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Mark Scheme (Results)

Summer 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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	(a)		1 | 4 6 8 9 2 | 1 2 3 5 7 9 3 | 0 4 6 8 8 4 | 1 3 6 6 8	3	B2 for correct ordered stem and leaf (B1 for fully correct unordered, or ordered with one error or omission) B1 (indep) for key (units not required but must be correct if stated) eg. 1 | 4 = 14 (marks)
	(b)		$\frac{9}{20}$ oe	2	B2 for $\frac{9}{20}$ oe or ft from stem and leaf diagram (B1 for $\frac{x}{20}$ where $x < 20$, $x \neq 9$ or $\frac{9}{y}$ where $y > 9$ or ft from stem and leaf diagram)
2	(a)		$30abc$	1	B1
	(b)		$3(y + 2)$	1	B1
	(c)		$x^2 - 3x$	1	B1
3			9.25	3	M2 for $x + x + 4 + x + x + 4 = 45$ oe or $x + x + 4 = 22.5$ oe (M1 for $x + x + 4 + x + x + 4$ oe) A1 for 9.25 or $\frac{37}{4}$ oe OR M1 for $45 - 8$ (= 37) or $22.5 - 4$ (= 18.5) M1 for $(45 - 8) \div 4$ or $(22.5 - 4) \div 2$ A1 for 9.25 or $\frac{37}{4}$ oe

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
4		400 ÷ 18 = 22(.2) 499 ÷ 20 = 24(.95) or 25 600 ÷ 26 = 23(.07…) (or equivalent in £) 18 ÷ 4 = 4.5 20 ÷ 4.99 = 4(.008…) 26 ÷ 6 = 4.3(333…)	18 pack with supporting working	4	M1 for a method that would result in at least two values that could be used to compare two packs M1 for a complete method that would result in values that could be used to compare all three packs A1 for all fully correct figures suitable for comparison C1 ft (dep on M2) for comparison of their values with a correct conclusion from their figures
5			0.09, 0.36	3	M1 for 1 – 0.4 – 0.15 oe (= 0.45) or 100 – 100×0.4 – 100×0.15 (= 45) M1 for (1 – 0.4 – 0.15) ÷ 5 (= 0.09) or (100 – 100×0.4 – 100×0.15) ÷ 5 (= 9) A1 for 0.09 and 0.36 oe OR M1 for 0.4 + 0.15 + x + 4x = 1 M1 for x = (1 – 0.4 – 0.15) ÷ 5 A1 for 0.09 and 0.36 oe [SC: B1 for 0.162 and 0.648 if M0 scored]

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5			0.09, 0.36	3	M1 for 1 – 0.4 – 0.15 oe (= 0.45) or 100 – 100×0.4 – 100×0.15 (= 45) M1 for (1 – 0.4 – 0.15) ÷ 5 (= 0.09) or (100 – 100×0.4 – 100×0.15) ÷ 5 (= 9) A1 for 0.09 and 0.36 oe OR M1 for $0.4 + 0.15 + x + 4x = 1$ M1 for $x = (1 – 0.4 – 0.15) \div 5$ A1 for 0.09 and 0.36 oe [SC: B1 for 0.162 and 0.648 if M0 scored]
6	(a)		20.3	2	M1 for $\frac{50}{1.57^2}$ oe A1 for answer in range 20.2 to 20.3
	(b)		68.04	2	M1 for (m =) $1.8^2 \times 21$ oe A1 for 68.04
	(c)		2.61	3	M2 for a complete method to find 145% of 1.8, eg. $\frac{145}{100} \times 1.80$ oe (M1 for a method to find 45% of 1.8, eg. $\frac{45}{100} \times 1.80$ (= 0.81) or for a multiplication factor of 1.45) A1 cao

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
7		x x^3-5x 3 12 4 44 3.1 14.(291) 3.2 16.(768) 3.3 19.(437) 3.4 22.(304) 3.5 25.(375) 3.6 28.(656) 3.7 32.(153) 3.8 35.(872) 3.9 39.(819) 3.75 33.9(84..) 3.76 34.3(57..) 3.77 34.7(32..) 3.78 35.1(10..) 3.79 35.4(89..)	3.8	4	B2 for a trial $3.7 \leq x \leq 3.8$ evaluated (B1 for a trial $3 \leq x \leq 4$ evaluated) B1 for a different trial $3.75 \leq x < 3.8$ evaluated B1 (dep on at least one previous B1) for 3.8 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.
8	(a)		4 : 3	2	M1 for 720 : 540 oe or for 3 : 4 or 1 : $\frac{4}{3}$ oe or $\frac{3}{4}$: 1 oe A1 for 4 : 3 or $\frac{4}{3}$ (or 1 .33….) : 1 or 1 : $\frac{3}{4}$ (or 0.75)
	(b)		480	2	M1 for 720 ÷ 3 (= 240) or scale factor of $\frac{3}{2}$ or $\frac{2}{3}$ oe or 720 : 480 A1 cao

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9			124º with reasons	4	M1 for a method to find any angle, eg. angle *DEF* = 180 – 70 – 54 (= 56) or angle *AEB* = 70 or angle *EAB* = 54 or angle *GEB* = 180 – 70 (= 110) A1 for *x* = 124 NB: angles may be just shown on the diagram C2 for full reasons, appropriate to their given method, with no additional reasons (C1 for one appropriate reason relating to parallel lines) Possible reasons: corresponding angles are equal; alternate angles are equal; co-interior angles (allied) add up to 180 angles on a straight line add up to 180 ; angles in a triangle add up to 180; vertically opposite angles are equal ; the exterior angle of a triangle is equal to the sum of the interior opposite angles; angles at a point add up to 360;
10		2 × 8 = 16 6 × 21 = 126 10 × 12 = 120 14 × 7 = 98 18 × 2 = 36	7.92	4	M1 for *fx* with *x* consistently within interval including ends (allow 1 error) M1 for consistently using appropriate midpoints in *fx* M1 (dep on first M1) for "Σ*fx*" ÷ 50 (or divided by "Σ*f*" if clearly calculated), eg 396 ÷ 50 A1 for 7.92 cao

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
11			42.28	5	M1 for method to find weekly mileage, eg. 18 × 2 × 5 (= 180) or weekly car park charge, eg. 3.50 × 5 (= 17.50) M1 for method to find fuel used in a relevant journey, eg. "180" ÷ 45.2 (= 3.9823 gallons) or 18 ÷ 45.2 (= 0.39823 gallons) M1 for a correct use of the conversion factor to convert between gallons and litres, eg. "3.9823" × 4.546 (= 18.1 …. litres) or "0.39823" × 4.546 (= 1.81 …. litres) or 1.369 × 4.546 (= 6.22... £/gallon) or 45.2 ÷ 4.546 (= 9.94… miles/litre) M1 for a method to find the cost of a relevant journey, eg. "18.1…" × 1.369 (= 24.78 …) or "1.81…" × 1.369 (= 2.478 …) or "3.9823" × "6.22..." (= 24.78...) A1 for answer in the range 42.26 to 42.3(0) NB candidates could work in litres or in gallons and/or could work in £ or p

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
12			144	4	M1 for method to find the interior angle of a regular pentagon, eg. 180 × (5 – 2) ÷ 5 (= 108) oe M1 (indep) for using a line of symmetry to find an angle, eg. " interior angle " ÷ 2 (half an interior angle) or 90 between line and side M1 (dep on M2) for complete method to find angle *x*, eg. 90 + "54" or "108"×5 – "108"×2 – 90×2 A1 for 144 supported by working OR M1 for considering all 5 lines of symmetry or angle vertically opposite *x* with angle bisector drawn M1 for 360 ÷ 10 (= 36) or 360 ÷ 5 (= 72) M1 for (360 ÷ 10) × 4 or (360 ÷ 5) × 2 A1 for 144 supported by working OR M1 for method to find the exterior angle of a regular pentagon (72°), eg. 360 ÷ 5 (= 72) oe M1 (indep) for using a line of symmetry to find an angle, eg. "interior angle" ÷ 2 (half an interior angle) or 90 between line and side M1 (dep on M2) for complete method to find angle *x*, eg. 180 – 2(180 – 90 – 72) A1 for 144 supported by working

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
13	(a)		–1, 1, –1	2	B2 for all correct (B1 for 1 or 2 correct)
	(b)		Correct graph	2	M1 ft for 4 or 5 points from their table plotted correctly, provided at least B1 awarded in part (a) A1 for a fully correct graph (no line segments)
14			3	5	M1 for a complete method to find the area of the cross section, eg. 15 × 2 + "(12 – 4)" × 2 + 15 × 2 (= 76) or for finding the volume of a relevant prism, eg. 15 × 2 × 120 (= 3600) "(12 – 4)" maybe just seen on the diagram M1 for a method to find the volume of the bar, eg. "76" × 120 (= 9120) or ft "area of cross section"×120 provided "area of cross section" includes a method to find the area of at least **two** relevant rectangles M1 for "volume" × 8, eg. "9120" × 8 (= 72960) or 250 × 1000 ÷ 8 (= 31250) NB "volume" must be dimensionally correct M1 (dep on previous M1) for 250 ÷ ("volume" × 8) ÷ 1000, eg. 250 ÷ "72960 ÷ 1000" (= 3.4265….) or "31250" ÷ "9120" A1 for an answer of 3 with correct working

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
15			No (supported)	4	M1 for a correct method to calculate 77% of 15000 or 0.77 seen eg. 15000 × 0.77 oe (= 11550) or $15000 - \frac{23}{100} \times 15000$ oe (= 15000 – 3450 = 11550) M1 for demonstrating a correct compound interest method over 3 years, eg "11550" × 0.82 (=9471) **and** "9471" × 0.82 (=7766.22) or "11550" × 0.82^2 or 0.77×0.82^2 (=0.517748) A1 for 7766(.22) or 0.51(7748) or 0.48(2252) C1 ft (dep on M2) for a statement giving the correct decision for their calculated values
16	(a)		128	1	B1 for answer in the range 128 to 128.5
	(b)		10.5 to 11.5	2	M1 for a LQ in the range 122 to 122.5 **or** an UQ in the range 133 to 133.5 A1 for answer in the range 10.5 to 11.5

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
17			30.1	4	M1 for a correct trigonometric statement to find an unknown angle, eg. sin(30+x) or cos $A = \frac{10.4+5.2}{18}$ or $\frac{\sin ADC}{18} = \frac{\sin 30}{10.4}$ M1 for a complete method to find the angle, eg. $\sin^{-1}\left(\frac{10.4+5.2}{18}\right)$ (= 60.07...) or $\cos^{-1}\left(\frac{10.4+5.2}{18}\right)$ (= 29.92..) or $\sin^{-1}\left(\frac{18 \times \sin 30}{10.4}\right)$ (= 59.92.. or 180 – 59.92.. = 120.07..) M1 (dep on M2) for a fully complete method to find angle x, eg. "60.07.". – 30 or 60 – "29.92.." or 90 – "59.92.." A1 for answer in the range 30.07 to 30.1 OR M1 for (BC^2=) $18^2 – (10.4 + 5.2)^2$ or $BC^2 + (10.4 + 5.2)^2 = 18^2$ M1 for (BC =) $\sqrt{18^2 - (10.4+5.2)^2}$ (= 8.97...) M1 (dep on M2) for a fully complete method to find angle x, eg. $\tan^{-1}\left(\frac{5.2}{"8.97..."}\right)$ A1 for answer in the range 30.07 to 30.1

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		$10a^5b^4$	2	B2 cao (B1 for any two of 10, a^5, b^4 in a product)
	(b)		$y = 5p^2 - x$	3	M1 for a correct first step to either remove the square root, eg. $p^2 = \frac{x+y}{5}$ or clear the fraction, eg. $\sqrt{5}p = \sqrt{x+y}$ M1 (dep) for a method to remove the square root **and** a method to clear the fraction , eg. $5p^2 = x + y$ A1 for $y = 5p^2 - x$
19			11	2	M1 for $\frac{51}{234} \times 50$ oe (= 10.89...) A1 for 11 (accept 10)
20		$\frac{-6 \pm \sqrt{6^2 - 4 \times 3 \times -2}}{2 \times 3}$ $(x + 1)^2 - 1 - \frac{2}{3} = 0$	0.29 and – 2.29	3	M1 for substitution of $a = 3$, $b = 6$, $c = -2$ into the formula or for completing the square (condone **one** sign error) M1 for $\frac{-6 \pm \sqrt{60}}{6}$ or $-1 \pm \sqrt{\frac{5}{3}}$ or in simplified form A1 for answers in the range 0.29 to 0.292 and – 2.292 to – 2.29
21			29.25	3	B1 for one of 14.5, 13.5, 8.75, 8.65 M1 for "v_{UB}" − "u_{LB}" where $14 <$ "v_{UB}" ≤ 14.5 and $8.65 \leq$ "u_{LB}" < 8.7 A1 for 29.25 from correct working

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
22			28.9	3	M2 for $\frac{75}{360} \times 2 \times \pi \times 6$ oe + $\frac{75}{360} \times 2 \times \pi \times 10$ oe (= 7.85... + 13.08... = 20.94..) (M1 for $\frac{75}{360} \times 2 \times \pi \times 6$ oe or $\frac{75}{360} \times 2 \times \pi \times 10$ oe) A1 for 28.9 to 28.95
23		$0<t\leq 5$ fd = 8 ÷ 5 = 1.6 $5<t\leq 15$ fd = 32 ÷ 10 = 3.2 $15<t\leq 30$ fd = 36 ÷ 15 = 2.4 $30<t\leq 40$ fd = 18 ÷ 10 = 1.8 $40<t\leq 60$ fd = 6 ÷ 20 = 0.3	Correct histogram	3	B3 for a fully correct histogram with vertical axis correctly scaled or with a key, eg. 2 cm^2 = 1 (B2 for at least 4 correct blocks with or without a scale or a key OR for all five fd correct) (B1 for 2 correct blocks of different widths or for at least three correct fd values)

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
24	(a)		$\frac{-1}{3x+4}$	2	M1 for $(3x \pm 4)(x \pm 3)$ or $(-3x \pm 4)(-x \pm 3)$ A1 for $\frac{-1}{3x+4}$, accept $\frac{1}{-3x-4}$
	(b)		$\frac{2x}{x^2-1}$	3	M1 for common denominator $(x-1)(x+1)$ or x^2-1 M1 for $\frac{x(x+1)}{(x-1)(x+1)} - \frac{x(x-1)}{(x-1)(x+1)}$ oe or $\frac{x(x+1)-x(x-1)}{(x-1)(x+1)}$ oe (NB: The denominator must be $(x-1)(x+1)$ or x^2-1 or another suitable common denominator) A1 for $\frac{2x}{(x-1)(x+1)}$ or $\frac{2x}{x^2-1}$

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
25			80.4	6	M1 for $0.5 \times 7 \times 8 \times \sin x = 18$ M1 (dep) for $(x =) \sin^{-1}\left(\frac{18}{0.5\times 7\times 8}\right)$ oe $(= 40)$ M1 (dep on at least M1) for $(AC^2 =) 7^2 + 8^2 - 2\times7\times8\times\cos$ "40" M1 (dep on previous M1) for correct order of evaluation or 27.2(03…) or 5.2(15…) M1 (dep) for $\sin A = \frac{8 \times \sin"40"}{"5.2(15..)"}$ or $\sin A = \frac{18}{0.5 \times 7 \times "5.2(15..)"}$ or $\cos A = \frac{"5.2(15..)"^2+7^2-8^2}{2\times"5.2(15..)"\times7}$ A1 for answer in the range 80.3 to 80.4 from correct working OR (with perpendicular from A meeting BC at a point X) M1 for $0.5 \times 8 \times h = 18$ M1 (dep) for $(h =) \frac{18}{0.5\times 8}$ $(= 4.5)$ M1 (dep on at least M1) for $BAX = \cos^{-1}\frac{"4.5"}{7}$ $(= 49.99\ \ldots)$ M1 (dep) for $(BX =) \sqrt{7^2 - "4.5"^2}$ $(= 5.3619\ldots)$ M1 (dep) for $CAX = \tan^{-1}\frac{8-"5.3619"}{"4.5"}$ $(= 30.38\ \ldots)$ A1 for answer in the range 80.3 to 80.4 from correct working NB Similar method applies for use of perpendicular from C to AB

Table for use in Question 11

Journeys in miles	Fuel used in gallons; miles ÷ 45.2	Fuel used in litres, gallons × 4.546	Cost of journey in £, litres × 1.369 or gallons × 6.22...
18	0.398...	1.81...	2.478...
36	0.796...	3.62...	4.956...
90	1.991...	9.05...	12.39...
180	3.98...	18.1...	24.78...
252	5.57...	25.3...	34.69...

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	(a)	Stem and leaf diagram enlarged and 4th horizontal line has been inserted.	B2 for correct ordered stem and leaf (B1 for fully correct unordered or ordered with one error or omission) B1 (indep) for key (units not required but must be correct if stated) eg 1 4 = 14 (marks)
2	(a)	Braille only - 3a x 5b x 2c changed to 3p x 5q x 2r. MLP only - a changed to e, b changed to f and c changed to g.	B1

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
3		Diagram enlarged. MLP only - x changed to y.	M1 for forming an appropriate equation e.g. $x + x + 4 + x + x + 4 = 45$ M1 for correct operation(s) to isolate x and non-x terms in an equation eg $4x + 8 = 45$ or $4x = 37$ A1 for 9.25 or $\frac{37}{4}$ oe OR M1 for 45 – 8 M1 for (45 – 8) ÷ 4 A1 for 9.25 or $\frac{37}{4}$ oe
4		Diagram removed.	M1 for a method that results in at least two values that can be used to compare two multipacks M1 for a complete method to find all three equivalent figures A1 for all 3 correct figures suitable for comparison C1 ft (dep on M2) for comparison of their values with a correct conclusion
8		Diagram removed.	M1 for 720 : 540 oe or 3 : 4 A1 cao M1 for 720 ÷ 3 or scale factor of $\frac{3}{2}$ or $\frac{2}{3}$ oe A1 cao

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
9		Diagram enlarged. Wording added ‘Angle FBC is marked x°’.	M1 for angle *DEF* = 180 – 70 – 54 (= 56) or for angle *AEB* = 70 M1 for 180 – “56” (= 124) or for 70 + 54 (= 124) C2 (dep on M2) for 124 with full reasons, appropriate to their given method (C1 (dep on at least M1) for one appropriate reason relating to parallel lines) Possible reasons: corresponding angles are equal; alternate angles are equal angles on a straight line add up to 180° ; angles in a triangle add up to 180° vertically opposite angles are equal the exterior angle of a triangle is equal to the sum of the interior opposite angles

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
12		Diagram enlarged.	M1 for method to find the exterior angle of a pentagon (72°) M1 for method to find the interior angle of a pentagon (108°) M1 for 360 – "108" – "108"/2 – "108"/2 or for 180 – (180 – 90 – "108"/2) or for "108"×5 – "108"×2 – 90×2 A1 for 144 supported by working OR M1 for considering all 5 lines of symmetry M1 for 360 ÷ 10 (= 36) M1 for "36" × 4 A1 for 144 supported by working
13	(b)	Grid enlarged.	M1 ft for 5 points from their table plotted correctly, provided at least B1 awarded in part (a) A1 for a fully correct graph
14		Diagrams enlarged. Model provided for all candidates of the first diagram.	M1 for a complete method to find the area of the cross section (= 76) or for finding the volume of one small prism after splitting the bar into prisms M1 (dep) for a complete method to find the volume of the bar eg "76"×120 (= 9120) oe M1 for "volume" × 8 eg "9120" × 8 (=72960) M1 for 250 ÷ "72.96" (=3.4265….) A1 cao

PAPER: 1MA0_2H			
Question		**Modification**	**Notes**
16		Grid enlarged. Small squares removed. Right axis has been labelled. Graph line marked to go through (125,15)(130,30)(135,45).	B1 130 cao M1 for reading from graph at cf = 15 (= 122) and cf = 45 (= 133) with at least one of LQ or UQ correct A1 cao
17		Diagram enlarged.	M1 for $\sin(C) = \frac{10.4+5.2}{18}$ oe or for $(BC^2) = 18^2 - (10.4 + 5.2)^2$ M1 for $\sin^{-1}\left(\frac{"15.6"}{18}\right)$ or for $\sqrt{324 - 243.36}$ or $\sqrt{80.64}$ (= 8.979...) M1 for $\sin^{-1}\left(\frac{"15.6"}{18}\right) - 30$ or for for $\tan^{-1}\left(\frac{5.2}{"8.979..."}\right)$ A1 for 30.07 to 30.1 **OR** M1 for $\sin(ADC) = \left(\frac{18 \times \sin 30}{10.4}\right)$ M1 for $\sin^{-1}\left(\frac{18 \times \sin 30}{10.4}\right)$ (= 59.926...) M1 for (180 – "59.926") – 90 oe A1 for 30.07 to 30.1

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Question		**Modification**	**Notes**
18	(a)	MLP only - a changed to j and b changed to k. Braille only – a changed to p b changed to q.	B2 cao (B1 for any two of 10, a^5, b^4 in a product)
	(b)	MLP only - x changed to e and y changed to f.	M1 for a method to remove square root or clear fraction M1 for a method to remove square root **and** clear fraction A1 for $y = 5p^2 - x$
22		Diagram enlarged. Shading changed to dotty shading. Wording added 'A B C D' after 'Calculate the perimeter of the shaded region.'	M1 for $\frac{75}{360} \times 2 \times \pi \times 6$ oe (= 7.85...) or $\frac{75}{360} \times 2 \times \pi \times 10$ oe (= 13.08...) M1 for "7.85..." + "13.08..." A1 for 28.9 to 28.95
23		Table frequencies changed to 8, 32, 36, 24 and 16. Diagram enlarged.	B3 for a fully correct histogram with vertical axis correctly scaled or with a key, eg. 2 cm^2 = 1 (B2 for at least 4 correct blocks with or without a scale or a key OR for all five fd correct) (B1 for 2 correct blocks of different widths or for at least three correct fd values)
24(b)		MLP only - x changed to y.	M1 for common denominator $(x - 1)(x + 1)$ M1 for $\frac{x(x+1) - x(x-1)}{(x-1)(x+1)}$ A1 for $\frac{2x}{(x-1)(x+1)}$ or $\frac{2x}{x^2 - 1}$

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25		Diagram enlarged.	M1 for $0.5 \times 7 \times 8 \times \sin B = 18$ M1 for $(B =) \sin^{-1}\left(\frac{18}{0.5\times 7\times 8}\right)$ oe $(= 40.0)$ M1 for $(AC^2 =) 7^2 + 8^2 - 2\times 7\times 8\times \cos$ "40.0" M1 (dep) for correct order of evaluation or 27.209… M1 for $\frac{\sin A}{8} = \frac{\sin "40.0"}{"5.216"}$ or $0.5\times 7\times$ "5.216" $\times \sin A = 18$ A1 for answer in the range 80.3 to 80.4 from correct working OR (with perpendicular from A meeting BC at a point X) M1 for $0.5 \times 8 \times AX = 18$ M1 for $(AX =) \frac{18}{0.5\times 8} (= 4.5)$ M1 for $BAX = \cos^{-1}\frac{"4.5"}{7} (= 49.99\ \ldots)$ M1 for $(BX =) \sqrt{7^2 - "4.5"^2}$ $(= 5.3619\ldots)$ M1 for $CAX = \tan^{-1}\frac{8 - "5.3619"}{"4.5"} (= 30.38\ \ldots)$ A1 for answer in the range 80.3 to 80.4 from correct working

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