GCSE Mathematics (1MA1) – Foundation Tier Paper 2H

Mock Set 3 student-friendly mark scheme

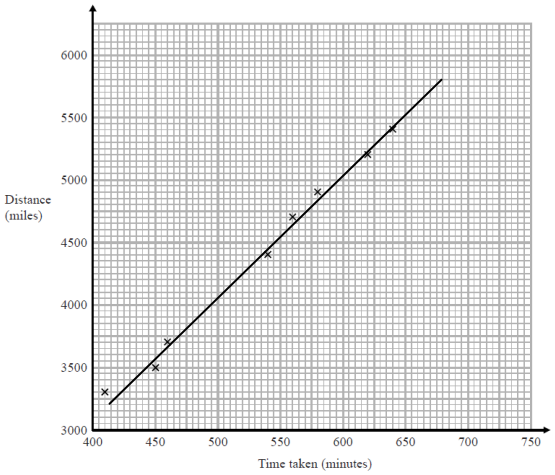
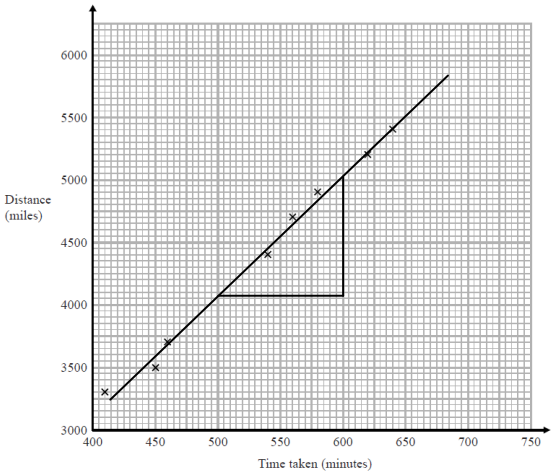
Please note that this mark scheme is not the one used by examiners for making scripts. It is intended more as a guide to good practice, indicating where marks are given for correct answers. As such, it doesn't show follow-through marks (marks that are awarded despite errors being made) or special cases.

It should also be noted that for many questions, there may be alternative methods of finding correct solutions that are not shown here – they will be covered in the formal mark scheme.

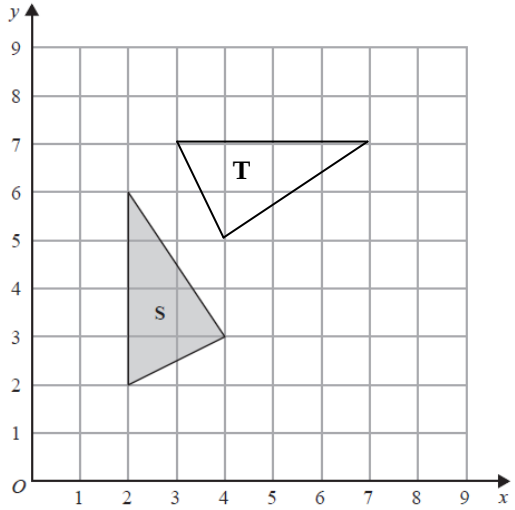
NOTES ON MARKING PRINCIPLES

Guidance on the use of codes within this mark scheme
M1 – method mark. This mark is generally given for an appropriate method in the context of the question. This mark is given for showing your working and may be awarded even if working is incorrect. P1 – process mark. This mark is generally given for setting up an appropriate process to find a solution in the context of the question. A1 – accuracy mark. This mark is generally given for a correct answer following correct working. B1 – working mark. This mark is usually given when working and the answer cannot easily be separated. C1 – communication mark. This mark is given for explaining your answer or giving a conclusion in context supported by your working. Some questions require all working to be shown; in such questions, no marks will be given for an answer with no working (even if it is a correct answer).

Question 1 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)(i)		B1	This mark is given for a line of best fit drawn on the scatter diagram
	490 minutes	B1	This mark is given for an answer in the range 480 – 500
(a)(ii)	Data is only a sample Line of best fit can vary Scale cannot be read exactly	C1	This mark is given for one of the possible reasons shown
(b)(i)		M1	This mark is given for a method to find the gradient of the line of best fit
	$\frac{5000-4050}{100} = 9.5$	A1	This mark is given for an answer in the range 9.4 – 9.8
(b)(ii)	Speed in miles per minute	C1	This mark is given for a correct interpretation of the line of best fit

Question 2 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)		M1	This mark is given for the shape **T** drawn in the correct orientation
		A1	This mark is given for the shape **T** drawn in the correct orientation with coordinates (4, 5), (3, 7) and (7, 7)
(b)	Rotation of 90° anticlockwise with centre (5, 4)	B1	This mark is given for a correct description of the transformation

Question 3 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$2.5 \times 4x = 10x$ $7 \times (2x - 3) = 7(2x - 3)$	P1	This mark is given for a process to find an expression for the area of rectangle **A** and rectangle **B**
	$10x = 14x - 21$	P1	This mark is given for a process to form an equation for the two rectangles
	$4x = 21$	P1	This mark is given for a process to find the value of x
	$x = 5.25$	A1	This mark is given for a correct answer only
	Perimeter of **B** $= 2 \times ((2 \times 5.25 - 3) + 7)$ $= 2 \times 14.5$ $= 29$	B1	This mark is given for substituting to find a value for the perimeter of rectangle **B**

Question 4 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	First spin: $\frac{3}{4}, \frac{1}{4}$ Second spin: $\frac{3}{4}, \frac{1}{4}, \frac{3}{4}, \frac{1}{4}$	B2	This mark are given for finding all six probabilities correctly (B1 given for finding four of the probabilities correctly)
(b)	$\frac{3}{4} \times \frac{1}{4}$	M1	This mark is given for finding a method to work out the combined probability
	$\frac{3}{16}$	A1	This mark is given for the correct answer only

Question 5 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$S = \pi^2 (10^2 - 8^2)$	M1	This mark is given for substituting
	$= (3.142)^2 \times 36$ $= 355$	A1	This mark is given for the correct answer to 3 significant figures

Question 6 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{4}{4+3} = \frac{4}{7}$	B1	This mark is given for the correct answer only
(b)	$\frac{5}{5+3} = \frac{5}{8}$	P1	This mark is given for a process to find the fraction of large vans
	$\frac{4}{7} \times \frac{5}{8}$	P1	This mark is given for a process to multiply fractions
	$\frac{20}{56}$	A1	This mark is given for the correct answer only

Question 7 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{5}{8}$	B1	This mark is given for the correct answer only
(b)	9.660254	B1	This mark is given for part of the calculation
	2.129754359	B1	This mark is given for the correct answer only

Question 8 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$p^2 = a + \frac{t}{2}$	M1	This mark is given for eliminating the square root
	$p^2 - a = \frac{t}{2}$	M1	This mark is given for rearranging
	$t = 2(p^2 - a)$	A1	This mark is given for the correct answer only

Question 9 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$BEF = x$ (alternate angles are equal)	M1	This mark is given for the use of parallel lines to find an angle
	$EFB = \frac{180 - x}{2}$ (angles in a triangle add up to 180)	M1	This mark is given for finding an expression for the size of angle EFB
	$w + \frac{180 - x}{2} = 180$ (angles on a straight line add up to 180) $w = 180 - \frac{180 - x}{2} = 90 + \frac{1}{2}x$	M1	This mark is given for a complete method to show the printed result
	Alternate angles are equal Angles in a triangle add up to 180 Angles on a straight line add up to 180	C1	This mark is given for a complete list of reasons

Question 10 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$6.5 \times 10^7 \times 1.006^4$	M1	This mark is given for a method to find an estimate for the population in 2020
	6.66×10^7	A1	This mark is given for a correct answer only
(b)	Growth is calculated using a compound calculation, not a simple one	C1	This mark is given for a correct explanation
(c)	Common ratio is 1 + 0.06%, so 1.006	M1	This mark is given for a method to find the common ratio
	Terms are generated by multiplying the previous term by 1.006, so a geometric progression is formed	C1	This mark is given for a correct conclusion

Question 11 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$2 : 5 : \frac{3}{4} \times 14 : \frac{1}{4} \times 14$	P1	This mark is given for finding an expression for the ratio using the fact that $C + D$ = twice 2 + 5
	$2 : 5 : 10\frac{1}{2} : 3\frac{1}{2}$	P1	This mark is given for finding a correct unsimplified ratio
	4 : 10 : 21 : 7	A1	This mark is given for the correct (whole number) answer only

Question 12 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\tan QPR = \frac{3}{5}$	P1	This mark is given for a process to link 60% to a trigonometric ratio
	$\angle QPR = 30.96°$	P1	This mark is given for a method to find the size of angle QPR
	$\sin QPR = 0.514$	A1	This mark is given for the correct answer only

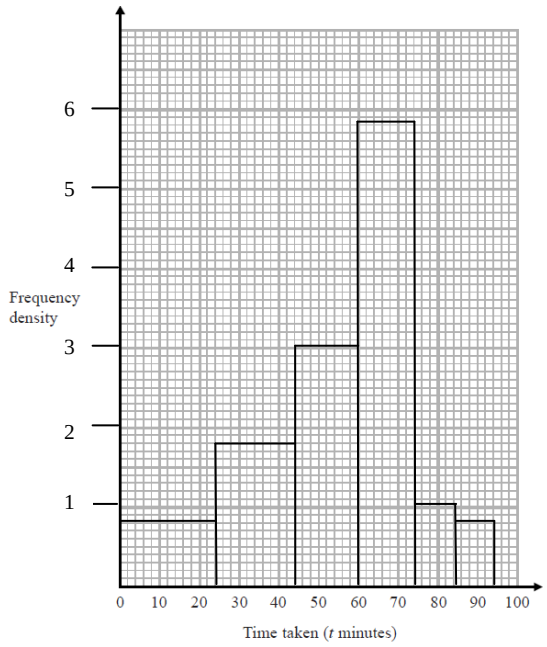
Question 13 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	E, C, D, A, B	B3	These marks are given for all five graphs labelled correctly (B2 for 3 or 4 graphs correct, B1 for 1 or 2 graphs correct)

Question 14 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$10 \times 9 \times 8$	M1	This mark is given for a method to find how many different sandwiches may be bought
	720	A1	This mark is given for the correct answer only

Question 15 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Frequency densities: 20 ÷ 25 = 0.8 25 ÷ 20 = 1.75 45 ÷ 15 = 3 87 ÷ 15 = 5.8 10 ÷ 10 = 1 8 ÷ 10 = 0.8 	C3	These marks are given for a fully correct histogram with axes scaled C2 is given for all bars in correct proportions C1 is given for two correct bars of different widths

Question 16 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	f(2) = –1, f(3) = 3	M1	This mark is given for a method to establish that there is at least one root in the interval (2, 3)
	Since there is a sign change, there must be at least one root in $2 < x < 3$	A1	This mark is given for a supporting explanation
(b)	$x^3 = 3x^2 - 3$ $x = \sqrt[3]{3x^2 - 3}$	C1	This mark is given for a correct rearrangement
(c)	$x_1 = \sqrt[3]{3 \times 2^2 - 3}$	M1	This mark is given for finding an expression for x_1
	$x_1 = 2.080\ldots$	A1	This mark is given for correctly evaluating x_1
	$x_2 = 2.153\ldots$	A1	This mark is given for correctly evaluating x_2

Question 17 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\left(\frac{500}{150}\right)^{\frac{1}{3}} \times 5$	P1	This mark is given for a process to find a volume scale factor
	7.47	A1	This mark is given for the correct answer only

Question 18 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(x - 8)(x + 4) = x^2 - 4x - 32$ $(x - a)^2 + b \quad = x^2 - 2ax + a^2 + b$	P1	This mark is given for a process to expand one set of brackets
	$-4x = -2ax, \quad a = 2$	A1	This mark is given for finding the correct value of a
	$32 = a^2 + b$ $32 = 4 + b$ $b = -36$	A1	This mark is given for finding the correct value of b

Question 19 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Arc length = 25 – 9 – 9 = 7	P1	This mark is given for a process to find the arc length
	$\frac{7}{2\pi r} = \frac{7}{18\pi} = \frac{x}{360}$	P1	This mark is given for a process linking the arc length to the circumference
	$x = \frac{7 \times 360}{18\pi}$	P1	This mark is given for a complete process to find the value of x
	= 44.6°	A1	This mark is given for the correct answer only

Question 20 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$5.365 \leq p < 5.375$ $2.85 \leq s$ 2.95	B1	This mark is given for the upper and lower bounds of p and s
	Upper bound for $m = \frac{1}{5.365 \times 2.85}$	M1	This mark is given for using the two lower bounds for p and s to find the upper bounds for m
	0.0654 (to 3 significant figures)	A1	This mark is given for the correct answer only

Question 21 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$h = b \sin C$	M1	This mark is given for using sine to find the height of the triangle
	Area of $ABC = \frac{1}{2} \times$ base $\times$ height	M1	This mark is given for using an expression for the area of the triangle
	Thus area = $\frac{1}{2} \times a \times b \sin C$ $= \frac{1}{2} ab \sin C$	C1	This mark is given for a correct conclusion leading to a full proof

Question 22 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$2xy = 40$	P1	This mark is given for a process to set up an equation to solve the problem
	$2x + 2x + 2y + 2y + xy + xy = 100$	P1	This mark is given for a process to form a second equation
	$4x + 4y + 2xy = 100$ Since $2xy = 40$, $4x + \frac{80}{x} + 40 = 100$ Multiplying both sides by x, $4x^2 + 80 + 40x = 100x$ $4x^2 – 60x + 80 = 0$ Dividing through by 4, $x^2 –15 + 20 = 0$	P1	This mark is given for a process to eliminate one variable
	$x = \frac{15 \pm \sqrt{145}}{2} = 1.479$ $y = \frac{40}{2x} = 13.522$	P1	This mark is given for a process to use the quadratic formula to find the value of x and the value of y
	$\sqrt{2^2 + 1.479^2 + 13.522^2}$	P1	This mark is given for a process to find the length of the diagonal of the cuboid
	13.7 (3 significant figures)	A1	This mark is given for the correct answer only