



GCSE MARKING SCHEME

SUMMER 2024

**GCSE
MATHEMATICS – COMPONENT 1
(HIGHER TIER)
C300UA0-1**

About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

EDUQAS GCSE MATHEMATICS

SUMMER 2024 MARK SCHEME

GCSE (9-1) Mathematics Component 1: Higher Tier	Mark	Comment
1. $\frac{8 \times 10}{0.2}$ or better 400	M2 A1	Award M1 for any one of the following: - sight of any TWO of 8, 10 or 0.2 $\frac{2^3 \times \sqrt{100}}{0.2}$ CAO
	(3)	
2. $11c + 3 = 4c + 8$ $7c = 5$ or $-5 = -7c$ $c = \frac{5}{7}$	B1 B1 B1	FT until 2 nd error $11c + 3 = c + 6$ counts as 2 errors ISW If $5/7$ not seen, accept 0.71or better For FT if answer simplifies to an integer, it must be given as an integer.
	(3)	
3.*(a) Method to find prime factors with two correct prime factors seen from the set {3, 3, 5, 5, 11} before the second error. 3, 3, 5, 5, 11 $3^2 \times 5^2 \times 11$	M1 A1 B1	Note: $2475 = 3 \times 825$ or 5×495 or 11×225 or 15×165 or 25×99 C.A.O. Ignore 1s. Primes may only be seen in factor tree. FT 'their derived primes' provided at least one index form used with at least one square. Do not FT non-primes. Allow $(3^2)(5^2)(11)$ and $3^2.5^2.11$ Do not allow $3^2, 5^2, 11$. Inclusion of 1 as a factor gets B0.
3.(b) $2^3 \times 5^2 \times 7^2$	B2	B1 for sight of $8 \times 5^2 \times 7^2$ $8 \times 25 \times 49$
	(5)	

4. In any order: Reason 1 - reference to only plotted six months of year e.g. • 'the graph shows sales are increasing but trend is different for first six months of year' • 'the highest values (January and February of 90 and 83) are not shown' Reason 2 - reference to scale not starting at 0 on y-axis e.g. • 'it looks like the sales have doubled (between July and December)'	E1 E1	Award maximum of E1 if both reasons come from same list Do not allow the following for either response: • any reasons relating to clarity of points / missing gridlines / circles rather than crosses • mention of winter clothing firm • 'full title missing' • 'scale is in 1000s may confuse' • the scale doesn't go up to 90 which is the highest value' – it didn't need to go up to 90 for Jul to Dec
	(2)	
5*(a) An appropriately worded question e.g. How much do you spend each month on gym membership? AND An appropriate set of response boxes e.g. $c = £0$, $£0 < c \leq £10$, $£10 < c \leq £20$, $c > £20$ less than £10, £10-£20, more than £20	B2	Question must include 'each month', There must be a minimum of 3 response boxes which: • do not overlap • cover all amounts including £0 and no upper limit with the exception of allowing a <u>consistent</u> £1 gap e.g. £0 £1 to £10, £11 to £20, £21 or more <i>Note: If inequalities are used then allow e.g. < 5, 5 - 10, 11 - 15, > 15 OR 5 >, 5 - 10, 11 - 15, 15 < OR $0 \leq 10$, $11 \leq 20$, $21 \leq 30$, ≥ 31 where the inequalities are in the correct directions and the groups are clear.</i> <i>Treat as one error incorrect use e.g. $0 \geq 10$, $11 \geq 20$, $21 \geq 30$, $31 \geq$</i> B1 for one of the following: • an appropriately worded question with no more than 'one identified error' from above response boxes. • a question that does not include 'per month' but with no errors in the response boxes.
5(b)(i) Appropriate explanation e.g. 'The mean is affected by the few people who spent a long time (in the leisure centre).' 'The mean can be significantly affected by outliers or skew' 'It would be more accurate to use the mode' 'Most people spent less than 7 hours (in the leisure centre).' 'The modal time (or median time) is 0 – 4 hours.'	E1	Do not accept: 'The mean is not the best average.'

5(b)(ii) Appropriate reason e.g. 'Not enough people asked.' 'Many responding 0-4 hours probably didn't go to the leisure centre'	E1	Do not accept: 'Some people spend longer than 24 hours' 'He only asked in one area' 'Only collected data for one week' 'They may spend different amounts of hours each week'
	(4)	
6*. $30x = 40x - 80$ or better $x = 8$ (Capacity =) 240 (litres)	B3 B1 B1	B2 for $30x = 40(x - 2)$ OR $\frac{30x}{x-2} = 40$ B1 for sight of one of the following: • $30x$ • $40(x - 2)$ • $30 = k/x$ and $40 = k/(x-2)$ An answer of 240 (litres) implies the previous B1 If B2 awarded and $x \neq 8$ award a further SC2 for a correctly evaluated answer to $30 \times$ 'their positive 8'.
	(5)	
7*.(a) $\frac{11}{21}$	B1	
7.(b) 5 parts = (£)45 OR 1 part = (£)9 OR 11 parts – 2x3 parts = 45 oe OR $11/_{21} - 45 = 6/_{21}$ $45 \div 5 \times 7$ oe OR 9×7 (£)63	B1 M1 A1	May be implied by M1 FT an arithmetic error in 'their 11 – 2x3' for M1 A0
	(4)	

8.(a)	<table><tr><th>Statement</th><th>AT</th><th>NT</th><th>ST</th></tr><tr><td>$p^2 = n^2$</td><td></td><td></td><td>✓</td></tr><tr><td>$p < n$</td><td></td><td>✓</td><td></td></tr><tr><td>$\frac{n}{p} < 0$</td><td>✓</td><td></td><td></td></tr><tr><td>$n^2 > p^3$</td><td></td><td></td><td>✓</td></tr></table>	Statement	AT	NT	ST	$p^2 = n^2$			✓	$p < n$		✓		$\frac{n}{p} < 0$	✓			$n^2 > p^3$			✓	B2	1 mark for 2 or 3 correct If more than one box ticked for any row, mark as incorrect.
Statement	AT	NT	ST																				
$p^2 = n^2$			✓																				
$p < n$		✓																					
$\frac{n}{p} < 0$	✓																						
$n^2 > p^3$			✓																				
8.(b)	$\frac{2}{7}$	B2	ISW B1 for $\frac{1}{\left(3\frac{1}{2}\right)}$ or $1 \div 3\frac{1}{2}$ or $\frac{1}{\frac{7}{2}}$ or $\frac{1}{3 \cdot 5}$ or $\frac{10}{35}$ or $\frac{2}{\text{their } 2 \times 3 + 1}$ or $\left(\frac{7}{2}\right)^{-1}$																				
8.(c)	1	B1																					
		(5)																					

9*. 36 $\times \frac{6}{9} \text{ oe}$ $\times \frac{1}{2}$ 12 (minutes)	M1 M1 A1	<u>A table method altering all 3 values in the same ratio at the same time is M0</u> M marks may be seen in either order e.g. $\frac{\text{Printers}}{9} \quad \frac{\text{Booklets}}{n} \quad \frac{\text{Time}}{24}$ FT from M0 previously awarded Must be from use of 36 e.g. if this calculation is performed first $\frac{\text{Printers}}{6} \quad \frac{\text{Booklets}}{0.5n} \quad \frac{\text{Time}}{18}$ CAO																								
<u>Alternative method 1</u> Printers first then booklets <table border="1"> <thead> <tr> <th>Printers</th><th>Booklets</th><th>Time</th></tr> </thead> <tbody> <tr> <td>6</td><td>n</td><td>36</td></tr> <tr> <td>$\times 1.5$</td><td>$\times 1.5$</td><td></td></tr> <tr> <td>9</td><td>$1.5n$</td><td>36</td></tr> <tr> <td></td><td>$\div 3$</td><td>$\div 3$</td></tr> <tr> <td>9</td><td>$\frac{1}{2}n$</td><td>12</td></tr> </tbody> </table>	Printers	Booklets	Time	6	n	36	$\times 1.5$	$\times 1.5$		9	$1.5n$	36		$\div 3$	$\div 3$	9	$\frac{1}{2}n$	12	M1 M1 A1	<i>Note: the number of booklets may be an assumed number</i> FT 9 and 'their 36' CAO						
Printers	Booklets	Time																								
6	n	36																								
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<u>Alternative method 2</u> Booklets first then printers <table border="1"> <thead> <tr> <th>Printers</th><th>Booklets</th><th>Time</th></tr> </thead> <tbody> <tr> <td>6</td><td>n</td><td>36</td></tr> <tr> <td>$\div 2$</td><td>$\div 2$</td><td></td></tr> <tr> <td>3</td><td>$\frac{1}{2}n$</td><td>36</td></tr> <tr> <td>$\times 3$</td><td></td><td>$\div 3$</td></tr> <tr> <td>9</td><td>$\frac{1}{2}n$</td><td>12</td></tr> </tbody> </table>	Printers	Booklets	Time	6	n	36	$\div 2$	$\div 2$		3	$\frac{1}{2}n$	36	$\times 3$		$\div 3$	9	$\frac{1}{2}n$	12	M1 M1 A1	<i>Note: the number of booklets may be an assumed number</i> FT $\frac{1}{2}n$ and 'their 3' CAO						
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<u>Alternative method 4</u> (using 1 printer) <table border="1"> <thead> <tr> <th>Printers</th><th>Booklets</th><th>Time</th></tr> </thead> <tbody> <tr> <td>6</td><td>n</td><td>36</td></tr> <tr> <td>$\div 6$</td><td></td><td>$\times 6$</td></tr> <tr> <td>1</td><td>n</td><td>216</td></tr> <tr> <td></td><td>$\div 2$</td><td>$\div 2$</td></tr> <tr> <td>1</td><td>$\frac{1}{2}n$</td><td>108</td></tr> <tr> <td>$\times 9$</td><td></td><td>$\div 9$</td></tr> <tr> <td>9</td><td>$\frac{1}{2}n$</td><td>12</td></tr> </tbody> </table>	Printers	Booklets	Time	6	n	36	$\div 6$		$\times 6$	1	n	216		$\div 2$	$\div 2$	1	$\frac{1}{2}n$	108	$\times 9$		$\div 9$	9	$\frac{1}{2}n$	12	M1 M1 A1	<i>Note: the number of booklets may be an assumed number</i> Two steps needed for M1 FT $\frac{1}{2}n$ and 'their 108' CAO
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6	n	36																								
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	(3)																									

10*. (a)		
(£)72	B2	B1 for $54 \div 3 \times 4$ OR $54 \div 0.75$ oe
10.(b) (i)		
0.67	B1	
10.(b) (ii)		
1.06 ³	B1	
	(4)	
11*.		
3a + 4b = 2(.)70. AND 2a + 3b = 1(.)95	B1	Both equations given, a & b may be other letters, words are accepted.
Method to eliminate one variable e.g. equal coefficients with intention to subtract	M1	FT provided at least one equation is correct and consistent place value, with equivalent level of difficulty.
OR rearranges one equation and substitutes into the other		
First variable correct	A1	C.A.O. Accept in £ or p apple = 30p or banana = 45p
Method to calculate second variable	m1	FT their '1 st variable' provided M1 previously awarded.
Second variable found	A1	FT Accept in £ or p (provided > 0)
(£)2.10 or 210(p)	A1	FT 'their a and b' provided B1M1m1 previously awarded and both greater than 0 If units are given they must be correct
		No marks for trial and improvement. No marks for an unsupported answer.
<i>Alternative method (for candidates who do not find the values of both variables)</i>		
3a + 4b = 2(.)70. AND 2a + 3b = 1(.)95	B1	Both equations given, a & b may be other letters, words are accepted.
(£)2.10 or 210(p)	SC5	Award SC5 for a complete algebraic method , with <u>no errors</u> , leading to a final answer of (£)2.10 or 210(p). Method may include adding/subtracting/scaling/substituting into equations.
	(6)	
12*. (a)		
4.3 x 10 ¹¹	B2	B1 for sight of the correct value not in standard form e.g. 0.43 x 10 ¹² or 430 000 000 000

12.(b)		Be aware of correct answer from incorrect work. Award B0.																								
7.9×10^5	B2	B1 for the correct value not in standard form e.g. 79×10^4 or 790 000 If no marks, award SC1 for 760000 + 30000 seen with a slip in the addition but their answer correctly converted into standard form																								
	(4)																									
13.																										
2^{26}	B2	Mark final answer B1 for $2^5 \times 2^{7 \times 3}$ or $2^{5+7 \times 3}$ or sight of 2^{21} If no marks award SC1 for 2^{15} (from $2^5 \times 2^{10}$)																								
	(2)																									
14.(a)																										
$(n+1)(n+2)$	B1	Allow $n(n+3) + 2$ with (odd x even) or (even x odd) is even then + 2 is even																								
odd x even → even (since $n+1$ and $n + 2$ are consecutive numbers so one will be odd and one even)	B1	Suitable complete explanation.																								
<u>Alternative method 1 - using expansion of odd and even expressions</u>																										
$(2k)^2 + 3(2k) + 2 = 4k^2 + 6k + 2$ AND 'all terms even' AND $(2k+ 1)^2 + 3(2k + 1) + 2 = 4k^2 + 10k + 6$ AND 'all terms even'	B2	B1 for working correct expansion, simplification and justification of either $(2k)^2 + 3(2k) + 2$ OR $(2k+ 1)^2 + 3(2k + 1) + 2$																								
<u>Alternative method 2 – using combinations of odd and even terms</u>																										
Correct justification e.g. if n is odd then $n^2 + 3n + 2$ is odd + odd + even → even AND if n is even then $n^2 + 3n + 2$ is even + even + even → even	B2	B1 for justification with either odd OR even values for n . OR B1 for at least 4 correctly evaluated terms from substituting two (or more) odd values AND two (or more) even values of n .																								
		<table><tr><td>n</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>n^2+3n+2</td><td>6</td><td>12</td><td>20</td><td>30</td><td>42</td></tr></table> <table><tr><td>n</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr><tr><td>n^2+3n+2</td><td>56</td><td>72</td><td>90</td><td>110</td><td>132</td></tr></table>	n	1	2	3	4	5	n^2+3n+2	6	12	20	30	42	n	6	7	8	9	10	n^2+3n+2	56	72	90	110	132
n	1	2	3	4	5																					
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14.(b)																										
$n^2 + 2$	B2	B1 for $n^2 + k$ where $k \neq 0$ or 2 Allow B1 for $n^2 + bn + c$ where $b \neq 0$ or $c \neq 0$																								
	(4)																									

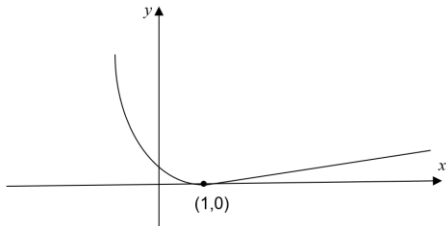
15.(a) Explanation to indicate that graph should show direct proportion. e.g. - the graph shows 'as g increases, h decreases which is inverse proportion' - if h increases then the cube root of g will also increase - the graph shows inverse proportion - the graph is going down – it should be going up	E1	Allow: it is not a positive gradient Do not allow: - graph should be a straight line - graph should be a smooth curve - h is bigger than g so h is bigger than $\sqrt[3]{g}$ - when g increases h decreases without saying why								
15. (b)(i) $p \propto \frac{1}{\sqrt{q}}$ OR $p = \frac{k}{\sqrt{q}}$ k = 180 OR k = 36 x $\sqrt{25}$ OR k = 36 x 5 OR $36 = \frac{k}{5}$ (p=) $\frac{180}{\sqrt{q}}$	B1 M1 A1	Allow $p \propto \frac{k}{\sqrt{q}}$ M1 implies B1 FT for B0 M1 A0 for $p \propto \frac{1}{q^n}$ with $n > 1$, May be seen explicitly in (b)(ii) Do not allow $p \propto \frac{180}{\sqrt{q}}$								
15.(b) (ii) <table><tr><td>p</td><td>60</td><td>36</td><td>45</td></tr><tr><td>q</td><td>9</td><td>25</td><td>16</td></tr></table>	p	60	36	45	q	9	25	16	B2	FT from inverse proportion but not from 1/q B1 for each correct value Check working space for unambiguous answers if table left blank
p	60	36	45							
q	9	25	16							
	(6)									
16.(a)(i) Condition 2 $l < 2s$ Condition 3 $6l + 4s < 120$	B1 B1	Allow if order reversed $3l + 2s < 60$ may be seen Penalise -1 only for the first use of $\leq$ instead of $<$.								

16.(a) (ii)	B3	FT from 'their conditions 2 and 3' provided both conditions are inequalities containing 'l' and 's' B1 for each correct line drawn Accept solid lines Accept sight of $l=13$ if $l=12$ shown If more than one horizontal line drawn, $l=12$ needs to be clearly marked or used for the region B1 Correct region shown FT from 'their' lines provided at least two correct and region enclosed by the three lines Accept 'shading out' Allow B1 if $l=13$ used (instead of $l=12$) AND at least one other line correct
16.(a)(iii) 8 small and 14 large tables	B1	CAO B0 if more than one solution given
16.(b)(i) '0-15' bar drawn with height 0.6	B2	B1 for 9/15 oe seen
16.(b)(ii) 44 $\frac{44}{110} (\times 100)$ 40(%)	B2 M1 A1	B1 for $10 \times 2.6 (=26)$ OR $20 \times 0.9 (=18)$ Check the histogram FT 'their 26' + 'their 18' provided one correct and total not equal to 35 (from $26 + 9$) On FT the percentage must be given correctly to the nearest whole number or better
	(13)	

17. $(3x - 5)(x + 4) (=0)$ $(x=) 5/3, (x=) -4$	B2 B1	B1 for one of the following: $(3x...5)(x...4)$ - two brackets that expand to give $3x^2 + 7x + k$ OR $3x^2 + mx - 20$ STRICT FT from 'their' brackets provided at least B1 previously awarded, with at least one answer a fraction. Accept '$x=5/3$ or $x=-4$', which is correct, allow for e.g. '$x=5/3$ and $x=-4$' Do not accept 1.6 or 1.7 only 1.66(...) If no marks award SC1 for $(x=) 5/3, (x=) -4$ Use of formula – no marks
	(3)	
18.(a) $2 \times \pi \times 12 \times 7 + 2 \times \pi \times 12 \times 12$ $(168\pi + 288\pi)$ 456π (cm²)	M3 A1	M2 for $2 \times \pi \times 12 \times 7 + \pi \times 12 \times 12$ $(168\pi + 144\pi = 312\pi)$ OR $2 \times \pi \times 12 \times 7$ AND $2 \times \pi \times 12 \times 12$ (168π) AND (288π) M1 for $2 \times \pi \times 12 \times 7$ OR $2 \times \pi \times 12 \times 12$ (168π) OR (288π) CAO
18.(b) (Volume of wedge =) $\frac{30}{360} \times \pi \times r^2 \times 8$ (Fraction =) $\frac{\frac{30}{360} \times \pi \times r^2 \times 8}{\pi \times r^2 \times 25}$ $\frac{2}{75}$	M2 M2 A1	Allow a number for 'r' provided used correctly M1 for $\frac{30}{360} \times \pi \times r^2$ FT from M1 M1 for sight of $\pi \times r^2 \times 25$ CAO
<i>Alternative method</i> <i>Candidates that do not calculate volumes</i> $\frac{30}{360} \times \frac{8}{25}$ $\frac{2}{75}$	M4 A1	If no marks SC1 for sight of $\frac{30}{360}$ AND $\frac{8}{25}$
	(9)	

19.(a)(i) Anya is incorrect with idea that they could be in any order i.e. SF' + S'F e.g. 'Anya has calculated the probability of passing Spanish only' 'Anya hasn't calculated the probability of passing French only'	E1	Do not allow the E1 for numerical 'explanations' only i.e. 'It should be $0.6 \times 0.3 + 0.4 \times 0.7$' Do not accept 'she hasn't added the results together' unless explanation given for what is meant by 'results'
19.a(ii) $(0.6 \times 0.3) + (0.4 \times 0.7)$ 0.46 oe	M1 A1	Award marks if seen in a(i) and not replaced. CAO
19.(b) $0.6 \times 75 + 0.2 \times (75 - 0.6 \times 75)$ (=45 + 6) $\frac{51}{75}$ oe ISW	M3 A1	Allow for appropriate sight of 45 AND/OR 6 throughout M2 for 0.6×75 AND $0.2 \times (75 - 0.6 \times 75)$ (=45) (=6) M1 for one of the following: • 0.6×75 • 45 • $0.2 \times (75 - 0.6 \times 75)$ • 0.2×30 • 6 CAO
<u>Alternative method</u> $0.6 + (1 - 0.6) \times 0.2$ oe 0.68	M3 A1	M2 for $(1 - 0.6) \times 0.2$ oe. (= 0.08) M1 for $0.6 + 0.2 \times \dots$ or $0.6 + (1 - 0.6) \times \dots$ oe
	(7)	
20.(a) $(\cos 30) = \frac{\sqrt{3}}{2}$ $(\tan 30) = \frac{1}{\sqrt{3}}$ OR $\frac{\sqrt{3}}{3}$	B1 B1	Allow $\frac{\sqrt{1}}{\sqrt{3}}$

20.(b)		
(CD =) $10 \times \sin 30$	M2	Allow $10 \times \frac{1}{2}$ OR $10 \div 2$
		M1 for $\sin 30 = \frac{CD}{10}$
5(cm)	A1	An unsupported 5 (cm) is awarded M0 A0
(AD ² =) $12^2 + 5^2$	M1	FT 'their derived 5', from use of trigonometry or unsupported 5. Allow M1 only for $AD^2 = 12^2 + CD^2$
(AD =) $\sqrt{169}$ or $AD^2 = 169$	A1	FT 'their derived 5'.
(AD =) 13 (cm)	A1	CAO
	(8)	
21.		
(Total of the 3 values =) $18\sqrt{3}$	B1	May be seen in later working
$(\frac{12}{\sqrt{3}} =) 4\sqrt{3}$	B1	
$(\sqrt{3}^5 =) 9\sqrt{3}$	B1	
$(x = 18\sqrt{3} - 4\sqrt{3} - 9\sqrt{3} =) 5\sqrt{3}$	B1	FT provided at least B2 previously awarded, the third value of the form $a\sqrt{3}$ and $x > 0$ Mark the final answer unless x clearly identified
<u>Alternative method 1 (multiplying by $\sqrt{3}$)</u>		
(Total of the 3 values =) $18\sqrt{3}$	B1	May be seen in later working
$\sqrt{3}x + 12 + \sqrt{3}^6 = 54$	B1	FT their $a\sqrt{3}$
$\sqrt{3}^6 = 27$	B1	Using $(x + \frac{12}{\sqrt{3}} + \sqrt{3}^5 = 18\sqrt{3}) \times \sqrt{3}$
$x = (\frac{54 - 12 - 27}{\sqrt{3}} =) 5\sqrt{3}$	B1	FT provided at least B1 B1 previously awarded, $\sqrt{3}^6$ is an integer and $x > 0$ Mark the final answer unless x clearly identified
<u>Alternative method 2 (multiplying by $\sqrt{3}$)</u>		
(Total of the 3 values =) $18\sqrt{3}$	B1	May be seen in later working
$(\sqrt{3}^5 =) 9\sqrt{3}$	B1	
$\sqrt{3}x + 12 + 27 = 54$ or better	B1	FT their $a\sqrt{3}$
$x = (\frac{54 - 12 - 27}{\sqrt{3}} =) 5\sqrt{3}$	B1	Using $(x + \frac{12}{\sqrt{3}} + 9\sqrt{3} = 18\sqrt{3}) \times \sqrt{3}$
		FT their $a\sqrt{3}$ provided at least B1 B1 previously awarded and $x > 0$ Mark the final answer unless x clearly identified
	(4)	

22. $(y =) (x + 7)^2 + 21$ Turning point $(-7, 21)$	B2 B2	Mark final answer B1 for sight of $(x+7)^2$ or $(x + (14 \div 2))^2$ Ignore sight of '=0' Must follow from B1 FT from 'their' $(x+7)^2$ for the x coordinate FT 'their' 21 but not 70 or -49 for the y coordinate B1 for $(-7, \dots)$ or $(\dots, 21)$
	(4)	
23.(a)(i) $(\mathbf{RQ} =) -(\mathbf{f} + 5\mathbf{g}) + (4\mathbf{f} + 3\mathbf{g})$ $3\mathbf{f} - 2\mathbf{g}$ $k = 1/3$	M1 A1 A1	Unsupported ($k =$) $1/3$ is awarded no marks
23.(a)(ii) RQ and OP are parallel OP is 3 times <u>the length</u> of RQ or RQ is $1/3$ of <u>the length</u> of OP	E1 E1	Allow the use of vector notation Do not allow 'they both go in same direction' STRICT FT for 'their k' from (i) Do not accept $OP = 3 \times RQ$ OR $RQ = \frac{1}{3} \times OP$
23.(b) $(\mathbf{PX} =) -18\mathbf{f} + 12\mathbf{g}$	B2	Allow B2 for $m = -18$ and $n = 12$ B1 for $(\mathbf{PX} =) 2(-9\mathbf{f} + 6\mathbf{g})$ or $-2(9\mathbf{f} - 6\mathbf{g})$ If no marks award SC1 for $(\mathbf{PX} =) 18\mathbf{f} - 12\mathbf{g}$ or $m = 18$ and $n = -12$
	(7)	
24.(a) Translation through $\begin{pmatrix} k \\ 0 \end{pmatrix}$, where $k > 0$ Minimum point labelled $(1, 0)$ or scale marked 	B1 B1	Allow intention of correct shape IF no marks award SC1 for a correct sketch of $y = f(x+3)$ with minimum point labelled $(-5, 0)$ or scale marked

