Chhetri Academy

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GCSE MATHS

Ratio, proportion and rates of change

Edexcel 1MA1 | Subtopic collection Topic 35

Speed, density, pressure and best buys

Higher tier

Answers and examiner comments

148	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 10

The full source mark scheme begins on page 212. Use the original paper code, tier and question number shown above.

Original question 17

The full source mark scheme begins on page 212. Use the original paper code, tier and question number shown above.

Original question 3

No matching mark scheme was available in the supplied archive for this question.

Original question 2

No matching mark scheme was available in the supplied archive for this question.

10	(a)		58	1	B1 57 to 59 (not inclusive)
	(b)		3.6	1	B1 3.5 to 3.7 (not inclusive)
	(c)	$7-3.6$	3.4	1	B1 for 3.3 to 3.5 (not inclusive) or ft on 7 – "(b)" provided "b" < 7

8		$1.72 \div 2$ (= 0.86) $7.65 \div 9$ (= 0.85)	Large box with reasons	3	M1 for $1.72 \div 2$ (= 0.86) M1 for $7.65 \div 9$ (= 0.85) A1 for large box or 9 kg with correct calculations OR M1 for $2 \div 1.72$ (= 1.162…) M1 for $9 \div 7.65$ (= 1.176…) A1 for large box or 9 kg with correct calculations OR M2 for $7.65 \times 2 \div 9$ (=1.70) or for $1.72 \div 2 \times 9$ (=7.74) A1 for large box or 9 kg with correct calculations OR M1 for 1.72×9 (= 15.48) M1 for 7.65×2 (= 15.30) A1 for large box or 9 kg with correct calculations NOTE: Accept equivalent methods for comparison

1380 4H

1380/4H

13	7120 ÷ 8	890	2	M1 for 7120 ÷ 8 or 7120 ÷ 480 A1 cao

1380_4H

1380/4H

Original question 5

The full source mark scheme begins on page 266. Use the original paper code, tier and question number shown above.

Original question 8

The full source mark scheme begins on page 282. Use the original paper code, tier and question number shown above.

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.

9	8 km per 30 seconds = 16 km per minute = 16 × 60 = 960 km per hour 960 km/hr × 5 ÷ 8 = 600 miles per hour	600	3	M1 convert to km/h by × 2 × 60 or 960 seen or use of speed = distance ÷ time M1 convert distance to miles by × 5 ÷ 8 oe or sight of 5 miles A1 cao

5MB2H_01

10		$(7 \times 2 + 2 \times 5) \times 200 = 4800$ 4800×8	38 400 g	5	M1 for 7×2 or 2×5 or 7×7 or 5×5 or 2×2 M1 for "7×2" + "2×5" oe or "7×7" – " 5×5" M1 (dep on 1st M) for '24' × 200 or '0.0024' × 2 M1 for '4800' × 8 or '0.0048' × 8 000 000 or '0.0048' × 8000 A1 for 38 400g or 38.4kg SC B3 for any answer including digits 384

1380_3H

Original question 9

The full source mark scheme begins on page 297. Use the original paper code, tier and question number shown above.

6		Distance = 25 + 45 + 30 = 100 Travel time = 100 ÷ 50 = 2 9 am + 2h + 3h **OR** 25 ÷ 50 + 45 ÷ 50 + 30 ÷ 50 = 30 min + 54 min + 36 min = 120 min = 2 hours 9 am + 2h + 3h	2 pm	4	M1 adding 2 or 3 distances with at least 2 correct) M1 '100' ÷ 50 (= 2 hours) M1 9 + 3 + '100 ÷ 50' oe A1 cao **OR** M1 for $\frac{25}{50}$ (= 30 min) or $\frac{45}{50}$ (= 54 min or $\frac{30}{50}$ (= 36 min) M1 for adding 2 or 3 times (from at least 2 correct distances) (= 2 hours) M1 9 + 3 + '30 + 54 + 36' oe A1 cao

1380_3H

Question		Working	Answer	Mark	Notes
16		½ (12 + 8) × 6 = 60 '60' × 20 = 1200 1200 × 5 = 6000 6000 ÷ 1000 = 6	6	5	M1 ½ (12 + 8) × 6 oe or 60 seen M1 (dep) '60' × 20 M1 (indep) '1200' × 5 A1 6000 cao A1 ft (dep on 1st or 3rd M1 scored) for 6

Question		Working	Answer	Mark	Notes
6	(a)	3.95÷15 (=0.263…) small 6.15÷2.2 (=0.279..) large OR 15÷3.95 (=3.797..) small 22÷6.15 (=3.577..) large OR 3.95×22÷15 (=0.5.793..) OR 6.15×15÷22 (=4.193..) OR 3.95×22 (=86.9) small 6.15×15 (=92.25) large OR 3.95×3=£11.85 for 45 tablets 6.15×2=£12.30 for 44 tablets OR 3.95÷15=(0.263…) 3.95 + 7×'0.26'	comparative figures and conclusion	4	M1 3.95÷15 (=0.263…) small M1 6.15÷22 (=0.279..) large A1 for 0.26(3..) and 0.27(9…) or 26p and 28p or 26p and 27p C1 (dep on a previous M mark) for 'small box' using two comparative figures **OR** M1 15÷3.95 (=3.797..) small M1 22÷6.15 (=3.577..) large A1 for 3.7(97..) and 3.5(77…) ie rounded or truncated to 1 or more decimal places C1 (dep on a previous M mark) for 'small box' using two comparative figures **OR** M2 3.95×22÷15 (=5.793..) or 6.15×15÷22 (=4.193..) A1 for 5.79…or 4.19… C1 (dep on a previous M mark) for 'small box' **OR** M1 3.95×22 (=86.90) small M1 6.15×15 (=92.25) large A1 for 86.9(0) and 92.25 C1 (dep on a previous M mark) for 'small box' using two comparative figures **OR** M1 3.95×3 small M1 6.15×2 large A1 11.85 and 12.3(0) C1 (dep on a previous M mark) for 'small box' using two comparative figures **OR** M1 3.95÷15 (=0.263….) M1 3.95 + '0.263..' ×7 A1 for 5.79… C1 (dep on a previous M mark) for 'small box'

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
	(b)(i) (ii)		356.5 357.5	2	B1 for 356.5 B1 for 357.5 or 357.4$\dot{9}$ or 357.49… or 357.49 recurring or 357.499

7	(a)	eg 60/30 =	2	2	M1 for method shown to work out the gradient for train A eg right-angled triangle drawn, 60÷30, etc. A1 cao Ignore units. SC B1 $y=2x+k$
	(b)	40÷30=1.3(3…..)	Train A and explanation	1	B1 Train A and slope is greater oe or accept a calculated speed, or distances for consistent time period or times for consistent distance
	(c)		15	1	B1 cao

Question		Working	Answer	Mark	Notes
9		Lisa = 4½ miles in 30 min = 9 mph Martin = 16 × 5 ÷ 8 = 10 mph Or Lisa = 9 × 8 ÷ 5 = 14.4 km/h Martin = 16 km/h Or For 5miles Lisa took 33 minutes 10 miles is 66 minutes Martin = 16 × 5 ÷ 8 = 10 miles in 1 hour Or Martin 16 km/h = 10 mph = 5 miles in 30 minutes Draw travel graph for Martin Martin's graph steeper (or Lisa = 4.5 miles in 30 minutes)	Martin faster + calculation or graph	4	M1 for Lisa's speed or distance × 8 ÷ 5 or Martin's 16 × 5 ÷ 8 A1 for one correct conversion from metric to imperial or imperial to metric for their speed or distance (units should be seen) M1 for using the same time period or same distance C1 (dep on M2) concluding statement + both answers correct with units OR M1 for plotting (30, 5) on the graph A1 for a correct line to show Martin's speed M1 for converting 16 km/h to 10 mph oe C1(dep on M2) for concluding statement fully supported by working ie Martin is faster because his graph is steeper oe

Original question 10

The full source mark scheme begins on page 310. Use the original paper code, tier and question number shown above.

6			Farm shop	4	M1 for 12.5 ÷ 2.5 (=5) M1 for '5'×1.83 or '5' × 183 A1 for (£)9.15 or 915(p) C1 (dep on at least M1) for decision ft working shown **OR** M1 for 12.5 ÷ 2.5 (=5) M1 for 9 ÷ '5' or 900 ÷ '5' A1 for (£)1.8(0) or 180(p) C1 (dep on at least M1) for decision ft working shown **OR** M1 for 9 ÷ 12.5 (=0.72) **or** 1.83 ÷ 2.5 (=0.732) M1 for 9 ÷ 12.5 (=0.72) **and** 1.83 ÷ 2.5 (=0.732) A1 for 72(p) **and** 73.(2)(p) or (£)0.72 **and** (£)0.73(2) C1 (dep on at least M1) for decision ft working shown **OR** M1 for 12.5 ÷ 9 (= 1.388...) M1 for 2.5 ÷ 1.83 (= 1.366...) A1 for 1.38.... **and** 1.36... truncated or rounded C1 (dep on at least M1) for decision ft working shown

1MA0_2H

Original question 4

The full source mark scheme begins on page 330. Use the original paper code, tier and question number shown above.

Original question 16

The full source mark scheme begins on page 351. Use the original paper code, tier and question number shown above.

5		1.89÷2 (=0.945) 4.30÷5 (=0.86) 8.46÷9 (=0.94) OR 2÷1.89 (=1.058..) 5÷4.30 (=1.162..) 9÷8.46 (=1.063…)	5kg box	4	M2 for all of 1.89÷2 (=0.945), 4.30÷5 (=0.86) and 8.46÷9 (=0.94) (M1 for a method to compare at least two values) A1 for 0.945/0.94/0.95, 0.86, 0.94 or 94/95/94.5, 86, 94 C1 (dep M1) for a comparison of their 3 values leading to a correct deduction. OR M2 for all of 2÷1.89 (=1.058..), 5÷4.30 (=1.162..) or , 9÷8.46 (=1.063…), allow values rounded or truncated to 3 dp (M1 a method to compare at least two values) A1 for 1.058..., 1.162..., 1.063.. oe C1 (dep M1) for a comparison of their 3 values leading to a correct deduction.

Question		Working	Answer	Mark	Notes
12		$\frac{3.45 \times 10^{10}}{2650}$ =13018867.92 =	1.3×10^{7}	3	M1 for time = distance ÷ speed expressed numerically. M1 for 13000000 to 13100000 or digits 130188.. 130189.. or 1.3×10^{n} to 1.31×10^{n} where n is a number other than 7, or absent, or digits 13(01…) $\times10^{n}$ A1 $1.3(0)\times10^{7}$ – 1.31×10^{7}

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
10		**For example** **UK** / **USA** **$ per US gal**: ($)6.90(8412) / [$3.15] **£ per litre**: [£1.24] / (£)0.56(53...) **£ per US gal**: (£)4.69(96) / (£)2.14(28...) **$ per litre**: ($)1.82(28) / ($)0.83(11...) 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...)	Cheaper in US	4	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.

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

Original question 8

The full source mark scheme begins on page 370. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
1			39.00	3	M1 for 240 ÷ 8 or 30 seen, or 240 × 1.3(0) or 312 seen, or 1.3 ÷ 8 or 0.1625 seen M1 (dep) for 240 × 1.3 ÷ 8 or "30" × 1.3(0) or "312"÷ 8 or "0.1625"×240 A1 for 39.00 or 39 NB: M marks for use of 130 in place of 1.30

Original question 4

The full source mark scheme begins on page 384. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
3	(a)		30	1	B1 for 30 minutes
	(b)		20	1	B1 cao
	(c)		graph completed	2	B1 for horizontal line from (5, 20) to (5.30, 20) B1 for a single straight line with the correct gradient from '(5.30, 20)' to the time axis

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

Original question 7

The full source mark scheme begins on page 402. Use the original paper code, tier and question number shown above.

Original question 1

The full source mark scheme begins on page 423. Use the original paper code, tier and question number shown above.

Original question 21

The full source mark scheme begins on page 423. Use the original paper code, tier and question number shown above.

Original question 11

The full source mark scheme begins on page 438. Use the original paper code, tier and question number shown above.

Original question 9

The full source mark scheme begins on page 460. Use the original paper code, tier and question number shown above.

11			32.5	3	M1 for 45 ÷ 30 (=1.5) or 1hr 30 min seen or for 20 ÷ 40 (=0.5 or 30min) M1 (dep) for (45 + 20) ÷ ("1.5" + "0.5") A1 cao

Question		Working	Answer	Mark	Notes
9		342 ÷ 88 = 3.886… 570 ÷ 195 = 2.923… 1500 ÷ 399 = 3.759… OR 88 ÷ 342 = 0.257… 195 ÷ 570 = 0.342… 399 ÷ 1500 = 0.266	Small bottle with correct calculations	4	M1 for one of 342 ÷ 88 (= 3.886…), 570 ÷ 195 (= 2.923…), 1500 ÷ 399 (= 3.759…) OR one of 88 ÷ 342 (= 0.257…), 195 ÷ 570 (= 0.342…), 399 ÷ 1500 (= 0.266) OR any other calculation that could lead to a comparative figure M1 for calculations that could lead to comparative figures for 2 bottles M1 for calculations that could lead to comparative figures for 3 bottles, e.g. all three from the above lists C1 for correct comparative figures for all 3 bottles leading to a correctly stated comparison: small or 342g best value

PAPER: 5MB3H_01

PAPER: 1MA0_2H

Question	Working	Answer	Mark	Notes
5		£26.50 **or** HK$325.95	3	M1 for 3179.55 ÷ 12.3 (=258.5) M1 (dep) for 285 - '258.5' A1 for £26.50 (correctly stated with currency) **OR** M1 for 285 × 12.3 (=3505.5) M1 (dep) for '3505.5' - 3179.55 (=325.95) A1 for HK$325.95 (correctly stated with currency)

Original question 7

The full source mark scheme begins on page 477. Use the original paper code, tier and question number shown above.

Original question 13

The full source mark scheme begins on page 477. Use the original paper code, tier and question number shown above.

Original question 4

The full source mark scheme begins on page 499. Use the original paper code, tier and question number shown above.

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

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

Original question 8

The full source mark scheme begins on page 512. Use the original paper code, tier and question number shown above.

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

Original question 8

The full source mark scheme begins on page 512. Use the original paper code, tier and question number shown above.

Original question 10

The full source mark scheme begins on page 530. Use the original paper code, tier and question number shown above.

14			6 hours	4	B1 for 5 miles = 8 km or equivalent statement or for $\frac{8}{5}$ or $\frac{5}{8}$ used correctly M1 for $50 \times r$ with $1.5 \leq r \leq 1.7$ oe or $480 \times s$ with $0.6 \leq s \leq 0.7$ oe M1 for 480 ÷ speed or distance ÷ 50 A1 oe

PAPER: 1MA0_1H

6			2.15 pm	3	M1 for 240 ÷ 60 (=4) M1 for adding at least 3 of the 4 periods of time eg 20 (mins) + "4 (hrs)" + 25 (mins) + 30 (mins) (=5 h 15 min) oe or 2.15 without units A1 for 2.15 pm 14 15 (h or pm) oe

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*7			54 with reasons	3	M1 for angle *RWY* or angle TWZ = 180 − 126 (= 54) or angle *TWR* or angle *WRS* = 126 (may be marked on diagram) A1 for 54 C1 for appropriate reasons for method shown eg. Angles on a straight line add up to 180 and Alternate angles are equal OR Corresponding angles are equal and Angles on a straight line add up to 180 OR Vertically opposite angles are equal and Allied angles / Co-interior angles add up to 180 OR Angles at a point add up to 360 with other reasons as above.

13			62	4	M1 for B to C time = 210 ÷ 70 (= 3 h) M1 for A to B dist = (5 − "3") × 50 (= 100) M1 (dep on M1) for average speed = total distance ÷ total time or 210 + "(2 × 50)" ÷ 5 A1 cao

PAPER: 5MB2H_01

Original question 4

The full source mark scheme begins on page 550. Use the original paper code, tier and question number shown above.

Original question 18

The full source mark scheme begins on page 550. Use the original paper code, tier and question number shown above.

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.

PAPER: 1MA0_2H

Original question 23

The full source mark scheme begins on page 564. Use the original paper code, tier and question number shown above.

Original question 6

The full source mark scheme begins on page 582. Use the original paper code, tier and question number shown above.

Original question 7

The full source mark scheme begins on page 596. Use the original paper code, tier and question number shown above.

Original question 2

The full source mark scheme begins on page 609. Use the original paper code, tier and question number shown above.

Original question 8

The full source mark scheme begins on page 609. Use the original paper code, tier and question number shown above.

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

Original question 6

The full source mark scheme begins on page 623. Use the original paper code, tier and question number shown above.

16		Volume of A $= \frac{140}{0.7} = 200$ Volume of B $= \frac{128}{1.6} = 80$ Mass of C = 140+128 = 268 Density of C $= \frac{268}{280}$	0.957	4	M1 for finding the volume of either liquid A or B or the mass of liquid C M1 for a complete method to find the volume AND mass of liquid C M1 (dep M2) for "total mass" ÷ " total volume" A1 for 0.957 to 0.96

PAPER: 1MA0_2H

Question		Working	Answer	Mark	Notes
24		$\frac{232.5}{202.5} \times 60$	68.9	4	M1 for 232.5 or 237.5 or 197.5(=3.29… hours) or 202.5 (= 3.375 hours) M1 for correct conversion of "upper bound of time" from minutes to hours, (202.5 to 205) ÷ 60 M1 for "lower bound of distance" ÷ "upper bound of time" (230 to 232.5) ÷ (3.375 to 3.41(6…)) A1 for 68.8 to 69 from correct working OR M1 for 232.5 or 237.5 or 197.5(=3.29… hours) or 202.5 (= 3.375 hours) M1 for "lower bound of distance" ÷ "upper bound of time" (230 to 232.5) ÷ (202.5 to 205) M1 for correct conversion of "lower bound of speed" from miles per minute to miles per hour, ((1.12(1...) to 1.14(8...)) × 60 A1 for 68.8 to 69 from correct working

9		Italy with reason	3	B1 for 5 miles = 8km oe M1 for change to consistent units from $70 \times r$ with $1.5 \leq r \leq 1.7$ or $130 \times s$ with $0.6 \leq s \leq 0.7$ C1 for Italy identified and 112 kph stated or Italy identified and 81.(25) mph stated oe

5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
*10		27	4	M1 for 360÷5 (=72) or 360÷8 (=45) M1 for '72' – '45' A1 for $x = 27$ C1 (dep on M1) for sum of exterior angles of polygon is 360 degrees oe OR M1 for 3×180÷5 (=108) or 6×180÷8 (=135) M1 for '135' – '108' A1 for $x = 27$ C1 (dep on M1) for sum of interior angles of polygon is $180(n - 2)$ oe degrees or angles in a triangle sum to 180 degrees OR M1 for 360÷8 (=45) or 3×180÷5 (=108) M1 for 180 – ('108'+'45') A1 for $x = 27$ C1 (dep on M1) for sum of exterior angles of polygon is 360 degrees oe and angles on a straight line sum to 180 degrees

Original question 4

The full source mark scheme begins on page 646. Use the original paper code, tier and question number shown above.

11	(a)		150	2	M1 for 180 – (360 – 330) or 180 – 30 or 330 – 180 or a complete diagram showing the bearing of 330° A1 cao
	(b)		11 40	4	M1 for 200 ÷ 120 (=1 2/3 h) M1 for conversion between hours and minutes A1 for 1 h 40 min or 100 minutes B1 (ft dep on M1) for 11 40

1MA0 1H November 2015

4			49	3	M1 for converting calculations to common units (either system is acceptable) M1 for dividing their total capacity by the refuelling rate A1 48.9 - 49.1

PAPER: 1MA0_2H

Original question 8

The full source mark scheme begins on page 665. Use the original paper code, tier and question number shown above.

10	(a)	9×6	54	2	M1 for a method to find the speed e.g 9 ÷ 10, 9 ÷ 0.16 A1 cao
	(b)		Graph completed	3	B1 horizontal line from (30,21) to (45,21) M1 for a complete method to show the return journey is 30 mins or ½ hour evidenced by the line on the graph or by calculation A1 Correct line drawn from Luscoe (x,21) to (x + 30,0)

Original question 3

The full source mark scheme begins on page 684. Use the original paper code, tier and question number shown above.

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…)

5MB3H_01 November 2015					
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

PAPER: 1MA0_2H

Question		Working	Answer	Mark	Notes
4		400 ÷ 18 = 22(.2) 499 ÷ 20 = 24(.95) or 25 600 ÷ 26 = 23(.07…) (or equivalent in £) 18 ÷ 4 = 4.5 20 ÷ 4.99 = 4(.008…) 26 ÷ 6 = 4.3(333…)	18 pack with supporting working	4	M1 for a method that would result in at least two values that could be used to compare two packs M1 for a complete method that would result in values that could be used to compare all three packs A1 for all fully correct figures suitable for comparison C1 ft (dep on M2) for comparison of their values with a correct conclusion from their figures

14			3	5	M1 for a complete method to find the area of the cross section, eg. 15 × 2 + "(12 – 4)" × 2 + 15 × 2 (= 76) or for finding the volume of a relevant prism, eg. 15 × 2 × 120 (= 3600) "(12 – 4)" maybe just seen on the diagram M1 for a method to find the volume of the bar, eg. "76" × 120 (= 9120) or ft "area of cross section"×120 provided "area of cross section" includes a method to find the area of at least **two** relevant rectangles M1 for "volume" × 8, eg. "9120" × 8 (= 72960) or 250 × 1000 ÷ 8 (= 31250) NB "volume" must be dimensionally correct M1 (dep on previous M1) for 250 ÷ ("volume" × 8) ÷ 1000, eg. 250 ÷ "72960 ÷ 1000" (= 3.4265….) or "31250" ÷ "9120" A1 for an answer of 3 with correct working

PAPER: 1MA0_2H

12	(a)		0.27	2	M1 for method to work out the gradient for train A A1 for 0.26 – 0.28
	*(b)		Comparison	1	C1 for speed of train B is constant, speed of train A is increasing. oe

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)

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)

Question	Working	Answer	Mark	Notes
9		6.56	4	M1 for $200^2 + 60^2$ (= 43600) M1 for $\sqrt{40000 + 3600}$ or $\sqrt{43600}$ (= 208.8…) M1 for a complete method eg ("208.8" + 2 × 200 + 2 × 60) ÷ 100 × 0.9 oe A1 for 6.55 – 6.561
*10		large carton with correct calculations	3	M1 for 1.60 ÷ 125 (= 0.0128) or 2.8 ÷ 225 (= 0.0124(4…)) or 125 ÷ 1.60 (= 78(.125(g)) or 225 ÷ 2.80 (= 80(.35…g)) or any other calculation that could lead to a comparative figure M1 for 1.60 ÷ 125 (= 0.0128) **and** 2.8 ÷ 225 (= 0.0124(4…)) or for 125 ÷ 1.60 (= 78(.125(g)) **and** 225 ÷ 2.80 (= 80(.35…g)) or for calculations that could lead to comparative figures for the cartons 2 C1 for correct comparative figures for both cartons leading to a correctly stated comparison. Accept any other method considered equivalent. Figures may be truncated or rounded as long as their method is clear.

PAPER: 1MA0/2H

Original question 10

The full source mark scheme begins on page 698. Use the original paper code, tier and question number shown above.

6	30 ÷ 15 = 2 48 ÷ (6 – 2)	12	3	M1 for 30 ÷ 15 = 2 M1 for 48 ÷ (6 – "2") A1 cao	E
*7	120 ÷ 8 × 5 80 + 75 = 155 155 > 150 150 – 80 = 70 70 ÷ 5 × 8 112 < 120	No with reason	3	M1 for method to convert 120 km to miles 120 ÷ 8 × 5 (=75) M1 for 80 + '75' (=155) C1 for No with correct total distances in miles OR M1 for 150 – 80 = 70 M1 for complete method to convert 70 miles to km 70 ÷ 5 × 8 (=112) C1 for No with correct values for distance driven in France and mileage remaining.	E

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Original question 9

The full source mark scheme begins on page 720. Use the original paper code, tier and question number shown above.

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

3	**£:** 189 ÷ 1.39= 135.97 174 ÷ 1.27 = 137.01 **SF:** 115 × 1.39 = 159.85 174 ÷ 1.27 × 1.39 = 190.44 **€:** 115 × 1.27 = 146.05 189 ÷ 1.39 × 1.27 = 172.68	London with correct comparable figures	3	M1 for method to convert one price to another currency, eg 189 ÷ 1.39 M1 for a complete method leading to 3 prices in the same currency or to figures that can be used to compare the 3 prices A1 for London and correct comparable figures (accept rounded or truncated to the nearest unit)

18		8.4	3	M1 for using $d = m/v$ e.g. $11.34 = 74 / V$ or vol. of lead (= 6.5(25...) or vol. of tin (= 17.2(3...) M1 (dep) for a complete method using 200 ÷ "total volume" A1 for answer in range 8.4 to 8.44

Question	Working	Answer	Mark	Notes
4 (a)		57.1	P1	for a process to find time from Liverpool to Manchester, eg. 56 ÷ 70 (= 0.8 (hrs) or 48 (mins))
			P1	for a process to find total distance, eg. 56 + 61 (= 117) or the total time, eg. "48" + 75 (= 123) or "0.8" + $\frac{75}{60}$ (= 2.05) with consistent units of time
			P1	(dep P2) for a correct process to find average speed with consistent units of time, eg."117" ÷ "2.05" or "117" ÷ "123"
			A1	for answer in the range 57 to 57.1
(b)		explanation	C1	for explaining that the time taken for the two parts of the journey must be the same or the distance from Leeds to York is $\frac{3}{4}$ of the distance from Barnsley to Leeds

Question	Working	Answer	Mark	Notes
6		1.01	P1	fruit syrup 15 × 1.4 (= 21) or water 280 × 0.99 (= 277.2) or apple juice 25 × 1.05 (= 26.25)
			P1	(dep P1) for complete process to find the total mass e.g. “277.2” + “26.25” + “21” (= 324.45) or a weighted density eg 15 × 1.4 ÷ 320 (= 0.065625) or 280 × 0.99 ÷ 320 (= 0.86625) or 25 × 1.05 ÷ 320 (= 0.08203125)
			P1	(dep P2) for complete process to find the density eg “324.45” ÷ 320 (=1.01..) or “0.065625” + “0.86625” + “0.08203125” (= 1.0139..)
			A1	1.01 to 1.014

17	(a)		No (supported)	P1 P1 P1 C1	for 265 or 275 or 274.999... or 107.5 or 112.5 or 112.4999... process to find $\frac{d}{t}$ where $270 < d \leq 275$ and $107.5 \leq t < 110$ oe for process to work in consistent units of time eg $\frac{d}{t} \times 60$ or $t \div 60$ where $265 \leq d \leq 275$ and $107.5 \leq t < 110$ oe or $160 \div 60$ (= 2.666..) Conclusion supported with correct figure(s) given eg No and 153(.488..) or No and 2.66 to 2.7 and 2.5(581..) from correct working
	(b)		Statement	C1	e.g. Less distance in the same time so (max) speed would drop

Paper 1MA1: 3H

9		22.5	P1	for process to find James' speed eg 50÷2.5(=20) **or** 50 ÷ 150 ($=\frac{1}{3}$)
			P1	for process to find James' time for 15 km eg 15 ÷ "20" (=0.75) **or** 15 ÷ $\frac{1}{3}$ (=45)
			P1	for process to find Peter's time for 15 km eg "45" − 5 (=40)
			P1	for process to find Peter's speed eg 15 ÷ "40" **or** 15 ÷ $\frac{"40"}{60}$
			A1	oe

10 (a)		0 to 20 seconds	B1	for between 0 seconds and 20 seconds
		with reason	C1	for reason given eg gradient is greatest oe
(b)		18	B1	ft from (a)

2		New York (supported)	P1 P1 C1	for changing between £ and $, eg 1.089×1.46 (= 1.58(9.)) or 2.83÷1.46 (= 1.93(8.)) or between litres and gallons, eg 1.089×3.785 (= 4.12(1.)) or 2.83÷3.785 (= 0.74(7.)) for a complete process to give values that can be used for comparison, eg “1.938...” ÷ 3.785 (= 0.51(2.)) **or** “1.589...”...× 3.785 (= 6.01(7.)) **or** 1.089 × 3.785 = (4.12(1.)) and 2.83 ÷ 1.46 (= 1.93(8.)) for New York and correct comparative values

3		648	M2 [M1 A1	a complete method, eg 12.5 × 1000 ÷ 19.3 for using volume = mass/density, eg 12500 ÷ 19.3 (condone inconsistent units or incorrect conversions) may be implied by digits 647... or 648...] for answer in range 647 to 648

Paper: 1MA1/3H

Question	Working	Answer	Mark	Notes
18 (a)	values 0, 2, 5, 10,18	130	M1	for starting to find area under the curve, eg 0.5×5×2 (= 5)
			M1	for a complete method to find the area under the curve using 4 strips of equal width, eg "5" + 0.5×5×(2+5) (= 17.5) + 0.5×5×(5+10) (= 37.5) + 0.5×5×(10+18) (= 70)
			A1	for 130 or answer in range 130.1 to 132 supported by accurate working
(b)		overestimate with reason	C1	for "overestimate" and appropriate reason linked to method eg area between trapeziums and curve also included

Question	Answer	Mark	Mark scheme	Additional guidance
4 (a)	Estimated value	P1	for using a rounded value in a correct process eg 3000 ÷ 15 **or** 15 × 8 **or** 20 × 8	Their rounded value must be used in a calculation Rounding may appear after a correct process eg 15.12 × 8 = 120.96 ≈ 100 followed by eg 3069.25 ÷ 100
		P1	for a full process to find the number of days eg "3000" ÷ "15" ÷ "10" (= 20) **or** "3000" ÷ "15" ÷ 8 (= 25)	Accept 3069.25 ÷ 15.12 ÷ 8 oe
		A1	for a correct answer following through their rounded values	
(b)	Explanation	C1	eg less days required **or** it doesn't affect the answer because I would still round 16.27 down to 15 (or up to 20)	Refers to time taken

Paper: 1MA1/1H

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** $\frac{("3.5"-"2.6")}{"3.5"}$ ×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

14	11 – 19	P1 P1 A1	for drawing a tangent to the curve at time = 5 for process to find the gradient, eg 70 ÷ 5 (dep on 1st P1) for answer in the range 11 - 19 m/s	 Using their drawn tangent, eg change in *y* ÷ change in *x* Must come from gradient of a tangent.

Paper: 1MA1/2H

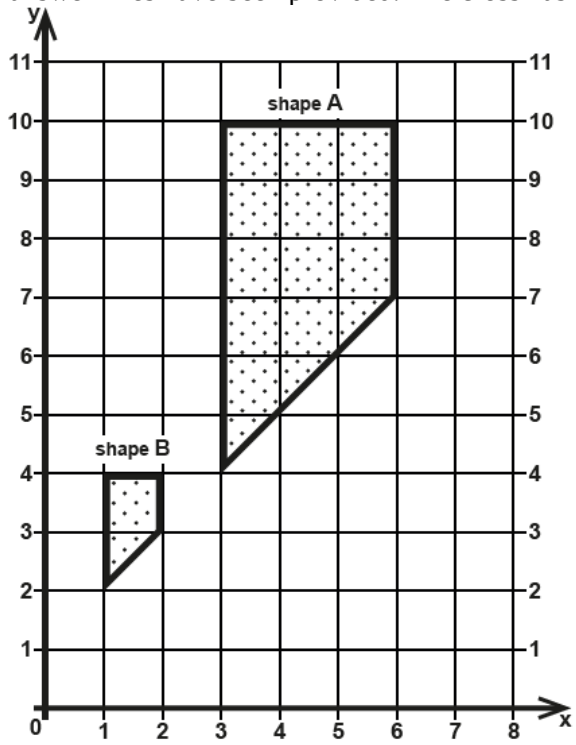
Question	Answer	Mark	Mark scheme	Additional guidance
21	0.43	B1	for one correct bound for mass or length eg 1967.5 **or** 1972.5 **or** 13.15 **or** 15.95 **or** 21.65 **or** 13.25 **or** 16.05 **or** 21.75	Can work in any units
		P1	for a correct process to find a bound for the volume, eg 13.15 × 15.95 × 21.65 (=454(0.925125)) **or** 13.25 × 16.05 × 21.75 (=462(5.409375))	Accept volumes truncated or rounded to at least 3 sig fig
		P1	for a correct process to find a bound for density, eg [mass LB] ÷ "462(5.409375)" (=0.425(367755)) where 1965 ≤ mass LB < 1970 **or** [mass UB] ÷ "454(0.925125)" (=0.434(3828506)) where 1970 < mass UB ≤ 1975	Accept densities truncated or rounded to at least 3 sig fig
		A1	for both correct bounds, 0.425(367755) **and** 0.434(3828506)	Accept bounds truncated or rounded to at least 3 sig fig At this point correct units must be used
		C1	(dep on A1) for a correct statement on degree of accuracy e.g. UB and LB both round to 0.43 to 2 decimal places or 2 significant figures	Must be 0.43 not 0.4

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: 1MA1/2H			
Question		**Modification**	**Mark scheme notes**
3		Diagram enlarged	Standard mark scheme
5	(a)	Table has been turned to vertical format and left aligned. Wording added 'There are five spaces to fill.' Braille will label answer spaces (i) to (v) from left to right.	Standard mark scheme
5	(b)	Diagram enlarged	Standard mark scheme

Paper: 1MA1/2H			
Question		**Modification**	**Mark scheme notes**
7		Shape B has been drawn on the grid and the question has been changed to: 'It shows shape A and shape B given on a grid. Describe fully the single transformation that maps shape A onto shape B.' 3 answer lines have been provided. The cross has been removed from the y axis. 	B2 for all three aspects: enlargement scale factor 1/3 centre (0,1) (B1 for just two of these aspects)

Paper: 1MA1/2H			
Question		**Modification**	**Mark scheme notes**
10		Diagram enlarged. Right axis has been labelled. Arrows have been made longer. Intermediate labels have been added to the axes.	Standard mark scheme
12		Diagrams enlarged. Wording added 'There are four spaces to fill.' Braille will label answer spaces (i) to (iv) from top to bottom.	Standard mark scheme
13		Diagram enlarged. Angles moved outside of the angle arcs and the arcs have been made smaller. Wording added 'Angle BAD = y^o Angle BDO = x^o	Standard mark scheme
14		Diagram enlarged. Axes labels have been moved to the left of the horizontal axis and above the vertical axis. Right axis has been labelled. Graph line moved to go through (5, 40).	Standard mark scheme applied to the given graph, which will likely result in figures such as 40/2 =20; apply normal MLP tolerances, likely to result in an answer in the range 16 - 24 m/s
15		Wording added 'It shows a probability tree diagram.' Diagram enlarged. Wording added in (a): 'There are five spaces to fill.' Braille will label answers as shown below. (ii) 0.45 (iii) (iv) (i) (v)	Standard mark scheme
16		Diagram enlarged.	Standard mark scheme, but apply usual MLP tolerances to reading off the answers.
17		Diagram enlarged. Axes labels have been moved to the left of the horizontal axis and above the vertical axis. Right axis has been labelled. Shading has been changed to dotty shading. In part (a) wording added 'There are four spaces to fill.' Braille will label answer spaces (i) to (iv) from top to bottom.	Standard mark scheme

Paper: 1MA1/2H			
Question		**Modification**	**Mark scheme notes**
18		Model provided for all candidates. Diagram enlarged and also provided for MLP. Wording added ‘marked x on the model.’	Standard mark scheme
19		2 Models provided for all candidates. Diagrams enlarged and also provided for MLP. No diagram given for the formulae for braille candidates. Shape label has been moved above the diagram. Wording added ‘Model 1 is a solid sphere. Model 2, shape S is one quarter of a solid sphere, centre O.’	Standard mark scheme

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 × 22 + 5 × 28 + 5 × 32 + 5 × 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	

Paper: 1MA1/3H

5	(a)	16 to 20	P1	for using time = $\frac{\text{distance}}{\text{speed}}$, eg $\frac{1}{200}$ or $\frac{1}{213}$ **or** for 1 hour = 60 × 60 (= 3600) seconds	
			P1	complete process, eg $\frac{1}{200} \times 60 \times 60$ oe or $\frac{1}{213} \times 60 \times 60$ oe	Calculation could be done in stages.
			A1	for answer in range 16 to 20	
	(b)	decision with reason	C1	(dep on correct use of time = $\frac{\text{distance}}{\text{speed}}$) for reason related to their response to part(a), eg overestimate as speed rounded down	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
20	3.75	P1	works to find vol of frustum eg $1/3\pi(3.6)^2\times6.4 - 1/3\pi(1.8)^2\times3.2$ or 86.858.. − 10.857… (=24.192π or 76.00..)	
		P1	works to find vol of hemisphere eg $\frac{1}{2}\times\frac{4}{3}\pi\times3.6^3$ (=31.104π or 97.7....)	781.7… by use of diameter does not get the mark
		P1	mass of frustum as [vol]×density eg "76.00" × 2.4 (=182.4..) **or** mass of hemisphere as [vol]×density eg "97.7...."×4.8 (=469.037...)	[vol] is their volume which could be ft using the radius, using the diameter, or could be another value as long as it is stated as being the volume, or clearly intended from working.
		P1	mean density as total mass ÷ total volume eg ("182.4.." + "469.037") ÷ ("76…" + "97.7..") or "651.4..". ÷ "173.7...."	All figures must come from correct method shown.
		A1	answer in the range 3.7 to 3.8	

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
5 (a)	2 mins 48 secs	P1	for an appropriate first step eg 700 ÷ 475 (=1.47..) **or** 475 ÷ [time] (= 4.16.. m/s) **or** [time] ÷ 475 (= 0.24 s/m)	[time] what candidate indicates as time of first race Units are not needed and can be ignored if given
		P1	for a complete method to find the required time eg 700 ÷ 475 × [time] (=168) **or** 700 ÷ (475 ÷ [time]) (=168) **or** [time] ÷ 475 ×700 (=168)	Allow calculation in stages and appropriate rounding.
		A1	cao	
(b)	Statement	C1	eg takes less time **Acceptable examples** Quicker time Faster time Reduces my answer to part (a) **Not acceptable examples** It is an underestimate The amount of time could/may increase Laura goes faster	

Paper: 1MA1/3H

18	2.7 with statement	B1 B1 P1 A1 C1	for 179.5 or 180.5 or 180.4999... for 486.5 or 487.5 or 487.4999... for a correct process to find a bound for average speed, eg [upper bound of distance] ÷ [lower bound of time] where 487 < [UB of distance] ≤ 487.5 and 179.5 ≤ [LB of time] < 180 **or** for [lower bound of distance] ÷ [upper bound of time] where 486.5 ≤ [LB of distance] < 487 and 180 < [UB of time] ≤ 180.5 (dep on all previous marks) for 2.695(2…) **and** 2.715(8 …) with both values clearly coming from working with correct values for 2.7 from 2.695… and 2.715… **and** statement that both LB and UB round to 2.7	Accept bounds truncated or rounded to at least 4 sig fig

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
14 (a)(i)	0.83	B1	for a tangent drawn at $t = 15$	Working: $7.5 \div 9 = 0.83...$ No tangent scores 0 marks
		M1	full method to use the tangent to find the gradient (eg $7.5 \div 9$)	This mark can be awarded if the tangent is drawn at $t \neq 15$ Working may be seen on the diagram
		A1	for answer in the range 0.6 to 1.0	
(ii)	Statement	C1	statement **Acceptable examples** acceleration rate of change of speed increase in speed over time **Not acceptable examples** rate of change m/s/s increase in speed	
(b)	220	P1	for splitting the area into strips and correct process to find the area of one strip, eg $\frac{5\times4}{2}$ (=10) **or** $\frac{(4+12)}{2}\times5$ (=40) **or** $\frac{(12+18)}{2}\times5$ (=75) **or** $\frac{(18+20)}{2}\times5$ (=95)	Working 4, 12, 18, 20
		P1	for a complete process using at least 4 strips to find the area under the curve eg, "10" + "40" + "75" + "95"	Allow one error in the reading of speeds
		A1	for answer in the range 215 to 225 from correct working using at least 4 strips	

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
11 (a)	130	P1	for process to divide eg $(3.9 \times 10^7) \div (3 \times 10^5)$	Condone missing brackets
		A1	cao	Accept 1.3×10^2
(b)	Explanation	C1	Explanation referring to the time **Acceptable examples** The time will be more It will take longer The answer will be bigger **Not acceptable examples** The answer will be wrong The answer will be different	

Question	Answer	Mark	Mark scheme	Additional guidance
13	1.01	P1	for 1.09×60 (= 65.4 or $\frac{327}{5}$) **or** 0.97×128 (= 124.16 or $\frac{3104}{25}$)	Note that the volumes may be converted to ml, eg 1.09×60000 (= 65400)
		P1	for 1.09×60 (= 65.4 or $\frac{327}{5}$) **and** 0.97×128 (= 124.16 or $\frac{3104}{25}$) **or** "65.4" + "124.16" (= 189.56 or $\frac{4739}{25}$)	
		P1	for a complete process to find the density of antifreeze eg ("65.4" + "124.16") ÷ 188 or 189.56 ÷ 188 or $\frac{4739}{25} \div 188$	Candidates working in ml must use 188,000
		A1	for answer in the range 1.00 to 1.01	If an answer within the range is seen in working but then rounded incorrectly award full marks. Accept 1 for 1.00 Note that the correct value is 1.008.....

8	(i)	Distance in the range 20 to 23	P1	for a process to draw a bearing of 070°, eg. a line drawn 70° from the North line at *P*	Accept a line of any length as long as the intention is clear.
	(ii)	Bearing in the range 317 to 330	P1	for a process to work out the distance *PQ*, eg. 12 × 1.5 (= 18)	
			P1	(dep previous P1) for the process to use the given scale, eg. "18" ÷ 4 (= 4.5 cm)	Award P3 for Q shown in the correct place on the diagram. 4.5 scores 2 marks provided there is a link to 12 × 1.5 (= 18)
			A1	(dep P3) for distance in the range 20 to 23	Award no marks if no supportive processes
			A1	(dep P3) for bearing in the range 317 to 330	Award no marks if no supportive processes Award A0A0 if *Q* is not in the correct place

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
9 (a)	21.6	M1	for a method using distance = speed × time, eg. $72 \times \frac{18}{60}$ or 7.2 km in 6 minutes, so 7.2 × 3 oe partitioning method	Accept 72 × 18
		A1	for 21.6 oe	
(b)	No (supported)	M1	for a method to convert 20 m/s to km/h or 72 km/h to m/s, eg. $20 \times \frac{3600}{1000}$ (= 72) or $72 \times \frac{1000}{3600}$ (= 20)	Accept methods to convert **both** speeds to km/s or m/h
		C1	for No since 72 km/h = 20 m/s oe	

Question	Answer	Mark	Mark scheme	Additional guidance
21 (a)	52.5	P1	starts to find area under graph, eg $\frac{30\times12}{2}$ (=180) **or** 50 × 12 (=600) **or** $\frac{20\times12}{2}$ (=120)	
		P1	complete process to find area under graph, eg $\frac{30\times12}{2}+50\times12+\frac{20\times12}{2}$ (= 900)	
		P1	starts process to find half way time, eg (("900" ÷ 2) – 180) ÷ 12 (=22.5)	
		A1	52.5 oe	
(b)	Comparison	C1	acceptable comparison **Acceptable** (acceleration) during first part is positive but (acceleration) during last part is negative / deceleration (acceleration is) greater during the last part than during the first part gradient is steeper in the last part / longer to speed up than slow down speed / (acceleration) is increasing at start and decreasing at end (acceleration) is slower in the first part (acceleration) is ascending in the first part and descending in the last part 0.4 is the first part and –0.6 in the last part **Not acceptable** goes down in the last part speed is greater in last part than first part	

Paper: 1MA1/2H

6	50	B1	for finding the time difference, eg, 1hr 18 mins or 78 mins oe	Allow 1.18 for this mark 118 scores B0
		P1	for correct process to convert minutes to hours, eg 18 ÷ 60 (=0.3) **or** 78 ÷ 60 (=1.3) **or** for a correct process to convert speed in miles per minute to mph eg "0.833.." × 60	For a conversion of time or speed
		P1	for using speed = distance ÷ time eg, 65 ÷ [time] **or** 65 ÷ 78 (=0.833..)	[time] is what the candidate clearly indicates as time difference
		A1	cao SCB2 for 83(.333…) seen as the answer	

Paper: 1MA1/3H

13	739	P1	process to find the volume of C, eg $\pi \times 3^2 \times 25$ (= 706.8583471 or 225π)	For use of 3.14 Volume of C is 706.5
		P1	process to find the volume of A **or** the volume of B, eg "706.8..." $\times \frac{2}{2+13}$ (= 94.24777961 or 30π) or "706.8…" $\times \frac{13}{2+13}$ (= 612.6105675 or 195π) **or** process to work with density and ratio, eg (2 × 1.21 + 13 × 1.02) (= 15.68)	Volume of A is 94.2 Volume of B is 612.3
		P1	process to find the mass of C, eg "30π" × 1.21 (= 114.0398133) + "195π" × 1.02 (= 624.8627788) **or** "225π" × "15.68" ÷ (2+13)	Mass of A is 113.982 Mass of B is 624.546
		A1	for an answer in the range 738.5 to 739	Do not award accuracy mark if the figure is from obvious incorrect working

Paper: 1MA1/3H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
19	3.4	M1	for drawing a suitable tangent at $t = 6$	
		M1	for a full method to find the gradient of the tangent at t=6, eg 20 ÷ 5.8	Use of change in y over change in x
		A1	answer in the range 3.05 to 3.7	Answers of $\frac{10}{6}$ oe scores no marks

8	450	M1 M1 A1	for 18 ÷ 3 (=6) for substitution eg. $75 = \frac{F}{"6"}$ or $75 \times$ "6" cao	Ignore units

13	196	P1 P1 A1	for vol A = 1400 ÷ 70 (=20) **or** for mass B = 280 × 30 (=8400) for density C = $\frac{1400+"8400"}{"20"+30}$ (= $\frac{9800}{50}$) or answer with digits 196 cao	 An answer of 350 from 70 + 280 gets no marks

2	2 hours 45 minutes	P1 P1 A1	for 30 ÷ 24 (= 1.25) or 12 ÷ 8 (= 1.5) for finding the sum of their two times eg “1.25” + “1.5” (= 2.75) or 165 (minutes) cao	May be written in hours and/or minutes or 3 h 15 min or 2 h 75 min

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
16 (a)	129 to 160	M1	for a method to find an estimate for the area under the curve eg $0.5 \times 30 \times 9$	Do not accept 30×9
		A1	for value in the range 129 to 160 (If M0, SC B1for 126 or 127.5)	Award full marks for any correct method leading to a better estimate.
(b)	underestimate with reason	C1	(dep M1) for "underestimate" and appropriate reason linked to their method, eg area between triangle and curve not included	
(c)	Explanation	C1	for explanation, **Acceptable examples** method gives average acceleration (in first 60 seconds) he has not used/drawn a tangent (at time 60 seconds) he has not worked out the gradient (at time 60 seconds) **Not acceptable examples** he has not used strips he has calculated it accurately rather than using an estimate the estimate of 13 should be about 4.4 the answer should be approximately 0.073	

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
3 (a)	80	M1	for a complete method eg $\frac{20}{15} \times 60$ **or** 20×4 **or** $20 \div \frac{1}{4}$	
		A1	cao	
(b)	Travel graph	M1	for method to find distance travelled in last 20 minutes, eg $75 \times \frac{20}{60}$ (= 25)	Can be implied by a distance of 25km drawn on the graph
		C2	for a fully correct travel graph	
		(C1	for horizontal straight line from (10 15, 20) to (10 25, 20) **or** for a line of the correct length and gradient to indicate a speed of 75km/h eg a straight line from (10 25, 20) to (10 45, 45))	

Question	Answer	Mark	Mark scheme	Additional guidance
7	1.6	P1	for 1.8 × 80 (= 144) **or** 1.2 × 40 (= 48) or for 192 **or** for 80 : 40 = 2 : 1	
		P1	for (“144” + “48”) ÷ (80 + 40) or 192 ÷ 120 **or** for (1.8 × 2 + 1.2) ÷ 3 or 4.8 ÷ 3	
		A1	oe	

Question	Answer	Mark	Mark scheme	Additional guidance
4	260	P1	conversion to common units of capacity eg 2.2 × 4.54 (= 9.988) or 8 ÷ 4.54 (= 1.76...) **OR** for Company A 2400 ÷ 4.54 (= 528.63...) **OR** 2400 ÷ 8 (= 300) **OR** a rate per minute 8 ÷ [time for Company A] (= 4.8…) oe	Results of calculations may be truncated or rounded. [time for Company A] could be 1 min 40 sec or 1.66… or 1.6 or 1.40 etc as long as it is clear it relates to 1 min 40 sec
		P1	for a complete process to find the time for company A or company B in minutes. eg in litres Company A 2400 ÷ "4.8…" (= 500) or "300" × [1 min 40 sec] (= 500) **or** Company B 2400 ÷ "9.988" (= 240.28...) **OR** eg in gallons Company A "528.63.." ÷ ("1.76..." ÷ [1 min 40 sec]) (= 500) **or** Company B "528.63…" ÷ 2.2 (= 240.28…)	
		P1	for complete processes to find the times for both company A and company B in minutes. Company A eg in litres 2400 ÷ "4.8…" (= 500) or "300" × [1 min 40 sec](= 500) **or** in gallons "528.63.." ÷ ("1.76. .." ÷ [1 min 40 sec]) (= 500) **AND** Company B eg in litres 2400 ÷ "9.988" (= 240.28...) or in gallons "528.63…" ÷ 2.2 (= 240.28…)	
		A1	for an answer in the range 259 to 260	If the answer is given within the range but then rounded incorrectly award full marks.

Paper: 1MA1/3H	

21	(a)	19.1	M1	for a method to find an estimate for the area of at least 1 trapezium under the curve eg $0.5 \times 1 \times (4 + 6)$ or $0.5 \times 1 \times (6 + 7.2)$ or $0.5 \times 1 \times (7.2 + 7.8)$	
			M1	for a complete method eg $0.5 \times 1 \times (4 + 6) + 0.5 \times 1 \times (6 + 7.2) + 0.5 \times 1 \times (7.2 + 7.8)$ or $0.5\{(4 + 7.8) + 2(6 + 7.2)\}$	Allow a maximum of 2 errors in y values used
			A1	cao	Ignore any reference to units
	(b)	Statement	C1	eg distance (travelled)	If units are given they must be correct

7	3 : 2	P1 P1 A1	for a process to find either volume eg 3^3 (= 27) or 4^3 (= 64) for showing density **A** = 81 ÷ "27" (= 3) or density **B** = 128 ÷ "64" (= 2) for 3 : 2 oe	 Ignore units quoted

Paper: 1MA1/1H

14 (a)	0.9	M1	for drawing a tangent at $t = 2$	
		M1	for a complete method to find the gradient eg tangent at $t = 2$ and "2.7" ÷ "3"	Use of change in y over change in x Working may be seen on the diagram
		A1	for answer in the range 0.7 to 1.1	Accept answers in the form $\frac{a}{b}$ where a and b are integers
(b)	Statement	C1	eg distance (travelled)	If units are given they must be correct

Paper: 1MA1/1H

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
6	600.74	M1	works out decrease for one year eg $679 \times 4 \div 100$ (= 27.16) oe **or** $679 \times (100 - 4) \div 100$ (= 651.84) oe	Implied by 679×0.12 (= 81.48) or 679×0.88 (= 597.52)
		M1	for compound method, eg $679 \times$ "0.96"^{t}, $t \geq 2$ **or** "651.84" × "0.96" (= 625.76..) **or** "651.84" × 0.04 (= 26.07) **or** for answers in the range 600.71 to 600.74	Values may be rounded or truncated
		A1	for 600.71 **or** 600.72 **or** 600.73 **or** 600.74	If correct answer seen, and then difference found award M1M1A0

7	No (supported)	P1 P1 P1 C1	for a conversion with litres and gallons, eg 18 ÷ 4.5 (= 4) **or** 8 × 4.5 (= 36) for a conversion with £ and euros, eg 27 × 0.85 (= 22.95) **or** 40.8 ÷ 0.85 (= 48) for finding the unit price, eg 27 ÷ 18 (= 1.5) **OR** finding proportionality for fuel eg ("36" ÷ 18) (= 2) for No with comparative figures, eg No with 20.4 **and** 22.95 **OR** No with 1.275 **and** 1.133…	See page at end of mark scheme May compare cost per gallon or cost in euros May be seen in a calculation or given in a description Accept comparative figures rounded or truncated No is implied by eg Wales is cheaper

Paper: 1MA1/2H

9	0.8	P1 P1 A1	for process to find the area, eg $187.5 = \frac{180}{A}$ **or** $180 \div 187.5$ (= 0.96) **or** $\frac{180}{1.2x} = 187.5$ **or** $1.2x = \frac{180}{187.5}$ for complete process to find width, eg "0.96" ÷ 1.2 **or** $180 \div 225$ cao	Ignore units for P marks only

Paper: 1MA1/2H

6	10	P1	for a process to use distance = speed × time for either of the parts of Jessica's journey, eg. $6\times\frac{15}{60}$ (= 1.5) or $9\times\frac{40}{60}$ (= 6) or 6 × 15 (= 90) or 9 × 40 (= 360)	
		P1	for a process to add the 2 distances for Jessica, eg $6\times\frac{15}{60}+9\times\frac{40}{60}$ (= 7.5) or 6 × 15 + 9 × 40 (= 450)	
		P1	for complete process to find Amy's average speed, eg. "7.5" ÷ "0.75" oe or "450" ÷ 45	Must be consistent units at this stage.
		A1	cao	

Paper: 1MA1/3H

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
7	1250	P1	for process to use area of base in the formula, eg $\frac{10000}{2\times 4}$	
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
23	20	B1	stating bound, eg 10.65 **or** 10.55 **or** 31 min 48.5sec **or** 31 min 47.5sec **or** 1908.5sec **or** 1907.5sec	
		P1	(dep on B1) for a correct bound for time in hours, eg 0.5301(38…) **or** 0.5298(61…) **Or** a correct process to find one bound for speed in km per minute eg [UB of S] = [UB of D]÷[LB of T] or [LB of S] = [LB of D]÷[UB of T] **or** a correct process to find one bound for speed in km per second eg [UB of S] = [UB of D]÷[LB of T] or [LB of S] = [LB of D]÷[UB of T]	Bound rounded or truncated to 4 dp Where $10.6 < [\text{UB of D}] \leq 10.65$ **and** $31 \text{ min } 47.5 \text{ sec} \leq [\text{LB of T}] < 31 \text{ min } 48 \text{ sec}$ **Or** $10.55 \leq [\text{LB of D}] < 10.6$ **and** $31 \text{ min } 48 \text{ sec} < [\text{UB of T}] \leq 31 \text{ min } 48.5 \text{ sec}$ Where $10.6 < [\text{UB of D}] \leq 10.65$ **and** $1907.5 \text{ sec} \leq [\text{LB of T}] < 1908 \text{ sec}$ **Or** $10.55 \leq [\text{LB of D}] < 10.6$ **and** $1908 \text{ sec} < [\text{UB of T}] \leq 1908.5 \text{ sec}$
		P1	(dep on P1) for correct process to find one bound for speed in km per hour, eg [UB of S] = [UB of D]÷ 0.5298(61…) **or** [LB of S] = [LB of D]÷ 0.5301(38…) **OR** Correct process to convert a bound for speed in km per minute to km per hour eg [UB of S] = [UB of D]÷[LB of T] × 60 **or** [LB of S] = [LB of D]÷[UB of T] × 60 **OR** Correct process to convert a bound for speed in km per second to km per hour eg [UB of S] = [UB of D]÷[LB of T] × 60 × 60 **or** [LB of S] = [LB of D]÷[UB of T] × 60 × 60	Time used in hours Where $10.6 < [\text{UB of D}] \leq 10.65$ **and** $31 \text{ min } 47.5 \text{ sec} \leq [\text{LB of T}] < 31 \text{ min } 48 \text{ sec}$ **Or** $10.55 \leq [\text{LB of D}] < 10.6$ **and** $31 \text{ min } 48 \text{ sec} < [\text{UB of T}] \leq 31 \text{ min } 48.5 \text{ sec}$ Where $10.6 < [\text{UB of D}] \leq 10.65$ **and** $1907.5 \text{ sec} \leq [\text{LB of T}] < 1908 \text{ sec}$ **Or** $10.55 \leq [\text{LB of D}] < 10.6$ **and** $1908 \text{ sec} < [\text{UB of T}] \leq 1908.5 \text{ sec}$
		A1	for both correct bounds from correct working, 20.099… **and** 19.900…	Figures rounded or truncated to 3 sf or better
		C1	for 20 correct to 2 significant figures as both bounds agree.	

Paper: 1MA1/2H

7	(a)	0.008	B1	for 0.008 or 8×10^{-3}	
	(b)	50	M1	for conversion from km to m eg 180×1000 (= 180 000) **or** for conversion from hours to seconds eg $180 \div (60 \times 60)$ (= 0.05) **or** for conversion from km per hour to metres per second, eg $1000 \div (60 \times 60)$ (= 0.277...) (Accept $(60 \times 60) \div 1000$ (= 3.6))	May be awarded at any stage
			M1	for a complete process eg $180 \times 1000 \div 3600$	
			A1	cao	

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

8	3	P1 P1 A1	for process to find area of base, eg 1200 ÷ 40 (= 30) for process to find pressure, eg 90 ÷ "30" cao	

Paper: 1MA1/1H

6	65	P1 P1 A1	for a correct process to find the number of seconds, eg 67 205 600 ÷ 11.9 (= 5 647 529.4...) **or** for a correct process to convert between seconds and days, eg 24 × 60 × 60 (= 86 400) oe, may be seen in stages or 11.9 × 60 × 60 × 24 (= 1 028 160) for a complete process, eg "5 647 529.4..." ÷ "86 400" or 67 205 600 ÷ "1 028 160" accept answers in the range 65 to 65.4 or 66	Note that this mark may be awarded at any stage in the working. If a correct answer within the range is shown in working but incorrectly rounded award full marks.

8	648	M1 A1	for substitution into density formula eg 9×72 or $9 = \frac{m}{72}$ cao	

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
7	65	P1	for a full process to find the volume of the container, eg $\pi \times 15^2 \times 43$ (= 30 394.9…)	These steps may be completed in a different order Accept 9675π
		P1	for a process to convert between cm^3 and litres, eg "30 394.9…" ÷ 1000 (= 30.39…) **or** [volume] ÷ 1000 **or** 0.47 × 1000 (= 470)	Accept 9.675π or $\frac{387}{40}\pi$
		P1	for a process to find the time taken, eg [volume] ÷ 0.47 or [volume] ÷ "470"	[volume] can be any value they believe to be the volume that might have been incorrectly converted (or not at all)
		A1	answer in the range 64.6 to 65	If an answer is given in the range in working and then rounded incorrectly award full marks.

7	7 hours 56 minutes	P1 P1 A1	for process to begin to work with speed, eg 143 ÷ 55 (= 2.6) for process to work in minutes, eg "2.6" × 60 (= 156 mins) **and** 5 × 60 + 20 (= 320 mins) or for 476 (mins) **or** for process to work in hours eg "2.6" **and** $5\frac{20}{60}$ (= 5.33...)...or for 7.93... **or** for process to work in hours and minutes, eg "2" + ("0.6" × 60) (= 2 hrs 36 mins) cao	May work in minutes or hours and minutes Accept 2 or more decimal places for this mark

8	Shown	M1	for substitution to find area of face, eg $3.5 = \frac{504}{\text{area}}$ or $3.5 \times \text{area} = 504$ or $\text{area} = 504 \div 3.5$ (= 144) **or** for working from surface area eg $900 \div 6$ (= 150)	Other equivalent methods should be credited accordingly
		M1	for method to find comparable figures, eg "144" × 6 (= 864) or "150" × 3.5 (= 525) or 504 ÷ "150" (=3.36…) **or** for 504 ÷ 3.5 (= 144) **and** 900 ÷ 6 (= 150) **or** for 900 ÷ 144 (= 6.25) **and** 6	
		C1	for correct comparable figures, eg 864 (and 900) **or** 144 and 150 **or** 525 (and 504) **or** 3.36… (and 3.5) **or** 6.25 and 6	Condone incorrect units given.

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
22	(£)9.37(9…) and conclusion	B1	for stating at least one bound 187.5 or 192.5 or 192.499… or 872.5 or 877.5 or 877.499… or 71.5 or 72.5 or 72.499…	May be seen in calculations Accept 192.499... or 192.4$\dot{9}$ or 877.499... or 877.4$\dot{9}$ or 72.499… or 72.4$\dot{9}$
		P1	for correct use of LB and UB find the lower bound for profit, eg [LB of selling price] – [UB of costs] (= 872.5 – 192.5 (= 680))	872.5 ≤ [LB selling price] < 875 190 < [UB costs] ≤ 192.5
		P1	(dep P1) for correct use of LB and UB to find the lower bound for hourly rate, eg [LB of profit] ÷ [UB of hours]	LB profit = "680" 72 < [UB hours] ≤ 72.5
		C1	for (£)9.37(9…) and conclusion that Ebony does earn more than minimum wage with value from working with correct bounds	$\frac{872.5 - 192.5}{72.5}$ Accept bounds truncated or rounded to at least 2 dp

Question	Answer	Mark	Mark scheme	Additional guidance
14 (a)	–2.5	M1	for drawing a tangent at $t = 5$	No tangent drawn score 0 marks
		M1	(dep on M1) for a complete method to find the gradient eg tangent at $t = 5$ and "10" ÷ "4" **or** an answer in the range 2.0 to 2.8	Working may be seen on the diagram
		A1	for answer in the range –2.0 to –2.8 dependent on tangent drawn	Accept answers in the form $\frac{a}{b}$ where a and b are integers
(b)	79	M1	for a method to find an estimate for the area of at least 1 trapezium under the curve, eg $\frac{1}{2}\times 2\times(25+16)$ $(=41)$ oe or $\frac{1}{2}\times 2\times(16+9)$ $(=25)$ oe or $\frac{1}{2}\times 2\times(9+4)$ $(=13)$ oe **or** for a method to find an estimate for the area of at least 1 rectangle with heights at intersection of midpoint and curve, eg 2×20.5 $(=41)$ oe or 2×12.5 $(=25)$ oe or 2×6 $(=12)$ oe	May be seen as a rectangle added to a triangle Allow consistent use of incorrect width for both M marks
		M1	for a complete method, eg $\frac{1}{2}\times 2\times(25+16)+\frac{1}{2}\times 2\times(16+9)+\frac{1}{2}\times 2\times(9+4)$ oe or $\frac{1}{2}\times 2\times(25+4+2(16+9))$ **or** $(2\times 20.5)+(2\times 12.5)+(2\times 6)$	Allow 1 error in y values used
		A1	For 79 or 78	Allow 78 only if it comes from rectangle/midpoint method

Paper: 1MA1/2H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
4	29 775	P1	for evidence of using a correct first step eg 25 000 × 0.06 (= 1500) or 25 000 × 1.06 (= 26 500)	
		P1	for evidence of a "compound interest" process eg "26 500" × 0.06 (= 1590) or "26 500" × 1.06 (= 28 090) **or** $25\,000 \times 1.06^t$, $t \geq 2$	
		P1	for a complete process eg $25\,000 \times 1.06^3$ (= 29 775.4)	P3A0 is implied by 4775 or 4776 or 4780 or 4800
		A1	for 29 775 or 29 776 or 29 780 or 29 800 SCB1 for 3000 or 4500 or 28000 or 29500 seen if P0 scored	

5	2	P1 P1 P1 A1	for process to find volume of tin eg 600 ÷ 0.6 (= 1000) for process to find volume of salt eg "1000" – 700 (= 300) for a process to find density of the salt eg 600 ÷ "300" **or** 0.6 × ("1000" ÷ "300") **or** 600 ÷ [volume] cao	Award P1 for 600 ÷ 0.6 (= 1000) even if not used [volume] can be 700 or from a seen calculation using "1000", "300", 700 or identified as volume by label or formula or units A correct answer with no supportive working gets 0 marks

Paper: 1MA1/3H

7	63	P1 P1 P1 A1	for process to find volume, eg $\pi \times 100^2 \times 30$ (= $300\,000\pi$ or 942 477(.796...)) for process to find time in seconds, eg "942 477(.796...)" ÷ 250 (= 1200π or 3769(.911...)) **or** [volume] ÷ 250 **or** for converting rate to minutes, eg 250 × 60 (= 15 000) for complete process eg "3769(.911...)" ÷ 60 (= 20π) **or** "942 477(.796...)" ÷ "15 000" (= 20π) for answer in the range 62 to 63	(volume =) 942 478 implies P1 (time =) 3770 implies P2 [volume] ≠ 30, 60, 100, 250 A correct answer with no supportive working gets 0 marks If an answer is shown in the range in working and then incorrectly rounded award full marks

Paper: 1MA1/3H

5	(a)	Estimated time	P1 P1 A1	for rounding of distance = 5 (miles) or speed = 30 (mph) (dep) for using time = distance/speed eg 5 ÷ 30 **or** for a complete process, eg 30 ÷ 60 (= 0.5) **and** 5 ÷ "0.5" or 30 ÷ 5 (= 6) **and** 60 ÷ "6" or $4.96 \times \frac{60}{30}$ for a correct answer following through their correct rounded distance and/or speed	
	(b)	Overestimate with reason	C1	ft from (a) for decision with correct reasoning, eg overestimate as dividing a larger number by a smaller number or overestimate as miles rounded up and speed rounded down	Ft the rounding and process from (a) Must relate to estimation and not rounding of their final answer and they must have a final answer to part (a)

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
8	4.5	P1	for process to find the area, eg $80 = \frac{720}{A}$ **or** (area =) $\frac{720}{80}$ (= 9) **or** $80 = \frac{720}{2x}$ **or** $2x = \frac{720}{80}$	
		P1	for complete process to find the length, eg "9" ÷ 2 or 720 ÷ (2 × 80)	
		A1	for 4.5 oe	

Question	Answer	Mark	Mark scheme	Additional guidance
3	Zurich (supported)	P1	for one process to compare, eg eg Currency conversion, 3.5 × 1.25 (= 4.375) **or** 7.20 ÷ 1.25 (= 5.76) **or** finds 1g in one place £3.50 ÷ 200 (= 0.0175) **or** 7.20 ÷ 360 (= 0.02) **or** finds 200g in Zurich, 7.2 ÷ 360 × 200 (= 4.0) **or** finds 360g in London, 3.5 ÷ 200 × 360 (= 6.30) **or** finds grams per unit cost, 200 ÷ 3.50 (= 57.1..) **or** 360 ÷ 7.20 (= 50**)**	Accept figures rounded or truncated to 2sf throughout
		P1	for a complete process to find comparable figures in the same currency, eg comparing 200g in £ or francs 3.5 × 1.25 (= 4.375) **and** 7.2 ÷ 360 × 200 (= 4.0) **or** "4.0" ÷ 1.25 (= 3.20) **OR** comparing 360g in £ or francs "6.30" × 1.25 (= 7.875) **or** 3.5 ÷ 200 × 360 (= 6.30) **and** 7.20 ÷ 1.25 (= 5.76) **OR** comparing 1g in £ or francs "0.0175" × 1.25 (= 0.0218…) **and** 7.20 ÷ 360 (= 0.02) **or** £3.50 ÷ 200 (= 0.0175) **and** "0.02" ÷ 1.25 (= 0.016) **OR** comparing quantity per unit cost in £ or francs 200 ÷ 3.50 (= 57.1…) **and** 360 ÷ "5.76" (= 62.5) **or** 200 ÷ "4.375" (= 45.7…) **and** 360 ÷ 7.20 (= 50**)**	Accept working in pence Ignore incorrect units for P marks Award if this mark implies the previous
		C1	for Zurich supported by correct comparable values, eg 4.3(75 F) **and** 4(.0 F) **or** (£)3.2(0) **or** 7.8(75 F) **or** (£)6.3(0) **and** (£)5.76 **or** 0.021(8… F) **and** 0.02 (F) **or** (£)0.017(5) **and** (£)0.016 **or** 57(.1… g/£) **and** 62(.5 g/£) **or** 45(.7… g/F) **and** 50 (g/F)	Clear indication that bar is better value for money in Zurich supported by correct values for comparison Units not needed but if given must be correct Table with examples at end of mark scheme

Paper: 1MA1/2H

12	5.9	P1	for a process to find the volume of the cylinder, eg $\pi \times 3^2 \times 8$ $(= 226.19...)$	Can be implied by 72π
		P1	for process to find mass of cylinder, eg "226.19" × 7.86 (= 1777.89...) **or** [volume$_1$] × 7.86	[volume$_1$] must be unambiguously the volume of the cylinder but cannot be 3 or 8
		P1	for process to find volume of cube, eg "1777.89" ÷ 8.5 (= 209.16...) **or** [mass] ÷ 8.5	[mass] must be unambiguously the mass of the cylinder
		P1	for process to find side length, eg $\sqrt[3]{"209.16..."}$ **or** $\sqrt[3]{[\text{volume}_2]}$	[volume$_2$] must be unambiguously the volume of the cube
		A1	for answer in range 5.9 to 5.94	

Paper: 1MA1/2H

22	1760	M1	for starting to find the area under the curve, eg 0.5 × 10 × **54** (= 270) oe or 0.5 × 10 × (**54** + **76**) (= 650) oe or 0.5 × 10 × (**76** + **92**) (= 840) **or** for a method to find an estimate for the area of at least 1 strip with heights at intersection of midpoint and curve eg 10 × [**39**] oe or 10 × [**67**] oe or 10 × [**86**] oe	Must have one correct expression for the award of this mark May be seen as a rectangle added to a triangle Where 38 ≤ [39] ≤ 40 Where 66 ≤ [67] ≤ 68 Where 85 ≤ [86] ≤ 87
		M1	for a complete method to find the area under the curve, eg 0.5 × 10 × 54 + 0.5 × 10 × (54 + 76) + 0.5 × 10 × (76 + 92) oe eg 0.5 × 10 (92 + 2(54 + 76) **or** 10 × [39] + 10 × [67] + 10 × [86] oe	Allow 1 error in *y* values used
		A1	for 1760 or 1890 to 1950 SCB2 for an answer in the range 1815 – 1855	Allow 1890 to 1950 only if it comes from midpoint method

Paper: 1MA1/3H

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)(i)	10	M1	for a tangent drawn at $t = 3$	A tangent must be seen to award any marks
		M1	for a complete method to find the gradient from tangent, eg $\frac{30}{3}$	This mark can be awarded if the tangent is drawn at $t \neq 3$
		A1	for answer in the range 8.5 to 11.5 or ft acceptable tangent at $t = 3$	Accept answers in the form $\frac{a}{b}$ where a and b are integers Award 0 marks for a correct answer (in the range) with no (or incorrect) supportive working
(ii)	Acceleration or rate of change of velocity	C1	for a correct explanation **Acceptable examples** acceleration rate of change of velocity increase in velocity each second how quickly the velocity increases increase in velocity over time the rate at which the particle is accelerating **Not acceptable examples** rate of change increase in velocity the velocity per second velocity ÷ time as time increases so does the velocity how steep the line is the acceleration of the particle and how far it got	Award if extra information is given provided not contradictory or incorrect Accept ‘speed’ for ‘velocity’

Paper: 1MA1/1H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
12 (b)	220	M1	for a method to find an appropriate area, eg $\frac{1}{2}\times 30\times 2\,(=30)$ oe or $\frac{1}{2}(30+50)\times(4-2)\,(=80)$ oe or $\frac{1}{2}\times(50+60)\times(6-4)\,(=110)$ oe **or** for a method to find an estimate for the area of at least one rectangle with height at intersection of midpoint and curve, eg 2 × 16 (= 32) oe or 2 × 42 (= 84) oe or 2 × 56 (= 112) oe	Must have one correct expression for the award of this mark May be seen as a rectangle added to a triangle
		M1	for a complete method, eg $\frac{1}{2}\times 30\times 2+\frac{1}{2}(30+50)\times 2+\frac{1}{2}(50+60)\times 2$ or $\frac{1}{2}\times 2\times(0+60+2(30+50))$ **or** 2 × 16 + 2 × 42 + 2 × 56	Allow 1 error in *v* values used
		A1	for 220 or 228	Allow 228 only if it comes from rectangle/midpoint method

Answer 145 | Mark scheme

Paper: 1MA1/1H

8	25	P1 P1 A1	for working with density eg 8 ×1500 (= 12 000) **or** [density] ×1500 for a conversion, eg "12 000" ÷ 1000 (= 12) **or** $\frac{8}{1000}$ $(=0.008)$ **or** 300 × 1000 (= 300 000) **or** [mass] ÷ 1000 cao	P marks can be awarded in either order [density] is 8×10^n Condone 8×1500×300 for this mark only P marks can be awarded in either order [mass] must be what they believe to be mass following a calculation that uses 8 and 1500 but not 300

Question	Answer	Mark	Mark scheme	Additional guidance
4	New York (supported)	P1	for a conversion between kg and lbs, eg 2 × 2.2 (= 4.4) **or** 5 ÷ 2.2 (= 2.27...)	See page at end of mark scheme
		P1	for a conversion between pounds and US dollars, eg 3.75 × 1.2(0) (= 4.50) **or** 4.9(0) ÷ 1.2(0) (= 4.08...)	
		P1	for a process to find figures to compare, eg 3.75 ÷ "4.4" (= 0.85...) **and** "4.08…" ÷ 5 (= 0.81(6…)) **or** "4.50" ÷ 2 (= 2.25) **and** 4.9(0) ÷ "2.27..." (= 2.15(6...)) **or** "4.4" ÷ 3.75 (= 1.17…) **and** 5 ÷ "4.08" (= 1.22…) **or** 2 ÷ "4.5" (= 0.44…) **and** "2.27" ÷ 4.9(0) (= 0.46 …)	£ per lb US dollars per kg lbs per £ kg per US dollar Condone the incorrect assignment of units for all 3 P marks
		C1	for New York with correct comparable figures, eg 0.85… **and** 0.81(6…) **OR** 2.25 **and** 2.15(6...)	Final comparable values can be rounded or truncated, they just need to be accurate enough to allow a comparison.

Question	Answer	Mark	Mark scheme	Additional guidance
6	630	M1	for converting time, eg 24 minutes = $\frac{24}{60}$ (= 0.4 (hours)) oe eg $\frac{2}{5}$ (hours) **or** 2 hours 24 minutes = 2 + $\frac{24}{60}$ (= 2.4 (hours)) oe eg $2\frac{2}{5}$ (hours) **or** 2 hours 24 minutes = 2 × 60 + 24 (= 144 (minutes)) oe **or** 2 hours 24 minutes = 2 × 60 × 60 + 24 × 60 (= 8640 (seconds)) oe **OR** for using distance ÷ time, eg 1512 ÷ [time] oe **or** [distance] ÷ [time] oe	10.5 or 0.175 imply M1 [distance] can be 1512 or the result of an attempt to convert 1512 km to a different unit, it must have the digits 1512 eg 151.2 or 1 512 000 [time] can be any value they believe to be the time the plane takes to fly
		M1	for a complete method using distance ÷ time, eg 1512 ÷ "2.4" **or** 1512 ÷ "$2\frac{2}{5}$" **or** 1512 ÷ "144" × 60 oe **or** 1512 ÷ "8640" × 60 × 60 oe	
		A1	cao	

Paper: 1MA1/3H

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.
$\surd$ - 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.

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.

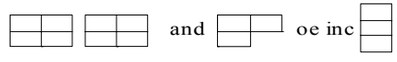
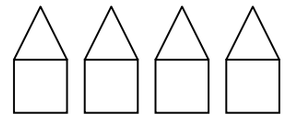
9 Parts of questions

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

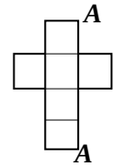
Paper 5501

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)		 and oe inc	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 $\frac{2}{3}$

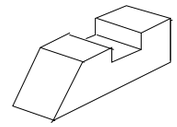
Paper 5501

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)

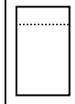
Paper 5503

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

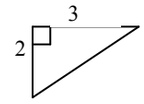
No	Working	Answer	Mark	Notes
11 (a)	Bryani was correct $4 \times 3^2 = 4 \times 9 = 36$	Bryani	2	M1 for 4×9 or $4 \times 3 \times 3$ or "square the three/x then multiply by four" A1 Bryani **SC** 4×3^2 with Bryani gets B2
(b)			1	B1 cao
12 (a)			3	B2 for rectangle height 4 squares, base 3 squares (B1 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 $2.5 \times 100 \times 100$ A1 cao
10 (a)	$\sum f = 90$ (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	$2 \times 2 \times 3 \times 5$	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

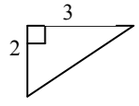
No	Working	Answer	Mark	Notes
22 (a)		No, as you would expect about 100. Yes, as it is possible to get 200 sixes with a fair dice	1	B1 for a consistent answer
(b)	$\frac{1}{6}, \frac{5}{6}$ + labels		3	B1 for $\frac{5}{6}$ on the red dice, *not six* branch B1 for a fully complete tree diagram with all 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)	$\vec{AY} = \frac{5}{3}\vec{AB}$ or $\vec{BY} = \frac{2}{3}\vec{AB}$ $\vec{EY} = 16\mathbf{b} - 4\mathbf{a}$ or $\vec{XY} = 4\mathbf{b} - \mathbf{a}$ $\vec{EY} = 4\vec{XY}$ or $\vec{EX} = 3\vec{XY}$ or $\vec{EY} = \frac{4}{3}\vec{EX}$	Printer Answer	3	B1 for either $\vec{AY} = \frac{5}{3}\vec{AB}$ or $\vec{BY} = \frac{2}{3}\vec{AB}$ oe B1 ft for either $\vec{EY} = 16\mathbf{b} - 4\mathbf{a}$ or $\vec{XY} = 4\mathbf{b} - \mathbf{a}$ ft only on parts (*a*) and (*b*) B1 for either $\vec{EY} = 4\vec{XY}$ or $\vec{EX} = 3\vec{XY}$ or $\vec{EY} = \frac{4}{3}\vec{EX}$ 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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GCSE MATHEMATICS 5MB01

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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.

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)

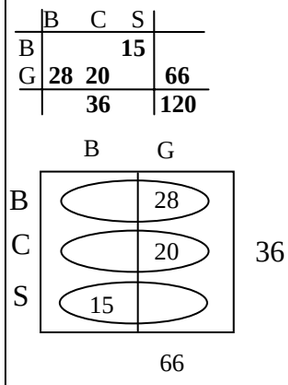
GCSE MATHEMATICS 5MB01

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 $1355 \div 1000 = 1.355$ 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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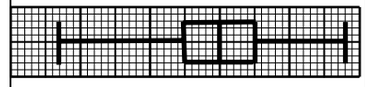
GCSE MATHEMATICS 5MB01

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)

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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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Mark Scheme (Results)

March 2011

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GCSE Mathematics (Modular) – 5MB1H
Paper 01

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NOTES ON MARKING PRINCIPLES

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5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		Reason	2	B2 for 2 acceptable reasons relating to the types below [B1 for 1 acceptable reason] Bias relating to age. Bias relating to gender Bias relating to PE students Size of sample too small Sampling method is not random
(b)		Question and response boxes	2	B2 for a suitable question with at least 3 non-overlapping response boxes (must include a time period and units) [B1 for a suitable question with time period or at least 3 non-overlapping response boxes with units]
2 (a)		Point at (11.5, 73)	1	B1 Point plotted $\pm\frac{1}{2}$ small square
(b)			1	B1 for description of dynamic relationship eg "the more hours of sunshine, the more ice creams sold" or positive correlation]Note: 'sunnier' implies 'more hours of sunshine']
(c)		62 - 70	2	B2 for answer in the range 62-70 OR M1 for a single straight line of best fit with positive gradient, passing between (6.5, 45), (6.5, 59) and (12, 70), (12, 80) or a vertical line drawn from 10 A1 for answer in range 62-70 or ft from single straight "line of best fit" with positive gradient

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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 × $\frac{20}{100}$ or 14.5 × 2 or 145 ÷ 10 × 2 A1 for 29 SCB1 for 116 if no other marks have been awarded.

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<table>
<tr><th colspan="5">5MB1H_01</th></tr>
<tr><th>Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>4</td><td>30 - 17 = 13
5 - 3 = 2
13 -2 - 7 = 4
4 + 4

OR
17 – 4 – 3 = 10
10 + 7 = 17
30 – 5 – 17

OR
17 – 4 = 13
13 + 7 = 20
20 + (5-3) = 22
30 - 22

<table><tr><td></td><td>B</td><td>G</td><td>Total</td></tr><tr><td>Packed</td><td>4</td><td></td><td></td></tr><tr><td>School lunch</td><td></td><td>7</td><td></td></tr><tr><td>Home</td><td>3</td><td></td><td>5</td></tr><tr><td>Total</td><td>17</td><td></td><td>30</td></tr></table></td><td>8</td><td>4</td><td>M1 for calculation of total girls 30 - 17 (= 13)
M1 for calculation of girls going home 5 - 3 (= 2)
M1 for calculation of girls having packed lunch
"13" - "2" - 7 (= 4)

M1 for 17 – 4 – 3 (= 10)
M1 for “10”+ 7 (= 17)
M1 for 30 – 5 – “17”

M1 for 17 – 4 + 7 (= 20)
M1 for “20” + (5 – 3)
M1 for 30 – “22”

A1 cao

[Interim answers may appear in a 2-way table or Venn diagram]
M1 for a 2-way table or diagram, with clear labeling, showing at least 3 pieces of the given information correctly placed
A1 for 13 (girls) or 10 (boys, school lunch)
A1 for 2 (girls, home) or 17 (total school lunch)
A1 cao
[Note: for the award of the final A1, the 8 in any diagram must be highlighted, in some way, to be the required answer]</td></tr>
</table>

PMT

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5		0.85 × 800	680	2	M1 for 0.85 × 800 A1 cao
6		15 × 9 = 135 (7 × 2) + (8 × 3) + (9 × 3) + (10 × 4) + (11 × 2) = 127 135 - 127	8	3	M1 for 15 × 9 or 135 seen M1 (7 × 2) + (8 × 3)+(9 × 3) + (10 × 4) + (11 × 2) or 127 seen A1 8 cao
7	(a)	48 ÷ 4	12	2	M1 48 ÷ 4 or 49 ÷ 4 or 48 – 36 A1 for 12
	(b)		Box plot drawn	2	B2 fully correct box plot (B1 for the box plot drawn with one plotting error)
	(c)		On Tuesday: Median higher (IQ) Range higher.	2	B1 for median higher on Tuesday or journeys took longer on Tuesday B1 for (IQ) range higher on Tuesday or more variation in journey length on Tuesday. (NB: For B2 at least one comparison must be in context)

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5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
*8	3 × 2 × 74.25 + 3 × 2 × 31 3 × 2 × 59.75 + 4 × 2 × 31.75	631.50, 612.50 so November cheapest with reason given	5	M1 for at least one correct dinner cost calculation 3 × 2 ×31 or 4 × 2× 31.75 M1 for at least one correct room cost calculation 3 ×2 × 74.25 or 3 × 2 × 59.75 OR M2 for at least one combined room and dinner calculation 2 × 3 × (31 + 74.25) or 2(3 × 59.75 + 4 × 31.75) AND A1 for 631.5(0) A1 for 612.5(0) C1 ft holiday identified QWC: Decision must be stated and total costs must be attributable from both calculations consistent for 2 people. **Alternative** M1 for at least one correct dinner cost calculation 3 × 31 or 4 × 31.75 M1 for at least one correct room cost calculation 3 × 74.25 or 3 × 59.75 OR M2 for at least one combined room and dinner calculation 3 × (31 + 74.25) or (3 × 59.75 + 4 × 31.75) AND A1 for 315.75 A1 for 306.25 C1 ft holiday identified QWC: Decision must be stated and total costs must be attributable from both calculations consistent for 1 person.

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)	1 - (0.3 + 0.21 + 0.16 + 0.09) 0.24 ÷ 4	0.06	3	M1 for 1 - (0.3 + 0.21 + 0.16 + 0.09) or 1-0.76 or 0.24 M1 dep for "0.24" ÷ 4 A1 cao
	(b)	0.3 × 0.16 + 0.16 × 0.3 + 0.21 × 0.21	0.1401	3	M1 for one correct product or 3 correct pairs identified by scores or probabilities. Ignore 4+4 repeated with no other errors. M1 for all correct products with intention to add A1 for 0.1401
10	(a)	15×0=0 40 × 14 = 560 55 × 16 = 880 65 × 21 = 1365 85 × 9 = 765 3570 ÷ 60	59.5	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 (dep on first M) for "Σ*fx*" ÷ 60 A1 for 59.5
	(b)		14,30,51,60	1	B1 all 4 correct
	(c)			2	M1 for at least 4 of "5 points" plotted consistently within each interval, ± 0.5 full square, and joined by curve or line segments providing no gradient is negative. A1 for a fully correct cf graph.
	(d)			2	B2 for answer in the range 21 - 25 (B1 for answer in the range 35 - 39) **OR** M1 (dep on graph being cf) for using w = 63 A1 ft (± 0.5 square)

5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
11 (a)		0.2 0.4, 0.6, 0.4	2	B1 for Martin correct B1 for Luke correct
(b)		0.08	2	M1 for "0.2" × "0.4" ft values from tree diagram if both < 1 A1 cao
12	$\frac{34}{182} \times 50 = 9.34$	9	2	M1 for $\frac{34}{182} \times 50$ (= 9.3..) A1 cao
13		4	2	M1 for an attempt to evaluate 2500 x 1.03^n for at least one value of n (not equal to 1) Or $\frac{2813.77}{2500}$ (=1.1255...) and 1.03^n evaluated, $n \geq 2$ Or finding at least two correct interest payments. ie 75 and 77.25 A1 for 4 cao
14 (a)		5 15	2	B1 cao B1 cao
(b)		fd = 2 (ht 4cm) fd = 2.5 (ht 5cm)	2	B2 for 2 correct bars B1 for 1 correct bar If B0 is scored then you can award M1 at least one correct frequency density calculated for the missing bars Or 1 sq = 2.5 plants oe

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Mark Scheme (Results)

June 2011

Modular Mathematics (GCSE)
Unit 2: 5MB2H_01 (Higher)

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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

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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

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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

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) (b) (c)		p^8 h^5 x^6	3	B1 for p^8 B1 for h^5 B1 for x^6

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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	$n^2 - 2n + 1 + n^2 + n^2 + 2n + 1$ ≡ $3n^2 + 2$	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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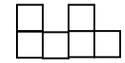
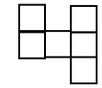
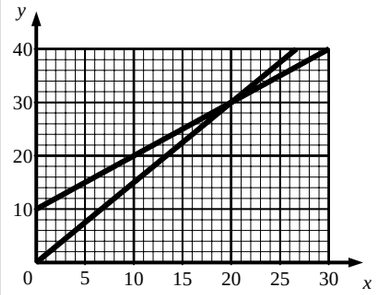
1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		380	1	B1 cao
	(b)		6.2	1	B1 cao
	(c)		Arrow at 34	1	B1 cao
2	(a)		8	1	B1 for 8 ± 0.2
	(b)		35	1	B1 for 35 ± 2°
	(c)		Circle drawn	1	B1 for all parts within ± 2mm, (use overlay)
3	(a)		4, 7, 4, 3, 2	2	M1 for at least 3 correct tallies **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) (ii) (b)		(2, 3) (–3, 1) Point plotted at (3, –4)	2 1	B1 cao B1 cao B1 cao
6	(a) (b) (c)		– 5 6 3	1 1 1	B1 cao B1 for 6 or – 6 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) (b)	 24 ÷ 4 =	Walk 6	1 2	B1 cao 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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Mark Scheme (Results)

June 2012

GCSE Mathematics (2MB01)
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

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

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

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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

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]

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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

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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

PMT

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]

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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]

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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)

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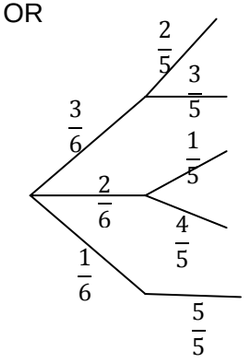
5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14		$\frac{3}{6} \times \frac{2}{5} + \frac{2}{6} \times \frac{1}{5}$ = 8/30 $1 - \frac{8}{30} = \frac{22}{30}$ OR $2 \times \frac{3}{6} \times \frac{2}{5} + 2 \times \frac{3}{6} \times \frac{1}{5} + 2 \times \frac{2}{6} \times \frac{1}{5}$ 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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Mark Scheme (Results)

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GCSE Mathematics (2MB01) Higher
5MB2H (Non-Calculator) Paper 01

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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

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×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)

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

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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

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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)

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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)

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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 cm²

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

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	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
		(180 – 40)÷2 =70 180 – 2×(90 –70) = 140			

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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)

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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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Mark Scheme (Results)

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

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Guidance on the use of codes within this mark scheme
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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

5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6		<table><tr><th></th><th>A</th><th>G</th><th>T</th><th>total</th></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	53	4	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
7		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	160	3	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

<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>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>

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)

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

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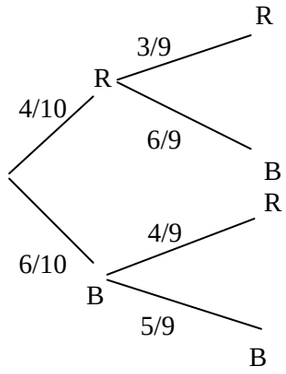
5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	f.d. = 2, 12, 10, 3 e.g. each square = 4 people 1:15:10:1.5 e.g. each square = 2 people 2:30:20:3	histogram	3	B2 for all 4 bars fully correct with areas in the ratio 1:15:10:1.5 or 2:30:20:3 oe (B1 for 2 or 3 bars drawn in the correct 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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5MB3H (Calculator) Paper 01

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5MB3H_01					
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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" $\div 3$ 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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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 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.

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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			1 | 7 8 8 9 2 | 0 0 1 2 3 5 9 3 | 3 7 7 4 | 2 1 | 8 represents 18	3	B2 for a fully correct ordered diagram (B1 for correct unordered diagram or ordered with at most two errors or omissions) B1 for a correct key Accept stem written as 10, 20 etc but key only acceptable if consistent with this
*2			No + comparison	3	M1 for a correct start to the process eg. $\frac{225}{9}$ **or** $\frac{\mathbf{475}}{\mathbf{225}}$ **or** $\frac{\mathbf{20}}{\mathbf{9}}$ **or** $\frac{475}{20}$ M1 for completion of a fully correct method that will lead to an appropriate comparison C1 (dep on M2) for a correct statement with conclusion with 500 g **or** 25g more needed **or** 19 cakes **or** 25g **and** 23.75g SC :If **no** working then B1 for a correct statement with correct figures and units

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)		30	1	B1 for 30 minutes
	(b)		20	1	B1 cao
	(c)		graph completed	2	B1 for horizontal line from (5, 20) to (5.30, 20) B1 for a single straight line with the correct gradient from '(5.30, 20)' to the time axis
4	(a)	1 − 0.2 − 0.1 0.7 ÷ 2	0.35	3	M1 for correctly using total probability is 1 or 100% if percentages used M1 (dep) for complete correct method to complete the solution A1 for 0.35 or 35% or $\frac{35}{100}$oe
	(b)		20	2	M1 for 0.1 × 200 oe A1 cao SC : If M0 then award B1 for an answer of $\frac{20}{200}$
5		π × 5 × 1.80	28.27	3	M1 for use of π × x (with x = 5 or x = 2.5) **or** 2 × π × x (with x = 5 or x = 2.5) M1 for π × 5 × 1.8(0) **or** 2 × π × 2.5 × 1.8(0) A1 for 28.26 or 28.27 or 28.28 or 28.3(0) or 28.8(0)

1MA0_2H					
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					
Question		**Working**	**Answer**	**Mark**	**Notes**
8		x | $x^3 - 3x$ 2 | 2 2.1 | 2.(961) 2.2 | 4.(048) 2.3 | 5.(267) 2.4 | 6.(624) 2.5 | 8.(125) 2.6 | 9.(776) 2.7 | 11.(583) 2.8 | 13.(552) 2.9 | 15.6(89) 3 | 18 2.85 | 14.5(99...) 2.86 | 14.8(13...) 2.87 | 15.0(29...) 2.88 | 15.2(47...) 2.89 | 15.4(67...)	2.9	4	B2 for a trial $2.8 \leq x \leq 2.9$ evaluated correctly (B1 for a trial evaluated correctly for $2 \leq x \leq 3$) B1 for a different trial evaluated correctly for $2.85 \leq x < 2.9$ B1 (dep on at least one previous B1) for 2.9 NB For trials where x has one decimal place: $x \leq 2.6$ trials must be evaluated to at least 1 sf truncated or rounded $2.6 < x < 2.85$ trials must be evaluated to at least 2 sf truncated or rounded $2.85 \leq x \leq 2.9$ trials must be evaluated to at least 3 sf truncated or rounded NB. Accept 15 or 15.0 for trial at x =2.87 No working scores 0 marks. **If candidate is clearly working with $x^3 - 3x - 15 = 0$ then use same scheme as above but subtract 15 from all evaluated values in the table**

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9			1180	3	M1 for a correct method to find the area of the cross section M1 (dep) for a complete correct method for the volume of the prism A1 cao **OR** M1 for a correct method to find the volume of one cuboid M1 (dep) for a complete correct method for the volume of the prism A1 cao
10			Translation; $\binom{6}{-1}$	2	B1 for translation B1 for $\binom{6}{-1}$ NB: B0 if more than one transformation given
11	(a)	$3x + 12 + 10x - 2$	$13x + 10$	2	M1 for correct method to expand one bracket eg $3 \times x + 3 \times 4$ **or** $3x + 12$ or $2 \times 5x - 2 \times 1$ **or** $10x - 2$ A1 for $13x + 10$
	(b)	$2x^2 - 8x + x - 4$	$2x^2 - 7x - 4$	2	M1 for all 4 terms (and no additional terms) correct ignoring signs **or** 3 out of no more than four terms correct A1 for $2x^2 - 7x - 4$
	(c)		$3y(2y - 3x)$	2	B2 for $3y(2y - 3x)$ (B1 for $3(2y^2 - 3xy)$ **or** $y(6y - 9x)$ **or** $3y(2y + 3x)$ **or** $3y(2y - ax)$ where a is any positive integer except 3 **or** $3y(by - 3x)$ where b is any positive integer except 2)

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		−2, −1, 0, 1,	2	B2 for all 4 correct values; ignore repeats, any order (B1 for 3 correct (and no incorrect values) eg. −2, −1, 0 **or** one additional value eg. −3, −2, −1, 0, 1)
	(b)		$p>6$	2	M1 for clear intention to add 7 to both sides **or** $3p > 11 + 7$ **or** clear intention to divide all 3 terms by 3 as a first step **or** $3p > 18$ **or** $3p = 18$ **or** $3p < 18$ **or** $\frac{18}{3}$ A1 for $p > 6$ as final answer NB: (p =) 6 on the answer line scores M1 A0
13	(a)		11.5	3	M1 for $13^2 - 6^2$ or 169 − 36 or 133 M1 (dep on M1) for $\sqrt{"13^2 - 6^2"}$ **or** $\sqrt{133}$ A1 for answer in the range 11.5 − 11.6
	(b)		47.2	3	M1 for cos (RPQ)= $\frac{17}{25}$ oe **OR** sin PQR = $\frac{17}{25}$with PQR clearly identified M1 for (RPQ =+) $\cos^{-1}\frac{17}{25}$oe **OR** PQR = $\sin^{-1}\frac{17}{25}$with PQR clearly identified A1 for answer in the range 47.1 − 47.2 SC : B2 for an answer of 0.823(033...) **or** 52.3(95...) **or** 52.4

PMT

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)	$100 = 4 \times 2 \times c$	12.5	2	M1 for correct substitution into formula A1 for 12.5 oe
	(b)	$m^2 = \frac{k+1}{4}$ $4m^2 = k + 1$ $k = 4m^2 - 1$ or $2m = \sqrt{(k+1)}$ $4m^2 = k + 1$ $k = 4m^2 - 1$	$k = 4m^2 - 1$	3	M1 for correct method to clear fraction **or** remove square root sign M1 (dep) for a fully correct method to both clear fraction **and** remove square root sign A1 for $k = 4m^2 - 1$ **or** $k = (2m + 1)(2m - 1)$
15	(a)	$\frac{1}{2} \times (4 + 12) \times 10$	80	2	M1 for a fully correct method for area of *QRST* A1 cao
	(b)	**For example** $\frac{PT+10}{PT} = \frac{12}{4} = 3$ $PT + 10 = 3PT$ $2PT = 10$	5	3	M1 for a correct scale factor or ratio using two corresponding sides from two similar triangles or two sides within the same triangle (may be seen within an equation) eg. $\frac{12}{4}$oe **or** 4 : 12 oe **or** $\frac{PT}{4}$**or** $\frac{PS}{12}$ **or** $\frac{12}{12-4}$ etc. M1 for a correct equation with *PT* or *PS* as the only variable **or** complete correct method using scale factor A1 cao

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1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	154500 – 150000 $\frac{4500}{150000} \times 100$	3	3	M1 for 154500 – 150000 or 4500 M1 for $\frac{'154500-150000'}{150000} \times 100$ oe A1 cao **OR** M1 for $\frac{154500}{150000}$ (× 100) M1 for "$\frac{154500}{150000} \times 100$ " − 100 oe A1 cao
	(b)	$154500 \times \frac{4}{100} + 154500$ $160680 \times \frac{4}{100} + 160680$ or 154500×1.04^2	167107.20	3	M1 for 154500 × $\frac{4}{100}$ or 6180 **or** 12360 **or** 160680 **or** 166860 **or** 1.04 × 154500 M1 (dep) for (154500 + '6180') × $\frac{4}{100}$ or 6427.2(0) or ' 160680' × 1.04 A1 for 167107.2(0) as final answer **OR** M2 for 154500×1.04^2 (M1 for 154500 × 1.04) A1 167107.2(0) as final answer

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17		$\sqrt{\frac{2.73\ldots}{0.732\ldots}}$	1.931851…	2	M1 for 2.73… or 0.732…or 3.73…or 1.931 or 1.932 or 1.93 or $(1+\sqrt{3})$ or $(\sqrt{3}-1)$ or $(2+\sqrt{3})$ **or** 1.65... **or** 0.855... A1 for 1.9318(5…) SC: B1 for 2.5127(17...)
18	(a)	minimum = 5 lower quartile = 14 median = 25 upper quartile = 30 maximum = 44	box plot	3	B3 for fully correct box plot (B2 for at least 3 correct values plotted including box **and** tails **or** 5 correct values indicated) (B1 for at least 2 correct values plotted including box **or** tails **or** 3 or 4 correct values indicated)
	(b)		comparisons	2	B1 for a correct comparison (ft) of medians B1 for a correct comparison (ft) of ranges or IQRs
19		$\frac{30}{360}\times\pi\times15^2$	58.8	2	M1 for a correct method to find the area of sector *OAB* A1 for answer in range 58.8 − 58.9125

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20			15.0	3	M1 for $8^2 + 8^2 - 2 \times 8 \times 8 \times \cos 140$ M1 (dep) for correct order of evaluation **or** 226.(05...) A1 for answer in range 15.0 − 15.04 **OR** M1 for $\frac{PR}{\text{SIN } 140} = \frac{8}{\sin\left(\left(\frac{180-140}{2}\right)\right)}$ M1 for $PR = \frac{8}{\sin\left(\left(\frac{180-140}{2}\right)\right)} \times \sin 140$ A1 for answer in range 15.0 − 15.04 **OR** M1 for 8 × sin70 or 8 × cos20 M1 for 2 × 8 × sin70 **or** 2 × 8 × cos 20 A1 for answer in range 15.0 − 15.04

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
21		Total area = (0.12 × 40) + (0.36 × 20) + (0.7 × 20) + (0.56 × 20) + (0.18× 40) = 44.4 Area (140 < w < 200) = (0.36 × 20) + (0.7 × 20) + (0.56 × 20) = 32.4 32.4 ÷ 44.4	0.73	4	M1 for a method to find the frequency **or** the area of any one block M1 for a method (with correct values) to find total area of all blocks **or** 44.4 **or** 1110 **or** a correct method (with correct values) to find total area of middle 3 blocks **or** 32.4 **or** 810 M1 (dep on M2) for a correct method to find required proportion (could lead to a decimal or a percentage or a fraction) A1 for answer which rounds to 0.73 or 73% or $\frac{27}{37}$ or equivalent fraction

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1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
22		$\frac{1}{3} \times \pi \times 15^2 \times 40$ $-\frac{1}{3} \times \pi \times 7.5^2 \times 20$	8250	4	B1 for 15cm as diameter or 7.5 cm as radius of smaller cone (may be marked on diagram or used in a formula) M1 for a numerical expression for the volume of one cone eg. $\frac{1}{3} \times \pi \times 15^2 \times 40$ (=9424...) **or** $\frac{1}{3} \times \pi \times 7.5^2 \times 20$ (=1178...) M1 for $\frac{1}{3} \times \pi \times 15^2 \times 40$ oe $-\frac{1}{3} \times \pi \times 7.5^2 \times 20$ oe A1 for answer in the range 8240 − 8250 **OR** B1 for 2^3 M1 for a numerical expression for the volume of the large cone eg. $\frac{1}{3} \times \pi \times 15^2 \times 40$ (=9424...) M1 volume of frustrum = $\frac{7}{8} \times \frac{1}{3} \times \pi \times 15^2 \times 40$ oe A1 for answer in the range 8240 − 8250
23			11	2	M1 for a $\frac{68}{300} \times 50$ oe A1 for 11 (accept 12)

1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*24			0.229 because the LB and UB agree to that number of figures	5	B1 for 3.465 or 3.475 or 3.474999… B1 for 8.1315 or 8.1325 or 8.132499… M1 for $\frac{\sqrt{3.475}}{8.1315}$ as UB **OR** $\frac{\sqrt{3.465}}{8.1325}$ as LB C1 (dep on all previous marks) for 0.2292… and 0.2288… both values must clearly come from working with correct values C1 for 0.229 from 0.2292… and 0.2288… **and** 'both LB and UB round to 0.229'
25			$1 + \sqrt{5}$	5	M1 for $\frac{1}{2} \times x \times x \times \sin 30°$ oe M1 for $\frac{1}{2}(x-2)(x+1)$ oe **or** $\frac{1}{2} \times (x-2) \times (x+1) \times \sin 90$ M1 (dep on at least one previous M1) for formation of equation from equating areas with x as the only variable A1 for $x^2 - 2x - 4 = 0$ oe in the form $ax^2 + bx + c = 0$ or $ax^2 + bx = c$ A1 cao

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5MB3H (Calculator) Paper 01

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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

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.

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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)

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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 $\frac{7}{9}\times 10800$ or 8400 or $\frac{2}{9}\times 10800$ 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 $5.4(7...)\div 2.5^2$ 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

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

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}

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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)		$3\mathbf{c}$	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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Mark Scheme (Results)

Summer 2013

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

PMT

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NOTES ON MARKING PRINCIPLES

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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.
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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 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.

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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.
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)		331.705	1	B1 cao
	(b)		179300	1	B1 cao
2			24	4	M1 for 0.15 × 240 (= 36) oe M1 for $\frac{3}{4}$ × 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					
Question		**Working**	**Answer**	**Mark**	**Notes**
3			2| 4 7 8 3| 0 3 3 5 7 8 8 4| 1 1 2 4 4 5 Key,eg 4|1 is 4.1(kg)	3	B2 for correct ordered stem and leaf (B1 for fully correct unordered or ordered with one error or omission) B1 (indep) for key (units not required)
4	(a)		6 + 3t	1	B1 for 6 + 3t
	(b)		$6x^2 + 15x$	2	B2 for $6x^2 + 15x$ (B1 for $6x^2$ or $15x$)
	(c)	$m^2 + 10m + 3m + 30$	$m^2 + 13m + 30$	2	M1 for all 4 terms (and no additional terms) correct with or without signs or 3 out of no more than four terms correct with signs A1 for $m^2 + 13m + 30$
5		5|525 5|105 3|21 7	$3 \times 5 \times 5 \times 7$	3	M1 for continual prime factorisation (at least first 2 steps correct) or first two stages of a factor tree correct M1 for fully correct factor tree or list 3, 5, 5, 7 A1 $3 \times 5 \times 5 \times 7$ or $3 \times 5^2 \times 7$

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Question		**Working**	**Answer**	**Mark**	**Notes**
6			7	3	M1 for 4 ×10 or 40 or $\frac{12+6+15+x}{4}$ or a correct equation M1 for a complete and correct method A1 cao
7	(a)	(4,0) (3, 0) (3, -1) (2, -1) (2, 2) (4, 2)	Correct position	2	B2 for correct shape in correct position (B1 for any incorrect translation of correct shape)
	(b)		Rotation 180° (0,1)	3	B1 for rotation B1 for 180° (ignore direction) B1 for (0, 1) **OR** B1 for enlargement B1 for scale factor -1 B1 for (0, 1) (NB: a combination of transformations gets B0)

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Question		**Working**	**Answer**	**Mark**	**Notes**
8		$\frac{20 \times 300}{0.5}$	12000	3	B1 for 20 or 300 used M1 for "20" × "300" or $\frac{"20"}{0.5}$ or $\frac{"300"}{0.5}$, values do not need to be rounded A1 for answer in the range 11200 –13200 SC B3 for 12000 with or without working
9		LCM (80, 50) = 400 Matt 400 ÷ 50 = 8 Dan 400 ÷80 = 5 **OR** 50 = 2 × 5 (× 5) 80 = 2 × 5 (× 2 × 2 × 2)	Matt 8 Dan 5	3	M1 lists multiples of both 80 (seconds) and 50 (seconds) (at least 3 of each but condone errors if intention is clear, can be in minutes and seconds) or use of 400 seconds oe. M1 (dep on M1) for a division of "LCM" by 80 or 50 or counts up "multiples" (implied if one answer is correct or answers reversed) A1 Matt 8 and Dan 5 SC B1 for Matt 7, Dan 4 **OR** M1 for expansion of both 80 and 50 into prime factors. M1 demonstrates that both expansions include 10 oe A1 Matt 8 and Dan 5 SC B1 for Matt 7, Dan 4

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Question		Working	Answer	Mark	Notes
10			1.5	4	M1 for correct expression for perimeter eg. $4 + 3x + x + 6 + 4 + 3x + x + 6$ oe M1 for forming a correct equation eg. $4 + 3x + x + 6 + 4 + 3x + x + 6 = 32$ oe M1 for $8x = 12$ or $12 \div 8$ A1 for 1.5 oe **OR** M1 for correct expression for semi-perimeter eg. $4 + 3x + x + 6$ oe M1 for forming a correct equation eg. $4 + 3x + x + 6 = 16$ oe M1 for $4x = 6$ or $6 \div 4$ A1 for 1.5 oe

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Question		**Working**	**Answer**	**Mark**	**Notes**
***11 QWC**		$\frac{30}{24} \times 60 = 75$	Debbie + explanation	4	M1 for reading 24 (mins) and 30 (km) or a pair of other values for Debbie M1 for correct method to calculate speed eg. 30 ÷ 24 oe A1 for 74 – 76 or for 1.2 – 1.3 and 1.1 C1 (dep on M2) for correct conclusion, eg Debbie is fastest from comparison of "74 – 76" with 66 (kph) or "1.2 – 1.3" and 1.1 (km per minute) **OR** M1 for using an appropriate pair of values for Ian's speed eg 66 and 60, 33 and 30, 11 and 10 M1 for pair of values plotted on graph A1 for correct line drawn C1 (dep on M2) for Debbie is fastest from comparison of gradients. **OR** M1 for reading 24 (mins) and 30 (km) or a pair other values for Debbie M1 for Ian's time for same distance or Ian's distance for same time. A1 for a pair of comparable values. C1 (dep on M2) for Debbie is fastest from comparison of comparable values.

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Question		**Working**	**Answer**	**Mark**	**Notes**
12		x – 2 -1 0 1 2 3 4 y 4 4.5 5 5.5 6 6.5 7	$y = ½ x + 5$ drawn	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 plotted correctly) 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 M1 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = ½ x + 5$ drawn A1 for correct line between x = -2 and x = 4 **(Use of y=mx+c)** M1 for line drawn with gradient 0.5 **OR** line drawn with y intercept at 5 M1 for line drawn with gradient 0.5 **AND** line drawn with y intercept at 5 A1 For correct line between x = -2 and x = 4 SC B2 for a correct line from x = 0 to x = 4
*13 QWC			Yes with explanation	3	M1 for bearing ± 2 ° within overlay M1 for use of scale to show arc within overlay or line drawn from C to ship's course with measurement C1(dep M1) for comparison leading to a suitable conclusion from a correct method

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Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)	Line joins an empty circle at -2 to a solid circle at 3	diagram	2	B2 cao (B1 for line from -2 to 3)
	(b)	$2x \geq 7$	$x \geq 3.5$	2	M1 for correct method to isolate variable and number terms (condone use of =, >, ≤, or <) or (x =) 3.5 A1 for $x \geq 3.5$ oe as final answer
*Q15 QWC			No + explanation	3	M1 for $500 \times 9 \times 10^{-3}$ oe A1 for 4.5 C1 (dep M1) for correct decision based on comparison of their paper height with 4 **OR** M1 for $4 \div 500$ oe A1 for 0.008 C1 (dep M1) for correct decision based on comparison of their paper thickness with 0.009 **OR** M1 for $4 \div (9 \times 10^{-3})$ oe A1 for 444(.4...) C1 (dep M1) for correct decision based on comparison of their number of sheets of paper with 500
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 m³/hr, 0.4 m³ 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 m³/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)

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PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20			$5x^2$	4	M1 for $4x \times 4x$ M1 for $(2x \times 4x)/2$ or $(2x \times x)/2$ or $(3x \times 4x)/2$ M1(dep M2) for "16 x^2" – "4 x^2" – "x^2" – "6 x^2" A1 for $5x^2$ **OR** M1 for $\sqrt{(2x)^2 + (4x)^2}$ $(= \sqrt{20x^2} = \sqrt{20}\,x)$ M1 for $\sqrt{(x)^2 + (2x)^2}$ $(= \sqrt{5x^2} = \sqrt{5}\,x)$ M1(dep M2) for $\frac{"\sqrt{5}\,x" \times "\sqrt{20}\,x"}{2}$ $(= \frac{\sqrt{100}}{2}\,x^2)$ A1 for $5x^2$
21	(a)	Cf table: 4, 9, 25, 52, 57,60 cf graph	Correct Cf graph	3	B1 Correct cumulative frequencies (may be implied by correct heights on the grid) M1 for at least 5 of "6 points" plotted consistently within each interval A1 for a fully correct CF graph
	(b)(i)		172	3	B1 for 172 or read off at cf = 30 or 30.5 from a cf graph, ft provided M1 is awarded in (a)
	(ii)	IQR = UQ – LQ	12 - 14		M1 for readings from graph at cf = 15 or 15.25 and cf = 45or 45.75 from a cf graph with at least one of LQ or UQ correct from graph (± ½ square). A1ft provided M1 is awarded in (a)

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
22			1200 cm^3	4	M1 for 10 × 2 × 2 and 15 × 2 M1 for "40" × "30" A1 for 1200 B1 (indep) for cm^3 OR M1 for 10 × 15 or 2^3 or 8 indicated as scale factor M1 for 10 × 15 × 2 × 2 × 2 A1 for 1200 B1 (indep) for cm^3 SC B2 for 600 cm^3 (B1 for 600)
23		$\frac{4(x+5)}{(x+5)(x-3)}$	$\frac{4}{x-3}$	2	M1 for $(x \pm 5)(x \pm 3)$ A1 for $\frac{4}{x-3}$
24		12 ÷ 10 = 1.2 15 ÷ 5 = 3 13 ÷ 5 = 2.6 18 ÷ 10 = 1.8 3 ÷ 15 = 0.2	Histogram	3	B3 for fully correct histogram (B2 for 4 correct blocks) (B1 for 3 correct blocks) (If B0, SC B1 for correct key eg $1cm^2$ = 2 (calls) Or frequency ÷ class interval for at least 3 frequencies) **NB** Apply the same mark scheme if a different frequency density is used.

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Question		**Working**	**Answer**	**Mark**	**Notes**
25	(a)		$a = 4, b = 5$	3	M1 for sight of $(x-4)^2$ M1 for $(x-4)^2 - 16 + 21$ A1 for $a = 4, b = 5$ OR M1 for $x^2 - 2ax + a^2 + b$ M1 for $-2a = -8$ and $a^2 + b = 21$ A1 for $a = 4, b = 5$
	(b)		(4, 5)	1	B1 ft
26		50 1 1 1 50 1 1 1 50	$\frac{126}{720}$	4	M1 for 3 fractions $\frac{a}{10}$, $\frac{b}{9}$, $\frac{c}{8}$ where a < 10, b < 9 and c < 8 M1 for $\frac{7}{10}\times\frac{3}{9}\times\frac{2}{8}$ or $\frac{3}{10}\times\frac{7}{9}\times\frac{2}{8}$ or $\frac{3}{10}\times\frac{2}{9}\times\frac{7}{8}$ $(=\frac{42}{720})$ M1 for $\frac{7}{10}\times\frac{3}{9}\times\frac{2}{8} + \frac{3}{10}\times\frac{7}{9}\times\frac{2}{8} + \frac{3}{10}\times\frac{2}{9}\times\frac{7}{8}$ or $3\times\frac{3}{10}\times\frac{2}{9}\times\frac{7}{8}$ A1 for $\frac{126}{720}$ oe. eg. $\frac{7}{40}$ **Alternative Scheme for With Replacement** M1 for $\frac{7}{10}\times\frac{3}{10}\times\frac{3}{10}$ $(=\frac{63}{1000})$ M1 for $\frac{7}{10}\times\frac{3}{10}\times\frac{3}{10}\times 3$ $(=\frac{189}{1000})$ M0 A0 No further marks

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Question		**Working**	**Answer**	**Mark**	**Notes**
27	(a)		**a - b**	1	B1 for **a - b** oe
	(b)		$\frac{2}{5}\mathbf{a} + \frac{3}{5}\mathbf{b}$	3	M1 for a correct vector statement for $\overrightarrow{NR}$ eg. ($\overrightarrow{NR}$ =) $\overrightarrow{NQ} + \overrightarrow{QR}$ or ($\overrightarrow{NR}$ =) $\overrightarrow{NS} + \overrightarrow{SR}$ M1 for $\frac{2}{5}SQ$ (+ QR) or $\frac{3}{5}QS$ (+ SR) (SQ, QR, QS, SR may be written in terms of **a** and **b)** A1 for $\frac{2}{5}(\mathbf{a} - \mathbf{b}) + \mathbf{b}$ oe or $\frac{3}{5}(\mathbf{b} - \mathbf{a}) + \mathbf{a}$ oe
28	(a)		(90, 0)	1	B1 for (90, 0) (condone ($\frac{\pi}{2}$, 0))
	(b)		Correct graph	1	B1 for graph through (0, 2) (90, 0) (180, -2) (270, 0) (360, 2) professional judgement

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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

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Question		**Modification**	**Notes**
3		Stem and leaf diagram: Additional horizontal line was inserted in the diagram.	Standard mark scheme
4	(b)	MLP only: *x* changed to *y*.	Standard mark scheme
7	(a) (b)	2cm grid – shape P moved up two squares. 2cm grid. No shading of shapes – x axis -2 and -4 removed as they would obscure shape	Note that the original shape **P** is in a different position Standard mark scheme
10		Braille and MLP *x* changed to *y*.	Standard mark scheme
11		2 cm for 5 on both axes.	Change of scale
12		1.5 cm grid.	Standard mark scheme

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
13		N line increased to 9 cm. Shading removed. 'Land' and 'Sea' labelled. 037 degrees was changed to 040 degrees.	037° changed to 040°
14		2 cm spaces between numbers.	Standard mark scheme
17	(b)	Model as well as diagram provided. Braille only: 90 degrees written on diagram instead of the right angle sign.	Standard mark scheme
21		Frequency table: numbers changed to 5, 5, 10, 25, 10 and 5. Grid: 1.5 cm for 5 on both axes. Right axis labelled.	Frequency numbers changed to 5, 5, 10, 25, 10, 5 (a) Cumulative frequencies 5, 10, 20, 45, 55, 60 (b) Greater tolerance needed. Median and IQR will be different to those in standard scheme.
22	(b)	Models as well as diagram provided.	Standard mark scheme
24		2cm grid both axes. In the table, the number of calls is changed to 12 14 13 20 6	Number of calls changed to 12, 14, 13, 20, 6 So frequency density will be 1.2, 2.8, 2.6, 2, 0.4
27		vectors 'a' and 'b' in larger font size	Standard mark scheme
28		Size of diagram enlarged. Cross at A changed to a filled-in circle	Standard mark scheme

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

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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)

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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

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)

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

Question		Working	Answer	Mark	Notes
6	(a)		16.5	1	B1 cao
	(b)		17.5	1	B1 for 17.5 accept 17.499(9…) or $17.4\dot{9}$
7			0.5	2	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=0.5*x*+1
8		<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></table> <table><tr><td></td><td>F</td><td>H</td><td>T</td><td>Tot</td></tr><tr><td>B</td><td>**10**</td><td>12</td><td>**8**</td><td>30</td></tr><tr><td>G</td><td>35</td><td>26</td><td>**29**</td><td>**90**</td></tr><tr><td>Tot</td><td>**45**</td><td>**38**</td><td>**37**</td><td>120</td></tr></table>	29	4	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

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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

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

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

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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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.
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12 Parts of questions
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13 Range of answers
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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

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PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		18.75	2	M1 for 84 **or** 4.48 **or** $\frac{112}{25}$ **or** 18.7 **or** 18.8 **or** 19 **or** 20 **or** $\frac{75}{4}$ A1 cao
(b)		20	1	B1 for 20 **or** ft from their answer to (a) provided (a) is written to 2 or more significant figures
2 (a)		12	2	M1 for 32÷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
3		4	2	M1 for 14 **or** $\frac{3+7}{n} = \frac{5}{7}$ **or** any fraction equivalent to $\frac{2}{7}$ or $\frac{5}{7}$ A1 cao
4			2	M1 for a 5cm by 5 cm square **or** a 5cm by 3 cm rectangle **or** a 5 cm by 2 cm rectangle A1 for correct elevation with dividing line NB: diagrams which appear to have a 3D element get 0 marks

PMT

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
5		£26.50 **or** HK$325.95	3	M1 for 3179.55 ÷ 12.3 (=258.5) M1 (dep) for 285 - '258.5' A1 for £26.50 (correctly stated with currency) **OR** M1 for 285 × 12.3 (=3505.5) M1 (dep) for '3505.5' - 3179.55 (=325.95) A1 for HK$325.95 (correctly stated with currency)
6		19	4	M1 for 130 − 96 (=34) M1 for 73 − 55 (=18) M1 for '34' − 9 − '18' + 12 A1 cao **OR** M1 for 96 − 55 − 12 (=29) M1 for 9 + '29' (=38) M1 for 130 − 73 − '38' A1 cao

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*7		Small with correct figures for comparison	4	M1 for one calculation eg 6.5 ÷ 30 (=0.216...) **or** 8.95 ÷ 40 (=0.22375) **or** 10.99 ÷ 50 (=0.2198) M1 for all three calculations eg 6.5 ÷ 30 (=0.216...) **and** 8.95 ÷ 40 (=0.22375) **and** 10.99 ÷ 50 (=0.2198) A1 for 0.216(6...) **and** 0.223(75) **and** 0.219(8...); can be rounded or truncated as long as they remain different C1 (dep on M1) for conclusion ft from three comparable figures [could use different figures relating to 30, 40, 50] **OR** M1 for one calculation eg 6.5 × 20 (=130) **or** 8.95 × 15 (=134.25) **or** 10.99 × 12 (=131.88) M1 for three calculations eg 6.5 × 20 (=130) **and** 8.95 × 15 (=134.25) **and** 10.99 × 12 (=131.88) A1 for 130 **and** 134(.25) **and** 131(.88); can be rounded or truncated as long as they remain different C1 (dep on M1) for conclusion ft from three comparable figures eg cost of 600 plants or comparing small and medium and small and large e.g. 120 plants and 150 plants separately] **OR** M1 for one calculation e.g 30 ÷ 6.5 (= 4.615…) **or** 40 ÷ 8.95 (= 4.469…) **or** 50 ÷ 10.99 (= 4.549…) M1 for three calculations e.g. 30 ÷ 6.5 (= 4.615…) **and** 40 ÷ 8.95 (= 4.469…) **and** 50 ÷ 10.99 (= 4.549…) A1 for 4.6(15…) **and** 4.4(69…) **and** 4.5(49…) can be rounded or truncated as long as they remain different C1 (dep on M1) for conclusion ft from three comparable figures [or any other calculations leading to comparable figures]

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
8 (a)		$7n - 4$	2	B2 for $7n - 4$ (B1 for $7n + d$ where d is an integer)
(b)		explanation	2	M1 for '$7n - 4$' = 150 **or** any other valid method, eg. counting on 7s (to get 150) A1 for a complete explanation eg. the 22nd term is 150 or $n = 22$ from solution of equation or a clear demonstration based on 22 or complete sequence
9		115	4	M1 for $360 - 4 \times 25$ (=260) M1 (dep) for '260'÷4 (=65) M1 for 180 − '65' **or** (360 −2× '65') ÷ 2 A1 for 115 with working **OR** M1 for 360÷4 (=90) M1 (dep) for '90' − 25 (=65) M1 for 180 − '65' **or** (360 − 2×'65') ÷ 2 A1 for 115 with working
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				
Question	**Working**	**Answer**	**Mark**	**Notes**
11 (a)		x^{10}	1	B1 cao
(b)		m^{12}	1	B1 cao
(c)		$3a^{-4}f^{6}$	2	B2 for $3a^{-4}f^{6}$ **or** $\frac{3f^{6}}{a^{4}}$ (B1 for any two from 3, a^{-4} or $\frac{1}{a^{4}}$, f^{6} in a product)
12		440	2	M1 for 140 × π oe or 439 A1 for 439.6 – 440
*13	Distance ÷ speed: 30 ÷ 70 (= 0.42-0.43); Distance ÷ time: 30 ÷ 26 (=1.15…); Speed × time: = 70 × 26 (=1820 mins); mph to miles/min =70÷ 60 (=1.16-1.17); Minutes to hours is 26 ÷ 60 (=0.43…)	No with correct figure	3	M1 for a calculation which uses the Time × Speed = Distance relationship **OR** a conversion of units eg between hours & minutes or between mph & miles per min M1 for a calculation involving both of the above C1 for "no" with a correct calculation, with units, from working: 25.2-25.8 minutes, 30.1-30.8 miles, 69-69.3 mph NB: 70 ÷ 26 × 30 as a single stage calculation gets 0 marks

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)		$20 < T \leq 24$	1	B1 for $20 < T \leq 24$
	(b)	$6\times10 + 8\times14 + 13\times18 + 21\times22 + 2\times26 = 920$ $920 \div 50$	18.4	4	M1 for finding fx with x consistent within intervals (including the end points) allow 1 error; implied by 820, 1020 M1 (dep) for use of all correct mid-interval values eg 920 M1 (dep on 1st M1) for $\sum fx \div \sum f$ A1 for 18.4 oe
	(c)		correct frequency 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
15			80.1	3	M1 for $39^2 + 70^2$ M1 for $\sqrt{"1521" + "4900"}$ or $\sqrt{"6421"}$ A1 for 80.1 - 80.2

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)		6.25	3	M1 for clear intention to expand bracket **or** divide both sides of the equation by 5 as first step M1 for correct method to isolate terms in *f* A1 for 6.25 oe
	(b)		−0.75	4	M1 for correct method to clear fractions eg. multiply all terms by 6 M1 for expansion of brackets oe M1 (dep on M1) for isolating the terms in *h* **and** the constant terms A1 for −0.75 oe
17	(a)		**-15, 0**, 3, 0 ,**-3**, **0**, 15	2	B2 for all correct (B1 for any 2 or 3 correct)
	(b)		Correct graph	2	M1 for at least 5 points plotted correctly (ft from table if at least B1 awarded in (a)) A1 for a fully correct curve

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
18		49.5	4	M1 for $\tan 54 = \frac{\text{height}}{6}$ M1 for (height =) $6 \times \tan 54$ (=8.2-8.3) M1 for $\frac{1}{2} \times$ '8.258..' $\times 12$ A1 for 49.2 - 50 **OR** M1 for $\cos 54 = \frac{6}{AC}$ M1 for $(AC =) \frac{6}{\cos 54}$ (=10.2(07...)) M1 for $\frac{1}{2} \times 12 \times$ '10.207' $\times \sin 54$ A1 for 49.2 - 50 **OR** M1 for $\frac{AC}{\sin 54} = \frac{12}{\sin 72}$ M1 for $(AC =) \frac{12}{\sin 72} \times \sin 54$ (=10.2(07...)) M1 for $\frac{1}{2} \times 12 \times$ '10.207' $\times \sin 54$ A1 for 49.2 – 50

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
19	(a)		0.00078	1	B1 cao
	(b)		9.56×10^7	1	B1 cao
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
21	(a)		$(2x + 3)(2x - 3)$	1	B1 cao
	(b)		$m = \frac{g-5}{a+3}$	3	M1 for correct processes to isolate terms in m from other terms M1 for taking m out as a common factor A1 for $m = \frac{g-5}{a+3}$ **or** $m = \frac{5-g}{-a-3}$

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
22 (a)		'show'	2	M1 for $\frac{1}{2} \times (x - 4 + x + 5) \times 2$ **or** $2x \times (x - 4) + \frac{1}{2} \times 2x \times 9$ A1 for completion with correct processes seen
(b)		13	3	M1 for $\frac{-1 \pm \sqrt{1^2 - 4 \times 2 \times -351}}{2 \times 2}$ condone incorrect sign for 351 M1 for $\frac{-1 \pm \sqrt{2809}}{4}$ A1 for 13 NB for either M mark accept + only in place of ± **OR** M2 for $(2x + 27)(x - 13)$ (M1 for $(2x \pm 27)(x \pm 13)$) A1 for 13
23		15	2	M1 for $\frac{134}{1065} \times 120$ **or** 15.098... oe A1 cao

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
24		14.4	3	M1 for $\pi \times 6.5^2 \times 11.5$ (=1526.42...) M1 (dep) for $\frac{\text{'1526.42...'}}{\pi \times 5.8^2}$ A1 for 14.4 - 14.5 **OR** M1 for $\frac{5.8}{6.5}$ or $\frac{6.5}{5.8}$ or 0.89(23…) or 1.12(06896…) M1 for $11.5 \div \left(\frac{5.8}{6.5}\right)^2$ or $11.5 \div \left(\frac{6.5}{5.8}\right)^2$ A1 for 14.4 - 14.5
*25		Yes with explanation	3	M1 For **Line A**: writes equation as $y = 1.5x + 4$ or gives the gradient as 1.5 or constant term of 4 OR for **Line B**: shows a method which could lead to finding the gradient or gives the gradient as 2 or constant term of 4 or calculates a sequence of points including (0,4) or writes equation of line as $y = 2x + 4$ M1 Shows correct aspects relating to an aspect of Line A and an aspect of Line B that enables some comparison to be made eg gradients, equations or points. C1 for gradients 1.5 **and** 2 **and** Yes **with** explanation that the gradients are different or states the lines intersect at (0,4) or explanation that interprets common constant term (4) from equations OR M1 for a diagram that shows both lines drawn and intersecting at (0,4) M1 for a diagram that shows both lines and their intersection point identified as (0,4) C1 for Yes and states the intersection point as (0,4)

PAPER: 1MA0_2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
26	180-136-"34.4" =9.504	3.73	5	M1 for $\frac{\sin L}{12.8} = \frac{\sin 136}{15.7}$ M1 for $L = \sin^{-1}\left(\frac{\sin 136}{15.7} \times 12.8\right)$ or **or** $\sin^{-1}0.566...$ A1 for 34.4 - 34.5 M1 for $\frac{LN}{\sin(180-136-'34.4')} = \frac{15.7}{\sin 136}$ or $\frac{LN}{\sin(180-136-'34.4')} = \frac{12.8}{\sin'34.4'}$ or $(LN^2 =)\ 15.7^2 + 12.8^2 - 2\times15.7\times12.8\times\cos(180 - 136 - '34.4')$ A1 for 3.73 - 3.74
27	$12\times20 + 10.8\times10 + 7\times15 + 5\times15 + 1.8\times30 + 0.6\times30$ $=240+108+105+75+54+18$ $=528+72=600$	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 $\frac{'72'}{'600'}\times100$ 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

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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

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Mark Scheme (Results)

November 2013

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

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

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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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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).
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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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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

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

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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

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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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PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		Reflection in $x = 0$ or y-axis	2	B1 for reflection B1 for $x = 0$ or y-axis (NB: a combination of transformations gets B0)
(b)		Triangle (1, 0)(4, 0)(1, –2)	2	M1 for any correct rotation of 90° clockwise OR for any correct rotation about the point (0, 2) A1 for a triangle with vertices at (1, 0), (4, 0) and (1, –2)
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

PMT

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
3	$x = 3$ gives 39 $x = 4$ gives 80 $x = 3.1$ gives 42.(191) $x = 3.2$ gives 45.(568) $x = 3.3$ gives 49.(137) $x = 3.4$ gives 52.(904) $x = 3.5$ gives 56.(875) $x = 3.6$ gives 61.(056) $x = 3.7$ gives 65.(453) $x = 3.8$ gives 70.(072) $x = 3.9$ gives 74.(919) $x = 3.55$ gives 58.9(38875) $x = 3.56$ gives 59.3(58016) $x = 3.57$ gives 59.7(79293)	3.6	4	B2 for a correct trial in the range $3.5 \leq x \leq 3.6$ evaluated (B1 for a correct trial in the range $3 \leq x \leq 4$ evaluated) B1 for a different correct trial in the range $3.55 \leq x < 3.58$ evaluated B1 (dep on at least one previous B1) for 3.6 Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1 dp but to 1 dp (rounded or truncated) if the value of x is to 2 dp NB: If no working shown, no marks can be awarded, even if the answer is correct.
4		480	2	M1 for using a correct ratio of $\frac{800}{150}$ oe or $\frac{150}{800}$ oe or $\frac{90}{150}$ oe or $\frac{150}{90}$ oe A1 cao [SC: B1 for $477 \leq$ answer < 480 if no working and M0 scored]

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PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
*5	Key ring: 1.6 × 9 = 14.4 Purse : 3.2 × 8 = 25.6	Key ring £1.60 Purse £3.20	4	M1 for $9x$ or $8 \times 2x$ (where x is the price of a key ring) M1 for equation $9x + 8 \times 2x = 40$ oe A1 for 1.6 and 3.2 C1 (dep on M2) for both "£1.60" and "£3.20" clearly identified for correct items with correct money notation OR M1 for $(8\times2) : 9$ (= 16 : 9) M1 for $40 \div (16 + 9)$ A1 for 1.6 and 3.2 C1 (dep on M2) for both "£1.60" and "£3.20" clearly identified for correct items with correct money notation OR M2 for trial with attempt to evaluate $9x$ and $8 \times 2x$ with £1 < x < £2 (M1 for trial with attempt to evaluate $9x$ and $8 \times 2x$ with £1 ≤ x ≤ £4) A1 for 1.6 and 3.2 C1 (dep on M2) for both "£1.60" and "£3.20" clearly identified for correct items with correct money notation [SC: B2 for both £1.60 cao and £3.20 cao clearly identified for correct items with correct money notation if no working shown]

PAPER: 5MB3H_01				
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
7		Correct region shaded	3	B1 for perpendicular bisector within guidelines B1 for arc of circle, centre A, within guidelines B1 ft for a correct region shaded or otherwise indicated from their perpendicular bisector of AB and their arc drawn, centre A

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PAPER: 5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*8		179 ÷ 70 = 2.5(571.....) 275 ÷ 100 = 2.7(5) 399 ÷150 = 2.6(66....) 70 ÷ 179 = 0.39(11....) 100 ÷ 275 = 0.36(36...) 150 ÷399 = 0.37(59....)	70 m*l* tube with reason	4	**Using pence per m*l*** M1 for a correct method of finding the cost per millilitre (or cost/10 m*l* etc) for one of the sizes M1 for a correct method of finding the cost per millilitre (or cost/10 m*l* etc. must be consistent) for each of the sizes A1 for 2.5(571.....) (70 m*l*) and 2.7(5) (100 m*l*) and 2.6(66....) (150 m*l*) or equivalent depending upon units used. These values can be rounded or truncated as long as they remain different C1 (dep on M1) for selecting the tube with the best value for money based upon a comparison of their 3 values. OR **Using m*l* per 1p** M1 for a correct method of finding the volume per pence (or £) for one of the sizes M1 for a correct method of finding the volume per pence (or £) for each of the sizes, with consistent units A1 for 0.39(11....) (70 m*l*) and 0.36(36...) (100 m*l*) and 0.37(59....) (150 m*l*) or equivalent depending upon units used. These values can be rounded or truncated as long as they remain different C1 (dep on M1) for selecting the tube with the best value for money based upon a comparison of their 3 values.
9	(a)	*x* –1 0 1 2 3 4 5 *y* **9** 3 –1 **–3** –3 **–1** 3	9, –3, –1	2	B2 for a fully correct table of values (B1 for at least one correct extra entry)
	(b)		Correct graph	2	B1 (dep on at least B1 in (a)) for all of their points correctly plotted B1 (dep on previous B1) for smooth curve through all 7 of their points
	(c)		0.7, 4.3	2	B1 for an answer rounding to 0.7 or ft their graph B1 for an answer rounding to 4.3 or ft their graph

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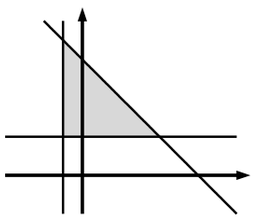
PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
10 (a)		10.25	2	M1 for an attempt to expand the bracket or divide both sides by 4 as a first step. A1 for 10.25 oe
(b)		$t = \frac{P+3}{4}$	2	M1 for a correct first step of either adding 3 to both sides or dividing both sides by 4 A1 for $t = \frac{P+3}{4}$ oe [SC: B1 for $P + 3 \div 4$ if M0 scored]
11		66.7	3	M1 for tan (y =) $\frac{86}{37}$ (= 2.3243..) M1 (dep) for $\tan^{-1}$ "2.32(43..)" = or $\tan^{-1}(\frac{86}{37})$ (accept 'shift tan' or 'inv tan' for $\tan^{-1}$) A1 for answer in the range 66.6° to 66.8° [SC: B1 for an answer in the range 23.2 to 23.3 if M0 scored]
12		Region identified	4	B1 for $x + y = 6$ or $x = -1$ or $y = 2$ drawn B1 for $x + y = 6$ and $x = -1$ and $y = 2$ drawn M1 for consistent shading (in or out) for any two of the lines $x + y = 6$, $x = -1$, $y = 2$ A1 lines drawn, and correct region identified by either shading in, or shading out; the letter R is not required, but necessary if no shading. Note: Lines may be solid or dotted/dashed etc

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PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
13		32.2	4	M1 for $BC = \frac{10}{4} \times 5$ (= 12.5) M1 for $EC = \frac{10}{4} \times 5.8 - 5.8$ (=8.7) M1(dep on at least M1) for '12.5' + '8.7' + 5 + 6 A1 cao OR M1 for $BC = \frac{5}{4} \times 10$ (= 12.5) M1 for $EC = \frac{5.8}{5} \times$ '12.5' – 5.8 (= 8.7) M1 (dep on at least M1) for '12.5' + '8.7' + 5 + 6 A1 cao OR M1 for $BC = \frac{5}{4} \times 10$ (= 12.5) M1 for $EC = \frac{6}{4} \times 5.8$ (= 8.7) M1 (dep on at least M1) for '12.5' + '8.7' + 5 + 6 A1 cao OR M1 for 4 + 5 + 5.8 (= 14.8) M1 for $\frac{10}{4} \times$ '14.8' (= 37) M1 (dep on at least M1) for '37' – 4 – 5.8 + 5 A1 cao

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PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
14	$4x - 5y = 33$ $\underline{15x + 5y = 5}$ $19x = 38$ $x = 2$, $3\times2 + y = 1$ $y = -5$ $12x - 15y = 99$ $\underline{12x + 4y = 4}$ $-19y = 95$ $y = -5$, $3x - 5 = 1$ $x = 2$ OR $4x - 5(1 - 3x) = 33$ $x = 2$, $3\times2 + y = 1$ $y = -5$	$x = 2$, $y = -5$	3	M1 for a fully correct process to eliminate one variable (condone one arithmetical error) M1 (dep on M1) for a correct substitution of their value (of x or y) into one of the equations, or for starting again with a fully correct process to eliminate the second variable A1 for $x = 2$ and $y = -5$ OR M1 for a correct rearrangement of one of the equations to make either x or y the subject and a correct method of substitution into the other equation. (condone one arithmetical error) M1 (dep on M1) for the substitution of their value (of x or y) into one of the equations. A1 for $x = 2$ and $y = -5$ [Note: No marks for trial and improvement methods unless a fully correct solution is found]
15 (a)(i)		3.202(17….)	3	B2 for for 3.202(17.....) (B1 for 5.357 .. or 1.673... seen)
(a)(ii)		3.20		B1 for 3.20 or ft from "(a)" [Note: 3.2 only gets B0]
(b)		1.17×10^{10}	2	M1 for $2.34 \times 5 \times 10^{(5+4)}$ or $11.7 \times 10^{(5+4)}$ or 234000 × 50000 (= 11700000000) A1 for 1.17×10^{10}

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PAPER: 5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	$\frac{1}{2} \times 5 \times 5 \times \sin 60^o$ or $\sqrt{5^2 - 2.5^2} = 4.330.....$ $\frac{1}{2} \times 5 \times 4.33 \ldots \ldots$	10.8	3	M1 for using a triangle of sides 5 cm and angle 60° or a right-angled triangle of sides 5 cm and 2.5 cm M1 for a complete correct method to find the area of the triangle A1 for answer in the range 10.8 to 10.9
	(b)		7	4	M1 for $\frac{4}{3} \times \pi \times 17.5^3$ (= 22449.29...) or $\frac{1}{2} \times \frac{4}{3} \times \pi \times 35^3$ (= 89797.19...) M1 for $\frac{1}{2} \times \frac{4}{3} \times \pi \times 17.5^3$ (= 11224.6) M1 (dep on M1) for 80 × 1000 ÷ '11224.6' oe A1 for 7 or (dep on M2) ft rounded down.
17		$(x^2 - 7)y = (x^2 + 9)$ $x^2y - 7y = x^2 + 9$ $x^2y - x^2 = 9 + 7y$ $x^2(y - 1) = 9 + 7y$	$x = (\pm)\sqrt{\frac{7y+9}{y-1}}$ oe	4	M1 for correctly removing the fraction or $(x^2 - 7)y$ oe seen M1 for a correct rearrangement, isolating terms in x^2 on one side of an equation M1 for the fully correct factorisation of their $x^2y - x^2$ oe A1 for $x = (\pm)\sqrt{\frac{7y+9}{y-1}}$ or $x = (\pm)\sqrt{\frac{-7y-9}{1-y}}$ oe

PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
*18		128°	4	M1 for 180 – 116 (= 64), when clearly attempting to find angle *ADC* M1 (indep) for their angle *ADC* × 2 C2 (dep on M2) for $x = 128(^o)$ and fully correct reasons supported by method: eg. "opposite angles of a cyclic quadrilateral add up to 180°" and "the angle at the centre of a circle is twice the angle at the circumference" [C1 (dep on the relevant M1) for one correct reason] OR M1 for 116 × 2 (= 232), when clearly attempting to find reflex angle *AOC* M1 (dep) for 360 – '232' C2 (dep on M2) for $x = 128(^o)$ and fully correct reasons: eg. "the angle at the centre of a circle is twice the angle at the circumference" and "angles at a point add up to 360°" [C1 (dep on the relevant M1) for one correct reason] [SC: B2 for 128 seen identified as angle *x*, if M0 scored]
19 (a)		**b** – **a**	1	B1 for **b** – **a** oe
(b)		$\frac{4}{5}$**a** + $\frac{1}{5}$**b** oe	3	M1 for a fully correct vector statement for $\overrightarrow{OX}$ eg.($\overrightarrow{OX}$ =) $\overrightarrow{OA}$ (or **a**) + $\overrightarrow{AX}$ (or $\frac{1}{5}\overrightarrow{AB}$) or ($\overrightarrow{OX}$ =) $\overrightarrow{OB}$ (or **b**) + $\overrightarrow{BX}$ (or $\frac{4}{5}\overrightarrow{BA}$ or $-\frac{4}{5}\overrightarrow{AB}$) M1 (indep) for $\pm\frac{1}{5}$(**b** – **a**) or $\pm\frac{4}{5}$(**a** – **b**), ft their (a) A1 for **a** + $\frac{1}{5}$(**b** – **a**) or **b** + $\frac{4}{5}$(**a** – **b**) oe

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PAPER: 5MB3H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
20		4.5, –0.75 oe	3	M2 for $(2x – 9)(4x + 3)$ oe (M1 for $(2x \pm 9)(4x \pm 3)$) oe A1 for 4.5, –0.75 oe [SC: B1 for 4.5 and –0.75 oe, found by any other method]

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**
Q1	(a) (b)	2cm grid 2cm grid. Triangle A to be rotated about the point (0,1).	
Q6		July peak / off peak in a different format. Information the same.	Standard mark scheme
Q7		Dashed line to join Alford and Bancroft. A to B – 7.5cm.	Standard mark scheme
Q9		1 ½ cm grid.	Standard mark scheme
Q12		2cm grid.	Standard mark scheme
Q13		Measurement arrows taken out.	Standard mark scheme
Q16		Model and diagram	Standard mark scheme

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Mark Scheme (Results)

Summer 2014

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 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

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		$\frac{2}{21}$	1	B1 for $\frac{2}{21}$
	(b)		$\frac{4}{15}$	2	M1 for attempting to use a suitable common denominator with at least one of the two fractions correct A1 for $\frac{4}{15}$ oe
2			0 | 5 9 1 | 3 5 6 8 9 9 2 | 1 2 3 3 5 7 8 9 3 | 1 2 4 4 | 0	3	B2 for fully correct diagram. Accept a stem of 10, 20, etc. (B1 for ordered with at most 2 errors or omissions or for correct unordered diagram) B1 for a correct key (units may be omitted) consistent with diagram.
3		<table><tr><td></td><td>Sq</td><td>G</td><td>S</td><td>Tot</td></tr><tr><td>F</td><td>2</td><td>4</td><td>15</td><td>21</td></tr><tr><td>M</td><td>6</td><td>14</td><td>9</td><td>29</td></tr><tr><td>Tot</td><td>8</td><td>18</td><td>24</td><td>50</td></tr></table>	4	4	M1 for a correct first step which results in a value that could be in the table: eg. 50 – 18 – 8 (= 24) or 50 – 21 (= 29) or 8 – 6 (= 2) M1 for a correct method to find a second value that could be in the table using their first value eg "29" – 9 – 6 (=14) or "24" – 9 (=15) M1 for a fully correct and complete method. 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					
Question		**Working**	**Answer**	**Mark**	**Notes**
5			Question given	2	B1 for a suitable question which includes a time frame (the time frame could appear with the response boxes) B1 for at least 3 non-overlapping exhaustive response boxes with no use of inequality symbols
6	(a)		$2m^2 + 6m$	1	B1 for $2m^2 + 6m$
	(b)		$3xy(y - 2)$	2	B2 for $3xy(y - 2)$ (B1 for $3x(y^2 - 2y)$ or $3y(xy - 2x)$ or $xy(3y - 6)$ or $3xy$(a two term algebraic expression))
*7			3	4	M1 for a method to calculate at least one area eg 10×7 (=70) or 16×10 (=160) M1 for a method to find the total area (=124) M1 (dep on M1) for "124" ÷ 36 C1 (dep on M3) for 3 (pigs) clearly identified and supported by correct calculations Or M1 for an area of $36m^2$ drawn with dimensions shown M1 for 3 areas of $36m^2$ drawn with dimensions shown M1 (dep on M1) for method to find the area left (=16) C1 (dep on M3) for 3 (pigs) clearly identified and supported by correct calculations
8			Correct region	3	B1 for full line drawn 1.5 cm from edge of patio and parallel to it B1 for full arc of circle radius 3 cm centre the centre of the pond B1 ft for shading region to the right of their vertical line **and** outside the arc of their circle with correct centre

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)		Shape drawn	2	B2 for shape with vertices at (0, –1), (–1, – 3), (–2, –3), (–2, –1) (B1 for rotation of 180° about the wrong centre)
	(b)		Triangle drawn	2	B2 for triangle with vertices at (6, 9), (9, 9), (9, 3) (B1 for 2 vertices correct or enlargement sf 3 in wrong position or enlargement, centre (0, 0), but sf >1, ≠ 3)
*10		1.18 ÷ 4 = 0.295 (118 ÷ 4 = 29.5) 1.74 ÷ 6 = 0.29 (174 ÷ 6 = 29) 1.18 ÷ 2 = 0.59 1.74 ÷ 3 = 0.58 1.74 × 4 = 6.96 1.18 × 6 = 7.08 1.74 × 2 = 3.48 1.18 × 3 = 3.54 1.18÷2×3=1.77 1.74÷3×2=1.16 4÷1.18=3.3(…) 6÷1.74=3.4(…)	6 pints	3	M1 for division of price by quantity for both bottles or division of quantity by price for both bottles or complete method to find price of same quantity of milk A1 for two correct values that could be used for a comparison C1 ft (dep on M1) for comparison of their values with a correct conclusion.
11			36	3	M1 for a correct method to find either an interior or an exterior angle; eg. (180 × 3) ÷ 5 or 540 ÷ 5 (=108) or 360 ÷ 5 (=72) M1 (dep) for a complete method to find angle *CFD*. A1 cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	*(a)		No, temp is 25°C	3	M1 for substitution of 77 into the RHS of the formula A1 for 25 cao or for 225/9 and 180/9 cao C1 (dep on M1) for conclusion (ft) following from working shown OR M1 for substitution of 20 into LHS of formula and correct process to find F A1 for 68 cao C1 (dep on M1) for conclusion (ft) following from working shown
	(b)		$F = \frac{9C}{5} + 32$	3	M1 for expansion of the brackets (eg $5 \times F - 5 \times 32$) or an attempt to multiply both sides by 9, or divide both sides by 5 as the first step. M1 (dep) for a correct second step A1 for $F = \frac{9C}{5} + 32$ oe
*13			Answer in range 35 – 50	4	M1 for a method to either find the exact or approximate number of seconds in one day, e.g. $24 \times 60 \times 60$ (=86400) or the number of minutes in 2014 seconds, e.g. $2014 \div 60$ or $2000 \div 60$ (≈30) M1 for a correct method to find the number of prizes; eg. '$24 \times 60 \times 60$' $\div$ 2014 oe or $60 \div$ "30" $\times 24$ oe B1 for rounding at least one appropriate value in the working to 1 sf, e.g. 24 rounded to 20 or 2014 rounded to 2000 or 86400 rounded to 90000 C1 (dep on M2) for answer in 35 – 50 clearly identified
14			6 hours	4	B1 for 5 miles = 8 km or equivalent statement or for $\frac{8}{5}$ or $\frac{5}{8}$ used correctly M1 for $50 \times r$ with $1.5 \leq r \leq 1.7$ oe or $480 \times s$ with $0.6 \leq s \leq 0.7$ oe M1 for $480 \div$ speed or distance $\div 50$ A1 oe

<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>15</td><td>(a)</td><td></td><td>2, –1, 2, 7</td><td>2</td><td>B2 for all correct
(B1 for 2 or 3 correct)</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Correct graph</td><td>2</td><td>M1 (dep on at least B1) for at least 6 points from their table plotted correctly
A1 cao for fully correct graph</td></tr>
<tr><td></td><td>(c)</td><td>$x^2 - 3x - 4 = 0$
$(x - 4)(x + 1) = 0$</td><td>–1, 4</td><td>2</td><td>M1 for line $y = x + 3$ drawn correctly or for reduction to correct 3 term quadratic (=0) and :
$(x \pm 1)(x \pm 4)$
or formula using $a = 1$, $b = -3$ and $c = -4$, allow one sign error in the formula,
or $\left(x - \frac{3}{2}\right)^2 = 4 + \left(\frac{3}{2}\right)^2$
A1 cao</td></tr>
<tr><td>16</td><td>(a)</td><td></td><td>0.75</td><td>2</td><td>M1 for “5.6” – “4.85” with at least one value correct
A1 cao</td></tr>
<tr><td></td><td>(b)</td><td></td><td>20</td><td>2</td><td>M1 for a complete method e.g. 80 ÷ 4
A1 cao</td></tr>
<tr><td></td><td>(c)</td><td><table><tr><th></th><th>1st half</th><th>2nd half</th></tr><tr><td>Med</td><td>5.3</td><td>4.75</td></tr><tr><td>Range</td><td>2.2</td><td>2.45</td></tr><tr><td>IQR</td><td>0.75</td><td>0.75</td></tr></table></td><td>2 comparisons</td><td>2</td><td>B1 ft from (a) for a correct comparison of a measure of spread
B1 for a correct comparison of medians (accept averages)
For the award of both marks at least one of the comparisons made must be in the context of the question.</td></tr>
</table>

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17	(a)		1	1	B1 cao
	(b)		$\frac{1}{100}$	1	B1 for $\frac{1}{100}$ or 0.01
	(c)		0.00273 27.3×10^{-3} 2.73×10^{3} 273×10^{2}	2	M1 for converting all numbers to same form with at least one conversion correct A1 for fully correct order with correct numbers in any correct form (SC B1 if one number incorrectly placed or all 4 numbers listed in reverse order)
18			$x = 7$ $y = -3$	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 $x = 7$ and $y = -3$
19			$y = \frac{1}{2}x - 5$	3	M1 for method to find gradient of L_1 e.g $\frac{6-3}{6-0}$ $\left(=\frac{1}{2}\right)$ M1 for $y =$ "$\frac{1}{2}$"$x + c$ or $y = mx - 5$ (c, m do not have to be numerical, or correct numerical values) or for $(L =)\frac{1}{2}x - 5$ A1 $y = \frac{1}{2}x - 5$ oe

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20			6	3	M1 for $\frac{15}{10}$ (=1.5) or $\frac{10}{15}$ (=0.66..) or $\frac{16}{10}$(=1.6) or $\frac{10}{16}$(=0.625) M1 for $\frac{15}{10}$ × 16 (=24) oe A1 cao OR M1 for $\frac{15}{16}$(=0.9375) or $\frac{16}{15}$ (=1.066…) or $\frac{16}{10}$(=1.6) or $\frac{10}{16}$(=0.625) M1 for $\frac{15}{16}$× 10 (=9.375) oe A1 20.625 oe
21			55	3	M1 for angle ABO = 90 or angle ADO = 90, or angle OBC = 15 or angle FDO = 90 or angle EBO = 90 (could be marked on the diagram) M1 for reflex angle BOD = 360 – (360 – 90 – 90 – 40) (= 220) or angle BCD = (360 – 90 – 90 – 40) ÷ 2 (= 70) or angle BDO or angle DBO = 90 – (180 – 40)/2 (= 20) or angle BOC = 180 – (15 + 15) (=150) A1 cao
22	(a)		$27x^6y^{12}$	2	B2 cao (B1 for any two terms correct in a product, e.g. $9x^6y^{12}$)
	(b)		$\frac{x-3}{2x-1}$	3	M1 for $(x-3)(x+3)$ M1 for $(2x-1)(x+3)$ A1 for $\frac{x-3}{2x-1}$ cao

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23	(a)		$\frac{3}{10}, \frac{6}{9}, \frac{3}{9}, \frac{7}{9}, \frac{2}{9}$	2	B1 for $\frac{3}{10}$ on LH yellow branch B1 for $\frac{6}{9}, \frac{3}{9}, \frac{7}{9}, \frac{2}{9}$ correct on tree diagram
	(b)		$\frac{48}{90}$	3	M1 for $\frac{7}{10} \times "\frac{3}{9}"$ or $"\frac{3}{10}" \times "\frac{7}{9}"$ or $"\frac{3}{10}" \times "\frac{2}{9}"$ M1 for $\frac{7}{10} \times "\frac{3}{9}" + "\frac{3}{10}" \times "\frac{7}{9}" + "\frac{3}{10}" \times "\frac{2}{9}"$ A1 for $\frac{48}{90}$ oe OR M1 for $\frac{7}{10} \times "\frac{6}{9}"$ M1 for $1 - \frac{7}{10} \times "\frac{6}{9}"$ A1 for $\frac{48}{90}$ oe

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*24			Proof	3	M1 for $\overrightarrow{MN} = \overrightarrow{MO} + \overrightarrow{ON}$ (= **n** – **m**) or $\overrightarrow{NM} = \overrightarrow{OM} + \overrightarrow{NO}$ (= **m** – **n**) or $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$ (= 2**n** – 2**m**) or $\overrightarrow{BA} = \overrightarrow{OA} + \overrightarrow{BO}$ (= 2**m** – 2**n**) M1 for $\overrightarrow{MN}$= **n** – **m** and $\overrightarrow{AB}$= 2**n** – 2**m** oe C1 (dep on M1, M1) for fully correct proof, with $\overrightarrow{AB}$= $2\overrightarrow{MN}$ or $\overrightarrow{AB}$ is a multiple of $\overrightarrow{MN}$ [SC M1 for $\overrightarrow{MN}$ = 0.5**n** – 0.5**m** and $\overrightarrow{AB}$ = **n** – **m** C1 (dep on M1) for fully correct proof, with $\overrightarrow{AB}$= $2\overrightarrow{MN}$ or $\overrightarrow{AB}$ is a multiple of of $\overrightarrow{MN}$]
25	(a)		$4\sqrt{3}$	2	M1 for $\frac{12}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ A1 for $\frac{12\sqrt{3}}{3}$ oe with a rational denominator
	(b)		18	2	M1 for $\sqrt{2}\times\sqrt{2} + \sqrt{2}\times\sqrt{8} + \sqrt{8}\times\sqrt{2} + \sqrt{8}\times\sqrt{8}$ oe A1 cao OR M1 for $(\sqrt{2} + 2\sqrt{2})^2$ A1cao

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PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
26	(a)		180, 0	1	B1 for 180, 0 Accept π, 0
	(b)		270, –1	1	B1 for 270, –1 accept $\frac{3\pi}{2}$, –1
	(c)		$a = 2$ $b = 3$ $c = 1$	3	B1 cao B1 cao B1 cao

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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**
Q08		Diagram made x 2 size. 3 metres changed to 6 metres. 6 metres changed to 12 metres.	B1 for full line drawn 3 cm from edge of patio and parallel to it B1 for full arc of circle radius 6 cm centre the centre of the pond B1 ft for shading region to the right of their vertical line **and** outside the arc of their circle with correct centre
Q09	(a) (b)	2 cm grid. A cut-out shape is provided. Axis removed. 2 cm plain grid. L shape put on grid. 3 squares down and an extra square across. Total 4 squares. Candidates asked to enlarge the shape by SF3	B2 for shape with vertices at (0, –1), (–1, – 3), (–2, –3), (–2, –1) (B1 for rotation of 180° about the wrong centre) B2 for a correct enlargement (B1 for an enlargement with a SF other than 3 or for 3 sides correct)
Q10		No pictures	M1 for division of price by quantity for both bottles or division of quantity by price for both bottles or complete method to find price of same quantity of milk A1 for two correct values that could be used for a comparison C1 ft (dep on M1) for comparison of their values with a correct conclusion.

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q14		No picture, just a box giving the distances	B1 for 5 miles = 8 km or equivalent statement or for $\frac{8}{5}$ or $\frac{5}{8}$ used correctly M1 for $50 \times r$ with $1.5 \leq r \leq 1.7$ oe or $480 \times s$ with $0.6 \leq s \leq 0.7$ oe M1 for 480 ÷ speed or distance ÷ 50 A1 oe
Q15		Grid x 2 – 2 cm squares. Top row removed.	B2 for all correct (B1 for 2 or 3 correct) M1 (dep on at least B1) for at least 6 points from their table plotted correctly A1 cao for fully correct graph M1 for line $y = x + 3$ drawn correctly or for reduction to correct 3 term quadratic (=0) and : $(x \pm 1)(x \pm 4)$ or formula using $a = 1$, $b = -3$ and $c = -4$, allow one sign error in the formula, or $\left(x - \frac{3}{2}\right)^2 = 4 + \left(\frac{3}{2}\right)^2$ A1 cao

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PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q16	(a)	Box plots: "first half" – relevant figures are 4.25, 4.75, 5.25, 5.5, 6.4.	M1 for "5.5" – "4.75" with at least one value correct A1 cao
	(c)	"Second half" figures are 3.6, 4.25, 4.75, 5, and 6. 2 cm squares	B1 ft from (a) for a correct comparison of a measure of spread B1 for a correct comparison of medians (accept averages) For the award of both marks at least one of the comparisons made must be in the context of the question.
Q19		2 cm grid	M1 for method to find gradient of L_1 e.g $\frac{6-3}{6-0}$ $\left(=\frac{1}{2}\right)$ M1 for $y =$ "$\frac{1}{2}$"$x + c$ or $y = mx - 5$ (c, m do not have to be numerical, or correct numerical values) or for $(L =)\frac{1}{2}x - 5$ A1 $y = \frac{1}{2}x - 5$ oe

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
Q20		Picture removed – box with the word "Photo inserted" Diagram labelled Diagram (i) and (ii)	M1 for $\frac{15}{10}$ (=1.5) or $\frac{10}{15}$ (=0.66..) or $\frac{16}{10}$(=1.6) or $\frac{10}{16}$(=0.625) M1 for $\frac{15}{10} \times 16$ (=24) oe A1 cao OR M1 for $\frac{15}{16}$(=0.9375) or $\frac{16}{15}$ (=1.066…) or $\frac{16}{10}$(=1.6) or $\frac{10}{16}$(=0.625) M1 for $\frac{15}{16} \times 10$ (=9.375) oe A1 20.625 oe
Q22	(b)	MLP only : x changed to y	M1 for $(y-3)(y+3)$ M1 for $(2y-1)(y+3)$ A1 for $\frac{y-3}{2y-1}$ cao
Q25		x 2 size, solid answer lines Braille only – Roman numerals inserted on the five answer lines	Standard mark scheme

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Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Unit 3: 5MB3H_01 (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.

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 for correct method 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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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)
2			7.4	3	M1 for a correct method to find the weight of 1 metre of hosepipe, eg. (1 ÷ 0.5) × 150 (= 300) M1 (dep) for a correct method to find the weight of the hosepipe alone, eg. "300" × 20 (= 6000) A1 for 7.4 (accept 7400 g)
3			enlargement scale factor 3 centre *O*	3	B1 for enlargement B1 for scale factor 3 B1 for (centre) *O* oe NB: B0 for any combination of transformations
*4		**Examples** **£ per bag** 2.15÷50 = 0.043 (4.3) 3.29÷80 = 0.0411.. (4.11..) 5.17÷125 = 0.0413..(4.13..) **Bags per £ (or pence)** 50÷2.15 = 23.2(5...) 80÷3.29 = 24. 3(1...) 125÷5.17 = 24.1(7...) **Price per 400 bags** S: 2.15×8 = 17.2 M: 3.29×5 = 16.45 **Price per 1000 bags** M: 3.29×12.5=41.125 L: 5.17×8=41.36	Medium	4	M1 for division of price by quantity for at least two boxes or division of quantity by price for at least two boxes or a complete method to find price of same quantity for at least two boxes or to find quantity of same price applied to at least two boxes M1 for a complete method to give values that can be used for comparison of all 3 boxes. A1 for correct values that can be used for comparison for all 3 boxes C1 ft (dep on M2) for comparison of their values with a correct conclusion.

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
5			41.1 to 41.2	3	M1 for a method to find the circumference of the circle, eg. $\pi \times 16$ (= 50.265..) M1 for a method to find the length of the semicircle, eg. "50.265.." ÷ 2 (= 25.132..) A1 for answer in the range 41.1 to 41.2
6	(a)		$5x - 3 = 52$	3	M1 for $2x$ or $2x - 3$ seen M1 for x and $2x$ and $2x - 3$ A1 for $5x - 3 = 52$ from correct working
	(b)		11	2	M1 for intention to either add 3 to both sides or to divide all terms by 5 as a first step A1 cao
7			77 to 77.2	4	M1 for $\pi \times 40^2 \times 90$ (= 452389. ..) M1 for "452389. .." – 65000 (= 387389. …) M1 (dep on at least M1) for "387389. .." ÷ ($\pi \times 40^2$) A1 for answer in the range 77 to 77.2 OR M1 for $\pi \times 40^2$ (= 5026. ...) M1 for 65000 ÷ "5026. ...." (= 12.93...) M1 (dep on at least M1) for 90 − "12.93..." A1 for answer in the range 77 to 77.2

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Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
8		x=2 gives 20 x=2.1 gives 21(.86...) x=2.2 gives 23(.84...) x=2.3 gives 25(.96...) x=2.4 gives 28(.22...) x=2.5 gives 30(.62...) x=2.6 gives 33(.17...) x=2.7 gives 35(.88...) x=2.8 gives 38(.75...) x=2.9 gives 41(.78...) x=3 gives 45 x=2.35 gives 27.0(7...) x=2.36 gives 27.3(0...) x=2.37 gives 27.5(3...)	2.3	4	B2 for a correct trial $2.3 \leq x \leq 2.4$ evaluated (B1 for a correct trial $2 \leq x \leq 3$ evaluated) B1 for a different correct trial $2.3 < x < 2.4$ evaluated B1 (dep on at least one previous B1) for 2.3 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
9			shaded region	3	B1 for arc of circle centre A radius 2 cm B1 for arc of circle centre B radius 4 cm B1 ft for correct region shaded
10	(a)		2, −1, 2	2	B2 for all correct (B1 for two correct)
	(b)		graph	2	M1 for at least 5 points plotted correctly (ft from table if at least B1 awarded in (a)) A1 for a fully correct graph
	(c)		−0.4, 2.4	2	B1 for an answer in the range 2.3 to 2.5 or ft their graph B1 for an answer in the range −0.3 to −0.5 or ft their graph

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
11			16	3	M1 for a correct first step in a process to find q, eg. a right-angled triangle drawn with correct vertical and horizontal lengths shown or correctly finding the difference in x coordinates and the difference in y coordinates of any two of the three given points M1 for a complete method to find q A1 cao
12	(a)		$e > \frac{9}{4}$	2	M1 for correct process to isolate terms in e from other terms A1 for $e > \frac{9}{4}$ oe
	(b)		shaded region	2	M1 for $x + y = 1$ drawn or for a region shaded above their line with negative gradient A1 for region shaded above line
13	(a)		5.0	3	M1 for $2.1^2 + 4.5^2$ or 4.41+20.25 or 24.66 M1 for $\sqrt{(2.1^2 + 4.5^2)}$ or $\sqrt{24.66}$ A1 for answer in the range 4.9 to 5.0
	(b)		115	4	M1 for a correct method to find the angle at the tower (A) or the angle at the tree (B), eg. $\tan(A) = \frac{4.5}{2.1}$ (= 2.14…) or $\tan(B) = \frac{2.1}{4.5}$ (= 0.46…) M1 for $\tan^{-1}\left(\frac{4.5}{2.1}\right)$ (= 64.98..) or $\tan^{-1}\left(\frac{2.1}{4.5}\right)$ (= 25.01…) A1 for 64.9(8...) or 25.0(1...) A1 for 115 or ft 180 – "64.98..." or 90 + "25.01"

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
14			2700	3	M1 for a correct method to find 25% of 4800 (= 1200) M1 for a fully complete and correct method to find the value of the car at the end of 2015 A1 cao OR M2 for $4800 \times (0.75)^2$ A1 cao
15			57.6	2	M1 for $\frac{D}{8} = \frac{36}{5}$ oe A1 for 57.6 oe
16	(a)		0.0045	1	B1 cao
	(b)		6.58×10^{-6}	2	M1 for $(2.5 \div 3.8) \times 10^{(-2-3)}$ or $0.657...\times10^{-5}$ or 0.00000657.. A1 for an answer in the range 6.57×10^{-6} to 6.58×10^{-6}

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
*17		Example: 4a+5b=1115 3a+2b=530 12a+15b=3345 12a+ 8b = 760 7b=1225 b=175 a=(1115 − 5×175)÷4 (= 60) OR 8a+10b=2230 15a+10b=2650 7a = 420 a=60 b=(1115 −4×60)÷5 (=175)	Small = 60 Large = 175	5	M1 for two correct equations expressed in terms of two variables M1 (dep) for correct process to eliminate either variable (condone one arithmetic error) A1 for 60 or 175 M1 (dep) for correct substitution of their found variable or M1 (indep) for correct process to eliminate the other variable (condone one arithmetic error) C1 (dep on M3) for a statement giving small = 60 **and** large = 175
*18			No with reason	4	M1 for $\frac{4}{3} \times \pi \times 2^3$ (=33.51...) M1 for 45 ÷ "volume" A1 for 1.3 – 1.4 C1 (dep on M1) for No and eg. 1.34 > 1.24 OR M1 for (volume =) 45 ÷ 1.24 (= 36.29...) oe M1 for (r^3 =) "36.29..."÷ ($\frac{4}{3} \times \pi$) oe A1 for 8.6 − 8.7 C1 (dep on M1) for No and eg. 8.6... > 8

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
19			proof	4	B1 for $\overrightarrow{AM}$ = 0.5**b** or $\overrightarrow{MC}$ = 0.5**b** or $\overrightarrow{BC}$ = **a** or $\overrightarrow{CX}$ = **a** or $\overrightarrow{BX}$ = 2**a** Note: This could be shown on the diagram or in a correct vector expression M1 for a correct relevant vector expression for $\overrightarrow{OM}$ or $\overrightarrow{MX}$ or $\overrightarrow{OX}$ eg $\overrightarrow{OM}$=$\overrightarrow{OA}$ + $\overrightarrow{AM}$ or $\overrightarrow{OX}$= **b** + 2**a** A1 for any two from $\left(\overrightarrow{OM}\right)$ = **a** + 0.5**b**, $\left(\overrightarrow{MX}\right)$ = **a** + 0.5**b** and $\left(\overrightarrow{OX}\right)$ = **b** + 2**a** B1 for a fully correct proof, eg." $\overrightarrow{OX}$ = 2$\overrightarrow{OM}$ so the vectors are parallel and have a common point *O* " OR (geometric proof) M1 for <OAM = <MCX or OA = CX and AM = CM A1 for <OAM = <MCX with reason (alternate angles) and OA = CX and AM = CM B1 for ΔOAM ≡ ΔXCM with reason, eg SAS B1 for correct proof, eg <AMO = <CMX with reason (vertically opposite angles)
20			15500 to 15600	3	B1 for 50.5 (accept 50.4$\dot{9}$) or 227.5 (accept 227.4$\dot{9}$) or 177.5 (accept 177.4$\dot{9}$) M1 for 0.5 × “227.5” × “177.5” ×sin“50.5” A1 for an answer in the range 15575 to 15580 from using three **correct** upper bounds
21			−4, 1	4	M1 for method to clear the fraction., eg $4 - 2x = x(x + 1)$ oe M1 for rearranging to the form $ax^2 + bx + c = 0$ condone one error M1 (dep on previous M1) for a method to solve their quadratic equation A1 for −4 and 1

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**
Q03		1.5cm grid	
Q04		No pictures	
Q07		model provided as well as diagram	
Q09		diagram size X2 10km and 20km changed to 20km and 40 km	
Q10		grid x 2 2cm squares	
Q12		2 cm grid Q13 On the diagram crosses at tower and tree changed to filled in circles	

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Mark Scheme (Results)

November 2014

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

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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.

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

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 × 25 (= 130) M1 for ($ADB =$) 130 ÷ 2 (=65) M1 for ($DAC =$) 180 – 65 – 80 A1 cao supported by working.
18	(a)	5 × 8 = 40 12.5 × 15 = 187.5 17.5 × 11 = 192.5 25 × 10 = 250 40 × 6 = 240 910 ÷ 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

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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**
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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Paper_5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
1.		12 | 3 5 9 13 | 0 3 3 5 7 8 14 | 7 7 8 9 15 | 0 1	3	B2 for a fully correct ordered diagram (B1 for correct unordered diagram or ordered with at most two errors) B1 for correct key eg 12 | 3 means 123 (cm)
2. (a)		2 different reasons	2	B1 for a reason relating to: Bias – due to gender or due to railway station location Size of sample too small B1 for one other reason
(b)		Question and response boxes	2	B1 for a suitable question with time period and units in question or response boxes B1 for at least 3 non-overlapping and exhaustive response boxes
3.		$\frac{x+x+5+2x}{3}$	2	M1 for intention to add x, $x + 5$, $2x$ or $4x + 5$ seen or ambiguous answer eg "$4x$+5"÷3 A1 for $\frac{x+x+5+2x}{3}$ oe

Paper_5MB1H_01				
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4. (a)		Frequency 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
(b)		$160 < h \leqslant 180$	1	B1 for $160 < h \leqslant 180$ (could be ft from diagram)
5. (a)		0.05	3	M1 for correct method using sum of probabilities = 1 eg $1 - 0.6 - 0.25$ (=0.15) or $0.6 + 0.25 + 2x + x = 1$ M1 (dep) for correct method to use P(blue) = 2 × (Green) Eg "0.15" ÷ 3 A1 cao
(b)		30	2	M1 for 0.6 × 50 oe A1 cao

Paper_5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
6.		15.42	4	M1 for method to find litres needed for either car A (eg 450÷10.3 (= 43.69)) or car B (eg 450÷14.6 = (30.82)) M1 for method to find cost of fuel for either car A (eg 1.39×43.69 (=60.73) or car B (eg 1.47×30.82 (=45.31)) M1 (dep M2) or method to find difference in fuel costs for car A and B A1 cao Or M1 for method to find cost per mile for car A (eg 1.39÷10.3 (=0.135) or for car B (eg 1.47÷14.6 (=0.101)) M1 for method to find total cost of fuel for either car A (eg 450×0.135 (=60.73)) or for car B (eg450×0.101 (=54.31)) M1 (dep M2) for method to find difference in fuel costs for car A and B A1 for £15.42 NB: Working throughout may be in £ or pence.
7.		28	5	M1 for method to find $\frac{1}{5}$ of children eg 60 ÷ 5 (=12) M1 for method to find number of boys or girls eg "12" × 2 (=24) or "12"×3 (=36) M1 for method to find total number going in the morning eg $\frac{3}{4} \times 60$ (= 45) M1 for complete method to find number of girls going in the morning eg 45 – (24 - 7) A1 cao
8.		0.7, 0.3 0.9, 0.1, 0.9, 0.1	2	B1 for 0.7, 0.3 in correct position B1 for 0.9, 0.1, 0.9, 0.1 in correct position

Paper_5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
9. (a)		Point at (47, 34)	1	B1 point plotted
(b)		Positive	1	Positive (correlation)
(c)		48 to 51 inclusive	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 35 or point marked at (n,35). A1 for given answer in the range 48 – 51
10.		1615.34	3	M1 for correct method to find value of investment after 1 year eg 1500×0.025 or 37.5 or 1500×1.025 or 1537.5 oe) M1 for a complete compound interest method to to find value of investment after 3 years eg 1500×1.025^3 A1 cao
*11		Justification	4	M1 for method to find total mileage eg 55 × 5 + 50 (= 325) M1 for method to find mean eg 325 ÷ 6 A1 for 54.1 – 54.2 C1 (dep on at least M1) for justification comparing means. OR M1 for method to find total mileage for Andy's mean 52.5 × 6 (= 315) M1 for method to find correct total mileage 55 × 5 + 50 (= 325) A1 for 315 and 325 C1 (dep on at least M1) for justification comparing correct totals

Paper_5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
12. (a)		40	1	B1 cao
(b)		22-24	3	M1 for reading graph up from 43 and across [36-38] A1 for 22 or 23 or 24
(c)		Correct box plot	3	B3 for fully correct box plot (allow ft for median from (a)) (B2 for at least 3 correct values plotted including box **and** tails **or** 5 correct values indicated) (B1 for at least 2 correct values plotted including box **or** tails **or** 3 or 4 correct values plotted) Min LQ Median UQ Max 17 32 “40” 46 50
13.		223	3	B1 for using 4.5, 4. 4$\dot{9}$, 0.0045 or 0.0044$\dot{9}$ M1 for 1000 or 1 kg divided by 4.5, 4. 4$\dot{9}$, 0.0045 or 0.0044$\dot{9}$ (=222.72) or 222 seen A1 cao
14. (a)		Correct explanation	1	B1 for groups in the sample are in the same proportion as they are in the population.
(b)		33	2	M1 for $\frac{494}{1786} \times 120$ oe A1 cao

Paper_5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
15.	(50,10) (10,50) (20,20) (20,50) (50,20)	$\frac{12}{30}$	4	M1 for method to identify all correct pairs eg sample space or tree diagram (may be implied by correct products) M1 for all correct products $\frac{1}{6}\times\frac{3}{5}, \frac{3}{6}\times\frac{1}{5}, \frac{2}{6}\times\frac{1}{5}, \frac{1}{6}\times\frac{2}{5}, \frac{2}{6}\times\frac{1}{5}$ M1 for finding sum of correct products $\frac{1}{6}\times\frac{3}{5}+\frac{3}{6}\times\frac{1}{5}+\frac{2}{6}\times\frac{1}{5}+\frac{1}{6}\times\frac{2}{5}+\frac{2}{6}\times\frac{1}{5}$ A1 for $\frac{12}{30}$ oe OR M1 for method to identify all correct pairs < 40p eg sample space or tree diagram (may be implied by correct products) M1 for all correct products $\frac{3}{6}\times\frac{2}{5}, \frac{3}{6}\times\frac{2}{5}, \frac{2}{6}\times\frac{3}{5}$ M1 for completing working $1-(\frac{3}{6}\times\frac{2}{5}+\frac{3}{6}\times\frac{2}{5}+\frac{2}{6}\times\frac{3}{5})$ A1 for $\frac{12}{30}$ oe

Paper_5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
16. (a)		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 1.2, 2.1, 2.2, 1.6, 0.4
(b)		38	2	M1 for $\frac{1}{3} \times 33 + 21 + 6$ A1 cao OR M1 for vertical line at m= 20 or showing one third of $15 < m \leqslant 30$ bar. A1 cao

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

PAPER: 5MB1H_01			
Question		**Modification**	**Notes**
1		Size x 1½. 4th horizontal line drawn in.	
4		Grid: 2 cm squares both axes, right axes labelled. Horizontal axis – heavier lines at 120, 140, 160, 180, and 200 Vertical axis heavier lines at 5, 10 and 15	
8		Braille (i) to (vi) given on diagram and candidates asked to write values for each.	
9		2 cm grid. Crosses changed to filled in circles. Right axis labelled	
12		Graph line changed – Curve goes through (15,1) (30, 15) (40, 30) (45, 45) (50, 60)	
	(c)	17 changed to 15 – will mean five points are 15, 30, 40, 45 and 50	
16		Table: 21 changed to 20 Top line 84 changed to 83 Grid: 2 cm	

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Mark Scheme (Results)

November 2014

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

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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

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PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		$7n - 2$	2	M1 for $7n + k$ where $k \neq -2$ or absent A1 cao
	(b)		31	2	M1 for correct substitution $4\times3^2 - 5$ oe A1 cao
2			108	5	M1 for a method for finding the dimensions eg length & width = 12 or 2 × length + width = 21 A1 for length = 9 (could be shown on diagram) A1 for width = 3 (could be shown on diagram) M1 for area = "9" × "3" × 4 A1 cao
3			50	3	M1 for 625 ÷ 250 (= 2.5) or 360 ÷ 120 (= 3) or 1000 ÷ 300 (=3⅓) M1 for correct method to calculate the number of cookies for one ingredient e.g. 625 ÷ 250 or 2.5 oe **and** 20 × "2.5" A1 cao OR M1 for multiples of 250 : 120 : 30 e.g. for 40 cookies 500, 240, 600 M1 for multiples linked with the weight of ingredients available e.g. (625, 2½) or (360, 3) or (1000. 3⅓) A1 cao

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4		x -2 -1 0 1 2 3 y -7 -5 -3 -1 1 3	correct line	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 correctly plotted) A1 for correct line between -2 and 3 **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $2x$-3 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 -2 and 3 **(Use of y=mx+c)** M2 line segment of $2x$-3 drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of 2 OR line drawn with a y intercept of -3 and a positive gradient) A1 for correct line between -2 and 3

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(i)		candles 3 holders 5	5	M1 for listing multiples of either 30 or 18 (at least 3 but condone errors if intention is clear) M1 for listing multiples of both 30 and 18 (at least 3 but condone errors if intention is clear) M1 (dep on M1) for division by 30 or 18 or counts up multiples (implied if one answer is correct or answers are reversed) A1 candles (packs) 3, holders (packs) 5 or any same multiple of 3,5 OR M1 expansion of either number in factors M1 demonstrates one of the expansions that includes 6 oe M1 demonstrates second expansion that includes 6 oe A1 candles (packs) 3, holders (packs) 5 or any same multiple of 3,5
	(ii)		90		B1 for 90 or ft on both their packs or ft "common multiple" NB: accept consistent multiples of the given answer
*6			NO figures and comparisons	5	M1 for 100 × 40 × 60 (= 240 000) M1 for "240 000" ÷ 8000 (= 30) M1 for "30"× 2.50 (= 75) A1 for 240 000 and 75 C1 (dep on M1) for comparing the cost of grit with £70 ft from their working OR M1 for 70 ÷ 2.50 (= 28) M1 for "28"× 8000 (= 224 000) M1 for 100 × 40 × 60 (= 240 000) A1 for 240 000 and 224 000 C1 (dep on M1) for comparing values of grit needed with that which can be bought for £70 ft from their working

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PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*7			broke the record	5	M1 conversion between km and miles M1 for a first step to find comparable figures M1 for a complete method to find comparable figures A1 for correct comparable figures C1 (dep on first 2 M marks) for statement e.g broke the record with comparison of their figures
8			$14\frac{2}{3}$	3	M1 for method to write fractions as improper fractions with one correct M1 (dep on M1) for multiplying numerators and denominators A1 cao SC: B2 for $\frac{220}{15}$ oe
9			(–3,–12,–1)	2	B2 cao B1 for two out of three coordinates correct
10	(a)		1	1	B1
	(b)		$\frac{1}{16}$	1	B1
	(c)		$2\sqrt{7}$	2	M1 for multiplying numerator and denominator by $\sqrt{7}$ A1 for $2\sqrt{7}$

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		$6x^5y^8$	2	M1 for any two of 6, x^5, y^8 A1 cao
	(b)		$6x^2-11x+3$	2	M1 for 3 out of 4 correct terms with correct signs, or all 4 terms correct ignoring signs A1 cao
	(c)		$4x^3y^2(2y^3-3x)$	2	M1 for $4x^3y^2$ (two terms involving x and/or y) or correct partial factorising taking out two from 4 or x or y A1 cao
	(d)		$(2+x)(e-2f)$	2	M1 for partial factorising of at least two terms eg $2(e-2f)$ or $x(e-2f)$ or $e(2+x)$ or $2f(2+x)$ oe A1 cao
12			$y=\frac{10}{3}x+\frac{130}{3}$	5	B1 for stating B as (0, 5) or $OB = 5$ (could be written on the diagram) B1 for C as (10, 0) or $OC = 10$ (could be written on the diagram) or A is (-10, 10) or ft from their BC M1 gradient of $DA = \frac{10}{3}$ or $y=\frac{10}{3}x+c$ M1 for substitution of $x = -13$, $y = 0$ or $x = -10$, $y = 10$ in their equation A1 $y=\frac{10}{3}x+\frac{130}{3}$ oe
13			$\frac{7x-6}{x(2-x)}$	3	M1 for intention to use $x(2-x)$ as the denominator M1 for $\frac{4x-3(2-x)}{x(2-x)}$ oe A1 cao allow $2x-x^2$ as a denominator

PAPER: 5MB2H_01					
Question		Working	Answer	Mark	Notes
*14			Proof	5	B1 for matching two lines of the same length with reasons B1 for matching two sides of the kite with reasons B1 for showing $AD = AB$ and $DC = CB$ with reasons C1 for "Tangents from an external point are equal in length." C1 for a complete proof

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PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
4		2 cm grid – inside spaces will be slightly less but equal Q5. Picture removed	
6		Model given – MLP also have diagram Wording inserted: The box is 100 cm long, 40 cm wide and 60 cm high	
11	(a)	x changed to e y changed to f	
	(d)	x changed to y	
14		AC joined with a dotted line	

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In Mathematics B (2MB01)
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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)

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**
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 (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)		$\frac{1}{30}$	1	B1 for $\frac{1}{30}$ oe
	(b)		$\frac{3}{10}$	2	M1 for method to sum the number of white chocolates in the bag, eg 4 + 4 + 1 (= 9), A1 for $\frac{3}{10}$ or $\frac{9}{30}$ oe
	(c)		0.48	2	M1 for 1− (0.35 + 0.17) oe A1 for 0.48 oe
2		x | x^3-x^2 3 | 18 3.1 | 20.(181) 3.2 | 22.(528) 3.3 | 25.(047) 3.4 | 27.(744) 3.5 | 30.(625) 3.6 | 33.(696) 3.7 | 36.(963) 3.8 | 40.(432) 3.9 | 44.(109) 4 | 48 3.45 | 29.1(61125) 3.46 | 29.4(50136) 3.47 | 29.7(41023) 3.48 | 30.0(33792) 3.49 | 30.3(28449)	3.5	4	B2 for a trial $3.4 \le x \le 3.5$ evaluated correctly (B1 for a trial evaluated correctly for $3 \le x \le 4$) B1 for a different trial evaluated correctly for $3.45 \le x < 3.5$ B1 (dep on at least one previous B1) for 3.5 [Note: Trials should be evaluated to at least accuracy shown in table, truncated or rounded] [NB No working scores 0 marks]

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)		4.58006(9567)	2	M1 for 1.83 or 8.381(527307) or 4.6 or 4.58 or 4.580 or 4.5801 A1 for 4.58006(9567)
	(b)		4.5801	1	B1 ft provided at least 5 decimal places in (a)
4			Enlargement	2	B2 for fully correct triangle (B1 for 2 vertices correct or enlargement scale factor 2 in the wrong position or enlargement, centre *A*, with a different scale factor)
*5		1155 ÷ 15 = 77 $x + 2x + x - 7 = 77$ $4x - 7 = 77$ $4x = 84$; $x = 21$ OR $15x + (15 \times 2x) + 15(x - 7) = 1155$ $60x - 105 = 1155$ $60x = 1260$ $x = 21$	Redlands 21 St Samuels 42 Francis Long 14	5	M1 for $2x$ or $x-7$ M1 for 1155 ÷ 15 (= 77) M1 (dep M2) for equation summing their three expressions to "77" A1 for 21, 42 and 14 C1 for fully correct answer with correct labels OR M1 for an expression for the cost of the pupils from Redlands M1 for expression for the cost of the pupils from either St Samuels or Francis Long M1 (dep M2) for equation summing their three expressions to 1155 A1 for 21, 42, and 14 C1 for fully correct answer with correct labels

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*6			Large box	4	M1 for a complete method to find the cost per sachet or the number of sachets per £1 for one size of box M1 for a complete method to find all three comparable figures A1 for 0.47(08. .), 0.46, 0.45 or 2.12(3...), 2.17(..), 2.22 (2..) oe C1(dep on M2) for a comparison of their answers leading to a correct deduction OR M1 for 3 multiples of each of 12, 20 and 35 or a common multiple of 12, 20 and 35, eg 420 or multipliers to compare the same number of sachets from each box, eg $\times\frac{35}{12}$ and $\times\frac{35}{20}$ M1 for a complete method to find three comparable costs A1 for three correct costs, eg 197.75 and 193.20 and 189.00 C1(dep on M2) for a comparison of their answers leading to a correct deduction
7	(a)		$7x + 35$	1	B1 cao
	(b)		$12y^2 - 9y$	1	B1 cao
	(c)	$t^2 + 2t + 4t + 8$	$t^2 + 6t + 8$	2	M1 for all 4 terms (and no additional terms) correct with or without signs or 3 out of no more than 4 terms correct with signs A1 for $t^2 + 6t + 8$
8			68 34 51	3	M1 for $153 \div (4 + 2 + 3)$ (=17) or for a correct method to scale up to at least 44:22:33 without error M1 (dep M1) for "17" × 4 or "17" × 2 or "17" × 3 or for a complete method to build up to 68:34:51 with at least two of these values correct A1 for 68, 34, 51 in any order (If M0,SC B2 for two correct lengths)

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)		Polygon drawn	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 point joined) NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted
	*(b)		Yes with reason	2	M1 for finding a quarter of 51 and for finding how many teachers sent more than 30 emails C1 for 12.75 or 13 compared to 15 and yes she is correct OR M1 for finding how many teachers sent more than 30 emails and '15'× 4 C1 for comparing 60 with 51 and yes she is correct OR M1 for 15 ÷ 51 (= 0.29...) or $\frac{15}{51}$ × 100 (= 29…%) C1 for comparing 0.29.. with $\frac{1}{4}$ or 0.25 OR 29….% with 25% and yes she is correct
10			Loci drawn	3	B1 for line parallel to *BC* and 3 cm from *BC* B1 for arc drawn, centre *C*, with radius 4 cm B1 ft for shading a region below their horizontal line **and** inside their arc

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*11			No supported by working	4	M1 for π × 7 (= 21.9 to 22) or π × 7 × 2.54 = (55.5 to 56) M1 (dep) for a complete method that could lead to two figures that are comparable eg π × 7 × 2.54; π × 7 and 50 ÷ 2.54 A1 for correct comparable figures eg 55.5 to 56 (cm); 21.9 to 22 (in) and 19.6 to 19.7 (in) C1 (dep M2) for a correct conclusion based on their comparable figures OR M1 for eg 50 ÷ π (= 15.9 to 15.92) or 50 ÷ 2.54π (=6.26 to 6.27) M1 (dep) for a complete method that could lead to two figures that are comparable eg (50 ÷ π) ÷ 2.54; 50 ÷ π and 7 × 2.54 A1 for correct comparable figures eg 6.26 to 6.27 (in); 15.9 to 15.92 (cm) and 17.7 to 17.8 (cm) C1 (dep M2) for a correct conclusion based on their comparable figures
12			$p = 8$, $q = 10$	3	M1 for finding the difference between the x or y coordinates eg 4 − 2 (= 2) or 17 − 5 (= 12) M1 for a complete method to find the value of p or the value of q A1 cao
13			245	2	M1 for method to identify the angle required, including on a diagram A1 cao
14		10 × 75 + 14 × 105 + 9 × 135 + 5 × 165 + 2 × 195 750 + 1470 + 1215 + 825 + 390 4650÷40	116.25	4	M1 for finding at least 4 products ft consistently within interval (including end points) M1 (dep) for use of at least 4 correct midpoints. M1 (dep on 1st M) for 'Σft' ÷ 40 A1 for 116.25

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)		0.000064	1	B1 for 0.000064 or $\frac{1}{15625}$ or 6.4×10^{-5} oe
	(b)		4.2875×10^{7}	2	B2 cao (B1 for digits 42875 or 4.3×10^{7} or 4.29×10^{7} or 4.288×10^{7})
16		Volume of A = $\frac{140}{0.7}$ = 200 Volume of B = $\frac{128}{1.6}$ = 80 Mass of C = 140+128 = 268 Density of C = $\frac{268}{280}$	0.957	4	M1 for finding the volume of either liquid A or B or the mass of liquid C M1 for a complete method to find the volume AND mass of liquid C M1 (dep M2) for "total mass" ÷ " total volume" A1 for 0.957 to 0.96
17		Gradient of N = 3 Gradient of perpendicular to line N = $-\frac{1}{3}$	$y=-\frac{1}{3}x+1$	3	M1 for complete method to find gradient of line N or for drawing a perpendicular line M1 for method to find the gradient of a perpendicular line A1 $y=-\frac{1}{3}x+1$ oe

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		Diagram type	1	B1 for box plot or box and whisker or cumulative frequency
	*(b)		Comparison given	2	C1 for a correct comparison of medians C1 for a correct comparison of a measure of spread with correct figures NB for the award of both marks at least one of the comparisons must be in context
19		BC = $\frac{12}{\tan 60}$ = 6.92(8…) DE = 6.92(…) × tan 30 = 4 CE = 12 + 4 AC = $\frac{12}{sin60}$ = 13.8(5…) CE = $\frac{13.8(5\ldots)}{cos30}$	16 with supporting working	4	M1 for a method to find BC or AC or AD B1 for angle EAD = 30˚ or AED = 60° or ACD = 30˚ or CAD = 60° M1 for a method to find CE A1 for 15.9-16.1 with supporting working

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20			Shown	3	M1 for correct expansion of $(n+3)^2$ or $(n-3)^2$ eg $(n+3)^2 = n^2+6n+9$ or $(n-3)^2 = n^2-6n+9$ M1 for correct expansion of complete expression, eg $(n^2+6n+9) - (n^2-6n+9)$ A1 for $12n$ and conclusion OR M1 for $[n+3+n-3][n+3-(n-3)]$ M1 for $2n \times 6$ A1 for conclusion
21		$3^2 \times 180$	1620	2	M1 for using a scale factor of 3^2 (= 9) A1 cao
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)
23			22.5	3	M1 for $\frac{1}{2} \times 7 \times 5 \times \sin 40$ or $\frac{1}{2} \times 7 \times 5 \times \sin(180 - 40)$ M1 (dep M1) for doubling the area of the triangle A1 for 22.4 – 22.5 OR M1 for complete method to find height of parallelogram, eg $5 \sin 40°$ M1 (dep M1) for complete method to find the area of the parallelogram, eg $7 \times 5\sin 40°$ A1 for 22.4 – 22.5

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PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
24		$\frac{232.5}{202.5} \times 60$	68.9	4	M1 for 232.5 or 237.5 or 197.5(=3.29… hours) or 202.5 (= 3.375 hours) M1 for correct conversion of "upper bound of time" from minutes to hours, (202.5 to 205) ÷ 60 M1 for "lower bound of distance" ÷ "upper bound of time" (230 to 232.5) ÷ (3.375 to 3.41(6…)) A1 for 68.8 to 69 from correct working OR M1 for 232.5 or 237.5 or 197.5(=3.29… hours) or 202.5 (= 3.375 hours) M1 for "lower bound of distance" ÷ "upper bound of time" (230 to 232.5) ÷ (202.5 to 205) M1 for correct conversion of "lower bound of speed" from miles per minute to miles per hour, ((1.12(1...) to 1.14(8...)) × 60 A1 for 68.8 to 69 from correct working
25		$\frac{-4 \pm \sqrt{4^2 - 4 \times 3 \times -12}}{2 \times 3}$	1.44 and −2.77	3	M1 for substitution of $a = 3$, $b = 4$, $c = -12$ into the formula (condone one sign error) or for completing the square M1 for $\frac{-4 \pm \sqrt{160}}{6}$ or in simplified form A1 for answers in the ranges 1.43 to1.45 and −2.76 to −2.78

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
26	(a)		(4), 9, 8, 10, 12	2	M1 for correct calculation to find one frequency e.g. 0.9×10 or 1.6×5 or 1×10 or 0.8×15 or for one frequency correct or shows that 1 $cm^2 = 1$ A1 for all frequencies correct
	(b)		$\frac{8}{43}$	2	M1 for 8 (people) or $\frac{2}{3}$ of "12" A1ft for 8 out of 43 stated as a percentage or fraction or decimal
	(c)		26000	2	M1 ft for finding the interval in which the "21.5th" or "22nd" value lies or 26 or 25.5 A1 for 26000 or 25500
27		$\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$ $= \mathbf{a} + \mathbf{b}$ $\overrightarrow{AC} = \frac{7}{2}\overrightarrow{AB}$ $\overrightarrow{OC} = \overrightarrow{OA} + \overrightarrow{AC}$ $= 2\mathbf{a} + \mathbf{b} + \frac{7}{2}(\mathbf{a} + \mathbf{b})$	$\frac{11}{2}\mathbf{a} + \frac{9}{2}\mathbf{b}$	4	M1 for $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$ $(= -(2\mathbf{a} + \mathbf{b}) + (3\boldsymbol{a} + 2\boldsymbol{b}))$ or $\mathbf{a} + \mathbf{b}$ M1 for $\overrightarrow{AC} = \frac{7}{2}\overrightarrow{AB}$ or $\overrightarrow{BC} = \frac{5}{2}\overrightarrow{AB}$, may be in terms of **a** and **b** M1 (dep M2) for complete method to find $\overrightarrow{OC}$ in terms of **a** and **b** A1 for $\frac{11}{2}\mathbf{a} + \frac{9}{2}\mathbf{b}$ or equivalent simplest form (SCB2 for $\frac{11}{2}\mathbf{a} + \frac{23}{2}\mathbf{b}$ or $\frac{11}{2}\mathbf{a} + \frac{19}{2}\mathbf{b}$)

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
28	(a)		Circle drawn	2	B2 fully correct circle drawn (B1 for circle drawn with centre (0,0) or circle drawn with radius 4) OR M1 at least 5 correct points calculated and plotted A1 fully correct circle drawn
	(b)		$x = 1.4$, $y = 3.8$ $x = -2.2$, $y = -3.4$	3	M1 for $y = 2x + 1$ drawn or for elimination of one variable A1 for one correct pair of values given or for $x = 1.4, -2.2$ (± 0.2) or ft from graph provided 2 marks in (a) A1 for second correct pair of values given (±0.2) or ft from graph provided 2 marks in (a)

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PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q4		Grid is enlarged. 2 rows at the top and 2 columns on the right are removed. The enlargement is drawn on the diagram and the question is reversed. 'Describe fully the single transformation that maps shape P onto shape Q.'	B2 for enlargement, scale factor 2, centre A (B1 for enlargement, or scale factor 2)

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PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q6		Diagrams removed.	M1 for a complete method to find the cost per sachet or the number of sachets per £1 for one size of box M1 for a complete method to find all three comparable figures A1 for 0.47(08. .), 0.46, 0.45 or 2.12(3...), 2.17(..), 2.22 (2..) oe C1(dep on M2) for a comparison of their answers leading to a correct deduction **OR** M1 for 3 multiples of each of 12, 20 and 35 or a common multiple of 12, 20 and 35, eg 420 or multipliers to compare the same number of sachets from each box, eg $\times\frac{35}{12}$ and $\times\frac{35}{20}$ M1 for a complete method to find three comparable costs A1 for three correct costs, eg 197.75 and 193.20 and 189.00 C1(dep on M2) for a comparison of their answers leading to a correct deduction
Q7	(a)	MLP only: x changed to p.	B1 cao

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q9	(a)	In text 51 is changed to 55. Frequencies changed to : 5, 20, 15, 10, 5. Grid is simplified and enlarged. Both axes – 3cm grid with an intermediate line. Label for horizontal axis left aligned. Label for vertical axis placed above the axis.	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 point joined) NB Ignore any histogram drawn and any part of frequency polygon outside range of first and last points plotted
Q9	(b)	In text 51 is changed to 55. Frequencies changed to : 5, 20, 15, 10, 5. Grid is simplified and enlarged. Both axes – 3cm grid with an intermediate line. Label for horizontal axis left aligned. Label for vertical axis placed above the axis.	M1 for finding a quarter of 55 and for finding how many teachers sent more than 30 emails C1 for 13.75 or 14 compared to 15 and yes she is correct **OR** M1 for finding how many teachers sent more than 30 emails and '15'× 4 C1 for comparing 60 with 55 and yes she is correct **OR** M1 for 15 ÷ 55 (= 0.27...) or $\frac{15}{55} \times 100$ (= 27…%) C1 for comparing 0.27.. with $\frac{1}{4}$ or 0.25 OR 27….% with 25% and yes she is correct
Q10		Rectangle has been widened so that AD and BC are 12 cm. In text, 8 metres has been changed to 10 metres.	B1 for line parallel to *BC* and 3 cm from *BC* B1 for arc drawn, centre *C*, with radius 5 cm B1 ft for shading a region below their horizontal line **and** inside their arc

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PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q11		Diagram is enlarged.	M1 for $\pi \times 7$ (= 21.9 to 22) or $\pi \times 7 \times 2.54$ = (55.5 to 56) M1 (dep) for a complete method that could lead to two figures that are comparable eg $\pi \times 7 \times 2.54$; $\pi \times 7$ and $50 \div 2.54$ A1 for correct comparable figures eg 55.5 to 56 (cm); 21.9 to 22 (in) and 19.6 to 19.7 (in) C1 (dep M2) for a correct conclusion based on their comparable figures **OR** M1 for eg $50 \div \pi$ (= 15.9 to 15.92) or $50 \div 2.54\pi$ (=6.26 to 6.27) M1 (dep) for a complete method that could lead to two figures that are comparable eg $(50 \div \pi) \div 2.54$; $50 \div \pi$ and 7×2.54 A1 for correct comparable figures eg 6.26 to 6.27 (in); 15.9 to 15.92 (cm) and 17.7 to 17.8 (cm) C1 (dep M2) for a correct conclusion based on their comparable figures
Q14		Frequency column has been widened to allow for working.	M1 for finding at least 4 products *ft* consistently within interval (including end points) M1 (dep) for use of at least 4 correct midpoints. M1 (dep on 1st M) for 'Σft' $\div$ 40 A1 for 116.25
Q17		Diagram is enlarged.	M1 for complete method to find gradient of line N or for drawing a perpendicular line M1 for method to find the gradient of a perpendicular line A1 $y = -\frac{1}{3}x + 1$ oe
Q19		Diagram is enlarged. Angle arc put inside the angle size.	M1 for a method to find BC or AC or AD B1 for angle EAD = 30° or AED = 60° or ACD = 30° or CAD = 60° M1 for a method to find CE A1 for 15.9-16.1 with supporting working

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q23		Diagram is enlarged. Angle arc put inside the angle size.	M1 for $\frac{1}{2} \times 7 \times 5 \times \sin 40$ or $\frac{1}{2} \times 7 \times 5 \times \sin(180 - 40)$ M1 (dep M1) for doubling the area of the triangle A1 for 22.4 – 22.5 **OR** M1 for complete method to find height of parallelogram, eg 5 sin40° M1 (dep M1) for complete method to find the area of the parallelogram, eg 7 × 5sin40° A1 for 22.4 – 22.5
Q26	(a)	Braille only: (i) to(iv) put in the spaces in the frequency table. Diagram enlarged. Label for horizontal axis left aligned. Label for vertical axis placed above the axis. Top row of grid removed.	M1 for correct calculation to find one frequency e.g. 0.9 × 10 or 1.6 × 5 or 1 × 10 or 0.8 × 15 or for one frequency correct or shows that 1 cm^2 = 1 A1 for all frequencies correct
Q26	(b)	Diagram enlarged. Label for horizontal axis left aligned. Label for vertical axis placed above the axis. Top row of grid removed.	M1 for 8 (people) or $\frac{2}{3}$ of "12" A1ft for 8 out of 43 stated as a percentage or fraction or decimal
Q26	(c)	Diagram enlarged. Label for horizontal axis left aligned. Label for vertical axis placed above the axis. Top row of grid removed.	M1 ft for finding the interval in which the "21.5th" or "22nd" value lies or 26 or 25.5 A1 for 26000 or 25500

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q27		Diagram enlarged. Lowercase vectors are increased further in size for emphasis.	M1 for $\overrightarrow{AB} = \overrightarrow{AO} + \overrightarrow{OB}$ $(= -(2\mathbf{a} + \mathbf{b}) + (3\boldsymbol{a} + 2\boldsymbol{b}))$ or $\mathbf{a} + \mathbf{b}$ M1 for $\overrightarrow{AC} = \frac{7}{2}\overrightarrow{AB}$ or $\overrightarrow{BC} = \frac{5}{2}\overrightarrow{AB}$, may be in terms of **a** and **b** M1 (dep M2) for complete method to find $\overrightarrow{OC}$ in terms of **a** and **b** A1 for $\frac{11}{2}\mathbf{a} + \frac{9}{2}\mathbf{b}$ or equivalent simplest form (SCB2 for $\frac{11}{2}\mathbf{a} + \frac{23}{2}\mathbf{b}$ or $\frac{11}{2}\mathbf{a} + \frac{19}{2}\mathbf{b}$)
Q28	(a)	Grid enlarged and simplified.	B2 fully correct circle drawn (B1 for circle drawn with centre (0,0) or circle drawn with radius 4) **OR** M1 at least 5 correct points calculated and plotted A1 fully correct circle drawn
Q28	(b)	Grid enlarged and simplified.	M1 for $y = 2x + 1$ drawn or for elimination of one variable A1 for one correct pair of values given or for $x = 1.4, -2.2$ (± 0.2) or ft from graph provided 2 marks in (a) A1 for second correct pair of values given (±0.2) or ft from graph provided 2 marks in (a)

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Mark Scheme (Results)

Summer 2015

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)

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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5MB3H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
1		71.40	2	M1 for 41.65÷7 A1 for 71.4(0)
2		4	3	M1 $\frac{4.5}{100} \times 300$ (=13.5) or $\frac{104.5}{100} \times 300$ (=313.5) oe M1 50 ÷ "13.5" (=3.7) or at least 3 repeated addition of "13.5" A1 cao SC B1 for $1.045^n \times 300$

5MB3H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
3 (a)		1.75	2	M1 for intention to multiply brackets or for intention to divide all terms by 4 as the first step A1 for 1.75 oe
(b)		p > 7.5	2	M1 for correct method to isolate *p* or intention to divide all terms by 2 as the first step (condone the use of '=' in method) A1 for *p* > 7.5 oe
(c)		3, -5	3	M2 for $(x-3)(x+5)$ (M1 for $(x \pm 3)(x \pm 5)$) A1 cao 3 and –5 OR M1 for $\frac{-2 \pm \sqrt{2^2 - 4\times1\times-15}}{2\times1}$ M1 for $\frac{-2 \pm \sqrt{64}}{2}$ A1 for 3 and – 5 cao

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5MB3H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
*4		275g (£7.95) pack with reason	4	M1 for one of 439 ÷ 150 (= 2.92), 639 ÷ 200 (= 3.19), 795 ÷ 275 (= 2.89) OR one of 150 ÷ 439 (= 0.341), 200 ÷ 639 (= 0.31), 275 ÷ 795 (= 0.345) OR any other calculation that could lead to a comparative figure M1 for calculations that could lead to comparative figures for 2 jars M1 for calculations that could lead to comparative figures for 3 jars eg all 3 from the above lists C1 for correct comparative figures for all 3 jars leading to a correctly stated comparison: 275g best value
5 (a)		7, -2, -1	2	B2 for all three correct values 7, -2, -1 (B1 for two correct values 7, -2 or -1)
(b)		Correct curve	2	B2 for fully correct curve (B1 ft for at least 5 points plotted correctly)
6		6	4	M1 for $7x + 22$ or $(5x+2)$ or $7b + 22p$ or $5b + 2p$ M1 for forming equation $7x + 22 = 2(5x + 2)$ M1 for correct intent to isolate x on one side A1 cao

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5MB3H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
7		28	3	M1 for 240 × 1.2 (=288) M1 for "288" ÷ 10 (=28.8) A1 cao OR M1 for 10 ÷ 1.2 (=8.33) M1 240 ÷ "8.33" (=28.8) A1 cao
8		Correct position marked	3	M1 for perpendicular bisector of the line AC M1 for arc of circle centre D radius 7cm A1 for correct point
*9		No with comparison of correct figures.	3	M1 for correct method to find frame dimensions 15+5+5 (=25) and 10+5+5 (=20) M1 for finding relationship between length and width for both eg 15 ÷ 10 (=1.5) and 25 ÷ 20 (= 1.25) or for correct use of a scale factor to find a comparable length C1 for correct conclusion following comparison of 2 correct comparable figures
10		Rotation, 90° clockwise centre (1,4)	3	B1 for rotation B1 for 90° clockwise or 270° anticlockwise B1 for (1,4) NB Award B0 if more than one transformation given

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5MB3H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
11		3.4	3	M1 for $\pi \times 3.5^2 \times 10$ (=384.85 or =122.5π) or $\pi \times 6^2$ (=113.1 or =36π) M1 (dep) for "384.85" ÷ "113.1" or 122.5(π) ÷ 36(π) A1 for 3.4 – 3.5 OR M1 for $\left(\frac{12}{7}\right)^2$ (=2.9) or $\left(\frac{7}{12}\right)^2$ (=0.34) M1 for 10 ÷ "$\left(\frac{12}{7}\right)^2$" or 10 × "$\left(\frac{7}{12}\right)^2$" A1 for 3.4 – 3.5
12		7.5×10^9	2	M1 for 2.1×10^7 or 21000000 or sight of figures 75 A1 for 7.5×10^9
13		29.6	4	M1 for $8^2 + 5^2$ or 64 + 25 or 89 M1 (dep) $\sqrt{"8^2"+"5^2"}$ (=9.4) M1 for "9.4..." × π A1 for 29.5 – 29.65
*14		49	3	M1 for 180 - 56 - 75 A1 for 49 C1 for alternate segment theorem and angles on a straight line add up to 180° OR alternate segment theorem and angles in a triangle add up to 180° Appropriate to methods shown

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5MB3H/01 June 2015				
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
16	$y(x+5) = 3x$ $yx+5y = 3x$ $5y = 3x - yx$ $5y = x(3 - y)$	$x = \frac{5y}{3-y}$	3	M1 for intention to multiply by $x + 5$ M1 for intention to isolate yx and $3x$ on one side to get $3x - xy$ oe A1 for $x = \frac{5y}{3-y}$ or $\frac{-5y}{y-3}$
17		85.6	4	M1 for 360 ÷ 5 (=72) M1 (dep) for $\frac{1}{2} \times 6^2 \times \sin 72$ (=17.12) M1 for completing full method to find total area of pentagon A1 for 85.5 − 85.6 OR M1 for 360 ÷ 10 (=36) or $\frac{1}{2}$(180 − 360÷5) (=54) M1(dep) for eg $6 \times \sin 36 \times 6 \times \cos 36$ (=17.12) or $\frac{1}{2} \times 6 \times \sin 54 \times 6 \times \cos 54$ (=8.55) M1 for completing full method to find total area of pentagon A1 for 85.5 − 85.6

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5MB3H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
18		$y = \frac{375}{x^2}$	3	M1 for $y \propto \frac{1}{x^2}$ or $y = \frac{k}{x^2}$ or $k = yx^2$ M1 for $5^2 \times 15$ (=375) A1 for $y = \frac{375}{x^2}$ or $y = \frac{k}{x^2}$ and $k = 375$
19		300	3	B1 for 45 or 0.15 M1 for 45 ÷ 0.15 A1 for 300 cao
20 (a)		$p = 4$, $q = -10$	3	M1 for sight of $(x - 4)^2$ or $p = 4$ M1 for $(x - 4)^2 - 16 + 6$ A1 for $p = 4$, $q = -10$ OR M1 for $x^2 - 2px + p^2 + q$ or $-2p = -8$ or $p^2 + q = 6$ M1 for $-2p = -8$ and $p^2 + q = 6$ A1 for $p = 4$, $q = -10$
(b)		(4, -10)	1	B1 ft
21 (a)		Correct graph	2	M1 for any translation along x axis A1 correct position
(b)		$y = -g(x)$	1	B1 for $y = -g(x)$ oe from correct interpretation of diagram

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5MB3H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
22		6.2	5	M1 for a method to find an angle *RAB* = 70, *ABR* = 50, *BRA* = 60 or *TAR* = 20 M1 for substitution into sine formula $\frac{AR}{\sin"50"} = \frac{12}{\sin"60"}$ M1 for use of sine rule to find *AR*, *AR* = $\frac{12}{\sin"60"} \times \sin"50"$ (=10.61) M1 for substitution into cosine formula $TR^2 = 5^2 + "10.61"^2 - 2 \times 5 \times "10.61" \times \cos 20$ (=37.92) A1 for 6.15 - 6.2
23		$\frac{3}{4}(\mathbf{b} + \mathbf{a})$	4	B1 for $\mathbf{b} - \mathbf{a}$ or $\frac{1}{2}(\mathbf{b} - \mathbf{a})$ or $\mathbf{a} - \mathbf{b}$ or $\frac{1}{2}(\mathbf{a} - \mathbf{b})$ M1 for $\overrightarrow{OM} = \mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a})$ or $\mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b})$ oe M1 for $\overrightarrow{ON} = \frac{3}{2}(\mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a}))$ or $\frac{3}{2}(\mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b}))$ A1 for $\frac{3}{4}(\mathbf{b} + \mathbf{a})$ oe (simplified)

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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**
Q4		Diagrams have been removed.	M1 for one of 439 ÷ 150 (= 2.92), 639 ÷ 200 (= 3.19), 795 ÷ 275 (= 2.89) OR one of 150 ÷ 439 (= 0.341), 200 ÷ 639 (= 0.31), 275 ÷ 795 (= 0.345) OR any other calculation that could lead to a comparative figure M1 for calculations that could lead to comparative figures for 2 jars M1 for calculations that could lead to comparative figures for 3 jars eg all 3 from the above lists C1 for correct comparative figures for all 3 jars leading to a correctly stated comparison: 275g best value
Q5	(a)	Wording added: 'There are three spaces to fill.' Table produced in vertical format.	B2 for all three correct values 7, -2, -1 (B1 for two correct values 7, -2 or -1)
Q5	(b)	1½ cm grid provided.	B2 for fully correct curve (B1 ft for at least 5 points plotted correctly)

PMT

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q8		Size of diagram kept as original. Scale put on diagram as well as in text.	M1 for perpendicular bisector of the line AC M1 for arc of circle centre D radius 7cm A1 for correct point
Q9		Diagram has been enlarged. Dotty shading. Measurement labels moved to be more accessible for candidates.	M1 for correct method to find frame dimensions 15+5+5 (=25) and 10+5+5 (=20) M1 for finding relationship between length and width for both eg 15 ÷ 10 (=1.5) and 25 ÷ 20 (= 1.25) or for correct use of a scale factor to find a comparable length C1 for correct conclusion following comparison of 2 correct comparable figures
Q10		The grid has been enlarged. Shapes are labelled triangle A and triangle B. Wording added: 'It shows two triangles on the grid, triangle A and triangle B.' Dotty shading	B1 for rotation B1 for 90° clockwise or 270° anticlockwise B1 for (1,4) NB Award B0 if more than one transformation given

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q11		The diagram has been enlarged. 2 models provided for all candidates. A diagram is also provided for MLP.	M1 for $\pi \times 3.5^2 \times 10$ (=384.85 or =122.5π) or $\pi \times 6^2$ (=113.1 or =36π) M1 (dep) for "384.85" ÷ "113.1" or 122.5(π) ÷ 36(π) A1 for 3.4 – 3.5 OR M1 for $\left(\frac{12}{7}\right)^2$ (=2.9) or $\left(\frac{7}{12}\right)^2$ (=0.34) M1 for 10 ÷ "$\left(\frac{12}{7}\right)^2$" or 10 × "$\left(\frac{7}{12}\right)^2$" A1 for 3.4 – 3.5
Q13		The diagram has been enlarged.	M1 for $8^2 + 5^2$ or 64 + 25 or 89 M1 (dep) $\sqrt{"8^2"+"5^2"}$ (=9.4) M1 for "9.4..." × π A1 for 29.5 – 29.65
Q14		The diagram has been enlarged. Wording added: 'Angle CAB is marked x'.	M1 for 180 - 56 - 75 A1 for 49 C1 for alternate segment theorem and angles on a straight line add up to 180° OR alternate segment theorem and angles in a triangle add up to 180° Appropriate to methods shown

PMT

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q16		MLP: *x* changed to *e*. *y* changed to *f*.	M1 for intention to multiply by $e + 5$ M1 for intention to isolate yx and $3x$ on one side to get $3e - ef$ oe A1 for $x = \frac{5f}{3-f}$ or $\frac{-5f}{f-3}$
Q17		The diagram has been enlarged.	M1 for $360 \div 5$ (=72) M1 (dep) for $\frac{1}{2} \times 6^2 \times$ sin"72" (=17.12) M1 for completing full method to find total area of pentagon A1 for 85.5 − 85.6 OR M1 for $360 \div 10$ (=36) or $\frac{1}{2}(180 - 360 \div 5)$ (=54) M1(dep) for eg 6 × sin"36" × 6 × cos"36" (=17.12) or $\frac{1}{2}$ 6 × sin"54" × 6 × cos"54" (=8.55) M1 for completing full method to find total area of pentagon A1 for 85.5 − 85.6
Q19		MLP and braille: a changed to x. b changed to f.	B1 for 45 or 0.15 M1 for $45 \div 0.15$ A1 for 300 cao

PMT

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q21	(a)	The grid has been enlarged.	M1 for any translation along x axis A1 correct position
Q21	(b)	The grid has been enlarged.	B1 for $y = -g(x)$ oe from correct interpretation of diagram
Q22		The diagram has been enlarged. TR is joined by a dashed line.	M1 for a method to find an angle, $RAB = 70$, $ABR = 50$, $BRA = 60$ or $TAR = 20$ M1 for substitution into sine formula $\frac{AR}{\sin"50"} = \frac{12}{\sin"60"}$ M1 for use of sine rule to find AR, $AR = \frac{12}{\sin"60"} \times \sin"50"$ (=10.61) M1 for substitution into cosine formula $TR^2 = 5^2 + "10.61"^2 - 2 \times 5 \times "10.61" \times \cos 20$ (=37.92) A1 for 6.15 - 6.2
Q23		The diagram has been enlarged. OM is joined by a dashed line.	B1 for $\mathbf{b} - \mathbf{a}$ or $\frac{1}{2}(\mathbf{b} - \mathbf{a})$ or $\mathbf{a} - \mathbf{b}$ or $\frac{1}{2}(\mathbf{a} - \mathbf{b})$ M1 for $\overrightarrow{OM} = \mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a})$ or $\mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b})$ oe M1 for $\overrightarrow{ON} = \frac{3}{2}(\mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a}))$ or $\frac{3}{2}(\mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b}))$ A1 for $\frac{3}{4}(\mathbf{b} + \mathbf{a})$ oe (simplified)

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Mark Scheme (Results)

November 2015

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

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The strands are as follows:

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

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The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

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

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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 (embedded answers).

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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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PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		2 3 5 8 9 3 2 5 7 8 9 4 1 2 4 5 1 6 1 3	Stem and leaf with key	3	B2 for a fully correct ordered stem and leaf (B1 for a correct unordered stem and leaf or for an ordered stem and leaf with at most 1 error or omission) B1 (indep) for a correct key (units not required)
2	(a)		Point plotted	1	B1 cao
	(b)		positive	1	B1 cao
	(c)		18 - 22	2	M1 for a single line segment with a positive gradient that could be used as a line of best fit or a vertical line from 10 or a point plotted at (10, y) where y is in the range 18 - 22 A1 18 - 22
	(d)		45	1	B1 cao
3			32 64 29	4	M1 for $2y$ or $y - 3$ M1 for adding their three expressions and setting equal to 125 M1 for correct method to solve $ay + b = 125$ A1 Ali 32, Bhavara 64 and Ceris 29
4			49	3	M1 for converting calculations to common units (either system is acceptable) M1 for dividing their total capacity by the refuelling rate A1 48.9 - 49.1

PAPER: 1MA0_2H					
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
6			40 000	2	M1 for 100 × 100 isolated or 4 × 100 × 100 A1 cao
*7			No not enough	5	M1 for substituting into Pythagoras' theorem M1 for complete correct use of Pythagoras' theorem M1 for a complete method to find the perimeter of their trapezium A1 51.(20655..) C1 (dep on correct first 2 M marks) for correct conclusion dependent upon supporting calculations
*8			125m*l*	4	M1 for a complete method to find the cost per m*l* or the number of m*l* per £1 for one tube or for a method that results in at least 2 values that can be used to compare 2 tubes M1 for a complete method to find all three equivalent figures A1 3 correct figures suitable for comparison C1(dep on M2) for stating the correct tube size from their calculations

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9			Correct line drawn	2	M1 for two pairs of relevant arcs drawn A1 correct line drawn (with arcs) SC B1 Correct line no arcs visible
10	(a)	9×6	54	2	M1 for a method to find the speed e.g 9 ÷ 10, 9 ÷ 0.16 A1 cao
	(b)		Graph completed	3	B1 horizontal line from (30,21) to (45,21) M1 for a complete method to show the return journey is 30 mins or ½ hour evidenced by the line on the graph or by calculation A1 Correct line drawn from Luscoe (x,21) to (x + 30,0)
11	(a)		±7	2	M1 for intent to divide both sides by 3 as a first step or answer of 7 or -7 A1 ±7
	(b)		0.125 or $\frac{1}{8}$	1	B1 cao
	(c)		$27x^6$	2	M1 for either 27 or x^6 in a two term product A1 cao
	(d)		$p = \frac{w + 16}{4}$	2	M1 for ÷ 4 throughout or adding 16 to both sides as a first step A1 $p = \frac{w+16}{4}$ oe

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PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12			Rotation about (2,1) through 180˚	3	B1 rotation B1 about (2,1) B1 through 180˚ Or B2 enlargement scale factor −1 B1 about (2,1) Note Award no marks if more than one transformation is given .
13	(a)		5 and 6	2	M1 for evidence that (x =) 4, 5, 6 or evidence that (y =) 5,6,7, 8 A1 cao
	(b)		Region identified	4	M1 for two of the lines $y = -1$,$y = 3x - 1$ and $y = 4 - x$ drawn M1 for three of the lines $y = -1$, $y = 3x - 1$ and $y = 4 - x$ drawn M1 any correct shading(in or out) satisfying at least two of the inequalities where the shading must extend from the appropriate line A1 Fully correct region shown by either shading in, shading out or the use of R Accept lines that are solid or dashed
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
16	(a)		6.4×10^8	1	B1 cao
	(b)		5×10^2	2	M1 for $3 \div 6 \times 10^{7-4}$ or 0.5×10^3 or 500 or 30 000 000÷60 000 A1 cao
17			$y = 3x-5$	3	M1 for recognition that the gradient of $\mathbf{L_2}$ is 3 M1 for substitution of x=3 and y=4 into y= "m"x+c A1 $y = 3x-5$ oe (SC B2 for '$3x-5$ ' or $L_2 = 3x-5$)
18	(a)		37	1	B1 cao
	(b)		36	2	M1 for identifying LQ and UQ e.g 35 – 71 A1 cao
	*(c)			2	C1 for a correct comparison of medians ft (a) C1 for a correct comparison of a measure of spread with correct figures ft (b) For the award of both marks at least one of the comparisons must be interpretative

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
19	(a)		4.25	1	B1 cao
	(b)		7.20-7.21	3	B1 4.35 or 0.35 M1 for $4.35+\frac{1}{0.35}$ A1 7.2(0)-7.21 or $\frac{1009}{140}$ from a correct method seen
20		$\pi 2^2\times 2=8\pi$ $\pi 2^2\times\frac{20}{360}\times 3+\pi 2^2\times\frac{340}{360}\times 2$ $8\pi : \frac{74}{9}\pi$: 72 : 74 Or $\frac{20}{360}\times 3+\frac{340}{360}\times 2=\frac{37}{18}$ 2: $\frac{37}{18}$ 36:37	36:37	4	M1 method to find relative cost of design A e.g. $\pi 2^2$, $k\times\pi 2^2$ M1 for a complete method to find the relative cost of the watch face for design B e.g. $\pi 2^2\times\frac{20}{360}\times\frac{3}{5}+\pi 2^2\times\frac{340}{360}\times\frac{2}{5}$ M1 (dep on M1, M1) for the cost of design A: cost of design B A1 cao Or M1 for method to find fraction of the sectors in design B $\frac{20}{360}, \frac{340}{360}$ M1 for complete method to find the relative cost of the watch face for design B M1 (dep on M1,M1) for the cost of design A: cost of design B A1 cao

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
21			9 or 10	2	M1 for 35÷148×40 A1 9 or 10
22			$2x^2 + 7x + 4 = 0$	3	M1 for finding a correct coefficient M1 for a method to find a and c or b and c A1 $2x^2 + 7x + 4 = 0$ or $a = 2$, $b = 7$, $c = 4$
23	(a)		Graph drawn	2	B2 correct graph drawn (B1 for a graph translated up/down)
	(b)		Graph drawn	2	B2 for correct graph drawn (B1 for a graph reflected in the x axis or stretched by sf 2 parallel to the y axis)
24			31.1	5	M1 for $\frac{1}{2} \times 8.4 \times x \times \sin 40 = 100$ M1 for 100÷(0.5×8.4×sin 40) (= 37.(041...)) M1 (dep on 1st M1) for substituting the appropriate figures into the cosine rule eg $8.4^2+'37.041'^2-2\times8.4\times'37.041'\cos40^\circ$ M1 (dep on previous M1) for correct order of evaluation or (c^2=) 965.(897...) A1 31.07 - 31.1

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
25		$\frac{18}{30}\times\frac{12}{29}+\frac{7}{30}\times\frac{23}{29}+\frac{5}{30}\times\frac{25}{29}$ or $1-(\frac{18}{30}\times\frac{17}{29}+\frac{7}{30}\times\frac{6}{29}+\frac{5}{30}\times\frac{4}{29})$ or $\frac{18}{30}\times\frac{7}{29}+\frac{18}{30}\times\frac{5}{29}+\frac{7}{30}\times\frac{18}{29}$ $+\frac{7}{30}\times\frac{5}{29}+\frac{5}{30}\times\frac{18}{29}+\frac{5}{30}\times\frac{7}{29}$	$\frac{502}{870}$	4	B1 for a second 'branch' probability seen (could be seen in a tree) M1 for a product of any first and second stage correct probabilities M1 for a complete method to find the required probability A1 for $\frac{502}{870}$ oe Note if decimals used they must be correct to 2 decimal places SC with replacement B2 for $\frac{502}{900}$ oe B0 M1 $\frac{18}{30}\times\frac{12}{30}$ or $\frac{7}{30}\times\frac{23}{30}$ or $\frac{5}{30}\times\frac{25}{30}$ M1 $\frac{18}{30}\times\frac{12}{30}+\frac{7}{30}\times\frac{23}{30}+\frac{5}{30}\times\frac{25}{30}$ A0

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Q8	**Per 25ml**	**Per ml**	**Per £**
50ml	54.5	2.18	45.87155…
75ml	56	2.24	44.64285..
125ml	53.8	2.152	46.46840..

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**
Q01		MLP only: basis given for stem and leaf diagram.	B2 for a fully correct ordered stem and leaf (B1 for a correct unordered stem and leaf or for an ordered stem and leaf with at most 1 error or omission) B1 (indep) for a correct key (units not required)
Q02		Grid enlarged. Crosses changed to filled in circles. Right axis labelled	B1 cao B1 cao M1 for a single line segment with a positive gradient that could be used as a line of best fit or a vertical line from 10 or a point plotted at (10, *y*) where *y* is in the range 18 - 22 A1 18 - 22 B1 cao

PMT

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q07		Diagram enlarged and labelled ABCD clockwise from the top right. Measurement lines removed. Information about the length of lines given in the text.	M1 for substituting into Pythagoras' theorem M1 for complete correct use of Pythagoras' theorem M1 for a complete method to find the perimeter of their trapezium A1 51.(20655..) C1 (dep on correct first 2 M marks) for correct conclusion dependent upon supporting calculations
Q08		Diagram removed.	M1 for a complete method to find the cost per m*l* or the number of m*l* per £1 for one tube or for a method that results in at least 2 values that can be used to compare 2 tubes M1 for a complete method to find all three equivalent figures A1 3 correct figures suitable for comparison C1(dep on M2) for stating the correct tube size from their calculations
Q09		AB = 9 cm.	M1 for two pairs of relevant arcs drawn A1 correct line drawn (with arcs) SC B1 Correct line no arcs visible
Q15		Diagram enlarged. Measurement line remove – MLP. 7 cm and measurement line removed – Braille only.	C1 for a complete reason eg Angles in a semicircle are 90°, alternate segment theorem M1 for 7 × sin 35 M1 for 7 × sin 35 × 2 M1 (indep) for "*DB*"× cos 70 A1 2.74 - 2.75

PMT

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
Q18		Diagrams enlarged Dotty shading added	B1 40 cao M1 for identifying LQ and UQ e.g 35 – 70 A1 35 cao C1 for a correct comparison of medians ft (a) C1 for a correct comparison of a measure of spread with correct figures ft (b) For the award of both marks at least one of the comparisons must be interpretative
Q20		Diagrams enlarged.	M1 method to find relative cost of design A e.g. $\pi 2^2$, $k \times \pi 2^2$ M1 for a complete method to find the relative cost of the watch face for design B e.g. $\pi 2^2 \times \frac{20}{360} \times \frac{3}{5} + \pi 2^2 \times \frac{340}{360} \times \frac{2}{5}$ M1 (dep on M1, M1) for the cost of design A: cost of design B A1 cao Or M1 for method to find fraction of the sectors in design B $\frac{20}{360}, \frac{340}{360}$ M1 for complete method to find the relative cost of the watch face for design B M1 (dep on M1,M1) for the cost of design A: cost of design B A1 cao

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Q23		Diagrams enlarged.	B2 correct graph drawn (B1 for a graph translated up/down) B2 for correct graph drawn (B1 for a graph reflected in the *x* axis or stretched by sf 2 parallel to the *y* axis)
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Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Calculator) Unit 3

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5MB3H_01 November 2015					
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>4.9</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>

5MB3H_01 November 2015					
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…)

5MB3H_01 November 2015					
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

5MB3H_01 November 2015					
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)

November 2016

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	3 | 1 3 7 4 | 1 4 4 7 8 8 5 | 1 2 3 5 6 6 6 6 | 0 1 3 4	Diagram and key	3	B2 for fully correct diagram (accept a stem of 30, 40, 50, 60, the order of the numbers in the stem may be reversed) (B1 for one error or omission or unordered diagram with no errors) B1 for a correct key (units may be omitted but must be correct if stated) eg 3 | 1 = 31 (mm)
2 (a)		225 : 475	2	M1 for 700 ÷ 2 + 125 (= 475) **or** 700 ÷ 2 – 125 (= 225) A1 for 225 : 475 oe, eg 9:19
(b)		175, 455	3	M1 for 630 ÷ (5 + 13) (= 35) M1 for "35" × 5 (= 175) **or** "35" × 13 (= 455) A1 cao
3		26	3	M1 for (360 − 90) ÷ 2 (= 135) M1 for $4x + 31$ = "135" or $6x - 21$ = "135" A1 cao OR M1 for forming an appropriate equation eg $4x + 31 = 6x - 21$ or $6x - 21 + 4x + 31 + 90 = 360$ oe M1 (dep) for isolating terms in x and number terms A1 cao

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
4 (a)		0.3	2	M1 for 1 − (0.25 + 0.10 + 0.20 + 0.15) oe A1 for 0.3 oe
(b)		21	3	M1 for 0.25 + 0.10 (= 0.35) or 0.25 × 60 (= 15) or 0.10 × 60 (= 6) M1(dep) for 60 × "0.35" or "15" + "6" A1 cao
5		1.4091(…)	2	B2 for 1.4091(…) (B1 for 2.1025 or 1.492 or 2.397…or 2.398)
6		180	3	M1 for a correct start to the process, eg 300 ÷ 5 (= 60) or 300 ÷ (5 × 1.5) (= 40) or 8 ÷ 5 (= 1.6) or 5 ÷ 8 (= 0.625) M1 for a complete method that will lead to the number of bricks needed to build the wall (= 480) or for a complete method that will lead to the number of extra bricks needed to build the wall, eg 300 ÷ 5 × 3 A1 cao

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
7	x -1 0 1 2 3 4 y 10 8 6 4 2 0	$y = 8 - 2x$ drawn	3	B3 for a correct line between $x = -1$ and $x = 4$ OR B2 for a correct straight line segment through at least 3 of $(-1, 10)$, $(0, 8)$, $(1, 6)$, $(2, 4)$, $(3, 2)$, $(4, 0)$ **or** for all of these points plotted but not joined **or** for a line drawn with a negative gradient through $(0, 8)$ **and** clear intention to use of a gradient of -2, eg line through (0,8) and (0.5, 6) OR B1 for at least 2 correct points stated or plotted **or** for a line drawn with a negative gradient through $(0, 8)$ **or** a line with gradient -2
*8		Comparison	3	M1 for 23.50×1.34 A1 for 31.49 C1 (dep M1) for 'euros' stated and a comparison ft their "31.49" OR M1 for $31 \div 1.34$ A1 for 23.13(43...) C1 (dep M1) for '£' stated and a comparison ft their "23.13" OR M1 for $31 \div 23.50$ A1 for 1.31(91...) C1 (dep M1) for comparison ft their "1.31(91...)" and explanation linked to conversion rate.

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
9		6.56	4	M1 for $200^2 + 60^2$ (= 43600) M1 for $\sqrt{40000+3600}$ or $\sqrt{43600}$ (= 208.8…) M1 for a complete method eg ("208.8" + 2 × 200 + 2 × 60) ÷ 100 × 0.9 oe A1 for 6.55 – 6.561
*10		large carton with correct calculations	3	M1 for 1.60 ÷ 125 (= 0.0128) or 2.8 ÷ 225 (= 0.0124(4…)) or 125 ÷ 1.60 (= 78(.125(g)) or 225 ÷ 2.80 (= 80(.35…g)) or any other calculation that could lead to a comparative figure M1 for 1.60 ÷ 125 (= 0.0128) **and** 2.8 ÷ 225 (= 0.0124(4…)) or for 125 ÷ 1.60 (= 78(.125(g)) **and** 225 ÷ 2.80 (= 80(.35…g)) or for calculations that could lead to comparative figures for the cartons 2 C1 for correct comparative figures for both cartons leading to a correctly stated comparison. Accept any other method considered equivalent. Figures may be truncated or rounded as long as their method is clear.

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
11	$\pi \times 6^2 - 2 \times 6 \times 6$	41.1	4	M1 for correct method to work out the area of the circle or quarter circle or semi-circle eg $\pi \times 6^2$ (=113(.09..)); $\pi \times 6^2 \div 2 = 56.5(4..)$; $\pi \times 6^2 \div 4 = 28.2(7\ldots)$) M1 for method to work out the area of the square (=72) oe or a triangle eg ½×6×6 (=18) M1 for complete method to find shaded area. A1 for value in the range 41.04 - 41.112
12 (a)		n^4	2	M1 for $\frac{n^{10}}{n^6}$ oe or $\frac{n^7}{n^3}$ oe or $n \times n^3$ oe A1 cao
(b)		$3x^2 + 4x$	2	B2 for $3x^2 + 4x$ or $x(3x + 4)$ (B1 for $x^2 - 2x$ or $2x^2 + 6x$ or $3x^2 + nx$ or $px^2 + 4x$)
(c)		$5(y - 3)$	1	B1 cao
(d)		$9ab(2 + 3b)$	2	B2 for $9ab(2 + 3b)$ (B1 for $9a(2b + 3b^2)$ or $9b(2a + 3ab)$ or $ab(18 + 27b)$ or $3ab(6 + 9b)$ or $3a(6b + 9b^2)$ or $3b(6a + 9ab)$ or $9ab$(a two term algebraic expression))

PAPER: 1MA0/2H				
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)
14		126	3	M1 for 180 – (360 ÷ 5) (= 108) or (5 – 2) × 180 ÷ 5 (= 108) M1 for a complete method eg $\frac{360-"108"}{2}$ or $180-\frac{"108"}{2}$ A1 cao

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
15		28.9	5	M1 for $\sin 62 = \frac{BD}{15}$ **or** $\frac{BD}{\sin 62} = \frac{15}{\sin 90}$ oe M1 for (BD =) $15 \times \sin 62$ **or** $\frac{15}{\sin 90} \times \sin 62$ oe (= 13.24...) M1 for $\tan BCD = \frac{"13.24"}{24}$ oe **or** $\tan BDC = \frac{24}{"13.24"}$ with BDC clearly identified M1 for $BCD = \tan^{-1}\frac{"13.24"}{24}$ oe **or** $BDC = \tan^{-1}\frac{24}{"13.24"}$ with BDC clearly identified A1 for 28.8 – 28.9 **OR** M1 for $\cos(90 - 62) = \frac{BD}{15}$ M1 for (BD =) $15 \times \cos(90 - 62)$ (= 13.24...) M1 for $\tan BCD = \frac{"13.24"}{24}$ oe **or** $\tan BDC = \frac{24}{"13.24"}$ with BDC clearly identified M1 for $BCD = \tan^{-1}\frac{"13.24"}{24}$ oe **or** $BDC = \tan^{-1}\frac{24}{"13.24"}$ with BDC clearly identified A1 for 28.8 – 28.9

PAPER: 1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16			$\frac{8}{17}$	5	M1 for $5x + 4$ or $10 - x$ M1 (dep) for "$5x + 4$" = $\frac{2}{3}$ "$(10 - x)$" M1 for expanding the bracket or multiplying both sides by 3 in an equation of the form $(ax + b) = \frac{2}{3}(cx + d)$ A1 for correct equation with terms in x and number terms isolated, eg $15x + 2x = 20 - 12$ or $5x + \frac{2x}{3} = \frac{20}{3} - 4$ A1 for $\frac{8}{17}$ oe accept 0.47(0588...)
17	(a)		Question and responses	2	B1 for a suitable question which includes a time frame (the time frame could appear with the response boxes) B1 for at least 3 non-overlapping response boxes which are exhaustive for their question NB Do not accept inequality signs
	(b)		53 or 54	2	M1 for $\frac{460}{1709} \times 200$ (= 53.8...) oe A1 for 53 or 54

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*18		28°	4	M1 for angle $ABD = 62°$ M1 for angle $BAD = 90°$ C2 for angle $ADB = 28^{\circ}$ with full, appropriate reasons given angles in the same segment are equal; angles in a semicircle are 90°; angles in a triangle add up to 180° (C1 (dep on relevant M1) for one correct and appropriate reason relating to a circle theorem) OR M1 for angle $AOD = 62° \times 2$ (= 124°) M1 for $(180° - 124°) \div 2$ C2 for angle $ADB = 28°$ with full, appropriate reasons given the angle at the centre of a circle is twice the angle at the circumference; base angles of an isosceles triangle are equal; angles in a triangle add up to 180° (C1 (dep on relevant M1) for one correct and appropriate reason relating to a circle theorem)

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
19 (a)		$y^2 + 7y + 10$	2	M1 for all 4 terms (and no additional terms) correct ignoring signs **or** 3 terms correct A1 for $y^2 + 7y + 10$
(b)		$(e - 3)(e + 4)$	2	M1 for $(e \pm 3)(e \pm 4)$ A1 for $(e - 3)(e + 4)$
(c)		0.77, –0.43	3	M1 for $\frac{--1 \pm \sqrt{(-1)^2 - 4 \times 3 \times -1}}{2 \times 3}$ (condone one sign error) M1 for $\frac{1 \pm \sqrt{13}}{6}$ A1 for one answer in the range 0.767 to 0.77 and one answer in the range –0.43 to –0.4343
20		17.7(014…)	3	B1 for 7.75 or7.85 or 5.15 or 5.25 or 62.5 or 63.5 M1 for $\frac{1}{2} \times 7.75 \times 5.15 \times \sin 62.5$ A1 for 17.7(0140994…)

PAPER: 1MA0/2H					
Question		Working	Answer	Mark	Notes
*21			No with explanation and supportive working	4	M1 for method to find the volume of compost needed to fill one or more baskets eg $\frac{2}{3} \times \pi \times 20^3$ (= 16755(.16…)) Or $\frac{4}{3} \times \pi \times 20^3$ (= 33510(.32…)) M1 for appropriate use of 1 litre = 1000 cm^3, eg $4 \times 50 \times 1000$ (= 200000) or "16755" ÷ 1000 M1 for complete method to find values needed to make decision C1 for conclusion supported by correct values, eg 200000 and 201061(.92...) (accept 201000 to 201120) or 16666(.66...) and 16755(.16…) or 11.9(36...) NB Calculations can be in litres or cm^3
22	(a)	$2 = k^{-1}$	½	2	M1 for reading off and substituting a pair of values from the graph (excluding 0, 1) into the equation, eg $x = -1$, $y = 2$ A1 for ½ oe
	(b)		correct graph	2	B2 cao (B1 for correct general shape, eg $y = -\sin x°$)

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
23		Correct conclusion from correct working	4	B1 for $\overrightarrow{AB} = -5\mathbf{a} + 2\mathbf{b}$ or $\overrightarrow{BA} = 5\mathbf{a} - 2\mathbf{b}$ M1 for a correct vector statement for $\overrightarrow{OT}$ eg $\overrightarrow{OA} + \overrightarrow{AT}$ or $\overrightarrow{OB} + \overrightarrow{BT}$ or $\overrightarrow{OA} + \frac{5}{6}\overrightarrow{AB}$ or $\overrightarrow{OB} + \frac{1}{6}\overrightarrow{BA}$, may be written partially or fully in terms of **a** and **b** M1 for $5\mathbf{a} + \frac{5}{6}(-5\mathbf{a} + 2\mathbf{b})$ oe or $2\mathbf{b} + \frac{1}{6}(5\mathbf{a} - 2\mathbf{b})$ oe A1 for $\frac{5}{6}(\mathbf{a} + 2\mathbf{b})$ is parallel to $\mathbf{a} + 2\mathbf{b}$

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*24	$(n^2 + 4n + 4) - (n^2 + 2n + 1)$ $\frac{2n+3}{2n^2+3n}$ $\frac{2n+3}{n(2n+3)}$	Proof	4	M1 for correct method to expand $(n + 2)^2$ or $(n + 1)^2$ M1 for correct simplification of numerator M1 for factorisation of $2n^2 + 3n$ **or** for clearing the fractions on both sides correctly C1 for complete and correct proof OR M1 for $\{(n+2)-(n+1)\}\{(n+2)+(n+1)\}$ M1 for $1 \times (2n+3)$ M1 for factorisation of $2n^2 + 3n$ **or** for clearing the fractions on both sides correctly C1 for complete and correct proof OR M1 for $n\{(n+2)^2-(n+1)^2\} = (2n^2 + 3n) \times 1$ M1 for $n(n+2)^2 - n(n+1)^2$ or for correct expansion of $(n+2)^2-(n+1)^2$ M1 for correct expansion of $n\{(n+2)^2-(n+1)^2\}$ C1 for complete and correct proof (must include statement recognising the equality of LHS and RHS)

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**
1		Diagram enlarged. 4th horizontal line added to the bottom of the stem and leaf diagram. Key moved above and to the left of the diagram. Wording added 'It shows the basis of a stem and leaf diagram.	Standard mark scheme
3		Diagram enlarged. Wording added 'Angle $BOC = 4x + 31$'. Wording added 'Angle $AOC = 6x - 21$'.	Standard mark scheme
4		Diagram enlarged. Spike removed from the spinner and the spinner has been straightened.	Standard mark scheme
7		Grid enlarged.	Standard mark scheme
9		Diagram enlarged. Wording added '$CB = 200$ cm'. Wording added '$DC = 60$ cm'.	Standard mark scheme

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
10		Pictures have been removed.	Standard mark scheme
11		Diagram enlarged.	Standard mark scheme
12	(b)	MLP only: x changed to y.	B2 for $3y^2 + 4y$ or $y(3y + 4)$ (B1 for $y^2 - 2y$ or $2y^2 + 6y$ or $3y^2 + ny$ or $py^2 + 4y$)
	(d)	'a' changed to 's' and 'b' changed to 't' for all candidates.	B2 for $9st(2 + 3t)$ (B1 for $9s\,(2t + 3t^2)$ or $9t(2s + 3st)$ or $st(18 + 27t)$ or $3st(6 + 9t)$ or $3s(6t + 9t^2)$ or $3t(6s + 9st)$ or $9st$(a two term algebraic expression))
13	(a)	Wording added 'There are five spaces to fill.'	Standard mark scheme
	(b) to (d)	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.	Standard mark scheme
14		Diagram enlarged.	Standard mark scheme
15		Diagram enlarged. Wording 'AB = 15 m' changed to 'BA = 15 metres'. Wording 'BC = 24 m' changed to 'CB = 24 metres'. Wording added 'Angle CBD = angle BDA = 90°.'	Standard mark scheme

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
18		Diagram enlarged.	Standard mark scheme
19	(b)	Braille only: e changed to m.	M1 for $(m \pm 3)(m \pm 4)$ A1 for $(m - 3)(m + 4)$
21		Simplified diagram provided for MLP candidates.	Standard mark scheme
22	(a) (b)	Grid enlarged. Grid enlarged.	Standard mark scheme Standard mark scheme
23		Diagram enlarged. Cross at T changed to a solid dot.	Standard mark scheme

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Mark Scheme (Results)

November 2016

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

PMT

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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		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)).

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Question 14

This new topic was a challenge to many students. A large number failed to draw a tangent, often simply dividing the speed at $t = 15$ by 15, and so scored zero marks. Those who did draw a tangent then often scored all three marks. Some students took little care over the reading of the scales and therefore had an incorrect method for their gradient. It is important to realise that these questions need to have a tangent drawn. Several students gave an answer within the acceptable range, but they scored no marks as their answer clearly came from an incorrect method.

Part (ii) proved more challenging than the earlier one. This is a new topic and many students do not fully understand that gradients represent the instantaneous rate of change. In this context that being acceleration.

Part (b) brought in another new topic and students appeared better prepared than in previous series. However, the method for finding the area under the curve was often crude. Many students attempted to use rectangles, and whilst this does give an estimate, it is not a very good one. These students were able to score two marks typically for the processes, but their answer was usually outside the range given in the mark scheme. Students should be encouraged to use trapezia to find a better estimate. Many responses showed attempts to estimate distance using distance = speed × time. Many forgot to divide the triangle product for the first strip by two.

Question 11

Questions involving standard form are often well answered and this question was no exception. Students usually expressed their answer to part (a) as an ordinary number (130) with a small minority of students giving their answer in standard form (1.3×10^2). Most students worked in standard form and did not convert the distance and speed to ordinary numbers before dividing one by the other. The most common error seen in the method was for students to multiply the distance by the speed but this was not commonplace. However, there were a significant number of students who identified the correct calculation $(3.9 \times 10^7) \div (1.3 \times 10^5)$ but who expressed it without the brackets. This usually led to the incorrect answer 1.3×10^{12} because students were not careful about the order of operations when they used their calculator to evaluate their answer. These students could usually be awarded one of the two marks available.

Most students were able to gain the mark in part (b) for stating that their answer to part (a) would be increased or equivalent, for example that the signal will take longer to get to Mars.

Question 13

This question was successfully answered by about a half of all students. About two thirds of all students realised the need to multiply the measures of density and volume of both ethanol and propylene and so accessed the first two marks for these processes. Some students changed litres to millilitres before doing this. About a half of all students were able to move on from there to complete the calculation of the density of the antifreeze. The most common error seen by examiners was for students to use division rather than multiplication to work out $188 \div \left(\frac{60}{1.09} + \frac{128}{0.97}\right)$ or equivalent. The answer given, 1.005, was in the range of acceptable values but could not be awarded any credit.

Question 8

It was rare to see a fully correct solution to this question. Bearings remains a topic which many students find difficult to understand. Those students able to correctly draw a bearing of 070° usually went on to score well. The ability to use distance = speed × time did enable many students to gain at least one mark for a distance of 18 km and often an additional mark for correct use of scale. When a correct position for Q was found, the distance from L was usually correct but the bearing of Q from L, a reflex angle, was usually not correct.

Question 9

Distance = speed × time was usually applied in part (a) gaining the majority of students at least one mark. Misuse of units however was very common. 72 × 18 (= 1296) and 72 × 0.18 were the usual errors seen. Partitioning methods were usually incomplete and therefore gained no credit.

Part (b) was less well done again largely through the use of incorrect conversions. 1 km = 100 metres was a common mistake. Some students showed that the two speeds were the same but failed to answer the question posed.

Question 21

There was a lot of misunderstanding of what was being asked for in this question, particularly confusion between speed and acceleration.

In part (a) some found the half way mark on the time axis and gave the answer as 50 or used distance/speed/time. Of those that realised they needed to work with the area under the graph a large number made an error with the vertical scale using 12.5 or 14 for the speed. Some made errors using the formula for the area of a triangle. However, many still gained the first make for starting to find an area.

In part (b) few students realised the first part was acceleration and the last part deceleration, though they did notice that the last part was greater than the first part because the gradient was steeper. Some responses gave no comparison.

Question 6

Two marks was the modal mark for this question however full marks was also scored by a significant proportion of the cohort.

The vast majority of students were able to calculate the time difference as 1 hour 18 minutes or 78 minutes. However, they then thought that this was the time to use when using 'speed = distance/time'. They were awarded a mark for 65/78 or 65/1.18 as this was an indication that they knew the relationship between the speed, distance and time. However, students found it challenging to convert the time from minutes to hours. It was acceptable to convert before or after the use of the speed, distance, time formula but many students failed to attempt this part of the question.

Time continues to be a challenge for many students and centres are encouraged to show students different time formats and practice converting between units.

Question 13

Many students gained the first process mark by showing a full substitution of the figures to calculate the volume of the cylinder C or showing the correct figure for the volume of the cylinder *C*. The most common approach was then to work with density and ratio together, rather than with ratio to find the volumes of A and B, however many were not able to show enough understanding for the second mark. Some students did score the second mark for getting as far as 15.68 but then failed to process fully for the final two marks.

The most successful way seen to gain full marks was to find the individual volumes of *A* and *B* and add.

Question 19

Some students drew a tangent to answer this question but the most common incorrect answer was from 10/6 = 1.666… this was when students read off values at $x = 6$ and just divided the raw figures.

Those students that did draw a tangent often went on to calculate the gradient and obtained an answer within the acceptable range. However, there were a number of students who drew a tangent, thus

gaining the first method mark, but then incorrectly read the scales, or ignored the scales altogether. At this level it is expected that students should be able to accurately a read and apply scales on axes to gain an appropriate estimation.

Question 8

Many attempts failed at the first hurdle when students either used an incorrect method to find the area of the base of the prism, e.g. $18 \times 3 = 54$, or did not realise that they needed to find the area of the base. These students gained no marks. Some of the students who divided 18 by 3 to find the area of the base made no further progress but most went on to use the pressure formula. Many gained all three marks for an answer of 450 but some students evaluated 75×6 incorrectly and lost the accuracy mark. A few students used the formula incorrectly and worked out $75 \div 6$ rather than 75×6.

Question 13

Many students achieved the first mark for showing a process to find either the volume of liquid **A** or the mass of liquid **B**. Completing the process to find the density of liquid **C** proved problematic for some. Instead of using 20 and 8400 to find the mass and the volume of liquid C a common error was to divide 8400 by 20 and give an answer of 420. Those students who showed a complete process to find the density of liquid **C** usually gave a correct answer although arithmetic slips were frequently seen, most notably in working out 280 × 30 and 9800 ÷ 50. Mistakes in this question were often the result of using the formula for density incorrectly. A very common misconception, even amongst some students who showed some correct working, was that the density of **C** could be found by adding the density of **A** and the density of **B**. An answer of 350 from 70 + 280 was awarded no marks.

Question 2

This question was a good discriminator between less able students taking this paper. Many students at this level used "time = distance ÷ average speed" to get 1.25 hours and 1.5 hours before adding to get 2.75. A surprising number of students were, however, unable to convert this correctly to 2 hours 45 minutes. 2 hours 75 minutes and 3 hours 15 minutes were common incorrect answers seen.

Question 16

Many students worked out an estimate for the distance the car travelled by drawing a triangle under the curve, perhaps the expected approach. Working written by these students was generally accurate and the answers 132 and 135 within the given range and scoring two marks in part (a) were common. Unfortunately, as many if not more students merely multiplied either 8.8 or 9 by 30. This estimate was viewed as being too far from the actual distance travelled and did not convince examiners that students realized that the area under the curve gives the distance travelled. Some students used more than 1 triangle, for example using 2 strips and requiring the student to find the total area of a triangle and a trapezium. This method, an example of one providing a better estimate than when using a single triangle, was, of course, awarded full marks provided it was accurately carried out.

Answers to part (b) were often well expressed. The mark was awarded for a clear answer linked to an acceptable method for estimating the area in part (a). Vague answers such as “an underestimate because of the curve” could not be given the mark. Some students based their answers on the effects of rounding values of the speed rather than comparing the estimate calculated for the area under the curve with the exact area.

Part (c) was answered correctly only by better students who focused on the need to draw the tangent to the curve at time 60 seconds or on calculating the gradient of the curve at this point (or both). Many students attempting to answer this part of the question restricted their answers to a discussion of rounding. This was not accepted as an explanation worth crediting.

Question 3

In both parts of this question it was evident that many students did not have a secure understanding of time and calculations involving time. In part (a) students typically scored either two marks as they understood the question, or no marks as they incorrectly worked in minutes rather than hours. Part (b) allowed students who struggled with time to score at least one mark for the horizontal line segment to represent the stationary part of the journey. Those who calculated the time correctly and gained a method mark then normally gained the communication mark for the correct sloping section to the graph. A note to students is that $\frac{1}{3}$ is not equal to 0.3

Question 7

A fully correct response was not seen in the majority of cases, and in fact it was evident that students did not properly know the formula linking density, mass and volume. Of those who were able to score a mark the most common score was one mark for finding either an individual mass, or the total mass (192). At this point most didn't know to use total volume to calculate the density of **C**, and often divided by 3.

Question 4

A good discriminator, this question attracted many fully correct solutions but also many attempts which were awarded each of the marks available. There were a number of possible routes that students could take to solve the problem. By far the most common route taken was for students to work in litres and so to start off by working out the number of 8 litres in 2400 litres. Most students then showed the intention to work out the time for company A to fill the tank by multiplying 300 by 1 minute 40 seconds. These students usually scored at least 2 marks for their working. However, a significant number of students did not change their 1 minute 40 seconds accurately to minutes and examiners saw figures such as 1.6 and 1.40 used frequently. This inevitably led to otherwise successfully completed answers scoring 3 of the 4 marks available.
About one third of students obtained full marks for their solution to this question.

Question 21

A good number of students demonstrated how to estimate the area under the curve by using 3 trapeziums though some students used only one or two trapeziums.

Unfortunately, a large number of students were unable to access full marks for their answers because they used incorrect y values for $t = 3$ and/or for $t = 4$. Most students did gain some credit for a correct expression for at least one of the areas, usually for the trapezium between $t = 1$ and $t = 2$. It was encouraging to see students using the formula for the area of a trapezium rather than splitting the trapezium into a rectangle and triangle. These students were usually more successful in terms of the number of marks they got for their answers.

Answers to part (b) were often correct though there were a significant number of answers stating that the area represented either acceleration or speed. Units of measurement for the distance were not required but where these were given they were invariably correct.

Question 7

The majority of students gained the first mark for a process to find a volume and many went on to give a correct answer. The final mark was sometimes lost because of arithmetic errors, these occurred most often when dividing 81 by 27 or dividing 128 by 64. Having found the volume of each cube some students gained no more marks because they were unable to use density = mass ÷ volume. It was common to see mass × volume and volume ÷ mass being used. Some students did not realise that it was necessary to find the volume of each cube and

scored no marks at all. Often these students simply used the figures in the question, dividing 81 by 3 and dividing 128 by 4 or multiplying 81 by 3 and 128 by 4. There were also some students who calculated the surface area of the cubes and attempted to divide the mass by the surface area and gained no credit. Some students included units in their final answer but they were not penalised.

Question 14

Where tangents were drawn they were generally accurate and students often went on to gain all three marks for working out an estimate of the gradient that was within the acceptable range. Some answers were given in the form a/b and the final mark was lost when a and b were not integers. Errors were often the result of reading the scales incorrectly although some students divided the change in x by the change in y. A significant number of students drew a tangent, thus gaining the first method mark, but could not then complete the method to find the gradient. Many students used the coordinates of the point on the curve at $t = 2$ and simply divided 2.8 by 2. Some of these students had already drawn a tangent to the curve at $t = 2$.

In part (b) many students knew that the area under the graph represents the distance travelled. Incorrect answers often referred to acceleration or to time. Some students gave the answer as velocity or speed.

Question 6

This is a standard depreciation question and was generally answered well by most students. Common errors were students working with simple interest, which normally meant they were able to score the first mark for finding the decrease for one year. The other common error was to divide by 1.04 rather than multiply by 0.96. In this case they were not able to gain any credit at all. Those who had a correct method and gained 2 marks almost always gained the 3rd mark. The minority who didn't failed to gain this mark because they didn't use correct money notation of 2 decimal places or used the 'long way round' method by subtracting 4% year after year and so lost accuracy.

Question 7

This problem question required students to compare different volumes of petrol in different currencies. There are many approaches that could be used to answer this question.

Most students were able to score some marks. The most commonly awarded marks were those for converting volumes and for converting currency. It was often the third mark to get to the comparable figures that students struggled to gain. One common error was confusion with the currency conversion e.g. $27 \div 0.85$ instead of 27×0.85.

Question 9

This problem required students to use the given pressure formula to first find the area and then subsequently the length of the base of a cuboid. Most students were able to gain the first mark for substituting the force and pressure correctly into the formula. Unfortunately, many were then unable to rearrange the formula correctly to find the area. This meant that although they then divided by the width they couldn't gain the second mark as the process to find the area was incorrect. That said, there was still a high proportion of students who were able to complete the process correctly and gain an answer of 0.8 for 3 marks.

Question 6

The majority of students made a good attempt at this problem on distance, time and average speed. Many students produced a concise, accurate and complete solution. Lower attaining students sometimes lost accuracy in their working because they used 0.6, 0.66 or another decimal approximation when coverting 40 minutes to hours. These students were still able to be given 3 of the 4 marks available if they had used and shown correct processes in their solutions. A significant number of students appeared to ignore the units in the question and were very fortunate to get a correct answer because the nature of the problem depended on the ratio of the times taken, rather than the times themselves. Of those students who answered the question incorrectly, many did so because they did not know the formula and divided the speed by the time, instead of multiplying them.

Question 7

Many students gained the first mark for using the area of the base in the pressure formula. The accuracy mark was sometimes lost because of arithmetic errors when dividing 10 000 by 8 or because of an inability to divide 10 000 by 8. A few students used the formula incorrectly and worked out 10 000 × 8 rather than 10 000 ÷ 8. Many attempts failed at the first hurdle when students used an incorrect method to find the area of the base, e.g. 4 + 4 + 2 + 2= 12, or did not realise that they needed to find the area of the base. These students gained no marks.

Question 23

Candidates really struggled to gain full marks with this question, and it was primarily down to time conversion that was required.

A pleasing proportion had enough of an understanding of bounds to gain at least one mark for one correct bound either for distance, or for time in minutes and seconds, or just in seconds.

The second mark was for either correctly finding a bound for time in hours, or for a correct process to find a bound in kilometres per minute or kilometres per second. Those working in minutes often struggled here as they gave their time as 31.485 or 31.475, which is clearly incorrect.

The final process mark was for working in kilometres per hour, but was normally only seen when candidates had found the time in hours first. Due to premature rounding in the question, many who had gained the first 3 marks could not then gain the accuracy mark as their answer was outside of the acceptable range.

The C mark was only awarded to a handful of candidates as so few were able to communicate that the value of V was 20 correct to 2 significant figures as both bounds agree.

Question 7

This question, involving change of units, was poorly answered by those candidates at which it was targetted. In particular, part (a) rarely attracted a correct answer. Attempts at part (b) were often more successful with the majority of candidates gaining at least one of the three marks available. Where both marks were not awarded for part (b) a good proportion of candidates scored one mark, usually for multiplying by 1000 and showing their conversion from kilometres to metres. A good number of candidates lost marks because they used 360 for 60 × 60 or because they divided by 60 instead of by 3600. Some other candidates multiplied by 3600 instead of dividing by it.

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 8

A good proportion of the students who gained the first mark for dividing 1200 by 40 then went on to show a complete process. Many gained all three marks but some students made arithmetic errors and lost the accuracy mark. Errors such as $1200 \div 40 = 300$ and $90 \div 30 = 30$ were quite common. After dividing 1200 by 40 some students did not realise that they had found the value they needed to use in the pressure formula and it was common to see equated πr^2 equated to 30 in an attempt to find the value of r. Some carried out further incorrect work in an attempt to find the 'area' and some made no further progress. A common error was attempting to find the surface area of the cylinder and using this in the pressure formula. Some attempts failed at the first hurdle when students did not know how to use the volume of 1200 cm^3 and the height of 40 cm.

Question 6

The majority of students made a good attempt at this problem. There were many fully correct solutions. Answers of 65 or 66 were accepted to reward students who rounded their answer to the nearest day and those who rounded up because they reasoned that in 65 days, not quite enough lava had flowed from the volcano. Students who could not be awarded full marks often scored one mark for either dividing by 11.9 or for a correct process to convert between seconds and days. The latter process is exemplified by $24 \times 60 \times 60$ (= 86 400) or by successively dividing by 60, 60 and 24. The most common errors seen were from students who multiplied together 67, 205, 600 and 11.9 and from students who used incorrect conversion factors such as 60×24 or $60 \times 60 \times 12$.

Question 8

Most students found this question to be straightforward. However, a minority of students divided 72 by 9 or divided 9 by 72 so could not be awarded any marks.

Question 7

Most were able to gain some credit on this volume and flow problem. This was either for correctly working out the volume of the cylinder, or for correctly using the rate of flow. Unfortunately, very few were able to put all the steps together. Many didn't work with the conversion at all which could have been used with either the rate of flow or the volume, and this meant in most cases the maximum they could score was 2 marks out of the 4.

Question 7

This question testing the use of mixed units of time in the context of distance, speed and time was successfully completed by about a half of all students taking this paper. However, the vast majority of students gained a mark for using time = distance ÷ speed to get the time travelled by car. Unfortunately, the process of changing to consistent units of time defeated many students. In particular, when trying to work in hours and

minutes, many students changed 2.6 hours to 2 hours 60 minutes which, in turn, often led them to a final answer of 8 hours, 20 minutes. Another common error was for students to write 5 hours, 20 minutes as 5.2 hours then add this to 2.6 hours to end up with the same 8 hours 20 minutes as their final answer. Teachers might find it useful to help students to recognise that the decimal part of an hour represents tenths of an hour by using a conversion table to emphasise that 0.1 hours = 6 minutes

Hours	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Minutes	6	12	18	24	30	36	42	48	54	60

This may help students to understand that decimal part of an hour × 60 = number of minutes.

Question 8

A high percentage of students were able to use the given formula in this question to work out area, given pressure and force. Fewer candidates realised that their result gave them the area of one face of the cube and that they would need to multiply this by the number of faces before they could compare it with a total surface area of 900 cm^2. Consequently, they compared 144 with 900. Nevertheless, many students were able to do this and gained full marks for their responses.
Hardly any students used an accepted alternative approach, for example comparing 144 with 150.

Question 22

This question proved to be more of a challenge to the highest attaining students than any other question on the paper but there were still a good number of fully correct responses. Low attaining students often merely substituted values into the word formula without considering bounds. They could not be awarded any marks but of those students who did consider bounds, a large number of them wrote down at least one correct bound from the six bounds relevant to the three values given in the question. Only the best students could identify the correct bounds to use in order the minimise the profit (lower bound of selling price − upper bound of cost of materials). Students who showed a good understanding of the bounds needed for this could usually complete the process to find the lower bound of the hourly rate of pay and use it to give a statement to confirm that Ebony's rate of pay was definitely more than £8.20

Question 14

This question tested two topics that were new to 1MA1 and students are now scoring some good marks. In part (a) a tangent needed to be drawn and the gradient calculated. Many gained the first mark for drawing the tangent, and of those a significant number gained the second mark for a correct method to find the gradient. Unfortunately, many who did this, lost the third mark due to a missing negative sign in their answer. Weaker students read off at $x = 5$ and either multiplied or divided these two values, and thus scored zero. In this question, if no tangent was drawn, no marks could be scored.
In part (b) a method to find the area under the curve was required and a pleasing number attempted this with trapezia. This was also seen in terms of triangle and rectangles, which was perfectly acceptable. To gain the first mark, a single correct area of a trapezium (or rectangle and triangle) was required, with a complete method needed for the second M mark. Those who used rectangles whose height was the point where the middle of the bar crossed the graph could also gain full credit here, and normally did. This method led to an answer of 78 compared to the 79 got from the other.
Quite a few found the area under the tangent or had problems reading from the scale, but method marks could still be gained if this was limited to just one error.

Question 4

A good discriminator with most students showing understanding of working with percentages. There were, though, too many students who just used a simple interest rather than a compound interest process. A common approach was to find 6% of 25000, multiply this by 3 and often add this to the 25000 with 29500 being a very common incorrect answer.

There were multiple errors in copying down the numbers, particularly missed zeros from the 25000 and using a multiplier of 1.006 instead of 1.06. A number of students also mistakenly used a multiplier of 1.03, through either a misunderstanding of the question, or a misread, this could not be credited. Those who gained just 3 of the marks usually did so because they gave the answer as 29775.4. These students were not awarded the accuracy mark as they hadn't taken account of the context of the question, being that we cannot have 0.4 of a person.

Question 5

Most students realised that they needed to find the volume of the flour by dividing the mass by the density. However, many failed to appreciate that the volume of the salt was this volume subtract 700 and so did not gain the second process mark. An unexpectedly high number of students wrote 600/300 but gave the answer as 0.5 or 0.2 instead of 2, hence losing the final accuracy mark. The third process was not for a complete process and a student could gain this mark for 600 / [volume], where [volume] did not have to come from a correct process. Many students gained this mark for a calculation of 600 / 700 or 600 / 1000 but they did not get this mark for 0.857.. seen, this is because the process to arrive at this value had to be shown. Given the more common occurrence of square brackets in the mark scheme it is important that students get into a better habit of showing their method and processes so that they have a greater access to these marks.

Question 7

This multi-step question required the use of a variety of skills being combined to solve a problem and appeared to be challenging to many students. Many students multiplied the radius by the height or finding the surface area or squaring pi instead of the radius or dividing the volume by 3 and, hence spoiling this process. The second process mark was often the only mark being awarded, usually for [volume] ÷ 250. On this occasion [volume] could be anything the student believed to be the volume provided it was not a value that was not allowed as stipulated in the mark scheme. It was unfortunate and relatively rare when students divided something labelled other than volume by 250 and hence not achieving this mark. Again, it is important that students show their method and process so that they have greater access to these marks. A number of students who had a fully correct process to find

the time in seconds often stopped short of finding the time in minutes and hence only gained 2 of the 4 marks. With this question, full marks were given for an answer within the range from 62 to 63 inclusive but as the questions stipulated that ‘you must show all your working’ a correct answer with no supportive working scored no marks. It is important that students heed this instruction given on specific questions to ensure that they do not fall foul of this.

Question 5

In part (a) it was pleasing that a good proportion of learners earned the first mark for rounding 4.96 to 5 or rounding 30.4 to 30 and it was very common to see both numbers rounded. Many went on to gain the second mark for 5 ÷ 30 or for a complete process to find the time. Some of those writing $\frac{5}{30}$ were able to complete the process by multiplying by 60 but many could not. Some started with 30 ÷ 60 = 0.5 and then worked out 5 ÷ 0.5 and another successful approach was to write '30 miles in 60 minutes' and divide both sides by 6 to get '5 miles in 10 minutes'. However, many learners could not demonstrate a full process to find an estimate for the time taken by the car. The first step was often 30 ÷ 5 = 6. Some gave 6 as the answer and others multiplied it by 60. These gained no credit. However, dividing 60 by 6 completed the process and earned the second mark. A significant number of learners did not understand the implications of the word 'estimate' and attempted to answer the question using 4.96 and 30.4. They gained no marks.

In part (b) learners had to decide whether their answer to part (a) was an underestimate or an overestimate and give a reason for their answer. This was answered very poorly indeed. Many learners had rounded 4.96 up and rounded 30.4 down but only mentioned one of these in their answer. Answers such as "overestimate because I rounded the distance up" and "underestimate because I rounded down" were very common. Many learners did not consider how their rounding had affected the actual calculation they had carried out in part (a).

Question 8

Many learners made a good start, most often dividing 720 by 80 to find the area of the base of the rectangle and this earned them the first process mark. To complete the solution, they needed to divide the area of the base by 2 to find the length of the rectangle. A good proportion managed to work out the length as 4.5 cm and scored full marks. Some lost the accuracy mark due to an arithmetic error, most commonly $720 \div 80 = 90$, but they could still gain the second process mark for dividing by 2. After finding the area of the base many learners made no further correct progress and some gave 9 as the final answer or multiplied by 2 instead of dividing by 2. It was very common to see $b \times h \div 2$ being used in an attempt to find the length of the base. Presumably this was prompted by the triangular cross section of the prism. Some learners used the pressure formula incorrectly, working out 720×80, and gained no marks.

Question 3

The first problem solving question on the paper required learners to compare the cost of a chocolate bar in two different cities. This required them to find comparable amounts by weight or per unit cost, and to use a currency exchange.
The first mark was for a suitable start to the problem and could be gained by either converting one cost correctly, or by converting one item's weight, or by finding the weight per unit cost in one city. Many learners gained this first mark, which was really pleasing to see. A very good proportion were then able to gain a second mark for the process to find comparable figures. This required the amount to be comparable as well as the currency. This was a process mark so could be awarded even if arithmetic errors had occurred, providing clear working was seen. As mentioned in the introduction, learners are continuing to improve on this front and clear annotations were often provided.
The final mark was for having accurate comparable figures along with a correct conclusion. Conclusions were typically correct, except when learners working with the weight per unit cost. In this case the higher figure showed the better value and many who used this method misinterpreted this and gave London as their response.

Question 12

This shape problem had 4 stages, and each one was available to candidates, even with prior errors. The first step was to find the volume of the cylinder, which many struggled to do. There were various errors from finding the surface area to multiplying the radius by the

height. The next mark was for using the volume and given density to find the mass. This value was then to be used to find the volume of the cube using a given density. The final step was to cube root the volume to find the length of the cube. Although many struggled with the initial volume, their working was clear enough to establish that the value they used for the next step was what they believed to be the volume. Given this was the case the second mark could be gained, and often was. As was the case with the next mark for the second use of the density formula. The final process mark for cube rooting, a bit like the first, was less often awarded. It was quite common to see candidates dividing by 3 or even 6 as a last step or square rooting.

Question 22

Various responses were seen to this question with common incorrect answers being from 30×92 or $54 \times 10 + 76 \times 10 + 92 \times 10$. Of those who gained just one mark it was usually for correctly finding the area of the triangle in the first section. Of those that had an appreciation of what they needed to do, many limited their marks by incorrectly reading values from the graph or not doing as instructed and using 3 strips of equal width.

Question 12

The tangents drawn in part (a)(i) were generally accurate and responses often went on to gain all three marks for working out an estimate of the gradient at $t = 3$. If a tangent was not drawn then no marks were awarded. When answers were given in the form a/b the final mark was not awarded unless a and b were integers. Errors were often the result of reading the scales incorrectly although some responses divided the change in x by the change in y. Some responses drew a tangent, thus gaining the first method mark, but did not then show a method to find the gradient. Many responses used the coordinates of the point on the curve at $t = 3$ and divided 42 by 3. Some of these responses had already drawn a tangent to the curve at $t = 3$.

In part (a)(ii), many responses showed that they knew the gradient represents the acceleration of the particle. Incorrect answers often referred to velocity or time or the distance travelled. Some answers referred to correlation.

In part (b), many responses demonstrated how to estimate the area under the curve using three strips of equal width. Often, they used one triangle and two trapeziums and usually made good use of the formula for the area of a trapezium although some incorrect substitution into the formula was seen. Some split each trapezium into a rectangle and a triangle which was perfectly acceptable. A method to find an appropriate area was needed to gain the first method mark and this could be implied by a single correct area for one strip. A complete method was needed for the second method mark. In some of the incomplete methods seen the responses had omitted one of the five areas when using a rectangle and triangle approach. When responses gained just one mark it was often for finding the area of the triangle in the first strip. Candidates should always show the method they use to work out each area as method marks can still be awarded for incorrect areas if examiners can see that the incorrect areas come from a correct method.

Question 8

This problem required learners to work with density and unit conversions and as such these two processes provided the basis for the process marks.

These marks could be awarded in either order as the two steps could be done in either order.
The most common approach was to first use the density formula to find the mass of one of the steel rods. Those who attempted this did normally get this step correct, which is pleasing with density being a formula not given in the question. Some used this formula incorrectly but were still able to gain a mark if they completed a correct conversion.
Those who followed this most common approach then needed to either convert the mass of a single rod to kilograms or the maximum load of the trolley to grams. Again, it was common to see this conversion being carried out correctly. However, we did see some using a conversion factor of 100 rather than 1000. Those who started with a conversion of the 300kg quite often gained this mark but then didn't use of the density formula correctly, and so only gained 1 mark.
It was also seen that learners used density correctly but then didn't realise that the two masses were in different units and hence divided the wrong way round, again this response would only gain 1 mark.

Question 4

This problem-solving question was approached in various ways, with the most common and effective method involving the calculation of cost per pound in dollars to produce comparable values of 1.02 and 0.98. Clear and well-structured responses were more successful, and centres may wish to encourage labelling of working with correct units to support clarity. In some cases, the number of pounds per dollar was correctly calculated, but the conclusion was incorrect, stating that carrots in London were better value due to the lower figure. Many responses included correct conversions between kilograms and pounds, with more opting to convert 2kg to 4.4lb rather than 5lb to 2.27kg. Currency conversions were also commonly attempted, with more responses converting £3.75 to $4.50 rather than $4.90 to £4.08, both of which were credited with two marks. Where only two marks were awarded, this was usually due to not identifying two comparable figures. Responses that gained three of the four marks often missed the final mark due to an incorrect conclusion, such as stating London was better value, or due to errors like misinterpreting $0.98 > 1.02$ or premature rounding affecting accuracy.

Question 6

Most responses correctly applied the speed formula by dividing distance by time. Many also converted 2 hours and 24 minutes into total minutes (144) or into seconds. However, a notable number showed difficulty converting this time into decimal hours, with 2.24 hours

often used instead of the correct 2.4 hours. Additionally, while many responses correctly converted the time to 144 minutes, some did not recognise that this resulted in a speed in kilometres per minute. In these cases, the final step of multiplying by 60 to convert to kilometres per hour was missing, and only partial credit could be awarded.