Mark Scheme (Results)

Summer 2017

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. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

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. Examiners should also 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 indicate within the table where QWC is being assessed. 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 labeling 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.

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

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 canceling 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.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

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.

11 **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.

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)

Guidance on the use of codes within this mark scheme
M1 – method mark 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

Question	Working	Answer	Mark	Notes
1		Question	2	B1 for a question with a time frame for frequency of use B1 for at least 3 correctly labelled response boxes (non-overlapping and exhaustive) [Do not allow inequalities in response boxes]
2		555	3	M1 for recognising that 1295 is 70% eg 70% = 1295 M1 for 10% = 1295 ÷ 7 (=185) or 1% = 1295 ÷ 70 (=18.5) or $1295 \times \dfrac{3}{7}$ oe or (1295 – 185) ÷ 2 or $1295 \times \dfrac{10}{7}$ oe (=1850) A1 cao
3	**£:** 189 ÷ 1.39= 135.97 174 ÷ 1.27 = 137.01 **SF:** 115 × 1.39 = 159.85 174 ÷ 1.27 × 1.39 = 190.44 **€** 115 × 1.27 = 146.05 189 ÷ 1.39 × 1.27 = 172.68	London with correct comparable figures	3	M1 for method to convert one price to another currency, eg 189 ÷ 1.39 M1 for a complete method leading to 3 prices in the same currency or to figures that can be used to compare the 3 prices A1 for London and correct comparable figures (accept rounded or truncated to the nearest unit)
4 (a)		positive	1	B1 cao
(b)		17 – 21.5	2	M1 for a single line segment with positive gradient that could be used as a line of best fit or a horizontal line from 21 or a point plotted at (x, 21) where x is in the range 17 – 21.5 A1 for answer in range 17 – 21.5

Paper: 1MA0/2H				
Question	Working	Answer	Mark	Notes
*5		$x = 30°$ with complete reasons	4	M1 for a correct first step, eg angle *GED* = 55 or angle *GAD* = 55 or angle *EGA* = 180 – 55 (= 125) A1 for 30 C2 for 30 with full reasons, appropriate to their given method eg <u>alternate angles</u> are equal **and** <u>corresponding</u> <u>angles</u> are equal **and** <u>angles</u> on a straight <u>line</u> add up to <u>180</u> eg <u>corresponding angles</u> are equal **and** <u>angles</u> in a <u>triangle</u> add up to <u>180</u> **and** <u>alternate angles</u> are equal (C1 (dep on at least M1) for one appropriate reason relating to parallel lines or <u>opposite angles</u> of a <u>parallelogram</u>)
6		23	3	M1 for method to find difference in cost, eg 23×24 – 425 (= 127) or for 425 ÷ (23×24) (= 0.7699...) or 24 – (425 ÷ 23) (=5.52…) M1 for $\frac{"127"}{"552"} \times 100$ oe or or 100 – "0.7699 "×100 or $\frac{"5.52"}{24} \times 100$ A1for answer in range 23 – 23.01
7		Correct region	3	B1 for perpendicular bisector of the line *AB* B1 for arc of circle centre *B* radius 4 cm B1 for shading correct region

Question	Working	Answer	Mark	Notes
8 (a)		$6ab - 7g$	2	M1 for $6ab$ or $-7g$ A1 cao
(b)		$3(2m - 3)$	1	B1 cao
(c)		t^5	1	B1 cao
(d)		$2xy(x + 2y)$	2	B2 cao (B1 for $xy(2x + 4y)$ or $2x(xy + 2y^2)$ or $2y(x^2 + 2xy)$ or $2xy(\ldots)$ where $(\ldots)$ has two terms one of which is correct)
(e)	$w^2 - 5w - 5w + 25$	$w^2 - 10w + 25$	2	M1 for all 4 terms (and no additional terms) correct with or without signs or 3 out of no more than 4 terms correct with signs A1 cao
9		Correct position of C	3	M1 for line drawn or point marked on a bearing of 130° from A M1 for line drawn or point marked on a bearing of 245° from B A1 for correct position of C
10		72	4	M1 for "x" + 24 or "x" − 24 or for "g" and 5"g" M1 for forming an appropriate equation eg $x + 24 = 5(x - 24)$ or for $(5g - g) \div 2 = 24$ or $g = 12$ M1 for correct operations to isolate x terms and non-x terms in an equation of the form $ax + b = cx + d$ or $ax + b = c(x + d)$ or $x = 36$ or for $6 \times$ "12" oe A1 cao

Question	Working	Answer	Mark	Notes
*11		No (supported)	5	M1 for $\pi \times 9 \div 2$ (=14.137…) or $\pi \times 5 \div 2$ (=7.85…) or for $\pi \times 9$ (=28.27…) or $\pi \times 5$ (=15.7…) M1 for complete method to work out perimeter eg $2 + 2 + (\pi \times 9 \div 2) + (\pi \times 5 \div 2)$ (= 25.99...) M1 (dep M1) for method to find number of rolls required for their perimeter, eg "their total perimeter" ÷ 2.4 eg 25.99..÷2.4 (=10.8), "47.97.."÷2.4 (=19.9) or "43.47.." ÷2.4 (=18.3) M1 for method to work out cost eg 3×10 + 2×3.99 (= 37.98) or 11 × 3.99 (=43.89), 20 →67.98, 19→63.00 or for method to find how many rolls can be bought for £35 (= 10) C1 for a conclusion supported by fully correct answers eg 37.98 (for comparing with 35) e.g 10.8 and 10 OR M1 for $\pi \times 9 \div 2$ (=14.137…) or $\pi \times 5 \div 2$ (=7.85…) or for $\pi \times 9$ (=28.27…) or $\pi \times 5$ (=15.7…) M1 for complete method to work out perimeter eg $2 + 2 + (\pi \times 9 \div 2) + (\pi \times 5 \div 2)$ (= 25.99...) M1 for a method to find how many rolls can be bought for £35 (=10) M1 for a method to work out the coverage of 10 rolls e.g. 10 × 2.4 (=24) C1 for a conclusion supported by fully correct answers eg 25.9(...) and 24
12 (a)		$1.40 \le h < 1.50$	1	B1 any unambiguous description of the correct interval
(b)	1.35 × 11 = 14.85 1.45 × 9 = 13.05 1.55 × 7 = 10.85 1.65 × 6 = 9.9 1.75 × 2 = 3.5	1.49	4	M1 for fx consistently within interval including ends (allow 1 error) M1 consistently using appropriate midpoints M1 (dep on first M1) for $\Sigma fx \div \Sigma f$ eg 52.15 ÷ 35 A1 cao

Question	Working	Answer	Mark	Notes
13	x = 2 gives 10 x = 3 gives 30 x = 2.1 gives 11.(361) x = 2.2 gives 12.(848) x = 2.3 gives 14.(467) x = 2.4 gives 16.(224) x = 2.5 gives 18.(125) x = 2.6 gives 20.(176) x = 2.7 gives 22.(383) x = 2.8 gives 24.(752) x = 2.9 gives 27.(289) x = 2.61 gives 20.3(89..) x = 2.62 gives 20.6(04..) x = 2.63 gives 20.8(21..) x = 2.64 gives 21(.039..) x = 2.65 gives 21.2(59..)	2.6	4	B2 for a trial $2.6 \le x \le 2.7$ evaluated (B1 for a trial $2 \le x \le 3$ evaluated) B1 for a different trial $2.6 < x \le 2.65$ evaluated B1 (dep on at least one previous B1) for 2.6 Accept trials correct to the nearest whole number (rounded or truncated) if the value of x is to 1 dp but correct to 1dp (rounded or truncated) if the value of x is to 2 dp. NB: no working scores no marks even if the answer is correct.
*14		Simple with correct comparable values	4	M1 for a method to calculate 2.15% or 2.3% or 102.15% or 102.3% of 15000 M1 for a complete method to calculate using a compound interest rate of 2.15% for 3 years eg 1.0215^3 (=1.065(89…)) or $1.0215^3 \times 15000$ (=15988.45) M1 for a complete method to calculate using a simple interest rate of 2.3% for 3 years e.g $1+0.023 \times 3$(=1.069) or $15000 + 0.069 \times 15000$ (=16035) or 0.023×3 C1 for a correct decision in a statement based on their two accurate comparable values eg 16035, 15988 to 15988.50 or 1035, 988 to 988.50 or 1.065(89...), 1.069 or 6.6%, 6.9 %

Paper: 1MA0/2H				
Question	Working	Answer	Mark	Notes
15		100	4	M1 for 360 ÷ 9 (= 40) or (9 – 2) × 180 (= 1260) M1 (dep) for 180 – "40" or "1260" ÷ 9 (= 140) oe M1 (dep M2) for a complete method to find the required angle, eg "140" – (360 – "140" – "140") ÷ 2 or ("140" ÷ 7) × 5 A1 for 100 supported by working
*16		No with correct calculations	5	M1 for splitting the cross section into separate areas and a method to find the area of one part OR for splitting up the pool into smaller prisms and a method to find the volume of one prism, e.g. a cuboid M1 (dep) for a complete method to find the cross-sectional area OR for a method to find the volume of more than on prism M1 (dep) for a complete method to find the vol of the pool (= 70 (m^3) OR for a complete method to find the depth of 60000L of water M1 for method to find figure for comparison, eg distance between surface and top of pool ("70" – "60") ÷ (5 × 10) C1 No, with correct calculations, eg water level is 20cm below top of pool

Question	Working	Answer	Mark	Notes
17 (a)		$\dfrac{3}{x+1}$	1	B1 oe
(b)		–2.5	3	M1 for attempting to multiply both sides by 5 as a first step and cancelling the LHS (can be implied by equations of the form $15 - x = 15x + ?$ or $15 - x = ?x + 55$) M1 for method to isolate terms in x and number terms from $ax + b = cx + d$ A1 for –2.5 oe OR M1 for splitting the LHS correctly into two parts $\dfrac{15}{5} - \dfrac{x}{5} = 3x + 11$ M1 for method to isolate terms in x and number terms from $ax + b = cx + d$ A1 for –2.5 oe
(c)		$m = \dfrac{2E}{v^2}$	3	M1 for a method to remove square root or clear fraction as a first step M1 for a method to remove square root **and** clear fraction A1 for $m = \dfrac{2E}{v^2}$
18		8.4	3	M1 for using $d = m/v$ e.g. $11.34 = 74/V$ or vol. of lead $(= 6.5(25...)$ or vol. of tin $(= 17.2(3...)$ M1 (dep) for a complete method using $200 \div$ "total volume" A1 for answer in range 8.4 to 8.44
19 (a)		0.98 0.95, 0.05, 0.95	2	B1 for 0.98 oe for machine A B1 for 0.95, 0.05, 0.95 in correct positions for machine B
(b)		0.069	3	M1 for 0.02×0.05 or $0.02 \times$ "0.95" or "0.98" $\times$ "0.05" or "0.98" $\times$ "0.95" M1 for $0.02 \times 0.05 + 0.02 \times$ "0.95" $+$ "0.98" $\times$ "0.05" or $1 -$ "0.98" $\times$ "0.95" A1 for 0.069 oe

Question	Working	Answer	Mark	Notes
20		3072	3	M1 for $12 = \dfrac{k}{8^2}$ or $12 \times 8^2 \ (= 768)$ oe or $(8 \div 0.5)^2 \ (= 256)$ M1 (dep) for substituting into $T = \dfrac{k}{d^2}$ e.g $(T =)\dfrac{"768"}{0.5^2}$ oe eg $12 \times 8^2 \div 0.5^2$ oe A1 cao
21	$$\dfrac{-3 \pm \sqrt{3^2 - 4 \times 2 \times -7}}{2 \times 2}$$	1.27, −2.77	3	M1 for substitution of $a = 2$, $b = 3$, $c = -7$ (condone one sign error) M1 for $\dfrac{-3 \pm \sqrt{65}}{4}$ A1 for solutions in range 1.26 to 1.27 **and** −2.76 to −2.77
22		$\dfrac{528}{167}$	3	B1 for 37.55 or 37.65 or 11.25 or 11.35 or 8.35 or 8.45 M1 for $\dfrac{37.65 - 11.25}{8.35}$ for $\dfrac{v_{ub} - u_{lb}}{t_{lb}}$ where $37.6 < v_{ub} \le 37.65$ and $11.25 \le u_{lb} < 11.3$ and $8.35 \le t_{ub} < 8.4$ A1 for answer in range 3.16 to 3.162 from correct working
23		0.94 or 94% or $\dfrac{76}{81}$	3	M1 for method to work out total area eg $1.3 \times 10 + 3.2 \times 5 + 3.6 \times 5 + 2.4 \times 10 + 0.5 \times 20$ (=81) or area up to 100 grams eg $1.3 \times 10 + 3.2 \times 5 + 3.6 \times 5 + 2.4 \times 10 + 0.5 \times 10$ (=76) (In either case allow one error in reading a bar height) M1 for $1 - ((0.5 \times 10)/"81")$ oe or for method to work out the total area and the area up to 100 grams (In both cases allow one error in reading a bar height) A1 for answer in range 0.938 to 0.94 or 93.8% to 94% or $\dfrac{76}{81}$ oe

Question	Working	Answer	Mark	Notes
24		$y = \dfrac{1}{4}x + 5$	4	B1 for $m = -4$ M1 (indep) for gradient of perpendicular $= -\dfrac{1}{"-4"}$ or $\dfrac{1}{4}$ M1 (dep on previous M1) for substituting $x = -8$, $y = 3$ into $y = $ " $\dfrac{1}{4}$ " $x + c$ A1 for $y = \dfrac{1}{4}x + 5$ oe SC If M0 is scored then B2 for $y = -\dfrac{1}{4}x + 1$

Question	Working	Answer	Mark	Notes
25		41.6	6	M1 for $0.5 \times 5.4 \times 7.3 \times \sin B = 19$ M1 for $(B =) \sin^{-1}\left(\dfrac{19}{0.5 \times 5.4 \times 7.3}\right)$ oe (= 74.6) M1 for $(AC^2 =) 5.4^2 + 7.3^2 - 2 \times 5.4 \times 7.3 \times \cos$ "74.6" M1 (dep) for correct order of evaluation or 61.(479…) M1 for $\dfrac{\sin C}{5.4} = \dfrac{\sin "74.6"}{"7.84"}$ oe or $0.5 \times 7.3 \times$ "7.84" $\times \sin C = 19$ A1 for answer in the range 41.55 to 41.65 from correct working OR (with perpendicular from C meeting AB at a point X) M1 for $0.5 \times 5.4 \times CX = 19$ M1 for $(CX =)\ \dfrac{19}{0.5 \times 5.4}$ (= 7.037...) M1 for $BCX = \cos^{-1}\dfrac{"7.04"}{7.3}$ (= 15.425…) M1 for $(BX =)\ \sqrt{7.3^2 - "7.04"^2}$ (= 1.94…) M1 for $ACX = \tan^{-1}\dfrac{5.4 - "1.94"}{"7.04"}$ (= 26.17…) A1 for answer in the range 41.55 to 41.65 from correct working

Question	Working	Answer	Mark	Notes
25 cont.				OR (with perpendicular from *A* meeting *BC* at a point *Y*) M1 for $AY = \dfrac{19}{7.3 \div 2} = 5.20547 ..$ M1 for $BY = \sqrt{5.4^2 - "5.20547"^2} \ (= 1.43630..)$ M1 for $CY = 7.3 - "1.43630 .." \ (= 5.86369 ...)$ M1 for $\tan C = \dfrac{"5.20547 .."}{"5.86369"..} \ (= 0.8877..)$ M1 for $C = \tan^{-1} "0.8877 .."$ A1 for answer in the range 41.55 to 41.65 from correct working

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.
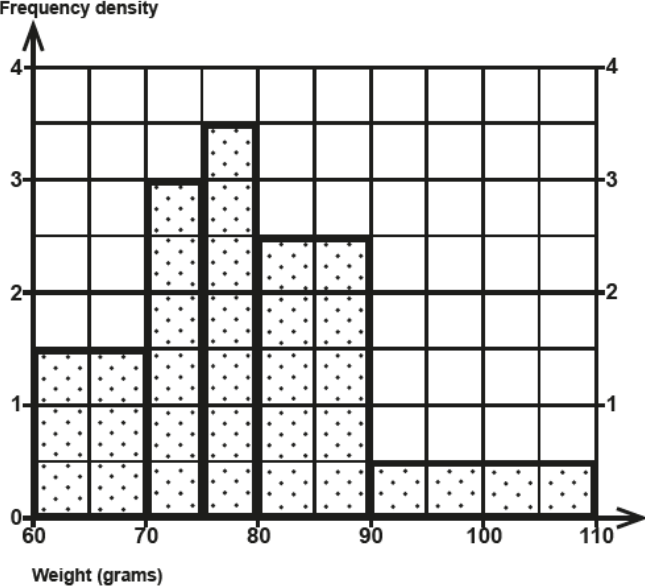
The following tolerances should be accepted on marking MLP papers, unless otherwise stated below:
Angles: ±5°
Measurements of length: ±5 mm

PAPER: 1MA0_2H			
Question		**Modification**	**Mark scheme notes**
4		Diagram enlarged. Axes labels moved to the left of the horizontal axis and above the vertical axis. Right axis has been labelled. Crosses have been changed to solid dots. In (b) the number 21 cm has been changed to 20 cm.	Standard mark scheme but in (b) the range used should be 20 - 24
5		Diagram enlarged. Angle sizes have been moved outside of the angle arcs and the arcs have been made smaller.	Standard mark scheme
7		Point B has been moved so the distance between A and B is 8 cm. Points A and B have been joined with a line. 40 km changed to 60 km. The scale has been moved above and to the left of the diagram.	The standard mark scheme can be applied in principle, with some adjustment. eg the use of a circle centre B which now has a radius of 6 cm instead of 4 cm.
8	(a)	MLP and Braille: a changed to p, b changed to q and g changed to n.	M1 for $6pq$ or $-7n$ A1 for $6pq - 7n$
9		North lines extended to 9 cm to allow for use of specialist equipment. Wording 'with a cross (x)' removed.	Standard mark scheme.
10		Diagram enlarged. Braille only: will add information about the diagram into the question wording.	Standard mark scheme
11		Diagram enlarged. Arrows removed from 2 m. Open headed arrows for 5 m. Dot has been made bigger. Information removed from the box and written as a sentence in the question wording.	Standard mark scheme
12		Frequency column has been widened to allow for working.	Standard mark scheme.
13		MLP only: x changed to y.	Standard mark scheme but x changed to y
15		Diagram enlarged.	Standard mark scheme

Question		Modification	Mark scheme notes
16		Model provided for all candidates. Diagram enlarged and also provided for MLP.	Standard mark scheme
17		MLP only: x changed to y.	Standard mark scheme but x changed to y
19		Diagram enlarged. Wording added 'There are four spaces to fill.' Braille only: answer lines labelled from (i) to (iv).	Standard mark scheme
23		Diagram enlarged. Axes labels have been moved to the left of the horizontal axis and above the vertical axis. Points on the histogram moved: 60-70 has moved up to 1.5 70-75 has moved down to 3 75-80 has moved down to 3.5 80-90 has moved up to 2.5 90-110 has stayed the same (0.5) 	M1 for method to work out total area, eg $1.5{\times}10 + 3{\times}5 + 3.5{\times}5 + 2.5{\times}10 + 0.5{\times}20$ (=82.5) M1 for $1 - ((0.5{\times}10)/\text{"82.5"})$ oe A1 for answer in range 0.939 to 0.94 or 93.9% to 94% or $\dfrac{31}{33}$ oe
25		Diagram enlarged. Wording added 'BA = 5.4 cm, BC = 7.3 cm'.	Standard mark scheme