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## Mark Scheme (Results)

November 2020

Pearson Edexcel GCSE  
In Mathematics (1MA1)  
Higher (Calculator) Paper 2H

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## General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

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

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

- 2** All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no 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.

**Questions where working is not required:** In general, the correct answer should be given full marks.

**Questions that specifically require working:** In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

- 3** **Crossed out work**

This should be marked **unless** the candidate has replaced it with an alternative response.

- 4** **Choice of method**

If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

- 5** **Incorrect method**

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 for your Team Leader to check.

- 6** **Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, 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.

**7 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 or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg incorrect algebraic simplification).

**8 Probability**

Probability answers must be given as a fraction, percentage or decimal. 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 fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

**9 Linear equations**

Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified 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).

**10 Range of answers**

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

**11 Number in brackets after a calculation**

Where there is a number in brackets after a calculation eg  $2 \times 6 (=12)$  then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.

**12 Use of inverted commas**

Some numbers in the mark scheme will appear inside inverted commas eg "12"  $\times$  50 ; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

**13 Word in square brackets**

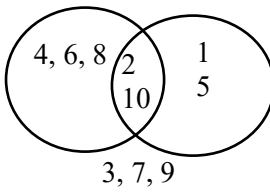
Where a word is used in square brackets eg [area]  $\times$  1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.

**14 Misread**

If a candidate misreads a number from the question. eg uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

### Guidance on the use of abbreviations within this mark scheme

<b>M</b>	method mark awarded for a correct method or partial method
<b>P</b>	process mark awarded for a correct process as part of a problem solving question
<b>A</b>	accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
<b>C</b>	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
<b>B</b>	unconditional accuracy mark (no method needed)
<b>oe</b>	or equivalent
<b>cao</b>	correct answer only
<b>ft</b>	follow through (when appropriate as per mark scheme)
<b>sc</b>	special case
<b>dep</b>	dependent (on a previous mark)
<b>indep</b>	independent
<b>awrt</b>	answer which rounds to
<b>isw</b>	ignore subsequent working

Paper: 1MA1/2H					
Question	Answer	Mark	Mark scheme	Additional guidance	
1 (a)	$2 \times 2 \times 3 \times 7$	M1	for a complete method to find prime factors, could be shown on a factor tree, with no more than one arithmetic error <b>or</b> for 2, 2, 3, 7	Condone the use of 1  Accept $2^2 \times 3 \times 7$  60, 120, 180, 240, 300, 360, 420 84, 168, 252, 336, 420 $60 = 2 \times 2 \times 3 \times 5$ or $2^2 \times 3 \times 5$ If factor tree in (a) is incorrect ft this factor tree in part3 (b) for M1 only	
		A1	for $2 \times 2 \times 3 \times 7$ oe		
	(b)	420	M1		for at least 3 multiples of both 60 and 84 (can include 60 and 84) <b>or</b> finds the prime factors of both 84 (may be seen in (a)) and 60, may be seen in factor trees
			A1		420 <b>or</b> $2 \times 2 \times 3 \times 5 \times 7$ oe
2 (a)	Venn diagram	M1	for correct numbers in at least one region	Ignore all entries except the region you are marking for each method mark  	
		M1	for correct numbers in at least two regions		
		A1	for all regions correct		
	(b)	$\frac{2}{10}$	M1		for $\frac{a}{10}$ where $0 < a < 10$ and $a$ is an integer <b>or</b> $\frac{2}{b}$ where $b > 2$ and $b$ is an integer <b>or</b> ft diagram
			A1		$\frac{2}{10}$ oe <b>or</b> ft diagram
			Need not be written in correct form at this stage eg could be a ratio 2 : 10 Repeated digits in the diagram should be counted as 2 elements  Accept any equivalent fraction, decimal form 0.2 or percentage form 20%		



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
5	99.5	M1  A1	for $\sin(34) = \frac{x}{178}$ oe <b>or</b> alternative method to find $x$  for answer in range 99.5 to 99.7	If an answer in the range 99.5 to 99.7 is given in the working space then incorrectly rounded, award full marks
6	$\begin{pmatrix} -9 \\ 14 \end{pmatrix}$	M1  A1	for $2\begin{pmatrix} 3 \\ 4 \end{pmatrix} - 3\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ <b>or</b> $\begin{pmatrix} 6 \\ 8 \end{pmatrix}$ <b>and</b> $\begin{pmatrix} 15 \\ -6 \end{pmatrix}$ <b>or</b> $\begin{pmatrix} -9 \\ y \end{pmatrix}$ <b>or</b> $\begin{pmatrix} x \\ 14 \end{pmatrix}$  cao	May be seen in two separate calculations eg $2 \times 3 + -3 \times 5$ and $2 \times 4 + -3 \times -2$ Condone incorrect notation if method is clear for this mark only
7	35.3	P1  P1  P1  A1	for starting the process to find length of third side of triangle, eg $9^2 - 6^2 (= 45)$ <b>or</b> $6^2 + x^2 = 9^2$  for $\sqrt{9^2 - 6^2}$ or $\sqrt{81 - 36}$ or $\sqrt{45}$ or $3\sqrt{5}$ ( $= 6.7..$ ) <b>or</b> $r^2 = 45$  for stating or using $\pi \times [\text{radius}]^2 \div 4$  for answer in range 35.2 to 35.4	[radius] is any value  If an answer in the range 35.2 to 35.4 is given in the working space then incorrectly rounded, award full marks No working, answer only, no marks



Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
8 (a)	580	M1	for method to find value before increase eg $551 \div 0.95$	
		A1	cao	
(b)	6354.67	M1	for $6000 \times 1.024$ oe (= 6144)	
		M1	for “6144” $\times 1.017^2$ oe	$6000 \times 1.024 \times 1.017^2$ scores M2
		A1	for 6354.66 <b>or</b> 6354.67 <b>or</b> 6354.68	If correct answer is stated then subsequently rounded isw and award 3 marks If correct answer stated and then interest only given as the answer award M2A0
9	Two changes	C1	plot the median at 162, not 161 oe	
		C1	plot the upper quartile at 171, not 172 oe	
			<b>Acceptable examples</b> the median has been plotted at 161 / upper quartile at 172 the upper quartile should be 171 (not 172) UQ is wrong as IQR is 17 not 18	
			<b>Not acceptable examples</b> the median / upper quartile have been plotted / drawn wrong the upper quartile has been worked out incorrectly She needs to work out the UQ	

Paper: 1MA1/2H					
Question	Answer	Mark	Mark scheme	Additional guidance	
10 (a)	1	B1	cao		
(b)	$\frac{8}{x-4}$	B1	cao		
(c)	$27n^{12}w^6$	B2 (B1)	cao for two of 27, $n^{12}$ , $w^6$ in a product)		
11	Yes (supported)	P1  C1	for process to find number of combinations, eg $5 \times 8$ oe (= 40) <b>or</b> for $240 \div 5$ (= 48) <b>or</b> $240 \div 8$ (= 30) <b>or</b> for $240 \div 5 \div 8$ (= 6) <b>or</b> $5 \times 8 \times x = 240$  Yes <b>and</b> 6		
12 (a)	-0.09	M1  A1	for suitable method to find gradient, eg $27 \div 300$  for answer in the range -0.1 to -0.08 oe	Any readings from the graph must be reasonable. Condone missing negative for M1	
(b)		C1	for explanation  <b>Acceptable examples</b> volume of petrol used each km litres/km Rate of fuel consumption For every 9 litres you can travel 100 km <b>Not acceptable examples</b> volume $\div$ distance volume of petrol used per distance km/litre as distance increases volume decreases	Can fit explanation linked to incorrect gradient in part (a)	

Paper: 1MA1/2H					
Question	Answer	Mark	Mark scheme		Additional guidance
13	15.4	M1  M1  A1	for $\frac{AB}{\sin 34} = \frac{23.8}{\sin 120}$ or $\frac{\sin 34}{AB} = \frac{\sin 120}{23.8}$  for $(AB =) \frac{23.8}{\sin 120} \times \sin 34$  for answer in range 15.36 to 15.4		“120” comes from $180 - 26 - 34$    If an answer in the range 15.36 to 15.4 is given in the working space then incorrectly rounded, award full marks
14	116	P1  P1  A1  B1	for setting up an equation, eg $(x + 4)^2 = x^2 + 70$  for process to reduce equation down to a linear equation ready to solve eg $8x = 54$ oe  for 6.75 oe  ft (dep P2) for finding the area of B or for answer in range 115 to 116	for setting up an equation, eg $x^2 - (x - 4)^2 = 70$  for process to reduce equation down to a linear equation ready to solve eg $8x = 86$ oe  for 10.75 oe	Equation must be in a single variable. If a candidate uses a trial and improvement method, it is either full marks or no marks.  Candidates must get as far as $ax = b$
15	Enlargement sf -1.5 centre (1, 1)	B2  (B1)	for enlargement scale factor -1.5 and centre (1, 1)  for enlargement scale factor -1.5 or enlargement centre (1, 1)		Award no marks if more than one transformation is given

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
16	$3n^2 + 2n + 5$	M1	for a correct start to a method to find the $n$ th term, eg equal 2nd differences imply a term in $n^2$	Need to see constant second difference found and $n^2$  $3n^2 + 2n$ implies M2
		M1	for working with $3n^2$ , eg $3n^2$ and sequence 7, 9, 11, ...	
		A1	for $3n^2 + 2n + 5$	
17	$-12, -7$	B1	cao	
18	$160\pi$	P1	for process to find curved surface area of cone, eg $\pi \times 10 \times 25 (= 250\pi) (= 785\dots)$	15 comes from $25 - 10$ $\frac{15}{25}$ may be seen as 0.6  Award 0 marks for an answer of $160\pi$ or an answer in range 502 to 503 with no supportive working. If $160\pi$ seen but answer in range 502 to 503 given on answer line isw and award full marks
		P1	for process to find the radius or diameter of the smaller cone eg $10 \times \frac{15}{25} (= 6)$ <b>or</b> $20 \times \frac{15}{25} (= 12)$ oe  <b>OR</b> uses area scale factor, eg “ $250\pi$ ” $\times \left(\frac{15}{25}\right)^2 (= 90\pi)$	
		P1	for a complete process, eg “ $250\pi$ ” $- \pi \times “6” \times 15 (= 785\dots - 282\dots)$ <b>or</b> answer in range 502 to 503	
		A1	for $160\pi$	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
19	788.4	P1 P1 P1 A1	for substituting values, eg $1040 = K \times 1200 + 20$ for process to find $K$ , eg $(1040 - 20) \div 1200$ oe ( $= 0.85$ ) for complete process, eg 09 17: “0.85” $\times$ 1040 + 20 ( $= 904$ ); 09 18: “0.85” $\times$ “904” + 20 for 788.4 or 788 or 789	
20 (a)	Shown	M1 M1 C1	for $\frac{n}{n+8}$ <b>or</b> starts to work with ratios, eg 3:7 forms equation and clears fractions, eg $10n = 7n + 56$ or $10n + 3(n+8) = 10(n+8)$ <b>or</b> equates $\frac{3}{10} = \frac{8}{x}$ or $\frac{3}{10} = \frac{8}{n+8}$ <b>or</b> continues to work with ratios, eg 3:7 = 24:56 gives the total sweets eg $\frac{80}{3}$ oe <b>or</b> number of red sweets $n = \frac{56}{3}$ oe <b>or</b> gives number of red as $\frac{56}{3}$ <b>OR</b> award 3 marks for a complete written argument, eg, $P(y) = \frac{3}{10}$ and there are 8 yellows. This cannot work as 3 is not a factor of 8 (and $\frac{3}{10}$ is in its simplest form)	Does not have to restate the $\frac{7}{10}$ ; giving a different probability will suffice

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
20 (b)	28	P1	for $\frac{n}{n+8}$ and $\frac{n-1}{n+7}$ oe	
		P1	forms an appropriate equation, eg $\frac{n}{n+8} \times \frac{n-1}{n+7} = \frac{3}{5}$	
		P1	for correctly forming a quadratic ready for solving, eg $an^2 + bn + c (= 0)$ , $2n^2 - 50n - 168 (= 0)$ , $n^2 - 25n - 84 (= 0)$ oe	Note we do not need to see “= 0”; just the LHS is sufficient.
		P1	process to solve quadratic equation, ft a 3 term quadratic factorising eg $(n + 3)(n - 28) (=0)$ oe <b>or</b> completing the square <b>or</b> correct use of formula eg $\frac{- -25 \pm \sqrt{25^2 - 4 \times -84}}{2}$ , $\frac{- -50 \pm \sqrt{50^2 - 4 \times 2 \times -168}}{2 \times 2}$	
		A1	cao	Award 0 marks for a correct answer with no supportive working.

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
21 (a)	Graph drawn	C2	for graph reflected in the $y$ -axis	Key points: (0, 0), (1, 2), (2, 1), (3, 0), (4, 2) Award C1 if line segments but goes through all key points
		(C1)	for a graph reflected in the $x$ -axis <b>or</b> for a correct graph through four of the five key points)	
(b)	$y = 5 + 2(x - 3) - (x - 3)^2$	C2	for $y = 5 + 2(x - 3) - (x - 3)^2$ oe eg $y = -x^2 + 8x - 10$ , $y = -[(x-4)^2 - 6]$	For either C mark accept equivalent expressions If a correct answer for C2 is given and is then incorrectly simplified, award C1 $a$ need not be positive
		(C1)	for $y = 5 + 2(x + 3) - (x + 3)^2$ <b>or</b> $y = 5 + 2(x - a) - (x - a)^2$ , $a \neq 3$ , $a \neq 0$ <b>or</b> $y = f(x - 3)$ <b>or</b> $y = (x - 4)^2 + 6$ <b>or</b> correct expression missing “ $y =$ ”	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
22	$x^2 + y^2 = 80$	P1	<p>for process to find gradient of tangent eg <math>\frac{10-0}{0--20} (= \frac{1}{2})</math></p> <p><b>or</b> for <math>20^2 + 10^2 (= 500)</math></p> <p><b>or</b> start to method to find angle between tangent and x axis, eg <math>\tan \theta = \frac{10}{20}</math></p>	
		P1	<p>for process to find gradient of normal/radius eg <math>\frac{-1}{"0.5"} (= -2)</math></p> <p><b>or</b> for <math>\sqrt{20^2 + 10^2}</math> or <math>\sqrt{500}</math> or 22.36... or 22.4</p> <p><b>or</b> completes process to find angle between tangent and x axis. eg <math>\theta = \tan^{-1}\left(\frac{10}{20}\right) (= 26.565\dots)</math></p>	
		P1	<p>for equation of tangent eg <math>y = "0.5"x + 10</math> oe or for equation of radius eg <math>y = "-2"x</math> oe</p> <p><b>or</b> for using similar triangles eg <math>\frac{r}{10} = \frac{20}{\sqrt{500}}</math></p> <p><b>or</b> for <math>\sin("26.565\dots") = \frac{r}{20}</math></p>	
		P1	<p>for process to find the x coordinate eg <math>"0.5"x + 10 = "-2"x</math> (<math>x = -4</math>)</p> <p><b>or</b> for <math>r = \frac{20}{\sqrt{500}} \times 10</math></p> <p><b>or</b> <math>r = 20 \times \sin("26.565\dots")</math></p>	
		A1	oe	Accept $(4\sqrt{5})^2$ for 80



## Modifications to the mark scheme for Modified Large Print (MLP) papers: 1MA1 2H

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:  $\pm 5^\circ$

Measurements of length:  $\pm 5$  mm

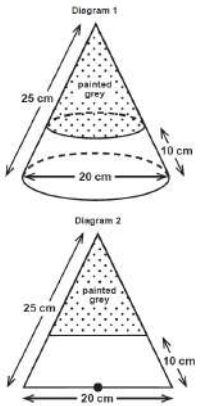
PAPER: 1MA1/2H		
Question	Modification	Mark scheme notes
2	Wording added "Look at the diagram for Question 22 in the Diagram Book. It shows an incomplete Venn diagram." Diagram enlarged. Labels "set A" and "set B" moved above the circles. Braille only: The Venn diagram labelled (i) to (iv).	Standard mark scheme
4	(a) Wording added "There are four spaces to fill." Table enlarged and turned to vertical format.	Standard mark scheme
4	(b) Wording added "Look at the diagram for Question 24(b) in the Diagram Book. It shows a grid." Diagram enlarged. Small squares removed and intermediate lines added.	Standard mark scheme
5	Wording added "Look at the diagram for Question 25 in the Diagram Book. It shows a right-angled triangle ABC." Triangle labelled ABC. Wording added "Angle ABC is a right angle, Angle ACB = $34^\circ$ , AB = $x$ mm, AC=178 mm." Diagram enlarged. Right angle made thicker. Angle moved outside of the angle arc, and the arc has been made smaller.	Standard mark scheme
7	Wording added "Look at the diagram for Question 27 in the Diagram Book." Wording "The diagram shows..." removed and replaced with "It shows..." Wording added "AC = 9 metres, AB = 6 metres" Wording added "Angle BCD= $90^\circ$ ". Diagram enlarged. Right angles made thicker.	

**PAPER: 1MA1/2H**

<b>Question</b>	<b>Modification</b>	<b>Mark scheme notes</b>										
9	<p>Wording added “Look at the diagram for Question 9 in the Diagram Book. It shows a box plot.”</p> <p>Wording added “She used her results to work out the information in the table below.”</p> <p>Table values changed as shown:</p> <table border="1" data-bbox="495 432 1473 635"><tbody><tr><td>Least height</td><td>140 cm</td></tr><tr><td>Lower quartile</td><td>155 cm</td></tr><tr><td>Interquartile range</td><td>17 cm</td></tr><tr><td>Median</td><td>162 cm</td></tr><tr><td>Range</td><td>40 cm</td></tr></tbody></table> <p>Wording “Aisha drew this box plot...” removed and replaced with “Aisha drew the box plot in the Diagram Book...” Diagram enlarged. Axis label moved to the left of the horizontal axis.</p> <p>Box plot values changed as below: Least height: 140; Lower quartile: 155; Median: 160; Upper quartile: 175; Greatest height: 180</p>	Least height	140 cm	Lower quartile	155 cm	Interquartile range	17 cm	Median	162 cm	Range	40 cm	<p>Standard mark scheme but with the numerical values changed:</p> <p>C1 plot the median at 162, not 160 oe</p> <p>C1 plot the upper quartile at 175, not 172 oe</p>
Least height	140 cm											
Lower quartile	155 cm											
Interquartile range	17 cm											
Median	162 cm											
Range	40 cm											
12	<p>Wording added “Look at the diagram for Question 12 in the Diagram Book.”</p> <p>Wording “The graph gives information...” removed and replaced with “It shows a graph which gives information...” Diagram enlarged. Graph line made thicker. Right axis has been labelled. Axes labels moved to the left of the horizontal axis and to the top of the vertical axis.</p>	<p>Standard mark scheme but in part (a) allow some leeway in the award of the A mark.</p>										

<b>PAPER: 1MA1/2H</b>		
<b>Question</b>	<b>Modification</b>	<b>Mark scheme notes</b>
13	<p>Wording added “Look at the diagram for Question 13 in the Diagram Book.”</p> <p>Wording “Here is triangle ABC” removed and replaced with “It shows a triangle ABC.</p> <p>Diagram enlarged. Angle ACB = <math>34^\circ</math> Angle ABC = <math>26^\circ</math> CB = 23.8 cm”.</p> <p>Angles moved outside of the angle arcs, and the arcs has been made smaller.</p>	Standard mark scheme
14	<p>Wording added “Look at the diagram for Question 14 in the Diagram Book.” Diagram enlarged.</p> <p>Wording “Here are two squares, A and B” removed, replaced with “It shows two squares, A and B.”</p> <p>Labels removed and replaced with “square A” and “square B” above the squares.</p>	Standard mark scheme
15	<p>Two labelled cut out shapes provided for all candidates.</p> <p>The grid reduced in size and cut at <math>x = 6</math> and <math>y = -6</math>.</p> <p>Wording added “Look at the diagram for Question 15 in the Diagram Book. It shows triangle A and triangle B on a grid. Two cut out shapes may be available if you wish to use them.”</p> <p>Diagram enlarged. Shading changed to dotty shading. Shape outlines made thicker.</p> <p>Shapes labelled “triangle A” and “triangle B”. Labels moved above the shapes.</p>	Standard mark scheme

**PAPER: 1MA1/2H**

Question	Modification	Mark scheme notes
18	<p>Model provided for all candidates.                      Wording added “Look at the two diagrams for Question 18. You may be provided with a model.”                      “The diagram represents a solid cone” removed and replaced with “Diagram 1 and the model represent a solid cone. Diagram 2, below Diagram 1, shows a 2D view of the cone.”                      Diagram enlarged. Diagram 2 provided as a 2D representation of the cone.                      Grey shading removed and replaced with dotted shading.                      The diagrams labelled ‘painted grey’ where it is shaded. Dashed lines longer and thicker.</p> 	Standard mark scheme
21	<p>(a) Wording added “Look at the diagram for Question 21(a) in the Diagram Book.”                      Wording “The graph of the curve with equation ... is shown on the grid below” removed and replaced with “It shows the graph of the curve with equation ... on a grid.”                      Diagram enlarged. Curve made thicker.                      Wording “On the grid above,...” removed and replaced with “On the same grid, ...”</p>	Standard mark scheme
21	<p>(b) Wording added “Look at the diagram for Question 21(b) in the Diagram Book.”                      Diagram enlarged. Curves made thicker. Crosses changed to solid dots/circles.</p>	Standard mark scheme



