

Mark Scheme (Results)

January 2019

Pearson Edexcel International GCSE

In Mathematics A (4MA1) Higher Tier

Paper 2HR

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- 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.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

- **Types of mark**
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)
  - dep – dependent
  - indep – independent
  - eeoo – each error or omission
- **No working**

  If no working is shown then correct answers normally score full marks

  If no working is shown then incorrect (even though nearly correct) answers score no marks.
- **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 it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

  Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.

  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 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.

  If there is no answer on the answer line then check the working for an obvious answer.
- **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: eg. 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 eg algebra.

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

- **Parts of questions**

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

Apart from questions 10b, 11, 12, 21, 22 (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark	Notes
1 (a)		$12 < d \leq 16$	1	B1
(b)	$2 \times 16 + 6 \times 18 + 10 \times 19 + 14 \times 27 + 18 \times 20$ $= 32 + 108 + 190 + 378 + 360$ (=1068)	10.68	4	M2 $f \times d$ for at least 4 products with correct mid- interval values and intention to add. If not M2 then award M1 for d used consistently for at least 4 products within interval (including end points) and intention to add or for at least 4 correct products with correct mid-interval values with no intention to add
	'1068' ÷ 100			M1 dep on at least M1 Allow division by their $\sum f$ provided addition or total under column seen
				A1 Accept 10, 10.7 and 11

Question	Working	Answer	Mark	Notes
2	$0.5 \times 6 \times 6 \times 5$ (= 90) $0.5 \times \pi \times 3^2 \times 5$ (=22.5π = 70.6858...) or $\pi \times 3^2 \times 5$ (=45π = 141.37166...) '90' – '70.6858.....'	19.3	4	M1 Correct method for volume of **A** M1 Correct method for volume of **B** or correct volume of cylinder M1 Correct method to find the difference in the volume A1 19 – 19.4
3 (a)		$6n + 4$	2	M1 for $6n + k$ (k may be 0 or absent) oe A1 oe eg $10 + (n – 1)6$ or $n \times 6 + 4$
(b)	...40, 46,... −2, 1, 6, 13, 22, 33 46 ... $6n + 4 = n^2 - 3$ oe	e.g. 22 or 46	2	M1 continuing sequence and writing at least 5 terms of 2nd sequence – allow one error or for a correct equation ft part (a) A1 or other number in both sequences eg −2

Question	Working	Answer	Mark	Notes
4	0.07 × 10 800 (= 756) oe 10 800 + '756'	11 556	3	M1 M1 M2 for 1.07 × 10 800 oe A1
5 (a)		*P* in correct region on overlay	2	M1 Correct bearing (±2°) or correct distance (±2 mm) A1 Fully correct position for P
(b) (i)		154	2	B1 150 – 158 ft from diagram
(ii)		332		B1 330 – 334 ft from diagram
6	360 ÷ 8 (= 45) or 180 – (360 ÷ 8) (= 135) or $\frac{6\times180}{8}(=135)$ oe e.g. $\frac{540-112-112-84}{2}$ (=116) or $\frac{540-308}{2}$ (= 116) or $\frac{232}{2}$ (= 116) e.g. '135' – '116' or 180 – '116' – '45'	19	4	M1 Correct method to find the interior or exterior angle of octagon M1 Correct method to find a missing angle from pentagon M1 Complete method A1

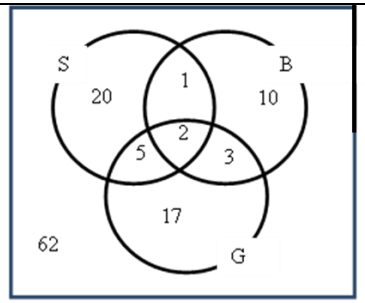
Question	Working	Answer	Mark	Notes
7	$\tan'35' = \frac{x}{15}$ or $\tan'55' = \frac{15}{x}$ or $\frac{x}{\sin 35} = \frac{15}{\sin 55}$ $x = 15 \times \tan$ '35' (= 10.5...) or $x = \frac{15}{\tan'55'}$ (= 10.5…) or $x = \frac{15}{\sin 55} \times \sin 35$ (= 10.5…) 10.5 + 37	47.5	4	M1 Forming a right-angled triangle with angle 125 – 90 marked or 55 marked M1 M1 A1 awrt 47.5
8 (a)		$3k^3m$	2	B2 B1 for an answer in the form ak^xm^y with 2 correct from $a = 3, x = 3, y = 1$
(b)	$7 + 1 < 4x \leq 17 + 1$ or $\frac{7}{4} < x - \frac{1}{4} \leq \frac{17}{4}$ $(7+1) \div 4 < x \leq (17+1) \div 4$ or $\frac{7}{4} + \frac{1}{4} < x \leq \frac{17}{4} + \frac{1}{4}$	$2 < x \leq 4.5$	3	M1 or one side of the inequality correct, e.g. 2 or 4.5 M1 A1 Accept $x > 2$, $x \leq 4.5$

Question	Working	Answer	Mark	Notes		
9	6000 × 0.015 (= 90) **or** 6000 × 1.015 (= 6090) (6000 + '90') × 0.015 (= 91.35) ('6090' + '91.35') × 0.015 (= 92.72) ('6090' + '91.35' + '92.72') × 0.015 (= 94.11..)	368.18	3	M1 M1 A1	or for $\frac{4\times1.5}{100} \times 6000$ (=360) or 6360 for complete method (4 years) for total value or sight of 6368….. accept 368 – 368.20	M2 for 6000×1.015^4

Question		Working	Answer	Mark	Notes	
10	(a)		$4x^4y^3$	2	B2	B1 for 2 correct terms of 3 in a product
	(b)	e.g. $2(8 - 2x) - 3(2x - 3) = 4 \times 6$ or	0.1	3	M1	For method to deal with fractions
		$\frac{2(8-2x)}{6} - \frac{3(2x-3)}{6} = 4$ or				eg. finds a common denominator (6 or a multiple of 6)
		$\frac{16-4x}{6} - \frac{6x-9}{6} = 4$ or				or
		$\frac{2(8-2x)-3(2x-3)}{6} = 4$ or				multiplies by common multiple in a correct equation.
		$\frac{-10x+25}{6} = 4$ oe				Condone one error in expansion
		e.g. $16 - 4x - 6x + 9 = 24$ or $-10x + 25 = 24$ oe			M1	For method to expand brackets and multiplies by common denominator in a correct equation.
						Condone one error in expansion
					A1	oe dep on M1
	(c)	$m^2 = \frac{1}{3}ef$	$f = \frac{3m^2}{e}$	2	M1	for squaring the m
					A1	oe must have $f =$

Question	Working	Answer	Mark	Notes
11	e.g. $y = 2 - \frac{1}{2}x$ or $y = 2 - \frac{x}{2}$ or $y = \frac{4-x}{2}$ or gradient of $L_1 = -0.5$ oe e.g. $\frac{9--7}{7--1}$ (=2) or $\frac{-7-9}{-1-7}$ (=2)	Yes, with correct gradients shown to make −1 when multiplied	3	M1 M1 A1 $2 \times -0.5 = -1$ and yes
Alternative scheme for 11				
	e.g. $y = 2 - \frac{1}{2}x$ or $y = 2 - \frac{x}{2}$ or $y = \frac{4-x}{2}$ or gradient of $L_1 = -0.5$ oe $-7 = 2(-1) + c$ or $9 = 2(7) + c$ ($c = -5$)	Yes, with correct equation shown to be valid by using the given points	3	M1 M1 dep on M1 for substituting $(-1, -7)$ or $(7, 9)$ into $y = 2x + c$ to find value of c A1 Uses the other point in $y = 2x - 5$ to show it is valid and yes

Question	Working	Answer	Mark	Notes
12	0, 4, 6, 9, 17, 21, 32, 42, 51, 69, 102	45	3	M1 for identifying 6 or 51 from ordered list **or** attempt to find 3rd and 9th seen (from an ordered list) M1 for identifying 6 **and** 51 A1 for 45
13	1 + 0.65 + 1.22 (=2.87) or 100 + 65 + 122 (=287) 861 ÷ 2.87 or (861 ÷ 287) × 100 oe	300	3	M1 oe Note: 861÷3=287 is M0 M1 A1
14 (a)(i)		a^2	1	B1
(ii)		ab^4	1	B1
(iii)		$\frac{1}{3}b$	1	B1oe
(b)	177 147 ÷ 2187 (= 81) or $a = 81$ 2187 ÷ 81 (= 27) or $b = 27$	$x = 4, y = 3$	3	M1 or $x + y = 7$, M1 $2x + y = 11$ A1 $x = 4$ **and** $y = 3$

Question		Working	Answer	Mark	Notes	
15	(a)	**$0.3^3 \times 0.7$**	0.0756	3	M1	oe
		$4 \times 0.3^3 \times 0.7$			M1	oe
					A1	$\frac{189}{2500}$ or 0.075 or 0.076
	(b)	**$1 - 0.7^4$ oe**	0.7599	2	M1	Fully correct method
					A1	0.759 – 0.7560
16	(a)			3	M1	for 2 in the middle **and** one from 1 or 3 or 5 in the correct place in the Venn diagram
					M1	for any 4 correct entries
					A1	for a fully correct answer including 62 outside the circles inside the rectangle
	(b)		$\frac{3}{28}$	1	B1ft	

Question		Working	Answer	Mark	Notes	
17	(a)	4.75×0.255	1.21	2	M1	for 4.75 or 0.255 seen
					A1	1.21125
	(b)	$2.735 \div 0.035$	78	2	M1	2.735 or 0.035 seen
					A1	78.142857...
18	(a)	(0, 1), (90, 0), (180, −1), (270, 0), (360, 1)	Curve through given coordinates	2	M1	for a translation of the curve parallel to the *x* axis or for a curve going through 3 correct points
					A1	fully correct
	(b)		(180, 4)	2	M1	1 coordinate correct or a sketch of $\sin\left(\frac{x}{2}\right)^0$
					A1	for (180, 4)

Question	Working	Answer	Mark	Notes
19	$\frac{BD}{\sin 97} = \frac{9.3}{\sin 58}$ $BD = \frac{9.3}{\sin 58} \times \sin 97$ (= 10.8846..) 0.5 × '10.88.' × 11.2 × sin47 (= 44.57.....) 0.5 × '10.88..' × 9.3 × sin25 (=21.39.....) or 0.5 × '4.63458 …' × 9.3 × sin97 (=21.39.....)	66.0	5	M1 M1 M1 Complete method to find area *BCD* M1 Complete method to find area *ABD* A1 Allow 65.9 – 66.1
20 (a)	$3(x^2 - 4x) + 7$ or $3\left(x^2 - 4x + \frac{7}{3}\right)$ $3((x-2)^2 - 4) + 7$ or $3\left((x-2)^2 - 4 + \frac{7}{3}\right)$ or $3(x-2)^2 - 12 + 7$	$3(x-2)^2 - 5$	3	M1 or expanding $a(x^2 + 2bx + b^2) + c$ M1 $-12 = 2ab$ or $7 = ab^2 + c$ A1 or $a = 3$, $b = -2$, $c = -5$
(b)		$x = 2$	1	B1 ft from (a)

Question	Working	Answer	Mark	Notes	
21	$(10x - 3)(x + 1) = 6x$	$(-0.05, -0.3)$	6	M1	for a correct equation to find points A and B
	$10x^2 + x - 3\ (= 0)$			M1	for rearranging equation in the form $ax^2 + bx + c\ (= 0)$
	$(5x + 3)(2x - 1)\ (= 0)$ or			M1	dep on M1for solving the quadratic equation using factorisation or using the formula or by completing the square
	$x = \frac{-1 \pm \sqrt{1^2 - (4 \times 10 \times -3)}}{2 \times 10}$ or				
	$10(x + 0.05)^2 - 0.025 - 3 = 0$				
	$x = -0.6$ and $x = 0.5$ $(y = -3.6$ and $y = 3)$			A1	Both x values correct dep on M2
	$\frac{'-0.6' + '0.5'}{2}$ or $\frac{'-3.6' + '3'}{2}$ oe			M1	dep on M1
				A1	

Question	Working	Answer	Mark	Notes		
22	$\pi\times(5r)^2\times\frac{45}{360}$ or $\pi\times(3r)^2\times\frac{45}{360}$ $\pi\times r^2\times\frac{45}{360}$ or $\pi\times(0.6r)^2\times\frac{45}{360}$ $\pi\times(5r)^2\times\frac{45}{360}-\pi\times(3r)^2\times\frac{45}{360}=\frac{81}{2}\pi$ or $\pi\times r^2\times\frac{45}{360}-\pi\times(0.6r)^2\times\frac{45}{360}=\frac{81}{2}\pi$	$9\pi+18$	6	M1 M1	oe oe	M2 for $0.64\pi r^2\times\frac{45}{360}=\frac{81}{2}\pi$ or $16\pi r^2\times\frac{45}{360}=\frac{81}{2}\pi$
	$r^2 = (40.5\times 8)\div(1-0.36)$ or $r^2 = 506.25$ oe $(r = 22.5)$ $r^2 = (40.5\times 8)\div(25-9)$ or $r^2 = 80.25$ oe $(r = 4.5)$			M1		or 1 share = 4.5 or $r = 22.5$ or $OA = 13.5$ or $AP = 9$
	$(AB =)\ 2\times\pi\times'13.5'\times\frac{45}{360}\left(=\frac{27}{8}\pi\right)$ or $(PQ =) 2\times\pi\times'22.5'\times\frac{45}{360}\left(=\frac{45}{8}\pi\right)$ oe Perimeter = $\frac{'27}{8}\pi'+\frac{'45}{8}\pi'+'9'+'9'$			M1 M1 A1		dep on M3 or $2\times\pi\times('13.5'+'22.5')\times\frac{45}{360}(=9\pi)$ dep on M4 oe

Question	Working	Answer	Mark	Notes	
23	$a + 9d = 66$ oe $\frac{20}{2}(2a + 19d) = 1290$ oe $a = 93$ or $d = -3$	81	4	M1 M1 A1 A1	A correct formula involving 10^{th} term Correct formula for sum of first 20 terms A correct value for a or d dep on M2