

Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCSE
In Mathematic A (1MA0)
Higher (Non-Calculator) Paper 1H

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2016

Publications Code 1MA0_1H_1606_MS

All the material in this publication is copyright

© Pearson Education Ltd 2016

NOTES ON MARKING PRINCIPLES

- 1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- 2 Mark schemes should be applied positively.
- 3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Note that in some cases a correct answer alone will not score marks unless supported by working; these situations are made clear in the mark scheme. Examiners should be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- 4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- 5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- 6 Mark schemes will award marks for the quality of written communication (QWC).
The strands are as follows:
 - i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
Comprehension and meaning is clear by using correct notation and labelling conventions.
 - ii) *select and use a form and style of writing appropriate to purpose and to complex subject matter*
Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.
 - iii) *organise information clearly and coherently, using specialist vocabulary when appropriate.*
The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

With working

If there is a wrong 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.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

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, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Partial answers shown (usually indicated in the ms by brackets) can be awarded the method mark associated with it (implied).

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks; transcription errors may also gain some credit. Send any such responses to review for the Team Leader to consider.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8 Follow through marks

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

9 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: e.g. incorrect cancelling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

10 Probability

Probability answers must be given as fractions, percentages or decimals. 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 answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated 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).

12 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13 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 includes all numbers within the range (e.g 4, 4.1)

14 The detailed notes in the mark scheme, and in practice/training material for examiners, should be taken as precedents over the above notes.

Guidance on the use of codes within this mark scheme

M1 – method mark for appropriate method in the context of the question
A1 – accuracy mark
B1 – Working mark
C1 – communication mark
QWC – quality of written communication
oe – or equivalent
cao – correct answer only
ft – follow through
sc – special case
dep – dependent (on a previous mark or conclusion)
indep – independent
isw – ignore subsequent working

PAPER: 1MA0_1H				
Question	Working	Answer	Mark	Notes
1		750 cm^3	3	M1 for 30×25 A1 for 750 B1 (indep) for cm^3
2	(a)	Correct shape	2	B2 for correct reflection with vertices $(-4, 2)$ $(-6, 3)$ $(-6, 7)$ $(-4, 6)$ (B1 for reflection in a vertical or horizontal line)
	(b)	Correct shape	2	B2 for correct rotation with vertices $(-1, 3)$ $(-5, 3)$ $(-6, 5)$ $(-2, 5)$ (B1 for rotation of 90° clockwise about $(0,1)$ or correct orientation fully in top left quadrant)
3	(a)	Reasons	2	B2 for 2 reasons from no time frame, vague response boxes, not exhaustive eg “no always” (B1 for 1 reason)
	(b)	Question written	2	B1 for a suitable question which includes a time frame (the time frame could appear with the response boxes) B1 for at least 3 non-overlapping exhaustive response boxes with no use of inequality symbols
	(c)	Reason	1	B1 for reason why the sample is biased eg all the same age, they are friends, too small a sample. NB: “biased” alone is insufficient.

PAPER: 1MA0_1H				
Question	Working	Answer	Mark	Notes
4		p^7	1	B1 cao
		g^2	1	B1 cao
		k^6	1	B1 cao
		$-5m + 10$	2	M1 for $3m + 12$ or $-8m - 2$ or $8m + 2$ A1 for $-5m + 10$ or $10 - 5m$ or $-5(m - 2)$ or $5(2 - m)$ oe
		$n(n - 7)$	1	B1 cao
5		44 - 56	2	B2 for 44 - 56 (B1 for 1000 or 900 or 20 or 18 or 19, unless it is clear these have not come from estimation)
6		90	3	M1 for $1 - \frac{3}{5}$ ($= \frac{2}{5}$ or 40%) oe M1 for a complete method to find the number of female teachers (54) eg $36 \div 2 \times 3$ or determines $\frac{3}{5}$ (60%) is 54, or 10% is 9 A1 cao OR M1 for $F : M = 3 : 2$ M1 for a complete method to find the number of female teachers (54) eg $\frac{3}{2} \times 36$ oe A1 cao

PAPER: 1MA0_1H				
Question	Working	Answer	Mark	Notes
*7		Conclusion (supported)	5	<p>M1 for finding the area of one rectangle which is not 6×10 eg $2 \times 2.5 (=5)$ or $4 \times 10 (=40)$ or 2.5×6 or 5×2</p> <p>M1 for a complete method to find the total area eg $5+5+40$ or $60-10 (=50)$</p> <p>M1 for a complete method to find the number of tins needed eg "50" $\div 5 \div 2.5 (=4)$ OR for a complete method to find the number of litres needed. eg "50" $\div 5 (=10)$ OR for a complete method to find the area covered by 3 tins eg $3 \times 2.5 \times 5 (=37.5)$</p> <p>A1 for $50 \text{ (m}^2)$ and 4 (tins needed) or for 10 (litres) and 7.5 (litres) or for $50 \text{ (m}^2)$ and $37.5 \text{ (m}^2)$</p> <p>C1 (dep M2) for a conclusion supported by their calculations</p>
8		60	3	<p>M1 for $\frac{16}{80}$ or $\frac{300}{80}$ oe</p> <p>M1 (dep) for "$\frac{16}{80}$" $\times 300$ or "$\frac{300}{80}$" $\times 16$</p> <p>A1 cao</p>
9		$T = 5x + 20y$	3	<p>B3 for $T = 5x + 20y$ oe (B2 for $5x + 20y$ or $T = 5x + y$ or $T = x + 20y$ or $T = 20x + 5y$) (B1 for $T =$ a two term linear expression in x and y, or $5x + y$ or $x + 20y$)</p>

PAPER: 1MA0_1H																											
Question	Working				Answer	Mark	Notes																				
10					-3, -2	2	M1 for $x = -3$ or $y = -2$; for finding the difference between the x or y coordinates of M and P (eg ± 4 or ± 4.5); for $\frac{x+5}{2} = 1$ or for $\frac{y+7}{2} = 2.5$ A1 for $x = -3, y = -2$																				
11	<table border="1"> <tr> <td></td> <td>S</td> <td>A</td> <td>B</td> <td></td> </tr> <tr> <td>M</td> <td>4</td> <td>9</td> <td>10</td> <td>23</td> </tr> <tr> <td>F</td> <td>6</td> <td>11</td> <td>26</td> <td>43</td> </tr> <tr> <td></td> <td>10</td> <td>20</td> <td>36</td> <td>66</td> </tr> </table>		S	A	B		M	4	9	10	23	F	6	11	26	43		10	20	36	66				11	4	M1 for a correct first step which results in a value that could be in the table: ie. $66 - 10 - 20 (= 36)$ or $66 - 43 (= 23)$ or $10 - 4 (= 6)$ M1 for correct method to find a second value that could be in the table using their first value eg “23” - 4 - 10 (= 9) or “36” - 10 (= 26) M1 for a fully correct and complete method. A1 cao
	S	A	B																								
M	4	9	10	23																							
F	6	11	26	43																							
	10	20	36	66																							
12					$100 - 25\pi$	3	M1 for $\pi \times 5 \times 5$ or 25π M1 for $(10 \times 10 - \pi \times 5 \times 5)$ A1 for $100 - 25\pi$ oe NB: ignore the inclusion of any units.																				
13					36	3	M1 for correct method to work out 20% of 30% (=6%) M1 for $30\% + “6\%”$ A1 cao OR M1 for complete and correct method to find amount of money spent on rent eg $800 \times 0.3 (=240)$ oe M1 for correct method to find rent next month (288) eg “240” $\times 1.2$ (=288) oe or $\frac{“288”}{800} \times 100$ oe or 30×1.2 A1 cao																				

PAPER: 1MA0_1H																														
Question	Working			Answer	Mark	Notes																								
14	(a)				Correct construction	2	M1 for correct construction arcs or bisector within guidelines but no (or incorrect) construction arcs A1 for bisector within guidelines with correct arcs shown																							
	(b)				Correct construction	2	M1 for correct construction arcs or perpendicular within guidelines but no (or incorrect) construction arcs A1 for perpendicular within guidelines with correct arcs shown																							
*15	(a)	<table border="1"> <tr> <td></td> <td>Age 16</td> <td></td> <td>Age 18</td> </tr> <tr> <td>HV</td> <td>310</td> <td><</td> <td>380</td> </tr> <tr> <td>LV</td> <td>80</td> <td><</td> <td>130</td> </tr> <tr> <td>Median</td> <td>180</td> <td><</td> <td>240</td> </tr> <tr> <td>Range</td> <td>230</td> <td><</td> <td>250</td> </tr> <tr> <td>IQR</td> <td>80</td> <td>></td> <td>70</td> </tr> </table>		Age 16		Age 18	HV	310	<	380	LV	80	<	130	Median	180	<	240	Range	230	<	250	IQR	80	>	70	Compares: medians and spread		3	C1 for any correct comparison of the medians C1 for any correct comparison of the IQRs or the ranges C1 (dep on one C1) for either statement written in context
	Age 16		Age 18																											
HV	310	<	380																											
LV	80	<	130																											
Median	180	<	240																											
Range	230	<	250																											
IQR	80	>	70																											
	(b)				150	2	M1 for $\frac{3}{4} \times 200$ oe A1 cao																							
16					7×10^8	2	M1 for 7×10^n , $n \neq 8$ or $a \times 10^8$, $a \neq 7$ or 700 000 000 or 0.7×10^9 A1 cao																							

PAPER: 1MA0_1H				
Question	Working	Answer	Mark	Notes
17 (a)		$x < 7$	2	M1 for isolating term in x eg $3x < 16 + 5$ or $3x < 21$ or for $(x =) 7$ or $x > 7$ etc A1 cao
(b)		$\frac{7}{5}$	3	M1 for multiplying by 4 or adding $\frac{w}{4}$ or subtracting $\frac{11}{4}$ or subtracting 1 [all applied to both sides and as a first step] M1 for isolating terms in w on one side and number terms on the other side of the equation A1 for $\frac{7}{5}$ oe
18 (a)		$2\frac{4}{5}$	3	M1 for writing as improper fractions eg $\frac{6}{5}$ or $\frac{7}{3}$ M1 (dep) for multiplying improper fractions eg $\frac{6 \times 7}{5 \times 3}$ or $\frac{14}{5}$ oe A1 cao
(b)		$\frac{4}{5}$	3	M1 for finding two correct fractions with a common denominator eg $\frac{7}{15} - \frac{10}{15}$ or $\frac{21-30}{45}$ M1 (dep) for complete and correct method eg $1 - \frac{3}{15}$ or $\frac{37}{15} - \frac{25}{15}$ or $\frac{111-75}{45}$ oe A1 for $\frac{4}{5}$ oe

PAPER: 1MA0_1H				
Question	Working	Answer	Mark	Notes
19 (a)(i)		-0.4 to -0.5 4.4 to 4.5	3	B1 for value in range -0.4 to -0.5 and value in range 4.4 to 4.5 NB: condone values given as part of coordinates.
(ii)		-1.0 to -1.2 5.0 to 5.2		M1 for $x^2 - 4x - 2 = 4$ or line $y = 4$ drawn on graph or points marked with a y coord. of 4 or a value in range -1.0 to -1.2 or a value in range 5.0 to 5.2 A1 for value in range -1.0 to -1.2 and value in range 5.0 to 5.2; do not accept coordinates.
(b)		-1.6 to -1.8 4.6 to 4.8	3	M1 for $x + y = 6$ drawn on graph A2 for value in range -1.6 to -1.8 and value in range 4.6 to 4.8 (A1 for one correct value or both values given as coordinates)
*20		69° (supported)	5	M1 for method to find angle PSR eg $90 - 48 (= 42)$ or method in triangle POS to find angle POS (= 84) M1 for method to find angle PMS (= 42) A1 cao C2 (dep on at least M1) for correct and complete set of appropriate reasons (C1 for one correct reason involving a circle theorem supported by working) eg The <u>tangent</u> to a circle is <u>perpendicular</u> (90) to the <u>radius</u> (<u>diameter</u>) <u>Alternate segment theorem</u> . <u>Angles</u> in a <u>triangle</u> add up to <u>180</u> Base <u>angles</u> of an <u>isosceles</u> triangle are <u>equal</u> . The <u>angle</u> at the <u>centre</u> of a circle is <u>twice the angle</u> at the <u>circumference</u> .

PAPER: 1MA0_1H				
Question	Working	Answer	Mark	Notes
21 (a)		0.7 0.2 0.3 0.8 0.05 0.95	3	B1 for 0.2, 0.8 oe B1 for 0.7, 0.3 oe B1 for 0.05, 0.95 oe
(b)		0.04	2	M1 for "0.8" × "0.05" A1 oe
22		2, 6	3	M1 for $(x^2 =) 4(x^2 - 6x + 9)$ or $4x^2 - 24x + 36$ oe or for $\frac{x^2}{4} = x^2 - 6x + 9$ M1 (dep) for $3x^2 - 24x + 36 = 0$ or $3(x^2 - 8x + 12) = 0$ or $(x - 2)(x - 6) = 0$ or $(3x - 6)(x - 6) = 0$ oe A1 cao OR M1 for $x = (\pm)2(x - 3)$ or $\frac{x}{2} = (\pm)(x - 3)$ M1(dep) for correct solution of one equation A1 cao

PAPER: 1MA0_1H				
Question	Working	Answer	Mark	Notes
23	(a)(i)	$\mathbf{a + b}$	2	B1 for $\mathbf{a + b}$ oe
	(ii)	$-\mathbf{a + 3b}$		B1 for $-\mathbf{a + 3b}$ oe
	(b)	$\frac{3}{4}\mathbf{a + \frac{3}{4}b}$	2	M1 for $\overrightarrow{OP} + \frac{1}{4}\overrightarrow{PR}$ or $\overrightarrow{OR} + \frac{3}{4}\overrightarrow{RP}$ (may be in terms of \mathbf{a} and \mathbf{b}) A1 for $\frac{3}{4}\mathbf{a + \frac{3}{4}b}$ or $\frac{3}{4}(\mathbf{a + b})$
	*(c)	$OS = \frac{3}{4}OT$	2	C2 (dep A1) for S divides OT in the ratio 3:1 oe or $OS = \frac{3}{4}OT$ oe (C1 (dep A1) for S lies on OT or that OT and PR intersect at S oe)
24		100, 25, 4	4	M1 for $y = \frac{k}{x^2}$ oe or $1 = \frac{k}{10^2}$ M1 for complete method to find k or $y = \frac{100}{x^2}$ oe OR (dep on M1) for $k = 100$ A1 for one entry correct A1 for other two entries correct

PAPER: 1MA0_1H				
Question	Working	Answer	Mark	Notes
25		$\frac{1}{4} - \frac{\sqrt{6}}{12}$	3	<p>M1 for $\frac{1}{2} \times \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2}$ or $\frac{1}{2} \times \frac{\sqrt{2}}{2} \times \frac{\sqrt{3}}{3}$</p> <p>M1 for $\frac{1}{2} \times \frac{\sqrt{2}}{2} \times \frac{\sqrt{2}}{2} - \frac{1}{2} \times \frac{\sqrt{2}}{2} \times \frac{\sqrt{3}}{3}$</p> <p>A1 for $\frac{1}{4} - \frac{\sqrt{6}}{12}$ oe</p> <p>OR</p> <p>M1 for (BC \Rightarrow) $\frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{3}$</p> <p>M1 for $\frac{1}{2} \times \left\{ \frac{\sqrt{2}}{2} - \frac{\sqrt{3}}{3} \right\} \times \frac{\sqrt{2}}{2}$</p> <p>A1 for $\frac{1}{4} - \frac{\sqrt{6}}{12}$ oe</p>

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: 1MA0_1H		
Question	Modification	Notes
1	Model provided for all candidates. Diagram enlarged and also provided for MLP.	Standard mark scheme
2	(a) Reflection drawn on the diagram. Shading changed to dotted shading. Wording changed 'It shows shape P and shape Q given on a grid. Describe fully the single transformation that maps shape P onto shape Q.' Grid enlarged. y axis is cut at -4. 3 answer lines given. (b) Rotation drawn on the diagram. Wording changed 'It shows shape P and shape S given on a grid.' Describe fully the single transformation that maps shape P onto shape S.' 3 answer lines given.	Marked scheme changed to: B1 Reflection B1 in the line $x = -1$ Mark scheme changed to: B1 Rotation or rotate B1 90° anticlockwise B1 about (0, 1)
7	Diagram enlarged. Braille only: Plan of floor labelled ABCDEFGH as 1F Q24.	Standard mark scheme
10	Diagram enlarged. Crosses changed to filled in circles. Arrows heads changed to open headed arrows.	Standard mark scheme
12	Diagram enlarged. Shading changed to dotted shading. Braille only: Diagram turned into horizontal position (circle inside square).	Standard mark scheme

PAPER: 1MA0_1H

Question		Modification	Notes																								
14	(a) (b)	Diagram lines made longer and thicker Braille only: Angle A 75° exactly for bisection. Diagram kept the same size. Point P has been moved to the left.	Standard mark scheme																								
15	(a) (b)	Grid enlarged. Small squares removed. Lines of the box plot have been moved. '16 year old workers' lines are at '75,125,175,200 and 300'. '18 year old workers' lines are at '125, 200, 225, 275 and 375'. '£130' changed to '£125'	Standard mark scheme with these following values <table border="1"> <thead> <tr> <th></th> <th>Age 16</th> <th></th> <th>Age 18</th> </tr> </thead> <tbody> <tr> <td>HV</td> <td>300</td> <td><</td> <td>375</td> </tr> <tr> <td>LV</td> <td>75</td> <td><</td> <td>125</td> </tr> <tr> <td>Median</td> <td>175</td> <td><</td> <td>225</td> </tr> <tr> <td>Range</td> <td>225</td> <td><</td> <td>250</td> </tr> <tr> <td>IQR</td> <td>75</td> <td>=</td> <td>75</td> </tr> </tbody> </table>		Age 16		Age 18	HV	300	<	375	LV	75	<	125	Median	175	<	225	Range	225	<	250	IQR	75	=	75
	Age 16		Age 18																								
HV	300	<	375																								
LV	75	<	125																								
Median	175	<	225																								
Range	225	<	250																								
IQR	75	=	75																								
14		Grid enlarged. Small squares removed. [Leeway needed for answering the question.]	Standard mark scheme																								
17	(a) (b)	Wording added above the table 'There are four spaces to fill.' Grid enlarged. Right axis labelled.	Standard mark scheme																								
18		Diagram enlarged.	Standard mark scheme																								

PAPER: 1MA0_1H		
Question	Modification	Notes
19	Grid enlarged. [Leeway need for answering the question.]	Standard mark scheme
20	Diagram enlarged. Cross changed to filled in circle.	Standard mark scheme
21	Diagram enlarged. Wording added 'There are six spaces to fill.'	Standard mark scheme
23	Diagram enlarged	Standard mark scheme

