuboid(s), eg. $y \times 2y \times (y + 1)$ M1 for a complete method to find the volume A1 for $9y^2 + 7y - 2$ or $(9y - 2)(y + 1)$ oe
23	(i)	Diagram enlarged. Distances have been changed to '30, 40, 30, 20, 20'. Wording added 'There are two spaces to fill.	M1 for evidence of frequency density calculation, eg 6 on the frequency density axis for the height of the first column or 5 is 1 cm² can be implied by 30 as the second missing frequency A1 for 40 and 30
	(ii)	'	B1 for 30 – 50 bar of height 1 cm
24		Braille only: letter 'I' changed to 'S'.	Standard Mark scheme
25		Diagram enlarged.	Standard Mark scheme
26		Diagram enlarged.	Standard Mark scheme
27		Two models provided for all candidates. Diagrams enlarged and also provided for MLP.	Standard Mark scheme

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Mark Scheme (Results)

November 2016

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Calculator) Unit 1

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NOTES ON MARKING PRINCIPLES

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The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
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If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

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Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

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It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect cancelling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

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11 Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

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Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

PAPER: 5MB1H_01				
Question	Working	Answer	Mark	Notes
1		4 | 7 8 8 5 | 0 0 1 3 5 7 8 6 | 1 2 4 6 6 9 7 | 3 5 8 4 | 7 represents 47 grams	3	B2 for fully correct ordered diagram (B1 for correct unordered diagram or ordered with at most 2 errors) B1 for correct key, eg 4 | 7 represents 47 (grams)
2 (a)		120	2	M1 for $\frac{2}{3} \times 180$ oe A1 cao
(b)		75	2	M1 for $1000 \div 400 \times 30$ or $30 + 30 + 15$ oe A1 cao OR M1 for $3 \times 25 : 40 \times 25$ oe or $75 : 1000$ A1 cao
3 (a)		The greater the hand = length the greater the foot length	1	B1 for the greater the hand = length the greater the foot length oe (accept positive correlation)
(b)		24 – 25	2	M1 for a single straight line segment with positive gradient that could be used as a line of best fit **or** an indication on the diagram from 18.5 on the *x*-axis A1 for answer in range 24 – 25
4 (a)		Suitable question	2	B1 for a suitable question including time period (may appear with response boxes) B1 for at least 3 non-overlapping boxes which are exhaustive for their question
(b)		Suitable reason	1	B1 for suitable reason, eg sample not representative

PAPER: 5MB1H_01				
Question	Working	Answer	Mark	Notes
5		$\frac{2x+9+4x-7}{2}$	2	M1 for $2x + 9 + 4x - 7$ oe A1 for $\frac{2x+9+4x-7}{2}$ oe
*6		No from a correct method	5	M1 for method to find cost of room after discount eg $(1 - 0.15) \times 168$ oe (= 142.8) M1 for method to find income or method to find total expenditure eg 48×9.5 (= 456) eg $50 + 25 + 15 + 225 +$ '142.8' (= 457.8) M1 (dep on M2) for complete method to work out if Freya has enough money eg '457.8' and '456' (or 1.8) eg '457.8' ÷ 48 (= 9.53− 9.54) eg '456' − 90 − 225 (= 141) A1 for correct values for comparison eg 457.8 and 456 eg 9.53 – 9.54 eg 141 and 142.8 C1 (dep on M1) for No or ft their values, with no incorrect statement.
7 (a)		$10 < a \leq 15$	1	B1 cao
(b)		12.5	4	M1 for finding 4 products fx consistently within interval (including end points) M1 (dep) for use of at least 4 correct mid points M1 (dep on first M1) for $\sum fx \div \sum f$ A1 cao

PAPER: 5MB1H_01

Question	Working	Answer	Mark	Notes
8	<table><tr><td></td><td>Co</td><td>Ju</td><td>Wa</td><td>Total</td></tr><tr><td>B</td><td>25</td><td></td><td>17</td><td></td></tr><tr><td>G</td><td></td><td>16</td><td></td><td>45</td></tr><tr><td>Total</td><td></td><td></td><td>37</td><td>99</td></tr></table> OR 37 – 17 = 20 45 − (20 + 16) = 9 25 + 9 =34 OR 99 – 45 =54 54 – (17 + 25) =12 99 – (37 + 12 + 16) = 34	34	4	M1 for a two-way table with clear labelling showing at least 3 values of the given information correctly placed M1 for 54 or 20 M1 for 9 or 12 A1 cao OR M1 for 37 – 17 (=20) M1 for 45 − (‘20’ + 16) (= 9) M1 for 25 + ‘9’ (=34) A1 cao OR M1 for 99 – 45 (=54) M1 for 54 – (17 + 25) (=12) M1 for 99 – (37 + 12 + 16) (=34) A1 cao
9 (a)		1.4	2	M1 for distance ÷ time, eg 14 ÷ 10 A1 for 1.3 – 1.5
(b)		Lorry travels 1.4 kilometres each minute	1	B1 for (lorry travels) 1.4 kilometres each minute oe
10		8.625	3	M1 for 50 × 8.4 (=420) or 30 × 8.25 (=247.5) M1 for (50 × 8.4 − 30 × 8.25) ÷ 20 A1 cao

PAPER: 5MB1H_01				
Question	Working	Answer	Mark	Notes
11		Correct method for obtaining random sample	1	B1 for a correct method for obtaining random sample, eg number each television and use random numbers to select the numbers (televisions)
12 (a)		50 – 60		M1 for '340' or reading graph at 72 A1 for 50 – 60
(b)	Median = 66 LQ = 62 UQ = 70 L = 50 and H = 81	Box plot	3	B3 for a fully correct box plot (B2 for a box plot with at least 3 correctly values including box and whiskers/tails B1 for a box plot with at least 2 correctly values including box and whiskers/tails or 5 correct values plotted and no box or whiskers/tails)
*(c)		Two comparisons	2	C2 ft for two relevant comparisons in context, one for median and one for IQR or range (C1 ft for one relevant comparison)
13 (a)		$\frac{2}{5}$ $\frac{3}{5}, \frac{2}{5}$ $\frac{3}{5}, \frac{2}{5}$	2	B1 for $\frac{2}{5}$ on first branch B1 for $\frac{3}{5}, \frac{2}{5}$ and $\frac{3}{5}, \frac{2}{5}$ on other branches
(b)		$\frac{6}{25}$	2	M1 f.t. for '$\frac{3}{5} \times \frac{2}{5}$' A1 f.t. for $\frac{6}{25}$ oe

PAPER: 5MB1H_01				
Question	Working	Answer	Mark	Notes
14		2	2	M1 for $\frac{17}{176} \times 20$ or 1.93…seen A1 cao
15	e.g. (0.8 + 0.8 + 0.8) + (3.6 + 3.6) + 7.2 + (4.4 + 4.4) = 25.6 cm^2 = 320 lizards So, 1 cm^2 = 12.5 lizards 7.2 + 4.4 + 4.4 = 16 16 × 12.5 = 200	200	3	M1 for equating area to frequency, eg 1 cm^2 = 12.5 lizards M1 for (7.2 + 4.4 + 4.4) × '12.5' A1 cao OR M2 for $\frac{16}{25.6} \times 320$ oe A1 cao
16 (a)		0.000125	2	M1 for $(1 - 0.95)^3$ A1 cao (accept $\frac{1}{8000}$)
(b)		0.135375	3	M1 for 0.95 × 0.95 × (1 – 0.95) M1 for 3 × 0.95 × 0.95 × (1 – 0.95) A1 for 0.135 – 0.136
17 (a)		750	2	M1 for $\frac{30}{N} = \frac{2}{50}$ oe A1 cao
(b)		assumption	1	B1 for correct assumption eg random selection (of beads)

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PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
1		67200	2	M1 for 0.12 × 60000 (= 7200) oe A1 cao
2		40	2	M1 for 32 ÷ 20 (= 1.6) or 32 × 25 (= 800) or 20:25 (or use of) A1 cao
3		105.7	2	M1 for π × 5.8 × 5.8 oe A1 for 105.6 to 105.8
4		Perpendicular bisector	2	M1 for accurate line drawn without arcs, or appropriate arcs A1 accurate line and appropriate arcs drawn
5 (a)		Inequality drawn	2	B2 for all three features of −2, O and right arrow (B1 for two of these features)
(b)		2	3	M1 for isolating the y terms A1 for $3y < 8$ or $3y = 8$ or better B1 ft
6 (a)		Triangle	2	B1 for triangle translated B1 for triangle at (−2,2), (−2,0), (−1,0)
(b)		Rotation 90° anticlockwise centre (0,0)	3	B1 Rotation B1 90° anticlockwise oe B1 centre (0,0) Note Award no marks if more than one transformation is given

PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
*7		Flow pumps	5	M1 for a correct first step, eg 4 × 35 (= 140 galls in 1 min or 8400 galls in 1 hour) or 1000000 ÷ 2100 (= 476 hours for 1 speedy pump) or 35 × 60 (= 2100 gallons in 1 hour) M1 for a correct method to find a time taken for one type of pump, eg 1000000 ÷ 8400 (= 119 hours) M1 for a correct method to find a time taken for the other type of pump (consistent), eg 500 ÷ 5 (= 100 hours) A1 for two correct comparable values, eg 119 (hours) and 100 (hours) C1 ft (dep M3) for conclusion of Flow pumps with correct figures for comparison OR M1 for a correct first step, eg 4 × 35 (= 140 galls in 1 min) M1 for a correct method to find the number of gallons pumped out by one type of pump in a certain time period, eg 1000000 ÷ 100 (= 10000 gall in 1 hour) M1 for a correct method to find the number of gallons pumped out by the other type of pump in a certain time period (consistent), eg for two correct comparable values, eg 10000 ÷ 60 (= 166 gallons in 1 min) A1 for 140 (galls in 1 min) and 166 (galls in 1 min) oe C1 ft (dep M3) for conclusion of Flow pumps with correct figures for comparison
8		2 000 000	2	M1 for 2 × 100 × 100 × 100 A1 oe

PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
*9		Tymes shop	3	M1 for 80 – 18 (= 62) or for method to reduce 80 by 20% oe (= 80 − 16 = 64) A1 for 62 and 64 C1 for comparison using 62 and 64 OR M1 for method to find 20% of 80 (=16) A1 for 16 C1 for comparison using 16 and given 18 OR M1 for writing £18 as a % of £80 (= 22.5%) A1 for 22.5% C1 for comparison using 22.5% and 20%
10		C shown	3	M1 for correct angle of 70° M1 for correct angle of 320° A1 C marked unambiguously in the correct position
11		8.56	3	M1 for $5.2^2 + 6.8^2$ (= 73.28) M1 for $\sqrt{(5.2^2 + 6.8^2)}$ or $\sqrt{73.28}$ A1 for 8.5 – 8.6

PAPER: 5MB3H_01

Question	Working	Answer	Mark	Notes
12 (a)		Equation	2	M1 for $2x \times x \times (x + 4)$ A1 for clear working leading to $x^3 + 4x^2 = 90$
(b)	3 63 4 128 3.1 68.231 3.2 73.728 3.3 79.497 3.4 85.544 3.5 91.875 3.45 88.67363 3.46 89.30814 3.47 89.94552 3.48 90.58579	3.5	4	B2 for trial evaluated using $3 < x < 4$ (B1 for trial evaluated using $3 \leq x \leq 4$) B1 for a different trial evaluated using $3.4 \leq x \leq 3.5$ B1 (dep on at least one previous B1) for 3.5 Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1 dp but correct to 1dp (rounded or truncated) if the value of x is to 2 dp. NB: no working scores no marks even if the answer is correct.
13 (a)		−3 −2 −1 0 1 2 3 −5 **8** 9 **4** **−1** 0 13	2	B2 for all 3 correct values (B1 for 2 correct values)
(b)			2	M1 (dep on B1) for plotting at least 6 values from their table A1 for a correct graph
14		$x = 0.4$, $y = -2$	4	M1 for a correct method leading to either x or y (condone one error) A1 for $x = 0.4$ or $y = -2$ M1 for a correct substitution into one of the equation or a correct method leading to the second value A1 cao
15		$d = ep - ef$	2	M1 for isolating the term in d or multiplication of all terms by e as the first step A1 oe

PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
*16			4	M1 for showing that *OAB* and *ODA* are isosceles (*OA*, *OB*, *OD* radii) or shows that *OD* bisects *AOB*. M1 for recognising that *AOB* = 120° (from *ACB* = 60°) A1 for identifying angles of ODA as 60° C1 (dep on M1) for conclusion that ODA is equilateral, and appropriate reason linked to shown method eg The angle at the centre of a circle is twice the angle at the circumference. OR M1 for showing that triangles *OAM* and *OBM* are congruent (*OM* common, *AM* = *MB* given, and *OA* = *OB* radii) M1 for showing *AOM* = 60° and *AO* = *OD* (radii) A1 for identifying angles of *ODA* as 60° C1 (dep on M1) for conclusion that *ODA* is equilateral, and appropriate reason linked to shown method eg The angle at the centre of a circle is twice the angle at the circumference.
17		16	2	M1 for 18 ÷ 24 (= 0.75) or 24 ÷ 18 (= 1.333) A1 cao
18		199 - 201	3	M1 for a correct first step, eg changes km/s to mph 13 × 2250 (= 29250 mph) M1 for finding time eg $\frac{1.4\times10^8}{"29250"}$ (= 4786 hours) A1 199 to 201 days OR M1 for a correct first step, eg changes km to miles $1.4 \times 10^8 \times 1.6$ ($= 2.24 \times 10^8$) M1 for finding time eg $\frac{"2.24\times10^8"}{13}$ (= 17230769 seconds) A1 199 to 201 days

PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
19 (a)		5 and −7	3	M1 for $(x \pm 5)(x \pm 7)$ M1 for $(x - 5)(x + 7)$ A1 cao OR M1 for correct substitution into formula M1 for reduction to $\frac{-2 \pm \sqrt{144}}{2}$ A1 cao
(b)		$\pm\sqrt{3}$	4	M1 for multiplying through by a common denominator eg by $(x + 1)(2x + 3)$ M1 (dep) for reduction eg to $4x + 6 + x^2 + x$ or $2x^2 + 3x + 2x + 3$ M1 for $x^2 - 3$ (= 0) A1 cao for both answers; accept decimals to at least 2 dp
20		$\frac{59}{330}$	3	M1 for $100x = 17.87878787\ldots$ or $1000x = 178.7878787\ldots$ **and** $10x = 1.7878787$ M1 (dep) for subtraction, $100x - x$ or $1000x - 10x$ or $\frac{17.7}{99}$ or $\frac{177}{990}$ seen A1 working leading to given fraction
21		7	2	M1 for $6000 \times (1.03)^n$ for $n > 2$ OR M1 for $7379.24 \div 6000$ (= 1.2298733) A1 cao

PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
22		8.64	5	M1 for $0.5 \times 9.3 \times 8 \times \sin BAC$ A1 for $BAC = 59.34°$ M1 for substitution into the cosine rule eg $9.3^2 + 8^2 - 2\times9.3\times8\times\cos$"59.34" M1 for correct order of calculation and $\sqrt{}$ eg $86.49 + 64 - 75.8777$ leading to $\sqrt{74.6123}$ A1 8.6 to 8.7 with supporting working
23 (a)		199.75	1	B1 cao
*(b)		Yes	3	B1 for ub = 24.5 or 175.5 M1 ft for "24.5" + "175.5" (= 200) C1 (dep M1) for 200 and statement based on their working as to whether the cup will overflow (ie comparison with (a)).

PMT

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Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE
In Mathematics A (1MA0)
Higher (Non-Calculator) Paper 1H



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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labeling conventions.

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7 With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
If there is no answer on the answer line then check the working for an obvious answer.
Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.
If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg incorrect canceling of a fraction that would otherwise be correct
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10 Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11 Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12 Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 Range of answers
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		x^{12}	1	B1 cao
(b)		2	1	B1 cao
(c)		18	1	B1 cao
(d)		example given	1	B1 for stating a value of n for which $6n + 1$ is not prime eg 4, 8, 9, 14, 19, ... ,1000 etc

Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*2		Yes (supported)	5	M1 for method to calculate profit on one laptop e.g. 400 × 0.3 oe (= 120) **or** 400 × 0.15 oe (= 60) M1 for method to calculate selling price of one of the two deals e.g. 400 × 1.3 oe (= 520) **or** 400 × 1.15 oe (= 460) M1 for method to calculate the total selling price of one laptop e.g. 40 × 400 × 1.3 oe (= 20 800) **or** 10 × 400 × 1.15 oe (= 4600) M1 for total income e.g. “20 800” + “4600” C1 for Yes **and** (£)25 400 **or** Yes with £400 more **OR** M1 for a method for the profit on one laptop e.g. 400 × 0.3 oe (=120) **or** 400 × 0.15 oe (= 60) M1 for a method for the total profit for one of the two deals e.g. 40 × “120” (= 4800) **or** 10 × “60” (= 600) M1 for a method for total profit “4800” + “600” (= 5400) M1 for a method for target profit e.g. 25 000 − 400 × 50 (= 5000) C1 for Yes with (£)5400 **and** (£)5000 **or** Yes with £400 more **OR** M1 for a method for the profit on one laptop e.g. 400 × 0.3 oe (= 120) **or** 400 × 0.15 oe (= 60) M1 for a method for the total profit for one of the two deals e.g. 40 × “120” oe (= 4800) **or** 10 × “60” (= 600) M1 for 50 × 400 + “4800” or 50 × 400 + “600” M1 for 50 × 400 + “4800” + “600” (= 25400) C1 for Yes **and** (£)25 400 **or** Yes with £400 more

Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
3 (a)		Frequency polygon	2	B2 correct frequency polygon (B1 for points plotted correctly but not joined OR for points plotted at the correct heights, consistently placed within the class intervals (including ends) and joined OR for an otherwise correct frequency polygon with one point incorrect OR correct frequency polygon with first and last points joined directly) NB: ignore parts of graph drawn to the left of the 1st point or the right of the last point; ignore any histograms drawn.
(b)		$60 < A \leq 80$	1	B1 ft frequency polygon
4		−2	3	M1 for expanding brackets eg $4x + 12$ $(= 2x + 8)$ or dividing by 4 as a first step eg $x + 3 = \frac{2x}{4} + \frac{8}{4}$ M1 ft their equation of the form $ax + b = 2x + 8$ or $x + 3 = ax + b$ for isolating terms in x and numbers e.g. $4x - 2x = 8 - 12$ seen as part of their solution oe A1 cao
5		42	3	M1 for a method to find angle ABD eg $ABD = 360 - 130 - 130 - 40$ $(= 60)$ or angle DBC eg $DBC = 180 - 2 \times 72$ $(= 36)$ (may be on the diagram) M1 for a complete method eg (180 – "60" − "36") ÷ 2 A1 cao OR M1 for a method to find angle ABC eg $ABC = 540 - 130 - 40 - 130 - 72 - 72$ $(= 96)$ M1 for a complete method eg (180 − "96") ÷ 2 A1 cao

Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
6 (a)		40 100	3	M1 for method to find unit weight eg 60 ÷ 3 (= 20) M1 for complete method to find weight of one of the other ingredients eg "20" × 2 (= 40) or "20" × 5 (= 100) A1 cao
(b)		1.44	3	M1 for a complete method to work out the weight of nuts needed eg 300 ÷ (3 + 2 + 5) × 3 (= 90) or 300 ÷ (60 + "40" + "100") × 60 (= 90) M1 for a complete method to work out the cost eg (800 ÷ 500) × "90" (= 144) A1 cao
7		15 200	3	M1 for a method to obtain at least 2 different areas from 50×80 (= 4000), $\frac{1}{2} \times 40 \times 60$ (= 1200), 60×80 (= 4800) M1 (dep on M1) for adding at least 4 correct face areas A1 cao
8 (a)		Transformation	2	B2 for a triangle with vertices at (−1, 1), (−2, 3) and (−2, 1) (B1 for a triangle in correct orientation or rotated 90° clockwise centre the origin)
(b)		Description	3	B1 Enlargement B1 Scale factor 3 (accept × 3) B1 Centre (1,0) NB: More than one transformation is B0

Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
9		$\frac{4}{15}$	3	M1 for a method to find the total number of people eg 3×5 (= 15) or $\frac{5}{15} = \frac{1}{3}$ M1 (dep) for "15" – 5 – 6 (= 4) A1 oe OR M1 for a method to find prob (boy) eg $\frac{6}{5} \times \frac{1}{3}$ (= $\frac{6}{15}$) M1 (dep) for $1 - \text{“}\frac{6}{15}\text{”} - \frac{1}{3}$ A1 oe OR M1 for an expression for the number of adults eg $\frac{5}{5+6+x}$ M1 (dep) for $\text{“}\frac{5}{5+6+x}\text{”} = \frac{1}{3}$ or $x = 4$ A1 oe **SC:** B2 for $\frac{4}{n}$ where $n > 4$, $n \neq 15$

Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
10 (a)		$3n - 1$	2	B2 for $3n - 1$ oe (B1 for $3n + k$, k an integer $\neq -1$ or absent)
(b)		Yes	2	M1 for $3n - 1 = 299$ ft if B1 earned in (a) A1 for eg Yes and $n = 100$ oe
(c)		$3(n+1)-1$	1	B1 oe eg $3n + 2$ or ft (a) providing at least B1 earned
11		(102, 104)	3	B1 for (P=) (106, 107) M1 for a complete method eg [104 − ("106" − 104), 105.5 − ("107" − 105.5)] or (A=) (102, y) or (A=) (x, 104) A1 cao
12		270	3	M1 for correct use of formula for volume of a cylinder using exact or (some) approximate figures eg $\pi \times 31^2 \times 97.5$ or $\pi \times 31^2 \times 100$ or using an estimate of π eg $\pi = 3$ in the volume formula M1 for a complete method to find an estimate for the volume in cm^3 with at least 2 values rounded eg $\pi \times 30^2 \times 100$ (= 270 000) eg $3.1 \times 30^2 \times 100$ eg $3 \times 31^2 \times 100$ A1 accept answer in the range 270 − 300 from a method using estimates

Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
13 (a)		5, −1, 5	2	B2 for all 3 correct (B1 for 1 or 2 correct)
(b)		Correct graph	2	M1 ft for 5, 6 or 7 points plotted correctly, provided at least B1 awarded in (a) A1 for a fully correct graph (no line segments)
(c)		−0.6, 3.6	2	M1 for use of $y = 3$ A1 for −0.5 to −0.7, 3.5 to 3.7 (ft quadratic graph)
14		130	4	M1 for setting up two correct equations eg 3p + 4c = 440 4p + 3c = 470 M1 for adding the two equations eg 7p + 7c = 910 or for a correct method to eliminate one variable (allow one error) M1 for a method to find p + c eg 910 ÷ 7 or for a complete method to find both p and c (p = 80, c = 50) A1 for 130 or £1.30(p) **NB:** Allow any letters for variables. Allow a non-algebraic approach eg 7 kg potatoes and 7 kg carrots costs a total of 910

Paper: 1MA0/1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15			18	4	M1 for correct initial use of Pythagoras eg $(AB^2 =)\ 10^2 - 6^2$ (= 64) or $AB = 8$ M1 (dep M1) for "$\sqrt{64}$" ÷ 2 (= 4) M1 for method to find area of trapezium eg $\frac{1}{2} \times$ "4" × (6 ÷ 2 + 6) A1 cao OR M1 for correct initial use of Pythagoras eg $(AB^2 =)\ 10^2 - 6^2$ (= 64) or $AB = 8$ M1 (dep M1) for method to find area of ΔABC eg $\frac{1}{2} \times$ "$\sqrt{64}$" × 6 (= 24) or area of ΔAED $\frac{1}{2} \times 6 \div 2 \times$ "4" (= 6) or $24 \times (\frac{1}{2})^2$ (= 6) M1 for a complete method to find area of $EDBC$ e.g $\frac{3}{4} \times$ "24" eg "24" − "6" A1 cao
16	(a)	40, 110, 170, 185, 195, 200	Table	1	B1
	(b)		Cumulative frequency diagram	2	M1 ft their cumulative frequency table for at least 5 points plotted correctly at the ends of the intervals provided tables values are cumulative, condoning one arithmetical error, **or** if the shape of the graph is correct for 5 or 6 points plotted not at the ends but consistently within each interval and joined. A1 for a correct graph (allow curve or line segments)
	(c)		40 to 48	2	M1 for reading their cumulative frequency graph from mark of 54 (= 152 to 160) where the points are plotted consistently within each interval and joined. A1 for answer in the range 40 to 48 or ft from their cumulative frequency graph

Paper: 1MA0/1H

Question	Working	Answer	Mark	Notes
17		0.5	4	M1 for identifying a common denominator in a correct expression or equation eg $\frac{4(x+1)}{12}+\frac{3(2x+5)}{12}$ (= 2) M1 (dep on M1) for expanding both brackets in an equation eg $\frac{4x+4}{12}+\frac{6x+15}{12}$ = 2 eg $4x + 4 + 6x + 15 = 12\times 2$ M1 (dep on M1) for isolating "like terms" on each side of an equation eg $4x + 6x = 24 - 15 - 4$ A1 for 0.5 oe
18 (a)		5.4×10^6	1	B1 cao
(b)		0.00032	1	B1 cao
(c)		6.3×10^{32}	2	M1 for 630×10^{30} oe or figures 63 **with** $\times 10^n$ A1 for 6.3×10^{32} or 6.30×10^{32}
*19	<table><tr><td></td><td>M</td><td>F</td></tr><tr><td>Median</td><td>40</td><td>40</td></tr><tr><td>Range</td><td>90</td><td>106</td></tr><tr><td>IQR</td><td>31</td><td>42</td></tr></table>	Compare: medians and spread	3	C1 for any correct comparison of the medians C1 for any correct comparison of the IQRs or range C1 for a comparison of medians, IQRs or ranges written in context

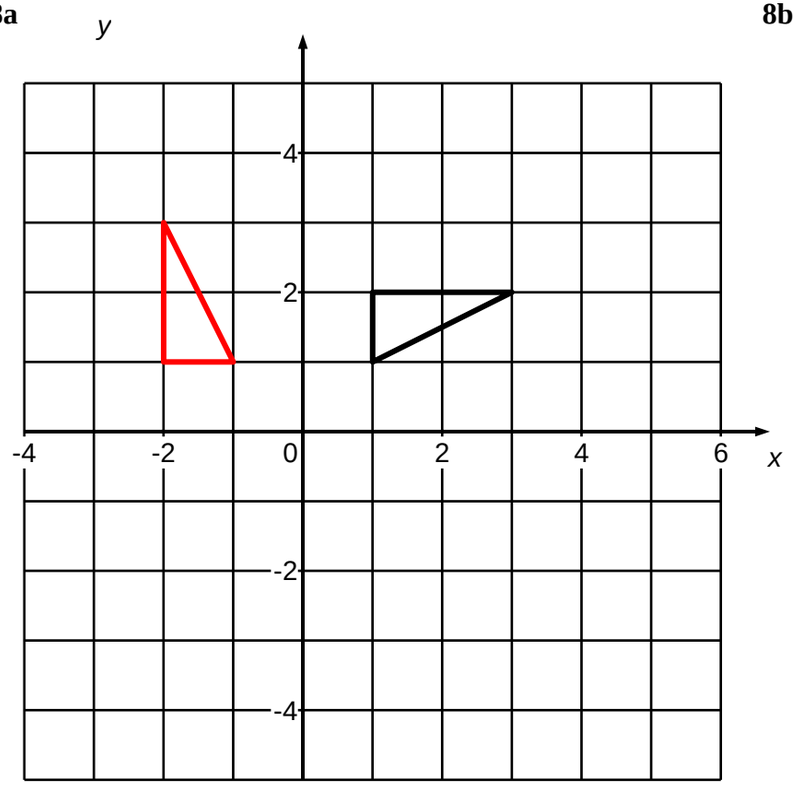
Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
20 (a)		x^6	1	B1 cao
(b)		$(2y + 1)(y - 3)$	2	M1 for $(2y \pm 1)(y \pm 3)$ or $(2y \pm 3)(y \pm 1)$ A1 cao
21		$16\sqrt{2}$	4	M1 for method to expand $(\sqrt{8} + 2)^2$ with at least 3 correct terms out of 4 terms M1 for method to expand $(\sqrt{8} - 2)^2$ with at least 3 correct terms out of 4 terms M1 (dep on M2) for a method to subtract the two expressions and use of $\sqrt{8} = 2\sqrt{2}$ A1 cao OR M1 for factorising $a^2 - b^2 = (a + b)(a - b)$ M1 for substituting for a and b with simplification (at least 1 of the two terms correct) M1 (dep on M2) for multiplying the 2 terms together and use of $\sqrt{8} = 2\sqrt{2}$ A1 cao

Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*22		155°	5	M1 for a method to find angle *AOD* e.g 90 − 40 (= 50) M1 for a complete method to find angle *BCD* eg 360 − '50' (= 310) and '310' ÷ 2 (= 155) A1 for 155 C2 for complete reasons for their method Angle between tangent and radius = 90 Angle at the centre is twice the angle at the circumference oe Angle sum of a triangle = 180 Sum of angles round a point = 360 (C1 for at least two reasons, one of which must be a circle theorem) OR M1 for a method to find angle *AOD* eg 90 − 40 (= 50) M1 for a complete method to find angle *BCD* eg 50 ÷ 2 (= 25) and 180 − '25' (= 155) A1 for 155 C2 for complete reasons for their method Angle between tangent and radius = 90 Angle at the centre is twice the angle at the circumference oe Opposite angles of a cyclic quadrilateral add up to 180 Angle sum of a triangle = 180 (C1 for at least two reasons, one of which must be a circle theorem)

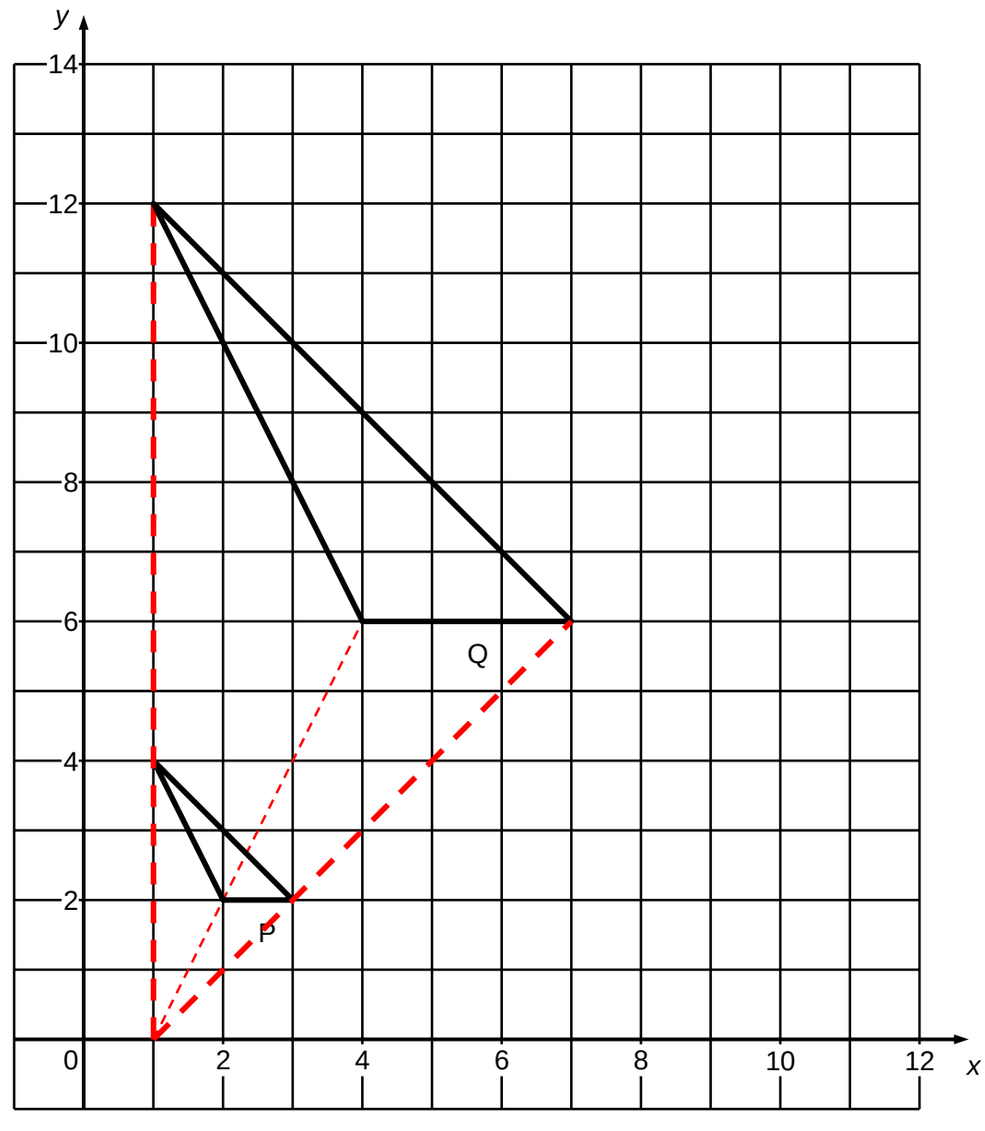
Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
23 (a)		$\frac{42}{110}$	3	M1 for use of 11 and 10 in the denominators M1 for $\frac{7}{11} \times \frac{6}{10}$ oe A1 for $\frac{42}{110}$ oe **SC for replacement**: B1 for $\frac{7}{11} \times \frac{7}{11}$ $(= \frac{49}{121})$
(b)		$\frac{62}{110}$	3	M1 for correct method for GG $\frac{3}{11} \times \frac{2}{10}$ $(= \frac{6}{110})$ M1 (dep) $1 - (BB + GG)$ $= 1 - (\text{“}\frac{42}{110}\text{”} + \text{“}\frac{6}{110}\text{”})$ A1 for $\frac{62}{110}$ oe OR M1 for at least two of $\frac{7}{11} \times \frac{3}{10}$, $\frac{7}{11} \times \frac{1}{10}$, $\frac{3}{11} \times \frac{1}{10}$ oe M1 for a complete method eg $2 \times (\frac{7}{11} \times \frac{3}{10} + \frac{7}{11} \times \frac{1}{10} + \frac{3}{11} \times \frac{1}{10})$ oe A1 for $\frac{62}{110}$ oe **SC for replacement**: B2 for $2 \times (\frac{7}{11} \times \frac{3}{11} + \frac{7}{11} \times \frac{1}{11} + \frac{3}{11} \times \frac{1}{11})$ oe $(= \frac{62}{121})$ or $(\frac{7}{11} \times \frac{4}{11} + \frac{3}{11} \times \frac{8}{11} + \frac{10}{11} \times \frac{1}{11})$ oe $(= \frac{62}{121})$ or $1 - (\text{“}\frac{49}{121}\text{”} + \frac{9}{121} + \frac{1}{121})$ oe $(= \frac{62}{121})$ (B1 for at least two of $\frac{7}{11} \times \frac{3}{11}$, $\frac{7}{11} \times \frac{1}{11}$, $\frac{3}{11} \times \frac{1}{11}$ oe)

Paper: 1MA0/1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
24 (a)		$3\mathbf{a} + 3\mathbf{b}$	2	M1 for $\vec{AB} = 6\mathbf{b} - 6\mathbf{a}$ oe or $\vec{BA} = 6\mathbf{a} - 6\mathbf{b}$ oe or $(\vec{OM}) = \frac{1}{2}(6\mathbf{a} + 6\mathbf{b})$ oe A1 cao
*(b)	Method 1 Show that $\vec{AG}$ is parallel to $\vec{AN}$	Shown	4	M1 for a method to find $\vec{OG}$ or $\vec{GM}$ in terms of **a** and **b** eg $\vec{OG} = \frac{2}{3}$ "$(3\mathbf{a} + 3\mathbf{b})$" $(= 2\mathbf{a} + 2\mathbf{b})$ eg $\vec{GM} = \frac{1}{3}$ "$(3\mathbf{a} + 3\mathbf{b})$" $(= \mathbf{a} + \mathbf{b})$ M1 for a method to find $\vec{AN}$ in terms of **a** and **b** eg $-6\mathbf{a} + 6\mathbf{b} \div 2$ $(= 3\mathbf{b} - 6\mathbf{a})$ M1 for a method to find $\vec{AG}$ in terms of **a** and **b** eg $-6\mathbf{a}$ + "$2\mathbf{a} + 2\mathbf{b}$" $(= 2\mathbf{b} - 4\mathbf{a})$ C1 for correct simplified expressions in terms of **a** and **b** for $\vec{AG}$ and $\vec{AN}$ followed by conclusion OR M1 for a method to find $\vec{OG}$ in terms of **a** and **b** eg $\frac{2}{3}$ "$(3\mathbf{a} + 3\mathbf{b})$" $(= 2\mathbf{a} + 2\mathbf{b})$ M1 for a method to find $\vec{GN}$ in terms of **a** and **b** eg −"$(2\mathbf{a} + 2\mathbf{b})$" $+ 6\mathbf{b} \div 2$ $(= \mathbf{b} - 2\mathbf{a})$ M1 for a method to find $\vec{AG}$ in terms of **a** and **b** eg $\frac{1}{2}(6\mathbf{b} - 6\mathbf{a}) - \frac{1}{3}$ "$(3\mathbf{a} + 3\mathbf{b})$" $(= 2\mathbf{b} - 4\mathbf{a})$ C1 for correct simplified expressions in terms of **a** and **b** for $\vec{AG}$ and $\vec{GN}$ followed by conclusion
	Method 2 Show that $\vec{AG}$ is parallel to $\vec{GN}$			

8a



8b



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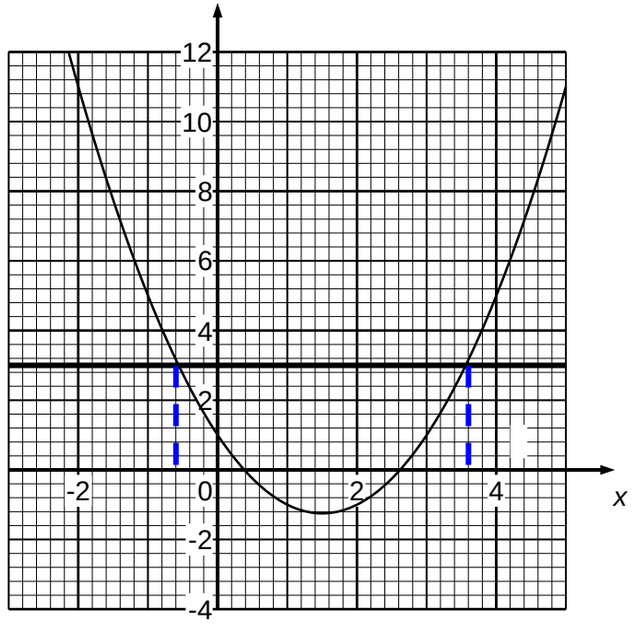

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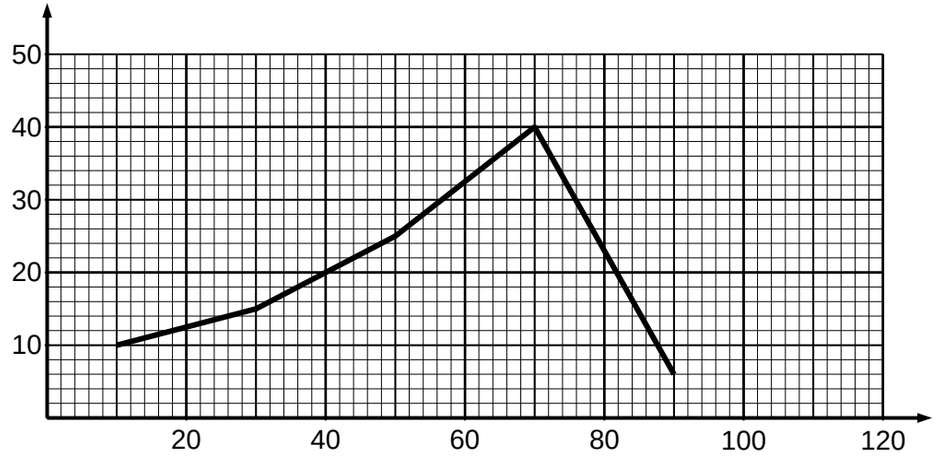
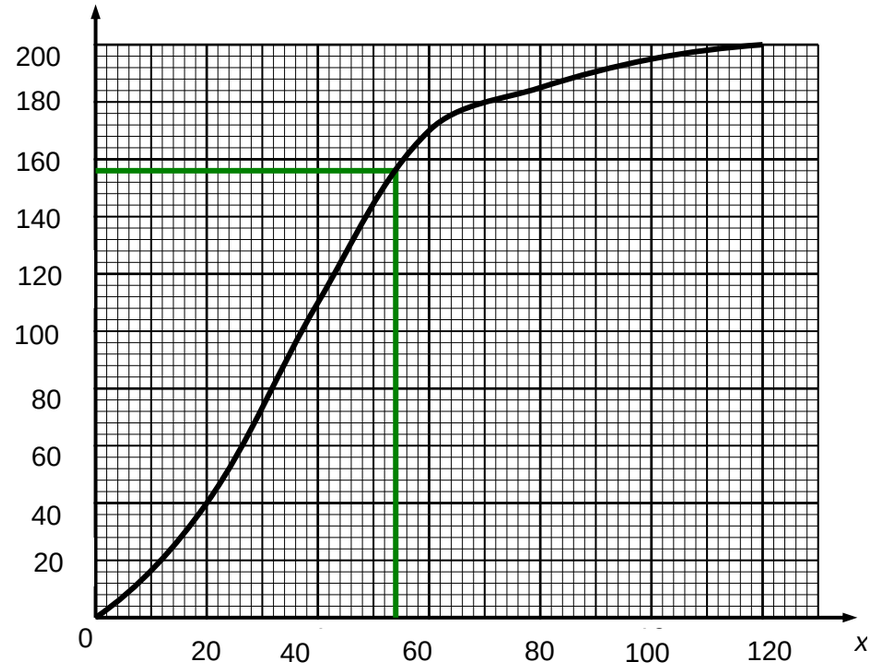
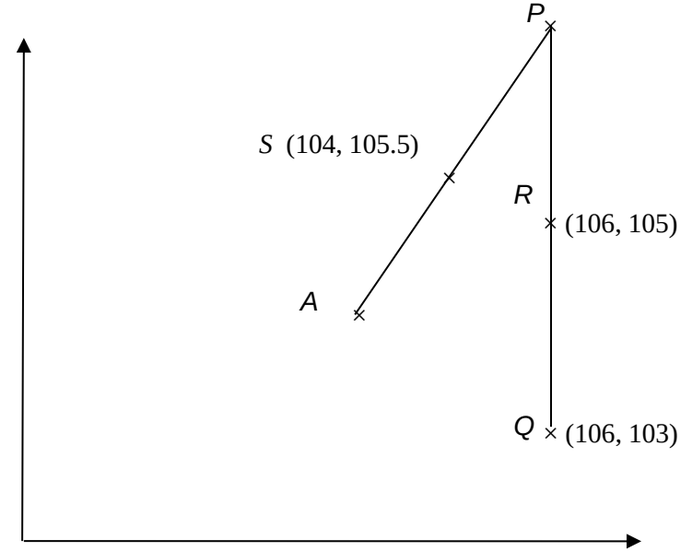


16


200
180
160
140
120
100
80
60
40
20
0
20
40
60
80
100
120
x

11

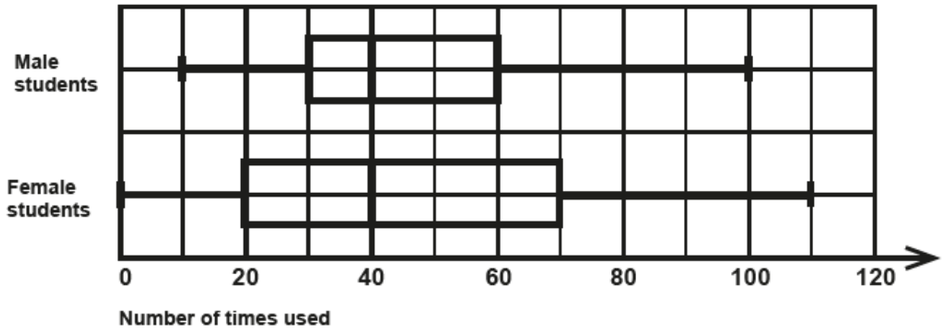

P
S (104, 105.5)
R
(106, 105)
A
Q
(106, 103)

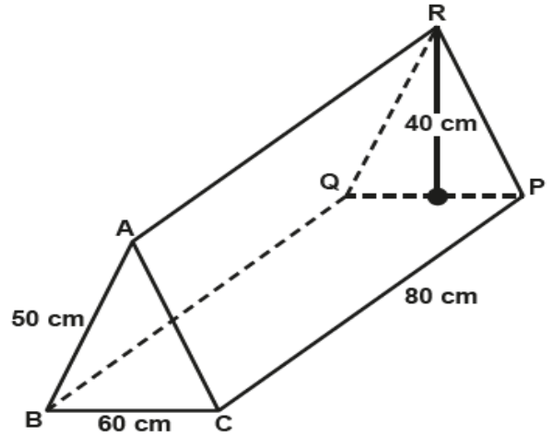
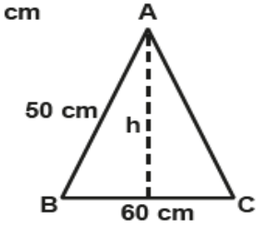
Modifications to the mark scheme for Modified Large Print (MLP) papers.

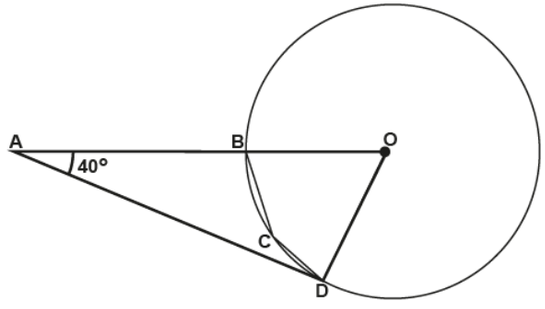
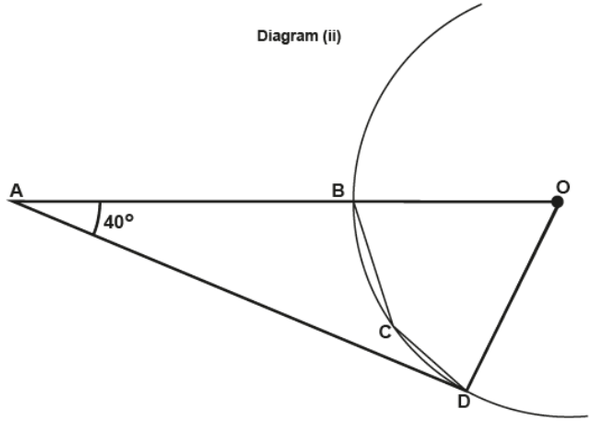
Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5º
Measurements of length: ±5 mm

PAPER: 1MA0_1H			
Question		**Modification**	**Mark scheme notes**
1	(a)	MLP only: *x* changed to *e*.	Standard mark scheme but *x* changed to *e* for MLP
3		Number 6 on the frequency column of the table changed to number 5. Diagram enlarged. Right axis has been labelled. Axes labels have been moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme
4		MLP only: *x* changed to *y*.	Standard mark scheme but *x* changed to *y* for MLP
5		Diagram enlarged. Angle sizes moved outside of the angle arcs; arcs have been made smaller.	Standard mark scheme
7		See below	
8	(a)	Question reversed. Triangle S has been rotated by anticlockwise 90° at the origin and has been labelled triangle T. Question wording changed to 'It shows triangle S and triangle T given on a grid. Describe fully the single transformation that maps triangle S onto triangle T.' 3 answer lines have been provided. Dotty shading has been used.	New mark scheme: B1 for Rotation B1 for 90° anticlockwise about origin [(0,0)]
8	(b)	Diagram enlarged. Shading has changed to dotty shading. Shapes labelled 'triangle Q' and 'triangle P'. Wording added 'It shows triangle Q and triangle P given on a grid.' Question wording 'shape' changed to 'triangle'. *x* axis cut so it finishes at 10. The grid to the left and below the axis is removed.	Standard mark scheme
12		Model provided for all candidates. Diagram enlarged and also provided for MLP. Arrow heads removed and a dot has been added to the centre.	Standard mark scheme
13		In (a) Table has been turned to vertical format and left aligned. Wording added 'There are three spaces to fill.'. In (b) Diagram enlarged.	Standard mark scheme
15		Diagram enlarged. Arrow removed from 6 cm. Arrow and line for 10 cm now a dashed line.	Standard mark scheme

<table>
<tr><th colspan="3">PAPER: 1MA0_1H</th></tr>
<tr><th colspan="2">Question</th><th>Modification</th><th>Mark scheme notes</th></tr>
<tr><td>16</td><td>(a)</td><td>Numbers on the frequency table changed to: 40, 70, 50, 20, 10, 10.</td><td>(a) award B1 for 40, 110, 160, 180, 190, 200
In (b) standard mark scheme (with the above figures) but apply extended tolerance to the plotting of their points.</td></tr>
<tr><td>16</td><td>(c)</td><td>Diagram enlarged. Right axis has been labelled. Axes labels have been moved to the left of the horizontal axis and above the vertical axis.
On larger print versions the horizontal axis is labelled 0, 20, 40, etc. due to lack of space
The number 54 has been changed to 50.</td><td>For (c): M1 indicates using diagram with a mark of 50 eg draws line from 50 to their cumulative frequency graph, or sght of 160 eg 200 − 160
A1 for 40 or ft on a cumulative frequency graph</td></tr>
<tr><td>17</td><td></td><td>MLP only: x changed to y.</td><td>Standard mark scheme with x replaced with y</td></tr>
<tr><td>19</td><td></td><td>Diagram enlarged. Points on the Male box plot moved to: 10, 30, 40, 60, 100. Points on the Female box plot moved to: 0, 20, 40, 70, 110. Horizontal axis label moved to the left of the axis.

</td><td>Standard mark scheme for the award of marks, but not the different figures they might use as shown below.
<table><tr><td></td><td>Male</td><td>Female</td></tr><tr><td>Median</td><td>40</td><td>40</td></tr><tr><td>Range</td><td>90</td><td>110</td></tr><tr><td>IQR</td><td>30</td><td>50</td></tr></table></td></tr>
<tr><td>22</td><td></td><td>See below</td><td></td></tr>
<tr><td>24</td><td></td><td>Diagram enlarged. Crosses at G and N changed to a solid dots.</td><td>Standard mark scheme.</td></tr>
</table>

PAPER: 1MA0_1H			
Question		**Modification**	**Mark scheme notes**
7		 Cross section of prism h = height 40 cm 	Diagram changed as shown. Model provided for all candidates. Diagram also enlarged and provided for MLP. Cross section of the prism also provided. Key provided for the cross section of the prism. Braille only: will label the cross section R P Q.	Standard mark scheme

2		Diagram enlarged and labelled 'Diagram (i)'. Angle size moved outside of the angle arc and the arc has been made smaller. An enlarged part of the diagram has also been provided and labelled 'Diagram (ii)'. Wording added 'Diagram (ii) shows an enlarged section of part of the diagram.' Question 22 Diagram (i)  Diagram (ii)  	Standard mark scheme.

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Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 3H

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General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

1 All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.
Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

3 **Crossed out work**
This should be marked **unless** the candidate has replaced it with an alternative response.

4 **Choice of method**
If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

5 **Incorrect method**
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

6 **Follow through marks**
Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.
Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

7 Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg incorrect algebraic simplification).

8 Probability

Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

9 Linear equations

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).

10 Range of answers

Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.

11 Number in brackets after a calculation

Where there is a number in brackets after a calculation E.g. 2 × 6 (=12) then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

12 Use of inverted commas

Some numbers in the mark scheme will appear inside inverted commas E.g. “12” × 50 ; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

13 Word in square brackets

Where a word is used in square brackets E.g. [area] × 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

14 Misread

If a candidate misreads a number from the question. Eg uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

Guidance on the use of abbreviations within this mark scheme	
M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
C	communication mark
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

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Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
1 (a)	negative	B1	cao	Ignore any description of a relationship and any reference to strength of correlation
(b)	Explanation	C1	for a correct explanation, eg "not in line with the trend of the other points" "does not fit in with the correlation" "is far away from the other points or line of best fit"	
(c)	Comment	C1	for an explanation eg "point would be outside of the range of the scatter diagram"	
2	$9p + 13$	M1	for method to expand one bracket, eg $5 \times p + 5 \times 3$ $(= 5p + 15)$ or $2 \times 1 - 2 \times 2p$ $(= 2 - 4p)$ or $-2 \times 1 - 2 \times -2p$ $(= -2 + 4p)$	If an attempt is made to multiply by -2 in the second brackets then it must be done consistently.
		A1	cao	
3	Triangle of area 18	M1	for a complete method to find area of trapezium eg $\frac{1}{2}(2 + 7) \times 4$ $(= 18)$ **OR** for a triangle drawn of area 36 **OR** for a triangle that would give an area ft their area of trapezium	The value for the area of the trapezium must be clear for the ft to be checked.
		A1	for a triangle drawn of area 18 eg base = 6, height = 6 or base = 9, height = 4	Accept use of dimensions that are not whole numbers as long as the intention is clear

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
4	Probabilities should sum to 1	C1	for stating that the probabilities should total 1 eg 0.25 should be 0.35	
	0.35 and 0.65 reversed	C1	for recognising that the 0.35 and 0.65 in the first branches for the 2nd throw should be reversed eg, "for the second throw, the probability it lands on 4 should be 0.65"	Can be shown on the diagram
5 (a)	50.5	M1	for $\cos ABC = \frac{7}{11}$ (0.63…) oe	Must be a complete statement for cos, sin or tan with all three elements present.
		A1	for answer in the range 50.4 to 50.51	If an answer is in the range 50.4 to 50.51 is given in the working space then incorrectly rounded, award full marks.
(b)	Increase (supported)	C1	States increase with supporting reason eg " $\frac{7}{10}$ is greater than $\frac{7}{11}$" " 0.636 is less than 0.7" …."cos increases as angle decreases" "decreasing the denominator increases the value of the fraction" "angle is now 45.6" (accept 45.5 – 45.6)	If figures are given they must be correct (truncated or rounded).

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
6 (a)	8	P1	for process to find sum of unknown probabilities, eg $1 - 0.45 - 0.25$ (= 0.3) **OR** to find the total number of counters in the bag, eg $\frac{18}{0.45}$ (= 40) **OR** to find the number of yellow counters, eg $\frac{0.25}{0.45} \times 18$ (= 10)	Award mark for any two probabilities given that sum to 0.3 eg given in the table.
		P1	for process to find P(red) = 0.2 oe **or** P(white) = 0.1 oe **OR** for process to find the total number of red and white counters, eg "40" – 18 – "10" (=12) **OR** for process to derive an equation in x, eg $2x + x = 1 - 0.45 - 0.25$ or $2x + x =$ "0.3" or $x = 0.1$	Award P2 for P(red) or P(white) (could be shown in table) Equations could be given as written statements or working but must be fully equivalent.
		P1	for a complete process to find the number of red counters, eg $\frac{2 \times 0.1}{0.45} \times 18$ or $\frac{2}{3} \times$ "12" or $0.2 \times$ "40" or $\frac{0.2}{0.025}$	
		A1	cao	
(b)	Explanation	C1	for explanation eg 0.5 multiplied by an odd number will never be a whole number, for half of a number to be an integer that number must be even, you can't have half a marble	

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Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
7	3.8	M1	for a correct first step, eg $5 - x = 2(2x - 7)$ or $5 - x = 4x - 14$ or $\frac{5}{2} - \frac{x}{2} = 2x - 7$	Method must show LHS ×2 and both terms on RHS ×2 or $5 - x$ and both terms on RHS ×2
		M1	(dep) for isolating terms in x eg $4x + x = 14 + 5$ or $-\frac{x}{2} - 2x = -7 - \frac{5}{2}$	eg $-4x$ both sides with -5 both sides or $+x$ both sides with $+14$ both sides
		A1	oe	Accept $\frac{19}{5}$, $3\frac{4}{5}$ oe but not $\frac{-19}{-5}$ oe

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Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
8	140	P1	for complete process to find sum of the interior angles of a pentagon eg $(5 - 2) \times 180$ or exterior $360 \div 5 = 72$, interior $180 - 72 = 108$, 108×5 **OR** for complete process to find sum of the exterior angles of the pentagon eg $(180 - x) + (180 - 2x) + (180 - 125) + (180 - 115) + (180 - 90)$	Must be a complete process that could lead to a figure of 540 if that process is evaluated incorrectly
		A1	for sum of interior angles is 540 **OR** for sum of exterior angles is 360	360 must be identified as the sum of the exterior angles
		P1	for start to process to find angle *ABC* eg [angles in a pentagon] – 115 – 125 – 90 (= 210) or $115 + 125 + 90 + x + 2x =$ [angles in a pentagon] **OR** $(180 - x) + (180 - 2x) + (180 - 125) + (180 - 115) + (180 - 90) = 360$	Award provided [angles in a pentagon] is greater than 400 Algebraic route needs to show both sides of the equation. LHS of equation may be simplified
		P1	for process to find angle *ABC* eg "210" ÷ 3 (= 70), "210" divided in the ratio 2 : 1 **or** for process to find angle *BCD* eg $\frac{2}{3} \times$ "210" **or** for $3x =$ "210" or $-3x =$ –"210"	Award if 70 is given for either *ABC* or *BCD* on the diagram
		A1	cao	Award marks for 140 on the diagram with working and not contradicted by the answer line. Award 0 marks for 140 without working.

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
9 (a)	4.52×10^3	M1	for $2.04.... \times 10^7$ oe eg $2.04....\times 10^{-5} \div 10^{-12}$ or $20.4... \times 10^6$ or 204(08163.27) **or** for correct value of T, 4517.(53....), not written in standard form, eg 4520	May be given correct to 3 sig figs or more
		A1	for answer in the range 4.51×10^3 to 4.52×10^3 (SC B1 for $6.32\ldots\times 10^{-1}$)	
(b)	Explanation	M1	for method to find the scale factor or decreased value in T, eg $\sqrt{\frac{1.1}{1.05^3}}$ (= 0.97.....) oe or $\sqrt{\frac{5.6 \times 10^{-5} \times 1.1}{(1.4\times10^{-4}\times1.05)^3}}$ (= $4.40\ldots\times 10^3$) oe	Award mark for a correct method to calculate the scale factor or the percentage increases in w and d^3 or the decreased value of T
		C1	(dep M1) for explanation eg value of scale factor less than 1, so a decrease in T **OR** compares $4.40\ldots\times 10^3$ with their value of T from (a) provided answer to (a) is greater	This mark may only be awarded if supported by numerical evidence
10	10	P1	for start to a process to find the LCM of 20, 45 and 120 (= 360), eg $45 = 3 \times 3 \times 5$ or $20 = 2 \times 2 \times 5$ or $120 = 2 \times 2 \times 2 \times 3 \times 5$ or writes down at least 3 multiples of 45 and 120	Could be presented as complete prime factor trees for 45 or 120
		P1	(dep) for a process to find number of times/hour using their LCM, eg $3600 \div 360$ or $3600 \div 720$	Must use a common multiple. Working may be in minutes.
		A1	for 10 or 11	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
11	150 000	P1	for process to find cost in 2007, eg 162 000 ÷ 0.9 (= 180 000) oe	
		P1	for process to find cost in 2003, eg [cost in 2007] ÷ 1.2 (= 150 000) oe	Award 2 marks for 162 000 ÷ 1.08 oe
		A1	cao	
12 (a)	1.5	M1	for method to find the gradient of the line, eg $\frac{12}{8}$	Must see use of scales.
		A1	for 1.5 oe	
(b)	Explanation	C1	Explanation relating to rate of change of volume with time, eg rate at which the container fills or change in number of litres per second or number of litres added per second	Ignore any quantities given. Award the mark for an explanation involving rate.
(c)	Explanation	C1	Explanation relating to volume (amount) of liquid in the container at the start eg number of litres in the container when $t = 0$, amount of liquid in the container to start with	
13	6.50	M1	for method to find ratio or scale factor of lengths or volumes eg $\sqrt{3} : 2$ or 1 : 1.15(47....) or 0.86(60…) : 1 or $\sqrt{27} : 8$ oe	Scale factors may just be seen as 1.15..., 0.86...etc
		M1	for complete method to find ratio of volumes and use to find required volume eg 10 ÷ ("1.15...")^3 or 10 × (“0.86…”)^3	
		A1	for answer in the range 6.49 to 6.53	If an answer is given within the range then incorrectly rounded to 3 sig figs, award full marks. Accept 6.5

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Paper: 1MA1/3H					
Question		**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
14		240	M1	for start to method to find total number of matches, eg 16×15 or $16^2 - 16$ or $16 \times 15 \times 2$ (= 480) or $\frac{16 \times 15}{2}$ (= 120)	Credit complete listing strategies
			A1	cao	
15	(a)	488 to 507	M1	for method to find area of one strip using trapezia, eg $\frac{1}{2} \times 5 \times 22$ (= 55) or $\frac{1}{2} \times 5 \times (22 + 28)$ (= 125) or $\frac{1}{2} \times 5 \times (28 + 32)$ (= 150) or $\frac{1}{2} \times 5 \times (32 + 35)$ (= 167.5) **OR** for a method to find an estimate for the area using rectangles eg 5×22 or 5×28 or 5×32 or 5×35	May use area of triangle + area of rectangle for the second, third and fourth strips – lengths must be correct. May use triangle for first strip, $\frac{1}{2} \times 5 \times 22$
			M1	for complete and correct method to find the area using four strips, eg $\frac{1}{2} \times 5 \times 22 + \frac{1}{2} \times 5 \times (22 + 28) + \frac{1}{2} \times 5 \times (28 + 32)$ $+ \frac{1}{2} \times 5 \times (32 + 35)$ or $5 \times 22 + 5 \times 28 + 5 \times 32 + 5 \times 35$	May use triangle for first strip, $\frac{1}{2} \times 5 \times 22$
			A1	for answer in the range 488 to 507 (SC B1 for using area under the curve)	
	(b)	Underestimate (supported)	C1	(dep M1) for underestimate since parts not included below the graph **OR** ft their method	

PMT

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
16 (a)	42	P1	for process to find an equation in a and b, eg $a \times 2^2 + b \times 2 = -2$ ($4a + 2b = -2$) or $a \times 4^2 + b \times 4 = 12$ ($16a + 4b = 12$)	
		P1	for process to find a pair of simultaneous equations and eliminate one unknown, eg $16a + 8b = -8$ and $16a + 4b = 12$ and subtraction or $16a + 4b = 12$ and $8a + 4b = -4$ and subtraction	Allow one arithmetic error in elimination, eg $16a + 8b = -8$ and $16a + 4b = 12$ leading to $4b = 20$ but no subtraction sign seen
		A1	for $a = 2$ and $b = -5$	
		A1	cao	
(b)	$n^2 - n$	M1	for correct method, eg n^2 seen as a term	
		A1	for $n^2 - n$ oe	

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
17	13.1	P1	for start of process to find the length of *BD*, eg $\frac{BD}{\sin 34°} = \frac{12.5}{\sin 109°}$	
		P1	for complete process to find the length of *BD*, eg $BD = \frac{12.5}{\sin 109°} \times \sin 34°$ (= 7.39...)	Accept 7.4 for the award of the first two P marks
		P1	for process to find the length of *AD*, eg $AD^2 = 11.4^2 + \text{“ } 7.39^2 \text{ ”} - 2 \times 11.4 \times \text{“7.39”} \times \cos 86°$	
		P1	for process to use correct order of operations, eg 129.96 + 54.6(5...) – 11.7(5...) (= 172.85...)	
		A1	for answer in the range 13.1 to 13.2	If an answer is given within the range and then incorrectly rounded to 3 sig figs award full marks.

PMT

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
18 (a)	Correct statement	C1	for substituting both 1 and 2 into $x^3 + x$ or into $x^3 + x - 7$	All arithmetic shown must be correct. Ignore any additional trials shown.
		C1	for values 2 and 10 plus explanation that these are above and below 7, or for values -5 and 3 plus explanation that there is a change of sign, thus implying a solution lies between 1 and 2	
(b)	Correct rearrangement	C1	for correct algebraic rearrangement	
(c)	1.74	M1	for substitution of 2 into the formula eg $\sqrt[3]{7-2}$ (= 1.70997…)	$x_1 = 1.70997\ldots$ $x_2 = 1.74241\ldots$ $x_3 = 1.73884\ldots$
		M1	for a substitution of x_1 to give x_2 (= 1.74241...)	Accept an accuracy of 2 dp or more rounded or truncated for values of x_1 and x_2
		A1	for answer in the range 1.738 to 1.74	Award the marks for 1.7 on the answer line provided correct iterations are shown in the working space.

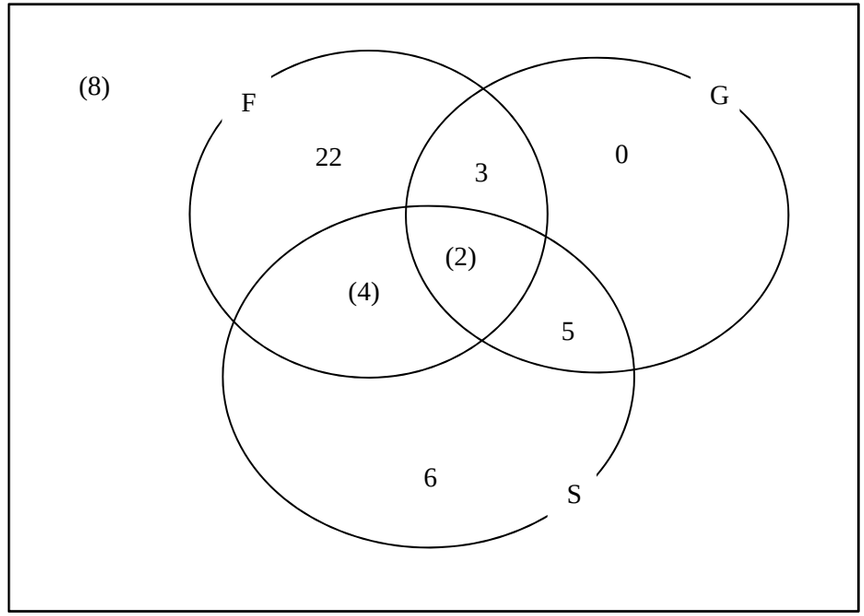
Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
19	$\frac{5}{3}$	P1	for process to derive an equation in x, eg $\frac{x}{4x-1}=\frac{6x+5}{12x+31}$	
		P1	for complete process to remove fractions, eg $x(12x + 31) = (6x + 5)(4x – 1)$	Must be correct use of brackets
		P1	for process to reduce to a quadratic equation, eg $12x^2 – 17x – 5 = 0$	Award for correct LHS only.
		P1	for process to solve the quadratic equation by factorisation or use of quadratic formula, eg $(4x + 1)(3x – 5) = 0$	Award for correct LHS only. Accept substitution into the formula; $\frac{--17\pm\sqrt{(-17)^2-4\times12\times-5}}{2\times12}$
		A1	for $\frac{5}{3}$ oe	Accept answers in the range 1.66 to 1.67 as equivalent

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
20	$\frac{6}{490}$	P1	for start to process information, eg draws Venn diagram and shows at least 1 unknown amount, eg 5 speak German and Spanish but not French	See Venn Diagram at end of mark scheme – rectangle not needed
		P1	for process to find at least 3 unknown amounts from, eg 5 speak German and Spanish but not French 3 speak French and German but not Spanish 22 speak French but not German or Spanish 0 speak German but not French or Spanish	
		P1	for complete process to find number of people who speak only Spanish (= 6)	Award first 3 marks to students who show this on the Venn diagram or in a statement.
		P1	for $\frac{\text{[number speaking Spanish only]}}{50} \times \frac{\text{[number speaking Spanish only]} - 1}{49}$, eg $\frac{6}{50} \times \frac{5}{49}$	Award this mark for use of their number of students who speak Spanish. Must be a clear link, eg from Venn diagram
		A1	for $\frac{6}{490}$ oe	See note 8 in general marking guidance but 0.01 or 1% must be from seen correct working.

PMT

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
21 (a)	Proof	C1	for starting the proof, identifying a pair of relevant equal sides or angles with reasons from $AD = BC$ (opposite sides of a parallelogram are equal) angle PAD = angle QCB (opposite angles of a parallelogram are equal) angle ADP = angle CBQ (given or both 90°)	
		C1	(dep C1) for complete identification of all three equal aspects with reasons	
		C1	(dep C2) for conclusion of congruency proof	Congruency conclusion must include a reference to ASA
(b)	Explanation	C1	for identifying a pair of equal sides or angles in $APCQ$, with reason, eg $AP = QC$ since triangle ADP is congruent to triangle CBQ	
		C1	(dep C1) for reasoning that $APCQ$ is a parallelogram so opposite sides of a parallelogram are parallel	

Q20



PMT

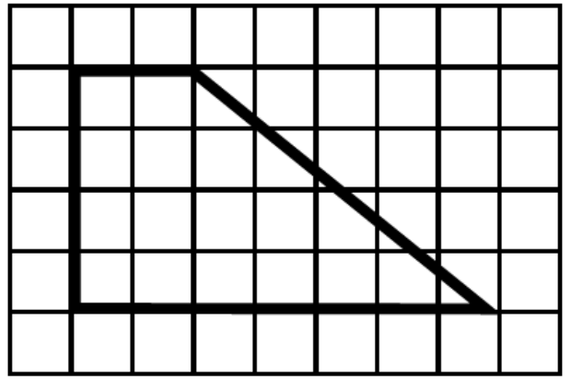
Modifications to the mark scheme for Modified Large Print (MLP) papers.

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme.

The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

Paper: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
1		Diagram enlarged. Axes labels moved to the left of the horizontal axis and above the vertical axis. Crosses changed to solid dots. Right axis has been labelled.	Standard mark scheme

PMT

Paper: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
3		Shape changed but the area is still the same. Wording changed to 'Look at the diagram for Question 21 in the Diagram Book. It shows a trapezium drawn on a grid of squares. Each square on the grid represents a 1 cm square. A triangle is going to be drawn that is equal in area to the trapezium. Write down the length of the base and the vertical height of a triangle that is equal in area to the trapezium.' Two answer lines have been provided. Each square on the grid represents a 1 cm square. 	M1 for a method to find area of trapezium, eg. $\frac{1}{2}(2+7)\times 4$ (=18) or $(2\times 4)+(0.5\times 5\times 4)$ or $8+10$ (=18) or for two answers that would give a triangle of area ft their area of trapezium (if not 18) or for two answers that would give a triangle of area 36 A1 for two answers given that would give a triangle of area 18, eg. base = 6, height = 6 or base = 9, height = 4 oe NB: answers need not be whole numbers.
4		Diagram enlarged. Wording added 'It shows a probability tree diagram	Standard mark scheme

Paper: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
5		Diagram enlarged. Wording added 'AB = 11cm CB = 7cm Angle ACB is a right angle. Angle ABC is marked.'	Standard mark scheme
6		Table has been turned to vertical format. Order of the table changed round so it reads: blue, yellow, red and white.	Standard mark scheme
8		Diagram enlarged. Angles moved outside of the angle arcs, with smaller arcs. Wording added 'Angle EAB = 125° Angle AED = 115° Angle EDC is a right angle.'	Standard mark scheme
10		Pictures removed. Wording changed to 'There are three lamps, lamp A, lamp B and lamp C.'	Standard mark scheme
12		Diagram enlarged. Right axis has been labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme
13		Pictures removed. Wording added 'shape A and shape B.'	Standard mark scheme
15		Diagram enlarged. Right axis has been labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme, but apply MLP tolerances when reading figures from the graph (extra tolerance needed).
17		Diagram enlarged. Angles moved outside of the angle arcs, and the arcs have been made smaller. Wording added 'The diagram shows a shape labelled ABCD. AB = 11.4 cm, CD = 12.5 cm, Angle ABD = 86°, Angle DBC = 109°, Angle BCD = 34°.'	Standard mark scheme

Paper: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
19		Diagrams enlarged. Angles moved outside of the angle arcs, and the arcs have been made smaller. Braille will label the triangles and add information about the measurements of the triangles.	Standard mark scheme
21		Diagram enlarged. Arrows made longer. Wording added 'ABP and QDC are straight lines and parallel.', 'AD is parallel to BC.'	Standard mark scheme

PMT

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Question 12

There was generally a poor understanding of how to tackle this question. A common approach was to assign a value to the volume of P and use it to work out the volumes of Q and R, for example P =100, Q = 150, R = 225. These values were often written on the spheres in the diagram. This was one of the most successful approaches as many students went on to write down an appropriate fraction. Some students made a mistake with the volume of R, writing 100, 150, 200 for example, and gained only the first mark. A different approach was to work out that the multiplier from P to R is 1.5 × 1.5. Whichever method was used the final hurdle for students was to write the volume of P as a fraction of the volume of R. For some this was their downfall. Fractions such as 1/2.25 that contained a decimal were common. These were not awarded the accuracy mark unless they were the result of simplifying a correct fraction. Some students gave an inverted fraction such as 9/4 and there were others who could not complete their method by giving any fraction at all. A common misconception was to assume that the volume of Q is 50% less than the volume of R and the volume of P is 50% less than the volume of Q (writing for example R =100, Q = 50, P = 25 or P = 1/2Q and Q = 1/2R) and give an answer of 1/4.

Question 9

Part (a) posed a challenge to many, including some of the highest achieving students. It goes to show that students still sometimes struggle to apply skills such as the relationship between length and area scale factors to unfamiliar situations. Most successful students started with a suitable ratio of the two circumferences, for example, 1 : 0.9 or more commonly 10 : 9. From here students had to square the values to achieve the ratio for areas, commonly seen as 100 : 81. The question didn't state that the ratio had to be in its simplest form so any equivalent ratio was acceptable for the accuracy mark.

Much like part (a), part (b) also caused problems. This time the first step was to write down a ratio of the two areas. Students struggled more with this first step than in part (a). Often 0.44 or 0.56 was used and no credit was given. Many students did not have the ratios the correct way round. Many appeared to think that f^2 was in fact greater than e^2. As in the previous part, once this first ratio was set up, the second mark was gained by applying knowledge of scale factors, in this case taking the square root to gain the ratio of lengths.

Question 11

Cumulative frequency is generally a well answered question. Most students this summer were able to gain the mark in part (a) for correctly completing the table,

Of those who gained the mark in (a) almost all gained at least one mark in (b). Those who did drop a mark usually plotted at mid-interval values rather than the end of interval values. This was catered for in the special case on the mark scheme.

The success rate in (c) often depended on the success of (b), but not exclusively. Those who had the correct graph, almost always gained at least one mark for taking a correct reading from their cumulative frequency graph. Of these, a good proportion then dealt with this value correctly to find the correct percentage. There were a number of students who didn't use the graph to answer (c) and reverted to their table in (a). This method is not on the specification, but will have been seen by students studying GCSE Statistics, and so was catered for in the mark scheme, as the table would lead to the value of 74 and subsequently 6.

Question 10

Examiners were able to award full marks to about a half of students for their answer to this question involving percentages. Most students showed a good understanding of the problem and calculated that the total interest added to Marie's account was £144. Not all of these students could express this as a percentage interest rate. The most common error was for students to express £144 as a percentage of £8144 instead of £8000. It was noticeable that a large number of students used a multiplier approach, interpreting 0.018 or 1.018 as a 1.8% increase. The most common errors seen were working out 20% of 8000, or using an incorrect reverse percentage process.

Question 18

Only a few gained marks on this question. Some were able to find at least one frequency but then failed to proceed. In general, those who got to 32 were able to draw the bar at 3.2 Incorrect answers came from just adding the heights of the bars or misreading the scales when drawing the bar.

Question 5

The vast majority of students gained the first mark for multiplying 24 by 50p and many went on to find that Sean made £2 profit. Some students were able to go directly from the profit of £2 and give an answer of 20% without showing any working whereas many used methods such as $\frac{(12-10)}{10\times100}$. Some students did not find the actual profit but chose to use $\frac{12}{10}$ and this was sufficient for the second mark. Sometimes the process was not completed correctly and the accuracy mark was lost. Some students, for example found $\frac{12}{10} = 1.2$ but did not give an answer of 20% and some $\frac{12}{10} \times 100$ and gave an answer of 120%.

Question 12

The cumulative frequency table was often completed correctly although some addition errors were made. However, a significant number of students clearly had no idea how to work out cumulative frequencies. Those who completed the table correctly generally plotted the points and joined them with a curve or with line segments. A few students did not join the points and some drew a line of best fit. There were some graphs drawn with the points plotted at the midpoints of the intervals and these were awarded one mark if the points were joined. Some graphs were 'squashed' into the region from $w = 225$ to 350 because students plotted at the midpoints of the intervals in the cumulative frequency table and these graphs gained no marks. Histograms were often drawn and very few of them had the cumulative frequency points identified. In part (c) many students gained one mark for working out 60% of 80 as 48 or for reading a value from the graph at wage = 360 but fully correct solutions were not as common as might have been expected. Errors were often made when reading from the graph, most often with the scale on the horizontal axis. A significant number of students made no attempt to use the graph.

Question 18

After gaining the first mark for the statement $x = k\sqrt{y}$ many students could not make any further progress. Many attempts using 44 did not lead anywhere. Those that used $\sqrt{1.44}$ as a multiplier gained the second mark but some students could not then make the step from 1.2 or 1.2y to find the percentage increase as 20%. Some students approached this question by using values of x and y. If, for example, y = 100 (and k =1) then x = 10 and after the increase y = 144 and x = 12. This approach often proved successful.

Question 3

The first problem question on the paper and one that was generally answered well, with all marks being awarded. In the most common approach students had to first work with the ratio to find the number of small and large tins. Having found this they needed to find the number of boxes of each by

dividing by their capacity of tins. The final step is to find the number of large boxes as a percentage of the total boxes or find how many large boxes 30% of the total is and compare this to Carlo's statement. If students did go wrong it was normally in the final two steps, with most students getting to the number of small and large boxes, but in some cases not then knowing what to do with these values.

Question 4

It was pleasing that a great many students were able to gain at least three of the four marks by working out the value of either Tamara's house or Rahim's house at the end of 2019. Many students worked out both values correctly and stated that Rahim's house had the greater value and they were awarded full marks. Too many responses, though, were spoilt by careless errors. Some students used the multipliers 0.8 and 1.3 to work out the new values but it was more common to see students start by working out 20% of 220 000 and 30% of 160 000. Build up methods for finding percentages were quite popular but incorrect statements such as 10% of 220 000 = 2200 and 10% of 160 000 = 1600 with no method shown gained no credit. Students should be advised that the method needs to be clear. When finding 10%, for example, they should show that they intend to divide by 10. Errors were frequently made in the final part of the process. Subtracting 44 000 from 220 000 was a problem for some students; sometimes the result of this calculation was greater than 220 000. Some students correctly found 30% of 160 000 but then subtracted this from 160 000 instead of adding. A few students only worked out 20% of 220 000 as 44 000 and 30% of 160 000 as 48 000 and stated that Rahim's house had the greater value. They were awarded the first mark only.

Question 9

Part (a) was not well answered with students showing they either didn't understand a very standard higher tier topic or that they couldn't accurately read the scale on an axis. It was the former that was most common, but many didn't know the difference between range and interquartile range, or simply had no idea. Of those who did know, many were unable to read the upper quartile from the diagram. Part (b) proved a challenge for many. The mark was for understanding the proportional representation of a box plot and that 50% of waiting times will be up to the median. Part (c) was answered better with the most common response relating the median wait time being higher on Monday than Tuesday. Reference to measures of spread were not able to gain credit in part (c), and this was costly for some.

Question 17

This histogram question was pleasing to mark, with a surprising number of students gaining some credit. Many were able to gain the first mark for one (or more) correct frequencies, and of these, a significant number going on to gain three marks for the correct process to find the total and then find 20%. The last mark proved extremely challenging but gaining 3 marks at this level showed good performance for a number of students. It was interesting to see that almost all worked with frequencies rather than areas, which shows a good understanding of histograms and frequency density.

Question 20

This question proved a real challenge due to the fact it involved 3 days, rather than the 2 that students are more familiar with. Also, the lack of scaffolding, which is to be expected at this grade, challenged students. Many attempted to draw a probability tree, and that alone was too difficult. A first mark could be gained for a correct product for consecutive days, typically seen for Monday and Tuesday, such as 0.7×0.8, but could equally be for Tuesday and Wednesday such as 0.2×0.6. Two marks were awarded for a correct triple probability and, when seen, it was normally for RM, RT, RW or

NRM, RT, RW. In fact it was the probabilities when it didn't rain on Tuesday that students found the most challenging. Awarding 3 or 4 marks was very rare.

Question 3

Most students made very good attempts at this multi-step question with many achieving full marks. It was pleasing to see many well presented solutions with working out that was easy to follow. The majority of students started by using the ratio $3:7$ to work out that there were 48 cars and gained the first two marks. Many students completed the process by finding $\frac{1}{8}$ of 48 and 25% of 48 and subtracting the numbers of cars that use electricity and the number of cars that use diesel from 48 to find the number of cars that use petrol. Arithmetic errors were quite common and were often made at the final stage when subtracting 6 and 12 from 48. It was surprising that a significant number of students used a build up method such as 10% = 4.8, 10% = 4.8, 5% = 2.4, etc. to find 25% of 48. Centres should note that incorrect statements such as 25% of 48 = 11 or $\frac{1}{8}$ of 48 = 5 can get no credit unless the method for finding 25% of 48 or $\frac{1}{8}$ of 48 is shown. Some students made the mistake of subtracting the number of cars using electricity from 48 and then finding 25% of 42, not 25% of 48. Instead of finding $\frac{1}{8}$ of 48 and 25% of 48 some students chose to combine $\frac{1}{8}$ and 25%, usually $\frac{3}{8}$ rather than 37.5%, and then worked with $\frac{3}{8}$ or $\frac{5}{8}$. The award of the SCB2 for finding the fraction and percentage correctly but not working with the ratio was relatively common.

Question 4

A good discriminator between lower attaining students, this question attracted many fully correct solutions. Despite there being a number of possible routes that students could take, there were also many incorrect or incomplete solutions. The most common approach was to find the cost of 15 rolls of wallpaper at each of the shops, though credit was given for comparing any number of rolls, for example 1 roll or 5 rolls. A high proportion of students compared £180 with £184.80 and reached a correct conclusion to score all 4 marks. However, some students worked out the discount and took that to be the cost of the wallpaper at Style Papers.

A common error seen was, for students who did not appear to have access to a calculator, to use a build-up method to find 12%, for example by writing down 10%, 1% and 1%. Students who did this often made an error with the arithmetic and lost marks because they did not show the calculation, for example the addition of the three percentages or how they worked out the 10% or 1%. Students are reminded that when showing their calculation of a percentage, they should show a full method, so for example instead of writing 12% of £70 = £8.40, they should write $\frac{12}{100} \times 70 = 8.40$ or $0.12 \times 70 = 8.40$. This is so that in the event of an incorrect answer, marks for a correct method can be awarded.

Question 10

Part (a) was answered quite poorly. Those who used the table to find that the probability of getting a 5 is $\frac{10}{40}$ gained the method mark but many students ignored the fact that the spinner is biased and gave the probability of getting a 5 as $\frac{1}{5}$. Using $\frac{10}{40}$ to work out an estimate of scoring 5 both times proved to be beyond many students. A common incorrect method was $\frac{10}{40} + \frac{10}{40} = \frac{1}{2}$ and often $\frac{10}{40}$ or $\frac{1}{4}$ was given as the final answer.

In part (b) many of the students who gained the method mark for identifying the proportion of 1s as $\frac{6}{40}$ were able to write this as 15%. Some students showed a method to write $\frac{6}{40}$ as a percentage, e.g. $\frac{6}{40} \times 100$, but could not complete the calculation whereas others did not know how to write it as a percentage. Dividing 40 by 6 was a common error. There were many students who did not identify the proportion of 1s as $\frac{6}{40}$.

Question 8

This AO1 question required learners to be able to find a percentage increase. On the whole it was answered quite well, with many learners able to gain at least 1 mark for finding the profit, or for finding the new value as a percentage or decimal of the original. However, a significant number couldn't complete the method, either by finding the profit as a percentage of the original, or by subtracting 100 or 1 from their value, and thus didn't gain the 2nd mark. A common error was to divide the profit by the selling price rather than the purchase price.

Question 17

It was relatively rare to see a fully correct solution to this question. However, many candidates were able to write at least one or all three of the relationships as a ratio or as an equation to gain one or two marks. Only higher attaining candidates could go on to link all four weights for example by giving the equations $\frac{2}{3}B + B = 3\left(\frac{3}{4}D + D\right)$, $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$. Some candidates spoiled their chances of getting the third mark by using the same variable, *x*, to represent two of the weights and gave an equation such as the one above with *x* substituted for both B and D. These candidates scored at least 3 of the 4 marks available. Any ratio equivalent to 42 : 63 : 15 : 20 was accepted and awarded full marks, for example 2.1 : 3.15 : 0.75 : 1. Using the common multiple 105 proved to be a successful strategy employed by some candidates.

Question 25

Many candidates could make a successful start on the question by using a correct process to find the volume of the top part of the pyramid and so scored the first mark available. This was often the limit to any credit which examiners could give candidates. A common mistake was for candidates to use the average density in a misguided attempt to work out the volume of the bottom part of the pyramid. This was, by design, a challenging question and so, as expected there were only a small number of completely successful solutions seen.

Question 7

Many students were able to work out the price of the holiday before the increase. Common approaches included 240 × 5 and 10% = 120 so 100% = 1200. Some students showed a method leading to 1200 but then gave a final answer of 960 or, less frequently, 1440. These students gained one mark only. A greater number of students than expected gained no marks at all. Often this was because they misinterpreted the question and took £240 to be the price of the holiday after the 20% increase giving the answer of £200.

Question 6

This was another problem solving question and another with good success for candidates. Many were able to gain all 3 marks for a correct answer. Those who didn't score full marks normally scored at least one for a correct process, either finding 57% or starting to work with the ratio. It was evident though, that a lot of candidates do not have efficient calculator strategies with many using build-up methods for percentage, rather than just multiplying by 0.57 or equivalent.

Question 2

The majority of students scored full marks on this question. There were a number of routes through the question and stages in the working could be seen in different orders. Most students started by calculating 68% of 800 then proceeded to take into account the other factors stated in the question. However, some students did not include all the

factors, for example, forgetting that each person will drink 2 cups of coffee. In cases where a student did not get a correct answer for the amount of coffee needed, a common error made was dividing 1088 by 10.6 instead of multiplying to give a final answer of 103g. Nearly all students earned the mark in part (b) for stating that "more coffee would be needed", or equivalent. Students should be reminded that if they calculate and use values to support their answer in part (b), the values must be correct.

Question 9

This question was also well answered. A wide variety of successful approaches were seen using fractions or decimal multipliers or both. Of those, a small number of students who scored one of the two marks available, gave an answer of 0.56 or 5.6. Students who attempted the question but scored no marks for their responses usually added or subtracted the 70% and 80% or expressed one as a percentage of the other.

Question 2

This question required students to calculate a percentage profit. All students were able to make an attempt with almost all gaining some credit. The first mark was for finding the amount spent and earned, and then the second was for calculating the profit. Unfortunately, many students then did not know how to progress further. Many chose to divide the profit by the amount earned rather than the amount spent, and as such gained no further credit.

Question 7

Most students made very good attempts at this multi-step question with many achieving at least three of the five marks. It was pleasing to see many well presented solutions with working out that was easy to follow. Most students worked with the number of jars with only a few choosing to take the more direct approach of working only with proportions. The majority of students gained the first mark by showing a process to find the number of empty jars. In order to make further progress students needed to associate corresponding parts from the two ratios. Many students realised that they needed to multiply both parts of the ratio 1 : 2 by 4 and they were able to write down the ratio 3 : 4 : 8 and gain the second mark. Using the ratio 3 : 4 : 8 to find the number of empty small jars gained the third mark. Some did this by finding $\frac{3}{15}$ of 150, others by writing the ratio as 30 : 40 : 80. Having found that Kasim has 30 empty small jars, many students did not read the question with sufficient care. The question asks for the percentage of Kasim's jars that are empty small jars so the required proportion is $\frac{30}{400}$. Many students, though, used $\frac{30}{150}$ and it was very common to see $\frac{30}{150}\times 100$ and an answer of 20%. Most of those students who did use $\frac{30}{400}$ were able to find the correct percentage but arithmetic errors cost some students the final mark. A common error was to divide 400 by 30 rather than 30 by 400.

Question 9

A good portion of the students found the correct value of *R*. Those who wrote 30% rather than 30 on the answer line were awarded the mark. Common incorrect answers were 70, 0.7 and 0.3

Question 6

There were many different approaches seen to Question 6 which was really interesting to see. As the question was designed to lack structure, students had to plot a path through the problem themselves, and most did so with at least some success.

The most common approach was to use the starting ratio of 1 : 6 : 14, and then to find $\frac{3}{7}$ of 14 = 6, and to subtract and add to the ratio to give 7 : 6 : 8. The next step was to then find 12.5% of 8 = 1 and again subtract and add to give 7 : 7 :7 and show Tina was correct. However, some worked with the values as fractions of 14, and others scaled up the ratio to a different total and worked from there. All these methods were capable of gaining full marks, but the latter two often led to errors, either in arithmetic, or due to premature rounding.
Some students lost marks, as although they were able to find $\frac{3}{7}$ and 12.5%, they either did so of the wrong values or added to the wrong values, or lost track of which values linked to which of the three people.
This is a question where working was required to gain credit and was asked for in the demand. Anyone giving a correct answer without supportive working would score zero.
Some students chose to use their oven values (in the ratio 1 : 6 : 14) which could also lead to full marks being given.

Question 9

In part (a) a good proportion of learners gained at least one mark but there were a large number who knew what a box plot looks like but couldn't find the necessary values from the cumulative frequency graph and scored no marks. Those that had a good understanding usually gained three marks for a fully correct box plot although some lost a mark because of inaccuracies in plotting values. When two marks were awarded for a box drawn and three correctly plotted values these values were usually the lowest mark, the highest mark and the median. Some learners earned just one mark for identifying one of the three values needed which tended to be the median. Box plots with the LQ, median and UQ plotted at 15, 30, 45 or at 20, 40, 60, i.e. quarters of the cumulative frequency or mark range, were often seen.

In part (b) many learners gained one mark for working out 30% of 60 as 18 or for reading a value from the graph at mark = 40 but fully correct solutions were not as common as might have been expected. Some worked out 30% of 60 but failed to obtain a comparative statistic and errors were sometimes made when reading from the graph, most often 44 instead of 42 for the cumulative frequency at a mark of 40. Some interpreted the value 42 read from the graph as the number who passed the test which therefore led to an incorrect conclusion being drawn. A significant number made no attempt to use the graph. It was sometimes not clear whether or not a value had been read from the graph. Learners should be encouraged to show a clear method on the graph if they are reading a value from it.

Question 12

It was pleasing to see some fully correct solutions but, overall, this question was answered very poorly with relatively few learners showing that they understood the relationships between lengths, areas and volumes in similar solids. Starting the process to find the ratio of the radius of **A** to the radius of **B** by finding $\sqrt[3]{64}$ or $\sqrt[3]{125}$ gained the first mark and some learners reached the ratio 4 : 5. The second mark was awarded for using the information about the radius of sphere **C** and working out $5 \div 2$ or for starting to work with area and working out 4^2. A process to find the ratio of the area of **A** to the area of **C**, such as $4^2 : 2.5^2$, was needed for the third mark but few were able to get this far. Some of those that did gave 16 : 6.25 as the final answer and were not awarded the accuracy mark because the question asked for an answer in the form $a : b$ where a and b are integers. A successful route used by a

few learners was to combine the ratios 4 : 5 and 2 : 1, giving the ratio of the radii as 8 : 10 : 5 from which they could easily see that the required ratio is $8^2 : 5^2$. Many learners could not make a correct start. It was common to see 125, the volume of sphere **B**, divided by 2 and then 64 : 62.5 given as the final answer. Since the question involved three spheres some learners attempted to use the formulae for the surface area or volume of a sphere.

Question 6

This was the second problem solving question and required learners to compare two percentage increases. It was generally answered well by most. The first mark was a simple one for either finding a correct difference or for a correct proportion. The next two marks were for finding, or showing the process to find, one, then both, correct percentage changes. Many were able to gain one, if not both, of these marks. The errors that stopped some were either choosing the new, rather than original, value as the denominator, or for those who didn't find the subtraction originally, for forgetting to subtract 100 from their percentage. For those who gained the 3 P marks, the C mark often followed for a correct comparison and conclusion. However, some candidates followed a correct comparison with an incorrect conclusion that Filip was wrong, muddling the interpretation of what they had found and that which they had been asked. Early rounding or truncating also could lead to losing this mark as candidates were unable to draw the correct conclusion, for example, rounding 11.84 to 12 and 1.53 to 2, and dividing these values. This meant they thought it was only 6 times greater and therefore Filip was wrong. Learners should be reminded of the risk of premature rounding.

Question 5

Overall, this question was fairly well answered, though many did not achieve full marks. Most learners were able to begin a correct solution through effective use of ratio to obtain the number of pens and pencils. Those who struggled to use the ratio to get going, doing 240 ÷ 3 = 80 pens and 240 ÷ 5 = 48 pencils; often benefitted from the mark scheme using square brackets, as they could still access subsequent process marks despite not having a correct start. The lack of a systematic approach to solving the problem seemed to be an issue for some as they lost their way when calculating a value for the profit or the total bought or sold. A number of students calculated the percentage profit for each item and then added the profits to get a final answer (66.6..% + 22.2..% = 88.8..%). Some learners who successfully obtained the values 1710 and 2490 struggled to find the percentage profit correctly, performing calculations such as $\frac{780}{2490}$ or $\frac{1710}{2490}$

Question 10

Those that recognised that this was a reverse percentage question were often successful in gaining both marks. However, there were some who calculated with 75% instead of 85%, of which those who wrote 100 – 15 = 75 could gain a mark. Many incorrect methods were seen, most commonly increasing or decreasing £46.75 by 15%.

Question 3

As a problem-solving question, a range of approaches were used. The most common and successful method involved calculating the selling price of 200 oranges, followed by determining the overall profit and then the percentage profit. Responses that gained one mark typically calculated the percentage based on the selling price rather than the cost price, often dividing by 40 to get 37.5% instead of dividing by 25 to reach the correct answer of 60%. Where two marks were awarded, this was usually due to the response being one step away from calculating the percentage profit, usually for the method to determine the total revenue as being 160% of the initial cost.

Question 12

In part (a), many responses demonstrated a sound understanding of reverse percentages. A common correct approach involved recognising that £440 represents a 10% increase on the original amount, identifying this as 110% of the original value, and dividing by 1.1 to find £400. Some responses focused on the £396 and showed that a 10% increase did not result in £440. In other cases, correct calculations were accompanied by incorrect statements, such as referring to 90% being "left," which implied a decrease rather than an increase, or attempting to find 10% of the new value instead of applying the reverse percentage method. Where such inconsistencies occurred, no marks were awarded. Responses that included vague explanations were sometimes supported by correct working, which allowed credit to be given. Most responses that scored zero marks gave the incorrect conclusion that Jim was correct.

In part (b), the most effective responses included labelled diagrams and followed a logical chain of reasoning. These often involved forming and solving equations, showing a clear understanding of percentage change and inverse operations. While many responses included successful percentage calculations, a significant number did not recognise the need to apply a reverse percentage. Instead, they focused on finding a percentage of a given amount, which did not address the question. A common incorrect method involved halving 180 to find 90 bikes in November, then increasing this by 25% to estimate October's figure. Most responses treated the question in two stages: first finding November, then October, rather than using a combined multiplier (1.5×0.75) and dividing by 1.125 to find October's sales directly. Where the process for finding November was incorrect, some responses still gained credit for a correct method to find October using their own value for November. In these cases, it was important that the method was clearly shown to be awarded the mark.