edexcel

Mark Scheme (Results)

November 2016

Pearson Edexcel GCSE
In Mathematics A (1MA0)
Higher (Calculator) Paper 2H

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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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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 a 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: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1	3 | 1 3 7 4 | 1 4 4 7 8 8 5 | 1 2 3 5 6 6 6 6 | 0 1 3 4	Diagram and key	3	B2 for fully correct diagram (accept a stem of 30, 40, 50, 60, the order of the numbers in the stem may be reversed) (B1 for one error or omission or unordered diagram with no errors) B1 for a correct key (units may be omitted but must be correct if stated) eg 3 | 1 = 31 (mm)
2 (a)		225 : 475	2	M1 for 700 ÷ 2 + 125 (= 475) **or** 700 ÷ 2 – 125 (= 225) A1 for 225 : 475 oe, eg 9:19
(b)		175, 455	3	M1 for 630 ÷ (5 + 13) (= 35) M1 for "35" × 5 (= 175) **or** "35" × 13 (= 455) A1 cao
3		26	3	M1 for (360 − 90) ÷ 2 (= 135) M1 for $4x + 31 =$ "135" or $6x - 21 =$ "135" A1 cao OR M1 for forming an appropriate equation eg $4x + 31 = 6x - 21$ or $6x - 21 + 4x + 31 + 90 = 360$ oe M1 (dep) for isolating terms in x and number terms A1 cao

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
4 (a)		0.3	2	M1 for $1 - (0.25 + 0.10 + 0.20 + 0.15)$ oe A1 for 0.3 oe
(b)		21	3	M1 for $0.25 + 0.10$ (= 0.35) or 0.25×60 (= 15) or 0.10×60 (= 6) M1(dep) for $60 \times$ "0.35" or "15" + "6" A1 cao
5		1.4091(…)	2	B2 for 1.4091(…) (B1 for 2.1025 or 1.492 or 2.397…or 2.398)
6		180	3	M1 for a correct start to the process, eg $300 \div 5$ (= 60) or $300 \div (5 \times 1.5)$ (= 40) or $8 \div 5$ (= 1.6) or $5 \div 8$ (= 0.625) M1 for a complete method that will lead to the number of bricks needed to build the wall (= 480) or for a complete method that will lead to the number of extra bricks needed to build the wall, eg $300 \div 5 \times 3$ A1 cao

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
7	x -1 0 1 2 3 4 y 10 8 6 4 2 0	$y = 8 - 2x$ drawn	3	B3 for a correct line between $x = -1$ and $x = 4$ OR B2 for a correct straight line segment through at least 3 of $(-1, 10)$, $(0, 8)$, $(1, 6)$, $(2, 4)$, $(3, 2)$, $(4, 0)$ **or** for all of these points plotted but not joined **or** for a line drawn with a negative gradient through (0, 8) **and** clear intention to use of a gradient of -2, eg line through (0,8) and (0.5, 6) OR B1 for at least 2 correct points stated or plotted **or** for a line drawn with a negative gradient through (0, 8) **or** a line with gradient -2
*8		Comparison	3	M1 for 23.50×1.34 A1 for 31.49 C1 (dep M1) for 'euros' stated and a comparison ft their "31.49" OR M1 for $31 \div 1.34$ A1 for 23.13(43...) C1 (dep M1) for '£' stated and a comparison ft their "23.13" OR M1 for $31 \div 23.50$ A1 for 1.31(91...) C1 (dep M1) for comparison ft their "1.31(91...)" and explanation linked to conversion rate.

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
9		6.56	4	M1 for $200^2 + 60^2$ (= 43600) M1 for $\sqrt{40000 + 3600}$ or $\sqrt{43600}$ (= 208.8…) M1 for a complete method eg ("208.8" + 2 × 200 + 2 × 60) ÷ 100 × 0.9 oe A1 for 6.55 – 6.561
*10		large carton with correct calculations	3	M1 for 1.60 ÷ 125 (= 0.0128) or 2.8 ÷ 225 (= 0.0124(4…)) or 125 ÷ 1.60 (= 78(.125(g)) or 225 ÷ 2.80 (= 80(.35…g)) or any other calculation that could lead to a comparative figure M1 for 1.60 ÷ 125 (= 0.0128) **and** 2.8 ÷ 225 (= 0.0124(4…)) or for 125 ÷ 1.60 (= 78(.125(g)) **and** 225 ÷ 2.80 (= 80(.35…g)) or for calculations that could lead to comparative figures for the cartons 2 C1 for correct comparative figures for both cartons leading to a correctly stated comparison. Accept any other method considered equivalent. Figures may be truncated or rounded as long as their method is clear.

PAPER: 1MA0/2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
11		$\pi \times 6^2 - 2 \times 6 \times 6$	41.1	4	M1 for correct method to work out the area of the circle or quarter circle or semi-circle eg $\pi \times 6^2$ (=113(.09..)); $\pi \times 6^2 \div 2 = 56.5(4..)$; $\pi \times 6^2 \div 4 = 28.2(7\ldots)$) M1 for method to work out the area of the square (=72) oe or a triangle eg ½×6×6 (=18) M1 for complete method to find shaded area. A1 for value in the range 41.04 - 41.112
12	(a)		n^4	2	M1 for $\frac{n^{10}}{n^6}$ oe or $\frac{n^7}{n^3}$ oe or $n \times n^3$ oe A1 cao
	(b)		$3x^2 + 4x$	2	B2 for $3x^2 + 4x$ or $x(3x + 4)$ (B1 for $x^2 - 2x$ or $2x^2 + 6x$ or $3x^2 + nx$ or $px^2 + 4x$)
	(c)		$5(y - 3)$	1	B1 cao
	(d)		$9ab(2 + 3b)$	2	B2 for $9ab(2 + 3b)$ (B1 for $9a(2b + 3b^2)$ or $9b(2a + 3ab)$ or $ab(18 + 27b)$ or $3ab(6 + 9b)$ or $3a(6b + 9b^2)$ or $3b(6a + 9ab)$ or $9ab$(a two term algebraic expression))

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
13 (a)		5, 30, 60, 75, 80	1	B1 for correct cumulative frequencies (may be implied by correct heights on the grid)
(b)		cf graph	2	M1 for at least 4 of the 5 points plotted correctly at the ends of the intervals or 4 of the 5 points plotted not at the ends but consistently within each interval and joined (dep on a cf table with no more than one arithmetic error) A1 for a fully correct cf graph (points may be joined by a curve or straight line segments)
(c)	IQR = UQ – LQ	26-28	2	M1 for reading values from their cf graph at cf = 20 or 20.25 **and** cf = 60 or 60.75 A1ft provided M1 is awarded in (b)
(d)		55-59	3	M1 for reading a value from their cf graph at weight 150 grams M1 for $\frac{"45"}{"80"} \times 100$ A1ft provided M1 is awarded in (b)
14		126	3	M1 for 180 – (360 ÷ 5) (= 108) or (5 – 2) × 180 ÷ 5 (= 108) M1 for a complete method eg $\frac{360-"108"}{2}$ or $180-\frac{"108"}{2}$ A1 cao

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
15		28.9	5	M1 for sin 62 = $\frac{BD}{15}$ **or** $\frac{BD}{\sin 62} = \frac{15}{\sin 90}$ oe M1 for (*BD* =) 15 × sin 62 **or** $\frac{15}{\sin 90}$ × sin 62 oe (= 13.24...) M1 for tan *BCD* = $\frac{"13.24"}{24}$ oe **or** tan *BDC* = $\frac{24}{"13.24"}$ with *BDC* clearly identified M1 for *BCD* = $\tan^{-1}\frac{"13.24"}{24}$ oe **or** *BDC* = $\tan^{-1}\frac{24}{"13.24"}$ with *BDC* clearly identified A1 for 28.8 – 28.9 **OR** M1 for cos(90 − 62) = $\frac{BD}{15}$ M1 for (*BD* =) 15 × cos(90 − 62) (= 13.24...) M1 for tan *BCD* = $\frac{"13.24"}{24}$ oe **or** tan *BDC* = $\frac{24}{"13.24"}$ with *BDC* clearly identified M1 for *BCD* = $\tan^{-1}\frac{"13.24"}{24}$ oe **or** *BDC* = $\tan^{-1}\frac{24}{"13.24"}$ with *BDC* clearly identified A1 for 28.8 – 28.9

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
16		$\frac{8}{17}$	5	M1 for $5x + 4$ or $10 - x$ M1 (dep) for "$5x + 4$" = $\frac{2}{3}$ "$(10 - x)$" M1 for expanding the bracket or multiplying both sides by 3 in an equation of the form $(ax + b) = \frac{2}{3}(cx + d)$ A1 for correct equation with terms in x and number terms isolated, eg $15x + 2x = 20 - 12$ or $5x + \frac{2x}{3} = \frac{20}{3} - 4$ A1 for $\frac{8}{17}$ oe accept 0.47(0588...)
17 (a)		Question and responses	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 response boxes which are exhaustive for their question NB Do not accept inequality signs
(b)		53 or 54	2	M1 for $\frac{460}{1709} \times 200$ (= 53.8...) oe A1 for 53 or 54

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*18		28°	4	M1 for angle *ABD* = 62° M1 for angle *BAD* = 90° C2 for angle *ADB* = 28° with full, appropriate reasons given angles in the same segment are equal; angles in a semicircle are 90°; angles in a triangle add up to 180° (C1 (dep on relevant M1) for one correct and appropriate reason relating to a circle theorem) OR M1 for angle *AOD* = 62° × 2 (= 124°) M1 for (180° − 124°) ÷ 2 C2 for angle *ADB* = 28° with full, appropriate reasons given the angle at the centre of a circle is twice the angle at the circumference; base angles of an isosceles triangle are equal; angles in a triangle add up to 180° (C1 (dep on relevant M1) for one correct and appropriate reason relating to a circle theorem)

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
19 (a)		$y^2 + 7y + 10$	2	M1 for all 4 terms (and no additional terms) correct ignoring signs **or** 3 terms correct A1 for $y^2 + 7y + 10$
(b)		$(e - 3)(e + 4)$	2	M1 for $(e \pm 3)(e \pm 4)$ A1 for $(e - 3)(e + 4)$
(c)		0.77, –0.43	3	M1 for $\frac{--1 \pm \sqrt{(-1)^2 - 4 \times 3 \times -1}}{2 \times 3}$ (condone one sign error) M1 for $\frac{1 \pm \sqrt{13}}{6}$ A1 for one answer in the range 0.767 to 0.77 and one answer in the range –0.43 to –0.4343
20		17.7(014…)	3	B1 for 7.75 or7.85 or 5.15 or 5.25 or 62.5 or 63.5 M1 for $\frac{1}{2} \times 7.75 \times 5.15 \times \sin 62.5$ A1 for 17.7(0140994…)

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*21		No with explanation and supportive working	4	M1 for method to find the volume of compost needed to fill one or more baskets eg $\frac{2}{3} \times \pi \times 20^3$ (= 16755(.16…)) Or $\frac{4}{3} \times \pi \times 20^3$ (= 33510(.32…)) M1 for appropriate use of 1 litre = 1000 cm^3, eg $4 \times 50 \times 1000$ (= 200000) or "16755" ÷ 1000 M1 for complete method to find values needed to make decision C1 for conclusion supported by correct values, eg 200000 and 201061(.92...) (accept 201000 to 201120) or 16666(.66...) and 16755(.16…) or 11.9(36...) NB Calculations can be in litres or cm^3
22 (a)	$2 = k^{-1}$	½	2	M1 for reading off and substituting a pair of values from the graph (excluding 0, 1) into the equation, eg $x = -1$, $y = 2$ A1 for ½ oe
(b)		correct graph	2	B2 cao (B1 for correct general shape, eg $y = -\sin x°$)

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
23		Correct conclusion from correct working	4	B1 for $\overrightarrow{AB} = -5\mathbf{a} + 2\mathbf{b}$ or $\overrightarrow{BA} = 5\mathbf{a} - 2\mathbf{b}$ M1 for a correct vector statement for $\overrightarrow{OT}$ eg $\overrightarrow{OA} + \overrightarrow{AT}$ or $\overrightarrow{OB} + \overrightarrow{BT}$ or $\overrightarrow{OA} + \frac{5}{6}\overrightarrow{AB}$ or $\overrightarrow{OB} + \frac{1}{6}\overrightarrow{BA}$, may be written partially or fully in terms of **a** and **b** M1 for $5\mathbf{a} + \frac{5}{6}(-5\mathbf{a} + 2\mathbf{b})$ oe or $2\mathbf{b} + \frac{1}{6}(5\mathbf{a} - 2\mathbf{b})$ oe A1 for $\frac{5}{6}(\mathbf{a} + 2\mathbf{b})$ is parallel to $\mathbf{a} + 2\mathbf{b}$

PAPER: 1MA0/2H				
Question	**Working**	**Answer**	**Mark**	**Notes**
*24	$(n^2 + 4n + 4) - (n^2 + 2n + 1)$ $\frac{2n+3}{2n^2+3n}$ $\frac{2n+3}{n(2n+3)}$	Proof	4	M1 for correct method to expand $(n + 2)^2$ or $(n + 1)^2$ M1 for correct simplification of numerator M1 for factorisation of $2n^2 + 3n$ **or** for clearing the fractions on both sides correctly C1 for complete and correct proof OR M1 for $\{(n+2)-(n+1)\}\{(n+2)+(n+1)\}$ M1 for $1 \times (2n+3)$ M1 for factorisation of $2n^2 + 3n$ **or** for clearing the fractions on both sides correctly C1 for complete and correct proof OR M1 for $n\{(n+2)^2-(n+1)^2\} = (2n^2 + 3n) \times 1$ M1 for $n(n+2)^2 - n(n+1)^2$ or for correct expansion of $(n+2)^2-(n+1)^2$ M1 for correct expansion of $n\{(n+2)^2-(n+1)^2\}$ C1 for complete and correct proof (must include statement recognising the equality of LHS and RHS)

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: ±5º
Measurements of length: ±5 mm

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
1		Diagram enlarged. 4th horizontal line added to the bottom of the stem and leaf diagram. Key moved above and to the left of the diagram. Wording added 'It shows the basis of a stem and leaf diagram.	Standard mark scheme
3		Diagram enlarged. Wording added 'Angle $B\,O\,C = 4x + 31$'. Wording added 'Angle $A\,O\,C = 6x - 21$'.	Standard mark scheme
4		Diagram enlarged. Spike removed from the spinner and the spinner has been straightened.	Standard mark scheme
7		Grid enlarged.	Standard mark scheme
9		Diagram enlarged. Wording added '$CB = 200$ cm'. Wording added '$DC = 60$ cm'.	Standard mark scheme

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
10		Pictures have been removed.	Standard mark scheme
11		Diagram enlarged.	Standard mark scheme
12	(b)	MLP only: x changed to y.	B2 for $3y^2 + 4y$ or $y(3y + 4)$ (B1 for $y^2 - 2y$ or $2y^2 + 6y$ or $3y^2 + ny$ or $py^2 + 4y$)
	(d)	'a' changed to 's' and 'b' changed to 't' for all candidates.	B2 for $9st(2 + 3t)$ (B1 for $9s(2t + 3t^2)$ or $9t(2s + 3st)$ or $st(18 + 27t)$ or $3st(6 + 9t)$ or $3s(6t + 9t^2)$ or $3t(6s + 9st)$ or $9st$(a two term algebraic expression))
13	(a)	Wording added 'There are five spaces to fill.'	Standard mark scheme
	(b) to (d)	Diagram enlarged. Axes labels have been moved to the top of the vertical axis and to the left of the horizontal axis. Right axis has been labelled.	Standard mark scheme
14		Diagram enlarged.	Standard mark scheme
15		Diagram enlarged. Wording 'AB = 15 m' changed to 'BA = 15 metres'. Wording 'BC = 24 m' changed to 'CB = 24 metres'. Wording added 'Angle CBD = angle BDA = 90^o.'	Standard mark scheme

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
18		Diagram enlarged.	Standard mark scheme
19	(b)	Braille only: e changed to m.	M1 for $(m \pm 3)(m \pm 4)$ A1 for $(m - 3)(m + 4)$
21		Simplified diagram provided for MLP candidates.	Standard mark scheme
22	(a) (b)	Grid enlarged. Grid enlarged.	Standard mark scheme Standard mark scheme
23		Diagram enlarged. Cross at T changed to a solid dot.	Standard mark scheme

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