Chhetri Academy

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GCSE MATHS

Number

Edexcel 1MA1 | Subtopic collection Topic 01

Place value, ordering and order of operations

Higher tier

Answers and examiner comments

162	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 1

The full source mark scheme begins on page 213. Use the original paper code, tier and question number shown above.

Original question 16

The full source mark scheme begins on page 213. Use the original paper code, tier and question number shown above.

Original question 18

The full source mark scheme begins on page 213. Use the original paper code, tier and question number shown above.

Original question 7

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

Original question 1

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

Original question 8

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

Original question 2

The full source mark scheme begins on page 267. Use the original paper code, tier and question number shown above.

Original question 10

The full source mark scheme begins on page 267. Use the original paper code, tier and question number shown above.

Original question 13

The full source mark scheme begins on page 267. Use the original paper code, tier and question number shown above.

Original question 14

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

Question		Working	Answer	Mark	Notes
7	(a)		08 30	1	B1 for 08 30 oe
	(b)		17	1	B1 cao
	(c)		10 15	1	B1 for 10 15 oe

5	(a)		116	1	B1 for 116 [accept 114 if 116 seen on the dotted line in the sequence]
	(b)		112	1	B1 cao
	(c)		it is odd (and all the terms are even)	1	B1 for a correct reason

15	(a)		$4x$	1	B1 for $4x$ (accept $4 \times x$, $x \times 4$, $x4$)
	(b)		y^3	1	B1 cao
	(c)		$2x + 8y$	2	B2 for $2x + 8y$ oe [B1 for $2x$ or $8y$ seen] {Note: $-8y$ seen with no working gets B0 $4x + 2x = 6x$ gets B0}

Question		Working	Answer	Mark	Notes
1	(a)		173160	1	B1 cao
	(b)		173.16	1	B1 cao

Question		Working	Answer	Mark	Notes
7	(a)	$\frac{3}{8}+\frac{1}{4}=\frac{3}{8}+\frac{2}{8}=$ Or |	| 1 | 4 | | 3 | XXXX | 12 | | 8 | 8 | 32 | 8 + 12 = 20	$\frac{5}{8}$	2	M1 Use of common denominator: $\frac{1}{4}$ as $\frac{2\times1}{2\times4}$ or writing both fractions with a common denominator other than 8 with at least one of the fractions correct. OR 0.375 + 0.25 A1 $\frac{5}{8}$ Accept 0.625 only Or M1 for sight of the addition table and 8 + 12 (= 20) A1 $\frac{5}{8}$
	(b)	$\frac{2}{3}\times\frac{4}{5}=\frac{2\times4}{3\times5}=\frac{8}{15}$	$\frac{8}{15}$	2	M1 for multiplying numerator and denominator of $\frac{2}{3}$ and $\frac{4}{5}$ OR 0.66(..)×0.8 OR 0.67 ×0.8 oe A1 for $\frac{8}{15}$ oe OR for 0.533..

1380 3H

1380/3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
7	(c)	423 ×12 4230 846 5076 12 ×423 4800 240 36 5076 4 2 3 0 4 | 0 2 | 0 3 — 1 0 8 | 0 4 | 0 6 — 2 400 20 3 4000 | 200 | 30 — 10 800 | 40 | 6 — 2 4000+200+30+800+40+6=5076	5076	3	M1 for a complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation A1 cao M1 for a complete grid with not more than 1 multiplication error, addition not necessary. M1 (dep) for addition of all the appropriate elements of the calculation A1 cao M1 for sight of a complete partitioning method, condone 1 multiplication error, addition not necessary. M1 (dep) for addition of the all the appropriate elements of the calculation A1 cao M2 for repeated addition, exactly 12 A1 cao

1380 3H

1380/3H

14	(a)		1	1	B1 cao
	(b)		$\frac{1}{2}$	1	B1 oe Accept 0.5

Question		Working	Answer	Mark	Notes
21		$(2+\sqrt{3})(2-\sqrt{3})$ $= 4-2\sqrt{3}+2\sqrt{3}-\sqrt{3}\sqrt{3}$ $= 4-3$	1	2	M1 for all 4 terms correct ignoring signs or 3 out of 4 terms with correct signs.or correct use of difference of 2 squares A1 cao (SC M1 for $4-2\sqrt{3}+2\sqrt{3}$)

20	(a)	121 + 136 + 71 + 32= 360 360 ÷ 4 = 90	90	2	M1 for (121 + 136 + 71 + 32) ÷ 4 or 360 ÷ 4 A1 cao
	(b)		increasing	1	B1 for increasing (cost of gas) oe

10		452 36 2712 13560 16272 **4 5 2** 1 | 12 | 15 | 6 | **3** 6 | 24 | 30 | 12 | **6** 2 7 2 $12000+1500+60+2400+300+12=16272$	162.72	3	M1 for complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. OR M1 for a complete grid. Condone 1 multiplication error, addition not necessary. OR M1 for sight of a complete partitioning method, condone 1 multiplication error. Final addition not necessary. A2 for 162.72 (A1 (dep on M1) for correct placement of decimal point after final addition (of appropriate values) or for digits 16272 seen) (SC; B1 for attempting to add 36 lots of 4.52)

	400	**50**	**2**
30	12000	1500	60
6	2400	300	12

1380_3H
Summer 2010

Question		Working	Answer	Mark	Notes
11		$300 \div 6 = 50$ $300 \div 10 \times 3 = 90$ $300 - 90 - 50$ or $\frac{1}{6} + \frac{3}{10} = \frac{7}{15}$ $\frac{7}{15} \times 300 = 140$ $300 - 140$	160	4	M1 for $300 \div 6$ or 50 seen M1 for 300 ÷ 10 × 3 oe or $30 + 30 + 30$ or 90 seen M1 (dep on at least 1 previous M1) for $300 - "50" - "90"$ A1 cao or M1 for $\frac{1}{6} + \frac{3}{10}$ or $\frac{7}{15}$ oe M1 for "$\frac{7}{15}$" × 300 or 140 seen or 1- "$\frac{7}{15}$" or $\frac{8}{15}$ oe seen M1 (dep on at least 1 previous M1) for 300-"140" or 160 seen or "$\frac{8}{15}$"× 300 A1 cao

1380_3H
Summer 2010

16		$\frac{13}{4}\times\frac{8}{3}$	$\frac{26}{3}$	3	M1 for attempt to convert to improper fractions eg. $\frac{3\times4+1}{4}$ oe or $\frac{2\times3+2}{3}$ oe seen M1 (dep) for $\frac{"13"\times"8"}{4\times3}$ or $\frac{104}{12}$ oe seen A1 for $\frac{26}{3}$ or $8\frac{2}{3}$ **OR** M1 for 3.25 × 2.66 or better M1 for a fully correct multiplication method A1 for 8.66.... (recurring)

1380_3H
Summer 2010

Question	Working	Answer	Mark	Notes
7	175 x 37 1225 5250 6475 grid: 100, 70, 5; 3000, 2100, 150, 30; 700, 490, 35, 7 3000 + 2100 +150 + 700 + 490 +35 = 6475	64.75	3	M1 for a complete method with relative place value correct, condone 1 multiplication error, addition not necessary M1(dep) intent to add A1 cao **or** M1 for a completed grid with not more than 1 multiplication error, addition not necessary M1(dep) intent to add A1 cao **or** M1 for sight of **any** complete partitioning method, condone 1 multiplication error, final addition not necessary M1(dep) intent to add A1 cao NB : In all methods ignore placement of decimal point until final answer.

1380/3H

Question	Working	Answer	Mark	Notes
18 (a)	$2\frac{17}{20} - 1\frac{8}{20}$	$1\frac{9}{20}$	3	M1 for dealing with the whole numbers M1 for finding a correct common denominator A1 for $1\frac{9}{20}$ or $\frac{29}{20}$ oe **or** B1 for $\frac{57}{20}$ or $\frac{7}{5}$ oe M1 for finding a correct common denominator A1 for $1\frac{9}{20}$ or $\frac{29}{20}$ oe **or** M1 for 2.85 M1 for 1.4 A1 for 1.45 oe
(b)	$\frac{8}{3} \times \frac{7}{4} = \frac{8\times7}{3\times4} = \frac{56}{12}$	$4\frac{2}{3}$	3	B1 for $\frac{8}{3}$ oe or $\frac{7}{4}$ oe M1 for multiplying numerator and denominator of "$\frac{8}{3}$" and "$\frac{7}{4}$" A1 for $4\frac{2}{3}$ oe mixed number or $\frac{14}{3}$ oe OR B1 for 2.67 or 2.66(...) and 1.75 M1 (dep B1) for correct method of multiplication A1 for $4\frac{2}{3}$ oe

1380_3H

1380/3H

Question	Working	Answer	Mark	Notes
18	19.5 × 1000 ÷ 210 = 19500 ÷ 210 = 92.8(5714…) or 92 × 210 = 19320 = 19.32 *l* 93 × 210 = 19530 = 19.53 *l* or 19500 ÷ 92 = 211.95 19500 ÷ 93 = 209.67	Explanation	3	M1 for converting between m*l* and *l* correctly or for 0.21 or 19500 seen M1 for "19500" ÷ "210" or 92 × "210" or 93 × "210" or "19500" ÷ 92 A1 for a worded explanation with correct calculations

Question	Working	Answer	Mark	Notes
7 (a)		68	2	M1 for $\frac{9}{5}\times 20+32$ A1 cao
(b)	Table of values 10 20 30 40 50 50 68 86 104 122 **or** Use $y=mx+c$ With $m=\frac{9}{5}$, $c=32$	Single line from (0, 32) to (50, 122)	3	B3 for correct single straight line from (0, 32) to (50, 122) [B2 for at least 3 points correctly plotted (ft from (a)) and joined with line segments **or** 3 correct points plotted two of which must be the extremes with no joining **or** a single line of gradient $\frac{9}{5}$ passing through (0,32) B1 for 2 correctly plotted points ft from (a) **or** a single line of gradient $\frac{9}{5}$ **or** a single line with positive gradient passing through (0,32) **or** 2 correct pairs of values, may include (20,68) from (a) if correct]
(c)		37.8	1	B1 for answer in range 36 - 39 **or** ft from line drawn (± 2mm) *NB : Whole question needs to be clipped together*

5MB2H_01

5MB2H_01

11	45	200 minutes	6	M1 for $120\times 20\times 30(=72000)$ M1 for $"72000"\div 120$ A1 for $600\,\text{cm}^3$ min oe M1 for $\frac{1}{2}\times(120+80)\times 40\times 30\,(=120000)$ M1 for $"120000"\div"600"$ A1 for 200 minutes or 3 hours 20 mins oe SC B1 for 4 hours

Question	Working	Answer	Mark	Notes
4	LCM (40, 24) = 120 Rolls 120 ÷ 40 = Sausages 120 ÷ 24 = OR Rolls 40 is 2×2×2 (×5) Sausages 24 is 2×2×2 (×3)	Rolls (packs) 3 Sausages (trays) 5 Hot dogs 120	5	M1 attempts multiples of either 40 or 24 (at least 3 but condone errors if intention is clear) M1 attempts multiples of both 40 and 24 (at least 3 but condone errors if intention is clear) M1 (dep on M1) for a division of 40 or 24 or counts up 'multiples' (implied if one answer is correct or answers reversed) A1 rolls (packs) 3, sausages (trays) 5 OR any multiple of 3,5 A1 hot dogs 120 or ft on both of their packs or ft 'common multiple' OR M1 expansion of either number into factors M1 demonstrates one of the expansions that includes 8 oe M1 demonstrates a 2nd expansion that includes 8 oe A1 cao for rolls (packs) 3, sausages (trays) 5 A1 hot dogs 120

5MB2H_01

Question	Working	Answer	Mark	Notes
12 (i)		1	3	B1 cao
(ii)		$\frac{1}{5}$		B1 for $\frac{1}{5}$ or 0.2
(iii)		3		B1 cao (accept ± 3)

Question		Working	Answer	Mark	Notes
11		P: T: B = 1 : 3 : 6 54 ÷ 10 × 6 or T = 3P and B = 2T oe So, B = 2 × (3P) = 6P P + T + B = P + 3P + 6P = 10P P = 54 ÷ 10 = £5.40 B = 6 × £5.40	32.40	3	M1 for 1 : 3 : 6 or any three numbers, in any order, in the ratio 1 : 3 : 6 M1 for 54 ÷ (1 + 3 + 6) × 6) A1 for 32.4(0) Or M1 for 1: 3: 6 oe or P + 3P + 6P (=10P) oe e.g T/3 + T + 2T (=10T/3) or e.g B/6 + B/2 + B (=10B/6) or 5.4(0) or 16.2(0) seen M1 for 54 ÷ 10 × 6 or [54 ÷ "$\frac{10}{3}$"] × 2 or 54 ÷ "$\frac{10}{6}$" oe A1 for 32.4(0) Alternative M1 for a partial decomposition of £54 in ratio 1 : 3: 6, e.g. (£)5 + (£)15 + (£)30 (=(£)50) M1 for a decomposition of the remaining amount, e.g. 40(p) + 120(p) + 240(p) (= 400(p)) A1 for 32.4(0)

1380_3H

7		$\frac{3}{4} \times 120 = 90$ $120 - 90 = 30$ left $30 \div 3$	10	3	M1 for $\frac{3}{4} \times 120$ oe or 90 or $\frac{1}{4} \times 120$ oe or 30 M1(dep) for '30' $-$ (2 $\times$ '30' $\div$ 3) oe or $\frac{1}{3} \times$ '30' oe A1 cao

Original question 8

The full source mark scheme begins on page 319. Use the original paper code, tier and question number shown above.

Original question 15

The full source mark scheme begins on page 333. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
11	(a)	Plot (15, 22) and (55, 15)	Points plotted	1	B1 cao ± ½ square
	(b)		Describe relationship	1	B1 If the temperature increases so the time taken decreases oe (accept negative correlation)
	(c)		18 – 20	2	M1 draw LOBF between (20,18) and (20, 22) to (70,3) and (70,8) A1 18 – 20 (if M0 allow B2 for an answer in the range 18–20)
	(d)		Reason	1	B1 reason e.g LOBF would give negative time, you should not use the LOBF beyond your data

18	(a)		1	1	B1 cao
	(b)		–2	1	B1 cao
	(c)	$9^{-3/2} = 1/9^{3/2} = 1/3^3$	$\frac{1}{27}$	2	M1 use of reciprocal eg $1/9^{3/2}$ or square root eg 3^{-3}, $\frac{1}{3^3}$ or $\sqrt{729}$ seen or 27 seen or -27 seen A1 cao

1380_3H

Question		Working	Answer	Mark	Notes
1	(a)	4.636809….. ÷ 3.44	1.3479(09665…)	2	M1 for 4.63(6809…..)or 3.44 seen or $\frac{86}{25}$ A1 for 1.3479(09665…)
	(b)		1.35	1	B1 ft for 1.35

10		(12×2 + 16×8 +20×14 +24×23 +28×9 +32×4) ÷ 60 = (24 + 128 + 280 + 552 + 252 + 128)÷60 = 1364 ÷ 60 **Alternative** (12.5×2 + 16.5×8 +20.5×14 +24.5×23 +28.5×9 +32.5×4) ÷ 60 = (25 + 132 + 287 + 563.5 + 256.5 + 130)÷60 = 1394 ÷ 60	22.7	4	M1 for *fx* consistently within intervals including the ends (allow 1 error) M1 (dep) for use of all correct mid-interval values (allow 12 – 12.5 etc) M1 (dep on 1st M1) for $\sum fx \div \sum f$ A1 for 22.7 – 23.23…

18		9×100	900	2	M1 for 10×10 (=100) **or** 9×100 **or** $1cm^2 = 100mm^2$ **or** 30×30 A1 cao

1380_4H

Question		Working	Answer	Mark	Notes
1		$\frac{1}{5} + \frac{3}{7} = \frac{7}{35} + \frac{15}{35}$ Or |	| 3 | 7 | | 1 | | 7 | | 5 | 15 | 35 | Or 0.2+0.42(857…)	$\frac{22}{35}$ oe	2	M1 for attempt to put over a common denominator with at least one fraction correctly done ie $\frac{7}{35}$ oe or $\frac{15}{35}$ oe Or M1 for table structure shown with all cells correct Or M1 attempt to use decimals, must use at least 2 decimal places for $\frac{3}{7}$ A1 $\frac{22}{35}$ oe

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

5MB1H_01

Original question 2

The full source mark scheme begins on page 346. Use the original paper code, tier and question number shown above.

Original question 7

The full source mark scheme begins on page 346. Use the original paper code, tier and question number shown above.

Original question 4

The full source mark scheme begins on page 366. Use the original paper code, tier and question number shown above.

Original question 7

The full source mark scheme begins on page 366. Use the original paper code, tier and question number shown above.

3		$\frac{10}{3} \div \frac{19}{4} = \frac{10}{3} \times \frac{4}{19}$ OR 3.33… ÷ 4.75	$\frac{40}{57}$ or 0.70175(4386…)	2	M1 for $\frac{10}{3}$ oe and $\frac{19}{4}$ oe or 3.33(…) and 4.75 or 40 ÷ 57 or 0.7, 0.70, 0.701, 0.702, 0.7017, 0.7018 A1 for $\frac{40}{57}$ or 0.70175(4386…)

5MB3H_01

Original question 3

The full source mark scheme begins on page 385. Use the original paper code, tier and question number shown above.

7		$\frac{9}{2}\times(12+18)=135$ 135 ÷ 20 = 6.75 (=7 bags) 7 × 4.99 OR $18\times9-\frac{1}{2}(6\times9)$ = 135 135 ÷ 20 = 6.75 (=7 bags) 7 × 4.99	34.93	4	M1 for $\frac{9}{2}\times(12+18)$ or $18\times9-\frac{1}{2}(6\times9)$ or $9\times12+\frac{1}{2}\times(18-12)\times9$ or 135 seen M1 (dep) for '135'÷ 20 or 6 or 7 seen M1 (dep on previous M1) for '6' × 4.99 or '7' × 4.99 A1 cao [SC: M1 for (12×9 + 6×9) ÷ 20 (= 162÷20) or 8 or 9 seen M1 (dep) for '8' × 4.99 or '9' × 4.99 OR M1 for (18×9 − 6×9) ÷ 20 (= 108÷20) or 5 or 6 seen M1 (dep) for '5' × 4.99 or '6' × 4.99]

1MA0_1H

Question		Working	Answer	Mark	Notes
20		0.38×10^{-1}, 3800×10^{-4}, 0.038×10^{2}, 380	Correct order	2	M1 changing any one correctly or at least 3 in the correct order (ignoring one) or reverse order A1 for correct order (accept any form)

Question		Working	Answer	Mark	Notes
6			120	4	M1 for method to find remaining area of wall eg (3 × 2.4) – (2 × 0.9) or 7.2 – 1.8 (= 5.4) oe M1 for remaining area of wall ÷ area of tile using changed units, eg, “5.4” ÷ “0.12” (= 45) or (7.2 ÷ 0.12) − (1.8 ÷ 0.12) oe or 60 – 15 or 45 seen M1 (dep on at least M1) finding the number of boxes (eg ÷6 and round up oe) A1 for 120 cao OR M1 for attempt to find how many rows of tiles eg 300 ÷ 30 and 240 ÷ 40 or 200 ÷ 40 and 90 ÷ 30 using changed units or 10 & 6 or 5 & 3 seen. M1 for complete method to find the number of tiles needed by tessellation method eg (“10”×”6”)-(“5”×”3”) or 60-15 or 45 seen M1 (dep on at least M1) finding the number of boxes (eg ÷6 and round up oe) A1 for 120 cao

7	(a)		370	1	B1 cao
	(b)		0.37	1	B1 cao
	(c)		17.02	1	B1 cao

13	(i)		$\frac{1}{16}$	2	B1 for $\frac{1}{16}$ or 0.0625
	(ii)		4		B1 cao

5MB2H_01

Question		Working	Answer	Mark	Notes
1		183 × 47 1281 7320 8601 **or** |	| 1 | 8 | 3 | × | | | 4 | 32 | 12 | 4 | | 8 | 7 | 56 | 21 | 7 | | | 6 | 0 | 1 | | **or** | 100 | 80 | 3 | | | 4000 | 3200 | 120 | 40 | | 700 | 560 | 21 | 7 | 4000 + 3200 +120 + 700 + 560 + 21 = 8601 **or** 183 × 100 = 18 300 183 × 50 = 18 300 ÷ 2 =9150 183 × 3 = 549 9150 – 549 = 8601	86.01	3	M1 for a complete method to multiply 183 by 47 and attempt at addition (condone one multiplication error) A1 for digits 8601 given as the answer B1 (dep on M1) for correctly writing their answer to 2 decimal places

1MA0_1H

Question		Working	Answer	Mark	Notes
8			09 36	3	M1 for listing 9, 18, 27, 36, 45, ...(at least 3 correct multiples with at most one incorrect) M1 for listing 12, 24, 36, 48, ... (at least 3 correct multiples with at most one incorrect) A1 for 09 36 or 9 36 (am) **OR** M1 for listing 9.09 9.18 9.27 9.36 ...(at least 3correct times with at most one incorrect) M1 for listing 9.12 9.24 9.36 ... (at least 3 correct times with at most one incorrect) A1 for 09 36 or 9 36 (am) **OR** M1 for $9 = 3 \times 3$ **or** $12 = 2 \times 2 \times 3$ (could be in factor tree) M1 for $9 = 3 \times 3$ **and** $12 = 2 \times 2 \times 3$ (could be in a factor tree) A1 for 09 36 or 9 36 (am) **SC B2** for 9 36 pm or (after) 36 (minutes) on the answer line

5		$\pi \times 5 \times 1.80$	28.27	3	M1 for use of $\pi \times x$ (with $x = 5$ or $x = 2.5$) **or** $2 \times \pi \times x$ (with $x = 5$ or $x = 2.5$) M1 for $\pi \times 5 \times 1.8(0)$ **or** $2 \times \pi \times 2.5 \times 1.8(0)$ A1 for 28.26 or 28.27 or 28.28 or 28.3(0) or 28.8(0)

1MA0_2H

2			60	3	M1 for 200 ÷ 5 (=40) M1(dep) for '40' × 1.50 or '40' × 150 A1 cao OR M1 150 ÷ 5 (= 30) or 1.5(0) ÷ 5 (=0.3(0)) M1(dep) for 200 × '30' or 200 × '0.3(0)' A1 cao (If no marks scored, SC B1 for 120)

3		$\frac{9}{24}+\frac{8}{24}$	$\frac{17}{24}$	2	M1 for converting to two fractions with a correct common denominator, at least one fraction correct. A1 $\frac{17}{24}$ oe

5MB2H_01

Question		Working	Answer	Mark	Notes
12		4.2×10^5 1.3×10^5 3.0×10^{-5} -2.5×10^{-4} 5.2×10^3 OR 420000 130000 0.00003 −0.00025 5200	-2.5×10^{-4} 30×10^{-6} 0.0052×10^6 13×10^4 4.2×10^5	3	M1 for intention to reduce numbers to standard form A1 at least two numbers correctly changed into standard form A1 correct order (any form) OR M1 for intention to reduce numbers to ordinary form A1 at least two numbers correctly changed into ordinary form A1 correct order (any form) (SC B2 for correct ordering largest to smallest)

16			1	3	M1 $(\sqrt{5})^2 - 1$ or $\sqrt{25} - 1$ or $\sqrt{5} \times \sqrt{5} - \sqrt{5} + \sqrt{5} - 1$ or $\sqrt{25} - \sqrt{5} + \sqrt{5} - 1$ M1 (indep) use of $(\sqrt{5})^2 = 5$ or $\sqrt{5} \times \sqrt{5} = 5$ A1 cao

Original question 11

The full source mark scheme begins on page 405. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
1	(a)		331.705	1	B1 cao
	(b)		179300	1	B1 cao

Original question 19

The full source mark scheme begins on page 420. Use the original paper code, tier and question number shown above.

Original question 6

The full source mark scheme begins on page 442. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
8			10752	4	M1 for splitting the pentagon (or show the recognition of the "absent" triangle) and using a correct method to find the area of one shape M1 for a complete and correct method to find the total area M1 (dep on at least one prev M1) for multiplying their total area by 2.56 (where total area is a calculation involving at least two areas) A1 cao

Question		Working	Answer	Mark	Notes
1			13	2	M1 for $7.8(0) \div 6 \times 10$ or $7.8(0) \div 6$ or $7.8(0) \times 10$ or $\frac{10}{6}$ oe or $\frac{6}{10}$ oe A1 cao

PAPER: 1MA0_1H

Question		Working	Answer	Mark	Notes
7	(i)	20, 40, 60 12, 24, 36, 48, 60	3 and 5 or any multiple of 3, 5	4	M1 attempts multiples of both 20 and 12 (at least 3 of each shown but condone errors if intention is clear) or identifies 60 or a multiple of 60 M1 (dep on M1) for a division by 20 or 12 or counts up 'multiples' or identifies a common multiple (implied if one answer is correct or answers reversed) A1 cheese slices (packets) 3, burgers (boxes) 5 or any multiple of 3, 5 OR M1 for expansion of either 20 or 12 into factors M1 for demonstration that both expansions include 4 (or 2 × 2) A1 cao for cheese slices (packets) 3, burgers (boxes) 5
		$20 = 4\times5 = 2\times2\times5$ $12 = 4\times3 = 2\times2\times3$			
	(ii)		60		B1 for 60 or ft from their correct answer in (i) or ft 'common multiple'

14	(a)		$\frac{1}{5}$	1	B1 oe
	(b)		$\frac{1}{9}$	1	B1 cao
	(c)	$9\times10^4\times3\times10^3$	2.7×10^8	2	M1 27×10^7 oe or $9\times3\times10^{4+3}$ A1 cao

PAPER: 1MA0_1H

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	(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}

PAPER: 5MB3H_01

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}

PAPER: 5MB3H_01

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

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

Original question 13

The full source mark scheme begins on page 463. Use the original paper code, tier and question number shown above.

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)

2	(a)		Points plotted	1	B1 for points plotted at (12, 6) and (13, 2)
	(b)		Description	1	B1 for description; accept negative correlation.
	(c)		5 – 7	2	M1 for evidence of use of graph eg a single straight line segment with negative gradient that could be used as a line of best fit **or** an indication on the diagram from 12 on the *y* axis. A1 for 5 – 7

3			2.064(285714…)	2	M1 for substitution of 0.7 into expression or 2.89 or 2.06 seen A1 for 2.064(285714…) or $\frac{289}{140}$

14		12, 24, 36, 48, 60, 72, …. 8, 16, 24, 32, 40, 48, 56, 64, 72,…	25.80	5	M1 for listing at least 3 multiples of each of 12 and 8 or 24 in two lists of multiples or from factor trees M1 (dep) for attempt to find a common multiple of 12 and 8 above 60 (=72) M1 (dep M2) for method to find the number of boxes **and** the number of packs 72 ÷12 (=6) and 72 ÷ 8 (=9) M1 for finding the total cost by multiplying numbers by cost and adding eg "6" × 2.50 + "9" × 1.20 A1 for 25.8(0)

PAPER: 1MA0_2H

2	(a)		Point plotted	1	B1 for point plotted at (6,35)
	(b)			1	B1 for description of dynamic relationship or negative correlation
	(c)			1	B1 for single straight line of best fit which could be used to take readings
	(d)		21 - 26	1	B1 for answer in the range 21 - 26 or ft from single straight line segment (if previous B0)

PAPER: 5MB2H_01

Question		Working	Answer	Mark	Notes
8			blue paint 5 white paint 4	5	M1 attempts multiples of either 12 or 15 (at least 3 but condone errors if intention is clear) M1 attempts multiples of both 12 and 15 (at least 3 but condone errors if intention is clear) M1 (dep on M1) for a division of 60 by 12 or 15, or counts up "multiples" or answer blue : white in the ratio 5 : 4 A1 blue paint 5; white paint 4 OR M1 correct expansion of either number into factors M1 correct expansion of both number into factors M1 (dep on M1) demonstrates two expansions that include 3 oe A1 blue paint 5; white paint 4

PAPER: 5MB2H_01

Question		Working	Answer	Mark	Notes
11		$0.0034\times10^{5} = 340$ $34\times10^{-5} = 0.00034$ $-3.4\times10^{-3} = -0.0034$ $3.4\times10^{4} = 34\,000$ $34\times10^{2} = 3400$	-3.4×10^{-3} 34×10^{-5} 0.0034×10^{5} 34×10^{2} 3.4×10^{4}	3	M1 for changing at least 1 correctly to standard form or for changing at least 1 correctly to an ordinary number M1 at least 3 correct changes to standard form or at least 3 correct changes to ordinary numbers A1 ordered [S.C. B2 (if no working) for 4 in the correct order or all correct but reverse order]

PAPER: 1MA0_1H

Question		Working	Answer	Mark	Notes
1	(i)		3484	1	B1 cao
	(ii)		34.84	1	B1 cao
	(iii)		670	1	B1 cao
*2			Maths with correct comparative figure(s)	2	M1 for correct method to find figure(s) to compare, eg $\frac{32}{80}\times 100$ (=40) oe **or** 0.38×80 oe (=30.4) C1 for maths with 40% or 30.4 or $\frac{40}{100}$ and $\frac{38}{100}$ oe

Original question 6

The full source mark scheme begins on page 483. Use the original paper code, tier and question number shown above.

PAPER: 1MA0_1H

Question		Working	Answer	Mark	Notes
14			25	4	M1 for 600 ÷ 4 (=150) M1 for 4500 ÷ "150" (=30) M1 for 750 ÷ "30" A1 for 25 with supporting working **OR** M1 for 4500 ÷ 750 (=6) or 750 ÷ 4500 (= $\frac{1}{6}$) M1 for 600 ÷ 4 (=150) or 600 ÷ "6" (=100) or 600 × "$\frac{1}{6}$" (=100) M1 for "150" ÷ "6" or "100" ÷ 4 or 150 × "$\frac{1}{6}$" A1 for 25 with supporting working **OR** M1 for 4500 ÷ 750 (=6) or 750 ÷ 4500 (= $\frac{1}{6}$) M1 for $\frac{1}{4} \times \frac{1}{"6"} \left(= \frac{1}{24}\right)$ M1 for "$\frac{1}{24}$" × 600 A1 for 25 with supporting working

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)

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

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

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]

Original question 19

The full source mark scheme begins on page 504. Use the original paper code, tier and question number shown above.

9		40, 80, 120 15, 30, 45, 60, 75, 90, 105, 120 40 = 2 × 2 × 2 × 5 15 = 3 × 5	3 and 8 or any multiple of 3, 8	3	M1 for multiples of both 40 and 15 (at least 2 of each shown but condone errors if intention is clear) or for 40 × 15 M1 (dep on M1) for a complete method to find a common multiple of 40 and 15, eg. 120, 240, 600 condoning one arithmetic error in any lists of multiples shown A1 for 3, 8 or any multiple of 3, 8 OR M1 for factors 2,2,2,5 and factors 3,5 M1 (dep on M1) for a complete method to find a common multiple of 40 and 15 A1 for 3, 8 or any multiple of 3, 8

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*10			Has enough (with evidence)	5	M1 for splitting the shape (or showing recognition of the "absent" triangles) and using a method to find the area of one shape M1 for a complete method to find the total area, (= 9 m^2) M1 (dep on M1) for a method to find the number of packs required from their total area, eg. "9" ÷ 2 = 4.5 rounded up to 5 M1 for a method to find 75% of 24.80 or 75% of the cost of their total number of packs, eg. 24.80 × "5" × $\frac{75}{100}$ (= 93) or 24.80 × $\frac{75}{100}$ (= 18.6) C1 for a conclusion supported by fully correct answers, eg. showing 9 (m^2), 5 (packs) and 93 or 7 (from 100 – 93) OR M1 for method to find 75% of £24.80, eg. 24.80 × $\frac{75}{100}$ (= 18.6) M1 for method to find total number of packs Mary can buy, eg. 100 ÷ "18.60" = 5.3.... truncated to 5 or 10 (m^2) M1 for finding area of one relevant shape or showing how one pack (2 m^2) can fit in the diagram M1 (dep on previous M1) for complete method to show that 5 packs can cover the floor C1 for a conclusion supported by fully correct answers, showing the capacity (10) greater than total area (9)

PAPER: 1MA0_1H

Original question 5

The full source mark scheme begins on page 518. Use the original paper code, tier and question number shown above.

Original question 3

The full source mark scheme begins on page 541. Use the original paper code, tier and question number shown above.

11		0.0025 2.5×10^{-2} 2.5×10^{2} 2500	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)

14	(a)		1	1	B1 cao
	(b)		$\frac{1}{16}$	2	M1 for two of cube root, square, reciprocal A1 cao

Question	Working	Answer	Mark	Notes
1		71.40	2	M1 for 41.65÷7 A1 for 71.4(0)

2	(i)		19.44	2	B1 cao
	(ii)		19 440		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

Original question 5

The full source mark scheme begins on page 557. Use the original paper code, tier and question number shown above.

Original question 7

The full source mark scheme begins on page 557. Use the original paper code, tier and question number shown above.

Original question 11

The full source mark scheme begins on page 557. Use the original paper code, tier and question number shown above.

5MB3H_01 November 2015

Question		Working	Answer	Mark	Notes
5			17.6	3	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

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

5		44 - 56	2	B2 for 44 - 56 (B1 for 1000 or 900 or 20 or 18 or 19, unless it is clear these have not come from estimation)

Original question 7

The full source mark scheme begins on page 570. Use the original paper code, tier and question number shown above.

8		60	3	M1 for $\frac{16}{80}$ or $\frac{300}{80}$ oe M1 (dep) for $"\frac{16}{80}"\times 300$ or $"\frac{300}{80}"\times 16$ A1 cao

PAPER: 1MA0_2H

Question		Working	Answer	Mark	Notes
11			42.28	5	M1 for method to find weekly mileage, eg. 18 × 2 × 5 (= 180) or weekly car park charge, eg. 3.50 × 5 (= 17.50) M1 for method to find fuel used in a relevant journey, eg. "180" ÷ 45.2 (= 3.9823 gallons) or 18 ÷ 45.2 (= 0.39823 gallons) M1 for a correct use of the conversion factor to convert between gallons and litres, eg. "3.9823" × 4.546 (= 18.1 …. litres) or "0.39823" × 4.546 (= 1.81 …. litres) or 1.369 × 4.546 (= 6.22... £/gallon) or 45.2 ÷ 4.546 (= 9.94… miles/litre) M1 for a method to find the cost of a relevant journey, eg. "18.1…" × 1.369 (= 24.78 …) or "1.81…" × 1.369 (= 2.478 …) or "3.9823" × "6.22..." (= 24.78...) A1 for answer in the range 42.26 to 42.3(0) NB candidates could work in litres or in gallons and/or could work in £ or p

PAPER: 1MA0_2H

7		24, 48, 72, 96, 120, 144, 168, 192, 216, 240, 264, **288** 36, 72, 108, 144, 180, 216, 252, **288**	12 boxes of book marks 8 packs of dust covers	4	M1 attempts multiples of either 24 or 36 (at least 3 but condone errors if intention is clear) M1 attempts multiples of both 24 and 36 (at least 3 but condone errors if intention is clear) M1 (dep on M2) for a division of 250 or 288 by 24 or 36, or counts up "multiples" (implied if answers reversed) A1 for 12 boxes of book marks, 8 packs of dust covers (accept 15b, 10p), (18b, 12p), etc. SC B1 for 11b, 7p

Original question 1

The full source mark scheme begins on page 589. Use the original paper code, tier and question number shown above.

11		125 miles or 200 km	3	B1 for 5 miles = 8 km or equivalent statement or for $\frac{5}{8}$ or $\frac{8}{5}$ used correctly M1 for method to use the correct conversion to find 40 (km) or 150 (miles) or $240 \times r$ with $0.6 \leq r \leq 0.7$ or $25 \times s$ with $1.5 \leq s \leq 1.7$ A1 for 200 km or 125 miles (units must be given)

PAPER: 1MA0/1H

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

Original question 21

The full source mark scheme begins on page 608. Use the original paper code, tier and question number shown above.

11		$\frac{29}{35}$	4	M1 for writing both $4\frac{3}{5}$ and $2\frac{2}{3}$ or both $\frac{3}{5}$ and $\frac{2}{3}$, with a common denominator (a multiple of 15) with at least one correct numerator M1 for $4 - 2 + \frac{9}{15} - \frac{10}{15}$ $(= \frac{29}{15})$ or $\frac{69}{15} - \frac{40}{15}$ M1 for "$\frac{29}{15}$" $\times \frac{3}{7}$ A1 for $\frac{29}{35}$ oe single fraction	E

12	(a) (b)	 $5.86 \times 10^6 = 5\,860\,000$ $4\,200\,000 = 4.2 \times 10^6$ 5.3 million $= 5\,300\,000 = 5.3 \times 10^6$	0.00023 A C B	1 2	B1 cao M1 for one correct conversion to or from standard form or answer reversed. A1 for A C B or numbers in correct order	C G

2		40	2	M1 for 32 ÷ 20 (= 1.6) or 32 × 25 (= 800) or 20:25 (or use of) A1 cao

Original question 7

The full source mark scheme begins on page 630. Use the original paper code, tier and question number shown above.

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%

14		130	4	M1 for setting up two correct equations eg 3p + 4c = 440 4p + 3c = 470 M1 for adding the two equations eg 7p + 7c = 910 or for a correct method to eliminate one variable (allow one error) M1 for a method to find p + c eg 910 ÷ 7 or for a complete method to find both p and c (p = 80, c = 50) A1 for 130 or £1.30(p) **NB:** Allow any letters for variables. Allow a non-algebraic approach eg 7 kg potatoes and 7 kg carrots costs a total of 910

Paper: 1MA0/1H

10		72	4	M1 for "x" + 24 or "x" – 24 or for "g" and 5"g" M1 for forming an appropriate equation eg $x + 24 = 5(x – 24)$ or for $(5g – g) \div 2 = 24$ or $g = 12$ M1 for correct operations to isolate x terms and non-x terms in an equation of the form $ax + b = cx + d$ or $ax + b = c(x + d)$ or $x = 36$ or for $6 \times$ "12" oe A1 cao

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*11		No (supported)	5	M1 for π × 9 ÷ 2 (=14.137…) or π × 5 ÷ 2 (=7.85…) or for π × 9 (=28.27…) or π × 5 (=15.7…) M1 for complete method to work out perimeter eg 2 + 2 + (π × 9 ÷ 2) + (π × 5 ÷ 2) (= 25.99...) M1 (dep M1) for method to find number of rolls required for their perimeter, eg "their total perimeter" ÷ 2.4 eg 25.99..÷2.4 (=10.8), "47.97.."÷2.4 (=19.9) or "43.47.." ÷2.4 (=18.3) M1 for method to work out cost eg 3×10 + 2×3.99 (= 37.98) or 11 × 3.99 (=43.89), 20 →67.98, 19→63.00 or for method to find how many rolls can be bought for £35 (= 10) C1 for a conclusion supported by fully correct answers eg 37.98 (for comparing with 35) e.g 10.8 and 10 OR M1 for π × 9 ÷ 2 (=14.137…) or π × 5 ÷ 2 (=7.85…) or for π × 9 (=28.27…) or π × 5 (=15.7…) M1 for complete method to work out perimeter eg 2 + 2 + (π × 9 ÷ 2) + (π × 5 ÷ 2) (= 25.99...) M1 for a method to find how many rolls can be bought for £35 (=10) M1 for a method to work out the coverage of 10 rolls e.g. 10 × 2.4 (=24) C1 for a conclusion supported by fully correct answers eg 25.9(...) and 24

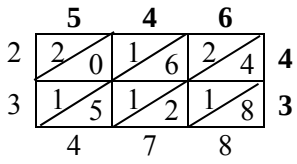
Original question 11

The full source mark scheme begins on page 643. Use the original paper code, tier and question number shown above.

Original question 16

The full source mark scheme begins on page 643. Use the original paper code, tier and question number shown above.

Question	Working	Answer	Mark	Notes
1 (a)		10,19	B1	cao
(b)		positive	C1	positive (correlation)
(c)		12 to 13	M1	for an appropriate line of best fit drawn, or a point marked at (x, 16.4) or a horizontal line drawn from 16.4 across to (x, 16.4) where x is in the range 12 to 13
			A1	hours given in the range 12 to 13
(d)		explanation	C1	(yes) e.g. as the majority of points for high temperature appear when there are more hours of sunshine (positive correlation)

3	21840 1638 23478  20000 + 1600 + 240 + 1500 + 120 + 18 = 23478	234.78	M1 A1 A1	for complete method with relative place value correct including addition of all the appropriate elements of the calculation e.g. two lines of 1st method, internal numbers of grids, or complete structure shown of partitioning methods for digits 23478 (ft dep M1) for correct placement of the decimal point into their final answer

	500	40	6
40	20000	1600	240
3	1500	120	18

Question	Working	Answer	Mark	Notes
5		70.5	P1	starts process of Pythagoras e.g. $5^2 + 12^2$
			P1	complete process for Pythagoras e.g. $\sqrt{5^2+12^2}$ or $\sqrt{25+144}$ or $\sqrt{169}$ (=13)
			P1	(dep P1 for Pythagoras) process of adding all the lengths e.g. 5 + 5 + 12 + 12 + "13" (=47)
			P1	(indep) process of multiplying at least 2 lengths by 1.5
			A1	cao SC: any evidence of working with Pythagoras award the P1 or P2

12		3 : 4 : 11	P1 P1 A1	Makes a start e.g. by using multipliers e.g. 1 + 5 = 6 and 7 + 11 = 18 and 6 × 3 = 18 or $AB:BD = 3:15$ or $x=3y$ (appropriate x and y shown) or $\frac{1}{6} = \frac{3}{18}$ Complete process to find ratios e.g. (7 + 11) ÷ (1 + 5) = 3 and 1 × "3" : 7 − ("3" × 1) : 11 oe

8		0.246, 0. $\dot{2}4\dot{6}$ 0.24$\dot{6}$, 0.24$\dot{6}$	M1 A1	for correct use of recurring symbol eg 0.24$\dot{6}$ = 0.24646… **or** 3 terms in the correct relative position cao

10	(a)		10	B1	accept ±10
	(b)		25	M1	for $(\sqrt[3]{125})^2$ **or** $\sqrt[3]{125} = 5$ **or** $125^2 = 15625$ **or** $\sqrt[3]{125^2}$
				A1	cao

Paper: 1MA1/1H

Question	Working	Answer	Mark	Notes
11		Tea £1.40 Coffee £1.80	P1 M1 M1 A1	for setting up two appropriate equations eg $3t + 2c = 7.80$, $5t + 4c = 14.20$ for method to eliminate one variable, condone one arithmetic error for method to substitute found variable or start again Tea £1.4(0) and Coffee £1.8(0) with amounts linked to correct drinks

Question	Working	Answer	Mark	Notes
9		65.60	P1	for start in using inverse proportionality, eg 5×4.5 (= 22.5) or $4.5 = \frac{k}{5}$ or $5 \times 4.5 \times 60$ (= 1350) or $\frac{5}{3}$ or $\frac{3}{5}$
			P1	for process to find number of hours for each cleaner today, eg $\frac{22.5}{3}$ (= 7.5)
			A1	for 65.6(0) (SC B2 for 61.5(0))

5	(a)		0.625	B1	cao
	(b)		$9.75 \leq x < 9.85$	B2	for $9.75 \leq x < 9.85$
				[B1	for 9.75 or 9.85 (or $9.84\dot{9}$)]

7		0.000 745 2	M1 A1	digits 7452 seen cao

Paper: 1MA1/3H

9	(a)	6	B1	cao	Accept ±6
	(b)	1	B1	cao	
	(c)	$\frac{1}{9}$	M1	for evidence of working with a cube root eg $\sqrt[3]{27}$ or $\sqrt[3]{729}$ **OR** evidence of working with a reciprocal eg $\frac{1}{27^{2/3}}$ or $\left(\frac{1}{27}\right)^{\frac{2}{3}}$	
			A1	cao	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
14	240	M1	for start to method to find total number of matches, eg 16×15 or $16^2 - 16$ or $16 \times 15 \times 2$ (= 480) or $\frac{16 \times 15}{2}$ (= 120)	Credit complete listing strategies
		A1	cao	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
1	9	M1	for a correct first step, using the laws of indices to simplify eg. 3^2 or 3^{7+-2} or 3^{7-3} or 3^{-2-3} OR for using exact values, eg. $2187 \times \frac{1}{9}$ (= 243) or $2187 \div 27$ (= 81) or $\frac{1}{27\times9}$ $(=\frac{1}{243})$	
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
4 (a)	200	M1	for 120 × 5 ÷ 3 oe	
		A1	cao	
(b)	statement	C1	Statement that each tap fills at the same rate or that the rate does not change over time Examples **Acceptable responses:** Taps are running at the same speed They (clearly referring to taps) all fill the pool with the same volume of water The amount of water is the same in the same time (again referring to taps) Each tap is doing a fifth of the filling That all taps take equal time to fill the pool All taps produce the same amount of water That the water flow stays at the same rate over the whole time. **Non acceptable responses** It will take more time because there are less taps The less taps used the longer it takes to fill the pool That 1 tap can take up to 24 mins each 3 taps will take longer to fill the pool	Any statement referring to the same amount of water flowing from each tap is acceptable.

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	7360	B1	cao	
(b)	0.1077981356	B2	for 0.1077(981…)	Answer must be given to at least 4 decimal places rounded or truncated
		(B1	for 5.74(45626…) **or** 53.29 **or** 0.11 **or** 0.107 **or** 0.108)	Accept a clear indication of the decimal point. Check first four decimal places only

13	408	M1 A1	for 1.01 × 400 (= 404) or 408.04 or 412.08 cao	412(.08) on the answer line M1A0 1.01 × 400 may be seen as part of a calculation

2	(a)	600	P1	for starting process to calculate amount of flour eg $60 \div 15$ (= 4) **or** 3×50 (= 150)	4 implied by 200g of sugar
			P1	for complete process eg $\frac{60}{15} \times$ "150"	
			A1	cao	
	(b)	2	P1	for process to calculate amount of butter eg $\frac{60}{15} \times 2 \times 50$ (= 400) **OR** for process to calculate the number of packs of butter needed eg [butter] ÷ 250	[butter] must be clearly stated or calculated, may be seen in part (a)
			A1	cao	2 must not come from incorrect working

Paper: 1MA1/1H

12	Explanation	C1	for explanation eg needs to find 4th root or gives the correct answer of 2.828… **Acceptable examples:** He needs to find $\sqrt[4]{64}$ It should be 2.8..(or $2\sqrt{2}$) It is not asking for 64 ÷ 4, it is asking what number to the power of 4 = 64 $64^{\frac{1}{4}}$ means the fourth root not a quarter of 64 $64^{\frac{1}{4}}$ means square root and square root again, not divide by 4 **Not acceptable examples:** It should be 2 The expression is 64 to the power of $\frac{1}{4}$ $64^{\frac{1}{4}}$ is not a $\frac{1}{4}$ of 64	

Paper: 1MA1/3H

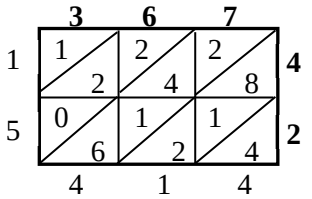
2	(a)	157.668(255)	M1	for 836.4 **or** 5.304(809139) **or** 28.141 **or** a truncated or rounded version of 157.668255 to no less than 3 sf	
			A1	for 157.668(255)	Answer must be given to at least 3 decimal places rounded or truncated Accept a clear indication of the decimal point. Check first 3 decimal places only
	(b)	157.7	B1	ft from part (a) provided answer to (a) has at least 5 sf	

9	0.000 672, 67.2×10^{-4} 6.72×10^{5} 672×10^{4}	B2 (B1	cao for correct conversions to same format, condoning one error **or** for 3 numbers in the correct order (ignoring one) **or** for all 4 numbers listed in reverse order)	Accept correct numbers in any form

Paper: 1MA1/1H

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
19	788.4	P1	for substituting values, eg $1040 = K \times 1200 + 20$	
		P1	for process to find K, eg $(1040 – 20) \div 1200$ oe (= 0.85)	
		P1	for complete process, eg 09 17: "0.85" × 1040 + 20 (= 904); 09 18: "0.85" × "904" + 20	
		A1	for 788.4 or 788 or 789	

Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	15.414	M1	for a complete method with relative place value correct including intention to add all the appropriate elements of the calculation eg 2 lines of the 1st method, internal numbers of grids, or complete structure shown of partitioning methods.	14680 734 15414  300 60 7 40 12000 2400 280 2 600 120 14 12000 + 2400 + 280 + 600 + 120 + 14 = 15414
		A1	for digits 15414	
		A1	(ft) dep on M1 for correct placement of the decimal point into their final answer	
(b)	37.4	M1	for a start to a method, eg 598.4 ÷ 16 (or 59.84 ÷ 1.6) = 3 (as a first digit)	A start to a repeated subtraction method or build-up method is acceptable if a correct first digit of 3 is found
		A1	for digits 374	
		A1	(ft) dep on M1 for correct placement of the decimal point into their final answer	

Paper: 1MA1/1H

9	(a)	1	B1	cao	
	(b)	3	B1	cao	
	(c)	$\frac{1}{16}$	B1	oe	
	(d)	3	B1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
2	12.85 or 12.86 or 13.5(0)	P1	for 9 + 2 + 1 (= 12)	Award this mark for sight of 4500, 1000 or 500
		P1	for working out how many lots of 175g are needed eg 6000 ÷ "12"× 2 ÷ 175 (= 5.71...)	Process may lead to 5 or 6 instead of 5.71...
		P1	for a complete process eg "5.71..." × 2.25 (= 12.857...)	"5.71…" (ft) may be rounded or truncated.eg "6"
		A1	for 12.85 or 12.86 or 13.5(0)	

Question	Answer	Mark	Mark scheme	Additional guidance
9 (a)	4	P1 A1	12 × 5 ÷ 15 cao	
(b)	Statement	C1	**Acceptable examples** it could take more time it could take less time it could take more or less time it would take longer if they worked at a slower rate **Not acceptable examples** the time will be less as there are more people if the rate at which the 15 people work changes it would have taken longer it would take less time	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
18	16	M1	for working with square root **or** with reciprocal in $\left(5\frac{4}{9}\right)^{-\frac{1}{2}}$ eg $\left(\frac{9}{49}\right)^{\frac{1}{2}}$ or $\frac{1}{\sqrt{\frac{49}{9}}}$ or $\frac{1}{\left(\frac{49}{9}\right)^{\frac{1}{2}}}$ or $\left(\frac{7}{3}\right)^{-1}$ or $\frac{3}{7}$	
		M1	for a full method to simplify the numerator eg $\frac{3}{7}\times\frac{14}{3}$ $(=2)$	
		M1	for showing $\div 2^{-3}$ as $\times 8$, eg $\frac{3}{7}\times\frac{14}{3}\times 8$ **or** for $2^1 \div 2^{-3}$ $(=2^4)$ **or** for correctly reducing the expression to a single calculation, eg $\frac{336}{21}$ or $\frac{112}{7}$ or $2\div\frac{1}{8}$	May be seen at any time during the calculation
		A1	cao	Award 0 marks for a correct answer with no supportive working

Paper: 1MA1/1H

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
11	Shown	M1	for 6 × 14.5 (= 87) **or** 13 × 7 (= 91) **or** 13 ÷ 6 (= 2.16(666…))	May work in hours or other units of time
		M1	for "87" ÷ 7 (= 12.428...) **or** "87" ÷ 13 (= 6.692…) **or** 6 × 14.5 (= 87) **and** 13 × 7 (= 91) **or** 14.5 ÷ "2.16" (= 6.692...)	Accept figure rounded or truncated to 1dp
		C1	(dep M2) for 12.(428…) (workers) **or** 6.69(2…) (days) **or** 87 **and** 91	Figures must be correct and supported by working. Accept value in range 6.69 to 6.72 for number of days

4	0.00128	M1 A1	for digits 128 **or** for correct placement of the decimal point following one arithmetical error, eg $32 \times 4 = 138$ with an answer of 0.00138 for 0.00128 **or** 1.28×10^{-3}	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
17	$\frac{16}{81}$	M1	for showing the cube root of 8 = 2 **and** the cube root of 27 = 3 **or** an intention to find the cube root and raise to power 4 eg $\sqrt[3]{\left(\frac{8}{27}\right)^4}$ or $\left(\sqrt[3]{\frac{8}{27}}\right)^4$ or $\left(\frac{2}{3}\right)^4$	
		A1	cao	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
1	56.4	M1	for a start to a method, eg 846 ÷ 15 or 8.46 ÷ 0.15 or 8.46 ÷ 3 × 20 or 282 ÷ 5 that leads to 5 as the first digit **or** for a complete method with no more than one arithmetic error	A start to a repeated subtraction method or a build-up method is acceptable if a correct first digit of 5 is found
		A1	for digits 564 identified	
		A1	(ft) dep on M1 for correct placement of the decimal point into their final answer	An answer of $56\frac{2}{5}$ gets 3 marks

Question	Answer	Mark	Mark scheme	Additional guidance
18	(c) 30 (t) 54	P1	for setting up an equation, eg $7c + 5t = 480$ **or** $c : t = 5 : 9$ **or** $\frac{c}{t} = \frac{5}{9}$ **or** $9c = 5t$ **or** for starting to work with ratio of total costs, eg 7×5 (= 35) **and** 5×9 (= 45) or $7 \times \frac{5}{14}$ **and** $5 \times \frac{9}{14}$ or $35 : 45$ or $7 : 9$	
		P1	for a process to eliminate c or t from correct equations, eg $7c + 9c = 480$ or $7 \times \frac{5t}{9} + 5t = 480$ or $7c + \frac{9c}{5} \times 5 = 480$ **or** for 480 ÷ (“35” + “45”) (= 6) **or** for a process to find total cost of carrots or total cost of tomatoes, eg 480 ÷ (“7” + “9”) × 7 (= 210) **or** 480 ÷ (“7” + “9”) × 9 (= 270)	
		P1	for a process to isolate t or c, eg $16c = 480$ or $80c = 2400$ oe or $80t = 4320$ oe **or** for one value correct eg $c = 30$ or $t = 54$ **or** for a process to find cost of 1 kg of carrots or 1 kg of tomatoes, eg 5 × “6” (= 30) **or** 9 × “6” (= 54) **or** “210” ÷ 7 (= 30) **or** “270” ÷ 5 (= 54)	
		A1	cao	

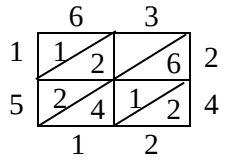
Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	1.765(2...)	M1	for fully evaluating the numerator or denominator, eg 18.3... or 10.4(1) **or** answer of 1.76 or 1.77 **or** digits 1765(2...)	
		A1	for 1.765(2.....)	Answer must be given to at least 3 decimal places rounded or truncated. Check first 4 significant figures only.
(b)	1.6	B1	for 1.6 oe	

4	17.5	P1 A1	for a first step, eg 5 × 14 (= 70) or 14 ÷ 4 (= 3.5) or 5 ÷ 4 (= 1.25) or 4 ÷ 5 (= 0.8) oe	Could be done algebraically. 11.2 as answer scores no marks.

Paper: 1MA1/3H

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
1	15.12	M1	for a complete method with relative place value correct including an intention to add all the appropriate elements of the calculation	252 1260 1512  | | 60 | 3 | |---|---|---| | 20 | 1200 | 60 | | 4 | 240 | 12 | 1200 + 60 + 240 + 12 = 1512
		A1	for digits 1512	
		A1	(dep on M1) for correct placement of the decimal point into their final answer	

14	17	M1 M1 A1	for $27^{\frac{2}{3}} = \left(\sqrt[3]{27}\right)^2$ or 3^2 or $\sqrt[3]{27^2}$ or $\sqrt[3]{729}$ **or** $\left(\frac{1}{2}\right)^{-3} = \frac{1}{\left(\frac{1}{2}\right)^3}$ or 2^3 for a full method eg "3"^{2} + "2"^{3} or for correctly evaluating $27^{\frac{2}{3}}$ or $\left(\frac{1}{2}\right)^{-3}$ eg 9 or 8 seen cao	

<table>
<tr>
<td>3 (a)</td>
<td>24.6</td>
<td>M1

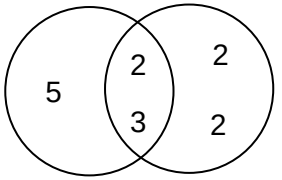
M1

A1</td>
<td>for finding 5 products within intervals (including end points) with not more than one error, may be seen near table.
eg 2 × 12.5 (= 25), 8 × 17.5 (= 140), 13 × 22.5 (=292.5),
21 × 27.5 (= 577.5), 6 × 32.5 (= 195)
or for 1230

for $\Sigma fx \div \Sigma f$
eg (“25” + “140” + “292.5” + “577.5” + “195”) ÷ “50”
or “1230” ÷ “50”

for 24.6 oe</td>
<td>
<table>
<tr><th>Min fx</th><th>Max fx</th></tr>
<tr><td>20</td><td>30</td></tr>
<tr><td>120</td><td>160</td></tr>
<tr><td>260</td><td>325</td></tr>
<tr><td>525</td><td>630</td></tr>
<tr><td>180</td><td>210</td></tr>
</table>
Σfx must come from 5 products,
fx within intervals (including end points)
</td>
</tr>
</table>

Paper: 1MA1/3H				
Question	**Answer**	**Mark**	**Mark scheme**	**Additional guidance**
(b)	No, with reason	C1	for No **and** reason **Acceptable examples** No, the median is in the interval $25 < T \leq 30$ No, the median is in the group containing the 25(.5)th temperature No, she did not take into account frequency No, the frequencies are not the same for each group. **Not acceptable examples** No, the median is 27.5 No, the median is higher than 22.5 $25 < T \leq 30$ Yes, …	Any incorrect statement as part of a correct response can be ignored unless it contradicts the statement.

5	4 packs and 5 boxes,	P1	for start of a process to find common multiples of 30 and 24, eg writes down at least 3 multiples of 30 and at least 3 multiples of 24 **or** draws factor trees for both 30 and 24 with no more than 1 error in total **or** draws a correct Venn diagram	30, 60, 90, 120, 150, 180, 210, 240 … 24, 48, 72, 96, 120, 144, 168, 192, 216, 240, … Condone the inclusion of 1 in factor trees or Venn diagrams for this mark 
		P1	for identifying a common multiple eg 120 or 240 or $5 \times 3 \times 2 \times 2 \times 2$ oe	May use any common multiple, 120, 240, 360...
		A1	for 4 packs and 5 boxes or any multiple of this pairing eg 8, 10	Award 0 marks for a correct answer without correct supportive working.

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
6	20	M1 A1	for 30 × 4 ÷ 6 oe cao	

Question	Answer	Mark	Mark scheme	Additional guidance
2 (a)	$2\frac{2}{15}$	M1	for a method to subtract using a common denominator with at least one fraction correct (suitable common denominator for original fractions with at least one correct numerator) eg $\frac{57}{15}-\frac{25}{15}$ **or** $(3)\frac{12}{15}-(1)\frac{10}{15}$	Use of decimals gets no credit unless it leads to a correct fraction
		A1	for $2\frac{2}{15}$ oe eg $\frac{32}{15}$	ISW incorrect conversion from improper fraction to mixed number or incorrect simplification of improper fraction
(b)	Mistake identified	C1	for explaining that Kevin did not convert to the correct mixed number **Acceptable examples** In his answer $\frac{9}{24}$ should have been $\frac{11}{24}$ The 9 should be 11 He has not got the numerator right in his final answer He simplified into the mixed number incorrectly He has not put the remainder as the numerator $1\frac{9}{24}$ would give you $\frac{33}{24}$ rather than $\frac{35}{24}$ $\frac{35}{24}=1\frac{11}{24}$ **Not acceptable examples** He should have used a common denominator He has not simplified his answer He should have done keep, flip, change He converted the fraction wrongly The answer should be $1\frac{10}{24}$	Figures may be seen in the question space

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
3 (a)	Yes (supported)	P1	for a process to find the area of one shape, eg 10×8 (= 80) **or** 10×5 (= 50) **or** 8×6 (= 48) **or** $(10 - 6) \times 5$ (= 20) **or** $(10 - 6) \times (8 - 5)$ (= 12) **or** $6 \times (8 - 5)$ (= 18) **or** 5×6 (= 30)	Do not award this mark if they go on to multiply by a third length
		P1	for a complete process to find the total area, eg "80" – "12" (= 68) or "50" + "18" (= 68) or "48" + "20" (= 68)	
		P1	for a complete process to find the area covered by 3 tins eg $3 \times 2.5 \times 10$ (= 75) **or** for a complete process to find the number of litres needed eg "68" ÷ 10 (= 6.8) or [area] ÷ 10 **or** for a complete process to find the number of tins needed eg "68" ÷ 10 ÷ 2.5 (= 2.72) or [area] ÷ 10 ÷ 2.5	[area] is what they believe to be the area
		A1	for 'Yes' supported by correct figures eg 68 (m^2) **and** 75 (m^2) **or** 6.8 (litres) **and** 7.5 (litres) **or** 68 (m^2) **and** 2.72 (tins needed)	Ignore incorrect amount of paint left over if correct figures seen
(b)	No effect (supported)	C1	ft from (a) for "has no effect" with reason **Acceptable examples** No effect, she will need less paint It won't change, she will still have enough No, she will have more paint left over No, as this will cover 82.5m^2 **Not acceptable examples** Petra will need less paint She will have more paint left over She won't have enough paint She will need more paint	Must have a decision in (a) Must include a decision eg yes / no / no effect If figures included in the statement they must be correct for their [area] in (a)

Paper: 1MA1/1H

3	4	M1 A1	for method to use formula, eg $72 \div 6\ (=12)$ or $72 \div 9\ (=8)$ cao	Can be implied by $\frac{72}{6}$ or $\frac{72}{9}$

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
1	682	M1	for a start to a method, eg 8184 ÷ 12 (or 818.4 ÷ 1.2) that leads to 6 as the first digit **or** for a complete method with no more than one arithmetic error	A start to a repeated subtraction method or build-up method is acceptable if a correct first digit of 6 is found
		A1	for digits 682	
		A1	ft (dep M1) for correct placement of the decimal point into their final answer	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	10	M1	for $25^{\frac{1}{2}} = 5$ **or** $8^{\frac{1}{3}} = 2$	Accept $25^{\frac{1}{2}} = -5$ for M1 only
		A1	cao	
(b)	$\frac{1}{8}$	M1	for $\left(\frac{1}{\sqrt[5]{32}}\right)^3$ **or** $\left(\frac{1}{2}\right)^3$ **or** $\sqrt[5]{\frac{1}{32^3}}$ **or** $\sqrt[5]{\frac{1}{32768}}$	
		A1	for $\frac{1}{8}$ oe SCB1 for answer of 8 if M0 scored	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
1	4.643(069317)	M1	for 192.6 **or** 8.934 **or** 21.558(09268) **or** answer of 4.64 **or** digits 4643…	
		A1	for 4.643(069317)	Answer must be given to at least 3 decimal places rounded or truncated Check first 3 decimal places only If given to 3 dp or better ignore subsequent rounding

14	180	M1 A1	for $10 \times 9 \times 4\ (=360)$ **or** $10 \times 9 \times 4 \div 2$ **or** $10 \times 9 \div 2\ (=45)$ **or** $(9\times4)+(8\times4)+(7\times4)+(6\times4)+(5\times4)+(4\times4)+(3\times4)+(2\times4)+(1\times4)$ oe cao	

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
5	10 000	M1	for recognising 8000 is $\frac{4}{5}$ eg 8000 ÷ 4 (= 2000) **or** $\frac{4}{5} = 8000$ **or** 8000 = 80% or 8000 ÷ 80 (= 100) **or** $x \times 0.8 = 8000$	
		M1	for a complete method, eg "2000" × 5 **or** $8000 \times \frac{5}{4}$ **or** "100" × 100 **or** $\frac{8000}{0.8}$	
		A1	cao	

Paper: 1MA1/2H

GCSE

Mark Scheme

Mathematics A (1387)

June 2003

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CONTENTS

Notes on Marking Principles 2
Paper 5501 4
Paper 5502 11
Paper 5503 17
Paper 5504 24
Paper 5505 32
Paper 5506 40

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.

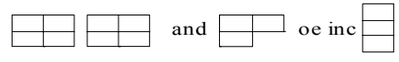
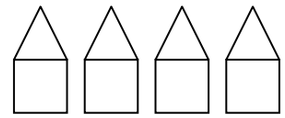
9 Parts of questions

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

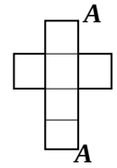
Paper 5501

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 $\frac{2}{3}$

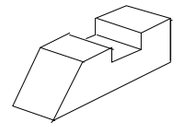
Paper 5501

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)

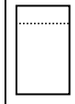
Paper 5503

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

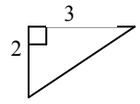
No	Working	Answer	Mark	Notes
11 (a)	Bryani was correct $4 \times 3^2 = 4 \times 9 = 36$	Bryani	2	M1 for 4×9 or $4 \times 3 \times 3$ or "square the three/x then multiply by four" A1 Bryani **SC** 4×3^2 with Bryani gets B2
(b)			1	B1 cao
12 (a)			3	B2 for rectangle height 4 squares, base 3 squares (B1 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.× 100 ×100 A1 cao
10 (a)	∑f = 90 (88), 144, 32, 96	Angles drawn, labelled	3	M1 for 1 person = 4°or one angle correct in table or pie chart A1 any 2 angles correctly drawn in pie chart A1 fully correct chart labelled
(b)	0.38 + 0.27 + 0.15	0.20	2	M1 1 – sum A1 cao
11	0 | 5 7 8 8 1 | 0 0 0 0 2 5 5 5 6 2 | 0 0 0 4 5 3 | 3 5 Key 1 | 3 = 13 (min)	See working column	3	B1 for stem 0, 1, 2, 3 or 0, 10, 20, 30 B1 for accurate unordered leaves condone 1 error or omission B1 for key and ordered leaves all correct
12 (a)	$V = \pi \times 4^2 \times 10$	502 – 503	2	M1 for $\pi \times 4^2 \times 10$ A1 502 – 503
(b)	$P^2 = 10^2 + 8^2$ $P = \sqrt{164}$	$\sqrt{164} < 13$	3	M1 for sight of a correct right-angled triangle M1 for $10^2 + 8^2$ A1 for conclusion based on a correct calculation or 12.8 seen
13 (a)	2 × 30	2 × 2 × 3 × 5	4	M1 for systematic method, eg division, factor trees (at least one prime) A1 cao
	2 × 48	$2^5 \times 3$		M1 for systematic method, eg division, factor trees (at least one prime) A1 cao
(b)		12	1	B1 cao
(c)	$2^5 \times 3 \times 5$	480	2	B2 cao B1 for $2^5 \times 3 \times 5$ or any correct common multiple

Paper 5504

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

Paper 5504

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

Paper 5504

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

Paper 5504

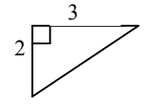
No	Working	Answer	Mark	Notes
22 (a)		No, as you would expect about 100. Yes, as it is possible to get 200 sixes with a fair dice	1	B1 for a consistent answer
(b)	$\frac{1}{6}, \frac{5}{6}$ + labels		3	B1 for $\frac{5}{6}$ on the red dice, *not six* branch B1 for a fully complete tree diagram with all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

Paper 5505

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

Paper 5505

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



Paper 5505

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

Paper 5505

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

Paper 5505

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

Paper 5505

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

Paper 5505

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

Paper 5505

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506				
No	**Working**	**Answer**	**Mark**	**Notes**
9	$\frac{6\times10^{15}}{3.2\times10^{8}}$ 1.875×10^{7}	4.3×10^{3}	3	B3 for 4.3×10^{3} to 4.34×10^{3} (B2 for 1.875×10^{7} oe or 4300 to 4340, final answer of 1.9×10^{7} B1 for sight of 6×10^{15} oe or 3.2×10^{8} oe)
10	$8.5\times\tan38$ $=8.5\times0.7813$ $\frac{8.5}{\sin(90-38)}=\frac{AB}{\sin38}$ $AB=\frac{8.5\times\sin38}{\sin(90-38)}$ $=\frac{5.2331}{0.788}=6.64$	6.64	3	M1 for correct use of trig, eg $\tan 38=\frac{opp}{8.5}$ M1 for $8.5\times\tan38$ A1 6.64 – 6.641 OR M1 for correct substitution into the sine rule M1 (dep) for correct rearrangement for $AB=$ A1 6.64 – 6.641
11 (a)		No, as you would expect about 100. Yes, as it is possible to get 200 sixes with a fair dice	1	B1 for a consistent answer See additional sheet

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

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

Paper 5506

No	Working	Answer	Mark	Notes
15 (a)	$4a^2 - 4a + 1 - (4b^2 - 4b + 1) =$	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 $4\left(a^2 + ab - a - ba - b^2 + b\right)$
	$4(a^2 - b^2) - 4(a - b)$ $4(a - b)(a + b - 1)$			
	OR $((2a - 1) - (2b - 1))((2a - 1) + (2b - 1))$ $(2a - 2b)(2a + 2b - 2)$			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)	$g_L = \dfrac{2 \times 4.495}{1.35^2 \times \sin 30.5}$	9.719	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
	$g_u = \dfrac{2 \times 4.505}{1.25^2 \times \sin 29.5}$	11.710		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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June 2007

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Mark Scheme

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Table Of Contents

Notes on Marking Principles	3 - 4
5521 / 01 Mark Scheme	5 - 11
5521 / 02 Mark Scheme	12 – 17
5523 / 03 Mark Scheme	18 – 27
5523 / 04 Mark Scheme	28 – 35
5525 / 05 Mark Scheme	36 – 43
5525 / 06 Mark Scheme	44 - 52

NOTES ON MARKING PRINCIPLES

1 **Types of mark**

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

2 Abbreviations

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

3 No working

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

4 With working

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

5 Follow through marks

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

6 Ignoring subsequent work

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

7 Probability

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

8 Linear equations

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

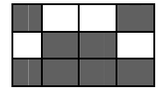
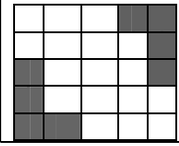
9 Parts of questions

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

Remember: if you are having difficulty making a decision on how you should mark a candidate response contact your Team Leader for advice, or send the item to review.

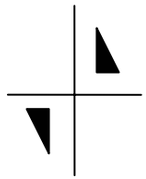
Paper 5521_01					
No		Working	Answer	Mark	Notes
1		Cat |||| /||| 8 Dog |||| | 6 Fish || 2 Hamster |||| 4	8, 6, 2, 4	3	M1 for attempt to tally or one frequency correct in either column A1 for 1 frequency correct or all tallies correct in correct column A1 for all frequencies correct (accept if /20)
2			27, 35, 42, 67, 118	1	B1 cao
3	(a)		Diameter drawn	1	B1 for a diameter
	(b)		Right angle marked	1	B1 *R* marked correctly
	(c)		Rectangle drawn	1	B1 for a rectangle
4	(a)		40	1	B1 cao
	(b)		50	1	B1 cao
	(c)		3 full loaves 4 full loaves + 1 half loaf	2	B1 for 3 full loaves B1 for 4 full loaves + 1 half loaf
5	(a)		7252	1	B1 cao
	(b)		Three thousand and eighty six	1	B1 accept 3 thousand and eighty six (condone 0 hundred)
	(c)		4600	1	B1 accept 4600
	(d)		200	1	B1 for 200 or 2 hundred or 100 or hundred
6	(i)		Cube	2	B1 for 'cube' (accept 'cuboid') ignore spelling
	(ii)		Cylinder		B1 for 'cylinder' ignore spelling
7		5×100	500	2	B2 for 490 or 500 or 510 (B1 for either 5 or 5.0 or 100 seen)

Paper 5521_01					
No		Working	Answer	Mark	Notes
8	(a)		8.4 cm or 84 mm	2	B2 allow ±2mm (B1 for 8.4 or 84, B1 for appropriate unit)
	(b)		37°	1	B1 allow ±2°
9	(a)		Carbon black	1	B1 accept 'black carbon' accept 26%
	(b)		0.1(0)	1	B1 cao
	(c)		0.04	1	B1 cao
	(d)	$\frac{26}{100}$	$\frac{13}{50}$	2	M1 for $\frac{26}{100}$ A1 cao
10	(a)		97	1	B1 cao
	(b)		London Reading	1	B1 cao
	(c)	41 + 57 + 58	156	3	M1 for two of 41, 57, 58 M1(dep) for '41' + '57' + '58' A1 cao
11	(a)		3	1	B1 cao allow ± 0.2
	(b)		–5	1	B1 cao allow ±0.2

Paper 5521_01					
No		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		Centimetres (cm) miles litres (*l*)	3	B3 (B1 for each correct answer) accept abbreviations
	(b)		300	1	B1 cao
	(c)	'1500>1400' or '1.5>1.4'	Reason	1	B1 for No and '1500>1400' or '1.5>1.4'
13	(a)	Height of bars 12, 8, 6 lines drawn between points	Bars drawn	2	B2 for 3 bars correctly drawn (B1 for 2 bars correct)
	(b)		July and August	1	B1 oe
	(c)	24 – 4	20	1	B1 (Accept '4 to 24' oe)
	(d)	The temperatures are rising	Temp's rising oe	1	B1 for reason
14	(a) (i)		$(-4, 3)$	2	B1 cao
	(ii)		$(2, -1)$		B1 cao
	(b) (i)	*D* marked at $(-4, -1)$	Point marked on grid	2	B1 for point marked at $(-4, -1)$ cao
	(ii)		$(-4, -1)$		B1 ft
15	(a)			1	B1 cao
	(b)			1	B1 cao

Paper 5521_01				
No	**Working**	**Answer**	**Mark**	**Notes**
16 (a)		(Pat +) reason	1	B1 correct comment (Pat may be implied)
(b)	21 ÷ 3	7	1	B1 cao
17 (i)		S marked at 1	3	B1 for S within ½ cm of 1
(ii)		P marked at 0		B1 for P marked at 0 cao
(iii)		Q marked at "1/3"		B1 for Q marked at 1/3 ± 1 cm use overlay
18	6 + 6 + 3 or $2\frac{1}{2}\times 6$	15	3	M1 for realizing 6 glasses in one bottle M1 for realizing 3 glasses in ½ a bottle A1 cao (M2 for attempt to find $2\frac{1}{2}\times 6$) oe
19	15 and 16 parts shaded Alternative 1 $\frac{3}{4}=0.75,\ \frac{4}{5}=0.8$ Alternative 2 $\frac{3}{4}=\frac{15}{20},\ \frac{4}{5}=\frac{16}{20}$	$\frac{4}{5}$ + reason	3	M1 for correctly shading 15 parts for 3/4 M1 for correctly shading 16 parts for 4/5 A1 (dependent on M2) for selection of 4/5 Alternative 1 M1 for $\frac{3}{4}=0.75$ M1 for $\frac{4}{5}=0.8$ A1 (dep on M2) for selection of 0.8 or $\frac{4}{5}$ or $\frac{16}{20}$ Alternative 2 M1 for $\frac{3}{4}=\frac{15}{20}$ M1 for $\frac{4}{5}=\frac{16}{20}$ A1(dep on M2) for selection of $\frac{4}{5}$ or $\frac{16}{20}$

Paper 5521_01				
No	**Working**	**Answer**	**Mark**	**Notes**
20 (a)		−5 (−3) (−1) 1 3 5	2	B2 cao (B1 for any 2 or 3 correct)
(b)	Points plotted	Line	2	B2 for line from (−1, −5) to (4, 5) (B1 ft for plotting at least 5 "points")
21	Shapes shaded on grid	6 tessellating shapes	2	B2 for fully correct with 5 or more additional shapes, no gaps (B1 for 4 shapes tessellating with at least one shape inverted, with or without the given shape ignore extras)
22 (a)		$\frac{7}{20}$	1	B1 for $\frac{7}{20}$ oe
(b)	7 + 2 (or 20 – 11) are not lime flavour	$\frac{9}{20}$	1	B1 for $\frac{9}{20}$
(c)		0	1	B1 for 0, zero or nought ($\frac{0}{20}$ gets B0)
23 (a)		$4a$	1	B1 accept $4\times a$, $a \times 4$, $a4$
(b)		$12b$	1	B1 accept $12\times b$, $b \times 12$, $b12$
(c)		$2a + 6b$	2	B2 cao (B1 for $2a$ or $6b$ seen)
(d)		$x(x-6)$	2	B2 cao (B1 for $x(ax+b)$ where a, b are numbers not equal to 0 or $x - 6$ seen on its own, or as part of an expression)
24 (a)		40	1	B1 cao
(b)		45	1	B1 for 42 – 48 accept ¾ hour
(c)	40×2 or $\frac{40}{30}\times 60$ or $40\div\frac{1}{2}$	80	2	M1 for 40×2 or $\frac{40}{30}$ or $40\div\frac{1}{2}$ A1 cao NB $\frac{40}{45}\times 60$ gets M0 A0

Paper 5521_01				
No	**Working**	**Answer**	**Mark**	**Notes**
25 (a)		4560	1	B1 cao
(b)		45.6	1	B1 cao
(c)		2.4	1	B1 cao
26	$-7 - 3 = -10$ $2 \times -10 = -20$ $-20 \div 4$	-5	3	M1 for substitution of 2 and -7 into $p(q - 3)$ or sight of -20 or $-14 - 6$ M1dep for '-20' $\div 4$ A1 cao B1 SC for sight of -10 if M0 awarded
27 (a)		Reflection in y-axis	1	B1 cao
(b)		Rotation by half turn about (0,0)	2	B2 cao (B1 for half turn not about (0,0).)
(c)		Enlargement Scale factor 3 Centre (0,0)	3	B1 for 'enlargement' B1 for "scale factor 3" or 3 seen B1 for 'centre (0,0)
28 (a)		Reason	1	B1 for 'The frequencies are nearly equal' oe
(b)	$1\times26+2\times26+3\times23+4\times25 = 247$ 247/100	2.47	3	M1 for fx (attempting at least 2 relevant products) M1 for $\sum fx \div 100$ A1 2.47 cao

Paper 5521_01				
No	**Working**	**Answer**	**Mark**	**Notes**
29	5 × 5 × 6	150	4	M1 for attempt at 1 division (e.g. 40 ÷ 8), may be implied by marks or number on one edge of diagram or by 5 or 6 seen M1 for attempt at 3 divisions (40÷8, 40÷8, 60÷10), may be implied by marks or numbers on diagram or by 5,5 and 6 seen. M1 (dep on 1st M1) for "5" × "5" × "6" A1 cao Alternatively M1 for 40 × 40 × 60 **or** 8 × 8 × 10 **or** 96000 or 640 seen M1 for 40 × 40 × 60 **and** 8 × 8 × 10 or 96000 **and** 640 seen M1 (dep on 1st M1) for "(40 × 40 × 60)" ÷ "(8 × 8 × 10)" A1 cao SC:B1 for dividing area of one carton face by area of corresponding box face if M0

Paper 5521_02					
No		Working	Answer	Mark	Notes
1	(a)	Draw diagram.	Diagram	1	B1 cao
	(b)		13,16	1	B1 cao
	(c)		31	1	B1 cao
2	(a)		8	1	B1 cao
	(b)		14	2	B2 for 14 (B1 for 13 or 15)
	(c)		16	2	B2 for 16 (B1 for 15, 17 or 8)
3	(a)		4,7 drawn	2	B2 for car height 4 and bus height 7, (B1 for one correct)
	(b)		6	1	B1 cao
	(c)		Walk	1	B1
	(d)		27	1	B1 cao
4	(a)		40	1	B1 for 40–41 inclusive
	(b)		12	1	B1 for 11.5 – 12.5 inclusive
5	(a)		Row complete	2	B2 for 1+..+11; 36 (B1 for one of the 2 cells complete)
	(b)		Square	1	B1 "square"
6		One line of symmetry		1	B1 within 2mm of centre of base / 2mm of vertex

Paper 5521_02				
No	**Working**	**Answer**	**Mark**	**Notes**
7 (a) (i)		09 06	2	B1 (accept 9 06 oe)
(ii)		39		B1 cao
(b)		06 55	1	B1 (accept 6 55 oe)
(c)		2h 6min	1	B1 cao
(d)		15 min	2	M1 for 0906 – 0645 – "(c)" or 0906 – 0645 − 2hr 6min or 2hr 21min − "(c)" or 2hr 21min − 2hr 6 min or 141 − 126 or 20 − 5 A1 cao SC: B1 for 55 or 75 or 93 seen
8 (i)		8,10,12,20 or 30	3	B1 at least one of 8, 10, 12, 20, 30 (no extras)
(ii)		8,12 or 20		B1 at least one of 8,12, 20 (no extras)
(iii)		3 or 5		B1 3 or 5 or both (no extras)
9 (a)		C or G	1	B1 at least one of C or G (no extras)
(b)		A and F	1	B1 cao
(c)		2	1	B1 (accept –2)
10 (a)		$\frac{7}{10}$	1	B1 7/10 oe
(b)(i)		4 squares	2	B1 4 squares shaded
(ii)		80%		B1 80% or ft from unshaded part (no ft from 0% or 100%)
(c)(i)		2.5	2	B1 2.4–2.6 inclusive
(ii)		1.7		B1 1.6–1.8 inclusive
11 (a)		2	1	B1 for 2 or –2
(b)		14	1	B1 for 14 or –14

Paper 5521_02					
No		**Working**	**Answer**	**Mark**	**Notes**
12		2 × 8.50 = 17.00 3 × 4.50 = 13.50 Total = 30.50 50.00 – 30.50	19.5(0)(*p*)	3	M1 for adding 5 correct values or 2 × 8.50 + 3 × 4.50 (ignore units) or 30.5(0) or 3050 seen M1 dep for 50 − "30.50" (ignore units) (OR M1for adding at least 1 adult ticket and at least 1 child ticket **and** subtracting from 50) A1 cao SC: B1 for 24 or 37 or 2400 or 3700 seen
13	(a)		Hexagon	1	B1
	(b)(i)		120	2	B1 cao
	(ii)		Str line		B1 reference to a (straight) line and 180°
	(c)		Obtuse	1	B1 Accept "interior"
14	(a)	2, 2, 3, 3, 3, 4, 4, 4, 5, 6	3.5	2	M1 ordering the numbers (condone 1 error or omission) A1 cao
	(b)	36 ÷ 10	3.6	2	M1 sum of numbers ÷ 10 A1 cao SC B1 for 3r 6
	(c)	6 – 2	4	1	B1 cao
15	(a)		Paul	1	B1 cao
	(b)	36 ÷ 2 oe	18	1	B1 cao
	(c)	60/360 =	1/6	2	M1 60/360 oe A1 cao

Paper 5521_02					
No		Working	Answer	Mark	Notes
16		4.7 ÷ 5.9 = 0.796610169	0.7966..	2	B2 for 0.7966 or better (B1 for 0.8, 0.80, 0.79, 0.796, 0.797 or digits 59 seen
17		$6x - 7 + 7 = 38 + 7$ $6x = 45$	7.5	2	M1 $6x = 45$ or +7 both sides A1 7.5 oe; accept 45/6 oe
18		**55** 61 74 **190** 33 **17** **10** 60 **88** **78** 84 250	**55** 61 74 **190** 33 **17** **10** 60 **88** **78** 84 250	3	B3 all six entries correct (B2 for 4 or 5 entries correct) (B1 for 2 or 3 entries correct)
19	(a)	900 × 1.70 =	1530	2	M1 900 × 1.7(0) or digits 153(0) seen A1 cao
	(b)	160 ÷ 1.70 =	£94.12 or £94.11	2	M1 160 ÷ 1.7(0) or digits 941(....) seen A1 cao
20	(a)(i)	180 – 54 (=126) "126" ÷ 2	63	3	M1 for (180–54) ÷ 2 A1 cao
	(ii)		Reason		B1 (indep) angles in triangle add to 180 OR equal angles in isosceles triangle OR equal angles and 2 sides the same (B0 if any incorrect reasoning given eg parallel, equilateral triangle)
	(b)	180 – "x"	117	1	B1 117 or ft 180 – "x" if $x < 90$
21	(a)	3 × 35 + 50	155	2	M1 for 3 × 35 + 50 or digits 155 seen A1 cao
	(b)	260 – 50 = 210 210 ÷ 35 =	6	3	M1 for 260–50 or 210 seen. M1 for "260-50" ÷ 35 or 210÷35 A1 cao SC B1 for starting at a number between 100 and 170 and adding at least two 35's and showing a total between 230 and 290 OR For adding at least three 35's, perhaps with other numbers, and showing a total between 180 and 240 (or between 230 and 290 if 50 is included in the sum)

Paper 5521_02				
No	**Working**	**Answer**	**Mark**	**Notes**
(c)		P=35h + 50	3	B3 for P=35h+50 or P=35×h+50 oe (B2 for correct RHS or P=h + 50 ×35 or P=35h+k where k is numerical oe) (B1 for P = some other linear expression in h, OR h + 50 ×35 OR 35h seen) NB: P=h scores no marks; ignore £ signs. SC B2 for $h = \frac{P-50}{35}$
22 (a)		Elevation	2	B2 for 4 vertical squares. Accept 4 by 1 rectangle. (B1 for 4 vertical squares with one square added or one parallelogram added at the top, or 3 vertical squares, or 4 horizontal squares)
(b)		Plan	2	B2 for 2 adjacent squares, vertical or horizontal. Accept 2 by 1 rectangle. (B1 for 3 adjacent horizontal or vertical squares or a rectangle with sides in the ratio 2:1)
23 (i) (ii) (iii)		5 9 6	3	B1 cao B1 cao B1 cao
24	$45.00 + 45.00 \times \frac{15}{100} =$ $45.00 + 6.75 =$	51.75	3	M2 for $45.00 + 45.00 \times \frac{15}{100}$ oe or 45.00×1.15 oe OR $45.00 + 6.75$ OR complete method or 5175 seen. (M1 for $45.00 \times \frac{15}{100}$ oe OR 6.75 seen OR 675 seen OR correct method for calculating 15% of 45) A1 cao SC Award B2 for an answer of 38.25

Paper 5521_02				
No	**Working**	**Answer**	**Mark**	**Notes**
25 (a)		Points	1	B1 all three points ±1 full square
(b)		Negative	1	B1 Negative (ignore additional descriptors unless contradictory)
(c)		lobf	1	B1 A single straight line drawn to cross between (5,30), (5,40) and (40,0), (40,15); accept freehand if considered to be straight.
(d)(i)		18–25	2	B1 18g–25g inclusive OR if not in this range ft ±1 square dep on single straight line with negative gradient.
(ii)		30–40		B1 30–40 min inclusive OR if not in this range ft ±1 square dep on single straight line with negative gradient
26		300 3 75 150	3	B3 for 4 correct answers (B2 for 2 or 3 correct answers) (B1 for 1 correct answer)
27	π × 0.65	2.04–2.05	2	M1 for π × 0.65 or 3.14 x 0.65 or 3.142 x 0.65 A1 for 2.04–2.05 SC Award B1 for 2.0 seen (not 2)
28	5 miles = 8 km 70mph÷5×8 = 112 km/h OR 120km/h ÷ 8 × 5 = 75 mph Faster than 70 mph	70mph (Great Britain) (112 km)	3	M1 5 miles = 8 km; OR 70 mph is about 100 km/h OR 1km=0.6(25) miles OR 1mile=1.6km oe M1 70 ÷ 5 × 8 (=112) or 120 ÷ 8 × 5 (=75) A1 (dep on at least M1) GB or 70 mph Refer to both answer line and working. NB GB or 70 mph without working scores 0 marks

Paper 5523_03				
No	**Working**	**Answer**	**Mark**	**Notes**
1		Cuboid drawn	2	B2 for correct isometric drawing in any orientation (ignore points 'behind', mark 7 vertices only); accept lines drawn near to dots as long as there is no ambiguity. (B1 for one of the three faces drawn correctly **or** for an isometric drawing of any cuboid)
2	Different makes of car Tally Frequency	Make of car Tally Frequency	3	B1 for make of car or list of at least 3 different makes B1 for tally or tally marks B1 for frequency or totals
3		6 tessellating shapes	2	B2 for fully correct with 5 or more additional shapes, no gaps (B1 for 4 or more shapes tessellating, with at least one shape inverted, with or without the given shape, ignore extras)
4	24.90 ÷ 3 or 8.30 24.90 – '8.30' or 2 × 8.30	16.6(0)	3	M1 for 24.90 ÷ 3 or 8.30 M1 (dep) for 24.90 – “8.30” or 2 × “8.30” A1 for 16.60 or 16.6

Paper 5523_03

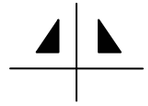
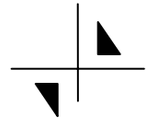
No	Working	Answer	Mark	Notes
5	315 × 24 24 × 315 1260 6300 7560 7200 7560 **3 1 5** 0 6 | 0 2 | 1 0 **2** 1 2 | 0 4 | 2 0 **4** 7 5 6 0 **300 10 5** 6000 | 200 | 100 **20** 1200 | 40 | 20 **4** 6000+200+100+1200+40+20 = 7560 **3 0.1 0.05** 60 | 2 | 1 **20** 12 | 0.4 | 0.2 **4** 60 + 2 + 1 + 12 + 0.4 + 0.2 = 75.6	75.6(0)	3	M1 for a complete method with relative place value correct. Condone 1 multiplication error, addition not necessary. **OR** M1 for a complete grid with not more than 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 7560 or digits 756(0) A1 (dep on M1, but not previous A1) for correct placement of decimal point.

Paper 5523_03				
No	**Working**	**Answer**	**Mark**	**Notes**
6	15 and 16 parts shaded Alternative 1 $\frac{3}{4} = 0.75$ or 75%, $\frac{4}{5} = 0.8$ or 80% Alternative 2 $\frac{3}{4} = \frac{15}{20}$, $\frac{4}{5} = \frac{16}{20}$	$\frac{4}{5}$ + reason	3	M1 for shading 15 parts for $\frac{3}{4}$ M1 for shading 16 parts for $\frac{4}{5}$ A1 (dep on M2) for selection of $\frac{4}{5}$ with correct shading Alternative 1 M1 for $\frac{3}{4} = 0.75$ or 75% M1 for $\frac{4}{5} = 0.8$ or 80% A1 (dep on M2) for selection of 0.8 or 80% or $\frac{4}{5}$ with correct decimals or percentages Alternative 2 M1 for $\frac{3}{4} = \frac{15}{20}$ oe M1 for $\frac{4}{5} = \frac{16}{20}$ oe A1 (dep on M2) for selection of $\frac{4}{5}$ or $\frac{16}{20}$ with equivalent fractions

Paper 5523_03				
No	**Working**	**Answer**	**Mark**	**Notes**
7	$5 \times 5 \times 6$	150	4	M1 for attempt at 1 division (e.g. 40 ÷ 8), may be implied by marks or number on one edge of diagram or by 5 or 6 seen M1 for attempt at 3 divisions (40÷8, 40÷8, 60÷10), may be implied by marks or numbers on diagram or by 5,5 and 6 seen. M1 (dep on 1st M1) for "5" × "5" × "6" A1 cao Alternatively M1 for 40 × 40 × 60 **or** 8 × 8 × 10 **or** 96000 or 640 seen M1 for 40 × 40 × 60 **and** 8 × 8 × 10 or 96000 **and** 640 seen M1 (dep on 1st M1) for "(40 × 40 × 60)" ÷ "(8 × 8 × 10)" A1 cao SC:B1 for dividing area of one carton face by area of corresponding box face if M0
8 (a)		$\frac{7}{20}$	1	B1 for $\frac{7}{20}$ oe
(b)	7 + 2 (or 20 – 11) are not lime flavour	$\frac{9}{20}$	1	B1 for $\frac{9}{20}$ oe
(c)		0	1	B1 for 0, zero or nought ($\frac{0}{20}$ gets B0)
9 (a)		$80x$	1	B1 for $80x$ (accept $80 \times x$, $x80$, $x \times 80$) seen
(b)		$95y$	1	B1 for $95y$ (accept $95 \times y$, $y95$, $y \times 95$) seen
(c)		$80x + 95y$	2	M1ft for adding "$80x$" and "$95y$" (algebraic expressions only) A1 for $80x + 95y$

Paper 5523_03

No	Working	Answer	Mark	Notes
10 (a)		40	1	B1 cao
(b)		45	1	B1 for 42 to 48 (accept 3/4 hour)
(c)	40×2 or $\frac{40}{30}\times60$ or $40\div\frac{1}{2}$	80	2	M1 for 40×2 or $\frac{40}{30}$ or $40\div\frac{1}{2}$ A1 cao NB $\frac{40}{45}\times 60$ gets M0 A0
11 (a)	$3\times3-4\times2$ or $9-8$	1	2	M1 for substitution of 3 and 2 into expression or 9 and 8 seen A1 cao
(b)	$-7-3=-10$ $2\times-10=-20$ $-20\div4$	-5	3	M1 for substitution of 2 and –7 into p(q – 3) or sight of -20 or –14 – 6 M1 (dep) for "–20" ÷ 4 A1 cao SC: B1 for –10 seen if M0
12 (a)	6 | 8 9 7 7 | 8 5 9 6 3 8 | 1 3 1 7 1 9 | 0 1	6 | 7 8 9 7 | 3 5 6 8 9 8 | 1 1 1 3 7 9 | 0 1	3	M1 for unordered diagram (condone one error) A1 cao B1 for key (eg 6 | 7 = 67)
(b)(i)		Explanation	2	B1 for '(order numbers and) select middle value' oe
(ii)		79		B1 cao

Paper 5523_03					
No		**Working**	**Answer**	**Mark**	**Notes**
13	(a)		Reflection in y-axis	1	B1 for triangle with vertices at (-1, 1) (-3, 1) and (-1,4)
	(b)		Rotation by half turn about (0, 0)	2	B2 for triangle with vertices (-1, -1) (-3, -1) and (-1, -4) (B1 for half turn not about (0,0))
	(c)		Enlargement Scale factor 3 Centre (0, 0)	3	B1 for 'enlargement' B1 for 'scale factor 3' or 3 seen B1 for 'centre (0,0)' B0 for any combination of transformations
14	(a)		4560	1	B1 cao
	(b)		45.6	1	B1 cao
	(c)		2.4	1	B1 cao
15	(a)	$4a-2a+5b+b$	$2a+6b$	2	B2 cao (B1 for $2a$ or $6b$ seen)
	(b)		$x(x-6)$	2	B2 cao (B1 for $x(ax+b)$ where a, b are numbers not equal to zero or $x-6$ seen on its own, or part of an expression)
	(c)		$3x-2x^3$	2	B2 cao (B1 for $3x$ or $2x^3$)
	(d)		$4x(3y+x)$	2	B2 cao (B1 for $2(6xy+2x^2)$ or $4(3xy+x^2)$ or $x(12y+4x)$ or $2x(6y+2x)$ or $4x(\quad)$)

Paper 5523_03					
No		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	$1 - (0.2 + 0.3 + 0.1)$	0.4	2	M1 for $1 - (0.2 + 0.3 + 0.1)$ A1 for 0.4 oe, accept $\frac{0.4}{1}$
	(b)	0.2×200	40	2	M1 for 0.2×200 A1 cao NB $\frac{40}{200}$ is M1 A0, 40 out of 200 is M1 A1
17	(a) (i)	$180 - 2 \times 25$	130	3	M1 for $180 - 2 \times 25$ A1 cao
	(ii)		Reason		B1 for mentioning isosceles and equal (or base) angles or equal sides and equal (or base) angles
	(b)	$180 - 95$	85	1	B1 cao
18	(a) (i)		7^5	3	B1 cao
	(ii)		7^4		B2 cao (B1 for sight of 7^5 or 7^{2+3} or 7×7^3 or $7^1 \times 7^3$ or $7^2 \times 7^2$ or 7^{2+3-1})
	(b)		$\frac{1}{2}$	1	B1 for $\frac{1}{2}$ or 0.5 or 2^{-1}
19	(a)		3×10^7	1	B1 cao
	(b)		0.002	1	B1 cao

Paper 5523_03					
No		**Working**	**Answer**	**Mark**	**Notes**
20			Box plot	2	3 aspects: 1st aspect – vertical line for median 2nd aspect – box using correct quartiles 3rd aspect – whiskers (could be single line) drawn with correct end points B2 for fully correct box plot (B1 for 1 aspect)
21	(a)	e.g. 2 | 126 3 | 63 3 | 21 7	$2\times3\times3\times7$	2	M1 for a systematic method of at least 2 correct divisions by a prime number oe factor trees; can be implied by digits 2, 3, 3, 7 on answer line. A1 for $2\times3^2\times7$ or $2\times3\times3\times7$
	(b)	$2\times3\times7$	42	2	B2 cao (B1 for 6, 14, 21 or $2\times3\times7$)
22		$\frac{8}{3}\times\frac{5}{4}=\frac{8\times5}{3\times4}=\frac{40}{12}$	$3\frac{1}{3}$	3	B1 for $\frac{8}{3}$ oe improper fraction or $\frac{5}{4}$ oe improper fraction M1 (dep on B1) for multiplying numerator and denominator of "$\frac{8}{3}$" and "$\frac{5}{4}$" A1 for $3\frac{1}{3}$ oe mixed number or $\frac{10}{3}$ OR B1 for 1.25 and 2.67 or 2.66(…) M1 (dep on B1) for correct method of multiplication A1 for $3.\dot{3}$

Paper 5523_03				
No	**Working**	**Answer**	**Mark**	**Notes**
23			2	M1 for a relevant pair of intersecting arcs A1 for line drawn within guidelines, at least 3cm in length, accept broken line [SC: B1 for line drawn within guidelines if M0]
24 (a)		$-1, 0, 1, 2, 3$	2	B2 cao (-1 each error or omission)
(b)(i)		$x \geq \frac{7}{2}$	3	M1 for $2x \geq 7$, condone use of = sign or wrong equality A1 for $x \geq \frac{7}{2}$ oe as final answer
(ii)		4		SC:B1 for 3.5 or $\frac{7}{2}$ seen if M0 B1 ft from $x \geq$ "$\frac{7}{2}$"
25	$4x + 2y = 8$ $4x - 10y = 20$ $12y = -12$ $y = -1$ $4x + 2(-1) = 8$ $x = 2.5$	$x = 2.5$ $y = -1$	3	M1 for correct process to eliminate either x or y (condone one arithmetical error) M1 (dep) for substituting found value into either equation A1 for $x = 2.5$, $y = -1$ [SC: B1 for $x = 2.5$ or $y = -1$ if M0]

Paper 5523_03					
No		**Working**	**Answer**	**Mark**	**Notes**
26		Interior angle of hexagon = 180 – (360 ÷ 6) = 120 360 – (90 + 120)	150	4	Alternative 1 M1 for 360 ÷ 6 A1 for 60 M1 (dep on M1) for "60" + 90 A1 cao Alternative 2 M1 for 360 ÷ 6 A1 for 60 M1 (dep on M1) for 360 – (2 × "60" + 90) A1 cao Alternative 3 M1 for (6 – 2) × 180 ÷ 6 A1 for 120 M1 (dep on M1) for 360 – (90 + "120") A1 cao
27	(a)		(16), 50, 82, 96, 100	1	B1 cao
	(b)	Cumulative freq. diag. curve/ segments	Cum. freq graph	2	B1 for 4 or 5 points plotted correctly ± 1 full (2mm) square depending on sensible table (condone 1 addition error) B1 (dep) for points joined by curve or line segments provided no gradient is negative - ignore any part of graph outside range of their points. (SC:B1 if 4 or 5 points plotted not at end but consistent within each interval and joined)
	(c)	100 – 42	58	2	M1 (ft dep on graph being cf) for reading from graph at 18 or 19, can be implied by answer in range 40 to 46 A1 for answer in range 56 to 60 or ft for 100 – '42' ±1 full (2mm) square

Paper 5523_04					
No		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	900 × 1.70 =	1530	2	M1 900 × 1.7(0) or digits 153(0) seen A1 cao
	(b)	160 ÷ 1.70 =	£94.12 or £94.11	2	M1 160 ÷ 1.7(0) or digits 941(....) seen A1 cao
2	(a)	4.7 ÷ 5.9 = 0.796610169	0.7966..	2	B2 for 0.7966 or better (B1 for 0.8, 0.80, 0.79, 0.796, 0.797 or digits 59 seen)
	(b)	0.82, 0.8, 0.85, 0.66, 0.875 0.66, 0.8, 0.82, 0.85, 0.875 2/3, 4/5, 0.82, 85%, 7/8	2/3, 4/5, 0.82, 85%, 7/8	2	B2 correct order (oe decimals in order) (B1 correct order reversed, or one error in ordered listing) with or without decimal equivalents. NB Accept 0.67 or 0.66
3		**55** 61 74 **190** 33 **17** **10** 60 **88** **78** 84 250	**55** 61 74 **190** 33 **17** **10** 60 **88** **78** 84 250	3	B3 all 6 correct (B2 for 4 or 5 entries correct) (B1 for 2 or 3 entries correct)
4	(a)	–3 (–1) (1) 3 5 7	**–3**, 3, **5**, **7**	2	B2 all correct (B1 2,3 correct)
	(b)	(-2,-3),(-1,-1),(0,1),(1,3),(2,5),(3,7)	line	2	B2 cao for line from $x = -2$ to $x = 3$ (B1 plotting at least 5 points correctly or single line passing through (0, 1) or single line of gradient 2) The six possible points are: (-2,-3), (-1,-1), (0,1), (1,3), (2,5), (3,7)
	(c)(i)		–2	2	B1 $y = -2$ or ft from line segment
	(ii)		2.5		B1 $x = 2.5$ or ft from line segment

Paper 5523_04					
No		**Working**	**Answer**	**Mark**	**Notes**
5	(a) (i)	180 – 54 (=126) "126" ÷ 2	63	3	M1 for (180–54) ÷ 2 A1 cao
	(ii)		Reason		B1 (indep) angles in triangle add to 180 OR equal angles in isosceles triangle OR equal angles and 2 sides the same (B0 if any incorrect reasoning given eg parallel, equilateral triangle)
	(b)	180 – "x"	117	1	B1 117 or ft 180 – "x" if $x < 90$
6		15/120×360 = 45 Plain 40/120×360 = 120 Cheese & Onion 55/120×360 = 165 Salt & Vinegar 10/120 × 360 = 30 Beef	45°, 120°, 165°, 30°	4	M1 evidence of method for at least one angle (could be implied by one correct angle of four on pie chart or in the table) A2 All four angles drawn ±2° tolerance, any order (A1 at least 2 angles correctly drawn ±2°, or all 4 angles in the table) B1 (dep on at least 1 angle drawn correctly, and exactly 4 sectors) for labels (flavour or frequency; initials will do) NB: Ignore the table if the pie chart provides the marks.
7	(a)	260 – 50 = 210 210 ÷ 35 =	6	3	M1 for 260–50 or 210 seen. M1 for "260-50" ÷ 35 or 210÷35 A1 cao
	(b)		P=35h + 50	3	B3 for P=35h+50 or P=35×h+50 oe (B2 for correct RHS or P=h + 50 ×35 or P=35h+k where k is numerical oe) (B1 for P = some other linear expression in h, OR h + 50 ×35 OR 35h seen) NB: P=h scores no marks; ignore £ signs. SC B2 for $h = \frac{P-50}{35}$
8	(a)		Elevation	2	B2 for 4 vertical squares. Accept 4 by 1 rectangle. (B1 for 4 vertical squares with one square added or one parallelogram added at the top, or 3 vertical squares, or 4 horizontal squares)

Paper 5523_04				
No	**Working**	**Answer**	**Mark**	**Notes**
(b)		Plan	2	B2 for 2 adjacent squares, vertical or horizontal. Accept 2 by 1 rectangle. (B1 for 3 adjacent horizontal or vertical squares or a rectangle with sides in the ratio 2:1)
9 (a)		Points	1	B1 all three points ±1 full square.
(b)		Negative	1	B1 Negative. Ignore other descriptors unless contradictory.
(c)		lobf	1	B1 A single straight line drawn to cross between (5,30), (5,40) and (40,0), (40,15); accept freehand if considered to be straight.
(d)(i) (ii)		18–25 30–40	2	B1 18g–25g inclusive OR if not in this range ft ±1 square dep on single straight line with negative gradient. B1 30–40 min inclusive OR if not in this range ft ±1 square dep on single straight line with negative gradient.
10		300, 3, 75, 150	3	B3 for 4 correct (B2 for 2 or 3 correct) (B1 for 1 correct)
11 (a)	$6x - 7 + 7 = 38 + 7$ $6x = 45$	7.5	2	M1 $6x = 45$ or +7 both sides A1 7.5 oe; accept 45/6
(b)	$5y - 2 = 10$ or $20y - 8 = 40$ $5y = 12$ $20y = 48$	$2\frac{2}{5}$	3	M1 $20y–8(=40)$ or $\frac{4(5y-2)}{4} = \frac{40}{4}$ or $5y–2=10$ M1 (indep) for correct rearrangement into the form $ay=b+c$ or better (eg $20y=40+8$ or $5y=10+2$, using own terms) A1 for $2\frac{2}{5}$, 2.4 oe
12	5 miles = 8 km 70mph÷5×8 = 122 km/h OR 120km/h ÷ 8 × 8 = 75 mph Faster than 70 mph	70mph (Great Britain) (112 km)	3	M1 5 miles = 8 km; OR 70 mph is about 100 km/h OR 1km=0.6(25) miles OR 1mile=1.6km oe M1 70 ÷ 5 × 8 (=112) or 120 ÷ 8 × 5 (=75) oe A1 (dep on at least M1) GB or 70 mph Refer to both answer line and working. NB GB or 70 mph without working scores 0 marks.

Paper 5523_04				
No	**Working**	**Answer**	**Mark**	**Notes**
13 (a)	$\pi \times 0.65$	2.04–2.05	2	M1 for $\pi \times 0.65$ or 3.14×0.65 or 3.142×0.65 oe A1 2.04–2.05 SC Award B1 for 2.0 seen (not 2)
(b)	1000 ÷ "(a)"	487–491	2	M1 for 1000 (or 100) ÷ "(a)" A1 for 487–491
14	$45.00 + 45.00 \times \frac{15}{100} =$ $45.00 + 6.75 =$	51.75	3	M2 for $45.00 + 45.00 \times \frac{15}{100}$ oe or 45.00×1.15 oe OR $45.00 + 6.75$ OR complete method or 5175 seen. (M1 for $45.00 \times \frac{15}{100}$ oe OR 6.75 seen OR 675 seen OR correct method for calculating 15% of 45) A1 cao SC Award B2 for an answer of 38.25
15		273	2	M1 for 728 ÷ 8 or 728 ÷ "3+5" or 91 A1 cao SC B1 for 455, or for 273:455
16	3 24 3.7 46.9(53) 4 60 3.8 51.0(72) 3.1 26.6(91) 3.9 55.4(19) 3.2 29.5(68) 3.21 29.8(66…) 3.3 32.6(37) 3.22 30.1(66…) 3.4 35.9(04) 3.23 30.4(68..) 3.5 39.3(75) 3.24 30.7(72...) 3.6 43.0(56) 3.25 31.0(78...) or 31	3.2	4	B2 for trial between 3.2 and 3.3 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.21 and 3.25 inclusive B1 (dep on at least one previous B1) cao for 3.2 as final answer. NB: embedded answers: –B1; award Bs for evaluations rounded or truncated to at least 1 dp or for 31

Paper 5523_04				
No	**Working**	**Answer**	**Mark**	**Notes**
17	$45^2 + 34^2 =$ $2025 + 1156 = 3181$ $\sqrt{3181} = 56.4$	56	4	M1 for $45^2 + 34^2$ M1 (dep) for $\sqrt{(2025 + 1156)}$ A1 for 56.4 … B1 for rounding their diagonal to the nearest integer (dep on evidence from decimal) NB 56 as the final answer gets full marks. NB Scale drawings result in 0 marks.
18	$2000 \times (1.055)^3$ Interest = 2348.48 – 2000 =	348.48	3	M1 for 5.5/100 × 2000 (oe) or 330 or 2330 or 110 or 2110 M1 (dep) for 5.5/100 × (2000 + "110" + "116.05") or 122.4… seen A1 cao (accept only 348.48 or 348.49) **OR** M2 for $2000 \times (1.055)^3$ or 2348.48(…) or 2348.49 seen (M1 for $2000 \times (1.055)^n$, $n \neq 3$) A1 for 348.48 or 348.49 [SC: B2 for 2348.48 - 2348.49]
19		Line	2	B2 line fully within tramlines, crossing AB and CD (B1 a straight line which crosses AB within the tramline, and also crosses CD) NB: Accept dotted or dashed lines, but not curves; accept freehand if considered to be straight. SC B1 for a perpendicular bisector of AB that is at least half way from AB to CD within the tramlines
20 (a)		$90<t\leq100$	1	B1 for $90<t\leq100$; accept 90-100.
(b)	65×12=780 75×22=1650 85×23=1955 95×24=2280 105×19=1995 8660/100=	86.6	4	M1 for use of fx with x consistent within intervals (including end points). Allow one slip. M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\sum fx/100$ or $\sum fx/\sum f$ A1 86.6

Paper 5523_04					
No		**Working**	**Answer**	**Mark**	**Notes**
21	(a)	$8 \times \frac{10}{4}$	20	2	M1 $\frac{10}{4}$ or $\frac{4}{10}$ or 0.4 or 2.5 oe seen A1 cao NB ratios get M0 unless of the form 1:*n* OR M1 $\frac{8}{4}, \frac{4}{8}$ oe seen A1 cao
	(b)	$15 \times \frac{4}{10}$	6	2	M1 $15 \times \frac{4}{10}$ oe A1 cao
22	(a)	$x^2 - 4x + 3x - 12 = x^2 - x - 12$	$x^2 - x - 12$	2	M1 for exactly 4 terms correct ignoring signs (eg x^2, 4*x*, 3*x*, 12) or 3 correct terms out of 4 terms with correct signs (eg 3 out of 4 of x^2, –4*x*, +3*x*,–12) A1 cao
	(b)	$(x+2)(x+5)$	$(x+2)(x+5)$	2	B2 cao (B1 for exactly one of $(x+2)$, $(x+5)$)
	(c)	$6=15+4q-20$ $6-15=4(q-5)$ $p-3t=4q-4t$ $6-3\times5=4(q-5)$	2 ¾	3	M1 for correct substitution of *p* and *t*. M1 for correct expansion of $4(q-t)$ oe (eg $4q-20$, $4q-4t$) A1 11/4 or 2 ¾ or 2.75 OR M1 for correct substitution of *p* and *t*. M1 for $\frac{p-3t}{4} = q - t$ oe A1 11/4 or 2 ¾ or 2.75

Paper 5523_04					
No		**Working**	**Answer**	**Mark**	**Notes**
23	(a)	$9.9\times10^8 - 6.0\times10^7$	9.3×10^8	2	M1 for $99\times10^7 - 6\times10^7$ or $9.9\times10^8 - 0.6\times10^8$ or conversion of either to an ordinary number, or 930000000 or 93×10^7 or 9.3×10^n where n is any positive integer A1 cao
	(b)	$\frac{6.0-4.5}{4.5}\times100 = \frac{1.5}{4.5}\times100 =$ or $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7}\times100$	33.3%	3	M2 $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7}\times100$ oe (M1 for $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7}$ or $\frac{6.0\times10^7 - 4.5\times10^7}{6.0\times10^7}\times100$ oe A1 cao OR M2 $\frac{6.0\times10^7}{4.5\times10^7}\times100$ -100 = (M1 $\frac{6.0\times10^7}{4.5\times10^7}\times100$ or 133.33(%)) A1 cao NB Accept any of the above expressions without any reference to 10^7.
24		LCM (40,24) = 120 Bread buns 120÷40 Burgers 120÷24 OR Bread buns: 40 is $2\times2\times2$ (×5) Burgers: 24 is $2\times2\times2$ (×3)	Bread buns 3 Burgers 5	3	M1 attempt to find LCM by eg lists of multiples, or summing of 40 and 24. A1 identify 120 (as LCM) A1 cao (both) OR M1 expansion of either number into its prime factors in a factor tree or 8×5 or 8×3 A1 both expansions correct A1 cao (both) SC B2 if answers given the wrong way around

Paper 5523_04				
No	**Working**	**Answer**	**Mark**	**Notes**
25	8 × 41 = 328 2 × 29 = 58 328 – 58 = 270 270 ÷ 6 = 45	45	3	M1 for either 8 × 41 (=328) or 2 × 29 (=58) M1 (dep) “328” – “58” (=270) A1 cao NB 328 and/or 58 on the answer line gets M1 (implied); 270 on the answer line gets M2 (implied)

Paper 5525_05				
No	**Working**	**Answer**	**Mark**	**Notes**
1 (a)	$1 - (0.2 + 0.3 + 0.1)$	0.4	2	M1 for $1 - (0.2 + 0.3 + 0.1)$ A1 for 0.4 oe, accept $\frac{0.4}{1}$
(b)	0.2×200	40	2	M1 for 0.2×200 A1 cao NB $\frac{40}{200}$ is M1 A0, 40 out of 200 is M1 A1
2	$650 - 430 = 220$ 1 choc ice costs 110p $650 - 5 \times 110 = 100$p	50	3	M1 for $650 - 430$ or 220 or 110 oe seen M1 for $650 - 5 \times \frac{'220'}{2}$ or $430 - 3 \times \frac{'220'}{2}$ oe A1 for 50p or £0.50 or £0.5 *Alternative scheme* $2x + 5y = 650$ $2x + 3y = 430$ oe M1 for subtracting two simultaneous equations to eliminate x (lollies)(2 or 3 terms correct) M1 for $650 - 5 \times 'y'$ or $430 - 3 \times 'y'$ oe A1 for 50p or £0.50 or £0.5 *Alternative scheme* M1 for $3\times (2x + 5y = 650)$ evaluated and $5 \times (2x + 3y = 430)$ evaluated oe (5 or 6 terms correct) M1 for subtraction of equations to eliminate y (choc ices)(2 or 3 terms correct ft) A1 for 50p or £0.50 or £0.5

Paper 5525_05				
No	**Working**	**Answer**	**Mark**	**Notes**
3		question + response boxes oe	2	1st aspect: One question (eg 'how long does it take you to travel to school?' or 'What time did you leave home to get to school?'); ignore other questions. 2nd aspect: Response list (at least two), not overlapping. 3rd aspect: Some mention of units (eg minutes) in either question or responses B2 for all three aspects, or B1 for just one aspects.
4	2 [(3×1) + (4×1)] + (3×6) + (1×6) + (2×6) + (4×6) + (1×6) + (5×6)	110 cm^2	4	M1 for attempt to find the area of one face M1 for at least 6 faces with intention to add A1 cao B1 (indep) for cm^2 (with or without numerical answer)
5	$\left(\frac{-6+4}{2}\right), \left(\frac{5+3}{2}\right)$	(–1, 4)	2	B2 cao [B1 for (–1,*a*) or (b,4) or (4,-1)]
6		Box plot	2	3 aspects: 1st aspect – vertical line for median 2nd aspect – box using correct quartiles 3rd aspect – whiskers (could be single line) drawn with correct end points B2 for fully correct box plot (B1 for 1 aspect)
7			2	M1 for a relevant pair of intersecting arcs A1 for line drawn within guidelines, at least 3cm in length, accept broken line [SC: B1 for line drawn within guidelines if M0]

Paper 5525_05					
No		**Working**	**Answer**	**Mark**	**Notes**
8	(a)	e.g. 2 | 126 3 | 63 3 | 21 7	$2\times3\times3\times7$	2	M1 for a systematic method of at least 2 correct divisions by a prime number oe factor trees; can be implied by digits 2, 3, 3, 7 on answer line. A1 for $2\times3^2\times7$ or $2\times3\times3\times7$
	(b)	$2\times3\times7$	42	2	B2 cao (B1 for 6, 14, 21 or $2\times3\times7$)
9	(a)		$-1,0,1,2,3$	2	B2 cao (-1 each error or omission)
	(b)(i)		$x\geq\frac{7}{2}$	3	M1 for $2x\geq7$, condone use of = sign or wrong equality A1 for $x\geq\frac{7}{2}$ oe as final answer
	(ii)		4		SC:B1 for 3.5 or $\frac{7}{2}$ seen if M0 B1 ft from $x\geq$ "$\frac{7}{2}$" or $x>$"$\frac{7}{2}$"
10	(a)(i)		7^5	3	B1 cao
	(ii)		7^4		B2 cao (B1 for sight of 7^5 or 7^{2+3} or 7×7^3 or $7^1\times7^3$ or $7^2\times7^2$ or 7^{2+3-1})
	(b)		$\frac{1}{2}$	1	B1 for $\frac{1}{2}$ or 0.5 or 2^{-1}
11	(a)	$5n=m+21$	$n=\frac{m+21}{5}$	2	M1 for $5n=m+21$ or for attempt to divide three terms by 5 A1 $n=\frac{m+21}{5}$ oe

Paper 5525_05				
No	**Working**	**Answer**	**Mark**	**Notes**
(b)	$4p-8q=3p+2$ $p-8q=2$ $p=8q+2$	$p=8q+2$	3	M1 for $4p-aq$ or $\frac{3}{4}p+b$ where a is an integer and b is a number M1 (dep) for taking one term correctly to LHS or RHS of expression A1 $p=8q+2$ oe
12		$y=\frac{1}{2}x+3$	2	B2 for $y = ½x + 3$ oe (B1 for $y = ½x + c$, $c \neq 7$ or $y = mx + 3$ oe or $½x + 3$ or $M = ½x + 3$)
13	$\frac{8}{3}\times\frac{5}{4}=\frac{8\times5}{3\times4}=\frac{40}{12}$	$3\frac{1}{3}$	3	B1 for $\frac{8}{3}$ oe or $\frac{5}{4}$ oe M1 (dep on B1) for multiplying numerator and denominator of "$\frac{8}{3}$" and "$\frac{5}{4}$" A1 for $3\frac{1}{3}$ oe mixed number or $\frac{10}{3}$ *OR* B1 for 1.25 and 2.67 or 2.66(…) M1(dep on B1) for correct method of multiplication A1 for $3.\dot{3}$
14	$4x+2y=8$ $4x-10y=20$ $12y=-12$ $y=-1$ $4x+2(-1)=8$ $x=2.5$	$x=2.5$ $y=-1$	3	M1 for correct process to eliminate either x or y (condone one arithmetical error) M1 (dep) for substituting found value into either equation A1 for $x = 2.5$, $y = -1$ [SC: B1 for $x = 2.5$ or $y = -1$ if M0]

Paper 5525_05					
No		**Working**	**Answer**	**Mark**	**Notes**
15		Interior angle of hexagon = 180 – (360 ÷ 6) = 120 360 – (90 + 120)	150	4	Alternative 1 M1 for 360 ÷ 6 A1 for 60 M1 (dep on M1) for "60" + 90 A1 cao Alternative 2 M1 for 360 ÷ 6 A1 for 60 M1(dep on M1) for 360 – (2 × "60" + 90) A1 cao Alternative 3 M1 for (6 – 2) × 180 ÷ 6 A1 for 120 M1(dep on M1) for 360 – (90 + "120") A1 cao
16	(a)		(16), 50, 82, 96, 100	1	B1 cao
	(b)	Cumulative freq. diag. curve/ segments	Cum. freq graph	2	B1 ft for 4 or 5 points plotted correctly ± 1 full (2mm) square depending on sensible table (condone 1 addition error) B1 (dep) for points joined by curve or line segments provided no gradient is negative - ignore any part of graph outside range of their points. (SC:B1 if 4 or 5 points plotted not at end but consistent within each interval and joined)

Paper 5525_05				
No	**Working**	**Answer**	**Mark**	**Notes**
(c)	$100 - 42$	58	2	M1 (ft dep on graph being cf) for reading from graph at 18 or 19, can be implied by answer in range 40 to 46 A1 for answer in range 56 to 60 or ft for 100 –'42' ±1 full (2mm) square
17 (a)		0.6 and 0.7,0.3,0.7	2	B1 for 0.6 on LH branch B1 for 0.7, 0.3 and 0.7 on RH branches
(b)	0.4×0.3	0.12	2	M1 for 0.4×0.3 A1 0.12 oe
(c)	$0.4\times0.7+0.6\times0.3$	0.46	3	M1 for '0.4×0.7' or '0.6×0.3' M1 for addition of two products from correct branches A1 0.46 oe Alternative M2 for an attempt to evaluate 1-(0.3×0.4 +'0.6×0.7') A1 cao
18	$x = 0.4545...$ so $100x = 45.4545...$ $99x = 45$ $x = \frac{45}{99} = \frac{15}{33}$	proof	3	M1 for $100x = 45.45\ldots$ or $10000x = 4545.45\ldots$ M1 (dep) for subtraction of both sides A1 for $\frac{15}{33}$ from correct proof
19	$\left(\sqrt{3}\right)^2 + \sqrt{3}\sqrt{2} - \sqrt{3}\sqrt{2} - \left(\sqrt{2}\right)^2$ $= 3 - 2$	1	2	B2 cao (B1 for $\sqrt{3}\sqrt{3} + \sqrt{3}\sqrt{2} - \sqrt{3}\sqrt{2} - \sqrt{2}\sqrt{2}$ oe, $\sqrt{3}\sqrt{3} - \sqrt{2}\sqrt{2}$ oe, or for 2,3, $\sqrt{4}$ $\sqrt{6}$ $\sqrt{9}$ seen)
20 (a)	$\frac{96}{24}$ or 4 $\sqrt{4}$ or 2	8	3	M1 for $\frac{96}{24}$ or $\frac{24}{96}$ or 4 or $\frac{1}{4}$ oe M1 for $\sqrt{\frac{96}{24}}$ or $\sqrt{\frac{24}{96}}$ or $\sqrt{'4'}$ or $\frac{1}{\sqrt{'4'}}$ or 2 or $\frac{1}{2}$ oe A1 cao

Paper 5525_05					
No		**Working**	**Answer**	**Mark**	**Notes**
	(b)	12×2^3	96	2	M1 for '2'^{3} or 8 A1 cao
21	(a)	$x\times3-x\times2x^2$	$3x-2x^3$	2	B2 cao (B1 for a two term expression with either $3x$ or $2x^3$)
	(b)		$4x(3y+x)$	2	M1 for taking out a factor of x, $2x$, 2, 4 or $4x$ A1 cao
	(c)	$\frac{5a}{b^2}$	$\frac{5a}{b^2}$	2	B2 for $\frac{5a}{b^2}$ or $5ab^{-2}$ (accept $\frac{5a}{1b^2}$) (B1 for either dealing with the numbers or dealing with the powers of a)
	(d)	$\frac{\cancel{x-3}}{\cancel{(x-3)}(x+3)}$	$\frac{1}{x+3}$	2	M1 for $(x-3)(x+3)$ A1 cao
22	(a)		$\mathbf{a}+\mathbf{b}$	1	B1 $\mathbf{a}+\mathbf{b}$ oe
	(b)	$ED=\mathbf{a}$ $DX=-2\mathbf{b}+2\ AC=2\mathbf{a}$ (So, $DX=2ED$)	$2\mathbf{a}$	3	M1 for $(DX=)\ DA+AX$ A1 for $(DX=)\ -2\boldsymbol{b}+2$ ("$\boldsymbol{a}+\boldsymbol{b}$") A1 $2\boldsymbol{a}$ from fully correct proof
23		$\pi(2x)^2h=\frac{4}{3}\pi(3x)^3$ $h=\frac{\frac{4}{3}\pi(3x)^3}{\pi(2x)^2}$	$9x$	3	M1 for $\pi(2x)^2h=\frac{4}{3}\pi(3x)^3$ (condone absence of brackets) M1 (dep) for valid algebra that gets to $h=ax$ (condone one error in powers of numerical constants) A1 cao

Paper 5525_05					
No		**Working**	**Answer**	**Mark**	**Notes**
24	(i)	$n^2+(n+1)^2=2(n^2+n)+1$	$2n^2+2n+1$	4	M1 for at least 3 terms correct from $n^2+n+n+1$ A1 for $2n^2+2n+1$ oe
	(ii)		$2(n^2+n)$ is always even so $2(n^2+n)+1$ is always odd		M1 for recognizing $2n^2$ is always even A1ft complete proof for their quadratic *Alternative method* M1 for recognizing that if n^2 is odd then $(n+1)^2$ is even or vice versa A1 for complete proof
25			42 318	2	B1 for answer in range 36 – 48 B1 for answer in range 312 – 324
26	(a)	$(x-3)^2-3^2+15$	$p=3, q=6$	2	B2 for $p=3$ and $q=6$ (B1 for $p=3$ OR $q=6$) SC: award B2 for $(x-3)^2+6$ if p and q are not identified
	(b)		Sketch	2	B1 for U shaped curve B1 ft for TP in first quadrant (ft if TP not in first quadrant)
27	(a)	Graph translated 2 units upwards through points (–4, 2), (–2, 4), (0,2) and (3,5)	Sketch	2	M1 for a vertical translation A1 curve through points (–4, 2), (–2, 4), (0,2) and (3,5) ± ½ square
	(b)	Graph reflected in x-axis through points (–4,0), (–2, –2), (0, 0) and (3, -3)	Sketch	2	M1 for reflection in x-axis or y-axis A1 curve through points (–4,0), (–2, –2), (0, 0) and (3, -3) ± ½ square

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
1		273	2	M1 for 728 ÷ 8 or 728 ÷ "3+5" or 91 A1 cao SC B1 for 455 or 273:455
2		$3n - 1$	2	B2 for $3n - 1$ oe (B1 for $3n + k$ where $k \neq -1$ but k could be 0)
3	3 24 3.7 46.9(53) 4 60 3.8 51.0(72) 3.1 26.6(91) 3.9 55.4(19) 3.2 29.5(68) 3.21 29.8(66…) 3.3 32.6(37) 3.22 30.1(66…) 3.4 35.9(04) 3.23 30.4(68..) 3.5 39.3(75) 3.24 30.7(72...) 3.6 43.0(56) 3.25 31.0(78...) or 31	3.2	4	B2 for trial between 3.2 and 3.3 inclusive (B1 for trial between 3 and 4 inclusive) B1 for different trial between 3.21 and 3.25 inclusive B1 (dep on at least one previous B1) cao for 3.2 NB: embedded answers: –B1; award Bs for evaluations rounded or truncated to at least 1 dp or for 31
4	2 is the only even prime number and the product of 2 odd numbers is odd	Yes	2	B2 for 'yes' and '2 is the only even prime number and the product of two odd numbers is odd' oe (B1 for 'yes' and either '2 is the only even prime number' oe **or** 'the product of two odd numbers is odd' oe)
5	$45^2 + 34^2 =$ $2025 + 1156 = 3181$ $\sqrt{3181} = 56.4$	56	4	M1 for $45^2 + 34^2$ M1 for $\sqrt{(2025 + 1156)}$ A1 for 56.4 … B1 for rounding their diagonal to the nearest integer (dep on evidence from decimal) NB 56 with no incorrect working as the final answer gets full marks. NB Scale drawings result in 0 marks.

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
6	2000 × $(1.055)^3$ Interest = 2348.48 – 2000 =	£348.48	3	M1 for 5.5/100 × 2000 (oe) or 330 or 16.5/100×2000 or 2330 or 110 or 2110 M1 (dep) for 5.5/100 × (2000 + "110" + "116.05") or 122.4… seen A1 cao (accept only 348.48 or 348.49) **OR** M2 for 2000 × $(1.055)^3$ or 2348.48(…) or 2348.49 seen (M1 for 2000 × $(1.055)^n$, $n \neq 3$) A1 for 348.48 or 348.49 [SC: B2 for 2348.48 - 2348.49]
7 (a)		Line	2	B2 line fully within tramlines, crossing AB and CD (B1 a straight line which crosses AB within the tramline, and also crosses CD) NB: Accept dotted or dashed lines, but not curves; accept freehand if considered to be straight. SC B1 for the perpendicular bisector of *AB* reaching halfway or more from *AB*
(b)		Region		B2 correct arc ±2mm and shaded within. Allow dotty or continous arc. (B1 inaccurate arc and shaded or accurate arc unshaded)
8	65×12=780 75×22=1650 85×23=1955 95×24=2280 105×19=1995 8660/100=	86.6	4	M1 for use of fx with x consistent within intervals (including end points). Allow one slip even if outside interval M1 (dep) for use of midpoints M1 (dep on 1st M1) for use of $\sum fx/100$ or $\sum fx/\sum f$ A1 86.6

Paper 5525_06					
No		**Working**	**Answer**	**Mark**	**Notes**
9		Distance ÷ time: 1400 ÷ 2 h 20 min 20 mins is $\frac{1}{3}$ hour 1400 × 3 ÷ 7 =	600 kph	3	B1 20 mins as $\frac{1}{3}$ hour or as 0.33……hour M1 for distance ÷ time eg 1400 ÷ "2h 20 min" A1 cao OR B1 2 hour 20min = 140 (min) M1 Speed = $\frac{1400}{140}$ = (10 km per minute) A1 cao
10	(a)	$(x+18)+2x+(2x+7)=180$	Equation	2	B2 for $(x+18)+2x+(2x+7)=180$ oe (B1 for $(x+18)+2x+(2x+7)$)
	(b)	$5x+25 = 180$ $5x = 155$	31	2	M1 for simplifying to at least $5x+25=180$ or 360 (may be earned in (a)) A1 for $x=31$
11	(a)	(–14) –4 (0) 4 14	–4, 4, 14	2	B2 for all 3 values correct (B1 for 1 or 2 values correct)
	(b)		curve	2	B1 for all 5 points plotted correctly ± ½ square (ft from table if at least B1 awarded in (a)) B1 (indep) ft for any smooth curve through their points

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
12 (a)	$8 \times \frac{10}{4}$	20	2	M1 $\frac{10}{4}$ or $\frac{4}{10}$ or 0.4 or 2.5 oe seen A1 cao NB ratios get M0 unless of the form 1:*n* OR M1 $\frac{8}{4}, \frac{4}{8}$ oe seen A1 cao
(b)	$15 \times \frac{4}{10}$	6	2	M1 $15 \times \frac{4}{10}$ oe A1 cao
13 (a)	$9.9\times10^8 - 6.0\times10^7$	$\pm 9.3\times10^8$	2	M1 for $99\times10^7 - 6.0\times10^7$ or $9.9\times10^8 - 0.60\times10^8$ or correct conversion of either to an ordinary number or 930000000 or 9.3×10^n where *n* is any positive integer A1 cao
(b)	$\frac{6.0-4.5}{4.5} \times 100 = \frac{1.5}{4.5} \times 100 =$ or $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7} \times 100$	33.3%	3	M2 $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7} \times 100$ oe (M1 for $\frac{6.0\times10^7 - 4.5\times10^7}{4.5\times10^7}$ or $\frac{6.0\times10^7 - 4.5\times10^7}{6.0\times10^7} \times 100$ oe A1 33.3 – 33.4 OR M2 $\frac{6.0\times10^7}{4.5\times10^7} \times 100$ -100 or 33.3% (M1 $\frac{6.0\times10^7}{4.5\times10^7} \times 100$ or 133.3%) A1 33.3-33.4 NB Accept any of the above expressions without any reference to 10^7.

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
14	LCM (40,24) = 120 Bread buns 120÷40 Burgers 120÷24 OR Bread buns: 40 is 2 × 2 × 2 (×5) Burgers: 24 is 2 × 2 × 2 (×3)	Bread Buns 3 Burgers 5	3	M1 attempt to find LCM by eg lists of multiples, or summing of 40s and summing of 24s, with at least 3 numbers in each list A1 identify 120 as LCM A1 cao (both) **OR** M1 expansion of either number into its prime factors in a factor tree or 8×5 or 8×3 A1 both expansions correct A1 cao (both) SC B2 if answers given the wrong way around
15	$\sin 32 = \frac{AB}{12}$ $AB = 12 \times \sin 32$ $AB = 6.35903\ldots$	6.36	3	M1 $\sin 32 = \frac{AB}{12}$ (accept Sin $\frac{AB}{12}$) M1 $12 \times \sin 32$ or $12 \times 0.5299..$ A1 accept 6.359 – 6.360 SC Gradians 5.78(1…) Radians 6.62 Get M1M1A0 **OR** Use of Sine Rule $\frac{\sin 32}{AB} = \frac{\sin 90}{12}$ or $\frac{AB}{\sin 32} = \frac{12}{\sin 90}$ M1 $AB = \frac{12 \times \sin 32}{\sin 90}$ M1 AB = 6.359 – 6.36 A1 SC Gradians 5.85(…) Radians 7. 40(…) M1M1A0

Paper 5525_06					
No		**Working**	**Answer**	**Mark**	**Notes**
16		$8 \times 41 = 328$ $2 \times 29 = 58$ $328 - 58 = 270$ $270 \div 6 = 45$	45	3	M1 for either 8×41 (=328) or 2×29 (=58) M1 (dep) "328" – "58" (=270) A1 cao NB 328 and /or 58 on the answer line gets M1 (implied); 270 on the answer line gets M2 (implied)
17	(a)	$x^2 - 4x + 3x - 12 = x^2 - x - 12$	$x^2 - x - 12$	2	M1 for exactly 4 terms correct ignoring signs (x^2, $4x$, $3x$, 12) or 3 out of 4 terms with correct signs (x^2, $-4x$, $+3x$, -12) A1 cao
	(b)	$6x^2 - 8x + 15x - 20 = 6x^2 + 7x - 20$	$6x^2 + 7x - 20$	2	M1 for exactly 4 terms correct ignoring signs ($6x^2$, $8x$, $15x$, 20) or 3 out of 4 terms with correct signs ($6x^2$, $-8x$, $+15x$, -20) A1 cao
	(c)	$(x+2)(x+5)$	$(x+2)(x+5)$	2	B2 cao (B1 for exactly one of $(x + 2)$, $(x + 5)$)
	(d)		$12p^8q^3$	2	B2 cao (B1 for any 2 out of 3 terms correct in a product or 3 terms correct in a sum or part product)
	(e)	$6 = 15 + 4(q - 5)$ $6 = 15 + 4q - 20$ $11 = 4q$	$2\frac{3}{4}$	3	M1 for correct substitution of p and t. M1 for correct expansion of $4(q-t)$ oe (eg $4q-20$, $4q-4t$) A1 11/4 or 2 ¾ or 2.75 OR M1 for correct substitution of p and t. M1 for $\frac{p-3t}{4} = q - t$ oe A1 11/4 or 2 ¾ or 2.75
18	(a)	$T=kx$; $150=6k$; $k=25$	$T=25x$	3	M1 for $T=kx$, k algebraic M1 subs $T=150$ and $x=6$ into $T = kx^n$ $(n \neq 0)$ A1 for $T=25x$ oe SC B1 $T \propto 25x$ oe

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
(b)	$T = 25 \times 15 =$	375	1	B1 ft on k , $k \neq 1$
(c)	$600 = 25x$; $x = 600 \div 25 =$	24	1	B1 ft on k , $k \neq 1$
19	$\frac{120}{570} \times 50 = 10.5263$ $\frac{250}{570} \times 50 = 21.9298$ $\frac{200}{570} \times 50 = 17.5438$	10 22 18	3	M1 method shown eg $\frac{120}{120+250+200} \times 50$ or one of 10.5(263) 21.9(298), 17.5(438) **OR** 570 ÷ 50 = 11.4 and one of 120 ÷ 11.4 =10.526…) , 270 ÷ 11.4 (=21.9298…) , 200 ÷ 11.4 (=17.5438…) A1 for 10.5(263), 21.9(298), 17.5(438) or 11, 22, 18 B1 correction to add to 50: 10, 22, 18 or 11, 22, 17
20	$x(x+1) + 4(2x–3) = (2x–3)(x+1)$ $x^2 + x + 8x – 12 = 2x^2 + 2x – 3x – 3$ $x^2 – 10x + 9 = 0$ $(x – 9)(x – 1) = 0$	$x = 1,9$	5	M1 for multiplying through by common denominator $(2x–3)(x+1)$ M1 (dep)for either $x^2 + x + 8x – 12$ or $2x^2 + 2x – 3x – 3$ oe A1 for correct quadratic (= 0) M1 for a correct method to solve 3 term quadratic A1 cao for both solutions
21	$AB^2 = 8^2 + 9^2 – 2×8×9×\cos40$ $AB^2 = 64 + 81 – 144×\cos40$ $AB^2 = 145 – 144 × 0.766$ $AB^2 = 145 – 110.31… = 34.6896$ $AB = \sqrt{34.6796} = 5.8897877$	5.89	3	M1 Subs in Cos Rule: $8^2 + 9^2 – 2×8×9×\cos40$ M1 correct order of evaluation of $8^2 + 9^2 – 2×8×9×\cos40$ A1 cao 5.88 – 5.89 SC: Award B2 for one of $AB^2 = 241.03…$ or $AB = 15.525…$ (radians) $AB^2 = 28.50…$ or $AB = 5.33…$ (gradians)
22 (a)		24 30	2	B1 24 cao B1 30 cao
(b)	Column $60 \leq w < 75$ at 10 Column $75 \leq w < 95$ at 4	10 4	2	B1 10 and correct width (tol $\pm\frac{1}{2}$ small square) B1 4 and correct width (tol $\pm\frac{1}{2}$ small square)

Paper 5525_06				
No	**Working**	**Answer**	**Mark**	**Notes**
23 (a)		100.5	1	B1 cao
(b)		10.515	1	B1 cao
(c)	$\frac{100.5}{10.515}$	9.5577746	2	M1 for greatest distance divided by least time Where 100 < greatest distance ≤ 100.5, 10.51 ≤ least time < 10.52 A1 for 9.555 – 9.56
(d)	$\frac{99.5}{10.525}$	9.45368..	2	M1 for least distance divided by greatest time Where 99.5 ≤ least distance < 100, 10.52 < greatest time ≤10.53 A1 for 9.45 – 9.455
24	$\frac{4}{7}\times\frac{4}{7}\times\frac{3}{7} + \frac{3}{7}\times\frac{3}{7}\times\frac{4}{7} =$ $\frac{48+36}{343} = \frac{84}{343}$ But there are three ways this can be achieved: BBG, BGB, GBB So the probability is $\frac{84}{343}\times 3$ OR $1-\frac{64}{343}-\frac{27}{343}$ NB: 84/343 = 0.244897; 252/343 = 0.73469 $\frac{4}{7} = 0.57(142...)$, $\frac{3}{7} = 0.42(857...)$	$\frac{252}{343}$	3	M1 for $\frac{4}{7}\times\frac{4}{7}\times\frac{3}{7}$ or $\frac{3}{7}\times\frac{3}{7}\times\frac{4}{7}$ oe or $\left(\frac{4}{7}\right)^3$ oe or $\left(\frac{3}{7}\right)^3$ oe or $\frac{91}{343}$ or 0.10(49…) or 0.13(99….) M1 (indep) for identification of all 6 outcomes (M2 for $1-\left[\left(\frac{4}{7}\right)^3+\left(\frac{3}{7}\right)^3\right]$) oe A1 $\frac{252}{343}$, $\frac{36}{49}$, 0.73(469…) oe

Paper 5525_06					
No		**Working**	**Answer**	**Mark**	**Notes**
25	(a)	$\frac{1}{3} \times \pi \times 5^2 \times 8 = \pi \times 25 \times 8 \div 3 =$ 209.4395	209–210	2	M1 for $\frac{1}{3} \times \pi \times 5^2 \times 8$ A1 for 209–210
	(b)	Base radius = $\frac{216}{360} \times 15 = 9$ Height = $\sqrt{(15^2 - 9^2)} =$	12	4	M1 for 216 ÷ 360 A1 for 9 M1 for $\sqrt{(15^2 - \text{“9”}^2)}$, where “9” < 15 A1 cao

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Mark Scheme (Results)

June 2011

Modular Mathematics (GCSE)
Unit 1: 5MB1H_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. 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

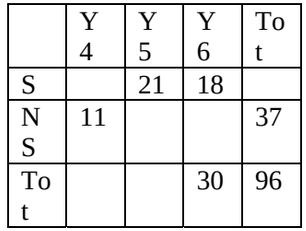
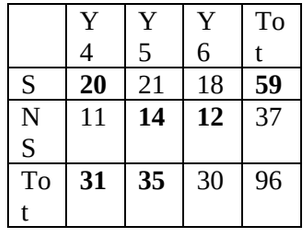
Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability 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 (i)	 OR 96 – 37 = 59 children can swim 18 + 21 = 39 children in Y5 or Y6 can swim 59 – 39	20	4	M1 for including 4 of the 6 pieces of information given in a clearly labeled two-way table A1 for 20 or 20 out of 96 or 20/96 OR M1 for a correct method that leads to the number of children in year 4 that can swim eg 96 – 37 (= 59) children can swim 18 + 21 = (39) children in Y5 or Y6 can swim '59' – '39' A1 for 20 or 20 out of 96 or 20/96
(ii)	 OR 20 + 11 = 31children in Y4 30 + 31 = 61 children in Y4 or Y6 96 – 61	35		M1 for one correct calculation leading to a 'new', piece of information in a clearly labeled two-way table A1 for 35 or 35 out of 96 or $\frac{35}{96}$ OR M1 for a correct method that leads to the total number of children in year 5 eg '20' + 11 (= 31) children in Y4 30 + '31' (=61) children in Y4 or Y6 96 – '61' children in Y5 A1 for 35 or 35 out of 96 or $\frac{35}{96}$ SC If M1 not earned then award B1 if ans(ii) = 55 – ans (i)

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5MB1H_01					
Question		Working	Answer	Mark	Notes
2	(a)	See scatter graph	(12,14) and(17,20) plotted	1	B1 for correct plotting of both points
	(b)			1	B1 Positive (accept a correct relationship)
	(c)		16 to 18	2	B2 16 – 18 (M1 for a single line segment from m=11 to m = 16 within overlay or a vertical line drawn from m = 15 A1 for an answer in the range 16-18 or ft their line of best fit ± 2mm)

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)	$\frac{15}{100} \times 2400 = 360$ 2400 – 360 = 2040 2040 ÷ (1 + 2 + 5) = 255 255 × 1, 255 × 2, 255 × 5	Cement = 255 Sand = 510 Stone = 1275	4	M1 for $\frac{15}{100} \times 2400$ or $\frac{85}{100} \times 2400$ M1 for '2040' ÷ (1 + 2 + 5) M1 (dep on previous M1) for '255' × 1 or '255' × 2 or '255' × 5 either explicitly or with answer(s) on the answer line. A1 for all 3 correct masses
	(b)*	255 × 30 – 6500 = 1150 so not enough OR 6500 ÷ 255 = 25.5 m^3 worth of cement Which is less than 30 so not enough OR 6.5 tonnes of concrete gives 6.5 × 8 = 52 tonnes of dry mixture 30 m^3 of concrete requires 30 × 2400 × 0.85 kg of dry mixture = 61200kg of dry mixture (=61.2 tonnes)	No, with justification	3	B1 for a correct conversion between kg and tonnes e.g. 6.5 tonnes = 6500 kg (but not 1 tonne = 1000 kg) M1 for '255' × 30 C1(dep on M1) for an answer of No (Yes), supported by (ft) calculations. OR B1 for a correct conversion between kg and tonnes e.g. 6.5 tonnes = 6500 kg (but not 1 tonne = 1000 kg) M1 for 6500 ÷ '255' C1(dep on M1) for an answer of No (Yes), supported by (ft) calculations OR M1 for 6.5 × 8 and 30 × 2400 × 0.85 B1 for a correct between kg and tonnes e.g. 61200 kg = 61.2 kg (but not 1 tonne = 1000 kg) C1 (dep on M1) for an answer of No (Yes), supported by (ft) calculations.

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)		14 | 8 15 | 2 4 16 | 0 2 4 4 8 17 | 0 3 4 9 14 | 8 = 148 cm	3	B2 for a fully correct ordered diagram (B1 for correct unordered diagram or ordered with at most two errors) B1 for a correct key eg 14 | 8 = 148 cm (cm not required)
	(b) *	Boy's Median = 170 Girl's Media = 164 Boy's Mean = 170(.38) Girl's Mean= 164 Boy's Range = 27 Girl's Range = 31 Boy's IQR = 14 Girl's IQR = 14.5 – 15.25 15 | 7 9 16 | 2 6 8 9 17 | 0 3 4 6 6 18 | 1 4	Compares: medians/means + Range + Spread	3	A maximum 2B marks from: B1 for a correct mean or median for either the boys or the girls. B1 for a correct measure of spread for either the boys or the girls. B1 for a correct stem and leaf diagram drawn for the boys (no need for a key) C1 for any correct comparison based on 2 medians(ft) or 2 means(ft) or 2 ranges(ft) or 2 IQRs (ft) or a correct statement following from comparing the correct stem and leaf diagrams. This comparison must be a general statement which compares the boys' heights with the girls' heights.
5	(a)	$1 - 0.3 - 0.1 - x$	$0.6 - x$	2	M1 for $0.3 + 0.1 + x + P(2) = 1$ oe A1 $0.6 - x$ or $\frac{6}{10} - x$ or $1 - (0.4 + x)$ or $1 - 0.3 - 0.1 - x$
	(b)	$0.3 + 0.1$	0.4	1	B1 cao
	(c)		$300x$	1	B1 for $300x$, $x \times 300$ oe

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6	(a)		Overlapping response boxes Leading/biased question Age too personal Missing units	2	B2 for any two of: overlapping response boxes, too personal to ask person's age, a leading or biased question, no units (B1 – just one of the above).
	(b)		How many pieces of fruit do you eat each day? 0 to2, 3 to 4, over 4	2	B1 for a sensible question including a time period B1 for at least 3 response boxes. Any pairs of response boxes must not overlap
	(c)	$\frac{73}{536+384+48+73} \times 100$	7	2	M1 for $\frac{73}{536+384+48+73} \times 100$ Or $100 \div \left\langle \frac{536+384+48+73}{73} \right\rangle$ Or 7.01… A1 for 7
7		1200×1.035^3 Or 1200 × 1.035 = 1242 1242 × 1.035 = 1285.47 1285.47× 1.035 = 1330.46	1330.46	3	M2 for 1200×1.035^3 A1 1330.46 – 1330.47 Or M1 1200 × 1.035 M1(dep) for ' 1242'× 1.035 and '1285.47'× 1.035 A1 1330.46 – 1330.47 [SC: B1 for 42 or 84 or 126 or 1242 or 1284 or 1326 seen, if M0 scored]

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(a)		$25 \leq t < 30$	1	B1 for the interval $25 \leq t < 30$ described unambiguously
	(b)	12.5×6 + 17.5×4 + 22.5×24 + 27.5×44 + 32.5×10 + 37.5×4 =75+70+540+1210+325+150 = 2370 2370 ÷ 92	25.8	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 $\frac{\Sigma fx}{\Sigma f}$ A1 25.76 – 25.8
	(c)	Cf table: 6, 10, 34, 78, 88, 92 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.
	(d)	Median at the (92+1)÷2 = 46.5 day temp IQR = UQ – LQ = 69.75th day temp – 23.25th day temp	Median = 25.4 IQR = 6.7	3	B1 for a median in the range 24.5−26.5 or B1 ft read off at CF = 46(.5) from a CF graph tol $\frac{1}{2}$ square M1 for reading off temps at CF= 69 or 69.75 (±0.5) and 23 or 23.25(±0.5) from a CF graph and subtracting A1 ft

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5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		Gradient $= \frac{68-32}{20}$	$m = 1.8$, $k = 32$	3	M1 for attempting to find the gradient of the line eg from height ÷ base of a triangle with the line as hypotenuse A1 for $m = 1.7 - 1.9$ B1 for $k = 31$ - 33
10	(a)		0.8 0.6 0.2 0.4 0.5 0.5	2	B2 for all 6 correct probabilities (B1 for two correct probabilities)
	(b)	0.6 × 0.8	0.48	2	M1 for '0.6' × '0.8' ft probability tree diagram A1 cao
	(c)	1 – (0.4 × 0.5) 1 – 0.2 OR 0.6 × 0.8 + 0.6 × 0.2 + 0.4 × 0.5	0.8	3	M2 for 1 – '0.4' × '0.5' ft probability tree diagram A1 cao OR M2 for '0.6' × '0.8' + '0.6' × '0.2' + '0.4' × '0.5' (M1 for any two of '0.6' × '0.8', '0.6' × '0.2', '0.4' × '0.5'added) A1 cao

5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
11 (a)		Histogram Fd axis labelled say 0 to 8 5 – 10, fd = 1.6 10 – 12, fd = 7.5 12 – 16, fd = 6 16 – 20, fd = 4 20 – 25, fd = 2	3	M1 for fd axis labeled and 1 correct block or for one correct division eg 8 ÷ 5 or 1.6 A1 for at least 2 additional correct blocks or 2 additional frequency densities calculated A1 for completely correct histogram SC B2 for a fully correct but unlabeled histogram OR M1 for area key and 1 correct block A1 for at least 2 additional correct blocks A1 for completely correct histogram SC B2 for a fully correct but unlabeled histogram
(b)		32	2	M1 for 6 × 1 + 16 + 10 A1 cao

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

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

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

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If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
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If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
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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.

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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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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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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

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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

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

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

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

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Mark Scheme (Results)

Summer 2012

GCSE Mathematics (Linear) 1MA0
Foundation (Non-Calculator) Paper 1F

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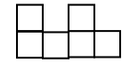
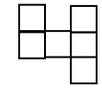
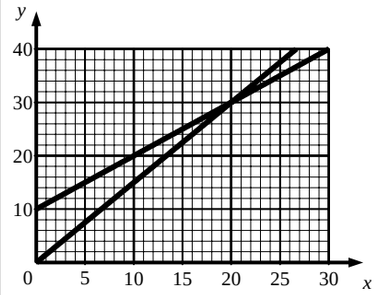
1MA0_1F					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		380	1	B1 cao
	(b)		6.2	1	B1 cao
	(c)		Arrow at 34	1	B1 cao
2	(a)		8	1	B1 for 8 ± 0.2
	(b)		35	1	B1 for 35 ± 2°
	(c)		Circle drawn	1	B1 for all parts within ± 2mm, (use overlay)
3	(a)		4, 7, 4, 3, 2	2	M1 for at least 3 correct tallies **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)		(2, 3)	2	B1 cao
	(ii)		(–3, 1)		B1 cao
	(b)		Point plotted at (3, –4)	1	B1 cao
6	(a)		– 5	1	B1 cao
	(b)		6	1	B1 for 6 or – 6
	(c)		3	1	B1 cao
7			(P, B), (P, S), (P, L) (M, B), (M, S), (M, L) (H, B), (H, S), (H, L)	2	M1 for any 3 combinations with no incorrect combinations A1 for all 9 combinations with no duplicates or extras
8	(a)		Walk	1	B1 cao
	(b)	24 ÷ 4 =	6	2	M1 for 24 ÷ 4 oe or ¼ oe seen A1 cao

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

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

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

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

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

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

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

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

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

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

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

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

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Mark Scheme (Results)

June 2012

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 $4 \times n + 2$ or $n4 + 2$, …) or nth = $4n + 2$ (B1 for a linear expression in $4n$ e.g. $4n + a$ ($a \neq 2$) or $n = 4n + 2$) (B0 for $n = 4n$ and $n + 4$)

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

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)

PMT

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

<table>
<tr><th colspan="6">5MB2H_01</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>9</td><td></td><td>Table of values
<table><tr><td>x</td><td>–2</td><td>–1</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>–7</td><td>–5</td><td>–3</td><td>–1</td><td>1</td></tr></table>
OR
Using $y= mx + c$
Gradient 2 intercept –3</td><td>Single line drawn from (–2, –7) to (2, 1)</td><td>3</td><td>(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)</td></tr>
</table>

PMT

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

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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 (180 – 40)÷2 =70 180 – 2×(90 –70) = 140	Angle *TOR* =140°	4	M1 for angle *PTO* (*PRO*) = 90° 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* = 140° or for 140° seen in the correct place in the diagram [140° 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 180° Sum of angles in a quadrilateral is 360° Triangles *PTO* and *PRO* are congruent Tangents from a point are equal in length OR M1 for angle *PTO* (*PRO*) = 90° 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* = 140° or for 140° seen in the correct place in the diagram [140° 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 180° Base angles of an isosceles triangle are equal Triangles *PTO* and *PRO* are congruent Tangents from a point are equal in length

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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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

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1		180×1.5 40×1.5 110×1.5 30×1.5	Flour = 270 Ginger = 60 Butter = 165 Sugar = 45	3	M1 for ×24÷16 oe or 24/16 or 1.5 seen or 180 + 90 (=270) or 40 + 20 (=60) or 110 + 55 (=165) or 30 + 15 (=45) or sight of any one of the correct answers A2 for all 4 correct answers (A1 for 2 or 3 correct answers)
2	(a)		Positive (correlation)	1	B1 for positive (correlation) [do not accept a relationship]
	(b)		85	2	B2 for an answer in the range 83 to 87 OR M1 for a single straight line segment with positive gradient that could be used as a line of best fit or for an indication on the diagram from 148 on the height axis A1 ft from their line of best fit
3*			9	4	M1 for 7155 – 7095 or 60 seen or 7155×15 (or .15) or 7095×15 (or .15) or 107325 or 106425 or 1073.25 or 1064.25 M1 for '60' ×15 or 7155 ×15 – 7095 × 15 [or .15 instead of 15] A1 for 9 or 9.00 or 900 C1 (ft) for answer with correct units (money notation) identified as the answer.
4			Question Answer	2	B1 for an appropriate question with reference to a time frame with a unit of time or a question with a time frame with a unit of time 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 inequalities] Do not accept frequency tables or data collection sheets.

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5			600	3	(M2 for 300 ÷ 0.5 or 60 × 10 or 30 × 20) M1 for at least two of 30, 10 and 0.5 or sight of 300 or 60 or 20 A1 for 600 – 620 but not 601.1(198428…) **OR** (M2 for 310 ÷ 0.5 or 62 × 10 or 31 × 20) M1 for at least two of 31, 10 and 0.5 or sight of 310 or 62 or 20 A1 for 600 – 620 but not 601.1(198428…)
6			Enlargement, scale factor 2.5, centre (0,0)	3	B1 for enlargement B1 for scale factor 2.5 oe B1 for (0,0); accept origin or *O* NB: if two different transformations are stated then 0 marks.
7		$\frac{9}{2}\times(12+18)=135$ 135 ÷ 20 = 6.75 (=7 bags) 7 × 4.99 OR $18\times9-\frac{1}{2}(6\times9)$ = 135 135 ÷ 20 = 6.75 (=7 bags) 7 × 4.99	34.93	4	M1 for $\frac{9}{2}\times(12+18)$ or $18\times9-\frac{1}{2}(6\times9)$ or $9\times12+\frac{1}{2}\times(18-12)\times9$ or 135 seen M1 (dep) for '135'÷ 20 or 6 or 7 seen M1 (dep on previous M1) for '6' × 4.99 or '7' × 4.99 A1 cao [SC: M1 for (12×9 + 6×9) ÷ 20 (= 162÷20) or 8 or 9 seen M1 (dep) for '8' × 4.99 or '9' × 4.99 OR M1 for (18×9 − 6×9) ÷ 20 (= 108÷20) or 5 or 6 seen M1 (dep) for '5' × 4.99 or '6' × 4.99]

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1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
8	(a)		0.15	2	M1 for 1 – (0.2 + 0.5) oe or sight of 0.3 A1 oe
	(b)		48	2	M1 for 240 × 0.2 oe or 48 + 120 + 36 +36 A1 cao
9			380	3	M1 for 4×7 + 5×2 (=38) or 9×2 + 5×4 (=38) or 4×7×10 or (7×9 − 5×5) or 5×2×10 (=100) or 9×2×10 (=180) or 5×4×10 (=200) or 9×7×10 (=630) or 5×5×10 (=250) M1 (dep) for '38'×10 or 380 or 4×7×10 + 5×2×10 or 9×2×10 + 5×4×10 or ×10 A1 cao
10			Region shaded	3	B1 for circle arc of radius 3cm (± 2mm) centre Burford B1 for circle arc of radius 5 cm (± 2mm) centre Hightown B1 for overlapping regions of circle arcs shaded
11	(a)		$12x + 20$	1	B1 cao
	(b)		$5x + 7$	2	M1 for $2\times x - 2\times 4$ or $3\times x + 3\times 5$ A1 cao
	(c)		$x^2 + 10x + 24$	2	B2 cao (B1 for 4 correct terms with or without signs, or 3 out of no more than 4 terms, with correct signs. The terms may be in an expression or in a table)

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12			36 – 9π	3	M1 for π×6×6 or 36π seen value 113.03-113.2 M1 for (12×12 –'π×6×6')÷4 or value 7.7-7.8 A1 for 36 – 9π oe **OR** M1 for π×6×6÷4 or 9π seen or value 28.2-28.3 M1 for 6×6 – 'π×6×6÷4' or value 7.7-7.8 A1 for 36 – 9π oe NB: for M marks π may be given numerically.
13*		180÷9×1:180÷9×3:180÷9×5 =20:60:100 Not enough cement (but enough sand and enough gravel) OR 1×15:3×15:5×15 =15:45:75 15+45+75=135 (<180) Not enough cement (to make 180kg of concrete)	No + reason	4	M1 for 180 ÷ (1+3+5) (= 20) or 3 multiples of 1: 3: 5 M1 for 1×"20" or 3×"20" or 5×"20" or 20 seen or 60 seen or 100 seen A1 for (Cement =) 20, (Sand =) 60, (Gravel) = 100 C1 ft (provided both Ms awarded) for not enough cement oe **OR** M1 for (1×15 and) 3×15 and 5×15 or 9×15 or sight of the numbers 15, 45, 75 together. M1 for '15' + '45' + '75' A1 for 135 (<180) C1 ft (provided both Ms awarded) for not enough cement oe

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1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14			230	2	M1 for 180 + 50 A1 cao **OR** M1 for 360 – (180 – 50) or 360 – 130 A1 cao **OR** M1 for 50 + (90 – 50) + 90 + 50 or 50 + 40 + 90 + 50 A1 cao **OR** M1 for a suitable diagram (sketch) with bearing of lighthouse from ship indicated and 50° marked at lighthouse; diagram only intended to indicate position of 50°; ignore other labels and markings unless they create ambiguity. A1 cao
15	(a)		m^2	1	B1 for m^2 or m^{5-3}
	(b)		$5x^6y^4$	2	M1 for $x^{4+2}y^a$ or x^by^{3+1} A1 cao

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16			84	4	M1 for $x - 1 + 3x + 1 + 3x$ (= 56) or $7x = 56+1-1$ or $\frac{3x(x-1)}{2}$ oe M1 for $7x = 56$ or 8 seen M1 for $0.5\times(\text{'8'} - 1)\times(3\times\text{'8'})$ A1 cao Ignore any statement of units. SC B2 for 8 as the answer or 7 identified as the height and 24 identified as the base of the triangle.
17			(4,3), (4,4), (4,5), (5.4) marked	3	M2 for identifying the correct region or at least 3 correct points with no more than 3 incorrect points (M1 for drawing $x = 3$ (solid or dashed line) or at least 1 correct point with no more than 3 incorrect points) A1 cao

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18			12	4	B1 for 60 seen M1 for (360 – 60) ÷ 2 (=150) M1 for 360 ÷ (180 – 150) or 150×n=180(n-2) oe A1 cao **OR** B1 for 60 seen M1 for 60 ÷ 2 (=30) M1 for 360 ÷ (60÷2) A1 cao **OR** M2 for 30 seen M1 for 360 ÷ 30 A1 cao
19	(a)		Box plot	2	B2 cao (B1 for ends of whiskers at 18 and 44 (as part of a box plot diagram) **OR** for ends of box at 25 and 33 with median at 29)
	(b)		2 comparisons	2	B2 ft for two comparisons with at least one referring to IQR or median values (B1 ft for one comparison of IQRs, medians, or other values) As well as median or interquartile range accept other valid references to spread if explained correctly within a statistical context. Statements need to be true.

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20		0.38×10^{-1}, 3800×10^{-4}, 0.038×10^{2}, 380	Correct order	2	M1 changing any one correctly or at least 3 in the correct order (ignoring one) or reverse order A1 for correct order (accept any form)
21	(a)		11, 34, 65, 92, 100	1	B1 cao
	(b)		cf graph	2	B1 for 5 or 6 points plotted correctly ±1 full 2 mm square at the upper end of the interval dep on sensible table (condone one error in addition) B1 (dep) for points joined by curve or line segments provided no gradient is negative. Ignore any point or graph outside range of their points. SC B1 for 5 or 6 points plotted not at end but consistently within each interval and joined.
	(c)		18 – 24	2	M1 for indication of taking a reading from 90 or ft from their cf graph A1 for 18 – 24

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
22		$12x+8y=16$ $12x+15y=51$ $7y = 35$ $3x+2\times5=6$ Alternative method $x=\frac{4-2y}{3}$ $4\left(\frac{4-2y}{3}\right)+5y=17$ $16-8y+15y=51$ $7y = 35$ $x=\frac{4-2\times5}{3}$	$x = -2$ $y = 5$	4	M1 for a correct process to eliminate either x or y or leading to substitution (condone one arithmetic error) A1 for either $x = -2$ or $y = 5$ M1 (dep) for correct substitution of their found value A1 cao SC If M0 scored B1 for $y = -2$ and $x = 5$

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23			7.5	4	B1 for identifying A at 3 or D at 6 or A(3, 0) or D(0, 6) oe eg may be seen as labels on the diagram M1 for $0=\frac{-1}{-2}\times 3+c$ M1 (dep on previous M1) for 6 + '1.5' A1 cao **OR** B1 for identifying A at 3 or D at 6 or A(3, 0) or D(0, 6) oe eg may be seen as labels on the diagram M1 for 3/6 = *OP*/3 or 1.5 oe seen (from similar triangles) M1 for 6 + '1.5' A1 cao **OR** B1 for identifying A at 3 or D at 6 or A(3, 0) or D(0, 6) oe eg may be seen as labels on the diagram M1 for $(6+OP)^2 = (6^2+3^2) + (3^2+OP^2)$ oe (from Pythagoras) M1 for 6 + '1.5' A1 cao
24			$t=\frac{3-4p}{p+2}$	4	M1 for intention to multiply both sides by 4+*t* eg $p\times 4+t=3-2t$ M1 for intention to correctly move their *t* terms to one side, and correctly move their other terms to the other side eg $p\times 4+t-4p+2t=3-2t+2t-4p$ M1 for intention to factorise eg $t(p\pm 2)$ A1 for $t=\frac{3-4p}{p+2}$ oe

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
25	(a)		640	2	M1 for $80\times\left(\frac{8}{4}\right)^3$ or $80\div\left(\frac{4}{8}\right)^3$ A1 cao
	(b)		40	2	M1 for $160\div\left(\frac{8}{4}\right)^2$ or $160\times\left(\frac{4}{8}\right)^2$ or ft their scale factor from (a) A1 cao

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
26	(a)		$\frac{5\sqrt{2}}{2}$	2	M1 for $\frac{5}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$ oe A1 for $\frac{5\sqrt{2}}{2}$ oe
	(b)		$8\sqrt{3}$	2	M1 for $2\times2+2\sqrt{3}+2\sqrt{3}+\sqrt{3}\times\sqrt{3}$ or $\left(4+4\sqrt{3}+3\right)-\left(4-4\sqrt{3}+3\right)$ or $2\times2-2\sqrt{3}-2\sqrt{3}+\sqrt{3}\times\sqrt{3}$ at least three terms in either correct; could be in a grid. A1 cao **OR** Difference of two squares M1 for $\left(\left(2+\sqrt{3}\right)-\left(2-\sqrt{3}\right)\right)\left(\left(2+\sqrt{3}\right)+\left(2-\sqrt{3}\right)\right)$ A1 cao
27	(a)		Circle, centre *O*, radius 2	2	B2 cao (B1 for a circle radius 2 any centre or for a circle or part of a circle centre (0, 0) any radius)
	(b)		Cosine curve crossing at (0, 1), (90, 0), (270, 0) and (360, 1)	2	B2 cao (ignore if sketch outside region) (B1 for a curve with correct intercepts but incorrect amplitude OR for a curve starting at (0,1) with correct amplitude but incorrect intercepts; curves must have a shape that approximates to a cosine curve)

1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
28	(a)		$\mathbf{a}-3\mathbf{b}$	1	B1 for $\mathbf{a}-3\mathbf{b}$ oe
	(b)			4	M1 for (**NC** =) $2\mathbf{a}-2\mathbf{b}$ oe M1 for (**NM** =) $\mathbf{b}+\frac{1}{2}"(\mathbf{a}-3\mathbf{b})"$ A1 for $\frac{1}{2}(\mathbf{a}-\mathbf{b})$ oe and $2\mathbf{a}-2\mathbf{b}$ oe C1 for **NC** is a multiple of **NM** (+ common point) **OR** M1 for (**NC** =) $2\mathbf{a}-2\mathbf{b}$ oe M1 for (**MC** =) $\frac{1}{2}"(\mathbf{a}-3\mathbf{b})"+\mathbf{a}$ A1 for $\frac{3}{2}(\mathbf{a}-\mathbf{b})$ oe and $2\mathbf{a}-2\mathbf{b}$ oe C1 for **NC** is a multiple of **MC** (+ common point) **OR** M1 for (**NM** =) $\mathbf{b}+\frac{1}{2}"(\mathbf{a}-3\mathbf{b})"$ M1 for (**MC** =) $\frac{1}{2}"(\mathbf{a}-3\mathbf{b})"+\mathbf{a}$ A1 for $\frac{1}{2}(\mathbf{a}-\mathbf{b})$ oe and $\frac{3}{2}(\mathbf{a}-\mathbf{b})$ oe C1 for **NM** is a multiple to **MC** (+ common point)

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Mark Scheme (Results)

March 2013

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

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

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

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

7 With working

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

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

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It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect 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

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)

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

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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.

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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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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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PAPER: 1MA0_1H					
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)

PAPER: 1MA0_1H					
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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PAPER: 1MA0_1H					
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

PAPER: 1MA0_1H					
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.

PAPER: 1MA0_1H					
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

PAPER: 1MA0_1H					
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

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

PAPER: 1MA0_1H					
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.

PAPER: 1MA0_1H					
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

PAPER: 1MA0_1H					
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

PAPER: 1MA0_1H			
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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NOTES ON MARKING PRINCIPLES

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

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

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

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

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

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

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

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

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

7 With working

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

8 Follow through marks

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

9 Ignoring subsequent work

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

10 Probability

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

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

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

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

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

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			40.5	3	M1 for 1.5×6 or 1.5 ×1.5 M1 for adding area of 5 or 6 faces provided at least 3 are the correct area A1 cao NB: anything that leads to a volume calculation 0 marks.
*2			Not enough mincemeat since 600<700 OR Only able to make 38 mince pies since insufficient mincemeat	4	M1 for 45 ÷ 18 (= 2.5) M1 for 2.5 used as factor or divisor A1 for ingredients as 562.5 and 875 and 250 and 700 and 2.5 (accept 2 or 3) OR for availables as 400, 400, 200 240, 2.4 (accept 2 or 3) C1 ft (dep on at least M1) for identifying and stating which ingredient is insufficient for the recipe (with some supportive evidence) OR M1 for a correct method to determine the number of pies one ingredient could produce M1 for a correct method to determine the number of pies **all** ingredient could produce A1 for 80 and 51 and 90 and 38 and 108 C1 ft (dep on at least M1) for identifying and stating which ingredient is insufficient for the recipe. (with some supportive evidence)

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
3	(a)		Points plotted at (1,8200) and (3.5,5000)	1	B1 for points accurately plotted ±1/2 square tolerance
	(b)		‘the older the car the lower the value’ ‘the greater the value the newer the car’	1	B1 for an acceptable relationship eg. ‘the older the car the lower the value’ (accept ‘negative correlation’ but not just ‘negative’)
	(c)		5200 to 6600	2	M1 for a single line segment with negative gradient that could be used as a line of best fit or a vertical line from 2.5 or a point at (2.5,*y*) where *y* is from 5200 to 6600 A1 for given answer in the range 5200 − 6600
4			126	3	M1 for 1 – 0.05 – 0.32 (= 0.63) M1 for ‘0.63’ × 200 A1 cao OR M1 for 0.05 × 200 (= 10) or 0.32 × 200 (= 64) or 0.37 × 200 (=74) M1 for 200 – ‘10’ – ‘64’ A1 cao OR M1 for 100 – 5 – 32 (= 63) M1 for $\frac{"63"}{100}\times 200$ A1 cao SC: B2 for $\frac{126}{200}$ as the answer.

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		Response boxes overlap and are not exhaustive	2	B2 for **TWO** aspects from: No time frame given Non-exhaustive responses Response boxes over-lapping (B1 for ONE correct aspect)
	(b)		How many magazines do you buy each month? 0-4 5-8 over 8	2	B1 for a question with a time frame B1 for at least 3 correctly labelled response boxes (non-overlapping, need not be exhaustive) **or** for a set of response boxes that are exhaustive (could be overlapping) [Do not allow inequalities in response boxes]
	(c)		One reason	1	B1 for ONE reason Eg. All the same age, may all be males, may all like same types of magazines, sample too small, biased
6			4.8	4	M1 for 60 × 60 (=3600) M1 for 15000÷ 20 (=750) or 20÷15000 (=0.00133..) or "3600"÷15000 (=0.24) or 15000÷"3600" (=4.16..) M1 for "3600" ÷ (15000÷20) or "3600"×20÷15000 oe A1 cao

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
7			28% or $\frac{14}{50}$	4	M1 for 100 30 (= 70) or $1 - \frac{3}{10}$ $(= \frac{7}{10})$ M1 for "70" ÷ (3 + 2) (= 14) or $"\frac{7}{10}" \div (3+2)$ $(= \frac{7}{50})$ M1 for "14" × 2 or $\frac{7}{50} \times 2$ A1 for 28% or $\frac{14}{50}$ oe **OR** M1 for a correct method to find (100-30)% of any actual sum of money M1 for "350" ÷ (3 + 2) (= 70) M1 for "70" × 2 A1 for 28% or $\frac{14}{50}$ oe **OR** M1 for starting with two numbers in ratio 3:2, eg 21 and 14 M1 for equating sum of their numbers to 100 – 30 (=70%), eg '21' + '14' (=35) M1 for scaling sum of their numbers to 100%, eg '35'÷70×100 (=50) A1 for 28% or $\frac{14}{50}$ oe SC: award B3 for oe answers expressed in an incorrect form eg $\frac{2.8}{10}$

PAPER: 1MA0_2H					
Question		Working	Answer	Mark	Notes
8			10752	4	M1 for splitting the pentagon (or show the recognition of the "absent" triangle) and using a correct method to find the area of one shape M1 for a complete and correct method to find the total area M1 (dep on at least one prev M1) for multiplying their total area by 2.56 (where total area is a calculation involving at least two areas) A1 cao
9			55	4	M1 for a correct method to find a different angle using 35° M1 for setting up a complete process to calculate angle *x* A1 cao B1 states one of the following reasons relating to their chosen method: Alternate angles are equal; Corresponding angles are equal; Allied angles / Co-interior angles add up to 180; the exterior angle of a triangle is equal to the sum of the interior opposite angles.

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<table>
<tr><th colspan="5">PAPER: 1MA0_2H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>10</td><td></td><td>
<table>
<tr><th>x</th><th>$x^3 + 2x$</th></tr>
<tr><td>4</td><td>72</td></tr>
<tr><td>4.1</td><td>77.(121)</td></tr>
<tr><td>4.2</td><td>82.(488)</td></tr>
<tr><td>4.3</td><td>88.(107)</td></tr>
<tr><td>4.4</td><td>93.(984)</td></tr>
<tr><td>4.5</td><td>100.(125)</td></tr>
<tr><td>4.6</td><td>106.(536)</td></tr>
<tr><td>4.7</td><td>113.(223)</td></tr>
<tr><td>4.8</td><td>120.(192)</td></tr>
<tr><td>4.9</td><td>127.(449)</td></tr>
<tr><td>5</td><td>135</td></tr>
<tr><td></td><td></td></tr>
<tr><td>4.65</td><td>109.8(44625)</td></tr>
<tr><td>4.66</td><td>110.5(14696)</td></tr>
<tr><td>4.67</td><td>111.1(87563)</td></tr>
<tr><td>4.68</td><td>111.8(63232)</td></tr>
<tr><td>4.69</td><td>112.5(41709)</td></tr>
</table>
</td><td>4.7</td><td>4</td><td>B2 for a trial $4.6 \leq x \leq 4.7$ evaluated correctly
(B1 for a trial evaluated correctly for $4 \leq x \leq 5$)
B1 for a different trial evaluated correctly for $4.65 \leq x < 4.7$
B1 (dep on at least one previous B1) for 4.7

[Note: Trials should be evaluated to at least accuracy shown in table, truncated or rounded]

No working scores 0 marks</td></tr>
<tr><td>11</td><td></td><td></td><td>3.52</td><td>3</td><td>M1 for $1.35^2 + 3.25^2$
M1 (dep) for $\sqrt{(1.35^2 + 3.25^2)}$ $(= \sqrt{12.385})$
A1 for answer in the range 3.51 to 3.52</td></tr>
</table>

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PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)	$3x - 6 = x + 7$ $2x = 13$	6.5	3	M1 for $3\times x - 3\times 2$ (=$3x - 6$) or $\frac{x}{3} + \frac{7}{3}$ seen M1 for correct method to isolate the terms in x or the number terms on opposite sides of an equation A1 for 6.5 oe
	(b)	$2 - y = 1 \times 5$	-3	2	M1 for intention to multiply both sides by 5 (to give $2 - y = 1 \times 5$) A1 cao
13	(a)		(3, 3.5) oe	2	M1 for a correct method to find the value of either the x coordinate or the y coordinate of the midpoint **or** $x = 3$ **or** $y = 3.5$ A1 cao
	(b)		-1.8 oe	2	M1 for correct method to find the gradient OR (+)1.8 A1 for -1.8 oe

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*14			The Friendly Bank	4	M1 for a correct method to find interest for the first year for either bank **OR** correct method to find the value of investment after one year for either bank **OR** use of the multiplier 1.04 or 1.05 M1 for a correct full method to find the value of the investment (or the value of the total interest) at the end of 2 years in either bank A1 for 2100.8(0) and 2110.5(0) (accept 100.8(0) and 110.5(0)) C1 (dep on M1) ft for a correct comparison of *their* total amounts, identifying the bank from their calculations **OR** M1 for either 1.04 × 1.01 or 1.05 × 1.005 M1 for 1.04 × 1.01 and 1.05 × 1.005 A1 for 1.0504 and 1.05525 C1 (dep on M1) ft for a correct comparison of *their* total multiplying factors identifying the bank from their calculations

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PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)		-2 -1 0 1 2 3 4 **8** 3 0 **-1** **0** 3 **8**	2	B2 for 8, -1, 0, 8 (B1 for at least two of 8, -1, 0, 8)
	(b)		Correct curve	2	M1 (ft) for at least 5 points plotted correctly A1 for a fully correct curve
	(c)	$x^2 - 2x - 3 = 0$ OR $(x - 3)(x + 1) = 0$	3 and −1	2	M1 for the straight line $y = 3$ drawn to intersect the "graph" from (a) A1 for both solutions **OR** M1 for identifying $y = 3$ from the table A1 for both solutions **OR** M1 for $(x \pm 3)(x \pm 1)$ A1 for both solutions

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*16		Angle *POT* = 180 – 90 – 32 = 58 (angle between radius and tangent = 90° and sum of angles in a triangle = 180°) Angle *OST* =angle *OTS* = 58÷2 (ext angle of a triangle equal to sum of int opp angles and base angles of an isos triangle are equal) or (angle at centre = 2x angle at circumference) OR Angle *SOT* = 90 + 32 = 122 (ext angle of a triangle equal to sum of int opp angles) (180 – 122) ÷ 2 (base angles of an isos triangle are equal)	29	5	B1 for angle OTP = 90°, quoted or shown on the diagram M1 for a method that leads to 180 – (90 + 32) or 58 shown at *TOP* M1 for completing the method leading to "58"÷2 or 29 shown at *TSP* A1 cao C1 for "angle between radius and tangent = 90°" **and** one other correct reason given from theory used NB: C0 if inappropriate rules listed OR B1 for angle OTP = 90°, quoted or shown on the diagram M1 for a method that leads to 122 shown at *SOT* M1 for (180 – "122") ÷ 2 or 29 shown at *TSP* A1 cao C1 for "angle between radius and tangent = 90°" **and** one other correct reason given from theory used NB: C0 if inappropriate rules listed

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17	(a)		Box plot overlay	2	M1 for a box drawn with at least 2 correct points from LQ, Med and UQ A1 for a fully correct box plot
	(b)		Comparison of a measure of spread plus a comparison of medians (in context)	2	B1 for a correct comparison of a measure of spread (using either range or iqr) B1 for a correct comparison of medians For the award of both marks at least one of the comparisons made must be in the context of the question.
18		$3p^2 = y + 4$ $p^2 = \frac{y+4}{3}$	$p = \sqrt{\frac{y+4}{3}}$	3	M1 for clear intention to add 4 to both sides or divide all terms by 3(with at least 3 terms) M1 for clear intention to find the square root from p^2 = (expression in y) A1 for $p = \sqrt{\frac{y+4}{3}}$ oe (accept ± a correct root)
19	(a)		$3(2 + 3x)$	1	B1 for $3(2 + 3x)$
	(b)		$(y + 4)(y – 4)$	1	B1 for $(y + 4)(y – 4)$
	(c)		$(2p − 5)(p + 2)$	2	M1 for $(2p \pm 5)(p \pm 2)$ A1 for $(2p − 5)(p + 2)$

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
20		cos y = 2.25 ÷ 6 y = cos^{-1} (2.25 ÷ 6) OR 6cos 75 = 1.55…	The ladder is not safe because y is not near to 75	3	M1 for cos y = 2.25 ÷ 6 oe M1 for cos^{-1} (2.25 ÷ 6) C1 for sight of 67-68 and a statement eg this angle is NOT (near to) 75° and so the ladder is not steep enough and so not safe. OR M1 for cos 75 = x ÷ 6 M1 for 6cos 75 C1 for sight of 1.55(29…) and a statement eg that 2.25 NOT (near to) 1.55 and so the ladder is not steep enough and so not safe.
21			48 or 49	2	M1 for $\frac{460}{460+320+165}\times 100$ (=48.67 ….) or $\frac{460}{9.5}$ or $\frac{460}{9.45}$ A1 for 48 or 49
22			1.33	3	M1 for $3.4 = \frac{k}{5^2}$ oe or 3.4×5^2 (=85) M1 for '3.4×5^2' ÷ 8^2 A1 for answer in range 1.32 to 1.33 or $\frac{85}{64}$
23		*d*: UB = 54.5 (or 54.499), LB = 53.5 *C:* UB = 170.5 (or 170.499), LB = 169.5 170.5 ÷ 53.5 169.5 ÷ 54.5	3.19 3.11..	4	B1 for any one correct bound quoted M1 for 170.5 ÷ 53.5 or 169.5 ÷ 54.5 A1 for UB = answer in range 3.18 to 3.19 from correct working A1 for LB = 3.11.. from correct working

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PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
24	(a)		18.2	2	M1 for ½ × 6 × 7 × sin60 A1 for answer in range 18.1 to 18.2
	(b)		6.56	3	M1 for $6^2 + 7^2 - 2 \times 6 \times 7 \times \cos 60$ M1 for correct order of operation eg 36 + 49 – 42 (=43) A1 for answer in range 6.55 to 6.56
25			$x = 2.87$, $y = -0.87$ and $x = -0.87$, $y = 2.87$	6	M1 for $x^2 + (2 - x)^2 = 9$ M1 for $4 - 4x + x^2$ A1 for $2x^2 - 4x - 5 = 0$ oe 3 term simplified quadratic M1 for a correct method to solve their quadratic Eg $x = \frac{4 \pm \sqrt{(16 - 4 \times 2 \times -5)}}{4}$ A1 for $x = 2.87$, $y = -0.87$ or better A1 for $x = -0.87$, $y = 2.87$ or better Award marks for equivalent algebraic expressions. Apply the same scheme as above for y first.

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		Model as well as diagram provided	Standard mark scheme
3	(a)	*y*-axis 2 cm for 1000. *x*-axis 2 cm for ½ Table: 8200 changed to 8000	Points plotted at (1,8000) and (3.5,5000
8		Braille diagram labelled A B E D C	Standard mark scheme
12	(a)	MLP only: *x* changed to *y*.	Standard mark scheme
13		Crosses at A and B changed to a filled-in circle. Braille: AB is joined with a line.	Standard mark scheme

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PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
15		Table: wording added "There are four spaces to fill." *x*-axis 2 cm for ½. *y*-axis 2 cm for 1. Labelling remains same as on standard paper.	Standard mark scheme
17		Both box plots put on one page and labelled 'Girls' and 'Boys' Girls: LQ changed to 15, UQ changed to 40 Boys: figures changed to 5 20 35 40 50 2 cm grids.	Standard mark scheme
20		'horizontal ground' and 'vertical wall' labelled.	Standard mark scheme
24		Braille: Information about measurements given	Standard mark scheme

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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		Sq G S Tot F **2** **4** **15** 21 M 6 **14** 9 **29** Tot 8 18 **24** 50	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

PAPER: 1MA0_1H

Question		Working	Answer	Mark	Notes
15	(a)		2, –1, 2, 7	2	B2 for all correct (B1 for 2 or 3 correct)
	(b)		Correct graph	2	M1 (dep on at least B1) for at least 6 points from their table plotted correctly A1 cao for fully correct graph
	(c)	$x^2 - 3x - 4 = 0$ $(x - 4)(x + 1) = 0$	–1, 4	2	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
16	(a)		0.75	2	M1 for "5.6" – "4.85" with at least one value correct A1 cao
	(b)		20	2	M1 for a complete method e.g. 80 ÷ 4 A1 cao
	(c)		2 comparisons	2	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.

	1st half	2nd half
Med	5.3	4.75
Range	2.2	2.45
IQR	0.75	0.75

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

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

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

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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)

November 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.

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

<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>1</td><td>(i)

(ii)

(iii)</td><td></td><td>3484

34.84

670</td><td>1

1

1</td><td>B1 cao

B1 cao

B1 cao</td></tr>
<tr><td>*2</td><td></td><td></td><td>Maths with correct comparative figure(s)</td><td>2</td><td>M1 for correct method to find figure(s) to compare,
eg $\frac{32}{80}\times 100$ (=40) oe or 0.38×80 oe (=30.4)
C1 for maths with 40% or 30.4 or $\frac{40}{100}$ and $\frac{38}{100}$ oe</td></tr>
<tr><td>3</td><td></td><td><table><tr><td>8</td><td>4 8 9</td></tr><tr><td>9</td><td>0 0 1 1 2 3 5 7 8</td></tr><tr><td>10</td><td>2 3 6 8</td></tr><tr><td>11</td><td>0 5</td></tr></table>8 | 4 represents 84(cm)</td><td>correct stem and leaf with key</td><td>3</td><td>B2 for a fully correct ordered diagram
(B1 for a correct unordered diagram or ordered with at most two errors or omissions with stems 8, 9, 10 and 11 present)

B1 for a correct key (units not necessary)

Accept stem written as 80, 90, etc. but key only if consistent with this</td></tr>
<tr><td>4</td><td></td><td></td><td>$T = 6x + 8y$</td><td>3</td><td>M1 for $6x$ or $8y$ oe or $T=$ (a linear expression in x and y)
M1 for $6x + 8y$ oe or $T = 6x$ ($+ay$) oe or $T = 8y$ ($+bx$) oe
A1 for $T = 6x + 8y$ oe</td></tr>
</table>

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

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

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

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

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

<table>
<tr><th colspan="5">PAPER: 1MA0_1H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>14</td><td></td><td></td><td>25</td><td>4</td><td>M1 for 600 ÷ 4 (=150)
M1 for 4500 ÷ “150” (=30)
M1 for 750 ÷ “30”
A1 for 25 with supporting working

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

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

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

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

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

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

PAPER: 1MA0_1H					
Question		**Working**	**Answer**	**Mark**	**Notes**
22	(a)		1	1	B1 cao
	(b)		$\frac{5y}{8x^3}$	2	M1 for correct square root or correct use of reciprocal eg $\frac{8x^3}{5y}$ **or** $\frac{25y^2}{64x^6}$ A1 for $\frac{5y}{8x^3}$ **or** $\frac{5}{8}yx^{-3}$ oe
	(c)		$\frac{x+27}{(x-3)(x+3)}$	3	M1 for denominator $(x-3)(x+3)$ **or** x^2-9 M1 for $\frac{5(x+3)}{(x-3)(x+3)}$ oe **or** $\frac{4(x-3)}{(x-3)(x+3)}$ oe (NB The denominator must be $(x-3)(x+3)$ or x^2-9 **or** another suitable common denominator) A1 for $\frac{x+27}{(x-3)(x+3)}$ **or** $\frac{x+27}{x^2-9}$

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

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

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

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

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Mark Scheme (Results)

November 2014

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

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

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The strands are as follows:

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

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

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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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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.

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

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: 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 $\sqrt[3]{(3 \times \text{“70.5”} \div 4 \div \pi)}$ (= 2.56…) M1 for $4 \times \pi \times \text{“2.56…”}^2$ A1 for 82.5 – 82.6
21	(a)		$\frac{3}{2}\mathbf{a}$	3	M1 for (eg $\overrightarrow{EO}$ or $\overrightarrow{CB}$ =) $\mathbf{a} - \mathbf{b}$ M1 for correct vector expression for $\overrightarrow{MN}$, eg $\overrightarrow{MO} + \mathbf{a} + \frac{1}{2}\mathbf{b}$ or $\overrightarrow{ME} + 2\mathbf{a} - \frac{1}{2}\mathbf{b}$ A1 for $\frac{3}{2}\mathbf{a}$ oe
	(b)		*MN* is parallel to *OA* and $\frac{3}{2}\times$ length of *OA*	2	B1 for *MN* is parallel to *OA* B1 for $MN = \frac{3}{2} \times$ length *OA* oe or ft part (a)
22	(a)		(0,–1)	1	B1 cao
	(b)		Straight line drawn	2	M1 for a horizontal translation of 1 unit. A1 for straight line drawn parallel to $y = f(x)$ through *O* from (–1.5, 3) to (1.5, –3)

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PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
2		No diagrams	
3		Wording changed to: Work out the length of the side labelled w cm on the first diagram.	
5		Garden enlarged – fountain to bench is 9.5 cm North lines put in from fountain and bench. Line joins fountain to bench. Change 7 metres to 11 metres. Change 12 metres to 14 metres.	

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
6		Model – MLP 2 diagrams as well.	
	(i)	Full diagram given without 3 cm and 2 cm measurements put on.	
	(ii)	End face only with all measurements. Wording inserted 'The length of the prism is 9 cm'	
7	(a)	2 cm grid. Shape A coordinates (1, 1) (3, 1) (4, 3) (2, 3)	
10		Ground labelled at each end.	
16		*q* changed to *y*	
		r changed to e	
17		*y* axis 2 cm for 0.1 *x* axis 2 cm for 1 Right axis labelled – leeway will be needed in plotting of some points.	
22		2 cm grid	

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Mark Scheme (Results)

Summer 2015

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

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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]

PMT

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 $\pi \times 7$ (= 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
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		$10 \times 75 + 14 \times 105 + 9 \times 135 + 5 \times 165 + 2 \times 195$ $750 + 1470 + 1215 + 825 + 390$ $4650 \div 40$	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' $\div 40$ 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)		$x = 1.4, \quad y = 3.8$ $x = -2.2, y = -3.4$	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)

PMT

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

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

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

PAPER: 1MA0_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)

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

PMT

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 (Non-Calculator) Unit 2

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NOTES ON MARKING PRINCIPLES

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

2 Mark schemes should be applied positively.

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.

PMT

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

PMT

5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		$5\frac{1}{4}$	1	B1 for $5\frac{1}{4}$ oe
(b)		12	2	M1 for $(28 \div 7) \times 3$ oe A1 cao
(c)		4000	2	M1 for 20 or 200 A1 for 4000 – 4040
2	−2 −1 0 1 2 3 7 5 3 1 −1 −3	Correct graph	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x M1 (dep) for plotting at least 2 of their points (any points plotted from their table must be correctly plotted) A1 for correct line between $x = -2$ and $x = 3$ **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3 - 2x$ 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 $x = -2$ and $x = 3$ **(Use of $y = mx + c$)** M2 line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of –2 OR line drawn with y intercept of 3 and a negative gradient) A1 for correct line between $x = -2$ and $x = 3$

PMT

5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
3		270	3	M1 for 9÷0.1 (=90) or 4.5÷1.5 (=3) oe M1 for "3" × "90" oe (=270) A1 cao OR M1 for 4.5÷0.1 (=45) or 9÷1.5 (=6) oe M1 for "6" × "45" oe (=270) A1 cao OR M1 for 9×4.5 (=40.5) or 1.5×0.1(=0.15) oe M1 for "40.5" ÷ "0.15" (=270) oe A1 cao
4		3, 5, 7	2	M1 for at least two consecutive numbers substituted into $2n+1$ or at least two of 3, 5 ,7 A1 cao
5		150 cm^3	3	M1 for a complete method to find the volume A1 for 150 B1 (indep) for cm^3
6	3000 ÷ 20=150 150 ÷ (14+1) = 10 10 × 0.5 = 20 20 × 3.99	79.80	4	M1 for amount of petrol or oil or mixture M1 for use of ratio M1(dep on M1, M1) for total cost of bottles A1 for 79.8(0)

PMT

5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
7 (a)		$5y + 4$	2	M1 for $3\times y-3\times 2$ or $2\times y+2\times 5$ A1 cao
(b)		w^2	1	B1 cao
(c)		$5(x + 4)$	1	B1 cao
8	1.15 × 2000 (=2300) 1.10 × 2300	2530	3	M1 for a correct method to find the amount at the end of the first year M1(dep) for a correct method to find the amount at the end of the second year A1 cao
9		Italy with reason	3	B1 for 5 miles = 8km oe M1 for change to consistent units from $70\times r$ with $1.5 \le r \le 1.7$ or $130 \times s$ with $0.6 \le s \le 0.7$ C1 for Italy identified and 112 kph stated or Italy identified and 81.(25) mph stated oe

PMT

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
11		0.0025 2.5×10^{-2} 2.5×10^{2} 2500	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)
12 (a)		(5, 3, 4)	1	B1 cao
(b)		point	1	B1 cao

5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
13		$x^2+10x+22$	4	M1 for $(x+8) - (x+5)$ (=3) or $(x+4) - (x+2)$ (=2) M1 for area of one rectangle eg $(x+2)(x+5)$ (= $x^2+7x+10$) M1 for complete method to find area e.g. $(x+2)(x+5) + 3(x+4)$ (= $x^2+7x+10 + 3x+12$) A1 cao
14 (a)		1	1	B1 cao
(b)		$\frac{1}{16}$	2	M1 for two of cube root, square, reciprocal A1 cao
15 (a)		$(y-7)(y+2)$	2	B2 cao (B1 for $(y \pm 7)(y \pm 2)$)
(b)		$\sqrt{5}+29$	2	M1 expand brackets, with at least 3 correct terms including signs or 4 correct terms ignoring signs eg $2\sqrt{5}\times3\sqrt{5}-2\sqrt{5}+3\sqrt{5}-1\times1$ A1 for $\sqrt{5}+29$ or $29+\sqrt{5}$
(c)		$\sqrt{3}$	2	M1 for $\frac{6}{\sqrt{12}}\times\frac{\sqrt{12}}{\sqrt{12}}$ oe or $\sqrt{12}=2\sqrt{3}$ A1 cao

PMT

5MB2H/01 June 2015				
Question	**Working**	**Answer**	**Mark**	**Notes**
16		$y = 2x - 1$	4	M1 for $\left(\frac{6+-2}{2}, \frac{1+5}{2}\right)$ oe M1 for $\frac{-1}{-0.5}$ oe (=2) M1(dep on previous M1) for using $y =$ '2'$x + c$ with their coordinates for the midpoint used correctly to find c A1 for $y = 2x - 1$ oe
*17		proof with reasons	5	M1 for using x oe for AOB or CPB or consistent use of three letter notation M1 for correct use of at least one circle theorem or for extending PR and CA to meet at 'X' and using triangles OBX and PCX A1 for correct proof C2 for fully correct reasons for each stage of proof (C1 for any relevant circle theorem reason) Possible reasons: Angles in a triangle add up to 180° Angles in a quadrilateral (4 sided shape) add up to 360° Angles on a straight line add up to 180° The tangent to a circle is perpendicular (90°) to the radius (diameter) Tangents from an external point are equal in length. Reasons must be relevant for method shown.

PMT

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

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

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

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q2		Grid has been enlarged.	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x M1 (dep) for plotting at least 2 of their points (any points plotted from their table must be correctly plotted) A1 for correct line between $x = -2$ and $x = 3$ **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $y = 3 - 2x$ 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 $x = -2$ and $x = 3$ **(Use of $y = mx + c$)** M2 line segment of $y = 3 - 2x$ drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of -2 OR line drawn with y intercept of 3 and a negative gradient) A1 for correct line between $x = -2$ and $x = 3$

PMT

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q3		Diagram has been enlarged. 9 metres moved to top of diagram 4.5 metres moved to the left of diagram.	M1 for 9÷0.1 (=90) or 4.5÷1.5 (=3) oe M1 for "3" × "90" oe (=270) A1 cao OR M1 for 4.5÷0.1 (=45) or 9÷1.5 (=6) oe M1 for "6" × "45" oe (=270) A1 cao OR M1 for 9×4.5 (=40.5) or 1.5×0.1(=0.15) oe M1 for "40.5" ÷ "0.15" (=270) oe A1 cao
Q5		Model provided for all candidates. Also a diagram is provided for MLP. Wording added: right-angled before triangular prism.	M1 for a complete method to find the volume A1 for 150 B1 (indep) for cm^3

PMT

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q7	(c)	MLP *x* changed to y.	B1 cao
Q10		Diagram has been enlarged.	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
Q12	(a)	Model provided for all candidates. Also enlarged diagram provided for MLP. On the model and diagram the point C is marked in the correct place, with an additional mark either side of the C	B1 cao
Q12	(b)	Question has been changed: "The point C has been marked on the cuboid. Write down the co-ordinates of point C". (1 mark) (_____, _____, _____)	B1 cao

PMT

PAPER: 5MB2H_01			
Question		**Modification**	**Notes**
Q13		Diagram has been enlarged. MLP *x* changed to y.	M1 for $(x+8) - (x+5)$ (=3) or $(x+4) - (x+2)$ (=2) M1 for area of one rectangle eg $(x+2)(x+5)$ ($= x^2+7x+10$) M1 for complete method to find area e.g. $(x+2)(x+5) + 3(x+4)$ ($= x^2+7x+10 + 3x+12$) A1 cao
Q17		Diagram has been enlarged.	M1 for using *x* oe for *AOB* or *CPB* or consistent use of three letter notation M1 for correct use of at least one circle theorem or for extending *PR* and *CA* to meet at '*X*' and using triangles *OBX* and *PCX* A1 for correct proof C2 for fully correct reasons for each stage of proof (C1 for any relevant circle theorem reason) Possible reasons: Angles in a triangle add up to 180° Angles in a quadrilateral (4 sided shape) add up to 360° Angles on a straight line add up to 180° The tangent to a circle is perpendicular (90°) to the radius (diameter) Tangents from an external point are equal in length. Reasons must be relevant for method shown.

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Mark Scheme (Results)

November 2015

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

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NOTES ON MARKING PRINCIPLES

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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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5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
1.			6 525 900 450	3	M1 for × 6 ÷ 4 oe or $\frac{6}{4}$ or 1.5 or 1 correct answer A2 for all correct (A1 for 2 or 3 correct)
2.			$8n + 24$	3	M1 for generating at least 3 terms of sequence 32, 40, 48 or sequence 4, 5, 6 M1 for $8n \pm k$ or $8(n \pm m)$ where $k \neq 24$, $m \neq 3$ A1 for $8n + 24$ or $8(n + 3)$ oe
3.			105 cm^3	4	M1 for writing factor pairs of 35, 21 or 15 M1 for "3" × "5" × "7" using their lengths dep on one at least one correct factor pair A1 ft for 105 (dep on one correct factor pair) B1 for cm^3

5MB2H_01 November 2015

Question		Working	Answer	Mark	Notes
4.		$y = \frac{1}{2}x + 3$ x: −2, −1, 0, 1, 2, 3, 4 y: 2, 2.5, 3, 3.5, 4, 4.5, 5	Correct line from (−2, 2) to (4, 5)	3	**(Table of values / calculation of values)** M1 for at least 2 correct attempts to find points by substituting values of x. M1 ft for plotting at least 2 of their points (any points plotted from their table must be correctly plotted) A1 for correct line between $x = -2$ and $x = 4$ **(No table of values)** M1 for at least 2 correct points with no more than 2 incorrect points plotted M1 for at least 2 correct points (and no incorrect points) plotted **OR** line segment of $y = \frac{1}{2}x + 3$ drawn A1 for correct line between $x = -2$ and $x = 4$ **(Use of $y = mx + c$)** M1 for line drawn with gradient of $\frac{1}{2}$ **OR** line drawn with a y intercept of 3 M1 for line drawn with gradient of $\frac{1}{2}$ **AND** line drawn with a y intercept of 3 A1 for correct line between $x = -2$ and $x = 4$ **SC** : B2 for correct line from $x = 0$ to $x = 4$

5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
5.			68	5	B1 for correct conversion of units M1 for 250 ÷ 25 (= 10) or 300 ÷ 20 (= 15) M1 for "10" × "15" M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0) A1 for 68 OR B1 for correct conversion of units M1 for 250 ÷ 20 (= 12.5) or 300 ÷ 25 (= 12) M1 for "12.5" × "12" M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0) A1 for 68 OR B1 for correct conversion of units M1 for 3 × 2.5 (= 7 .5) or 20 × 25 (= 500) M1 for "3 × 2.5" ÷ "0.2 × 0.25" or "300 × 250" ÷ "20 × 25" M1 (dep on M2) for number of tiles ÷ 20, round up, × 8.5(0) A1 for 68
*6		1, 4, 7, 10, 13 8, 6, 4, 2, 0	Explanation	2	M1 for listing at least 3 terms of both sequences C1 for Yes and explanation from fully correct working that 4 is in both sequences; numbers in A are increasing; numbers in B are decreasing

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5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
7			7.21 (am)	3	M1 for listing multiples 9,18,27,36 and 12,24,36 (condone 1 arithmetic error) or method to find LCM M1 for identifying 36 as LCM A1 cao OR M1 for listing times 6.54, 7.03, 7.12, 7.21 or for listing times 6.57, 7.09, 7.21 (condone one arithmetic error) M1 for listing times 6.54, 7.03, 7.12, 7.21 **and** 6.57, 7.09, 7.21 (condone one arithmetic error) A1 cao
8	(a)		$4(3e+1)$	1	B1 cao
	(b)		$15c - 10d$	1	B1 cao
	(c)		$28a^4b^3$	2	B2 for $28a^4b^3$ (B1 for two of 28, a^4 , b^3 as a product)
	(d)		$(x + 7)(x - 7)$	1	B1 cao
	(e)	$2y^2 - 6y + 7y - 21$	$2y^2 + y - 21$	2	M1 for 3 out of no more than 4 terms correct with correct signs or the 4 terms $2y^2$, $6y$, $7y$ and 21 seen, ignoring signs A1 cao

5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		360 – 64 140 + 40 + 296 + 40 = 516 540 − 516 = 24	24°	4	M1 for 1 correct relevant angle calculation A1 for 24 cao C2 for all reasons (C1 (dep M1) for reason relating to parallel lines or parallelogram which is relevant to their chosen method) eg angles on a straight line add to 180° angles at a point add to 360° angles in a triangle add to 180° angles in a quadrilateral add to 360° alternate angles are equal corresponding angles are equal allied angles / co-interior angles add up to 180° opposite angles in a parallelogram are equal
10			$4\frac{8}{35}$	3	M1 for converting both fractions to get a common denominator of a multiple of 35 with at least one correctly converted. M1 (dep on M1) for $3 + \frac{"28"}{35} + \frac{"15"}{35} (= 3\frac{43}{35})$ oe A1 for $4\frac{8}{35}$ cao

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5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)		7.8×10^{-3}	1	B1 cao
	(b)		6 710 000	1	B1 cao
	(c)	$-9,\ 0.9,\ 1,\ 3$	$-9,\ 0.9,\ 9^0,\ 9^{\frac{1}{2}}$	2	M1 for either $9^{\frac{1}{2}}$ or 9^0 evaluated correctly A1 for fully correct list from correct working, accept original numbers or evaluated. (SC: B1 for 1 error in position or a correct list in reverse order)
12.	(a)		(0, 5, 5)	1	B1 cao
	(b)		$(2\frac{1}{2}, 5, 2\frac{1}{2})$	1	B1 for $(2\frac{1}{2}, 5, 2\frac{1}{2})$ oe
13.			120	3	M1 for $80\% = 480$ or $\frac{480}{80}(=6)$ or $\frac{480}{80} \times 100\ (=600)$ oe M1 for $600 - 480$ or $\frac{480}{80} \times 20$ oe A1 cao
14.			$A = 9x^2 + 19x - 6$	4	B1 for one of $5x - 2$ or x found M1 for correct method to find area of one relevant rectangle. M1 for complete method to find whole area or simplified expression $9x^2 + 19x - 6$ or correct but not simplified formula A1 for correct, simplified formula $A = 9x^2 + 19x - 6$

PMT

5MB2H_01 November 2015					
Question		**Working**	**Answer**	**Mark**	**Notes**
15.			$y = \frac{3}{2}x - \frac{5}{2}$	4	M1 for attempt to find gradient of AB M1 (dep) for attempt to find gradient of perpendicular line eg use of $-\frac{1}{m}$ M1 for substituting $x = 3, y = 2$ into $y =$ "m" $x + c$ A1 for complete correct equation $y = \frac{3}{2}x - \frac{5}{2}$ oe
16.			$2\sqrt{7}$	3	M1 for multiplying numerator and denominator by $\sqrt{7}$ M1 for correct method to expand $(4+\sqrt{2})(4-\sqrt{2})$ with 3 out of no more than 4 terms correct with correct signs or the 4 terms seen, ignoring signs A1 for $2\sqrt{7}$ (accept $\sqrt{28}$)
17.		$\frac{(x-5)(x+3)}{(x+3)(2x+1)}$	$\frac{x-5}{2x+1}$	3	M1 for correct factorisation of numerator M1 for correct factorisation of denominator A1 for $\frac{x-5}{2x+1}$

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Mark Scheme (Results)

Summer 2016

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

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

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

With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.
If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.
If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.
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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
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Linear equations

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

12 Parts of questions

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

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

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

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

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
1			750 cm^3	3	M1 for 30×25 A1 for 750 B1 (indep) for cm^3
2	(a)		Correct shape	2	B2 for correct reflection with vertices (–4, 2) (–6, 3) (–6, 7) (–4, 6) (B1 for reflection in a vertical or horizontal line)
	(b)		Correct shape	2	B2 for correct rotation with vertices (–1, 3) (–5, 3) (–6, 5) (–2, 5) (B1 for rotation of 90(°) clockwise about (0,1) **or** correct orientation fully in top left quadrant)
3	(a)		Reasons	2	B2 for 2 reasons from no time frame, vague response boxes, not exhaustive eg "no always" (B1 for 1 reason)
	(b)		Question written	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
	(c)		Reason	1	B1 for reason why the sample is biased eg all the same age, they are friends, too small a sample. NB: "biased" alone is insufficient.

PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
4 (a)		p^7	1	B1 cao
(b)		g^2	1	B1 cao
(c)		k^6	1	B1 cao
(d)		$-5m + 10$	2	M1 for $3m + 12$ or $-8m - 2$ or $8m + 2$ A1 for $-5m + 10$ or $10 - 5m$ or $-5(m - 2)$ or $5(2 - m)$ oe
(e)		$n(n - 7)$	1	B1 cao
5		44 - 56	2	B2 for 44 - 56 (B1 for 1000 or 900 or 20 or 18 or 19, unless it is clear these have not come from estimation)
6		90	3	M1 for $1-\frac{3}{5}$ (=$\frac{2}{5}$ or 40%) oe M1 for a complete method to find the number of female teachers (54) eg $36 \div 2 \times 3$ or determines $\frac{3}{5}$(60%) is 54, or 10% is 9 A1 cao **OR** M1 for F : M = 3 : 2 M1 for a complete method to find the number of female teachers (54) eg $\frac{3}{2} \times 36$ oe A1 cao

PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*7		Conclusion (supported)	5	M1 for finding the area of one rectangle which is not 6 × 10 eg 2×2.5 (=5) or 4×10 (=40) or 2.5×6 or 5×2 M1 for a complete method to find the total area eg 5+5+40 or 60−10 (=50) M1 for a complete method to find the number of tins needed eg "50" ÷ 5 ÷ 2.5 (=4) OR for a complete method to find the number of litres needed. eg "50" ÷ 5 (=10) OR for a complete method to find the area covered by 3 tins eg 3×2.5×5 (=37.5) A1 for 50 (m^2) **and** 4 (tins needed) **or** for 10 (litres) **and** 7.5 (litres) **or** for 50(m^2) **and** 37.5(m^2) C1 (dep M2) for a conclusion supported by their calculations
8		60	3	M1 for $\frac{16}{80}$ or $\frac{300}{80}$ oe M1 (dep) for $"\frac{16}{80}"\times 300$ or $"\frac{300}{80}"\times 16$ A1 cao
9		$T = 5x + 20y$	3	B3 for $T = 5x + 20y$ oe (B2 for $5x + 20y$ or $T = 5x + y$ or $T = x + 20y$ or $T = 20x + 5y$) (B1 for T = a two term linear expression in x and y, or $5x + y$ or $x + 20y$)

<table>
<tr><th colspan="5">PAPER: 1MA0_1H</th></tr>
<tr><th>Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>10</td><td></td><td>−3, −2</td><td>2</td><td>M1 for $x = -3$ or $y = -2$; for finding the difference between the x or y coordinates of M and P (eg ±4 or ±4.5); for $\frac{x+5}{2} = 1$ or for $\frac{y+7}{2} = 2.5$
A1 for $x = -3$, $y = -2$</td></tr>
<tr><td>11</td><td><table><tr><td></td><td>S</td><td>A</td><td>B</td><td></td></tr><tr><td>M</td><td>4</td><td>9</td><td>10</td><td>23</td></tr><tr><td>F</td><td>6</td><td>11</td><td>26</td><td>43</td></tr><tr><td></td><td>10</td><td>20</td><td>36</td><td>66</td></tr></table></td><td>11</td><td>4</td><td>M1 for a correct first step which results in a value that could be in the table: ie. 66 – 10 – 20 (= 36) or 66 – 43 (= 23) or 10 – 4 (= 6)
M1 for correct method to find a second value that could be in the table using their first value eg “23” – 4 - 10 (= 9) or “36” - 10 (= 26)
M1 for a fully correct and complete method.
A1 cao</td></tr>
<tr><td>12</td><td></td><td>100 – 25π</td><td>3</td><td>M1 for π×5×5 or 25π
M1 for (10×10 –“π×5×5”)
A1 for 100 – 25π oe
NB: ignore the inclusion of any units.</td></tr>
<tr><td>13</td><td></td><td>36</td><td>3</td><td>M1 for correct method to work out 20% of 30% (=6%)
M1 for 30% + “6%”
A1cao

OR
M1 for complete and correct method to find amount of money spent on rent eg 800 × 0.3 (=240) oe
M1 for correct method to find rent next month (288) eg “240” × 1.2 (=288) oe or $\frac{"288"}{800} \times 100$ oe or 30 × 1.2
A1 cao</td></tr>
</table>

PAPER: 1MA0_1H

Question	Working	Answer	Mark	Notes
14 (a)		Correct construction	2	M1 for correct construction arcs or bisector within guidelines but no (or incorrect) construction arcs A1 for bisector within guidelines with correct arcs shown
(b)		Correct construction	2	M1 for correct construction arcs or perpendicular within guidelines but no (or incorrect) construction arcs A1 for perpendicular within guidelines with correct arcs shown
*15 (a)	<table><tr><td></td><td>Age 16</td><td></td><td>Age 18</td></tr><tr><td>HV</td><td>310</td><td><</td><td>380</td></tr><tr><td>LV</td><td>80</td><td><</td><td>130</td></tr><tr><td>Median</td><td>180</td><td><</td><td>240</td></tr><tr><td>Range</td><td>230</td><td><</td><td>250</td></tr><tr><td>IQR</td><td>80</td><td>></td><td>70</td></tr></table>	Compares: medians and spread	3	C1 for any correct comparison of the medians C1 for any correct comparison of the IQRs or the ranges C1 (dep on one C1) for either statement written in context
(b)		150	2	M1 for $\frac{3}{4} \times 200$ oe A1 cao
16		7×10^8	2	M1 for 7×10^n, $n \neq 8$ or $a \times 10^8$, $a \neq 7$ or $700\,000\,000$ or 0.7×10^9 A1 cao

PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
17 (a)		$x < 7$	2	M1 for isolating term in x eg $3x < 16 + 5$ or $3x < 21$ or for $(x =) 7$ or $x > 7$ etc A1 cao
(b)		$\frac{7}{5}$	3	M1 for multiplying by 4 or adding $\frac{w}{4}$ or subtracting $\frac{11}{4}$ or subtracting 1 [all applied to both sides and as a first step] M1 for isolating terms in w on one side and number terms on the other side of the equation A1 for $\frac{7}{5}$ oe
18 (a)		$2\frac{4}{5}$	3	M1 for writing as improper fractions eg $\frac{6}{5}$ or $\frac{7}{3}$ M1 (dep) for multiplying improper fractions eg $\frac{6\times7}{5\times3}$ or $\frac{14}{5}$ oe A1 cao
(b)		$\frac{4}{5}$	3	M1 for finding two correct fractions with a common denominator eg $\frac{7}{15}-\frac{10}{15}$ or $\frac{21-30}{45}$ M1 (dep) for complete and correct method eg $1-\frac{3}{15}$ or $\frac{37}{15}-\frac{25}{15}$ or $\frac{111-75}{45}$ oe A1 for $\frac{4}{5}$ oe

PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
19 (a)(i)		–0.4 to –0.5 4.4 to 4.5	3	B1 for value in range –0.4 to –0.5 and value in range 4.4 to 4.5 NB: condone values given as part of coordinates.
(ii)		–1.0 to –1.2 5.0 to 5.2		M1 for $x^2 - 4x - 2 = 4$ or line $y = 4$ drawn on graph or points marked with a y coord. of 4 or a value in range –1.0 to –1.2 or a value in range 5.0 to 5.2 A1 for value in range –1.0 to –1.2 and value in range 5.0 to 5.2; do not accept coordinates.
(b)		–1.6 to –1.8 4.6 to 4.8	3	M1 for $x + y = 6$ drawn on graph A2 for value in range –1.6 to –1.8 and value in range 4.6 to 4.8 (A1 for one correct value or both values given as coordinates)
*20		69° (supported)	5	M1 for method to find angle PSR eg 90 – 48 (= 42) or method in triangle POS to find angle POS (= 84) M1 for method to find angle PMS (= 42) A1 cao C2 (dep on at least M1) for correct and complete set of appropriate reasons (C1 for one correct reason involving a circle theorem supported by working) eg The tangent to a circle is perpendicular (90) to the radius (diameter) Alternate segment theorem. Angles in a triangle add up to 180 Base angles of an isosceles triangle are equal. The angle at the centre of a circle is twice the angle at the circumference.

PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
21 (a)		0.7 0.2 0.3 0.8 0.05 0.95	3	B1 for 0.2, 0.8 oe B1 for 0.7, 0.3 oe B1 for 0.05, 0.95 oe
(b)		0.04	2	M1 for "0.8" × "0.05" A1 oe
22		2, 6	3	M1 for $(x^2 =)\quad 4(x^2 - 6x + 9)$ or $4x^2 - 24x + 36$ oe or for $\frac{x^2}{4} = x^2 - 6x + 9$ M1 (dep) for $3x^2 - 24x + 36 = 0$ or $3(x^2 - 8x + 12) = 0$ or $(x - 2)(x - 6) = 0$ or $(3x - 6)(x - 6) = 0$ oe A1 cao OR M1 for $x = (\pm)2(x - 3)$ or $\frac{x}{2} = (\pm)(x - 3)$ M1(dep) for correct solution of one equation A1 cao

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PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
23 (a)(i)		**a** + **b**	2	B1 for **a** + **b** oe
(ii)		−**a** + 3**b**		B1 for −**a** + 3**b** oe
(b)		$\frac{3}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$	2	M1 for $\overrightarrow{OP} + \frac{1}{4}\overrightarrow{PR}$ or $\overrightarrow{OR} + \frac{3}{4}\overrightarrow{RP}$ (may be in terms of **a** and **b)** A1 for $\frac{3}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$ or $\frac{3}{4}(\mathbf{a} + \mathbf{b})$
*(c)		$OS = \frac{3}{4}OT$	2	C2 (dep A1) for S divides OT in the ratio 3:1 oe or $OS = \frac{3}{4}OT$ oe (C1 (dep A1) for S lies on OT or that OT and PR intersect at S oe)
24		100, 25, 4	4	M1 for $y = \frac{k}{x^2}$ oe or $1 = \frac{k}{10^2}$ M1 for complete method to find k or $y = \frac{100}{x^2}$ oe OR (dep on M1) for $k = 100$ A1 for one entry correct A1 for other two entries correct

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PAPER: 1MA0_1H				
Question	**Working**	**Answer**	**Mark**	**Notes**
25		$\frac{1}{4}-\frac{\sqrt{6}}{12}$	3	M1 for $\frac{1}{2}\times\frac{\sqrt{2}}{2}\times\frac{\sqrt{2}}{2}$ or $\frac{1}{2}\times\frac{\sqrt{2}}{2}\times\frac{\sqrt{3}}{3}$ M1 for $\frac{1}{2}\times\frac{\sqrt{2}}{2}\times\frac{\sqrt{2}}{2}-\frac{1}{2}\times\frac{\sqrt{2}}{2}\times\frac{\sqrt{3}}{3}$ A1 for $\frac{1}{4}-\frac{\sqrt{6}}{12}$ oe OR M1 for (BC =) $\frac{\sqrt{2}}{2}-\frac{\sqrt{3}}{3}$ M1 for $\frac{1}{2}\times\left\{\frac{\sqrt{2}}{2}-\frac{\sqrt{3}}{3}\right\}\times\frac{\sqrt{2}}{2}$ A1 for $\frac{1}{4}-\frac{\sqrt{6}}{12}$ 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: 1MA0_1H			
Question		**Modification**	**Notes**
1		Model provided for all candidates. Diagram enlarged and also provided for MLP.	Standard mark scheme
2	(a)	Reflection drawn on the diagram. Shading changed to dotty shading. Wording changed 'It shows shape P and shape Q given on a grid. Describe fully the single transformation that maps shape P onto shape Q.' Grid enlarged. y axis is cut at -4. 3 answer lines given.	Marked scheme changed to: B1 Reflection B1 in the line $x = -1$
	(b)	Rotation drawn on the diagram. Wording changed 'It shows shape P and shape S given on a grid.' Describe fully the single transformation that maps shape P onto shape S.' 3 answer lines given.	Mark scheme changed to: B1 Rotation or rotate B1 90° anticlockwise B1 about (0, 1)
7		Diagram enlarged. Braille only: Plan of floor labelled ABCDEFGH as 1F Q24.	Standard mark scheme
10		Diagram enlarged. Crosses changed to filled in circles. Arrows heads changed to open headed arrows.	Standard mark scheme
12		Diagram enlarged. Shading changed to dotty shading. Braille only: Diagram turned into horizontal position (circle inside square).	Standard mark scheme

<table>
<tr><th colspan="4">PAPER: 1MA0_1H</th></tr>
<tr><th colspan="2">Question</th><th>Modification</th><th>Notes</th></tr>
<tr><td>14</td><td>(a)

(b)</td><td>Diagram lines made longer and thicker
Braille only: Angle A 75° exactly for bisection.
Diagram kept the same size. Point P has been moved to the left.</td><td>Standard mark scheme</td></tr>
<tr><td>15</td><td>(a)

(b)</td><td>Grid enlarged. Small squares removed. Lines of the box plot have been moved.
‘16 year old workers’ lines are at ‘75,125,175,200 and 300’.
‘18 year old workers’ lines are at ‘125, 200, 225, 275 and 375’.

‘£130’ changed to ‘£125’</td><td>Standard mark scheme with these following values

<table><tr><td></td><td>Age 16</td><td></td><td>Age 18</td></tr><tr><td>HV</td><td>300</td><td><</td><td>375</td></tr><tr><td>LV</td><td>75</td><td><</td><td>125</td></tr><tr><td>Median</td><td>175</td><td><</td><td>225</td></tr><tr><td>Range</td><td>225</td><td><</td><td>250</td></tr><tr><td>IQR</td><td>75</td><td>=</td><td>75</td></tr></table></td></tr>
<tr><td>14</td><td></td><td>Grid enlarged. Small squares removed. [Leeway needed for answering the question.]</td><td>Standard mark scheme</td></tr>
<tr><td>17</td><td>(a)
(b)</td><td>Wording added above the table ‘There are four spaces to fill.’
Grid enlarged. Right axis labelled.</td><td>Standard mark scheme</td></tr>
<tr><td>18</td><td></td><td>Diagram enlarged.</td><td>Standard mark scheme</td></tr>
</table>

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
19		Grid enlarged. [Leeway need for answering the question.]	Standard mark scheme
20		Diagram enlarged. Cross changed to filled in circle.	Standard mark scheme
21		Diagram enlarged. Wording added ‘There are six spaces to fill.’	Standard mark scheme
23		Diagram enlarged	Standard mark scheme

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Mark Scheme (Results)

Summer 2016

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

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NOTES ON MARKING PRINCIPLES

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

2 Mark schemes should be applied positively.

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

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

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

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

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

ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
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PMT

PAPER: 5MB3H/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1*			Decision (supported)	3	M1 for correct first step e.g. 15 ÷ 3 M1 for complete method C1 for correct decision with accurate figures
2	(a)		Correct diagram	2	B2 cao (B1 for correct orientation)
	(b)		Enlargement, sf 4, centre (0, 1)	3	B1 for enlargement B1 for scale factor 4 B1 for centre (0, 1)
3			$w = \frac{d+5}{2}$	2	M1 for attempt to add 5 to both sides or divide both sides by 2 as a first step, eg $d + 5 = 2w$ oe or $\frac{d}{2} = w - \frac{5}{2}$ oe A1 for $w = \frac{d+5}{2}$ oe

PAPER: 5MB3H/01					
Question		Working	Answer	Mark	Notes
4			22.5	4	M1 for $4(x - 8) = 2x + 13$ M1 for expansion of bracket or division of all terms by 4, eg $4x - 32 = 2x + 13$, or $x - 8 = \frac{2x}{4} + \frac{13}{4}$ M1 for isolating x and number terms eg $2x = 45$, $\frac{x}{2} = \frac{45}{4}$ A1 for $\frac{45}{2}$ or 22.5 OR M1 for $(180 - 64) \div 2$ (= 58) M1 for $4(x - 8)$ = "58" or $2x + 13$ = "58" or "58" – 13 (= 45) M1 for isolating x and number terms eg $4x = 90$, $2x = 45$ or "45" ÷ 2 A1 for $\frac{45}{2}$ or 22.5 OR M1 for $64 + 4(x - 8) + 2x + 13$ M1 for $64 + 4(x - 8) + 2x + 13 = 180$ M1 for isolating x and number terms eg $6x = 135$ A1 for $\frac{45}{2}$ or 22.5
5			Correct region shaded	3	M1 for a circle centre M or N (accept arc of sufficient length to define the region) M1 for circle centre M radius 5 cm **and** circle centre N radius 3 cm (accept arc of sufficient length to define the region) A1 for correct region shaded

PAPER: 5MB3H/01					
Question		Working	Answer	Mark	Notes
*6			Conclusion (supported)	4	M1 for $\pi \times 120^2$ (= 45 216 – 45 249) M1 for "$\pi \times 120^2$" ÷ 1800 A1 for 25 – 25.2 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for $\pi \times 120^2$ (= 45 216 – 45 249) M1 for 20 × 1800 A1 for 36 000 and 45 216 – 45 249 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for $\pi \times 120^2$ (= 45 216 – 45 249) M1 for "$\pi \times 120^2$" ÷ 20 A1 for 2260 – 2263 C1 ft (dep on M2) for appropriate conclusion from their figures OR M1 for 1800 × 20 M1 for 36 000 ÷ π (=11 457 – 11 465) A1 for 107(.0…) C1 ft (dep on M2) for appropriate conclusion from their figures
7			161.50	5	M2 for a correct method to decrease 6720 by 20%, eg 6720 × 0.8 (= 5376) or 6720 × 0.2 (= 1344 and 6720 – 1344 (= 5376)) (M1 for a correct method to find 20% of 6720 eg 6720 × 0.2 or $\frac{20}{100} \times 6720$ (= 1344)) M1 for subtracting 1500 (= 3876) after a percentage calculation M1 "3876" ÷ 24 after the subtraction of 1500 A1 for 161.5(0)

PMT

PAPER: 5MB3H/01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8		3 42 3.1 45.(291) 3.2 48.(768) 3.3 52.(437) 3.4 56.(304) 3.5 60.(375) 3.6 64.(656) 3.7 69.(153) 3.8 73.(872) 3.9 78.(819) 4 84 3.71 69.6(14811) 3.72 70.(078848) 3.73 70.5(45117) 3.74 71.(013624) 3.75 71.4(84375)	3.7	4	B2 for a trial between 3 and 4 exclusive (B1 for a trial at 3 or 4) B1 for a different trial of $3.7 < x \leq 3.75$ B1 (dep on at least one previous B1) for 3.7 NB. Trials should be evaluated to at least 2 sf truncated or rounded for values of x correct to 1 decimal place. Trials should be evaluated to at least 1 dp truncated or rounded for values of x correct to 2dp. **NB** No working scores 0 marks even if answer is correct
9			618	4	M1 for a method to find an area which is part of the cross section M1 (dep) for a complete method to find the total area of the cross section M1 (dep M1) for their cross sectional area × 12 A1 cao **OR** M1 for a method to find the volume of cuboid, 8 × 8 × 12 (= 768) M1 for a method to find the volume of the triangular prism, ½ ×5 × 5 × 12(= 150) M1 (dep M2) for a complete method for the volume of the prism A1 cao

5MB3H_01					
Question		Working	Answer	Mark	Notes
10	(a)		15.2	3	M1 for $12.7^2 + 8.3^2$ or $161.29 + 68.89$ or 230.18 M1 for √"($12.7^2 + 8.3^2$)" or $\sqrt{"161.29 + 68.89"}$ or $\sqrt{230.18}$ A1 for 15.2 or 15.17(168…)
	(b)		16.1	3	M1 for $\sin 40° = \frac{DE}{25}$ oe or $\frac{DE}{\sin 40} = \frac{25}{\sin 90}$ oe M1 for 25 sin 40° A1 for 16.1 or 16.06(969…)
11	(a)		4.081	2	M1 for 8.875 or $\frac{71}{8}$ or 2.979…or 4.08 A1 for 4.081 or 4.0809(5…)…
	(b)		4×10^{-3}	2	M1 for 4×10^n, $n \neq -3$ or $a \times 10^{-3}$, $a \neq 4$ or 0.004 or 0.4×10^{-2} or 1/250 A1 cao
12			$x < 2$	2	M1 for an attempt to isolate x and number terms or multiply all terms by 2, or for $\frac{3}{2}x < 3$ or $-\frac{3}{2}x < -3$ or $x = 2$ A1 cao
13	(a)		0, 6, 4, –6	2	B2 for all values correct (B1 for any one value correct)
	(b)		Graph drawn	2	M1 ft (provided B1 in (a) for at least 6 points plotted correctly from their table A1 cao for correct curve drawn from (–4, –6) to (3, –6)
	(c)		1.5 to 1.6 and –2.5 to –2.6	2	M1 for correct use $y = 2$ (may be implied by one correct estimate) or correct use of formula. A1 for 1.5 to 1.6 and –2.5 to –2.6

5MB3H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14*		Sher Yas **Old 19300 12560** New 20265 13502 **Inc 965 942**	Correct comparison (supported)	3	M1 for a correct method to calculate the population at the beginning of the 10 year period for at least one place. eg $\frac{20265}{1.05}$ (= 19 300) oe or $\frac{13502}{1.075}$ (= 12 560) oe A1 for 965 (Sherbury) **and** 942(Yaston) C1 (dep on M1) ft for statement comparing increases leading to conclusion based on two comparable amounts eg increase in Sherbury is greater than increase in Yaston
15		$20x + 10y = 35$ $6x - 10y = -48$ $x = -\frac{1}{2}$ $y = \frac{9}{2}$ OR $12x + 6y = 21$ $12x - 20y = -96$ $26y = 117$ $y = \frac{9}{2}$ $x = -\frac{1}{2}$	$-\frac{1}{2}, \frac{9}{2}$	4	M1 for a correct process to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao OR M1 for full method to rearrange and substitute to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao **NB** Trial and improvement methods score 0 marks unless both x and y are correct
16			226	2	M1 for angle $ABC = 180 - 67$ (= 113) A1 cao OR M1 for obtuse angle $AOC = 2 \times 67$ (= 134) A1 cao

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5MB3H_01					
Question		Working	Answer	Mark	Notes
17			– 2.82, 19.82	3	M1 for $\frac{--17 \pm \sqrt{(-17)^2 - 4\times1\times-56}}{2\times1}$ (condone one sign error) or $\left(x - \frac{17}{2}\right)^2$ oe M1 for $\frac{17 \pm \sqrt{513}}{2}$ or for method leading to $\frac{17}{2} \pm \sqrt{\frac{513}{4}}$ oe A1 for answers in the range 19.82 to 19.825; – 2.82 to –2.825
18			21.2	4	M1 for correct use of sine rule to find *AB* or *BC*, eg $\frac{6}{\sin 25} = \frac{AB}{\sin 120}$ or $\frac{6}{\sin 25} = \frac{BC}{\sin(180-120-25)}$ M1 for (*AB* =) $\frac{6}{\sin 25} \times \sin 120$ (= 12.2(951…)) or (*BC* =) $\frac{6}{\sin 25} \times \sin 35$ (= 8.1(431…) M1(dep M2) for method to find area, eg 0.5 × 6 × "*AB*" sin35 or 0.5 × 6 × "*BC*" sin 120 A1 for answer in the range 21.1 – 21.2 OR (with perpendicular from *A* meeting *BC* extended at a point *X*) M1 for method to find *AX* M1 for method to find *BX* M1(dep M2) for 0.5 × "*AX*" × "*BC*" A1 for answer in the range 21.1 – 21.2
*19			0.38 because the LB and UB agree to that number of figures	5	B1 for 10.75 or 10.85 or 10.84999… B1 for 75.055 or 75.065 or 75.064999… M1 for $\sqrt{\frac{10.85}{75.055}}$ as UB **OR** $\sqrt{\frac{10.75}{75.065}}$ as LB A1 (dep on all previous marks) for both 0.3802… and 0.3784 must clearly come from working with correct values C1 for 0.38 from 0.3784… and 0.3802 … **and** "both LB and UB round to 0.38" **NB** An answer of 038(932….) without working scores no marks

5MB3H_01					
Question		Working	**Answer**	**Mark**	**Notes**
20			7.35	3	M1 for $y \propto \frac{1}{\sqrt{x}}$ or $y = \frac{k}{\sqrt{x}}$ or $9 = \frac{k}{\sqrt{4}}$ M1 for $k = 9\sqrt{4}$ (=18) A1 for 7.35 or 7.348…
*21			$\frac{2}{3}$ (7**a** + 3**b**) and correct conclusion	4	M1 for correct vector for $\overrightarrow{OY}$, or $\overrightarrow{AP}$ eg $(\overrightarrow{OY}) = \overrightarrow{OA} + \overrightarrow{AY}$, or $\overrightarrow{OY} = \overrightarrow{OA} + \frac{2}{3}\overrightarrow{AP}$ may include terms in **a** and **b,** eg. 6**a** + $\overrightarrow{AY}$, 4**b** + 4**a** – **b** + $\overrightarrow{PY}$ or $\overrightarrow{AP} = \overrightarrow{AO} + \overrightarrow{OB} + \overrightarrow{BP}$ or –6**a** + 4**b** + 4**a** – **b** or – 2**a** + 3**b** M1 for $(\overrightarrow{AY}) = \frac{2}{3}\overrightarrow{AP}$ or ⅔(–6**a** + 4**b** + 4**a** – **b**) or ⅔(–2**a** + 3**b**) or $(\overrightarrow{PY} = \frac{1}{3}\overrightarrow{PA}$ or ⅓(– 4**a** + **b** – 4**b** + 6**a**) or ⅓(2**a** – 3**b**) M1 for correct expression for $\overrightarrow{OY}$ in terms of **a** and **b,** eg $\frac{14}{3}$ **a** + 2**b** C1 for $\frac{2}{3}$ (7**a** + 3**b**) and "$\overrightarrow{OY}$ is parallel to the vector 7**a** +3**b**" **oe**

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

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

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

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q2	(a)	Grid enlarged. Shading changed to dotty shading. Labels added to shapes. Image labelled shape A. Rotation given and labelled shape B. Question changed to 'Describe fully the single transformation which maps shape A to shape B. One row top and bottom, one column left and right has been removed. Three answer lines given.	2 cao (B1 for correct orientation in third quadrant or correct quarter turn)
Q2	(b)	Grid enlarged. Shading changed to dotty shading. Labels added next to the triangles 'triangle P' and 'triangle Q'. One column removed from the left.	B1 for enlargement B1 for scale factor 4 B1 for centre (0, 1)

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PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q4		Diagram enlarged. MLP only – x changed to y. Braille only – measurements given in the text.	M1 for $4(x - 8) = 2x + 13$ M1 for expansion of bracket or division of all terms by 4, eg $4x - 32 = 2x + 13$, $x - 8 = 2x/4 + 13/4$ M1 for isolating x and number terms eg $2x = 45$, $x/2 = 45/4$ A1 for 45/2 or 22.5 OR M1 for $(180 - 64) \div 2$ (= 58) M1 for $4(x - 8) = 58$ or $2x + 13 = 58$ M1 for isolating x and number terms eg $4x = 90$, $2x = 45$ A1 for 45/2 or 22.5 OR M1 for $64 + 4(x - 8) + 2x + 13$ M1 for $64 + 4(x - 8) + 2x + 13 = 180$ M1 for isolating x and number terms eg $6x = 135$ A1 for 45/2 or 22.5
Q5		Diagram kept the same size as original. Scale moved above the diagram and also put in the question paper.	B1 for circle centre M radius 5 cm B1 for circle centre N radius 3 cm B1 for correct region shaded

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PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q6		Diagram enlarged. Cross changed to a filled in circle. Arrow heads removed.	M1 for $\pi \times 120^2$ (= 45238….) M1 for "$\pi \times 120^2$" ÷ 1800 A1 for 25.0 – 25.2 C1 for "surface is large enough as 25 > 20" oe OR M1 for $\pi \times 120^2$ (= 45238….) M1 for 20 × 1800 A1 for 36000 C1 for "surface is large enough as 36000 < 45238..." oe OR M1 for $\pi \times r^2 = 1800 \times 20$ M1 for 36000 ÷ π (=11459..) A1 for 107.0… C1 for "surface is large enough as 107…< 120" oe
Q9		Model provided for all candidates. Diagram enlarged and provided for MLP.	M1 for a method to find an area which is part of the cross section M1 (dep) for a complete method to find the total area of the cross section M1 (dep M2) for a complete method for the volume of the prism A1 cao OR M1 for a method to find the volume of cuboid, 8 × 8 × 12 M1 for a method to find the volume of the triangular prism M1 (depM2) for a complete method for the volume of the prism A1 cao

PMT

PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q10	(a)	Diagram enlarged. Braille only: measurements given in the text.	M1 for $12.7^2 + 8.3^2$ or $161.29 + 68.89$ or 230.18 M1 for $\sqrt{161.29 + 68.89}$ or $\sqrt{230.18}$ A1 for 15.2 or 15.17(168…)
Q10	(b)	Diagram enlarged. Braille only – measurements given in the text.	M1 for $\sin 40° = \frac{DE}{25}$ oe M1 for $25 \sin 40°$ A1 for 16.1 or 16.06(969…)
Q13	(a)	Wording added 'There are four spaces to fill.'	B2 for all values correct (B1 for any one value correct)
Q13	(b)	Grid enlarged.	M1 ft for at least 6 points plotted correctly from their table A1 cao for correct curve drawn from (–4, –6) to (3, –6)
Q16		Diagram enlarged. Dot added at centre.	M1 for angle ABC = 180 – 67 (= 113) A1 cao OR M1 for obtuse angle AOC = 2 × 67 (= 134) A1 cao

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PAPER: 5MB3H_01			
Question		**Modification**	**Notes**
Q18		Diagram enlarged.	M1 for correct use of sine rule to find *AB* or *BC*, eg $\frac{6}{\sin 25} = \frac{AB}{\sin 120}$ M1 for (*AB* =) $\frac{6}{\sin 25} \times \sin 120$ or (*BC* =) $\frac{6}{\sin 25} \times \sin 35$ M1(dep M2) for method to find area, eg 0.5×6×*AB*sin35 or 0.5×6×*BC* sin 120 A1 for answer in the range 21.1 – 21.2 OR (with perpendicular from *A* meeting *BC* extended at a point *X*) M1 for method to find *AX* M1 for method to find *BX* M1(dep M2) for 0.5 × "*AX*" × "*BC*" A1 for answer in the range 21.1 – 21.2
Q21		Diagram enlarged.	M1 for correct vector for $\overrightarrow{OY}$, eg $(\overrightarrow{OY}) = \overrightarrow{OA} + \overrightarrow{AY}$, may include terms in **a** and **b,** eg. 6**a** + $\overrightarrow{AY}$, 4**b** + 4**a** – **b** + $\overrightarrow{PY}$ M1 for $(\overrightarrow{AY} =) \frac{2}{3}\vec{A}P$ or $(\overrightarrow{PY} =) \frac{1}{3}\overrightarrow{PA}$ M1 for correct expression for $\overrightarrow{OY}$ in terms of **a** and **b,** eg $\frac{14}{3}$**a** + 2**b** C1 for $\frac{2}{3}$(7**a** + 3**b)** and "$\overrightarrow{OY}$ is parallel to the vector 7**a** +3**b" oe**

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Mark Scheme (Results)

November 2016

Pearson Edexcel GCSE
In 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° 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° × 2 (= 124°) M1 for (180° − 124°) ÷ 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)

PMT

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

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

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

PAPER: 1MA0_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

PMT

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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3

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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

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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

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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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Mark Scheme (Results)

Summer 2017

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



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6 Mark schemes will indicate within the table where QWC is 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*
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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.

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: 1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			Question	2	B1 for a question with a time frame for frequency of use B1 for at least 3 correctly labelled response boxes (non-overlapping and exhaustive) [Do not allow inequalities in response boxes]
2			555	3	M1 for recognising that 1295 is 70% eg 70% = 1295 M1 for 10% = 1295 ÷ 7 (=185) or 1% = 1295 ÷ 70 (=18.5) or 1295 × $\frac{3}{7}$ oe or (1295 – 185) ÷ 2 or $1295 \times \frac{10}{7}$ oe (=1850) A1 cao
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)
4	(a)		positive	1	B1 cao
	(b)		17 – 21.5	2	M1 for a single line segment with positive gradient that could be used as a line of best fit or a horizontal line from 21 or a point plotted at (x, 21) where x is in the range 17 – 21.5 A1 for answer in range 17 – 21.5

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*5		$x = 30^o$ with complete reasons	4	M1 for a correct first step, eg angle *GED* = 55 or angle *GAD* = 55 or angle *EGA* = 180 – 55 (= 125) A1 for 30 C2 for 30 with full reasons, appropriate to their given method eg alternate angles are equal **and** corresponding angles are equal **and** angles on a straight line add up to 180 eg corresponding angles are equal **and** angles in a triangle add up to 180 **and** alternate angles are equal (C1 (dep on at least M1) for one appropriate reason relating to parallel lines or opposite angles of a parallelogram)
6		23	3	M1 for method to find difference in cost, eg 23×24 – 425 (= 127) or for 425 ÷ (23×24) (= 0.7699...) or 24 – (425 ÷ 23) (=5.52…) M1 for $\frac{"127"}{"552"} \times 100$ oe or or 100 – "0.7699 "×100 or $\frac{"5.52"}{24} \times 100$ A1for answer in range 23 – 23.01
7		Correct region	3	B1 for perpendicular bisector of the line *AB* B1 for arc of circle centre *B* radius 4 cm B1 for shading correct region

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
8 (a)		$6ab - 7g$	2	M1 for $6ab$ or $-7g$ A1 cao
(b)		$3(2m - 3)$	1	B1 cao
(c)		t^5	1	B1 cao
(d)		$2xy(x + 2y)$	2	B2 cao (B1 for $xy(2x + 4y)$ or $2x(xy + 2y^2)$ or $2y(x^2 + 2xy)$ or $2xy(\ldots)$ where $(\ldots)$ has two terms one of which is correct)
(e)	$w^2 - 5w - 5w + 25$	$w^2 - 10w + 25$	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 cao
9		Correct position of C	3	M1 for line drawn or point marked on a bearing of 130° from A M1 for line drawn or point marked on a bearing of 245° from B A1 for correct position of C
10		72	4	M1 for "x" + 24 or "x" – 24 or for "g" and 5"g" M1 for forming an appropriate equation eg $x + 24 = 5(x - 24)$ or for $(5g - g) \div 2 = 24$ or $g = 12$ M1 for correct operations to isolate x terms and non-x terms in an equation of the form $ax + b = cx + d$ or $ax + b = c(x + d)$ or $x = 36$ or for $6 \times$ "12" oe A1 cao

Paper: 1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*11			No (supported)	5	M1 for π × 9 ÷ 2 (=14.137…) or π × 5 ÷ 2 (=7.85…) or for π × 9 (=28.27…) or π × 5 (=15.7…) M1 for complete method to work out perimeter eg 2 + 2 + (π × 9 ÷ 2) + (π × 5 ÷ 2) (= 25.99...) M1 (dep M1) for method to find number of rolls required for their perimeter, eg "their total perimeter" ÷ 2.4 eg 25.99..÷2.4 (=10.8), "47.97.."÷2.4 (=19.9) or "43.47.." ÷2.4 (=18.3) M1 for method to work out cost eg 3×10 + 2×3.99 (= 37.98) or 11 × 3.99 (=43.89), 20 →67.98, 19→63.00 or for method to find how many rolls can be bought for £35 (= 10) C1 for a conclusion supported by fully correct answers eg 37.98 (for comparing with 35) e.g 10.8 and 10 OR M1 for π × 9 ÷ 2 (=14.137…) or π × 5 ÷ 2 (=7.85…) or for π × 9 (=28.27…) or π × 5 (=15.7…) M1 for complete method to work out perimeter eg 2 + 2 + (π × 9 ÷ 2) + (π × 5 ÷ 2) (= 25.99...) M1 for a method to find how many rolls can be bought for £35 (=10) M1 for a method to work out the coverage of 10 rolls e.g. 10 × 2.4 (=24) C1 for a conclusion supported by fully correct answers eg 25.9(...) and 24
12	(a)		$1.40 \leq h < 1.50$	1	B1 any unambiguous description of the correct interval
	(b)	1.35 × 11 = 14.85 1.45 × 9 = 13.05 1.55 × 7 = 10.85 1.65 × 6 = 9.9 1.75 × 2 = 3.5	1.49	4	M1 for fx consistently within interval including ends (allow 1 error) M1 consistently using appropriate midpoints M1 (dep on first M1) for $\Sigma fx \div \Sigma f$ eg 52.15 ÷ 35 A1 cao

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
13	$x = 2$ gives 10 $x = 3$ gives 30 $x = 2.1$ gives 11.(361) $x = 2.2$ gives 12.(848) $x = 2.3$ gives 14.(467) $x = 2.4$ gives 16.(224) $x = 2.5$ gives 18.(125) $x = 2.6$ gives 20.(176) $x = 2.7$ gives 22.(383) $x = 2.8$ gives 24.(752) $x = 2.9$ gives 27.(289) $x = 2.61$ gives 20.3(89..) $x = 2.62$ gives 20.6(04..) $x = 2.63$ gives 20.8(21..) $x = 2.64$ gives 21(.039..) $x = 2.65$ gives 21.2(59..)	2.6	4	B2 for a trial $2.6 \leq x \leq 2.7$ evaluated (B1 for a trial $2 \leq x \leq 3$ evaluated) B1 for a different trial $2.6 < x \leq 2.65$ 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 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.
*14		Simple with correct comparable values	4	M1 for a method to calculate 2.15% or 2.3% or 102.15% or 102.3% of 15000 M1 for a complete method to calculate using a compound interest rate of 2.15% for 3 years eg 1.0215^3 (=1.065(89…)) or $1.0215^3 \times 15000$ (=15988.45) M1 for a complete method to calculate using a simple interest rate of 2.3% for 3 years e.g $1+0.023 \times 3$(=1.069) or $15000 + 0.069 \times 15000$ (=16035) or 0.023×3 C1 for a correct decision in a statement based on their two accurate comparable values eg 16035, 15988 to 15988.50 or 1035, 988 to 988.50 or 1.065(89...), 1.069 or 6.6%, 6.9 %

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
15		100	4	M1 for 360 ÷ 9 (= 40) or (9 – 2) × 180 (= 1260) M1 (dep) for 180 – "40" or "1260" ÷ 9 (= 140) oe M1 (dep M2) for a complete method to find the required angle, eg "140" – (360 – "140" – "140") ÷ 2 or ("140" ÷ 7) × 5 A1 for 100 supported by working
*16		No with correct calculations	5	M1 for splitting 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 prism, e.g. a cuboid M1 (dep) for a complete method to find the cross-sectional area OR for a method to find the volume of more than on prism M1 (dep) for a complete method to find the vol of the pool (= 70 (m^3) OR for a complete method to find the depth of 60000L of water M1 for method to find figure for comparison, eg distance between surface and top of pool ("70" – "60") ÷ (5 × 10) C1 No, with correct calculations, eg water level is 20cm below top of pool

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
17 (a)		$\frac{3}{x+1}$	1	B1 oe
(b)		–2.5	3	M1 for attempting to multiply both sides by 5 as a first step and cancelling the LHS (can be implied by equations of the form $15 - x = 15x + ?$ or $15 - x = ?x + 55$) M1 for method to isolate terms in x and number terms from $ax + b = cx + d$ A1 for –2.5 oe OR M1 for splitting the LHS correctly into two parts $\frac{15}{5} - \frac{x}{5} = 3x + 11$ M1 for method to isolate terms in x and number terms from $ax + b = cx + d$ A1 for –2.5 oe
(c)		$m = \frac{2E}{v^2}$	3	M1 for a method to remove square root or clear fraction as a first step M1 for a method to remove square root **and** clear fraction A1 for $m = \frac{2E}{v^2}$
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
19 (a)		0.98 0.95, 0.05, 0.95	2	B1 for 0.98 oe for machine A B1 for 0.95, 0.05, 0.95 in correct positions for machine B
(b)		0.069	3	M1 for 0.02 × 0.05 or 0.02 × "0.95" or "0.98" × "0.05" or "0.98" × "0.95" M1 for 0.02 × 0.05 + 0.02 × "0.95" + "0.98" × "0.05" or 1 – "0.98" × "0.95" A1 for 0.069 oe

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
20		3072	3	M1 for $12 = \frac{k}{8^2}$ or 12×8^2 (= 768) oe or $(8\div 0.5)^2$ (= 256) M1 (dep) for substituting into $T = \frac{k}{d^2}$ e.g $(T =)\frac{"768"}{0.5^2}$ oe eg $12\times 8^2 \div 0.5^2$ oe A1 cao
21	$\frac{-3\pm\sqrt{3^2-4\times 2\times -7}}{2\times 2}$	1.27, −2.77	3	M1 for substitution of $a = 2$, $b = 3$, $c = -7$ (condone one sign error) M1 for $\frac{-3\pm\sqrt{65}}{4}$ A1 for solutions in range 1.26 to 1.27 **and** –2.76 to –2.77
22		$\frac{528}{167}$	3	B1 for 37.55 or 37.65 or 11.25 or 11.35 or 8.35 or 8.45 M1 for $\frac{37.65-11.25}{8.35}$ for $\frac{v_{ub}-u_{lb}}{t_{lb}}$ where $37.6 < v_{ub} \leq 37.65$ and $11.25 \leq u_{lb} < 11.3$ and $8.35 \leq t_{ub} < 8.4$ A1 for answer in range 3.16 to 3.162 from correct working
23		0.94 or 94% or $\frac{76}{81}$	3	M1 for method to work out total area eg $1.3\times 10 + 3.2\times 5 + 3.6\times 5 + 2.4\times 10 + 0.5\times 20$ (=81) or area up to 100 grams eg $1.3\times 10 + 3.2\times 5 + 3.6\times 5 + 2.4\times 10 + 0.5\times 10$ (=76) (In either case allow one error in reading a bar height) M1 for 1 – ((0.5×10)/"81") oe or for method to work out the total area and the area up to 100 grams (In both cases allow one error in reading a bar height) A1 for answer in range 0.938 to 0.94 or 93.8% to 94% or $\frac{76}{81}$ oe

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
24		$y = \frac{1}{4}x + 5$	4	B1 for $m = -4$ M1 (indep) for gradient of perpendicular $= -\frac{1}{"-4"}$ or $\frac{1}{4}$ M1 (dep on previous M1) for substituting $x = -8$, $y = 3$ into $y =$ "$\frac{1}{4}$"$x + c$ A1 for $y = \frac{1}{4}x + 5$ oe SC If M0 is scored then B2 for $y = -\frac{1}{4}x + 1$

Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
25		41.6	6	M1 for $0.5 \times 5.4 \times 7.3 \times \sin B = 19$ M1 for $(B =) \sin^{-1}\left(\frac{19}{0.5\times5.4\times7.3}\right)$ oe $(= 74.6)$ M1 for $(AC^2 =) 5.4^2 + 7.3^2 - 2\times5.4\times7.3\times\cos$ "74.6" M1 (dep) for correct order of evaluation or 61.(479…) M1 for $\frac{\sin C}{5.4} = \frac{\sin "74.6"}{"7.84"}$ oe or $0.5\times7.3\times$ "7.84" $\times \sin C = 19$ A1 for answer in the range 41.55 to 41.65 from correct working OR (with perpendicular from C meeting AB at a point X) M1 for $0.5 \times 5.4 \times CX = 19$ M1 for $(CX =) \frac{19}{0.5\times5.4}$ $(= 7.037...)$ M1 for $BCX = \cos^{-1}\frac{"7.04"}{7.3}$ $(= 15.425…)$ M1 for $(BX =) \sqrt{7.3^2 - "7.04"^2}$ $(= 1.94…)$ M1 for $ACX = \tan^{-1}\frac{5.4-"1.94"'}{"7.04"}$ $(= 26.17…)$ A1 for answer in the range 41.55 to 41.65 from correct working

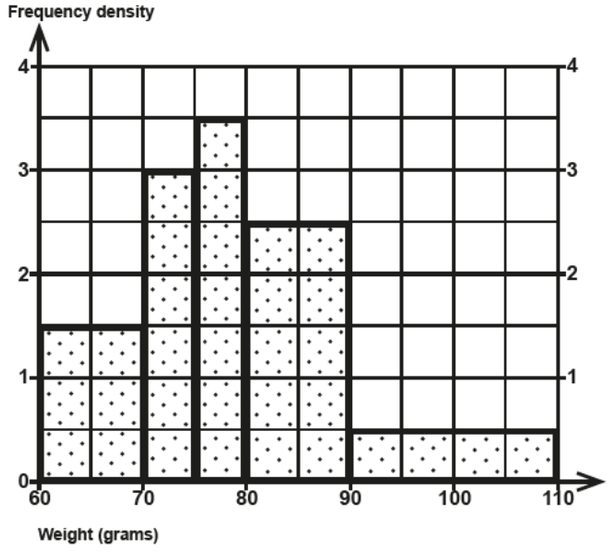
Paper: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
25 cont.				OR (with perpendicular from A meeting BC at a point Y) M1 for $AY = \frac{19}{7.3 \div 2} = 5.20547..$ M1 for $BY = \sqrt{5.4^2 - "5.20547"^2}$ $(= 1.43630..)$ M1 for $CY = 7.3 - "1.43630.."$ $(= 5.86369...)$ M1 for $\tan C = \frac{"5.20547.."}{"5.86369"..}$ $(= 0.8877..)$ M1 for $C = \tan^{-1} "0.8877.."$ A1 for answer in the range 41.55 to 41.65 from correct working

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**	**Mark scheme notes**
4		Diagram enlarged. Axes labels moved to the left of the horizontal axis and above the vertical axis. Right axis has been labelled. Crosses have been changed to solid dots. In (b) the number 21 cm has been changed to 20 cm.	Standard mark scheme but in (b) the range used should be 20 - 24
5		Diagram enlarged. Angle sizes have been moved outside of the angle arcs and the arcs have been made smaller.	Standard mark scheme
7		Point B has been moved so the distance between A and B is 8 cm. Points A and B have been joined with a line. 40 km changed to 60 km. The scale has been moved above and to the left of the diagram.	The standard mark scheme can be applied in principle, with some adjustment. eg the use of a circle centre B which now has a radius of 6 cm instead of 4 cm.
8	(a)	MLP and Braille: *a* changed to *p*, *b* changed to *q* and *g* changed to *n*.	M1 for $6pq$ or $-7n$ A1 for $6pq - 7n$
9		North lines extended to 9 cm to allow for use of specialist equipment. Wording 'with a cross (x)' removed.	Standard mark scheme.
10		Diagram enlarged. Braille only: will add information about the diagram into the question wording.	Standard mark scheme
11		Diagram enlarged. Arrows removed from 2 m. Open headed arrows for 5 m. Dot has been made bigger. Information removed from the box and written as a sentence in the question wording.	Standard mark scheme
12		Frequency column has been widened to allow for working.	Standard mark scheme.
13		MLP only: *x* changed to *y*.	Standard mark scheme but *x* changed to *y*
15		Diagram enlarged.	Standard mark scheme

PAPER: 1MA0_2H			
Question		**Modification**	**Mark scheme notes**
16		Model provided for all candidates. Diagram enlarged and also provided for MLP.	Standard mark scheme
17		MLP only: *x* changed to *y*.	Standard mark scheme but *x* changed to *y*
19		Diagram enlarged. Wording added 'There are four spaces to fill.' Braille only: answer lines labelled from (i) to (iv).	Standard mark scheme
23		Diagram enlarged. Axes labels have been moved to the left of the horizontal axis and above the vertical axis. Points on the histogram moved: 60-70 has moved up to 1.5 70-75 has moved down to 3 75-80 has moved down to 3.5 80-90 has moved up to 2.5 90-110 has stayed the same (0.5)  	M1 for method to work out total area, eg 1.5×10 + 3×5 + 3.5×5 + 2.5×10 + 0.5×20 (=82.5) M1 for 1 – ((0.5×10)/"82.5") oe A1 for answer in range 0.939 to 0.94 or 93.9% to 94% or $\frac{31}{33}$ oe
25		Diagram enlarged. Wording added 'BA = 5.4 cm, BC = 7.3 cm'.	Standard mark scheme

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Question 2

In part (a) the vast majority of students were able to start the process to calculate the amount of flour by dividing 60 by 4 or by multiplying 50 by 3 and gain the first mark. Most then went on to complete the process to find the amount of flour Deon needs and score full marks.
Those who used a unitary approach, starting with 50 ÷ 15 to find the amount of sugar to make one biscuit, rarely got the correct answer because of arithmetical errors and rounded values but often gained two of the three marks for showing a complete process.

Part (b) was also answered well with most students able to work out that Deon needs 400 g of butter and therefore needs to buy 2 packs. A few students gave the final answer as 1.6 and lost the accuracy mark. Students who made a mistake when calculating the amount of butter could still gain one mark if they divided their amount of butter by 250. A few students did not read the question with sufficient care and divided 600 g (the amount of flour) by 250 and gained no marks.

Question 12

About two thirds of students were able to give an acceptable reason why $64^{\frac{1}{4}}$ is not equal to $\frac{1}{4}$ of 64, usually by explaining that $64^{\frac{1}{4}}$ can be interpreted as the fourth root of 64 or $\sqrt[4]{64}$ or by evaluating the value of $\sqrt[4]{64}$ as 2.828. The reason "$\frac{1}{4}$ of 64 is not the same as 64 to the power $\frac{1}{4}$" was not deemed sufficient to score the mark because it is the same as merely rephrasing the statement in the question.

Question 2

The modal score for this question was full marks.

In part (a) a few students made errors with the root sign by only rooting the number 35 rather than the whole denominator. However, when full marks were not achieved students often gained one mark for showing partial correct working.

Part (b) was really well answered. Irrespective of their answer to part (a) the students were able to give 'their' answer correct to the required degree of accuracy.

Question 9

This question was well answered with many students writing the four numbers in order of size. Common mistakes were to place 67.2×10^{-4} before 0.000672 and 672×10^{4} before 6.72×10^{5}. Many students scored one mark for writing three of the numbers in the correct order (ignoring one). The most common approach seen was to convert each number into ordinary form but conversion into standard form was used by some students. The number 67.2×10^{-4} was often written incorrectly as 0.0000672 or as 6.72×10^{-5}. Some students showed no working at all.

Question 19

Question 19 was a problem involving an iteration process, and many students struggled with the concept. The first mark on offer was for correctly substituting the given values into the formula, and in many cases this mark was not awarded. Students confused the time with the height and tried to substitute this instead. Those who did get this far often struggled to then complete the process to find K. This often involved either adding 20 to 1040 as a first step or adding 20 to 1200. If students were able to find K they then often went on to gain all four marks, however some only used the formula once rather than twice and therefore ended up losing two marks.

Question 1

In part (a) many students used a suitable method to multiply the two decimals, with relative place value correct. This meant that all of these students were able to gain the method mark and many went on to get two or three marks. Some students correctly came up with the digits 15414 but placed the decimal point incorrectly and gained two of the three marks. Students making arithmetical errors were also able to score two of the three marks by giving an answer with the decimal place correctly positioned, if this followed a correct method. Students who tried to answer this question by a less formal method were not as successful, often showing an incomplete method such as $3 \times 4 + 0.67 \times 0.2$ and gaining no marks.

Students were not quite as successful in part (b). Those who used a formal method to divide a number with the digits 5984 by a number with the digits 16 usually gained the first mark for making a correct start to the method and getting 3 as the first digit. Many went on to gain all three marks. Some of those who divided correctly to get the digits 374 positioned the decimal point incorrectly and gained two of the three marks. Arithmetic errors were common but, as in part (a), students could still gain two of the three marks if the decimal place was correctly positioned in their final answer. Some students rounded both 59.84 and 1.6, divided 60 by 2, and wrote 30 as the final answer. This gained no marks but it would have been a useful strategy for students to use when deciding where to position the decimal point in their final answer.

Question 9

Part (a) was answered quite well with many students knowing that the value of 7^0 is 1. The common incorrect answers were 0 and 7.

Slightly fewer students were able to find the value of $3 \times 3^6 \times 3^{-6}$ in part (b) with the most common incorrect answer being 27.

In part (c), some of the students who knew that a negative power involved a reciprocal made arithmetic mistakes and gave incorrect answers such as $\frac{1}{8}$ or $\frac{1}{32}$.

In part (d), students not familiar with fractional indices often divided 27 by 3 instead of finding the cube root of 27 which resulted in 9 being a common incorrect answer.

Question 2

This question was a good discriminator between lower attaining students taking this paper. Most students realized the need to work with the ratio 9 : 2 : 1 in order to calculate the weight of cheese in 6000g of potato cakes and scored at least one mark finding the total of 9, 2 and 1. However, a surprising number of students misguidedly divided 6000g (of potato cakes) by 175g (of cheese) as their first calculation. These students rarely realized their error and so could score no marks for their attempts to answer this question. On the other hand a considerable proportion of students scored

full marks for a fully correct answer. Some students assumed that the cheese was sold in 175g packets and so rounded up the 5.71…lots of 175g to 6. These students were awarded full marks for an answer of £13.50. Nearly all students gave answers rounded to the nearest penny.

Question 9

For part (a) it was disappointing to see so many students use a directly proportional relationship and give an answer of 6.25 hours thereby implying that it would take 15 people longer than it would take 12 people to clean the same number of cars. There was little evidence of students applying a common sense check to their answers followed by a review of the processes applied to get their answer.

Part (b) was not generally answered well with examiners accepting any statement which might reflect that the time might change and which did not contain any contradiction. Further reasoning was not always required in order to access this mark. So, for example, “the time might increase” was accepted whereas it might have been preferred to have seen “if people worked at a slower rate, the time would increase”. However, examiners did not accept definite statements such as “the time will increase” without further qualification, so “the time will increase if they work at a slower rate” was accepted. Too many students had not properly understood the question and compared the amount of time taken by 15 people with the time taken by 12 people. This could not be accepted for the award of the mark.

Question 18

This was one of the better answered questions towards the end of the paper. Many students gained at least one mark and a good proportion of students gave a fully correct solution. When just one mark was awarded this was usually the first mark for making some progress with the numerator or the third mark for showing that $\div 2^{-3}$ is the same as $\times 8$. After writing $\left(5\frac{4}{9}\right)^{-\frac{1}{2}}$ as $\left(\frac{49}{9}\right)^{-\frac{1}{2}}$ some students were unable to deal with the negative power and a common error was to ignore the minus sign and write $\frac{7}{3}$ or treat the minus sign as a multiplier and write $-\frac{7}{3}$. A number who were able to find $\frac{3}{7}$ made errors converting $4\frac{2}{3}$ to $\frac{14}{3}$. Those who simplified the numerator to $\frac{3}{7}\times\frac{14}{3}$ scored the first two marks. It was surprising to see some students then work with $\frac{42}{21}$ rather than simplifying it to 2. An error here was $\frac{42}{21} = \frac{1}{2}$. Mistakes at the final stage when working with the denominator prevented some students from achieving the accuracy mark. Some used $2^1 \div 2^{-3}$ but combined the indices incorrectly or gave 2^4 as the final answer. A common error was to write the denominator 2^{-3} as –8. Students seemed to struggle with negative indices generally.

Question 11

Inverse proportion is a topic that many students find difficult. The students who understood that this was inverse proportion rather than direct proportion, typically did well and gained all three marks. The remaining students struggled to gain any marks, normally dividing 14.5 by 13 or 6 as a first step, and were then unable to get any further. Another common error was to try a 'build up' method, e.g. recognise that if 6 workers take $14\frac{1}{2}$ days then 12 workers will take $7\frac{1}{4}$ days but they were unable to get to the time taken for 13 workers.

Question 4

Multiplying 0.004 by 0.32 often resulted in an answer with the digits 128 and this was sufficient for the method mark to be awarded. Failure to place the decimal point in the correct position was a common error and this meant that many students did not gain the accuracy mark. Students making one arithmetical error were also able to score one of the two marks by giving an answer with the decimal place correctly positioned. This question exposed weaknesses in multiplying without a calculator, especially when decimals are involved.

Question 17

This was one of the better answered questions towards the end of the paper. Many students gained at least one mark and a good proportion of students gave the correct answer. A surprising number of students got as far as $\left(\frac{2}{3}\right)^4$ but then failed to evaluate this correctly.

Question 1

Most students used a formal method to divide a number with the digits 846 by a number with the digits 15 and usually gained the first mark for making a correct start to the method and getting 5 as the first digit. Many went on to gain all three marks. Some of those who divided correctly to get the digits 564 then positioned the decimal point incorrectly and gained only two of the three marks. Having divided 846 ÷ 15 and obtained 56.4 many students then gave the final answer as 0.564 or 0.00564, most likely thinking that they needed to divide 56.4 by 100 or by 10000 because they had multiplied both figures by 100 before dividing. If they had considered the relative sizes of the two numbers in the question then they might have realised that their final answer was not sensible. Arithmetic errors were common but students who had gained the first mark were still able to gain two of the three marks if the decimal place was correctly positioned in their final answer. A number of students did not know how to

deal with the final remainder of 6 which often resulted in answers of 56.6. Some students chose to use a build-up method or repeated subtraction to carry out the division but these methods were rarely successful.

Question 18

Many students struggled to find a strategy that would enable them to solve this problem and there were many solutions that had calculations dotted around the page making the working very difficult for examiners to follow. Many of the algebraic methods broke down at an early stage. After gaining the first mark for writing an equation such as $7c + 5t = 480$ many students were unable to use the ratio 5 : 9 correctly to write down a second equation. Writing $5c = 9t$ instead of $9c = 5t$ was a common mistake and the incorrect equations $5c + 9t = 14$ and $c + t = 14$ were frequently seen. Nevertheless, it was pleasing to see some successful solutions from students using an algebraic method. The majority of the correct answers came from students adopting a numerical approach. The most efficient of these saw students working with the ratio of total costs, finding $7 \times 5 = 35$ and $5 \times 9 = 45$, often as 35 : 45, and then dividing 480 by 80 to get 6. Multiplying 5 by 6 and 9 by 6 completed the solution. Some students worked out the total cost of the tomatoes and the total cost of the carrots and gained the first two marks but did not find the cost of 1 kg of each. Many of the incorrect strategies were based on dividing 480 by 12 or by 14.

Question 1

Part (a) provided a very familiar start and was answered very well. It is clear however that candidates are attempting the calculation in a single step. This is of course perfectly acceptable, but it leads to them either getting full marks, or no marks, as not intermediate or partial calculations are seen. Part (b) was again answered well, but some candidates were unaware of what is acceptable when asked for a 'value'. In this case we needed to see a decimal or a fraction that did not include any decimal values within it. For example, simply writing $\frac{1}{0.625}$ was not acceptable.

Question 4

There was a disappointing proportion of correct answers to this question testing inverse proportionality in a real life context. Many students approached the question using direct proportionality and so came to the conclusion that it would take less time (11.2 hours) for 4 pumps to fill the water tank than it does if 5 pumps are used. It was perhaps surprising that few students did a common sense check on this figure which may have led them to question whether they had applied the correct processes in their working.

Question 3

This question was also a good discriminator between students working at the lower end of the attainment range. Higher attaining students generally scored full marks. A good proportion of students realised that they needed to use a temperature within each interval in order to calculate an estimate of the mean temperature. Many of these students used the midpoints. However, a significant number of students used the upper

boundaries or other values within the intervals. Some students just added the 5 midpoints and divided by 5 while some other students did get the products of the temperatures and frequencies and added them, but then divided by 5 instead of the total frequency, 50. A small number of students merely added the frequencies and divided by 5 thereby not taking account of the temperatures at all.
Part (b) of the question was not answered as well as part (a) though there were some students who gained no credit in part (a) but who gave a correct response in part (b). There were many clear responses though a significant number of students gave an answer which was either too vague or ambiguous.

Question 5

Another well answered question with most students using the common multiple 120 and giving 4 packs and 5 boxes as their answer. Working was generally accurate. Alternative commonly seen acceptable combinations included 8 packs and 10 boxes, 12 packs and 15 boxes and 24 packs and 30 boxes. This latter pairing was given by those students who found 720 (30 × 24) as their common multiple. Very few students used factor trees or Venn diagrams to find a common multiple. Where these approaches were used, they were often not successful.

Question 6

There was a greater proportion of correct answers to this question testing inverse proportionality in a real life context than there has been in previous series. However, there were many students who approached the question using direct proportionality, often obtaining a time of 0.8 hours which may have been seen as unlikely had students carried out a common sense check. 45 machines was also a commonly seen incorrect response coming from $30 \times \frac{6}{4}$ or equivalent.

Question 2

Part (a) was answered very well. The most common approach was to convert both mixed numbers into improper fractions and then add these fractions using a common denominator of 15. Errors were made when converting to improper fractions and when writing to a common denominator but one mark was awarded for a method to subtract using a common denominator with at least one correct numerator. Simple arithmetic errors when subtracting numerators were common. Many students did convert back to a mixed number even though it wasn't required but any mistakes made converting $\frac{32}{15}$ into a mixed number were not penalised. Students who chose to deal with the whole numbers and the fraction parts separately had a quicker method that resulted in fewer arithmetic errors. A small number of students did not know that a common denominator was needed.

In part (b) many students were able to identify that Kevin had made a mistake when changing $\frac{35}{24}$ into a mixed number. The most common approach was to work through the problem and compare the result with the given solution. Students who could do the multiplication then spotted that Kevin's answer should be $1\frac{11}{24}$. Some students started from 35 – 24 which should be 11 and not 9 and some considered 24 + 9 which should be 33 and not the 35 that is needed. A common incorrect explanation was that Kevin should have simplified his final answer and some students stated that he should have used a common denominator or that he should have used 'keep, flip, change'. Very often the incorrect statements were from those students who had not tried to work through the problem themselves.

Question 3

It was pleasing to see many fully correct solutions to the problem in part (a) and the majority of students gained at least one mark. Most students divided the floor plan into two rectangles and were usually able to work out that the area is 68 m^2. A few students made simple arithmetic errors but still gained the mark for a complete process to find the total area. After finding a floor area, students needed to find out whether Petra has enough paint to cover the floor. The most common approach was to work out that the 3 tins will cover an area of 75 m^2. Alternatively, some students divided their area by 10 to find the number of litres needed and multiplied 3 by 2.5 to find that Petra has 7.5 litres of paint. Some students used approximation successfully, stating the area and stating that 7 litres would be sufficient and this was less than the 7.5 litres Petra had available. Whichever approach they chose, students usually went on to give the correct decision that Petra has enough paint. The majority of students did specify a "yes/no" answer and very few lost the final mark if the rest of the work was correct. Incorrect approaches included working with the perimeter or finding the product of all the given lengths.

Part (b) was also well answered with many students stating that it would not affect the answer to part (a) and giving a correct reason such as she will need less paint or she will have more paint left over. Some students made a comment about Petra needing less paint but could not be awarded the mark because they did not make a decision. If figures were included in the answer to part (b) they had to be correct for the area that had been calculated in part (a). Many students correctly found that Petra would now be able to cover 82.5 m^2.

Question 3

On the whole, this small problem was answered well, but many were put off by the extra numbers in the question. The '5000' was simply there to show the same number of bottles were made both days, but many tried to use this figure in the formula, often in place of 72. There were also cases where students wrote $72 \div 6$ but then went on to use this in an incorrect calculation. This said, many did gain full credit for using the formula twice and subtracting to get an answer of 4.

Question 1

Many learners used a formal method to divide a number with the digits 8184 by a number with the digits 12, usually 8184 ÷ 12, and most gained the first mark for making a correct start to the method and getting 6 as the first digit. Some went on to gain all three marks but having worked out 8184 ÷ 12 and obtained 682, many then gave the final answer as 68.2 or 6.82 and gained only two of the three marks. As they had multiplied both 818.4 and 1.2 by 10 before carrying out the division they possibly thought that they needed to divide 682 by 10 or by 100. If they had considered the relative sizes of the two numbers in the question then they should have realised that their final answer was not sensible. Arithmetic errors were common but those who had gained the first mark were still able to gain two of the three marks if the decimal place was correctly positioned in their final answer.

Question 10

In part (a) a good proportion of learners evaluated both $25^{\frac{1}{2}}$ and $8^{\frac{1}{3}}$ correctly and gave the correct answer of 10. Some gained one of the two marks for either $25^{\frac{1}{2}} = 5$ or $8^{\frac{1}{3}} = 2$. Answers such as $200^{\frac{5}{6}}$ and $200^{\frac{1}{6}}$ were very common and gained no marks.

In part (b) many of the learners who interpreted $\left(\frac{1}{32}\right)^{\frac{3}{5}}$ as $\left(\frac{1}{\sqrt[5]{32}}\right)^{3}$ went on to gain both marks for a correct answer of $\frac{1}{8}$. Some gave $\left(\frac{1}{\sqrt[5]{32}}\right)^{3}$ as the final answer and scored just the method mark but the most common route to one mark was to work out $\left(\sqrt[5]{32}\right)^{3}$ as 8 and then give 8 as the final answer. Those who started with $\sqrt[5]{\frac{1}{32^3}}$ gained the method mark but were not able to complete the arithmetic to get a correct final answer.

Question 1

It was very common to see the correct answer on question 1. The use of a calculator is a familiar start for learners, and they did well. Those who didn't gain full marks often only square rooted the numerator rather than the whole fraction. As ever, some were able to gain 1 mark for a correct partial evaluation.

Question 14

A slightly more complex question than has often been seen testing the product rule for counting. There were two main approaches, the most common being to recognise that each of the 10 teams would play 9 games if playing each other team once and so to multiply 10 by 9, then multiply this total by 4 to reflect the fact that each team plays each other team 4 times. This method to 360 was seen and gained one mark. When using this method though learners needed to realise this was counting each game twice, and then halve to get the answer of 180. It was this step that was often missing.
The alternative method was to recognise the issue of double counting in the initial calculation for the total number of games when playing each other once. This led to a value of 45, which again would score the first mark. Those who followed this method were more likely to gain the second by multiplying by 4 as they had understood the difficult concept of halving in their first step.
However, the most common, and incorrect approach was to do $10 \times 10 \times 4$ and this gained no marks.

Question 5

This was a ‘reverse percentage’ style question, but with the change being given as a fraction, in this case $\frac{1}{5}$. The first mark here was for realising that the given amount was after a decrease of

$\frac{1}{5}$ and was therefore $\frac{4}{5}$ of the original amount. Learners could achieve this simply by stating it, by forming a suitable equation with the original amount as an unknown, or by dividing by 4 as a first step. Less successful responses started by dividing by 5, this was then normally added to 8000 to give the common incorrect answer of 9600. This response gained no credit.
Those who understood the question often gained all 3 marks, and it was typically only arithmetic errors that stopped that from happening.
This reverse fraction, or the more common reverse percentage style question is definitely an area for improvement.