



Mark Scheme (Results)

November 2018

Pearson Edexcel GCSE (9 – 1)
In Mathematics (1MA1)
Higher (Calculator) Paper 2H

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November 2018

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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 (e.g. 3.5 – 4.2) then this is inclusive of the end points (e.g. 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 E.g. $2 \times 6 (=12)$ 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 E.g. "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

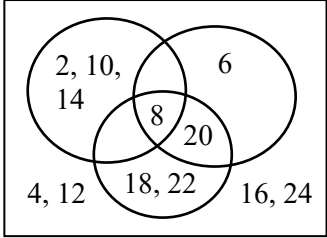
Where a word is used in square brackets E.g. [area] \times 1.5 : the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark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

M	method mark awarded for a correct method or partial method
P	process mark awarded for a correct process as part of a problem solving question
A	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)
C	communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
B	unconditional accuracy mark (no method needed)
oe	or equivalent
cao	correct answer only
ft	follow through (when appropriate as per mark scheme)
sc	special case
dep	dependent (on a previous mark)
indep	independent
awrt	answer which rounds to
isw	ignore subsequent working

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
1 (a)	Venn diagram	C4	fully correct Venn diagram	 <p>Need not be written as a fraction or probability at this stage. eg could be a ratio 1:12</p> <p>Acceptable equivalents are (eg, could fit) any fraction equivalent to $\frac{1}{12}$, 0.08(33..) or 8(.33..)%</p>
		(C3	7 of the 8 regions correct or for a diagram with only one number incorrectly placed)	
		(C2	5 or 6 of the 8 regions correct)	
		(C1	3 or 4 of the 8 regions correct)	
	(b)			
	$\frac{1}{12}$	M1	fit for identification of 1 or 12 eg from the diagram	
		A1	fit oe	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
2	statements	C1	<p>for lobf incorrect</p> <p>Acceptable examples lobf lobf does not suit all points/not a lobf lobf wrong since hits x axis/is inaccurate/should be amongst the crosses lobf goes through the origin/through one point</p> <p>Not acceptable examples no correlation/there is no title</p>	
		C1	<p>for height scale not linear</p> <p>Acceptable examples 150 missing Height not linear / Height numbers going up wrong</p> <p>Not acceptable examples 150 graph does not start at 140/graph does not start at 0 height should start at 170</p>	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
3	60	M1	use of parallel lines to find an angle eg $ABE=70$ or $EBG=75$ or $EBC = 110$ or shows parts of x as 35 or 25	Parts of x should be identified on the diagram by the insertion of a dividing line through angle x (need not be identified or drawn parallel).
		M1	for a complete method to find angle x ; could be in working or on the diagram	Correct method can be implied from angles on the diagram if no ambiguity or contradiction.
		A1	for $x = 60$	
		C1	(dep on M1) for one reason linked to parallel lines and one other reason, supported by working taken from: <u>alternate</u> angles are equal, <u>allied</u> angles / <u>co-interior</u> angles add up to 180, <u>angles</u> on a straight <u>line</u> add up to 180, <u>angles</u> in a <u>triangle</u> add up to 180°	Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked do not credit. There should be no incorrect reasons given.
4 (a)	Ben (supported)	P1	shows how to work interest out for one year eg $2000 \times 0.025 (= 50)$ or $1600 \times 0.035 (= 56)$ or 150 or 168 or $2000 \times 1.025 (= 2050)$ or $1600 \times 1.035 (= 1656)$	Throughout accept figures ± 1 pence which do not need to be presented in money notation (to 2dp) or with monetary symbols.
		P1	shows compound interest calculation for one account eg $2050 \rightarrow 51.25$ or $2101.25 \rightarrow 52.53$ or $1656 \rightarrow 57.96$ or $1713.96 \rightarrow 59.99$ eg $2000 \times 1.025^3 (= 2153.78)$ or $1600 \times 1.035^3 (= 1773.95)$	Award mark for a correct process shown, for which these figures can be taken as implying the process.
		P1	shows complete compound interest calculation for both accounts eg $2000 \times 1.025^3 (= 2153.78)$ and $1600 \times 1.035^3 (= 1773.95)$ OR one interest stated correctly eg 153.78 or 173.95	As above, award mark for both correct processes shown for both accounts, which these figures can be taken as implying the process.
		C1	Ben (shares) supported by 153.78 and 173.95	Accept an answer of “shares”.

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
4 (b)	conclusion	C1	<p>conclusion (ft) eg no change, shares now 182.5...</p> <p>Acceptable examples</p> <p>no since shares/Ben now 182.5</p> <p>Still Ben since $182.5 > \text{Ali}$</p> <p>No; he only gets 8.57 more</p> <p>No; he gets 68.56 instead of 59.98 (3rd yr)</p> <p>No; Ben already gets more interest, he would just get even more</p> <p>Not acceptable examples</p> <p>no</p> <p>shares now 182.5</p> <p>Still Ben since less than Ali</p> <p>$182.5 > 153.78$</p> <p>no; he needs 20.17 more</p>	Conclusion needs to be supported. ft is from part (a); calculations carried out as part of (b) need to be correct for the comparison to be valid.
5	No (supported)	P1 P1 P1 P1 C1	<p>calculates area of trapezium eg $\frac{1}{2} \times 7 \times (10+16)$ (= 91)</p> <p>for division by coverage eg $\div 2$ or [area of trapezium] $\div 2$ (= 45.5) or process to find coverage per tin eg 5×2 (= 10)</p> <p>for division to find the number of tins eg $\div 5$ or "45.5" $\div 5$ (= 9.1) or [area of trapezium] \div "10" (= 9.1)</p> <p>(dep on at least P2) for a process to multiply a whole number of tins (rounded up) by 16.99</p> <p>for 'No' supported by correct figures eg 169.9 or 90 and 91</p> <p>for process to find number of tins bought eg $160 \div 16.99 = 9$ tins</p> <p>for using whole no. of tins to find total litres eg 9×5 (= 45)</p> <p>(dep on at least P2) for a process to find the total coverage eg "45" $\times 2$ (= 90)</p>	<p>[area of trapezium] needs to be clearly stated if the process of finding the area is not clear</p> <p>There must be a conclusion ("No" or equivalent wording) including the figure 169.9 and working showing processes followed.</p>

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	7	P1 P1 A1	process to use gradient eg $y = 3x + c$ or $c = -6$ or $\frac{15-9}{d-5}$ or $(15 - 9) \div 3$ or $(6, 12)$ (dep) full process to rearrange equation formed to isolate d eg rearrangement of $15 = 3d - 6$ or $3 = \frac{15-9}{d-5}$ or for $5 + \frac{15-9}{3}$ cao	Condone use of a letter other than d , for d Must show processes to get as far as $d =$ Award P2 for an answer of $(7, 15)$
7 (a) (b)	8.623×10^{-5} 7.44×10^6	B1 M1 A1	cao for $\frac{3200 + 0.051}{0.00043}$ or $\frac{3200.051}{0.00043}$ or performs an operation eg shows 163.2, 7441860.5, 118.6(...) or an answer or $7.44(\dots) \times 10^n$ where $n \neq 6$ or 7441979(...) or an answer of 7.4×10^6 for $7.44(1979\dots) \times 10^6$	7441979.0689... If a correct answer is shown in working and then rounded incorrectly, award full marks. Answer need only be given correctly to 3 sig fig; if following digits are incorrect ignore them.
8	Rotation 90° anticlockwise centre $(-1, 1)$	M1 A1 A1	stating rotation or for showing R $[(1, 1), (1, -3), (3, -3)]$ for rotation of 90° anticlockwise for centre $(-1, 1)$ given as a coordinate.	Award for a triangle in the correct position without the label R as long as this is the only triangle in lower right quadrant. Accept rotation of 270° clockwise Can be given as a coordinate alone. Do not award A marks if there is evidence of other transformations in the description, or other ambiguity in the answer given.

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
9	$7 \leq N < 8$	M1 A1	for identifying the key numbers 7 and 8 cao	Ignore any inequality symbols used at this stage Accept 7.9 (recurring) for 8 as shown by 7.999 or 7.9... or recurring notation (or words)
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” $\div 5 = 49.6$ 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				
Question	Answer	Mark	Mark scheme	Additional guidance
11	1335	M1	for one correct procedure eg 9×15 (=135) or 15×8 (=120) or $9 \times 15 \times 8$ (=1080)	Ignore additional products.
		M1	for all three correct products eg “135”, “120”, “1080” or 9×15 , 15×8 , $9 \times 15 \times 8$ oe	Only these three products must be identified. There is no need to indicate summing at this stage.
		C1	for showing the three correct products added eg $135 + 120 + 1080$	There is no need to show the three products sum to 1335
12 (a)	$\frac{4x-6}{3x-9}$	M1	factorises numerator of $4x^2 - 9$ eg $(2x-3)(2x+3)$ oe	$\frac{2x(2x-3)(2x+3)}{3x(2x+3)(x-3)}$
		M1	factorises denominator eg $x(x-3)$ or $3(2x+3)$ or for $3x(2x^2 - 3x - 9)$	
		A1	cancels to give $\frac{4x-6}{3x-9}$	Accept $a = 4$, $b = -6$, $c = 3$, $d = -9$
(b)	$\frac{-x+8}{x(x+1)(x-2)}$	M1	method to use a common denominator eg $x(x+1)(x-2)$ by multiplying terms	Method must involve finding equivalents for all three separate terms; may be done in several stages.
		M1	deduce numerator eg $3x(x-2) + x(x+1) - 4(x+1)(x-2)$	
		A1	oe	Equivalents must be algebraically equivalent and must have involved full simplification.

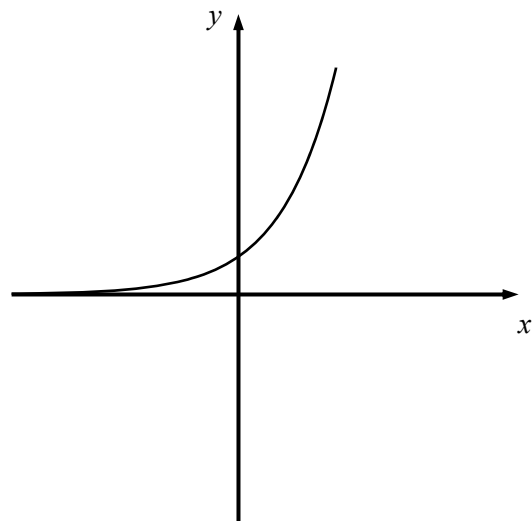
Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	84.9	P1 P1 A1	shows a process to find the radius or diameter eg $44 = 2 \times \pi \times r$ or $r = \frac{22}{\pi}$ or $d = \frac{44}{\pi}$ or $r = 7.0028$ or $d = 14.0056..$ (dep on P1) complete method to find the area eg $\frac{1}{2} \times "d" ^2 \times \sin 60$ oe, $\frac{1}{2} \times 14 \times \tan 60$ oe, $\frac{1}{2} \times 14 \times \sqrt{14^2 - 7^2}$ oe for answer in the range 84.8 to 85	Allow r in the range 7 to 7.1 and d in the range 14 to 14.1 Could be shown on the diagram. If the correct answer in the range is given in working and then rounded incorrectly award full marks.
14	curve (0,1) labelled	C1 C1	sketch of graph which starts above x -axis for negative x , and makes an increasing exponential rise into positive x for showing a label of (0,1) on the y axis	Condone graph “touching” the x axis. Do not award from a graph for positive x only. Do not award if a point is given for crossing the x -axis. Accept the coordinates shown as a label of “1” written on the y axis at the intersection.
15	6.5	B1	oe	Accept (eg) $6\frac{1}{2}$ and $\sqrt{42.25}$

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
16 (a)	0.455	M1	for $0.65 \times (1 - 0.65)$ or 0.65×0.35 ($=0.2275$ or $\frac{91}{400}$) or 2×0.2275 oe	Could be shown on a tree diagram but must show an intention to multiply
		A1	oe	Acceptable equivalents are 45.5% or $\frac{91}{200}$ oe
	42	M1	for a start of the process eg $78 \div 0.65$ ($= 120$) or 78×0.35 ($=27.3$)	$\frac{78 \times 0.35}{0.65}$, $\frac{78}{0.65} - 78$
		A1	cao	
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	Award for one of the two simultaneous equations eg $5q - p = 20$, $5q - 2p = -60$ oe
			or $p - 5 = 5(q - 5)$ or $2(p + 20) = 5(q + 20)$ 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
18	$\left(\frac{-16}{5}, \frac{48}{5}\right)$	P1 P1 P1 A1	for a method to find gradient of L_1 eg $\frac{6-2}{4-12} (= -\frac{1}{2})$ or states L_2 as $y = -3x$ (dep on P1) for a method to find equation of L_1 eg subs into $y = "-\frac{1}{2}x + c$ OR states L_1 as $y = "-\frac{1}{2}x + 8$ (dep on P2) complete method to equate both lines eg $"-\frac{1}{2}x + 8 = -3x$ oe	Ignore sketches. Accept equivalents eg $(-3.2, 9.6)$
19	$9 < m < 11$ $-11 < m < -9$	M1 M1 M1 M1 A1	for a correct method to begin rearranging to solve for m^2 eg $88 < m^2 + 7$ or $m^2 + 7 < 128$ or $81 < m^2 < 121$ for a complete method to $m^2 = 81$ or $m^2 = 121$ or better for a set of critical values: at least two out of $9, 11, -9, -11$ for selecting a correct inequality for one set of critical values eg $9 < m$ and $m < -9$ or $m < 11$ and $-11 < m$ or $9 < m$ and $m < 11$ or a set of inequalities with some error eg $9 ? m ? 11$ and $-11 ? m ? -9$ where $?$ is an incorrect inequality symbol like $9 < m \leq 11$ or $9 \geq m \geq 11$ or answer given as $\pm 9 < m < \pm 11$ $9 < m < 11$ and $-11 < m < -9$ given as boundaries of m	It is insufficient to just multiply all three elements by 4; some rearrangement must occur such as showing as two separate inequalities or isolating m^2 Accept an inequality used in place of " $=$ ". m^2 must be isolated at this stage. Do not award if other values are also given eg 10 Could be shown as $9 < m < 11$ or $-11 < m < -9$ or $-11 < m < 11$ Accept with an "and" or an "or" or neither

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
20	3.75	P1	works to find vol of frustum eg $\frac{1}{3}\pi(3.6)^2 \times 6.4 - \frac{1}{3}\pi(1.8)^2 \times 3.2$ or 86.858.. – 10.857... (=24.192 π or 76.00..)	781.7... by use of diameter does not get the mark [vol] is their volume which could be fit using the radius, using the diameter, or could be another value as long as it is stated as being the volume, or clearly intended from working. All figures must come from correct method shown.
		P1	works to find vol of hemisphere eg $\frac{1}{2} \times \frac{4}{3} \pi \times 3.6^3$ (=31.104 π or 97.7....)	
		P1	mass of frustum as [vol]×density eg “76.00” × 2.4 (=182.4.. or mass of hemisphere as [vol]×density eg “97.7....”×4.8 (=469.037...)	
		P1	mean density as total mass ÷ total volume eg (“182.4..” + “469.037”) ÷ (“76...” + “97.7..”) or “651.4..” ÷ “173.7....”	
		A1	answer in the range 3.7 to 3.8	
21	proof	C1	uses cyclic quad eg if $CAB = x$ then $CRO = 180 - x$ (<u>Opposite angles</u> of a <u>cyclic quadrilateral</u> add up to 180°.)	Underlined words need to be shown; reasons need to be linked to their method; any reasons not linked do not credit. Correct method can be implied from angles on the diagram if no ambiguity or contradiction. Full reasons given without any redundant reasons and correct reasoning throughout.
		C1	establishes relationship outside a circle eg $ORB = x$ (<u>Angles</u> on a straight <u>line</u> add up to 180)	
		C1	uses properties of a circle eg $RO = OB$ (both radii) so $ABC = x$ (Base angles of an <u>isosceles triangle</u> are equal.)	
		C1	Complete proof and conclusion	

Question 14: sketch of $y = 2^x$



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Modifications to the mark scheme for Modified Large Print (MLP) papers. Paper 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: ± 5 mm

PAPER: 1MA1_2H		
Question	Modification	Mark scheme notes
1	Diagram enlarged. Wording added 'It shows a Venn diagram.' Circles labelled 'set A', 'set B' and 'set C'. Braille only – sticky labels provided.	Standard mark scheme
2	Diagram enlarged. Crosses changed to solid dots. Axes labels moved to the left of the horizontal axis and above the vertical axis. Wording changed from 'Here is his answer.' to 'His answer is shown in the Diagram Book.'	Standard mark scheme
3	Diagram enlarged. Arrows moved further to the right and made bigger. Angles moved outside of the angle arcs and angle arcs made smaller. Wording added 'Angle CBG = 35° , Angle BED = 110° , Angle GEF = 25° , Angle BGE is marked x .' Wording changed from 'Work out the size of angle x .' to 'Work out the size of the angle marked x .'	Standard mark scheme

PAPER: 1MA1_2H		
Question	Modification	Mark scheme notes
5	Diagram enlarged and a model provided for all candidates. Wording added 'The diagrams show a floor in the shape of a trapezium and a tin of paint. The model represents the tin of paint.' Braille only – parallelogram labelled ABCD, added information about the shape.	Standard mark scheme
8	Diagram enlarged. Shading changed to dotted shading. Wording added 'It shows triangle P, triangle Q and triangle R on a grid.' Triangle P moved to (1,3), (5,3), (5,5). Triangle Q added at (-3,-1), (-3,-5), (-5,-5) and Triangle R added at (1,-1), (1,-5), (3,-5). Labels put above the shapes. Shape provided for all candidates. Wording added 'A cut out shape is available if you wish to use it.' Question wording changed: 8(a) Describe the single transformation that maps triangle P onto triangle Q.' (1 mark) 8(b) Describe the single transformation that maps triangle Q onto triangle R.' (1 mark) 8(c) Describe fully the single transformation that maps triangle R onto triangle P.' (1 mark)	(a) C1 for "reflection in the line $y = -x$ " (b) C1 for "reflection in the line $x = -1$ " (c) C1 for "rotation of 90° anticlockwise about the point $(-1,1)$ " OR rotation of 270° clockwise about the point $(-1,1)$
12	In both parts x changed to y .	Standard mark scheme but x changed to y .
13	Diagram enlarged	Standard mark scheme
14	Diagram enlarged	Standard mark scheme

PAPER: 1MA1_2H			
Question		Modification	Mark scheme notes
20		Diagrams enlarged, simplified and made 2D. 2 models provided, Model 1 and Model 2. Wording changed to 'There are two models, Model 1 and Model 2.' Diagrams labelled Diagram 1 and Diagram Wording changed from 'Here is a frustum of a cone' to 'Diagram 1 and Model 1 show a frustum of a cone'. Wording changed from 'The frustum is' to 'Diagram 2 and Model 2 show the frustum'. Wording 'shown below' removed	Standard mark scheme
21		Diagram enlarged	Standard mark scheme

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