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GCSE MATHS

Ratio, proportion and rates of change

Edexcel 1MA1 | Subtopic collection Topic 31

Ratio

Higher tier

Answers and examiner comments

100	2005-2025	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 2

The full source mark scheme begins on page 173. Use the original paper code, tier and question number shown above.

Original question 1

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

Original question 5

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

Original question 21

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

8	(a)		Four thousand, one hundred and seventeen	1	B1 for four thousand, one hundred and seventeen oe
	(b)		4100	1	B1 for 4100 in figures or words or 41 hundred

13		$180 \div 9$ (=20) 20×4	80	3	M2 for $180 \div (2 + 3 + 4) \times 4$ or 40, 60, 80 seen (M1 for $180 \div (2 + 3 + 4)$ or 20 seen A1 cao

Question		Working	Answer	Mark	Notes
7		$40 \div (2+3) = 8$ 8×2 8×3	16, 24	3	M1 for $40 \div (2+3)$ (= 8) oe or $\frac{2}{5}$ oe or $\frac{3}{5}$ oe or for listing at least 3 multiples of 2 and 3 M1 (dep) for "8"×2 or "8"×3 oe A1 for 16 and 24 in correct places [SC : B2 for 24, 16 if M0 scored] [SC: If M0 scored, B1 may be awarded for just one correct answer, in the correct place]

Question	Working	Answer	Mark	Notes
1	24 ÷ 2	36	2	M1 for 24 ÷ 2 **or** $\frac{3}{2} \times 24$ oe **or** 12 A1 cao

7	$420 \div 7 = 60$ $5 \times 60 = 300$ $2 \times 60 = 120$ $120 \div 3 \times 2 = 80$ $0.32 \times 300 + 1.17 \times 80 + 1.51 \times 40$ 96 + 93.60 + 60.40	250	5	M1 for $420 \div (5 + 2)$ or 60 seen M1 (dep) for $5 \times$ '60' or $2 \times$'60' or 300 or 120 seen M1 for '120'$\div 3 \times 2$ oe M1 for $32\text{p} \times$'300'+£1.17$\times$'80'+£1.51$\times$'40' A1 for 250.00 or 250 SC B1 for £539

Question	Working	Answer	Mark	Notes
1	$140 \div (3+4)(=20)$ "20"×4	80	2	M1 for $140 \div (3+4)$ or 20 or $\frac{4}{7} \times 140$ A1 cao

5MB1H_01

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

5MB1H_01

2	300 ÷ (2 + 3 + 5) × 5 = 300 ÷ 10 × 5 = 30 × 5	150	2	M1 for 300 ÷ (2 + 3 + 5) or × 5 or 30 seen or 60 : 90 : 150 A1 cao

5MB2H_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.

5MB1H_01

Question		Working	Answer	Mark	Notes
5		2800 ÷ (13 + 12 + 10) = 80p / share 80 × 12 = 960 $960 \times \frac{2}{3}$	6.40	4	M1 for 2800 ÷ (13 + 12 + 10) (=80) or 28 ÷ (13 + 12 + 10) (=0.8) **or** 80 **or** 0.8 **or** 10.4(0) **or** 1040 **or** 8 **or** 800 **or** $\frac{13}{35}$ **or** $\frac{12}{35}$ **or** $\frac{10}{35}$ oe seen M1 for '80' × 12(=960) or'0.80' × 12(=9.6(0)) **or** $\frac{12}{35} \times 2800$ **or** $\frac{12}{35} \times 28$ M1 (indept) for $\times \frac{2}{3}$ oe A1 for £6.40 or 640 pence [accept 6.4] SC : B2 for answer of 10 supported by working

1380_4H

2		60 ÷ 12 = 5 2×5=10; 3×5=15; 7×5=35	10 15 35	3	M1 for 60 ÷ (2+3+7) or ×5 or multiple build-up (at least 3 correct) eg 2:3:7, 4:6:14 ,6:9:21, 8:12:28 M1 for 60÷(2+3+7)×2 or 60÷(2+3+7) ×3 or 60÷(2+3+7) ×7 or sight of the numbers 10,15,35 together or 2×5 or 3×5 or 7×5 A1 cao SC B1 2 correct numbers out of 3 in a ratio

10		66 ÷ 2 = 33 ± (6 ÷2) P = 30 and T = 36 Ages = 30 : 36 = 5 : 6 770÷11=70 each part 5 × 70 = £350 6 × 70 = £420	350 420	5	M1 66 ÷ 2 = 33 ± (6 ÷2) or (66-6)÷2 or for at least 3 trials with a total of 66 or a difference of 6 or for $x + x + 6 = 66$ or $x + x – 6 = 66$ oe A1 for 30 and 36 seen or 5 and 6 oe M1 for 770 ÷ '11' or 770 ÷ 66 M1 for '770÷66'×'30', where '30' is a ft from their previous answer or '770÷66'×'36', where '36' is a ft from their previous answer or '770÷11'×5 or '770÷11'×6 oe A1 for P = 350 and T = 420

5MB2H_01

Original question 2

The full source mark scheme begins on page 234. Use the original paper code, tier and question number shown above.

Original question 3

The full source mark scheme begins on page 247. Use the original paper code, tier and question number shown above.

Question		Working	Answer	Mark	Notes
10		40 ÷ 5 = 8 8 × 1.5 = 12 (37.6–12)÷(40–8) = 25.6÷32 =	0.8	4	M1 for 40 ÷ 5 (=8) or at least 3 multiples of 1:4 M1 “8” × 1.5 (=12) M1 (37.6 – “12”) ÷ (40 – “8”) or 25.6 ÷ 32 A1 for 0.8, accept 800 g OR algebraic approach: M1 for (eg) k=4c and k+c=40 M1 for (eg) 1.5c+wk=37.6 M1 for “8”×1.5 + “32”×w = 37.6 A1 for 0.8, accept 800 g

Original question 13

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

Question		Working	Answer	Mark	Notes
12			240	4	M1 for 16 × 2 (= 32 girls) M1 for 16 + '16 × 2' (= 48) M1 (dep on the previous M1) for (16 + '32')× 5 **or** (16 + '32') × (4 + 1) A1 cao OR M1 for 1 : 2 = 3 parts M1 for 5 schools × 3 parts (= 15 parts) M1 (dep on the previous M1) for '15' parts × 16 A1 cao **SC B2** for 176 given on the answer line

Question		Working	Answer	Mark	Notes
1		105 ÷ 7 × 4	60	2	M1 105 ÷ (4+3) or a complete build up method A1 cao

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

5MB2H_01

Question		Working	Answer	Mark	Notes
7			28% or $\frac{14}{50}$	4	M1 for 100 30 (= 70) or $1-\frac{3}{10}\left(=\frac{7}{10}\right)$ M1 for "70" ÷ (3 + 2) (= 14) or $"\frac{7}{10}"\div(3+2)\quad\left(=\frac{7}{50}\right)$ 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
14	(a)	0.016 × 500 = 8 0.03 × 500 = 15 0.08 × 250 = 20 0.096 × 250 = 24 0.026 × 1000 = 26	(8), 15, 20, 24, 26	2	M1 for correct calculation to find one frequency e.g. 0.03 × 500 or 0.08 × 250 or 0.096 × 250 or 0.026 × 1000 or for one frequency correct or establishing that 1 cm^2 = 2.5 fish A1 for all frequencies correct
	(b)	0.026 × 500 = 13 8 + 15 + 20 + 24 + 26 = 93	13 : 93	2	M1 ft for a complete correct method to find the number of fish over 2000 g ie 0.026 × 500 (=13) or '26'÷2 A1ft for 13 : 93 or '0.026 × 500' : 'total for all their fish' or '26'÷2 : 'total for all their fish' SCB1 for 93:13 given as the answer
	(c)	47th item needed	1292	2	M1 for a complete correct method to divide the area of the histogram into two equal parts **OR** for a complete correct method to interpolate for the 47th value A1 for answer in range 1290 to 1300

PAPER: 5MB1H_01

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

PAPER: 1MA0_1H

PAPER: 1MA0_1H

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

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

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

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

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

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

19			(2, 1⅓, 1)	2	M1 for finding coordinates of P (6, 4, 3) or $OT = \frac{1}{3}\ OP$ or 2 correct coordinate values A1 oe

Original question 4

The full source mark scheme begins on page 286. Use the original paper code, tier and question number shown above.

Original question 7

The full source mark scheme begins on page 300. Use the original paper code, tier and question number shown above.

Original question 14

The full source mark scheme begins on page 314. Use the original paper code, tier and question number shown above.

8			68 34 51	3	M1 for 153 ÷ (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

6	(a)		0 8 9 1 4 7 8 8 2 0 1 1 2 2 5 6 3 0 3	3	B2 for a fully correct ordered stem and leaf diagram [B1 for a complete unordered diagram or for an ordered diagram with at most 2 errors] B1 (indep) key
	(b)		20	2	M1 for 36 ÷ (5 + 4) (=4) A1 cao

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)

5MB2H/01 June 2015

20		$\pi 2^2 \times 2 = 8\pi$ $\pi 2^2 \times \frac{20}{360} \times 3 + \pi 2^2 \times \frac{340}{360} \times 2$ $8\pi : \frac{74}{9}\pi$: 72 : 74 Or $\frac{20}{360} \times 3 + \frac{340}{360} \times 2 = \frac{37}{18}$ $2: \frac{37}{18}$ 36:37	36:37	4	M1 method to find relative cost of design A e.g. $\pi 2^2$, $k \times \pi 2^2$ M1 for a complete method to find the relative cost of the watch face for design B e.g. $\pi 2^2 \times \frac{20}{360} \times \frac{3}{5} + \pi 2^2 \times \frac{340}{360} \times \frac{2}{5}$ M1 (dep on M1, M1) for the cost of design A: cost of design B A1 cao Or M1 for method to find fraction of the sectors in design B $\frac{20}{360}, \frac{340}{360}$ M1 for complete method to find the relative cost of the watch face for design B M1 (dep on M1,M1) for the cost of design A: cost of design B A1 cao

PAPER: 1MA0_2H

8	(a)		4 : 3	2	M1 for 720 : 540 oe or for 3 : 4 or 1 : $\frac{4}{3}$ oe or $\frac{3}{4}$: 1 oe A1 for 4 : 3 or $\frac{4}{3}$ (or 1 .33….) : 1 or 1 : $\frac{3}{4}$ (or 0.75)
	(b)		480	2	M1 for 720 ÷ 3 (= 240) or scale factor of $\frac{3}{2}$ or $\frac{2}{3}$ oe or 720 : 480 A1 cao

PAPER: 1MA0_2H

PAPER: 5MB1H/01

Question		Working	Answer	Mark	Notes
8			School £8930 Hospital £13395	5	M1 for 23.5×1000 or for $\frac{1}{20} \times 1000$ (=50) oe M1 for "23500" $\times \frac{19}{20}$ (=22325) oe or for $(1000 - 50) \times 23.50$ (=22325) oe M1 for "22325" ÷ 5 (= 4465) M1 for "4465" × 2 or "4465" × 3 C1 for £8930 for school and £13395 for hospital.

3	(a)		4	2	M1 for 20 ÷ 5 (=4) Allow build up method to 4 lots of 1:5 A1 cao
	(b)		6	2	M1 for a full method to find the number of red counters needed eg 20 ÷ 2 – "4" A1 ft from (a)

27		32 : 45	5	M1 for a correct expression for surface area of the cylinder ($=2\times\pi\times3^2+6\pi h$) or surface area of the sphere ($=4\times\pi\times6^2$) M1 (dep) for equating 'surface area of cylinder' and '2 × surface area of sphere', $2\times\pi\times3^2+6\pi h = 2\times4\times\pi\times6^2$ M1 (dep) for a method to isolate h M1 for $\pi\times3^2\times$'45' oe and $\frac{4}{3}\times\pi\times6^3$ oe A1 cao

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PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
1		The enlargement has been drawn on the grid. Grid has been enlarged. Wording has been changed to: 'On the grid there are two shapes, shape X and shape Y. A point A is marked on the grid. Describe fully the transformation that maps shape X onto shape Y.'	B3 for an enlargement of scale factor 3 with centre A (B2 for 2 aspects described) (B1 for 1 aspect described)
4		Diagram enlarged. Axes labels have been moved to the top of the vertical axis and to the left of the horizontal axis. Right axis has been labelled.	As standard mark scheme
5		Model provided for all candidates. Diagram enlarged and also provided for MLP. Wording has been changed to: 'They show a prism. An arrow points to the side elevation of the prism. Now look at the three shapes below the diagram of the prism, shape A, shape B and shape C. Which shape A, B or C shows the view from the direction of the arrow? [The three diagrams show: A the front elevation, B the plan and C the side elevation].	B2 for shape C only indicated (B1 for shape C and one other shown)

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
6	(a)	The letter 'a' has been changed to 't' for all candidates. Frequency numbers have been changed to 5, 15, 15, 20, 5.	Standard mark scheme with letter change
	(b)	Grid has been enlarged. Axes labels have been moved to the top of the vertical axis and to the left of the horizontal axis. Right axis has been labelled.	Standard mark scheme Tolerance to **within** half a square
7		Diagram enlarged. Shading changed to dotty shading.	Standard mark scheme
9		Diagram has been enlarged. Wording added 'Angle CEA is marked x.'	Standard mark scheme
10	(a)	Diagram enlarged.	Standard mark scheme
12	(b)	North lines have been extended to 9cm. A line has been added between Y and L and this line has been extended to 9cm. The distance from point Y to T is now 10.8 cm. [Leeway will be needed for answering the question]. '80 km' changed to '100 km'.	M1 for line drawn on a bearing of 320 ±5 drawn A1 for an answer in the range 20 to 30

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
14		Grid has been enlarged. Triangle B and Triangle C have been drawn on the grid. Question changed to: 'A cut out shape has been provided.' '(a) Describe fully the transformation that maps triangle A onto triangle B. (b) Describe fully the single transformation that maps triangle B onto triangle C. (c) Describe fully the single transformation that maps triangle A onto triangle C.	(a) B1 for one aspect of rotation 90°clockwise or centre (0,1) (b) B1 for translation or vector $\begin{pmatrix}-3\\-1\end{pmatrix}$ (c) B1 for rotation of 90°clockwise with centre (−2,2)
	(a) (b)	The table has been turned to vertical format and left aligned. Wording added 'There are four spaces to fill.' Grid has been enlarged.	(a) Standard Mark scheme (b) Standard mark scheme- Allow extra tolerance
18		Diagram enlarged. Lines on the box plot have changed to, '95, 105, 115, 120, 135.'	Boys :Range 40, IQR 15 Standard Mark scheme
21		Diagram enlarged.	Standard Mark scheme

PAPER: 1MA0_1H			
Question		**Modification**	**Notes**
22		Model provided for all candidates. Diagram enlarged and also provided for MLP. MLP only: x changed to y.	M1 for finding an expression for a missing length eg $4y - 1 - y - y$ (=$2y - 1$) or $y + 2 - 2y$ (=$2 - y$) M1 for a correct eypression for one area from the cross-section, eg. $y \times 2y$ or $(4y - 1)(y + 2 - 2y)$ or for one volume of cuboid(s), eg. $y \times 2y \times (y + 1)$ M1 for a complete method to find the volume A1 for $9y^2 + 7y - 2$ or $(9y - 2)(y + 1)$ oe
23	(i)	Diagram enlarged. Distances have been changed to '30, 40, 30, 20, 20'. Wording added 'There are two spaces to fill.	M1 for evidence of frequency density calculation, eg 6 on the frequency density axis for the height of the first column or 5 is 1 cm² can be implied by 30 as the second missing frequency A1 for 40 and 30
	(ii)	'	B1 for 30 – 50 bar of height 1 cm
24		Braille only: letter 'I' changed to 'S'.	Standard Mark scheme
25		Diagram enlarged.	Standard Mark scheme
26		Diagram enlarged.	Standard Mark scheme
27		Two models provided for all candidates. Diagrams enlarged and also provided for MLP.	Standard Mark scheme

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

Paper: 1MA1/1H

Question	Working	Answer	Mark	Notes
6 (a)		40 100	3	M1 for method to find unit weight eg 60 ÷ 3 (= 20) M1 for complete method to find weight of one of the other ingredients eg "20" × 2 (= 40) or "20" × 5 (= 100) A1 cao
(b)		1.44	3	M1 for a complete method to work out the weight of nuts needed eg 300 ÷ (3 + 2 + 5) × 3 (= 90) or 300 ÷ (60 + "40" + "100") × 60 (= 90) M1 for a complete method to work out the cost eg (800 ÷ 500) × "90" (= 144) A1 cao

Paper: 1MA1/1H

Question	Working	Answer	Mark	Notes
14		$\frac{1}{3}$	P1	process to solve the problem e.g. $\frac{3}{10}\times\frac{4}{9}(=\frac{12}{90}=\frac{2}{15})$ OR finds the number of white circles for their chosen number OR for 9 : 21 (or a multiple of 9 : 21)
			P1	second step of the process e.g. $\frac{7}{10}\times\frac{2}{7}(=\frac{14}{70}=\frac{2}{10}=\frac{1}{5})$ OR finds the number of black circles for their chosen number OR for a multiple of 2 : 5 where the ratio parts sum to "21"
			P1	for complete process e.g. $"\frac{2}{15}"+"\frac{1}{5}"\left(=\frac{4}{30}+\frac{6}{30}\right)$ OR finds the total number of circles for their chosen number OR for 3 ratios that could be used to solve the problem eg 9 : 21 with 4 : 5 with 6 : 15
			A1	for $\frac{1}{3}$ oe

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

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

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

2		14:21:42	P1 P1 P1 A1	for 2 out of 3 expressions in one letter eg from x, $x+7$ $2x+14$ **or** see a set of numbers to show interpretation of the relationships, eg 10, 17, 34 (dep) for sum of their 3 expressions =77 eg $x + x+7+2x+14 =77$ oe **or** 2 systematic correct trials including addition for a correct process to isolate their term in x **or** $x=14$ for ratio 14:21:42 oe

Paper: 1MA1/1H

Question	Working	Answer	Mark	Notes
14		$y = \frac{x(k+1)}{k-1}$	M1	$y + x = k(y - x)$ **or** $\frac{y+x}{y-x} = k$ oe
	$ky - y = x + kx$ $y(k - 1) = x(1 + k)$		M1	For isolating x and y on opposite sides eg $ky - y = x + kx$
			A1	Completing correct algebraic reasoning to reach conclusion

11		0.119	P1 P1 A1	for starting the process, eg finds area 25π or 16π oe, or finds angle for town A, 0 – 19 (70°), may be on diagram for a complete process, eg $\frac{70}{360} \times \frac{25\pi}{41\pi}$ 0.118 – 0.119 or 11.8% - 11.9%

Paper: 1MA1/2H

Question	Working	Answer	Mark	Notes
4		15	P1	strategy to start the problem, eg $8:20$ and $20:5$
			P1	process to solve the problem, eg $\frac{5}{33}\times 100$ or $24:60:15$
			A1	cao

14		Shown	M1 M1 A1	for $\sqrt[3]{\frac{8}{27}}$ (= $\frac{2}{3}$) or $\sqrt[3]{\frac{27}{8}}$ (= $\frac{3}{2}$) or 2 : 3 or 3 : 2 for $\left(\sqrt[3]{\frac{8}{27}}\right)^2$ (= $\frac{4}{9}$) or $\left(\sqrt[3]{\frac{27}{8}}\right)^2$ (= $\frac{9}{4}$) or 4 : 9 or 9 : 4 132 from correct arithmetic

Paper: 1MA1/3H

2	140	P1 P1 A1	for beginning to solve the problem eg 50 ÷ 5 × 8 (= 80) **or** 14 : 8 : 5 oe **or** 14 : 8 and 8 : 5 oe (linked) for a full process to solve the problem eg “80” ÷ 4 × 7 **or** $\frac{50}{5}$ × “14” **or** 140 : 80 : 50 cao	80 may be seen in the ratio 80 : 50 If 140 clearly identified as houses in working award full marks

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
8	216	P1	for process to work with ratio eg 72 ÷ (3 + 4 + 5) (= 6) **or** 72 ÷ 12 (= 6)	
		P1	for process to find length of base or height of triangle eg 3 × "6" (= 18) **or** 4 × "6" (= 24) **OR** process to find area scale factor eg "6" × "6" (= 36)	
		P1	complete process to find the area of the triangle eg ½ × "18" × "24" **or** ½ × 3 × 4 × "6"^{2}	
		A1	cao	

Question	Answer	Mark	Mark scheme	Additional guidance
16	0.12	P1	for process to start eg $(1 - 0.2) \div (3 + 17)$ (= 0.04) **or** $(3 + 17) \div (1 - 0.2)$ oe (= 25) **or** $(100 - 20) \div (3 + 17)$ (= 4) **or** 3×4 (= 12) and 17×4 (= 68)	Just $1 - 0.2 = 0.8$ is **not** sufficient for P1 May be seen in a ratio
		P1	full process to find the required probability eg $3 \times$ "0.04" **or** $\frac{3}{20} \times (1 - 0.2)$ oe **or** $3 \div$ "25" or $3 \times$ "4" $\div 100$	
		A1	oe	0.12 using incorrect probability notation gets P2

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

15	3 : 10	P1 P1 P1 A1	process to find ratio of lengths **A**:**B** = $\sqrt{4}$:$\sqrt{25}$ (= 2:5 or $\frac{2}{5}$ or 2, 5) for process to find ratio of lengths **B**:**C** = $\sqrt[3]{27}$: $\sqrt[3]{64}$ (= 3:4 or $\frac{3}{4}$ or 3, 4) for process to write as one ratio eg. finding a common multiple of 3 and 5 **or** 6 : 15 : 20 oe cao	Accept working in fractions for the award of process marks but the final answer must be in correct simplified ratio notation

Paper: 1MA1/1H

21	3 : 4	P1 P1 P1 P1 A1 P1 P1 P1 P1 A1	starts process eg $\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$ oe for process to find $\overrightarrow{OM} = \mathbf{a} + \frac{1}{2}$ "($\mathbf{b} - \mathbf{a}$)"oe $(= \frac{1}{2}(\mathbf{a} + \mathbf{b}))$ for process to find $\overrightarrow{AP} = -\mathbf{a} + \frac{3}{5}$ "$(\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b})$" oe **or** (indep) for $\overrightarrow{AN} = -\mathbf{a} +$ "k"$\mathbf{b}$ process to find "k" using $\overrightarrow{AN} = -\mathbf{a} +$ "k"$\mathbf{b}$ as a multiple of $\overrightarrow{AP}$ cao **ALTERNATIVE** for producing OM to C such that AC is parallel to OB for process to show that $MC = OM$, using congruent triangles ACM and BOM for process to find PC as a multiple of OM/5 (= 7OM/5) for process to find ON as a multiple of AC(OB) (= 3OB/7) using similar triangles ACP and NOP cao	Formal geometric reasoning relating to congruent and similar triangles is not required

Paper: 1MA1/1H

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

Paper: 1MA1/2H

17	4 : 1	P1	for associating algebraic expressions with the correct ratio eg $p-5 : q-5$ (= 5 : 1) or $p+20 : q+20$ (= 5 : 2)	
		P1	for $\frac{p+20}{q+20}=\frac{5}{2}$ **or** $\frac{p-5}{q-5}=\frac{5}{1}$ oe **or** $p-5=5(q-5)$ **or** $2(p+20)=5(q+20)$ oe	Award for one of the two simultaneous equations eg $5q-p=20$, $5q-2p=-60$ oe
		M1	for a complete method shown to find p **or** q	Award for a simultaneous equation method to eliminate one variable leading to either $p = 80$ or $q = 20$
		M1	for a complete method shown to find p **and** q **or** two values for p and q that are in the ratio 4 : 1 or an unsimplified ratio 4 : 1 (eg 80 : 20) or an answer of 1 : 4	Award for a simultaneous equation method to eliminate both variables leading to either $p = 80$ **and** $q = 20$
		A1	cao	

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
6	17.3	P1	for full process to find either angle eg (180 − 90) ÷ (2+3) ×2 (=36) **or** for 36 or 54 seen as an angle	May be seen on diagram Condone correct values if incorrectly placed.
		P1	for a correct equation using trigonometry eg cos [*A*] = 14÷ *AB*	This must be shown as an equation with all four elements (eg cos, [*A*], 14, *AB*) present. [*A*] could be 36 or any angle clearly and unambiguously identified as *A*. This also applies to [*B*] with Sine.
		P1	(dep previous P mark) for rearranging their trigonometry equation to make *AB* the subject eg (*AB* =) "14 ÷ cos 36"	
		A1	for an answer in the range 17.3 to 17.4	If an answer is shown in the range in working and then incorrectly rounded award full marks.

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
6	96	P1	for process to find the ratio of the number of pens of each colour sold, eg $2 \times 7 : 5 \times 3 : 6 \times 4$ (= 14 : 15 : 24)	Does not have to be seen as a ratio but all three needed
		P1	for process to find the proportion of green pens sold, eg $\frac{212}{"14"+"15"+"24"}$ **or** $\frac{"24"}{"14"+"15"+"24"}$	
		P1	for a complete process to find the number of green pens sold, eg $\frac{212}{"14"+"15"+"24"} \times$ "24" **or** $\frac{"24"}{"14"+"15"+"24"} \times 212$	P3 can be implied by the values 56, 60 and 96
		A1	cao	

17	–1, 2.5	P1 P1 P1 A1	for process to form an equation, eg $\frac{x^2}{3x+5}=\frac{1}{2}$ **or** $2x^2 = 3x + 5$ for writing in a suitable form ready for solution, eg $2x^2 – 3x – 5$ (= 0) **or** $– 2x^2 + 3x + 5$ (= 0) (dep 1st P1) for process to solve quadratic equation of form $ax^2 + bx + c$ (= 0) eg $(2x – 5)(x + 1)$ (= 0) **or** $\frac{--3 \pm \sqrt{(-3)^2 - 4 \times 2 \times -5}}{2 \times 2}$ for –1, 2.5 oe	

Paper: 1MA1/1H

7	168	P1 P1 P1 A1	for working with ratio to find the amount for C or D eg 1.5 × 2 (=3) or (A, B, C, D =) 2 , 7 , 3 , 3 oe **OR** for suitable expressions linking A with C or D, eg. A = x, C = 1.5x for "2 + 3 + 3 + 7" (=15) **OR** adds 4 suitable expressions, eg. "x + 3.5x + 1.5x + 1.5x" (= 7.5x) for a complete process to find the amount of money eg 360 ÷ "15"× 7 **OR** 360 ÷ "7.5" × 3.5 cao	

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

Question	Answer	Mark	Mark scheme	Additional guidance
17 (a)	Explanation	C1	For stating the LCM of (4+7) and (5+3) is 88 **or** there is no smaller multiple of 8 and 11 (than 88)	
(b)	23	P1	for using a scale factor appropriately eg 4×8 (=32) **or** 3×11 (=33) **or** 7×8 (=56) **or** 5×11 (=55) **or** for writing a pair of suitable fractions, eg $\frac{7}{11}$ and $\frac{3}{8}$ **or** $\frac{4}{11}$ and $\frac{5}{8}$ **or** $\frac{3}{8}$ and $\frac{4}{11}$	May be seen in a two-way table or probability tree
		P1	for finding the number of large cubes and red cubes **or** small and yellow **or** small and red eg 7×8 (=56) and 3×11 (=33) **or** 4×8 (=32) and 5×11 (=55) **or** 4×8 (=32) and 3×11 (=33) **OR** a suitable fractional equation, eg $\frac{7}{11} - x = \frac{3}{8}$ **or** $\frac{5}{8} - x = \frac{4}{11}$ **or** $x = 1 - \frac{3}{8} - \frac{4}{11}$ **OR** a suitable pair of probabilities with a common denominator, eg $\frac{56}{88}$ and $\frac{33}{88}$ **or** $\frac{32}{88}$ and $\frac{55}{88}$ **or** $\frac{33}{88}$ and $\frac{32}{88}$	May be seen in a two-way table or probability tree $\frac{23}{88}$ scores P2A0
		A1	cao	

Paper: 1MA1/2H

14	36	P1 P1 P1 A1	for process to find an expression for the area of triangle eg $\frac{1}{2} \times 24 \times AE \times \sin 30$ (= $6AE$) (dep P1) for process to link the area of rectangle with the area of the triangle eg $2 \times \frac{1}{2} \times 24 \times AE \times \sin 30$ (= $12AE$) or for $AB = 12$ (indep) for use of given ratio eg $AE = 3AB$ oe, eg area of rectangle = $AE \times AB = 3x \times x$ cao	Accept any correct expression, eg $\frac{1}{2} \times 24 \times y \times \sin 30$ May be shown on the diagram by labelling AE and AB with, for example, $3x$, x or x, $\frac{1}{3}x$ or $\frac{3}{4}x$, $\frac{1}{4}x$ Do not accept 3, 1 or 1, $\frac{1}{3}$ or $\frac{3}{4}$, $\frac{1}{4}$ for this mark.

Paper: 1MA1/3H

3	18	P1 P1 P1 A1	for 240 ÷ 10 (= 24) **or** 240 ÷ 8 (= 30) for 3 × "24" (= 72) **or** 7 × "24" (= 168) **or** 3 × "30" (= 90) **or** 5 × "30" (= 150) for 3 × "24" (= 72) **and** 3 × "30" (= 90) **or** 7 × "24" (= 168) **and** 5 × "30" (= 150) Cao	Accept 3 + 7 for 10, 3 + 5 for 8

Paper: 1MA1/2H

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

Paper: 1MA1/3H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
24	4 : 3	P1	Process to find a missing vector using the given ratios as fractions, eg. $\frac{1}{3}$ of $\overrightarrow{OX}$ (=$\frac{1}{3}$ **a**) or. $\frac{1}{4}$ of $\overrightarrow{OY}$ (=$\frac{1}{4}$ **b**)	
		P1	for a process to use $\overrightarrow{ZO} = \overrightarrow{YX} = \mathbf{a} - \mathbf{b}$ oe	Might be embedded in their answer for ZP
		P1	for a process to find either $\overrightarrow{ZP}$ or $\overrightarrow{ZR}$ in terms of **a** and **b**, eg. either $\overrightarrow{ZP} = \mathbf{a} - \mathbf{b} + \frac{1}{3}\mathbf{a}$ or $\overrightarrow{ZR} = \mathbf{a} - \mathbf{b} + \frac{1}{4}\mathbf{b}$	The award of this mark implies the first two process marks.
		P1	for a process to write $\overrightarrow{ZP}$ and $\overrightarrow{ZR}$ as multiples of the same vector, eg. multiplying both by 12 to get the ratio, $\frac{4}{3}$(**a** – 0.75**b)** and **a** – 0.75**b** respectively	
		A1	oe	

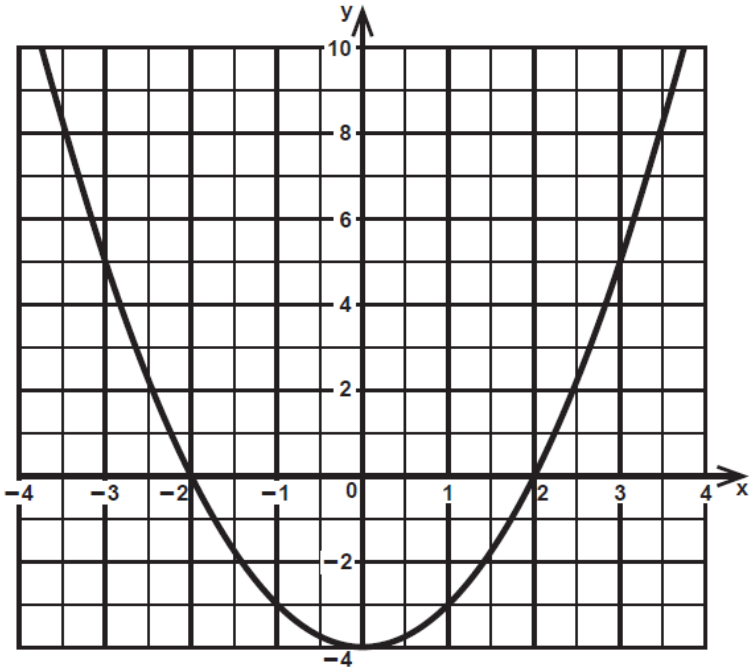
Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 3H

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

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

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
1		MLP only: *x* changed to *y*.	Standard mark scheme but note the letter change.
3		Diagram enlarged. Crosses changed to solid circles. Right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis. Question wording changed to 'Jamie got a mark of 35 in the Science test.'	M1 for for drawing a suitable line of best fit **or** for a line from $x = 35$ to a point at $(35, y)$, y in the range 30 – 45 **or** for a point marked on the grid at $(35, y)$, y in the range 30 – 45 A1 for an answer in the range 30 to 45
4		Frequency column widened.	Standard mark scheme
6		Wording changed to 'The table shows the information on his Sat Nav at 13 30.'	Standard mark scheme
8		Diagram enlarged. Angles moved outside angle arcs and angle arcs made smaller. Wording added 'Two angles are marked 117° and x°'	Standard mark scheme

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
9		Wording added 'It shows triangle A and triangle B on a coordinate grid.' Diagram enlarged. Label removed from inside triangle. Shading removed. Enlargement drawn at (2.5,1), (2.5,6) (5,6) Triangles labelled as 'triangle A' and 'triangle B'. Cross removed from (0,1) on the diagram. Grid cut at 7 on the x axis and 6 on the y axis. Grid cut before the *x* and *y* axes labels. Question wording now 'Describe fully the transformation that maps triangle A onto triangle B.' Three answer lines provided. Braille only: Two labelled shapes, triangle A and triangle B.	Amended mark scheme as follows: B1 for "enlargement scale factor 2.5" B1 for "centre (0,1) Award B0 for any mention of a different transformation.
10	(a)	MLP only: *x* changed to *y*.	Standard mark scheme but note letter change.
11		Diagram enlarged.	Standard mark scheme
12		Diagrams enlarged. Key moved above and to the left of the stem and leaf diagram. Horizontal line added to the base of the stem and leaf diagram. Wording changed to 'Look at Diagram 1 and Diagram 2 for Question 12… Diagram 1 shows a stem and leaf diagram. Diagram 2 shows a grid.' Wording added 'below Diagram 1'. Numbers in the stem and leaf changed (see table below) 17 5 7 9 18 4 5 5 19 0 0 1 3 4 5 8 20 1 3 4 4 5 7 21 2 3 3 5	Amended mark scheme: P1 for correctly identifying one of the LQ (185), median (195) or UQ (205) from the stem leaf M1 for showing a box and at least 3 correctly plotted values from 175, 185, 195, 205, 215 A1 for a fully correct box plot

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
14		Wording added 'shown in the table.'	
17		Question wording 1st line changed to 'It shows the graph of $y = x^2 - 4$' Question demand changed to 'Use the graph to find estimates to the equation $x^2 - 2x - 3 = 0$.' Diagram enlarged and changed (see below). The graph line will go through (-3, 5) and (3,5).  	Mark scheme first P1 now process to rearrange the equation to $x^2 - 4 = 2x - 1$ Otherwise standard mark scheme.
18		Diagram enlarged.	Standard mark scheme
19		Diagram enlarged. Right axis labelled. Axes labels moved to the left of the horizontal axis and above the vertical axis.	Standard mark scheme

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
23		Diagrams enlarged and model and shape may be provided. Sector *OACB* labelled as Diagram 1 and the cone labelled as Diagram 2. Add wording 'Diagram 1 shows a sector *OACB*... Diagram 2 shows a hollow cone…' There may be a model of the hollow cone and a cut out shape of the sector *OACB*. Wording added 'The formulae are shown above Diagram 1 and Diagram 2 in the Diagram Book.' Dashed lines made longer and thicker.	Standard mark scheme
24		Diagram enlarged.	Standard mark scheme

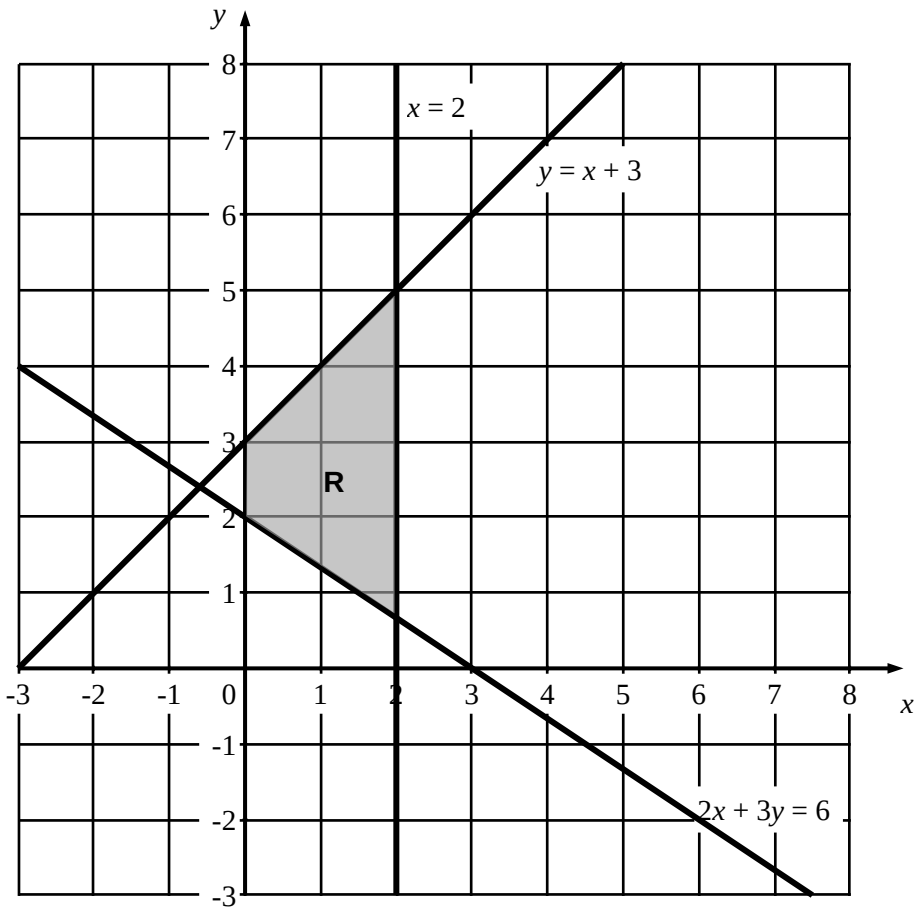
Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
10	6 : 15 : 20	P1	chooses a multiplier to equate the two fractions in terms of b eg $\frac{2}{5}\times\frac{3}{3}\left(=\frac{6}{15}\right)$ **or** $\frac{3}{4}\times\frac{5}{5}\left(=\frac{15}{20}\right)$ **or** lists equivalent fractions to $\frac{2}{5}$ up to at least $\frac{6}{15}$, eg. $\frac{2}{5}, \frac{4}{10}, \frac{6}{15}, ...$ **or** lists equivalent fractions to $\frac{3}{4}$ up to at least $\frac{15}{20}$, eg. $\frac{3}{4}, \frac{6}{8}, \frac{9}{12}, \frac{12}{16}, \frac{15}{20}, ...$ **or** (a : b =) 2 : 5 **and** (b : c =) 3 : 4 **or** for 6 : 15 or 15 : 20 seen	
		P1	puts into related terms ready for ratio eg $\frac{2}{5}\times\frac{3}{3}=\frac{6}{15}$ **and** $\frac{3}{4}\times\frac{5}{5}=\frac{15}{20}$ **or** for (a : b =) 6 : 15 **and** (b : c =) 15 : 20 **or** lists equivalent ratios up to a common element for b, eg a : b = 2 : 5, 4 : 10, 6 : 15 **and** b : c = 3 : 4, 6 : 8, 9 : 12, 12 : 16, 15 : 20	Need not be written in ratio form
		A1	for 6 : 15 : 20 oe	Accept equivalent ratios Accept a =6, b = 15 and c = 20

Paper: 1MA1/1H

21 (a)	3 : 4	P1	for start of process, eg isolate terms in c, eg $4c = 3d$ **or** divide all terms by d, eg $\frac{5c}{d}+1=\frac{c}{d}+4$	
		A1	for 3 : 4	Accept any equivalent ratio or $c = 3$, $d = 4$
(b)	5 : 2	P1	for start of process: to take all terms to one side eg $6x^2 - 7xy - 20y^2 (= 0)$ **or** divide all terms by y^2, eg $\frac{6x^2}{y^2}=\frac{7xy}{y^2}+\frac{20y^2}{y^2}$ **or** substitute a value of x ($x > 0$) or a value of y ($y > 0$) into the equation, eg $x = 5$, $150 = 35y + 20y^2$	
		P1	for second step in process, eg $(2x – 5y)(3x + 4y) (= 0)$ **or** $6p^2 – 7p – 20 (= 0)$ (where $p=\frac{x}{y}$) **or** $20y^2 + 35y - 150 (= 0)$	
		A1	5 : 2	Accept $x = 5$, $y = 2$ or equivalent ratios,eg, $1 : \frac{2}{5}$

Q13(a)

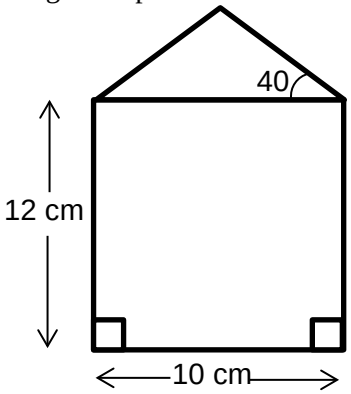


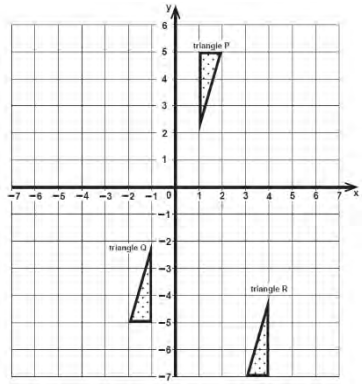
Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 3H

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

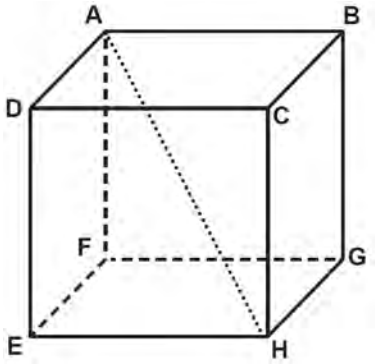
The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
1	(b)	The letter *c* changed to *p*. The letter *d* changed to *q*.	Standard mark scheme but note the change in letters.
5		Wording added 'Look at the diagrams for Question 27 in the Diagram Book.' Diagrams enlarged. Spinner headings moved above the spinners. Spinners straightened, stick replaced with black dot. Wording added 'There are six spaces to fill.'	Standard mark scheme
6	(a)	Wording added 'Look at the diagram for Question 28(a) in the Diagram Book. It shows the graphs of $5x - 9y = -46$ and $y = -2x$' Diagram enlarged and turned landscape. Label '$y = -2x$' moved to the other end of the graph line.	Standard mark scheme
6	(b)	Wording added 'Look at the diagram for Question 28(b) in the Diagram Book. It shows the graph of $y = x^2 - 4x + 2$.' Diagram enlarged. Grid cut at y=8. Small squares removed. Graph line made thicker.	Standard mark scheme but for answers in the ranges 0.5 to 0.7 and 3.3 to 3.5

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
8		Wording added 'Look at the table for Question 8 in the Diagram Book.' Table turned vertical.	Standard mark scheme
9		Wording added 'Look at Diagram 1 and Diagram 2 for Question 9 in the Diagram Book. You may be provided with a model.' Wording 'The diagram shows a prism' removed and replaced by 'Diagram 1 and the model represent a prism.' Wording added 'One angle is marked 40°. The prism has length 20 cm'; 'as shown in Diagram 2'. Diagram enlarged, angle moved outside angle arc and the angle arc made smaller. Diagram 2 provided below Diagram 1 as shown: 	Standard mark scheme

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
11		Shape provided for all candidates. Wording added 'Look at the diagram for Question 11 in the Diagram Book.' The wording 'The diagram shows a…' removed and replaced by 'It shows triangle P, triangle Q and triangle R on a grid'. Wording added 'A cut out shape may be available if you wish to use it.' Triangle Q and triangle R added to the diagram. Diagram enlarged, shading removed and changed to dotty shading. Open headed arrows. Labels added to the diagrams 'triangle P' etc.  The question split into 3 separate parts: (a)(i) Describe fully the single transformation that maps triangle P onto triangle Q. (ii) Describe fully the single transformation that maps triangle Q onto triangle R. (iii) Describe fully the single transformation that maps triangle P onto triangle R.	New mark scheme: (a)(i) B1 for "Rotation 180 about (0,0) [or origin]" (a)(ii) B1 for "Translation of $\begin{pmatrix}5\\-2\end{pmatrix}$" (a)(iii) B1 for "Rotation 180 about (2.5, –1)" (b) B1 for (2.5, –1) ft from rotation stated in (a)(iii)
12		Change *x* to *y*.	Standard mark scheme but note letter change.

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
13	(a)	Grid cut at x=7 and y=7. Diagram enlarged. Wording added "Look at the diagram for Q13(a) in the Diagram Book.'	Standard mark scheme
13	(b)	Wording added 'Look at the diagram for Question 13(b) in the Diagram Book.' Wording 'The diagram below shows…' changed to 'It is a grid showing…'. Diagram enlarged. Shading changed to dotty shading. Right axis labelled.	Standard mark scheme
14		Wording added 'Look at the diagram for Question 14 in the Diagram Book.' Diagram enlarged. Angle labels moved outside angle arcs and the angle arcs made smaller. Wording added 'Angle BDF = 40° Angle DEF = 100°'	Standard mark scheme
16		Wording added 'Look at the diagram for Question 16 in the Diagram Book.' The wording 'Here is a…' removed and replaced by 'It shows a…'. Diagram enlarged. Axis labels moved above the vertical axis and to the left of the horizontal axis. Right axis labelled. Small squares removed. Intermediates added at every 1 m/s. In part (c) box removed from around information.	Standard mark scheme Apply a greater tolerance in reading off and therefore arriving at the answer for part (a).
17		Wording added 'Look at the diagram for Question 17 in the Diagram Book. It shows a histogram.' Axis labels moved above the vertical axis and to the left of the horizontal axis. Right axis labelled. Shading changed to dotty shading. Small squares removed.	Standard mark scheme

PAPER: 1MA1/3H			
Question		**Modification**	**Mark scheme notes**
18		Wording added 'Look at the diagram for Question 18 in the Diagram Book. You may be provided with a model.' Wording 'The diagram shows a cube.' changed to 'The diagram and the model show a cube ABCDEFGH.' A dotty line joining A to H. Diagram enlarged. Model provided with AH joined.  	Standard mark scheme
19		Wording added 'Look at the diagram for Question 19 in the Diagram Book.' Diagram enlarged. Shading removed, ABCDEF shaded instead with dotty shading. Add wording 'ABCDEF is a shaded regular…'. Wording 'shaded' changed to 'unshaded'. 'x' labelled in between AF and FE.	Standard mark scheme
20		Options stacked vertically.	Standard mark scheme
21		Wording added 'Given that'. The letter c changed to p. The letter d changed to q.	Standard mark scheme but note the changes in letters.

5	33	P1 P1 A1	for relating 24 to 8 parts **or** (1 part =) 24 ÷ 8 (= 3) **or** for 15 – 7 (= 8) **or** starts to use a build-up method, eg (8 :) 14 : 30 for 15 – 4 (= 11) **and** 24 ÷ 8 (= 3) **or** 15 × 3 (= 45) **and** 4 × 3 (= 12) **or** for 12 (: 21) : 45 cao	8 parts = 24

Paper: 1MA1/1H

18	17.6	P1 P1 P1 P1 A1	for correct trig statement, eg $\sin 30 = \frac{h}{6}$ for complete process to find h, eg $6 \times \frac{1}{2}$ (= 3) for correct substitution into the area of a trapezium formula, eg $\frac{1}{2}(a+b) \times "3" = 66$ **or** $a + b = 44$ **or** $\frac{1}{2}(2x+3x) \times h = 66$ for complete correct process to find the length of AB, eg $\left[\frac{66 \times 2}{3} \div (2 + "3")\right] \times 2$ cao	An answer of $\frac{88}{5}$ gets P4 A0

Paper: 1MA1/1H

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
19	25 : 36	P1	for $\sqrt[3]{125}$ (= 5) **and** $\sqrt[3]{27}$ (= 3) oe **OR** for correct process to find the radius of A and radius of B (3.10… and 1.86…)	Accept scale factors expressed as fractions or decimals eg 1.66, 1.67, 0.6 or better Ignore units throughout
		P1	for method to find values in ratio of length between *A* and *C* eg 5 **and** 2×3 (= 6) oe **or** "3.10…" **and** "1.86…" × 2 (=3.72…) **OR** 25 **and** 36 **OR** for correct process to find SA of A **and** SA of C (120.(8…)) and (174.(0…))	For both P marks the lengths need not be written as a ratio
		A1	for 25 : 36 oe eg 1: 1.44	

Question	Answer	Mark	Mark scheme	Additional guidance
14	8 : 12 : 9 : 1	P1	for 2 + 3 (= 5) and 9 + 1 (= 10) OR for assigning a total number of sweets for F + G and O + J eg F + G = 100, O + J = 50	May be in algebraic form, eg $2a + 3a$ (= $5a$) and $9a + 1a$ (= $10a$) May be in algebraic form, eg F + G= $5a$, O + J = $2.5a$
		P1	for finding correct multiplier for relationship between totals for F + G and O + J eg × 4 to get from 5, 10 to 20, 10 OR for working out the number of sweets from their totals for F, G eg 40, 60 or for O, J, eg 45, 5	
		P1	for 2 × 4 (= 8) and 3 × 4 (= 12) OR for ratio in unsimplified form, eg 40 : 60 : 45 : 5	
		A1	cao	

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

Paper: 1MA1/1H

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
15 (a)	$\overrightarrow{AC} = 5\overrightarrow{AB}$ and reason	M1	for $\overrightarrow{AC} = 5(3\mathbf{a} + 4\mathbf{b})$ **or** $\overrightarrow{BC} = 4(3\mathbf{a} + 4\mathbf{b})$ or indicates that $15\mathbf{a} + 20\mathbf{b} = 5 \times (3\mathbf{a} + 4\mathbf{b})$	
		C1	for $\overrightarrow{AC} = 5\overrightarrow{AB}$ or $\overrightarrow{AC} = 5(3\mathbf{a} + 4\mathbf{b})$ or $15\mathbf{a} + 20\mathbf{b} = 5(3\mathbf{a} + 4\mathbf{b})$ **and** a correct reason, eg *AC* is a multiple of *AB* / multiples of each other / *AB* is a factor of *AC* **or** they have the same gradient / are parallel / go in the same direction **or** they have a point in common / both start at *A* **or** *AC* is an enlargement of *AB*	Do not award this mark if any incorrect working seen Could use *AB* and *BC* or *AC* and *BC*
(b)	5 : 2	P1	for ($\overrightarrow{DF}$ =) $3\mathbf{e} + 6\mathbf{f} + (-10.5\mathbf{e} - 21\mathbf{f})$ $(= -7.5\mathbf{e} - 15\mathbf{f})$ **or** for a multiplicative relationship for $\overrightarrow{DE}$ and $\overrightarrow{EF}$ eg $\overrightarrow{EF} = -3.5\overrightarrow{DE}$ or for (*DE* : *EF* =) 1 : –3.5 oe	
		P1	for a multiplicative relationship for $\overrightarrow{DF}$ and $\overrightarrow{DE}$ eg $\overrightarrow{DF} = -2.5\overrightarrow{DE}$ **or** for (*DF* : *DE* =) –5 : 2 oe eg –2.5 : 1 or –7.5 : 3 **or** for answer of 2 : 5 oe	
		A1	oe eg 2.5 : 1	

Paper: 1MA1/1H

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
15	(M) 18, (K) 15	P1	for start of process, eg $(6x + 1.5)$ **and** $(5x + 1.5)$ **or** $(6x + 1.5)$ **and** $(11x + 3)$ **or** $a + 1.5$ **and** $b + 1.5$ **OR** starts to work with ratio, eg 6 : 5 = 12 : 10	
		P1	for setting up an equation, eg $\frac{6x+1.5}{5x+1.5}=\frac{13}{11}$ **or** $66x + 16.5 = 65x + 19.5$ **or** $\frac{6x+1.5}{11x+3}=\frac{13}{24}$ **or** $144x + 36 = 143x + 39$ **or** $\frac{a}{b}=\frac{6}{5}$ **and** $\frac{a+1.5}{b+1.5}=\frac{13}{11}$ **or** $5a = 6b$ **and** $11a + 16.5 = 13b + 19.5$ oe **OR** for comparing 12 : 10 to 13 : 11 **and** deducing 1 part = 1.5	
		P1	for isolating in terms of x, eg $66x – 65x = 19.5 – 16.5$ **or** $144x – 143x = 39 – 36$ **or** $x = 3$ **or** for eliminating a or b, eg $55a = 66b$ **and** so $66b = 65b + 15$ **OR** for process to find values for M **and** K, eg 12×1.5 **and** 10×1.5	
		A1	cao	

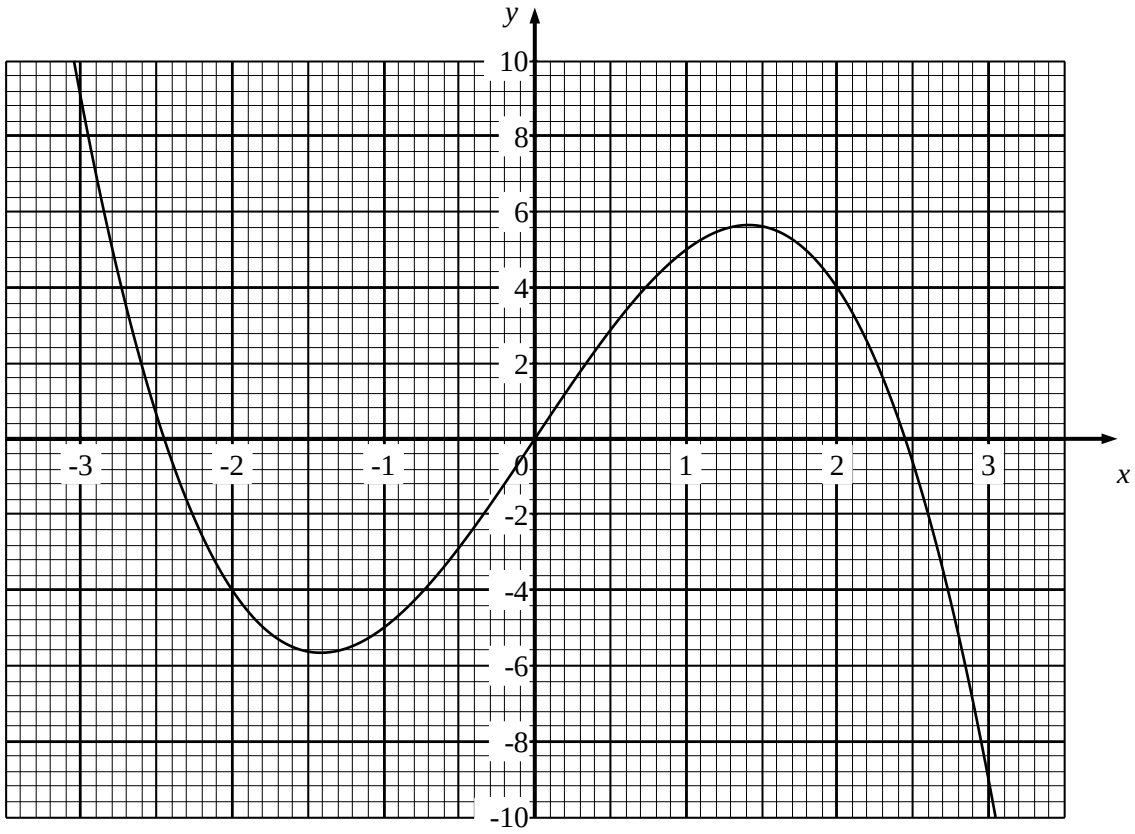
Paper: 1MA1/2H

18	30.6	P1	for process to find *TC*, eg. (*TC* =) $14 \times \frac{3}{3+4}$ (= 6)	Lengths of *TC*, *TD*, *SD* may be seen on the diagram
		P1	for process to find *TD*, eg. (*TD* =) $\sqrt{14^2 + "6"^2}$ or $\sqrt{232}$ or $2\sqrt{58}$ (= 15.2…)	
		P1	for process to find *SD,* using area of a trapezium, 147 = 0.5 × (*SD* + 12) × 14, or *SD*= 9	
		P1	for $\tan^{-1}\left(\frac{"9"}{"15.2..."}\right)$	A complete set of processes to find the angle is needed where an alternative route is involved with more than one stage in the working
		A1	for answer in the range 30.4 to 30.7	If an answer is given in the range in working and then rounded incorrectly award full marks.

Paper: 1MA1/3H

24	(a)	1 : 4	P1	for process to equate the two volumes, $\frac{4}{3}\pi r^3 = \frac{1}{3}\pi r^2 h$	
			A1	cao	
	(b)	$1 : \sqrt{8}$	P1	for process to equate surface areas, eg $4\pi r^2 = \pi r^2 + \pi r l$	Can be implied by $3r = l$
			P1	for process to substitute $l = \sqrt{h^2 + r^2}$, eg $4\pi r^2 = \pi r^2 + \pi r\sqrt{h^2 + r^2}$	
			P1	for process to isolate term in r^2 after substituting for l, eg $8r^2 = h^2$	
			A1	for $1 : \sqrt{8}$	

Question 9(b)



Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 1H

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme. Notes apply to both MLP papers and Braille papers unless otherwise stated.

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

PAPER: 1MA1_1H			
Question		**Modification**	**Mark scheme notes**
5		Wording added 'Look at the table for Question 5 in the Diagram Booklet.' Wording added 'in the Diagram Booklet'. Table enlarged.	Standard mark scheme
6	(a)	Text left aligned. Values changed: *a* to *p*; *b* to *q*; *c* to *r*	Standard mark scheme but note change of letter
6	(b)	Text left aligned. Values changed: *m* to *w*; *n* to *x*; *p* to *y*	Standard mark scheme but note change of letter
7		Wording added 'Look at Diagram 1 and Diagram 2 for Question 7 in the Diagram Booklet. You may be provided with a model. It is not accurate.' Wording added 'Diagram 1 and the model show'. Wording added 'that'. Diagram enlarged. Base view added with measurements. Wording added 'Diagram 2 shows the base view.' Frame removed from formula and moved above the diagram to the left	Standard mark scheme
9	(a)	Wording added 'below'. Wording added 'There are four spaces to fill.' Table turned vertical and enlarged.	Standard mark scheme
9	(b)	Wording added 'Look at the diagram for Question 9(b) in the Diagram Booklet.' Wording added 'in the Diagram Booklet'. Diagram enlarged. Axes labels moved above the vertical axis and right on the horizontal axis. Open headed arrows. Black grid lines. Small squares removed.	Standard mark scheme
10		Wording added 'Look at the diagram and table for Question 10 in the Diagram Booklet.' The word 'a' removed and replaced with 'the'. Wording added 'in the Diagram Booklet'. Diagram enlarged. Spinner straightened and spike removed. Dot added to the centre. Table turned vertical and enlarged. The wording 'Here are her results' removed and replaced with 'Her results are shown in the table in the Diagram Booklet.'	Standard mark scheme
11		Wording added 'Look at the diagram for Question 11 in the Diagram Booklet. It shows Shape P and Shape Q.' Labels moved above the shapes. Shapes relabelled as 'Shape P' and 'Shape Q'. Wording added 'in the Diagram Booklet'. Diagram enlarged. Shading changed. Axes labels moved above the vertical axis and right on the horizontal axis. Open headed arrows. Black grid lines.	Standard mark scheme
13		Wording added 'Look at the table for Question 13 in the Diagram Booklet.' Wording added 'There are three spaces to fill.' Table turned vertical and enlarged.	Standard mark scheme

PAPER: 1MA1_1H			
Question		**Modification**	**Mark scheme notes**
14		Wording added ‘Look at the diagram for Question 14 in the Diagram Booklet. It shows a grid.’ Wording added ‘in the Diagram Booklet’. Diagram enlarged. Axes labels moved above the vertical axis and left on the horizontal axis.	Standard mark scheme
15		Wording added ‘Look at the diagram for Question 15 in the Diagram Booklet.’ Diagram enlarged. Angle moved outside the angle arc. Angle arc made smaller.	Standard mark scheme
18		Wording added ‘Look at the diagram for Question 18 in the Diagram Booklet. It shows a circle with centre O’ Diagram enlarged. Angle moved outside the angle arc. Angle arc made smaller. The wording ‘a circle, centre O.’ removed and replaced with ‘the circle.’ Wording added ‘The lines AB, OB and OA form the triangle AOB.’ The word ‘point’ added. Dot at O enlarged.	Standard mark scheme
21		Wording added ‘Look at the diagram for Question 21 in the Diagram Booklet. It shows’ The wording ‘The diagram’ removed. Diagram enlarged. Axes labels moved above the vertical axis and right on the horizontal axis. Open headed arrows. Change cross to solid dot.	Standard mark scheme
22		Wording added ‘Look at the diagram for Question 22 in the Diagram Booklet.’ The wording ‘Here is’ removed and replaced with ‘It shows’. Diagram enlarged. Angle moved outside the angle arc. Angle arc made smaller. Wording added: ‘AC = 6.5cm’; ‘BC = 10.7 cm’; ‘Angle BAC = 30º'	Standard mark scheme

PAPER: 1MA1_1H			
Question		**Modification**	**Mark scheme notes**
24	(a)	Wording added 'Look at Diagram 1, Diagram 2, Diagram 3, Diagram 4 and Diagram 5 for Question 24(a) in the Diagram Booklet. You may be provided with models. They are not accurate.' Diagrams enlarged and added for 2D representation of sphere, cone side and cone base. The wording 'Here is a solid sphere and a solid cone' removed and replaced with 'Diagram 1 and model 1 show a solid sphere. Diagram 2 shows a 2D representation of the sphere. Diagram 3 and Model 2 show a solid cone. Diagram 4 shows a 2D representation of the cone. Diagram 5 shows the base of the cone.' Wording added 'radius of the sphere = radius of the base of the cone = r'. Wording added 'vertical height of the cone = h'; Wording added 'Volume of sphere = $\frac{4}{3}\Pi r^3$' Wording added 'Volume of cone = $\frac{1}{3}\Pi r^2 h$' Dashed lines made longer and thicker. Diagram headings moved above the diagrams. Labels moved to the left side. Models provided.	Standard mark scheme
24	(b)	Wording added 'Look at Diagram 1, Diagram 2, Diagram 3, Diagram 4 and Diagram 5 for Question 24(b) in the Diagram Booklet. You may be provided with models. They are not accurate. They show a different solid sphere and solid cone.' The wording 'Here is a different solid sphere and a different solid cone.' Removed. Diagrams enlarged and added for 2D representation of sphere, cone side view and cone base' Wording added 'Diagram 1 and model 1 show a solid sphere. Diagram 2 shows a 2D representation of the sphere. Diagram 3 and Model 2 show a solid cone. Diagram 4 shows a 2D representation of the cone. Diagram 5 shows the base of the cone.' Wording added 'radius of the sphere = radius of the base of the cone = r'. Wording added 'slant height of the cone = l'; 'Surface area of sphere = $4\Pi r^2$' Wording added 'Curved area of cone = Πrl' Dashed lines made longer and thicker. Diagram headings moved above the diagrams. Labels moved to the left side. Models provided.	Standard mark scheme

2	Description	C1	Identifies a mistake in the working **Acceptable examples** Rob should divide by 8 He should have added the 3 and 5 first He divided 120 by 3 and 5 instead of 8 He did not do it as $120 \times \frac{3}{8}$ and $120 \times \frac{5}{8}$ He did not add the two ratios first **Not acceptable examples** He has done it in two parts but he should do it in one The answer should be 45 : 75 They do not add up to 120 He is supposed to add his numbers 40 + 24 does not equal 120	

Question	Answer	Mark	Mark scheme	Additional guidance
4	Yes (supported)	P1	for a process to find the volume of 1 tank eg $\pi \times 40^2 \times 160$ (= 804247.7… or 804.2...or 256000π)	Values can be truncated or rounded
		P1	for complete process to find the volume of 4 tanks, [volume of tank] × 4 eg $\pi \times 40^2 \times 160 \times 4$ (= 3216990.8… or 3216.9... or 1024000π) **or** for process to find volume of fertiliser available per tank eg $32 \times 1000 \div 4$ (= 8000)	For this mark, [volume of tank] must come from a calculation involving π, r^2, h
		P1	for a process to find the volume of fertiliser needed for 1 tank eg [volume of tank] ÷ 101 (= 7962.8...) or 4 tanks (= 31851.3…) **OR** for a process to find volume of mixture that 32 litres of fertiliser will make eg 32000 × 101 (= 3232000) or 32 × 101 (= 3232)	For this mark, [volume of tank] must come from a calculation involving π, r^2, h or be stated as their volume.
		C1	for Yes supported by correct figures shown eg a comparable figure in the range 31.8 to 31.9 (litres) **or** in the range 31800 to 31900 with 32000 (cm^3) **or** in the range 3216 to 3217 with 3232 (litres) **or** in the range 3216000 to 3217000 with 3232000 (cm^3) **or** in the range 7958 to 7963 with 8000 (cm^3)	There are other possible pairs of values which can be used in the comparison

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

Paper: 1MA1/3H

19	16	P1	for Prob(R or G) = 1 – 0.4 (= 0.6) or for (number of red or green counters) = 50 – 0.4 × 50 (= 30) or for use of ratio, eg [probability] × $\frac{8}{15}$ (= 0.32) or [number of counters] × $\frac{8}{15}$	[probability] may be 0.4 or 0.6 [number of counters] may be 20 or 50
		P1	for a complete process to find number of green counters, eg $(1 - 0.4) \times \frac{8}{15} \times 50$ or for $\frac{16}{50}$	
		A1	cao	

3	No with reason	C1	for No and valid reason, eg compares $\frac{1}{3}$ with $\frac{1}{2}$ or 16 (with 24) **Acceptable examples** No, $\frac{1}{3}$ are red not $\frac{1}{2}$ There are 16 red counters (not 24) No as she has used the ratio 1:1 (not 1:2) Incorrect as it is 16 : 32 No as she should divide by 3 (as 1 + 2 = 3) No as they would both be 24 so it doesn't fit in the ratio 1 : 2 No because 24 + 48 = 72 **Not acceptable examples** Yes, … No as the number of red counters would be lower There is 1 red for every 2 blue	

Paper: 1MA1/2H

18	Shown	M1	for start to method to find a ratio connecting 2 of a, b and c, eg $a : c = 3 : 5$ oe or $b : c = 5 : 3$ oe **or** for start to method to combine ratios, eg $14a : 35c$ (= 126 : 525) **and** $20b : 35c$ (= 500 : 525)	May be expressed in fractional form Any ratios must be clearly assigned to variables
		M1	for method to find $a : b : c$, eg 9 : 25 :15 oe **or** for method to write $a + b : b + c$ in terms of one variable eg $\frac{3c}{5} + \frac{5c}{3} : \frac{5c}{3} + c$	
		A1	for $a + b : b + c = 34 : 40$ oe leading to result	34: 40 may be seen as $9+ 25 : 25+ 15$

23	Shown	M1 M1 C1	for start to process using ratio, eg 1 : 1 + 2 : 1 + 2 + 3 (= 1 : 3 : 6) for process to write down ratio of areas of triangles eg $1^2 : 3^2 : 6^2$ (= 1 : 9 : 36) for correct working leading to answer, eg 1 : 9 – 1 : 36 – 9 = 1 : 8 : 27	Values may not be seen in a ratio, can still award M marks May be seen combined with algebra

Paper: 1MA1/2H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
24	$\frac{5x^2-23x+50}{9x^2-3x}$	P1	for using $y = 3x$ or $x = \frac{1}{3}y$ to obtain an expression for a probability in one variable	This may be awarded at any time
		P1	for a correct second probability eg $\frac{x-1}{y-1}$ or $\frac{x-1}{3x-1}$ or $\frac{4}{y-1}$ or $\frac{4}{3x-1}$ or $\frac{y-x-6}{y-1}$ or $\frac{2x-6}{3x-1}$	
		P1	for forming a correct product eg $\frac{x}{y} \times \frac{x-1}{y-1}$ or $\frac{x}{3x} \times \frac{x-1}{3x-1}$ or $\frac{5}{y} \times \frac{4}{y-1}$ or $\frac{5}{3x} \times \frac{4}{3x-1}$ or $\frac{y-x-5}{y} \times \frac{y-x-6}{y-1}$ or $\frac{2x-5}{3x} \times \frac{2x-6}{3x-1}$	
		P1	for adding the 3 correct probabilities eg $\frac{x}{y} \times \frac{x-1}{y-1} + \frac{5}{y} \times \frac{4}{y-1} + \frac{y-x-5}{y} \times \frac{y-x-6}{y-1}$ or $\frac{x}{3x} \times \frac{x-1}{3x-1} + \frac{5}{3x} \times \frac{4}{3x-1} + \frac{2x-5}{3x} \times \frac{2x-6}{3x-1}$	Can be seen after processing of algebra
		A1	$\frac{5x^2-23x+50}{9x^2-3x}$	

Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 3H

Only mark scheme amendments are shown where the enlargement or modification of the paper requires a change in the mark scheme. Notes apply to both MLP papers and Braille papers unless otherwise stated.

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

PAPER: 1MA1_3H			
Question		**Modification**	**Mark scheme notes**
1	(b)	Letter 'x' changed to 'y'.	Standard mark scheme but note change of letter.
2	(a)	Letter 'g' at end of answer line changed to 'grams'	Standard mark scheme
3		Wording added 'Look at the diagram for Question 3 in the Diagram Booklet. It shows triangle AGF and two straight lines ACF and ADG.' Wording removed 'ACF and ADG are straight lines.' Wording added 'Angle CDG = 110°; Angle EFC = 125°' Diagram enlarged. Angles moved outside of angle arcs. Angle arcs made smaller.	Standard mark scheme
5	(b)	Wording added 'Remember: A = $2^2 \times 3^4 \times 7$ B = $3^2 \times 7^2$'	Standard mark scheme
7		Wording added 'Look at the diagram for Question 7 in the Diagram Booklet. It shows'. Wording 'Here is' removed. Diagram enlarged. Axes labels moved to above the vertical axes and right of the horizontal axes.	Standard mark scheme
8		Letter 'g' at end of answer line changed to 'grams'	Standard mark scheme

10		Wording added 'Look at the diagram for Question 10 in the Diagram Booklet. It shows a triangle ABD.' Wording removed 'ABD is a triangle.' Diagram enlarged. Angles moved out of angle arcs. Angle arcs made smaller. Right angles made more obvious. Wording added 'AB = 6.8 cm; Angle ABC = 41°; Angle ADC = 55° ' Wording added: Angle ACB and angle ACD are right angles.	Standard mark scheme
11		Wording added 'below'. Table enlarged and left aligned. Values changed in the table, so values can be plotted on the modified grid. 169 cm changed to 170 cm; 186 cm changed to 185 cm; 177 cm changed to 177.5 cm, 174 cm changed to 175 cm	
11	(a)	Wording added 'Look at the diagram for Question 11(a) in the Diagram Booklet. It shows a grid.' Diagram enlarged, no small squares. Open headed arrow. Axis label moved to the left of the horizontal axis.	Standard mark scheme but using the key values: 170, 175, 177.5, 180, 185
11	(b)	Wording added 'Look at the diagram for Question 11(b) in the Diagram Booklet. It is a box plot showing the distribution of the heights of a group of teenagers.' Wording removed 'below'. Diagram enlarged. Small squares removed. Open headed arrow. Axis label moved to the left of the horizontal axis. Box plot changed so values can be read on the modified grid: Key values now at 157.5, 165, 167.5, 172.5, 177.5	Standard mark scheme but using the new key values: Median Range IQR Adults 177.5 15 5 Teenagers 167.5 20 7.5
14		Wording added 'Look at the diagram for Question 14 in the Diagram Booklet.' Diagram enlarged. Angles moved out of angle arcs. Angle arcs made smaller. Wording added 'BA = 9 cm; AO = 6 cm; Angle BAO = 35°; Angle BOC = 80	Standard mark scheme
15	(a)	Letter 'a' changed to 'x'; Letter 'b' changed to 'y'.	Standard mark scheme but note change of letter.

16		Wording added 'Look at the diagram for Question 16 in the Diagram Booklet. It shows triangle T and triangle U on a grid.' Diagram enlarged. Open headed arrows. Axes labels moved to above the vertical axes and right of the horizontal axes. Triangle U added on the grid. Shapes labelled as 'triangle T' and 'triangle U'. Shading changed. Question changed. Wording removed 'On the grid, enlarge triangle T by scale factor -2 with centre of enlargement (-2,-2)' Wording added 'Describe fully the single transformation that maps triangle T onto triangle U.'	B2 for enlargement scale factor −2 centre (−2, −2) (B1 for two of these three aspects) Award no marks if more than one transformation is given.
17		Wording removed 'Here is'. Wording added 'Look at the diagram for Question 17 in the Diagram Booklet. It shows'. Diagram enlarged. Open headed arrows. Right axis labelled. Small squares removed.	Standard mark scheme
18		Wording added 'Look at Diagram 1, Diagram 2 and the formula for Question 18 in the Diagram Booklet. You may be provided with two models for this question and an additional formula model. They show a cone and a frustum.' Wording removed 'in the diagram.' Wording added 'by Diagram 1 and the models. Diagram 2 is a simplified 2D diagram of the frustum.' Formula diagram enlarged and a formula model provided. Wording added to the formula 'You may be provided with a model.' 3D frustum diagram enlarged. Dashed lines made longer and thicker. Open headed arrows. 2D diagram added. Model of frustum provided. Braille additional wording: Ask for the model for Question 18. The model is a large cone made from a small cone and a frustum. The small cone is detachable from the frustum. On the model: the slant height of the small cone is 6 cm; the slant height of the large cone is 10 cm the slant height of the frustum is 4 cm; the radius of the base of the large cone is 3 cm."	Standard mark scheme

19		Wording added 'Look at the diagram for Question 19 in the Diagram Booklet. It shows a graph.' '$0 \leq x \leq 4$' changed to '$0 \leq x \leq 2$' Wording added 'in the Diagram Booklet' Diagram enlarged but produced only in the range $0 \leq x \leq 2$.. Small squares removed. Right axis labelled. y axis cut at 10; x axis cut at 2. Axes labels moved to above the vertical axes and right of the horizontal axes.	Standard mark scheme
21		Letter 'x' changed to 'y'.	Standard mark scheme but note change of letter.

Question	Answer	Mark	Mark scheme	Additional guidance
6	144	P1	for using the ratio, eg $x = 2y$ **or** $2y + 2y + y$ (= 180) **or** 2 + 2 + 1 (= 5 (parts))	The first two marks may be awarded in either order
		P1	for using angle facts to give an equation, eg $x + x + y = 180$ **or** $2y + 2y + y = 180$ **or** $y + w = 180$ **or** $5x \div 2 = 180$ oe **or** $w = 2x$ **or** for $180 \div 5$ (= 36)	Award P2 for $x = 72$ or $y = 36$
		P1	for a complete process, eg $180 - (180 \div 5)$	
		A1	cao	

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
13	187.5	M1	for $\left(\frac{5}{2}\right)^3$ or $\left(\frac{2}{5}\right)^3$ or 2.5^3 or $\left(\frac{1}{2.5}\right)^3$ or $2^3 : 5^3$	
		M1	for a complete method, eg $12 \div 8 \times 125$ or 12×2.5^3	
		A1	oe	Accept $\frac{375}{2}$

5	21	P1 P1 P1 A1	for process to work correctly with initial ratio, eg 120 ÷ 4 × 9 (= 270) **or** 90 + 120 + 60 (= 270) for process to find the value of 1 part in the new ratio, eg "270" ÷ (2 + 5 + 3) (= 27) for complete process to find both values for Errol, eg "27" × 3 (= 81) **and** 120 ÷ 4 × 2 (= 60) cao	Can be implied by 90 : 120 : 60 or by a second ratio that totals 270

23	3 : 5	P1 P1 P1 A1	for process to eliminate fractions, eg $11(2x^2 + y^2) = 43(4x^2 - y^2)$ **or** $22x^2 + 11y^2 = 172x^2 - 43y^2$ for process to isolate terms in x^2 and y^2, eg $54y^2 = 150x^2$ **or** $y^2 = \frac{25x^2}{9}$ for full process to find a correct relationship between x and y eg $y = \frac{5x}{3}$ oe cao	Alternative methods are acceptable Accept square roots, eg $\sqrt{54}$ but not decimal approximations.

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
19	2 : 5	P1	for using similar triangles to form an equation eg $\frac{AB}{BC}=\frac{AD}{AB}$ oe or $\frac{AB}{4}=\frac{25}{AB}$ oe or $\frac{AB}{4k}=\frac{25k}{AB}$ oe or $AB:4=25:AB$ oe or $BC\times\text{sf}=BD\div\text{sf}$ oe or $4\times\text{sf}=25\div\text{sf}$ oe **or** for working with the perpendicular height of triangle ABC eg $(h^2=)\ 25^2-23^2\ (=96)$ or $(h=)\ \sqrt{25^2-23^2}\ (=\sqrt{96})$	May use x or any other letter for AB Accept $AB = 4 \times \text{sf}$, $AB = 25 \div \text{sf}$
		P1	for process to find AB eg $(AB=)\ \sqrt{4\times25}\ (=10)$ oe or $\sqrt{"96"+2^2}\ (=10)$ **or** for process to find the scale factor eg $\sqrt{\frac{25}{4}}\ (=\frac{5}{2}\text{ oe})$	
		A1	oe	

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

Paper: 1MA1/2H

Paper: 1MA1/3H

Question	Answer	Mark	Mark scheme	Additional guidance
10	Result shown	M1	for method to find the number of yellow counters in bag **A**, eg $x \div 3 \times 5$ $(= \frac{5x}{3})$ or for method to find the total number of counters in bag **A** eg $x \div 3 \times 8$ $(= \frac{8x}{3})$ or for starting to work with ratio using algebra eg $3y$, $5y$	Could use any letter other than y apart from x
		M1	(dep) for method to find the total number of counters in bag **B**, eg $(x + \text{“}\frac{5x}{3}\text{”}) \div 2$ $(= \frac{4x}{3})$ or $\text{“}\frac{8x}{3}\text{”} \div 2$ $(= \frac{4x}{3})$ or $(3y + 5y) \div 2$ $(= 4y)$	For the method marks condone decimals that are rounded or truncated to 1dp
		C1	for complete method showing that total number of counters in bag **A** and bag **B** is $4x$, eg $\frac{8x}{3} + \frac{4x}{3} = 4x$ or $3y + 5y + 4y = 12y$ **and** $12y \div 3y \times x = 4x$	For the C mark only accept values that are shown to be recurring and allow $3.\dot{9}x = 4x$

Paper: 1MA1/3H

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

Paper: 1MA1/1H

15	4 : 1	P1	for $\overrightarrow{OM}=\frac{1}{4}\mathbf{a}$ or $\overrightarrow{MO}=-\frac{1}{4}\mathbf{a}$ or $\overrightarrow{ON}=\frac{1}{3}\mathbf{b}$ or $\overrightarrow{NO}=-\frac{1}{3}\mathbf{b}$ $\overrightarrow{OX}=\mathbf{a}-\mathbf{b}$ or $\overrightarrow{XO}=-\mathbf{a}+\mathbf{b}$ or $\overrightarrow{ZY}=\mathbf{a}-\mathbf{b}$ or $\overrightarrow{YZ}=-\mathbf{a}+\mathbf{b}$	
		P1	for $\overrightarrow{XN}=\mathbf{b}-\mathbf{a}+\frac{1}{3}\mathbf{b}$ **(=** $\frac{4}{3}\mathbf{b}-\mathbf{a}$ **)** oe **or** $\overrightarrow{MN}=\frac{1}{3}\mathbf{b}-\frac{1}{4}\mathbf{a}$ oe **or** $\overrightarrow{XM}=\mathbf{b}-\mathbf{a}+\frac{1}{4}\mathbf{a}$ (= $\mathbf{b}-\frac{3}{4}\mathbf{a}$) oe	Implies 1st P1
		P1	for $\overrightarrow{XN}=\mathbf{b}-\mathbf{a}+\frac{1}{3}\mathbf{b}$ oe **and** $\overrightarrow{MN}=\frac{1}{3}\mathbf{b}-\frac{1}{4}\mathbf{a}$ or $\frac{4}{3}\mathbf{b}-\mathbf{a}-\mathbf{b}+\frac{3}{4}\mathbf{a}$ oe	
		A1	for 4 : 1 oe	A correct answer with no supportive working gets 0 marks

Paper: 1MA1/1H

Question	Answer	Mark	Mark scheme	Additional guidance
20	10.8	P1	for process to find FC, eg $\tan 52 = \frac{8}{FC}$ $(FC = 6.25(028..))$	
		P1	for process that will lead to side length of ABC, eg $\sin 60 = \frac{"6.25" \times 1.5}{BC}$ **or** $\cos 30 = \frac{"6.25" \times 1.5}{BC}$ **or** $("6.25" \times 1.5)^2 + (0.5x)^2 = x^2$ oe	
		A1	for answer in range 10.8 to 10.83	

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
2	1380 2070 3450	M1	for beginning to work with ratio, eg 6900 ÷ (2 + 3 + 5) (= 690) **or** 6900 ÷ 2 (= 3450) **or** 6900 ÷ 5 (= 1380) **or** one accurate value correctly assigned	Award M0 for a correct value assigned to an incorrect person
		M1	for full method to find the value for two people, eg two of: "690" × 2 (= 1380) **or** "690" × 3 (= 2070) **or** "690" ×5 (= 3450) **or** (6900 – "3450") ÷ 5 × 2 (= 1380) **or** (6900 – "3450") ÷ 5 × 3 (= 2070) **or** (6900 – "1380") ÷ 8 × 3 (= 2070) **or** (6900 – "1380") ÷ 8 × 5 (= 3450) **or** 6900 ÷ 2 (= 3450) **and** 6900 ÷ 5 (= 1380)	Award M0 for a correct value assigned to an incorrect person
		A1	for Sid (£) 1380 Tam (£) 2070 Musa (£) 3450 If M1M0, award SCB2 for Sid (£) 3450 Tam (£) 2070 Musa (£) 1380	Correct values not assigned or assigned to an incorrect person, coming from an incorrect method, eg (Sid =) 6900 ÷ 2 =3450 **and** (Tam =) 6900 ÷ 3 =2300 **and** (Musa =) 6900 ÷ 5 =1380 will score no marks

Paper: 1MA1/2H

Question	Answer	Mark	Mark scheme	Additional guidance
20	Shown	M1	for the method to find a coordinate of the point D eg $\frac{1}{1+3}\times 16\ (=4)$ **or** $\frac{3}{1+3}\times 8\ (=6)$ **or** (4, 6) labelled	First two marks may be seen in either order Accept 4 or 6 stated or (6, 4)
		M1	for a correct form for **L**, eg $y=\sqrt{3}x+c$ **OR** a correct equation for the gradient of **L**, eg $\frac{[6]-f}{[4]--2}=\sqrt{3}$	Condone incorrect value for c when awarding this mark
		M1	for correct substitution to find c eg $[6]=\sqrt{3}\times[4]+c$ **or** $y-[6]=\sqrt{3}(x-[4])$ **or** $c=[6]-[4]\sqrt{3}\ (=-0.928...)$ **OR** starts to rearrange equation for gradient, eg $[6]-f=([4]--2)\sqrt{3}$	[4] must be clearly identified as the x-coordinate of D if incorrect Award of this mark implies the previous mark [6] must be clearly identified as the y-coordinate of D if incorrect
		M1	(dep on previous M1)for the method to substitute in –2, eg $\sqrt{3}\times(-2)+[6]-\sqrt{3}\times[4]$ **or** $\sqrt{3}\times(-2)+[c]$ **OR** a correct unevaluated expression for f, eg $f=[6]-([4]--2)\sqrt{3}$	[c] must be clearly what they have found to be the y-intercept of **L and** must have come from correct processes to evaluate
		C1	accurate figure eg $f=$ –4.39... **or** –4.39... < –4	–4.39... must come from correct working Accept −4.4 or better

Paper: 1MA1/2H

GCSE

Edexcel GCSE

Mathematics A 1387

Summer 2005
Mark scheme

Edexcel GCSE
Mathematics A 1387

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NOTES ON MARKING PRINCIPLES

1 Types of mark

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

2 Abbreviations

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

3 No working

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

4 With working

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

5 Follow through marks

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

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

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

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

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

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

Paper 5521/01

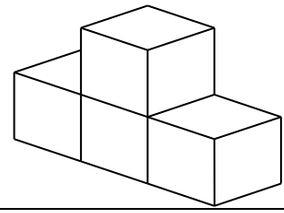
No	Working	Answer	Mark	Notes
4	286 × 43 = 11440 + 12298 = 12298 43 × 286 = 258 + 3440 + 8600 = 12298 286×40=1140 286×3=858 1140+858=12298 x | 40 | 3 | 200 | 8000 | 600 | 8600 80 | 3200 | 240 | 3440 6 | 240 | 18 | 258 | | | 12298 2 8 6 1 | 0 8 | 3 2 | 2 4 | 4 2 | 0 6 | 2 4 | 1 8 | 3 2 9 8	12298	3	M2 for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

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

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

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

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

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

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

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

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

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

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

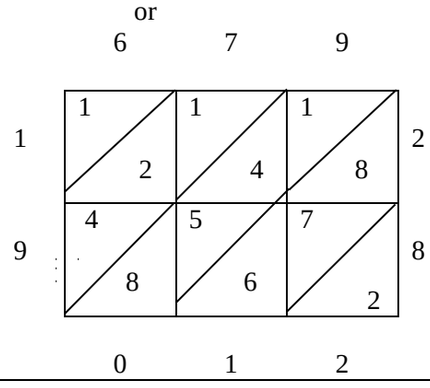
Paper 5521/02					
No		**Working**	**Answer**	**Mark**	**Notes**
10	(a)		1.5 – 2.0	1	B1 for height between 1.5m – 2.0m inclusive
	(b)	Height of man × "2.5"	3 – 6	3	B3 for height between 3m – 6m inclusive (B2 for multiplying (a) by a number between 2 and 3 inclusive) (B1 for multiplying (a) by a number)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

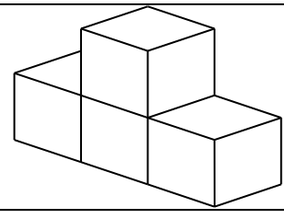
Paper 5521/02					
No		Working	Answer	Mark	Notes
19	(a)		Correct plane	2	B2 for a correct plane defined by showing at least 2 lines. (B1 for a line of symmetry on one face)
	(b)		Correct net	2	B2 cao (B1 for 2 equilateral triangles joined appropriately to at least one rectangle or for 1 equilateral triangle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

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

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

Paper 5523/03					
No		Working	Answer	Mark	Notes
5	(a)	$4\times3-2\times1$ $12-2$	10	3	M1 for 3×4 (=12) or 1×2 or attempt to divide diagram up into rectangles M1 "12" – "2" A1 cao
	(b)(i)	$\frac{10}{100}\times680$ or $680\div10$ 680 + 68	748	5	M1 $\frac{10}{100}\times680$ or $680\div10$ or 68 seen M1 (dep) 680 +"68" (or M2 for 680×1.10) A1 cao
	(ii)	"748" ÷ 50 or 14.96	15		M1 for "748" $\div50$ or 14.96; accept "748" rounded up or down to next 50 followed by $\div50$ A1 ft from (b)(i) rounded up SC B1 for 680 (seen) leading to 14
6	(a)	$2\times5+5\times-3=10-15=$	-5	2	M1 substitute e.g 2×5 and 5×-3 or 10 and -15 A1 cao
	(b)	5×4^2 - 7 5×16 - 7	73	3	M1 substitution e.g 5×4^2 -7; do not accept 54^2-7 M1 $5\times16-7$ or $5\times4\times4$-7 or 80 – 7 (NB 4^2 as 4×4) A1 cao

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Paper 5525/05					
No		**Working**	**Answer**	**Mark**	**Notes**
7		$2\times\frac{1}{2}\times6\times8$ or 48 $8\times9+6\times9+10\times9$ or 72 +54 + 90	264 cm^2	4	M1 attempt to find the area of one face; $\frac{1}{2}\times6\times8$ or (8×9) or (6×9) or (10×9) or 72 or 54 or 90 or 24 or 48 M1 all five faces with an intention to add A1 cao numerical answer of 264 B1 (indep) cm^2 with or without numerical answer
8			$\frac{\pi ab^3}{3d}$ $3(c+d)^3$ $3\pi bc^2$	3	B3 (B1 for each one correct) Nb –B1 for each of the 4th,5th,6th tick
9	(a)	$x+0.3+0.2+x=1$	0.25	2	M1 for $x+0.3+0.2+x=1$ oe, or $0.5\div2$ A1 oe
	(b)	0.3×200	60	2	M1 0.3×200 A1 cao Accept 60 out of 200 (in words) SC B1 for $\frac{60}{200}$
10	(a)		$(-12)-4\quad-2\quad(0)8$	3	B3 for all correct [(B1 for each one correct)
	(b)		5 points plotted accurately points joined with smooth curve	2	B1 ±1 full (2mm) square ft table if at least B1 awarded (all 5 points plotted) B1 ft for any smooth curve if previous B1 gained NB: curve must pass within 1 full square of the points
11			m=3 n=5	2	B1 for 3 B1 for 5 (B2 for $2^3\times5$ or $2\times2\times2\times5$) SC: award B1 only if m=3, n=3, for 8×5 seen

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

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

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

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

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

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

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

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

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

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

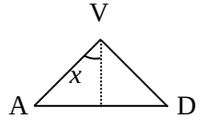
Paper 5525/06					
No		Working	Answer	Mark	Notes
12	(a)	$84 = 6.7\pi + 2 \times 6.7 + 2a$ $2a + 13.4 = 62.95\ldots$ or $2a + 34.44 = 84$	24.8	3	M1 for substituting correctly, π may be left M1 for correct rearrangement as far as $\pm 2a$ A1 for $24.7 - 24.8$
	(b)	$P = \pi r + 2r + 2a$ $P - 2a = \pi r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

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

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

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

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

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

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

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

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Mark Scheme (Results)

March 2012

GCSE Mathematics (2MB01)
Paper 5MB1H_01 (Calculator)

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NOTES ON MARKING PRINCIPLES

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

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

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

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

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

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

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

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

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

7 With working

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

8 Follow through marks

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

9 Ignoring subsequent work

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

10 Probability

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

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

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

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

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

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

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

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

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

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

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

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

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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			4*n* + 2	2	B2 for 4*n* + 2 oe (eg 4×*n* + 2 or *n*4 + 2, …) or *n*th = 4*n* + 2 (B1 for a linear expression in 4*n* e.g. 4*n* + a ($a \neq 2$) or *n* = 4*n* + 2) (B0 for *n* = 4*n* 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

5MB2H_01

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

PMT

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

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

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

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*15		180 –(90 + 20) = 70 2 × 70 = 140 (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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Mark Scheme (Results)

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GCSE Mathematics (Linear) 1MA0
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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) (b)		Positive (correlation) 85	1 2	B1 for positive (correlation) [do not accept a relationship] 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]

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)

Summer 2014

Pearson Edexcel GCSE
In Mathematics B (2MB01)
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.

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 awards mark for the quality of written communication (QWC).
The strands are as follows:

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

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

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

7 With working

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

8 Follow through marks

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

9 Ignoring subsequent work

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

10 Probability

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

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

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

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

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

Paper_5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			2 reasons	2	B2 for 2 aspects from: Bias or leading question; No time frame; Vague response boxes (B1 for 1 aspect)
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)
3			56	3	M1 for correct method to find 20% of 120 (=24) or $\frac{1}{3}$ of 120 (= 40) M1 (dep) for 120 − "24" − "40" A1 cao OR M1 for $1-\frac{20}{100}-\frac{1}{3}\left(=\frac{7}{15}\right)$ oe or $\left\{\frac{20}{100}+\frac{1}{3}\right\}\times 120\ (=64)$ oe M1 (dep) for "$\frac{7}{15}$" × 120 oe or 120 − "64" A1 cao (if M0, then SCB1 for 64)

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

Paper_5MB1H_01

Question		Working	Answer	Mark	Notes
5			$\frac{20-x}{20}$	2	M1 for writing $20 - x$ or for 20 as any denominator below an algebraic expression in x or $20 - x \div 20$ A1 for $\frac{20-x}{20}$ or $1 - \frac{x}{20}$ oe
6			2.55	3	B1 for max as 42.5 or 42.4$\dot{9}$ M1 for max × 60 or 2550 A1 for 2.55 (accept 2.54$\dot{9}$)
7	(a)		1 | 0 3 4 5 6 8 2 | 0 3 3 | 2 6 4 | 2 3 5 5 6 5 | 4	3	B2 for a fully ordered diagram (B1 for a correct unordered diagram or ordered with at most two errors) B1 for a correct key
	*(b)	<table><tr><td></td><td>Gym</td><td></td><td>Pool</td></tr><tr><td>HV</td><td>45</td><td><</td><td>54</td></tr><tr><td>LV</td><td>18</td><td>></td><td>10</td></tr><tr><td>Mean</td><td>32</td><td>></td><td>29.5</td></tr><tr><td>Median</td><td>34</td><td>></td><td>27.5</td></tr><tr><td>Range</td><td>27</td><td><</td><td>44</td></tr></table> 1 | 8 9 2 | 0 1 7 9 3 | 2 4 5 6 9 9 4 | 2 4 5	Compares: medians/means + Spread	3	A maximum of two B marks from: B1 for a correct mean or median for either the gym ages or the pool ages. B1 for a correct range for either the gym ages or the pool ages. B1 for a correct stem and leaf diagram drawn for the gym ages (no need for a key) C1 for any correct comparison which relates to the context of the gym ages and pool ages, of either medians means or ranges from correct figures, or from stem & leaf diagrams

Paper_ 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
8			154	3	M1 for $\frac{56}{200}$ or $\frac{550}{200}$ M1 for $\frac{56}{200} \times 550$ A1 cao
9	(a)		48	1	B1 cao
	(b)		12	1	B1 cao
	(c)		20	2	M1 for 80 ÷ 4 A1 cao
10	(a)	5 × 5 = 25 11 × 20 = 220 23 × 40 = 920 13 × 65 = 845 8 × 90 = 720 2730 ÷ 60	45.5	4	M1 for *fx* with *x* consistent within intervals (including the end points) allow one error M1 (dep) for use of all correct mid-interval values M1 (dep on first M1) for Σ fx ÷ 60 A1 cao
	(b)		5, 16, 39, 52, 60	1	B1 cao
	(c)		Cumulative frequency graph	2	M1 ft for at least 4 of 5 points from their cf table (values must be cumulative) plotted consistently within each interval A1 for a fully correct cf graph
	(d)		15, 16 or 17	2	M1 for method shown to read off from $x = 60$ on their cf graph or linear interpolation from the table A1 ft from their cf graph

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Paper_ 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11			68	3	M1 for 30 × 60 (= 1800) or 20 × 56 (= 1120) M1 for ("1800" – "1120") ÷ 10 A1 cao Or M1 for (60 − 56) × 20 or 4 × 20 (=80) M1 for "80" ÷ 10 = 8 A1 cao
12		$\frac{11264}{27500}$ (= 0.4096) $0.8^n = 0.4096$	4	2	$\frac{11264}{27500}$ (= 0.4096) M1 for and 0.8^n evaluated for n = 2 OR attempt to evaluate 27500×0.8^n for at least one value of n (not equal to 1) OR finding at least 2 deductions, ie 2 of 5500, 4400, 3520 A1 for 4 cao
13	(a) (b)		14 1.20	1 2	B1 cao M1 for attempt to find the gradient oe of the line eg drawing a right angled triangle with base & height shown, or $\frac{y_2 - y_1}{x_2 - x_1}$, values shown A1 for 1.20 (accept 1.2)
14			17	2	M1 for $\frac{117}{1034} \times 150$ or 16.9(729…..) A1 for 17

Paper_ 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
15			$\frac{54}{90} = \frac{3}{5}$	4	M1 for use of 9 as denominator of second probability M1 for a correct method to find the probability of at least one possible combination, $\frac{1}{10}\times\frac{6}{9}$ or $\frac{6}{10}\times\frac{1}{9}$ or $\frac{3}{10}\times\frac{1}{9}$ or $\frac{1}{10}\times\frac{3}{9}$ or $\frac{6}{10}\times\frac{3}{9}$ or $\frac{3}{10}\times\frac{6}{9}$ or $\frac{1}{10}\times\frac{9}{9}$, $\frac{6}{10}\times\frac{4}{9}$ or $\frac{3}{10}\times\frac{7}{9}$ M1 for complete and correct method shown eg $2\times(\frac{1}{10}\times\frac{6}{9}+\frac{6}{10}\times\frac{3}{9}+\frac{3}{10}\times\frac{1}{9})$ or $1-(\frac{6}{10}\times\frac{5}{9}+\frac{3}{10}\times\frac{2}{9})$ A1 for $\frac{54}{90}$ oe **Alternative scheme for replacement** M1 for $\frac{6}{10}\times\frac{6}{10}$ or $\frac{3}{10}\times\frac{3}{10}$ or $\frac{1}{10}\times\frac{1}{10}$ M1 for $1-(\frac{6}{10}\times\frac{6}{10}+\frac{3}{10}\times\frac{3}{10}+\frac{1}{10}\times\frac{1}{10})$ OR M1 for $\frac{1}{10}\times\frac{6}{10}$ or $\frac{6}{10}\times\frac{3}{10}$ or $\frac{3}{10}\times\frac{1}{10}$ M1 for $2\times(\frac{1}{10}\times\frac{6}{10}+\frac{6}{10}\times\frac{3}{10}+\frac{3}{10}\times\frac{1}{10})$ OR B2 for $\frac{54}{100}$ oe

Paper_ 5MB1H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16	(a)	16 ÷ 20 = 0.8 27 ÷10 = 2.7 36 ÷ 15 = 2.4 6 ÷ 5 = 1.2	Correct histogram	3	M1 for recognising and showing evidence of using frequency density, eg at least 2 correct frequency densities or a key . A1 for all bars in correct proportions OR for one error with bars and correct labelling and scaling of axes A1 for fully correct histogram including axes labelled and scaled.
	(b)		$\frac{18}{85}$	3	M1 for using 40 cm on horizontal scale and using a correct method to convert area of bar to the right of 40 cm to frequency, eg 2.4 × 5. M1 (dep) for '12' + 6 A1 for $\frac{18}{85}$ oe OR M1 for $\frac{36}{3}$ M1 (dep) for '12' + 6 A1 for $\frac{18}{85}$ oe

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

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Measurements of length: ±5 mm

PAPER: 5MB1H_01			
Question		**Modification**	**Notes**
Q02		2cm grid crosses, cha nged to solid circles. Right axis labeled	
Q07 Q09		Box for key put top left Box plot: median changed to 47.5, upper quartile changed to 52.5	
Q09	(C)	52kg changed to 52.5 kg	
Q10	 (C)	Frequencies changed: 5, 20, 15, 15, 5 grid x axis – 2 cm for 10, y axis 2cm for 5	
Q13		2 cm grid, line moved parallel to original graph line to go through (0,20) (50, 80) (75, 110)	
Q16		Frequency column: 27 changed to 28 2 cm grid Number of weather stations changed from 85 to 86	

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Mark Scheme (Results)

November 2014

Pearson Edexcel GCSE
In Mathematics B (2MB01)
Higher (Calculator) Unit 1

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

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

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

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

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

Paper_5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
4. (a)		Frequency polygon	2	B2 for fully correct frequency polygon - points plotted at the midpoint (B1 for all points plotted accurately but not joined with straight line segments) **or** all points plotted accurately and joined with last joined to first to make a polygon **or** all points at the correct heights and consistently within or at the ends of the intervals and joined (can include joining last to first to make a polygon) NB: ignore parts of graph drawn to the left of the 1st point or the right of the last point
(b)		$160 < h \leqslant 180$	1	B1 for $160 < h \leqslant 180$ (could be ft from diagram)
5. (a)		0.05	3	M1 for correct method using sum of probabilities = 1 eg $1 - 0.6 - 0.25$ (=0.15) or $0.6 + 0.25 + 2x + x = 1$ M1 (dep) for correct method to use P(blue) = 2 × (Green) Eg "0.15" ÷ 3 A1 cao
(b)		30	2	M1 for 0.6×50 oe A1 cao

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

Paper_5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
9. (a)		Point at (47, 34)	1	B1 point plotted
(b)		Positive	1	Positive (correlation)
(c)		48 to 51 inclusive	2	M1 for a single straight line segment with positive gradient that could be used as a line of best fit or a horizontal line from 35 or point marked at (n,35). A1 for given answer in the range 48 – 51
10.		1615.34	3	M1 for correct method to find value of investment after 1 year eg 1500×0.025 or 37.5 or 1500×1.025 or 1537.5 oe) M1 for a complete compound interest method to to find value of investment after 3 years eg 1500×1.025^3 A1 cao
*11		Justification	4	M1 for method to find total mileage eg 55 × 5 + 50 (= 325) M1 for method to find mean eg 325 ÷ 6 A1 for 54.1 – 54.2 C1 (dep on at least M1) for justification comparing means. OR M1 for method to find total mileage for Andy's mean 52.5 × 6 (= 315) M1 for method to find correct total mileage 55 × 5 + 50 (= 325) A1 for 315 and 325 C1 (dep on at least M1) for justification comparing correct totals

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

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

Paper_5MB1H_01				
Question	**Working**	**Answer**	**Mark**	**Notes**
16. (a)		Correct histogram	3	B3 fully correct histogram with vertical axis correctly scaled. (B2 for 4 correct blocks or 5 correct blocks with incorrect or no scale) (B1 for 2 correct blocks of different widths or any 3 correct blocks or correct FD values for at least 3 frequencies) eg fd of 1.2, 2.1, 2.2, 1.6, 0.4
(b)		38	2	M1 for $\frac{1}{3} \times 33 + 21 + 6$ A1 cao OR M1 for vertical line at m= 20 or showing one third of $15 < m \leqslant 30$ bar. A1 cao

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

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Mark Scheme (Results)

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PMT

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

PAPER: 5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4		x -2 -1 0 1 2 3 y -7 -5 -3 -1 1 3	correct line	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x. M1 ft for plotting at least 2 of their points (any points plotted from their table must be correctly plotted) A1 for correct line between -2 and 3 **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $2x$-3 drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points with no more than 2 incorrect points) A1 for correct line between -2 and 3 **(Use of y=mx+c)** M2 line segment of $2x$-3 drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of 2 OR line drawn with a y intercept of -3 and a positive gradient) A1 for correct line between -2 and 3

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

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

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

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

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

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Question 6

This ratio question was answered quite well. In order to make progress students needed to associate corresponding parts from the two ratios and work out 2×7, 5×3 and 6×4. Those that found the ratio of the number of pens of each colour sold, $14 : 15 : 24$, were often able to complete the process to work out the number of green pens sold.

Most did this by dividing 212 by 53 and then multiplying by 24 but some went from $14 : 15 : 24$ to $28 : 30 : 48$ and then to $56 : 60 : 96$ and usually selected the correct value to give as the final answer. Some students though, found $14 : 15 : 24$ but failed to make any further meaningful progress and scored one mark only.

Common incorrect methods used included dividing 212 by 14 (from $7 + 3 + 4$) and multiplying the result by 4 or dividing 212 by 4. These approaches made no use of the information about the number of pens in each pack. Students frequently tried different approaches in their attempts at a solution with the result that working out was often very difficult for examiners to follow.

Question 17

Many of the students who used the given statement, $x^2 : (3x + 5) = 1 : 2$, to form a correct equation were able to give fully correct solutions. Marks were sometimes lost through factorising $2x^2 – 3x – 5 = 0$ incorrectly. Some students gained only the first mark because they could not write their equation (which was often $2x^2 = 3x + 5$) in a suitable form ready for solution. Many students scored no marks at although some of these students had attempted to form an equation. Common incorrect equations were $x^2 = 2(3x + 5)$ and $x^2 + 3x + 5 = 3$ and some students used $x^2 = 1$ and $3x + 5 = 2$. Many students, though, simply substituted different values of x into the given statement. This approach sometimes resulted in an answer of $x = –1$ but gained no marks because two values of x are needed.

Question 7

This question required students to find two parts of a four-part ratio using a multiplicative relationship. A good number of students were unable to do this and, as a result, failed to score on this question. Typically, those who were able to find the values for C and D in the ratio went on to score well. Most scored four marks, and of those who didn't, many scored three marks, only dropping the last mark as they calculated all four values and either identified the wrong one as the answer, or didn't identify one at all. With questions that involve dividing in a ratio, where only one value is required, students need to be clear of the need to identify which is the value required by the question. The most common incorrect method seen was to divide 360 by 9, which led to zero marks.

Question 9

Part (a) posed a challenge to many, including some of the highest achieving students. It goes to show that students still sometimes struggle to apply skills such as the relationship between length and area scale factors to unfamiliar situations. Most successful students started with a suitable ratio of the two circumferences, for example, 1 : 0.9 or more commonly 10 : 9. From here students had to square the values to achieve the ratio for areas, commonly seen as 100 : 81. The question didn't state that the ratio had to be in its simplest form so any equivalent ratio was acceptable for the accuracy mark.

Much like part (a), part (b) also caused problems. This time the first step was to write down a ratio of the two areas. Students struggled more with this first step than in part (a). Often 0.44 or 0.56 was used and no credit was given. Many students did not have the ratios the correct way round. Many appeared to think that f^2 was in fact greater than e^2. As in the previous part, once this first ratio was set up, the second mark was gained by applying knowledge of scale factors, in this case taking the square root to gain the ratio of lengths.

Question 17

This explain question was probably the worst answered of the three. Most students realised that the number of cubes must be a multiple of 8 and 11 (the sum of the two ratios) but most missed the crucial part that 88 was the lowest common multiple. Without this acknowledgement, the mark could not be awarded.

Students generally struggled to find a way through part (b). Some used the structure of a two-way table or a probability tree, and when this was the case, were often successful. Most other

students worked with numbers of cubes, but struggled to find one of the correct pairs that would lead them to the number of large yellow cubes.

Question 14

A small minority of students scored full marks for their responses to this question. Weaker students often showed little or no working and if they did show working, it was often characterised by assuming that the triangles were right angled and using trigonometry to fit such a situation. More able students often did realise that references to area in the question together with the diagram showing non right angled triangles suggested use of the formula $\frac{1}{2}ab\sin C$. However, some of these students tried to find the length of AE instead of using the ratio $AB : AE$ to express AE as an unknown variable, for example $3x$. Students who used $AB = x$ and $AE = 3x$ scored at least one mark and often went on to write down and solve an equation using the given fact that the sum of the areas of the triangles was equal to the area of the rectangle. Examiners were surprised at the number of students who equated the area of one triangle to the area of the rectangle which led to the incorrect final answer of 18.

Question15

Some students appeared to have little knowledge about the content covered in this question and either did not attempt the question or revealed little understanding through their responses to the question. In general, little working was seen and students may have benefited from writing down the transformations represented by the equations $y = f(-x)$ and $y = f(x) - 3$.
Very few students did this and so some denied themselves the award of a mark for showing an understanding of the types of transformation involved in the question. However, examiners were able to award a good number of students at least one mark for getting an x coordinate as -7 or a y coordinate as -1. Students who gave a final answer of $(-10, -5)$ following on from an intermediate stage of $(-7, -2)$ could not be awarded any marks because they had not discriminated between which coordinates were changed by which transformation. Some students attempted to substitute values for x and y, often 7 and 2 respectively. The best students did show a good understanding of the notation and transformations involved and gave a fully correct answer.

Question 3

The majority of students gained full marks. Where this was not the case, many students gained two marks for finding 168 and 72 using the first ratio, but then carried on using 24 with the second ratio, using 48, rather than starting again with 240. On a rare occasion a student would gain the correct values to make a decision but subtracted the wrong numbers. Other common errors included dividing by the individual numbers in the ratio, not the sum, or multiplying 240×10 and 240×8.

Question 13

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

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

Question 10

Many students gained the first mark for writing $\frac{3}{4}$ as $\frac{15}{20}$ or for writing the ratios 2 : 5 and 3 : 4.
To make further progress students had to realise that they needed to make the value of *b* the same in each fraction or in each ratio. Unfortunately, those writing $\frac{3}{4}$ as $\frac{15}{20}$ often wrote $\frac{2}{5} = \frac{8}{20}$ instead of writing $\frac{2}{5} = \frac{6}{15}$ and those who started with the ratios 2 : 5 and 3 : 4 often failed to link the two ratios correctly. The students that did show a correct process for the second mark usually went on to give the correct answer.

Question 21

Though a significant proportion of students did not attempt this question, many of those students who did attempt it scored 1 or more marks, usually for a correct first step in either part (a) or part (b) or in both parts.

In part (a) many students isolated terms in one variable, usually showing $4c = 3d$. However, a great majority of these students then gave the final answer 4 : 3 rather than the correct answer 3 : 4.

Part (b) was done less well but some students scored one mark, usually for taking all terms to one side of the equation. Hardly any students made any progress by using the method of dividing throughout by one variable. A few students included factorisation as part of their solution in part (b). Success here led to the award of at least two marks in this part.

Summary

Based on their performance on this paper, students are offered the following advice:

- Check on the answers to calculations, so for example you should expect the mass of a red blood cell to be a small number
- practise less straightforward cases of finding the volume of a prism
- learn standard techniques involving combined transformations, for example the identification of the single equivalent transformation
- improve your skills in dealing with algebraic fractions, particularly in deciding when a fraction is in its simplest form and cannot be “cancelled” further
- practise questions which involve the use and interpretation of graphs, for example questions 6, 11, 13, 16 and 17 on this paper

Question 5

Although some students gained only the first mark, usually for 15 – 7 = 8 or for 24 ÷ 3 = 8, the majority of students gained either full marks or no marks. Those that made a correct start frequently went on to gain all three marks but many students were not able to find a suitable strategy to solve this ratio problem. Incorrect processes were often the result of adding the three numbers in the ratio, 4 + 7 + 15 = 26, as a first step.

Question 18

This proved to be a challenging question and finding the length of *AB* proved to be beyond most students. Some of those who attempted the question identified that they need to find the perpendicular height of the trapezium and gained the first mark for writing a correct trigonometric statement such as sin30 = *h*/6. Some students could not recall the value of sin30 and did not complete the process to find the height. After finding the height many students struggled to make any further progress, failing to realise that they should use the formula for the area of a trapezium. It was common to see the trapezium split into two triangles and a rectangle and attempts at using Pythagoras. A good proportion of those that did substitute correctly into the formula went on to show a complete process to find the length of *AB*. A small number of students gave $\frac{88}{5}$ as the final answer and lost the accuracy mark.

Question 19

This ratio problem required students to work with scale factors and ratios between 3 spheres. The most common error was to work with the 27 and the ratio 1 : 2 and arrive at 54. The first mark was for the ability to cube root to find 5 and 3, and at this stage the values did not need to be given in a ratio. Many students who succeeded this far then got confused and failed to work with the value of 3 and the ratio 1 : 2. Of those who got to the values of 3 and 6, many then failed to link the 6 from sphere **C** and the 5 from sphere **A**. Even fewer then knew to square to find the ratio of surface areas. Quite a few saw the question as having to find the radius for the sphere and had difficulty rearranging the correct formula or even trying to use an incorrect formula.

Question 14

Most students could make some progress with this question and gained a mark for finding the sum of the parts of each of the given ratios, 2 : 3 (=5) and 9 : 1 (=10). However, far fewer students could get any further. Students often tried to apply the fact that Olivia and Jessica had half as many sweets as Fran and Gary but then doubled the numbers relating to the wrong pair. Examiners were surprised that not more students assigned a given total number of sweets to one of the pairs, for example 100 sweets to be shared between Fran and Gary. Students could then have worked with this to find the number of sweets each student gets before writing them as a ratio in its simplest form.
Very few students attempted the question using algebra and where they did, they seemed to get confused because they used the initial letters of the names in their working.

Question 7

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

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

Question 15

In part (a) the first mark was awarded for indicating that 15**a** + 20**b** is 5 times 3**a** + 4**b** and a good proportion of students managed to do this. Some students wrote "×5" between the two vectors but did not write a mathematical statement linking $\overrightarrow{AB}$ and $\overrightarrow{AC}$. For the award of both marks it was necessary to see a statement such as $\overrightarrow{AC} = 5 \times \overrightarrow{AB}$ or 15**a** + 20**b** = 5(3**a** + 4**b**) and a correct reason. Many reasons mentioned multiples and some students also referred to the vectors being parallel or having a point in common. Some very good reasoning was seen but on the other hand a large number of students had difficulty formulating a correct reason or gave no reason at all. Some students worked with $\overrightarrow{BC}$ and $\overrightarrow{AB}$ and showed that $\overrightarrow{BC} = 4 \times \overrightarrow{AB}$ or 12**a** + 16**b** = 4(3**a** + 4**b**). A significant number of students, however, thought that simply working out $\overrightarrow{BC}$ as 12**a** + 16**b** was sufficient to show that *A*, *B* and *C* lie on a straight line. Incorrect working such as 15**a** ÷ 3**a** = 5**a** or (15**a** + 20**b**) ÷ (3**a** + 4**b**) = 5**a** + 5**b** was very common.

In part (b) many students realised that they needed to find the vector $\overrightarrow{DF}$ and gained the first mark for 3**e** + 6**f** + –10.5**e** – 21**f**. Arithmetic errors during this first step were common. Many students then gave –7.5**e** –15**f** : 3**e** + 6**f** as the final answer and gained one mark only. Those students who knew that they needed to do more in order to find a ratio of lengths generally gained the second mark for a multiplicative relationship such as $\overrightarrow{DF} = -2.5\overrightarrow{DE}$ or, more commonly, for writing a ratio such as –7.5 : 3 or –2.5 : 1. In many cases the accuracy mark was lost because the final ratio contained a negative sign. Students could also work with $\overrightarrow{DE}$ and $\overrightarrow{EF}$ but students who took this approach were usually unsuccessful in gaining full marks.

Question 15

Many students struggled to start this problem. There were 2 main methods to solving this problem. The first method was to use the 2 ratios to form an equation, which could then be solved. This is the method that most tried to attempt but struggled to combine the different parts. The second more efficient method was to compare 12 : 10 with 13 : 11 and realise this means the £1.50 is worth one part of this ratio.

Students looking to earn the higher grades need to practice more with using equating ratios to form equations.

Question 18

It is encouraging to report that the majority of students gained some credit for their attempt at this question. The length of *TC* was often found successfully and a good proportion of students were also able to find the length of at least one of *SD* and *TD*. Only the higher attaining students were able to identify the angle which was required and put everything together in order to find the size of this angle, that is the size of angle *DTS*. Errors commonly seen included, substituting 12 and 14 incorrectly into the formula for the area of the cross section and making an error in the use of Pythagoras' rule to find the length of *DT*.

Question 24

In part (a) many of the students who gained the first mark for equating the two volumes were not able to go on and find the correct ratio. Those that got as far as writing $4r = h$ often gave the ratio $r : h$ as 4 : 1 instead of 1 : 4.

The majority of students made no attempt at part (b) and very few managed to gain more than one mark. The first mark was awarded for equating the surface area of the sphere with the

surface area of the cone but a common error here was to omit the area of the base of the cone and write $4\pi r^2 = \pi rl$. Students making this error could still be awarded the next two process marks if they went on to substitute for l and isolate the terms in r^2.

Summary

Based on their performance on this paper, students should:

- practise their arithmetic skills, particularly division and operations with decimals
- take care when carrying out arithmetic operations and check their working to avoid careless errors
- read each question carefully and ensure that their final answer matches the question asked
- practise subtracting one algebraic expression from another, especially expressions with negative terms, and use brackets more efficiently
- practise finding angles using the circle theorems and stating the circle theorems used

Question 2

Candidates taking this paper could usually identify and describe what Rob had done wrong with sufficient clarity to score the available mark. It was enough for a candidate to say that Rob should have added the 3 and 5 together as a first step instead of dividing the 120 by the 3 and 5 separately. The small proportion of candidates who did not secure a mark here either did not appreciate just what was being asked and merely went ahead and divided 120 into the ratio 3:5 without explaining what Rob had done wrong or they gave an answer which was too vague to gain credit. Examiners noted that many candidates wrote that 8 needed to be divided by 120 and though this did not necessarily affect whether the mark was awarded or not, centres might like to address this error with candidates.

Question 4

A good discriminator, most candidates were able to score at least 2 marks for showing how to get the total volume of 4 tanks. Only the lowest attaining candidates failed to use a correct formula for the volume of a tank. A few candidates used the diameter instead of the radius to work out the volume, in effect working out the value of $\pi d^2 h$ or sometimes πdh instead of $\pi r^2 h$. Some candidates who left their volumes as a multiple of π, for example 256000π, then lost the π in the next step of their working. Correct attempts to use the ratio 1 : 100 were usually restricted to answers from higher attaining candidates and many candidates used 100 where they should have used 101 in their calculations. There was a wide range of possible approaches to answering the question and responses seen were very varied. The most common successful approach was to compare the volume of the 4 tanks with the amount of mixture that could be made with the available fertilizer.

Question 17

It was relatively rare to see a fully correct solution to this question. However, many candidates were able to write at least one or all three of the relationships as a ratio or as an equation to gain one or two marks. Only higher attaining candidates could go on to link all four weights for example by giving the equations $\frac{2}{3}B + B = 3\left(\frac{3}{4}D + D\right)$, $A = \frac{2}{3}B$ and $C = \frac{3}{4}D$. Some candidates spoiled their chances of getting the third mark by using the same variable, *x*, to represent two of the weights and gave an equation such as the one above with *x* substituted for both B and D. These candidates scored at least 3 of the 4 marks available. Any ratio equivalent to 42 : 63 : 15 : 20 was accepted and awarded full marks, for example 2.1 : 3.15 : 0.75 : 1. Using the common multiple 105 proved to be a successful strategy employed by some candidates.

Question 19

A small proportion of lower attaining candidates merely added the three numbers 0.4, 7 and 8 given in the question and tried to work with this. In general, however, the question was quite well answered. When it was not completed successfully, examiners could usually award some credit to a candidate for showing a correct process to find the probability that a counter was red or green, (1 − 0.4 or 0.6). Many candidates went on to find the correct probability for picking a green counter (0.32), thus showing an understanding of how to apply the ratio, but were then unable to make the final link to multiply this by the number of trials (50).

Question 3

The first reasoning question that required a written explanation and one that was typically answered well. Most recognised that the red counters represented a third of the total and not a half. As is often the case on such response questions, the clarity of candidates' explanations sometimes led to them not being credited the mark. Some candidates gave a correct explanation but then lost the mark with the inclusion of inaccurate figures or comments which contradicted their explanation; for communication marks the statement must be fully correct. Giving students the opportunity to talk and write using correct mathematical language will benefit many. Their ability to explain varied but most were able to state that the number of red counters should be 16 rather than 24. Those who used fractions in their explanation or described that the ratio would then be 1: 1 showed a good understanding of the mistake which had been made. Another common way forward was to assume that if there were 24 red, then there would have to be 48 blue and then the total of 72 would be more than the given total of counters in the bag. Explanations often lacked clarity and did not refer to the numbers in the question. There was also some carelessness over using the correct order of numbers in division with 3 divided by 48. Some also failed to express their reasoning unambiguously, such as only mentioning the number of blue counters, rather than focusing on the red.

Question 18

This ratio problem proved to be one of the most challenging on the paper for candidates. A pleasing number did make a start to working with the ratio, normally working with $a : c = 3 : 5$ or $b : c = 5 : 3$. However, then next step of equating the c element of the ratios proved too challenging for many. Others tried more complex methods working with ratios that contained numbers as variables, but struggled to complete any working that was worthy of credit. The most efficient method led to a ratio of $a : b : c = 9 : 25 : 15$ which would have gained 2 marks, it is only a single step from there to get to 34:40 and hence 17:20.

Question 23

Many candidates were caught out but the relatively familiar figures of 1, 8 and 27, and thought they had to work with cubing numbers. However, candidates had to find the length scale factor of the 3 triangles from the given ratio as 1:3:6 to gain the first mark, whereas many worked with the 1:2:3. Once they had the correct ratio of lengths they could then work out the correct ratio of areas for the 3 triangles to get 1:9:36. From here they had to work out the ratio of the areas of the 3 shapes, 2 of which were trapezia not triangles. There were a number of excellent responses, some working as above and others working nicely with algebra. There were also a number of candidates that gave lengths to the parallel sides and perpendicular height and worked correctly with areas.

Question 24

This question also discriminated well between high attaining students. Most students who made a good attempt at the question recognised the non-replacement nature of the problem and were able to make a start by forming expressions for probabilities in terms of x and/or y. A good proportion of these students were also able to use the ratio given in the question to make a substitution in order to get their expressions in terms of x only or y only. However, a significant number of students used "$y = 4x$" instead of the correct "$y = 3x$". Invariably and sensibly, the overwhelming majority of students opted for getting their expressions in terms of x only. Those students who attempted substituting $3x$ for y into their probabilities before combining their products had more success than those who substituted later as the algebra became more complex. A significant number of students obtained correct expressions for the probability of Freda taking two pink counters and the probability of her taking two blue counters but gave the probability of her taking two green counters as $\frac{2x-5}{3x} \times \frac{2x-4}{3x-1}$ instead of $\frac{2x-5}{3x} \times \frac{2x-6}{3x-1}$. This had clearly arisen from an error with signs earlier on in a student's working. It was encouraging to see a good number of fully correct solutions from students working at the highest level.

Summary

Based on their performance on this paper, students are offered the following advice:

- carry out a check to make sure you have not miscopied any numbers given in a question before you complete the question.
- check that you have not miscopied algebraic expressions from a previous line in your working.
- practise solving equations involving algebraic fractions.
- compare the medians and either the ranges or the interquartile ranges in context when asked to compare two distributions represented by box plots.
- ensure you can write and manipulate algebraic expressions accurately particularly with regard to the use of brackets and the signs of terms.
- practise solving real life problems involving inverse proportionality.
- carry out common sense checks where possible.

Question 5

This ratio problem proved a real challenge to many. A good number of students were able to gain the first mark for realising that they had to work from part to whole and either found the original total or the values for Chris and Errol at the start. For many that was as far as they were able to get as they didn't then work correctly with the new ratio and the total amount. Those that did, typically gained at least 3 marks for getting both values for Errol. Unfortunately, quite a few students lost the final mark because rather than subtracting these two values, they subtracted the value for Chris from the value for Errol.

Question 23

There was a good number of complete, clear and concise solutions to this question. The great majority of students who attempted this question started by eliminating the fractions and were given due credit for this first step. Most of the students following this approach were able to isolate terms in x and y accurately to get as far as $54y^2 = 150x^2$ or equivalent, then went on to get $3y = 5x$. A small number of students getting this far made an error when interpreting their linear relationship to get a ratio for $x : y$ and wrote 5 : 3 as their answer. The few students who used an approach involving simultaneous equations were usually successful.

Question 19

Overall, this question was answered poorly with the majority of students unable to find an appropriate strategy to work out the ratio $AB : AD$. Some students made a good start by using similar triangles to form an equation involving AB, e.g. $\frac{AB}{4} = \frac{25}{AB}$, or an equation involving the scale factor, e.g. 4 × scale factor = 25 ÷ scale factor. Many of those who formed a correct equation were able to complete the process to find the required ratio.
Most students, however, were unable to identify the need to compare the sides of the two similar triangles, *ABC* and *DAB*. Many used the ratio 4 : 21 incorrectly and answers of 4 : 25 were common. Students are advised that drawing two separate triangles and marking in lengths on the sides may help them to use the similarity of the triangles. A small number of students used Pythagoras to find the perpendicular height of the triangles and then *AB*. Some students assumed that Pythagoras could be applied to triangle *ACD* to find *AC* but it is not a right-angled triangle.

Question 6

There were many different approaches seen to Question 6 which was really interesting to see. As the question was designed to lack structure, students had to plot a path through the problem themselves, and most did so with at least some success.

The most common approach was to use the starting ratio of 1 : 6 : 14, and then to find $\frac{3}{7}$ of 14 = 6, and to subtract and add to the ratio to give 7 : 6 : 8. The next step was to then find 12.5% of 8 = 1 and again subtract and add to give 7 : 7 :7 and show Tina was correct. However, some worked with the values as fractions of 14, and others scaled up the ratio to a different total and worked from there. All these methods were capable of gaining full marks, but the latter two often led to errors, either in arithmetic, or due to premature rounding.
Some students lost marks, as although they were able to find $\frac{3}{7}$ and 12.5%, they either did so of the wrong values or added to the wrong values, or lost track of which values linked to which of the three people.
This is a question where working was required to gain credit and was asked for in the demand. Anyone giving a correct answer without supportive working would score zero.
Some students chose to use their oven values (in the ratio 1 : 6 : 14) which could also lead to full marks being given.

This question was a good discriminator of students understanding of algebraic concepts and proved to be challenging for many. Those that gained all 3 marks for this question usually went down the route of finding the number of yellow counters or the total number of counters in bag **A** in terms of x rather than for starting to work with ratio using algebra eg $3y$, $5y$. Too often students incorrectly had the number of red counters as $3x$ instead of x and hence the number of yellow counters as $5x$ instead of $\frac{5x}{3}$. This incorrect method led to the total number of counters in bag B being $4x$ rather than the total number of counters in bag A and bag B being $4x$ and hence gained no marks. Another common error was for students to think that replacing x with a numerical value was an algebraic approach, as such this gained no marks in the same way that substituting in values for n when trying to prove $n^2 + n$ is always even would gain no marks. There were a few students who lost out on gaining the C mark as rather than using fractions they worked with decimals but did not have these as recurring decimals. The variable 'x' was frequently lost on the total number of counters for bag B meaning marks were deducted.

Question 12

It was pleasing to see some fully correct solutions but, overall, this question was answered very poorly with relatively few learners showing that they understood the relationships between lengths, areas and volumes in similar solids. Starting the process to find the ratio of the radius of **A** to the radius of **B** by finding $\sqrt[3]{64}$ or $\sqrt[3]{125}$ gained the first mark and some learners reached the ratio 4 : 5. The second mark was awarded for using the information about the radius of sphere **C** and working out $5 \div 2$ or for starting to work with area and working out 4^2. A process to find the ratio of the area of **A** to the area of **C**, such as $4^2 : 2.5^2$, was needed for the third mark but few were able to get this far. Some of those that did gave 16 : 6.25 as the final answer and were not awarded the accuracy mark because the question asked for an answer in the form $a : b$ where a and b are integers. A successful route used by a

few learners was to combine the ratios 4 : 5 and 2 : 1, giving the ratio of the radii as 8 : 10 : 5 from which they could easily see that the required ratio is $8^2 : 5^2$. Many learners could not make a correct start. It was common to see 125, the volume of sphere **B**, divided by 2 and then 64 : 62.5 given as the final answer. Since the question involved three spheres some learners attempted to use the formulae for the surface area or volume of a sphere.

Question 15

Many of the higher attaining learners gained either partial or full credit for their answers to this question and the vector algebra seen was generally clearly presented. Using the information given to write a correct expression for a vector earned the first mark and often this was awarded for a correct expression for $\overrightarrow{OM}$ or $\overrightarrow{ON}$. A good proportion of those that gained the first mark were able to make further progress and earn the second mark which was most commonly awarded for a correct expression for $\overrightarrow{MN}$. Many of those that earned the third mark for correct expressions for both $\overrightarrow{MN}$ and $\overrightarrow{XN}$ did not reach the ratio 4 : 1. Sometimes this was because of errors in the simplification of the expressions found. However, some simplified correctly but gave $\frac{4}{3}\mathbf{b}-\mathbf{a}:\frac{1}{3}\mathbf{b}-\frac{1}{4}\mathbf{a}$ as the final answer. Learners could be

encouraged to write expressions such as $\frac{1}{4}\mathbf{a}$, $\frac{1}{3}\mathbf{b}$ and $\mathbf{a}-\mathbf{b}$ on the diagram, with arrows to show their direction, as this may aid their understanding of the direction when combining vectors.

Question 20

Although there were not as many steps as we often see on a 3D trigonometry problem here, many candidates struggled to make a start to the question. The first step to find FC proved conceptually too difficult and many either didn't attempt, or used a method that would lead to VC not FC. This could then lead to FC with a second step using Pythagoras, but this was normally missing.
If learners did find FC, they then had to use the ratio to find MC along with Pythagoras to form an equation for the side length. Alternatively, they could use MC along with either the $60°$ or $30°$ angle and trigonometry. Neither were seen often, but those who got this far generally gained the accuracy mark.

Question 2

Question 2 required learners to divide an amount in a 3-part ratio. This question was answered very well by most learners with the full 3 marks commonly being awarded. Less successful responses had made arithmetic errors when dividing or multiplying but were often awarded 1 or 2 marks.

Due to the nature of the values in the ratio (2 : 3 : 5) some responses recognised that 2 parts were equivalent to $\frac{2}{10}$ or $\frac{1}{5}$ of the whole and started by dividing by 5, or similarly with 5 parts being equivalent $\frac{1}{2}$ and dividing by 2. These responses were able to gain full marks. However, this is very similar to a common misconception where learners divide the total by each of the numbers in the ratio (2, 3 and 5), and this led to an incorrect answer. If this was the case, no marks were awarded. We also saw some responses working with 69 rather than 690. If full working was shown, this could be awarded the method marks.

Question 20

This 5-mark problem required learners to work with ratio and coordinates to find point D, then a given gradient to find the equation of line $\mathbf{L}$ and finally use this to find the y value of a specific coordinate. The mark scheme basically followed this path. The first mark was for a method to find one of the coordinates of point D using the ratio. The second mark was for a correct form for line $\mathbf{L}$, with the third mark using the coordinate of D to find the y-intercept of $\mathbf{L}$.
The final method mark was for substituting the given x value into their equation to find the y value.
Learners were able to gain later marks within the question if they failed to correctly find the coordinates for D, providing it was clear that these incorrect coordinates were what they believed to be those of D. This meant that those who made an error in the ratio but knew how to work with the equation of a line, were able to gain up to 3 marks.
The final mark was for an accurate figure for f, and for stating that this is less than -4
There were some good responses seen, but not many fully correct ones. Many learners knew some of the skills required but struggled to pull them all together.
A commonly seen mistake seen was learners assuming that the 2 lines were perpendicular, learners should be reminded to not assume a 90-degree angle unless given in the question.

Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

November 2019

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 3H

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GCSE (9 – 1) Mathematics – 1MA1
Principal Examiner Feedback – Higher Paper 3

Introduction

The paper was accessible to students who had been prepared for a higher GCSE Mathematics paper. There were some questions which were not well answered especially towards the end of the paper but this can be expected from the cohort sitting the November paper.

It was pleasing to see that many students showed their working out but it is worth noting that some students do not do this and where questions request working marks will be withheld if answers only are shown.

Report on Individual Questions.

Question 1

Part (a) of this question was answered well by the majority of students with a large proportion receiving full marks.

If full marks were not award then at least one mark was usually awarded. Of these students most were able to expand the brackets correctly but made errors when simplifying; for example, $x^2 - 9x + 4x - 45$ became $x^2 + 14x - 45$ or $x^2 - 4 - 45$ when simplified. The other main error was to add the –9 and 5 together for the constant term and obtain –4 rather than multiply to obtain –45.

Part (b) was also well answered with the majority of students gaining both marks for $3x(3x+2)$. Those who did not gain full marks often gained one mark for a correct partial factorisation. The most common incorrect answer seen was $3x(3+2)$.

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 3

This question was well answered and almost all students gained both marks. A few students drew a line at $x = 34$ but did not give a final answer or gave an answer outside of the range.

Question 4

This question was the first on the paper that some students found challenging. Many did not score at all as they were unable to start the question.

However, another large proportion of students were able to complete this question fully, obtain the correct solution and receive all the marks.

A few students did not use the mid-values for time but were still able to gain two marks for using values from within the inequalities and dividing the sum by 18.

Where working was shown and marks were often lost as a result of dividing the total by 4 or simply adding together the mid values (not considering the frequencies) and dividing this by 4.

Question 5

Unfortunately, metric conversions are challenging for students. This question was not answered well, with 370 and 3700 seen commonly as incorrect answers.

Question 6

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

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

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

Question 7

Part (a) and part (b) of this question was well answered. The vast majority of students gained both marks. Only occasional errors were seen with no common theme.

Part (c) was also very well answered and the modal score was full marks**.**

Many students appreciated that Asma was wrong and most were able to say why in an acceptable way, the most common of which was to write the numbers as ordinary numbers and then compare. A few others correctly referred to the number of digits in each number or compared the powers of 10.

However, the most common errors were to refer only to the number of zeros or include the poor use of terminology, e.g. ‘6.212 is to the power of 8’.

Question 8

The modal score for this question was full marks. When full marks was not obtained most students were able to obtain the first mark, but fewer could correctly identify the value of the interior or exterior angle of a pentagon without contradiction or error. Many either didn't know how to find the interior or exterior angle or divided 360 by the number of sides but thought that gave them the size of an interior angle, this was often shown by incorrect placement on the diagram.

A common incorrect response was $72 - 63 = 9^o$ Some students gave reasons for their calculations, even though not asked for. Students are reminded to carefully read the question being asked.

Question 9

This question was almost always attempted but the marks were reasonably evenly spread over the three options.

The most common incorrect responses seen were the incorrect placing of an image of correct size and orientation. A few students drew an enlargement using a different scale factor. The most common incorrect scale factor used was 3.5.

Question 10

Over a third of the students gained full marks for this question. Those that were successful usually carried out the same series of steps, multiplying by 7 for their first step rather than the use of fractions and then isolating x.

For those that were not fully successful the most common incorrect response was to only multiply one of 11 or $-x$ by 7. Another common error was to also multiply $9 + x$ by 7 as well as $11 - x$.

Part (b) was correctly answered by approximately half of the cohort. Incorrect answers were usually seen when students tried to multiply out the brackets or cancel terms within the brackets without considering the powers of 3 and 2.

Question 11

Most students attempted this question and it was common to see at least one correct product to gain the initial mark. It was pleasing to see that almost a third of the cohort went on to complete the question fully giving the correct answer

The most common incorrect responses involved adding the probabilities, e.g. $0.07 + 0.02 + 0.11 = 0.2$ or adding in the product 0.07×0.02. Although very few arithmetic errors were seen the most common one was $0.07 \times 0.98 = 0.686$ not 0.0686, using this often led to the student gaining two out of the three marks.

Question 12

The majority of students were able to interpret the stem and leaf diagram well, most were able to find the median but the quartiles were less well identified.

For the box plot, most plotted the end points accurately, but fewer plotted the box correctly. Frequently students obtained two marks by showing 3 correctly plotted values usually the minimum, maximum and median. The most common incorrect response involved misplacing the lower quartile.

It was rare to see a student state the median or quartiles and not successfully mark them on the scale.

Question 13

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

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

Question 14

This question was found by many to be challenging and some did not know how to start. A number of students simply added the numbers in all three ratios together to obtain 8/19, showing no understanding of what was expected.

One of the approaches which gained marks was by choosing a starting number and dividing it in the correct ratios. An alternative approach seen was a tree diagram, often with the first process mark being awarded for use of fractions for either soup (2/5) or Prawns (3/5), however, many students did not know what to do next after this point. The most common incorrect answer for this question, when working with fractions was seen, was to work only using the curry part of each ratio ($3/8 \times 5/6$) and ignoring the relationship to the choice of starter.

Question 15

Some fully correct responses were seen although many students gained one or two method marks. However, there are still too many students who used numerical values but algebra is required for proof questions.

When students tried to use algebra, a number gave incorrect expressions for even numbers, typically n and $n+2$ or n and $n+1$, note n is assumed to be an integer unless otherwise defined by the student.

Of those students who were able to state two consecutive even numbers algebraically many lost the second method mark as minor errors were made when expanding the expressions.

Question 16

Many mixed responses were seen here, it would be wise to remind students to read the question carefully as many stated the relationship incorrectly (e.g. using direct proportion, omitting the square, or using a square root instead).

Students who were able to state the correct relationship usually went on to find k successfully but then they found it much harder to substitute the fractional value of y into their formula. Some who managed to correctly find the value of x^2 did not give just the negative value of x as their final answer.

Students are reminded to always read questions carefully.

Question 17

This was a not well answered question. Many students left this question blank. Of those that made an attempt many ignored the statement 'Use the graph to find estimates …' and tried alternative methods, either using the quadratic formula, attempting to factorise, or drawing a graph using a table of values – neither of these scored any marks as they did not use the given graph as instructed to do so.

Some students completed the square and if done correctly this gained the first method mark. This was then followed up with a translation of the original graph being shown. Only a very few students rearranged the formula and plotted the correct straight line to look for the points of intersection.

Centres should note this is a specific assessment objective and so the graph must be used when the question states this.

Question 18

Many students found this question challenging and the modal score is zero. There were many blank responses.

Those who could use the cosine rule generally obtained the first two marks however, there was often confusion over the identity of angle BCA. Of those that correctly found angle BCA very few were able to apply the sine rule accurately and gain full marks for this question. A small number of students lost the final accuracy mark due to rounding earlier in their solution.

The most common errors seen involved using the trigonometry ratios for right-angled triangles.

Question 19

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

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

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

Question 20

Many students were able to score one mark with quite a few providing the full correct answer of $n^2 - 2n$. A number of students were able to identify a common second difference as 2 but were then unable to deduce that this meant the sequence was quadratic. Those that did either wrote final expression as $n^2 + 2n$, which was a very common incorrect answer or used the 'difference method' to try to find the nth term, as opposed to just finding it by inspection, which might have been easier with this sequence.

Question 21

This question with not well answered. The most common response by far was 65/81. Very few students were able to secure a mark indicating that they did not really understand what the question was asking. Subtraction or dividing by 4 was often seen rather than finding 4th root.

Question 22

Most students attempted this question and often gained one mark from multiplying by the reciprocal. Students could often factorise the numerator or the denominator of the first fraction, but they could not fully factorise the second fraction, often factorising $x^3 - 36x$ incorrectly or failing to notice the difference of two squares. Only a small minority managed to simplify to 7x, some went on to give their final answer as $a = 7$, this was not penalised.

Many students did not realise that they needed to factorise and cancel terms, a significant number of students spent a lot of time expanding the brackets for no gain and could not then simplify the complex expression generated.

Question 23

This question was not attempted by all students. Those who did attempt the question often gained the first two marks for substituting into the volume formula and rearranging to find the radius. Many of these students then failed to realise that the slant height of the cone had to be found, using Pythagoras. For those that did find the slant height, a good proportion did not use this slant height as the radius of the sector OACB.

A small number of students did gain full marks for this question.

Question 20

When answers were attempted students often gained three marks by finding correct vectors for ZP and ZR. Very few of these students were then able to show the full process to show ZP and ZR in an appropriate ratio.

Others only gained two marks for correct vectors using the given ratios and finding a vector for OZ or XY.

A noticeable error was when students had YX correct as $a - b$ they did not reverse the whole vector to get XY, they simply used $-a-b$.

Summary

Based on their performance on this paper, students should:

- read questions carefully
- practice questions involving time, in different notations and also converting between hours and minutes
- recognise right angled triangles and non right angled triangles and know which trigonometry relationships are appropriate for the different style of triangles.
- always attempt questions as part marks are available for suitable starting points.

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