EDUQAS GCSE MATHEMATICS

SUMMER 2024 MARK SCHEME

GCSE (9-1) Mathematics Component 1: Higher Tier	Mark	Comment
1. $\frac{8 \times 10}{0{\cdot}2}$ or better 400	 M2 A1	 Award M1 for any one of the following: • sight of any TWO of 8, 10 or 0·2 • $\frac{2^3 \times \sqrt{100}}{0{\cdot}2}$ CAO
	(3)	
2. 11c + 3 = 4c + 8 7c = 5 or -5 = -7c c = $\frac{5}{7}$	 B1 B1 B1	FT until 2nd error 11c + 3 = c + 6 counts as 2 errors ISW If 5/7 not seen, accept 0·71….or 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 x 825 or 5 x 495 or 11 x 225 or 15 x 165 or 25 x 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 x 5^2 x 7^2	 B2	 B1 for sight of • 8 x 5^2 x 7^2 • 8 x 25 x 49
	(5)	

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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 ≤ £10, £10 < c ≤ £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 consistent £1 gap e.g. £0 £1 to £10, £11 to £20, £21 or more *Note: If inequalities are used then allow e.g.* *< 5, 5 - 10, 11 - 15, > 15* *OR 5 >, 5 - 10, 11 - 15, 15 <* *OR 0 ≤ 10, 11 ≤ 20, 21 ≤ 30, ≥ 31* *where the inequalities are in the correct directions and the groups are clear.* *Treat as one error incorrect use e.g.* *0 ≥10, 11 ≥ 20, 21 ≥ 30, 31 ≥* 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.'

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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	B3	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)
x = 8	B1	
(Capacity =) 240 (litres)	B1	An answer of 240 (litres) implies the previous B1 If B2 awarded and x ≠ 8 award a further SC2 for a correctly evaluated answer to 30 × '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 $^{11}/_{21} - 45 = {}^{6}/_{21}$	B1	May be implied by M1
45 ÷ 5 x 7 oe OR 9 x 7 (£)63	M1 A1	FT an arithmetic error in 'their 11 – 2x3' for M1 A0
	(4)	

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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>	B2	1 mark for 2 or 3 correct If more than one box ticked for any row, mark as incorrect.
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 $\frac{2}{'their\ 2\times3+1'}$ or $\left(\frac{7}{2}\right)^{-1}$
8.(c) 1	B1	
	(5)	

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9*. 36 $\times \frac{6}{9}$ 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. <u>Printers</u> <u>Booklets</u> <u>Time</u> 9 n 24 **FT from M0 previously awarded** Must be from use of 36 e.g. if this calculation is performed first <u>Printers</u> <u>Booklets</u> <u>Time</u> 6 0.5n 18 CAO
<u>Alternative method 1</u> *Printers first then booklets* ***Printers*** / ***Booklets*** / ***Time*** *6* / *n* / *36* × 1.5 / × 1.5 / *9* / *1.5n* / *36* / ÷ 3 / ÷ 3 *9* / *½ n* / *12*	 *M1* *M1* *A1*	*Note: the number of booklets may be an assumed number* FT 9 and 'their 36' CAO
<u>Alternative method 2</u> *Booklets first then printers* ***Printers*** / ***Booklets*** / ***Time*** *6* / *n* / *36* *÷ 2* / *÷ 2* / *3* / *½ n* / *36* *× 3* / / *÷ 3* *9* / *½ n* / *12*	 *M1* *M1* *A1*	*Note: the number of booklets may be an assumed number* FT *½ n* and 'their 3' CAO
<u>Alternative method 3</u> *(using 1 printer)* ***Printers*** / ***Booklets*** / ***Time*** *6* / *n* / *36* *÷ 6* / / *× 6* *1* / *n* / *216* *× 9* / / *÷ 9* *9* / *n* / *24* / *÷ 2* / *÷ 2* *9* / *½ n* / *12*	 *M1* *M1* *A1*	*Note: the number of booklets may be an assumed number* *Two steps needed for M1* FT 9 and 'their 24' CAO
<u>Alternative method 4</u> *(using 1 printer)* ***Printers*** / ***Booklets*** / ***Time*** *6* / *n* / *36* *÷ 6* / / *× 6* *1* / *n* / *216* / *÷ 2* / *÷ 2* *1* / *½ n* / *108* *× 9* / / *÷ 9* *9* / *½ n* / *12*	 *M1* *M1* *A1*	*Note: the number of booklets may be an assumed number* *Two steps needed for M1* FT *½ n* and 'their 108' CAO
	(3)	

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10*.(a) (£)72	B2	B1 for 54 ÷ 3 x 4 OR 54 ÷ 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. FT provided at least one equation is correct and consistent place value, with equivalent level of difficulty.
Method to eliminate one variable e.g. equal coefficients with intention to subtract OR rearranges one equation and substitutes into the other	M1	Allow 1 error in one term, not one with equal coefficients
First variable correct	A1	C.A.O. Accept in £ or p **apple = 30p** or **banana = 45p**
Method to calculate second variable	m1	FT their '1st 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.
<u>Alternative method</u> (for candidates who do not find the values of both variables) *3a + 4b = 2(.)70. AND* *2a + 3b = 1(.)95* *(£)2.10 or 210(p)*	*B1* *SC5*	*Both equations given, a & b may be other letters, words are accepted.* *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) 4.3×10^{11}	B2	B1 for sight of the correct value not in standard form e.g. 0.43×10^{12} or 430 000 000 000

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12.(b) 7.9×10^5	B2	Be aware of correct answer from incorrect work. Award B0. 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 $2^5 \times 2^{7\times3}$ or $2^{5+7\times3}$ 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) odd × even → even (since n+1 and n + 2 are consecutive numbers so one will be odd and one even)	B1 B1	Allow n(n+3) + 2 with (odd x even) or (even x odd) is even then + 2 is even 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.* *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*
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)	

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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 √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) 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
	(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 ≤ instead of <.

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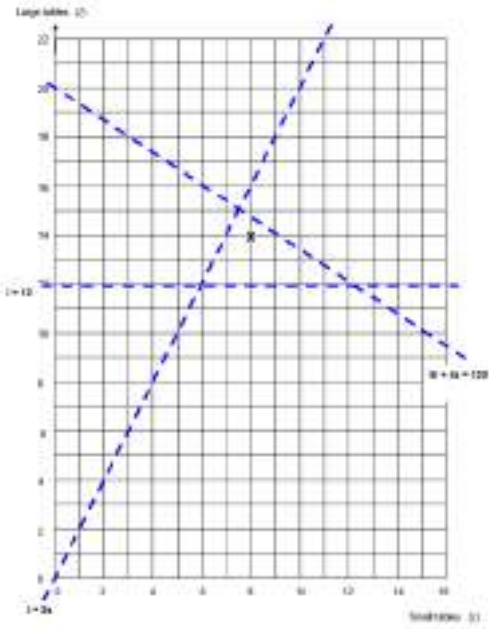
16.(a) (ii) 	B3 B1	FT from 'their conditions 2 and 3' provided both conditions are inequalities containing 'l' and 's' B1 for each correct line drawn Accept solid lines Accept sight of l=13 if l=12 shown If more than one horizontal line drawn, l=12 needs to be clearly marked or used for the region Correct 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 $\frac{44}{110}$ (× 100) 40(%)	B2 M1 A1	B1 for 10 × 2.6 (=26) OR 20 × 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)	

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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 × π × 12 × 7 + 2 × π ×12 × 12 (168π + 288π) 456π (cm^2)	M3 A1	M2 for 2 × π × 12 × 7 + π ×12 × 12 (168π + 144π = 312π) OR 2 × π ×12 × 7 AND 2 × π ×12 × 12 (168π) AND (288π) M1 for 2 × π ×12 × 7 OR 2 × π ×12 × 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 π × r^2 × 25 CAO
Alternative method *Candidates that do not calculate volumes* $\frac{30}{360} \times \frac{8}{25}$ $\frac{2}{75}$	 M4 A1	 If no marks SC1 for sight of $\frac{30}{360}$ AND $\frac{8}{25}$
	(9)	

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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 × 0.3 + 0.4 × 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 x 0.3) + (0.4 x 0.7) 0.46 oe	M1 A1	Award marks if seen in a(i) and not replaced. CAO
19.(b) 0·6x75 + 0·2x(75-0·6x75) (=45 + 6) $\frac{51}{75}$ oe ISW	M3 A1	Allow for appropriate sight of 45 AND/OR 6 throughout M2 for 0·6x75 AND 0·2x(75-0·6x75) (=45) (=6) M1 for one of the following: • 0·6 × 75 • 45 • 0·2 × (75 - 0·6 × 75) • 0·2 × 30 • 6 CAO
Alternative method *0·6 + (1 - 0·6) × 0.2. oe* 0·68	*M3* *A1*	*M2 for (1 – 0·6) × 0·2 oe. (= 0·08)* *M1 for 0.6 + 0.2 × ….. or 0.6 + (1 – 0.6) × …. oe*
	(7)	
20.(a) (cos 30 =) $\frac{\sqrt{3}}{2}$ (tan 30 =) $\frac{1}{\sqrt{3}}$ OR $\frac{\sqrt{3}}{3}$	B1 B1	 Allow $\frac{\sqrt{1}}{\sqrt{3}}$

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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	
$(\sqrt{3}^5 =) \quad 9\sqrt{3}$	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
Alternative method 1 (multiplying by $\sqrt{3}$) *(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 $a\sqrt{3}$* *Using $(x + \frac{12}{\sqrt{3}} + \sqrt{3}^5 = 18\sqrt{3}) \times \sqrt{3}$*
$\sqrt{3}^6 = 27$	*B1*	
$x = \left(\frac{54 - 12 - 27}{\sqrt{3}} =\right) \ 5\sqrt{3}$	*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*
Alternative method 2 (multiplying by $\sqrt{3}$) *(Total of the 3 values =) $18\sqrt{3}$*	*B1*	*May be seen in later working*
$(\sqrt{3}^5 =) \quad 9\sqrt{3}$	*B1*	
$\sqrt{3}x + 12 + 27 = 54$ or better	*B1*	*FT their $a\sqrt{3}$* *Using $(x + \frac{12}{\sqrt{3}} + 9\sqrt{3} = 18\sqrt{3}) \times \sqrt{3}$*
$x = \left(\frac{54 - 12 - 27}{\sqrt{3}} =\right) \ 5\sqrt{3}$	*B1*	*FT their $a\sqrt{3}$ provided at least B1 B1 previously awarded and x > 0* *Mark the final answer unless x clearly identified*
	(4)	

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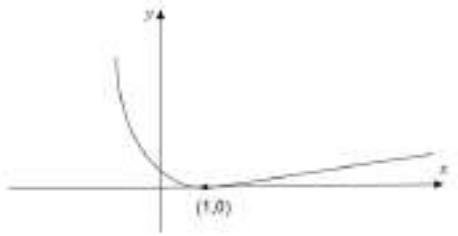
22. (y =) $(x + 7)^2 + 21$ Turning point (−7, 21)	 B2 B2	 Mark final answer B1 for sight of $(x+7)^2$ or $(x + (14\div2))^2$ Ignore sight of '=0' Must follow from B1 FT from 'their' $(x+7)^2$ for the x coordinate FT 'their' 21 but not 70 or −49 for the y coordinate B1 for (−7, ….) or (…. , 21)
	(4)	
23.(a)(i) (**RQ** =) - (**f** + 5**g**) + (4**f** + 3**g**) 3**f** – 2**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 the length of RQ or RQ is 1/3 of the length 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 = 3xRQ OR RQ = $\frac{1}{3}$xOP
23.(b) (**PX**=) -18**f** + 12**g**	 B2	 Allow B2 for m = -18 and n = 12 B1 for (**PX** =) 2(-9**f** + 6**g**) or -2(9**f** - 6**g**) If no marks award SC1 for (**PX** =) 18**f** - 12**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

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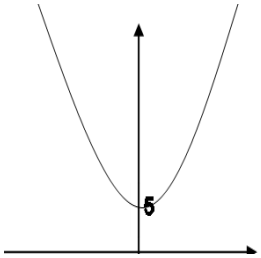
24.(b) Reflection in the x-axis	B1	Allow intention of correct shape. Allow this B1 for an inverted curve of the correct shape.
Translation through $\begin{pmatrix}0\\k\end{pmatrix}$, where $k > 0$	B1	Allow B1 for translation of $y = g(x)$ by $\begin{pmatrix}0\\5\end{pmatrix}$ with maximum point labelled (0,5) or scale marked
Minimum point labelled at (0,5) or scale marked  	B1	CAO.
	(5)	

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