



Mark Scheme (Results)

Summer 2018

**Pearson Edexcel GCSE (9 – 1)
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 (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
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)	m^7	B1	cao	
(b)	$125n^3p^9$	B2	cao	Allow multiplication signs
		(B1)	for 2 of 3 terms correct in a single product)	$125n^3p^x$ or $125n^x p^9$ where $x \neq 0$ or an^3p^9 where a is a number
(c)	$8q^6r^3$	B2	cao	Allow multiplication signs
		(B1)	for 2 of 3 terms correct in a single product)	$8q^6r^x$ or $8q^x r^3$ where $x \neq 0$ or aq^6r^3 where a is a number
2 (a)	280	M1	for listing at least 3 multiples of both 40 and 56 OR finds the prime factors of both 40 and 56	40, 80, 120, ... 56, 112, 168, ... OR 2,2,2,5 and 2,2,2,7
		A1	cao	
(b)	60	B1	60 or $2^2 \times 3 \times 5$ oe	$2^2, 3, 5$ not enough ie must be a product
3	$y = 3x - 6$	M1	for a correct method to find the gradient of the line, or $m = 3$ OR identifies -6 as the intercept in words or in a partial equation OR $y - b = m(x - a)$ where $m \neq 3$ and (a, b) is a correct coordinate	Just ringing -6 is insufficient
		M1	for $y = 3x + c$ or (L=) $3x - 6$ or $y = "3"x - 6$ OR $y - y_1 = 3(x - x_1)$ or $y - b = "3"(x - a)$ where (a, b) is a correct coordinate	Award of this mark implies the first M1 c must be seen either as a letter or a number
		A1	accept $y = 3x + -6$ oe	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
4	3 : 5	P1 P1 P1 P1 A1	for process to find 20% or 120% of the cost, eg 8500×0.2 (= 1700) oe or 8500×1.2 (= 10 200) oe for process to find total cost of payments, eg 12×531.25 (= 6375) 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 $1 - \frac{“6375”}{“10200”}$ ($=\frac{3}{8}$) for finding a correct un-simplified ratio, eg “3825” : “6375” oe or 5:3 or $1.6 : 1$ or $\frac{5}{3} : 1$ Accept 1: 1.6, 1: $\frac{5}{3}$	When partitioning all figures quoted must be correct or a full method shown eg $10\% = 8500 \div 10$ (=850) and $20\% = “850” + “850”$ (=1700) May be seen as a fraction of the total eg $\frac{3825}{10200}$ ($=\frac{3}{8}$) Figures at this stage must be expressed as part of a ratio eg 51:85, $\frac{3}{8} : \frac{5}{8}$ Ignore consistent units
5	(a) 0, -4, -6, -4, 0 (b) Graph (c) 2.6 and -1.6	B2 (B1) M1 A1 M1 A1	fully correct figures at least 2 correct figures) (dep B1) for at least 5 points correctly plotted ft from (a) fully correct graph for $y = -2$ drawn or intersections with $y = -2$ or $y = x^2 - x - 4$ drawn or 1 correct value ft a quadratic graph or for answers in the range 2.5 to 2.7 and -1.5 to -1.7	Must be a curve If answers stated as coordinates, award M1 for both coordinates and M0 for one coordinate

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
6	No (supported)	P1 P1 A1	For a process to calculate the initial or new pressure, eg $(70 + 10) \div (20 + 10)$ (=2.6 to 2.7) or $80 \div 30$ (=2.6 to 2.7) or $70 \div 20$ (=3.5) For a complete process to make a comparison eg. $0.8 \times \text{"3.5"} (=2.8)$ OR $\frac{(\text{"3.5"} - \text{"2.6"})}{\text{"3.5"}} \times 100$ (=22 to 26) OR $\text{"3.5"} \times 0.2$ (=0.7) and $80 \div 30$ (=2.6 to 2.7) OR $\frac{\text{"2.6"}}{\text{"3.5"}} (\times 100)$ (=0.74 to 0.78 or 74 to 78) for a correct conclusion supported by accurate figures eg 2.8 and 2.6(6...) OR decrease is 24% (or 22% to 26%) OR 0.7 and 2.6 to 2.7 and 3.5 OR 0.7 and 0.9 OR 0.76 (or 0.74 to 0.78) OR 76% (or 74% to 78%)	Accept any value in the range 2.6 to 2.7 if unsupported by working Allow truncation or rounding of figures
7	Enlargement	B2 (B1	for correct enlargement at (1,2) (2,3) (2,4) (1,4) for correct size and orientation in the wrong position OR 3 of 4 vertices correct and joined OR 4 correct vertices not joined)	

Paper: 1MA1/2H																									
Question	Answer	Mark	Mark scheme	Additional guidance																					
8	$\frac{3}{22}$	P1	for a process to find a first value eg male/Britain = $32 - 11$ (=21) or Italy/total = $60 - (32+12)$ (=16) or female/total = $60 - 38$ (=22)	<table><tr><td></td><td>Br</td><td>Sp</td><td>It</td><td>Tot</td></tr><tr><td>M</td><td>21</td><td>9</td><td>8</td><td>38</td></tr><tr><td>F</td><td>11</td><td>3</td><td>8</td><td>22</td></tr><tr><td>Tot</td><td>32</td><td>12</td><td>16</td><td>60</td></tr></table>		Br	Sp	It	Tot	M	21	9	8	38	F	11	3	8	22	Tot	32	12	16	60	May be seen in a frequency tree Values attributed to a category or from method seen
			Br	Sp	It	Tot																			
		M	21	9	8	38																			
		F	11	3	8	22																			
		Tot	32	12	16	60																			
P1	for process to find a secondary value, eg male/Spain = $38 - ("21" + 8)$ (=9) or female/Italy = $"16" - 8$ (=8)																								
P1	complete process to find female/Spain, eg $12 - "9"$ or $"22" - (11 + "8")$ (=3)																								
A1	oe accept 0.136 to 0.14 SC B3 for $\frac{3}{60}$																								
9	12 508.7(0)	P1	for start of process to find interest rate for year 1 eg $12336 \div 12000$ (=1.028) or $(12336 - 12000) \div 12000$ (=0.028) OR forms a suitable equation, eg $12000 \times (1 + \frac{x}{100}) = 12336$	Rate of interest = 2.8, or $x = 2.8$ implies P2 12509 must come from correct working																					
		P1	for complete process to find the interest rate for year 1 eg $("1.028" - 1) \times 100$ (=2.8) or $"0.028" \times 100$ (=2.8) OR correct process to solve correct equation eg $(12336 - 12000) \div 120$ (=2.8)																						
		P1	for complete process to find the value at the end of 2 years eg $("2.8" \div 2 + 100) \div 100 \times 12336$																						
		A1	accept 12508.7 to 12508.71 or 12509																						

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	Diagram	B1	for correct vector drawn including arrow	May be drawn anywhere on the grid. Condone missing label Accept consistent incorrect notation for M1
(b)	$\begin{pmatrix} 3 \\ -4 \end{pmatrix}$	M1	for $\mathbf{a} + 2\mathbf{b}$ drawn with resultant vector or for writing $\mathbf{a}$ and $\mathbf{b}$ as column vectors and attempt to add $\mathbf{a} + 2\mathbf{b}$, eg $\begin{pmatrix} 1 \\ 2 \end{pmatrix} + 2 \times \begin{pmatrix} 1 \\ -3 \end{pmatrix}$ or $\begin{pmatrix} 1+2 \\ c \end{pmatrix}$ or $\begin{pmatrix} d \\ 2+-6 \end{pmatrix}$ or $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$	
		A1	cao	
11 (a)	$\frac{2}{25}$	B1	accept 0.08	All powers and products must be evaluated
(b)	$\frac{1}{8}$	M1	$fg(x) = \frac{2}{(4x^3)^2}$ oe or $g(1) = 4$ or $\frac{2}{(4 \times 1^3)^2}$ oe	
		A1	oe	
12	BDAC	B2	all correct	
		(B1	for at least 2 correct)	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
13	(a) Shown	M1	for finding one missing angle eg $BDE = y$ or $ODE = 90$ or $ODF = 90$ or $DBO = x$ or $BCD = 180 - y$ or (reflex) $BOD = 2y$	Could be shown on the diagram or in working
		A1	for a complete correct method leading to $y - x = 90$	
		C1	(dep on A1) for all correct circle theorems given appropriate for their working eg The <u>tangent</u> to a circle is perpendicular (90°) to the <u>radius</u> (<u>diameter</u>) <u>Alternate segment</u> theorem OR <u>Angle</u> at the <u>centre</u> is <u>twice</u> the <u>angle</u> at the <u>circumference</u> Opposite angles in a <u>cyclic quadrilateral</u> sum to 180°	
	(b) Explanation	C1	for explanation eg No as y must be less than 180 as it is an angle in a triangle	
14	11 – 19	P1	for drawing a tangent to the curve at time = 5	Using their drawn tangent, eg change in $y \div$ change in x Must come from gradient of a tangent.
		P1	for process to find the gradient, eg $70 \div 5$	
		A1	(dep on 1 st P1) for answer in the range 11 - 19 m/s	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
15 (a)	0.55, 0.67, 0.33, 0.35, 0.65	B1	for 0.55 in correct position	Can be seen as fractions or percentages
		B1	for the branches for the second game correct	
	0.341	M1	for one correct product, eg $0.45 \times "0.33" (=0.1485)$ or $"0.55" \times "0.35" (=0.1925)$ or $0.45 \times "0.67" (=0.3015)$ or $"0.55" \times "0.65" (=0.3575)$	Follow through acceptable for method marks from their tree in part (a) providing probabilities are less than 1. Accept fractional equivalents
		M1	for correct method eg $(0.45 \times "0.33") + ("0.55" \times "0.35")$ or $1 - (0.45 \times "0.67") - ("0.55" \times "0.65")$	
16 (a)	Correct graph	A1	answer in range 0.34 – 0.341 oe	Circle could be drawn freehand as long as it approximates to a circle
		B2	for a circle radius 3.5, centre (0, 0)	
	$x = 2.0, y = -2.9$ $x = -1.2, y = 3.3$	(B1	for a circle centre (0, 0) of a different radius, or for a circle drawn of radius 3.5 centre not (0, 0) or incomplete correct circle)	
		M1	for $2x + y = 1$ drawn, or for correctly eliminating one variable, eg $x^2 + 1 - 4x + 4x^2 = 12.25$ or $x^2 + (1 - 2x)^2 = 12.25$	
(b)		A1	for the pair of x values, or the correct pair of y values, or one correct pair of x/y values ft from (a) (dep on B1)	$2x + y = 1$ does not have to be shown Use professional judgment
		A1	for both correct pair of x/y values, unambiguously matched ft from (a) (dep on B1)	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
17 (a)	4, 6, 5, 4	M1	for a correct method to find at least 2 frequencies from bars of different widths, eg $10 \times 0.4 (=4)$, $10 \times 0.6 (=6)$, $5 \times 1 (=5)$, $20 \times 0.2 (=4)$	Be aware of 10 coming from incorrect working ft does not apply to the A1
		A1	cao	
(b)	10	M1	for $\frac{23+1}{4} (=6)$ or $\frac{23}{4} (=5.75)$ could fit from their table in (a)	
		A1	for 10 or 9.375	
18	39.5	P1	for a start to a process eg, for a correct trigonometric statement, eg $\sin 48 = \frac{7.3}{AC}$ or $\cos 42 = \frac{7.3}{AC}$ or $\frac{AC}{\sin 90} = \frac{7.3}{\sin 48}$ OR angle CAH unambiguously identified on a diagram	Must include correct values
		P1	for a complete correct process to find AC , eg $(AC =) \frac{7.3}{\sin(48)}$ ($=9.8..$) or $(AC =) \frac{7.3}{\cos(42)}$ ($=9.8..$) or $(AC =) \sin 90 \times \frac{7.3}{\sin 48}$ ($=9.8..$)	
		P1	for a correct statement using angle CAH , eg $\tan(CAH) = \frac{8.1}{"9.8..."}$ OR $\sqrt{8.1^2 + "9.8" ^2} (=12.7...)$ and $\frac{\sin CAH}{8.1} = \frac{\sin 90}{"12.7"}$	
		A1	for answer in the range 39.5 – 39.51	

If an answer is given in the range but then incorrectly rounded award full marks.

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
19	905	P1	for correct use of formula for the volume of a sphere eg $\frac{1}{4} \times \frac{4}{3} \times \pi \times r^3 (= 576\pi \text{ or } 1809\dots)$ OR $576\pi \times 4$ or 2304π or $7238\dots (= \frac{4}{3} \times \pi \times r^3)$	We do not need to see what is in the brackets to award this mark. The contents of the bracket alone would score P0
		P1	for a complete correct process to find r , eg $r = \sqrt[3]{\frac{576 \times 4 \times 3}{4}}$ or $r = 12$	Could be shown in several stages $\sqrt[3]{\frac{576 \times 4 \times 3}{4}} = \sqrt[3]{1728}$
		P1	for a process to find the curved surface area eg $\frac{4 \times \pi \times [\text{radius}]^2}{4}$ ($=144\pi$ or $452\dots$) OR the surface area of both flat surfaces eg $(2 \times \frac{\pi \times [\text{radius}]^2}{2})$ OR complete expression for the total surface area eg $\frac{4\pi r^2}{4} + \frac{\pi r^2}{2} \times 2$ oe	Radius used must be clearly identified as their radius of the solid
		P1	for process to find the complete surface area eg $\frac{4 \times \pi \times [\text{radius}]^2}{4} + (2 \times \frac{\pi \times [\text{radius}]^2}{2})$	
		A1	answer in the range $904.7 - 905$ or 288π (SCB2 for an answer in the range $358.1 - 359.2$)	If an answer is given in the range but then incorrectly rounded, award full marks.
20 (a)	explanation	C1	for a correct explanation, eg $\sqrt{3} \times -\sqrt{3} = -3$, not 3	
(b)	explanation	C1	for correct explanation, eg $\sqrt{12} = 2\sqrt{3}$, not $3\sqrt{2}$	

Paper: 1MA1/2H				
Question	Answer	Mark	Mark scheme	Additional guidance
21	0.43	B1	for one correct bound for mass or length eg 1967.5 or 1972.5 or 13.15 or 15.95 or 21.65 or 13.25 or 16.05 or 21.75	Can work in any units
		P1	for a correct process to find a bound for the volume, eg $13.15 \times 15.95 \times 21.65$ (=454(0.925125)) or $13.25 \times 16.05 \times 21.75$ (=462(5.409375))	Accept volumes truncated or rounded to at least 3 sig fig
		P1	for a correct process to find a bound for density, eg [mass LB] $\div$ “462(5.409375)” (=0.425(367755)) where $1965 \leq \text{mass LB} < 1970$ or [mass UB] $\div$ “454(0.925125)” (=0.434(3828506)) where $1970 < \text{mass UB} \leq 1975$	Accept densities truncated or rounded to at least 3 sig fig
		A1	for both correct bounds, 0.425(367755) and 0.434(3828506)	Accept bounds truncated or rounded to at least 3 sig fig At this point correct units must be used
		C1	(dep on A1) for a correct statement on degree of accuracy e.g. UB and LB both round to 0.43 to 2 decimal places or 2 significant figures	Must be 0.43 not 0.4

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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.

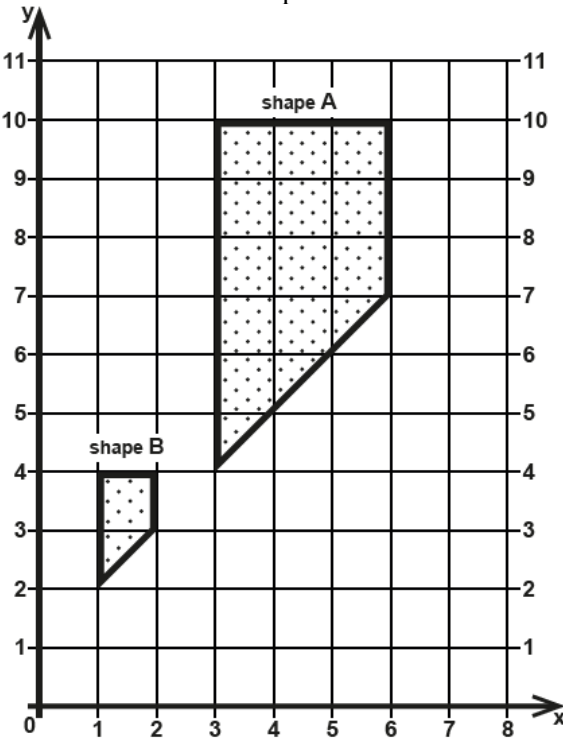
The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:

Angles: $\pm 5^\circ$

Measurements of length: ± 5 mm

Paper: 1MA1/2H			
Question		Modification	Mark scheme notes
3		Diagram enlarged	Standard mark scheme
5	(a)	Table has been turned to vertical format and left aligned. Wording added 'There are five spaces to fill.' Braille will label answer spaces (i) to (v) from left to right.	Standard mark scheme
5	(b)	Diagram enlarged	Standard mark scheme

Paper: 1MA1/2H

Question	Modification	Mark scheme notes
7	Shape B has been drawn on the grid and the question has been changed to: 'It shows shape A and shape B given on a grid. Describe fully the single transformation that maps shape A onto shape B.' 3 answer lines have been provided. The cross has been removed from the y axis. 	B2 for all three aspects: enlargement scale factor $\frac{1}{3}$ centre (0,1) (B1 for just two of these aspects)

Paper: 1MA1/2H			
Question		Modification	Mark scheme notes
10		Diagram enlarged. Right axis has been labelled. Arrows have been made longer. Intermediate labels have been added to the axes.	Standard mark scheme
12		Diagrams enlarged. Wording added 'There are four spaces to fill.' Braille will label answer spaces (i) to (iv) from top to bottom.	Standard mark scheme
13		Diagram enlarged. Angles moved outside of the angle arcs and the arcs have been made smaller. Wording added 'Angle BAD = y° Angle BDO = x° '	Standard mark scheme
14		Diagram enlarged. Axes labels have been moved to the left of the horizontal axis and above the vertical axis. Right axis has been labelled. Graph line moved to go through (5, 40).	Standard mark scheme applied to the given graph, which will likely result in figures such as $40/2 = 20$; apply normal MLP tolerances, likely to result in an answer in the range 16 - 24 m/s
15		Wording added 'It shows a probability tree diagram.' Diagram enlarged. Wording added in (a): 'There are five spaces to fill.' Braille will label answers as shown below. (ii) 0.45 (iii) (iv) (i) (v)	Standard mark scheme
16		Diagram enlarged.	Standard mark scheme, but apply usual MLP tolerances to reading off the answers.
17		Diagram enlarged. Axes labels have been moved to the left of the horizontal axis and above the vertical axis. Right axis has been labelled. Shading has been changed to dotted shading. In part (a) wording added 'There are four spaces to fill.' Braille will label answer spaces (i) to (iv) from top to bottom.	Standard mark scheme

Paper: 1MA1/2H			
Question		Modification	Mark scheme notes
18		Model provided for all candidates. Diagram enlarged and also provided for MLP. Wording added ‘marked x on the model.’	Standard mark scheme
19		2 Models provided for all candidates. Diagrams enlarged and also provided for MLP. No diagram given for the formulae for braille candidates. Shape label has been moved above the diagram. Wording added ‘Model 1 is a solid sphere. Model 2, shape S is one quarter of a solid sphere, centre O.’	Standard mark scheme

