

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

November 2022 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 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	(2, 1)	B1	This mark is given for the correct answer only
(b)	For example: As the amount of rainfall decreases, the number of hours of sunshine increases	C1	This mark is given for a valid description of the relationship
(c)		M1	This mark is given for a suitable line of best fit drawn
	3.5	A1	This mark is given for an answer in the range 3 to 4

Question 2 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		B2	These marks are given for a fully correct elevation 5 squares high and 3 squares wide

Question 3 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	$6n + 1$	B2	These marks are given for a fully correct answer (B1 is given for $6n + c$, where c is an integer $\neq 1$ or is missing)
(b)	$8 - 6n = -58$ $-6n = -66$ $-n = -11$	M1	This mark is given for a method to find whether or not n is an integer
	Yes, it is the 11th term	A1	This mark is given for valid explanation supported by correct working

Question 4 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$ABCO: 11 \times 7 = 77$ $DEFO: 9 \times 7 = 63$ $CDO: \frac{1}{2} \times 11 \times 9 = 49.5$ $AFO: \frac{1}{4} \times \pi \times 7^2 = 38.4845\dots$	P1	This mark is given for a process to find at least three of the four areas
	$77 + 63 + 49.5 + 38.4845\dots = 227.9845\dots$	P1	This mark is given for a process to find the total area of the garden
	$227.9845\dots \div 14 = 16.2846\dots$	P1	This mark is given for a process to find out the number of bags of grass seed needed
	17×10.95	M1	This mark is given for a process to find out the cost of the bags of grass seed needed (the number of bags must be an integer)
	186.15	A1	This mark is given for the correct answer only

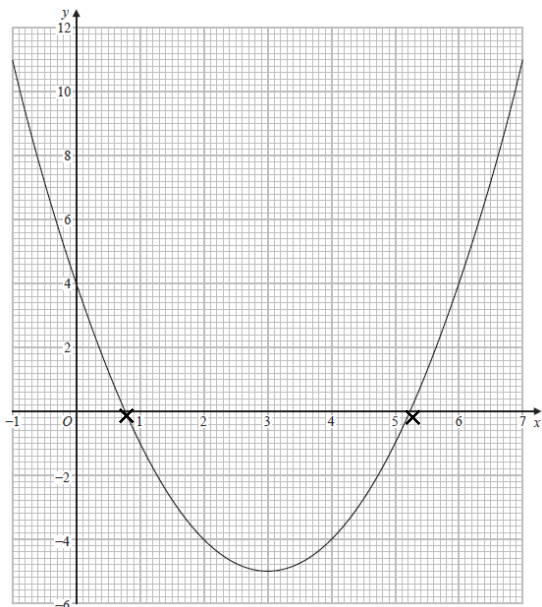
Question 5 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$14.5 \times \cos 53^\circ$	M1	This mark is given for a method to find the length x
	8.73	A1	This mark is given for a correct answer to three significant figures

Question 6 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$7000 \times 1.03 = 7210$	M1	This mark is given for a method to find the value of the investment after one year
	7210×1.015	M1	This mark is given for a method to find the value of the investment after two years
	7318.15	A1	This mark is given for the correct answer only

Question 7 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	4	B1	This mark is given for the correct answer only
(b)	(3, -5)	B1	This mark is given for the correct answer only
(c)		M1	This mark is given for a method to mark the intercepts with the x -axis on the graph
	5.2, 0.8	A1	This mark is given for correct answers in the ranges 5.1 to 5.3 and 0.7 to 0.9

Question 8 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$135 - 120 = 15$	M1	This mark is given for a method to find the absolute profit in £
	$\frac{15}{120} \times 100$	M1	This mark is given for a method to find the percentage profit
	12.5	A1	This mark is given for the correct answer only

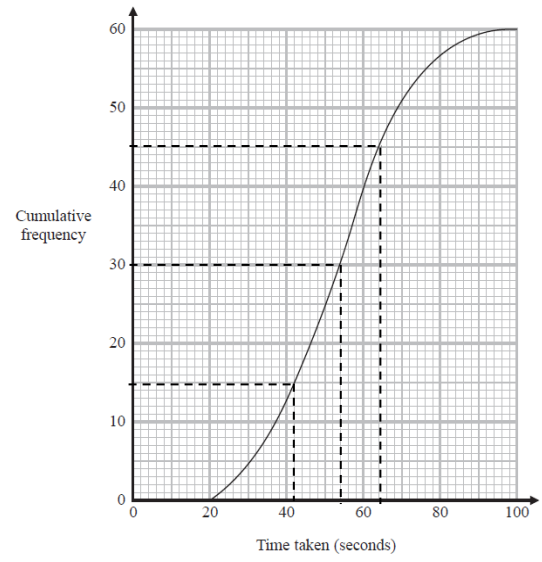
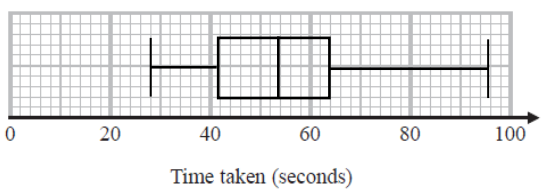
Question 9 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$y = \frac{3}{6}x + \frac{7}{6}$ so $y = \frac{1}{2}x + \frac{7}{6}$	M1	This mark is given for writing $6y = 3x + 7$ in terms of y
	For example: Yes, both lines have a gradient of $\frac{1}{2}$	A1	This mark is given for a valid answer supported by a correct explanation

Question 10 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{10914.75}{0.81} = 13475$	P1	This mark is given for a process to find the value of the car at the end of year 1
	$\frac{13475}{0.77}$	P1	This mark is given for a process to find the value of the car when it was bought
	17500	A1	This mark is given for the correct answer only

Question 11 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		B1	This mark is given for correctly identifying at least one of the lower quartile (42), median (54) or upper quartile (64) from the cumulative frequency diagram
		B2	These marks are given for a fully correct box plot (B1 is given for a box with at least three correctly plotted values from 24, 42, 54, 64 and 96)

Question 12 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$1.13^2 = 1.2769$ $1.13^3 = 1.442897$ $1.13^4 = 1.6304736\dots$ $1.13^5 = 1.8424351\dots$ $1.13^6 = 2.08191516\dots$	M1	This mark is given for a method to evaluate 1.13^n with $n > 1$
	6 years	A1	This mark is given for the correct answer only, having shown $1.13^6 > 2$
(b)	For example: The number of years will decrease We can't tell since we don't know how much it is increasing by	C1	This mark is given for a valid explanation

Question 13 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(-5 - 6)^2 + (8 - -7)^2$ $-11^2 + 15^2$ $121 + 225 = 346$	M1	This mark is given for a method to use Pythagoras' theorem to work out the length of AB
	$\sqrt{346} = 18.6$	A1	This mark is given for the correct answer only (to 1 decimal place)

Question 14 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	For example: $x = 1.06222\dots$ $10x = 10.6222\dots$ $100x = 106.222\dots$ $1000x = 1062.22\dots$	M1	This mark is given for a method to start to show the decimal as a fraction
	$1000x - 100x = 956$ $900x = 956$ $x = \frac{956}{900}$	M1	This mark is given for a method to find x as a fraction
	$x = \frac{239}{225} = 1 \frac{14}{225}$	A1	This mark is given for a fully correct proof

Question 15 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{20}{12}$ or $\frac{12}{42}$ or $\frac{12}{20}$ seen	P1	This mark is given for a start to a process to find an estimate for the number of rabbits in the park
	For example: $\frac{20}{N} = \frac{12}{42}$ so $N = \frac{20 \times 42}{12}$	P1	This mark is given for a process to find an estimate for the number of rabbits, N , in the park
	70	A1	This mark is given for the correct answer only
(b)	For example: The sample size cannot be greater than the population size	C1	This mark is given for a valid explanation

Question 16 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$y \leq 6$	M1	This mark is given for a n expression with $y = 6$ indicated
	$x \geq -3$	M1	This mark is given for a n expression with $x = -3$ indicated
	$y \geq 3x + 6$	M1	This mark is given for a n expression with $y = 3x + 6$ indicated
	$y \geq -\frac{x}{2} + 1$	A1	This mark is given for four correct inequalities found

Question 17 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{1587.762}{58.806} = 27$	P1	This mark is given for a process to find the scale factor of the volumes of the prisms
	$\frac{2 \times 43.74}{8.1} = 10.8$	P1	This mark is given for a process to find the height of B
	$\frac{10.8}{\sqrt[3]{27}}$	P1	This mark is given for a process to find the height, <i>h</i> , of A
	3.6	A1	This mark is given for the correct answer only

Question 18 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Area = $\frac{1}{2} \times 11.2 \times 4.3 \times \sin 118^\circ$	P1	This mark is given for a method to use the formula $A = \frac{1}{2} ab \sin C$
	21.3	A1	This mark is given for a correct answer only (to 3 significant figures)

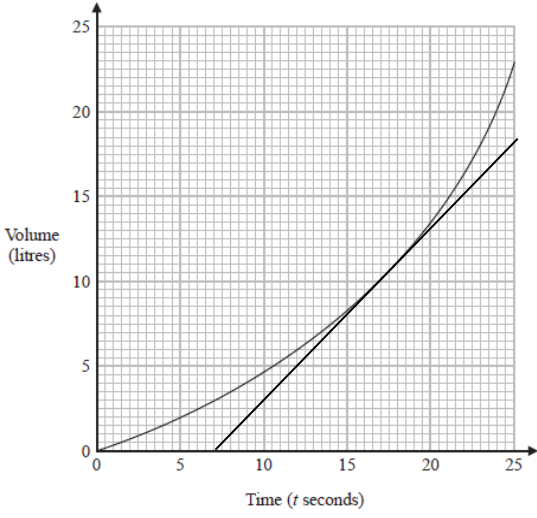
Question 19 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$(2x \pm 3)(3x \pm 2)$ or $\frac{-5 \pm \sqrt{5^2 - 4 \times 6 \times -6}}{2 \times 6}$	M1	This mark is given for a method to factorise the equation or to substitute into the quadratic formula
	$(2x + 3)(3x - 2)$ or $\frac{-5 \pm \sqrt{169}}{12}$	M1	This mark is given for a correct factorisation of the equation or a simplified version of the substitution
	$-\frac{3}{2}$ and $\frac{2}{3}$	A1	This mark is given for two correct solutions only (accept decimal solutions)

Question 20 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\sqrt{13^2 - 9^2} = \sqrt{169 - 81} = \sqrt{88}$ 9.3808...	P1	This mark is given for a correct process to use Pythagoras' theorem to find the length AF
	$\frac{9}{\cos 49} = \frac{9}{0.656...}$ 13.7182...	P1	This mark is given for a correct process to find the length FH
	$\tan FAH = \frac{13.7182...}{9.3808...}$	P1	This mark is given for a process to find the size of angle FAH
	56	A1	This mark is given for a correct answer only (to the nearest degree)

Question 21 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		M1	This mark is given for a tangent drawn at $t = 17.5$
	For example: $\frac{18.5}{17.5}$	M1	This mark is given for a method to find the gradient of the tangent
	1.06	A1	This mark is given for an answer in the range 0.9 to 1.2
(b)	For example: The gradient represents the rate of change of the volume over time	C1	This mark is given for a valid explanation

Question 22 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$h(x) = \sqrt[3]{2x+3}$	M1	This mark is given for a method to find $h(x)$
	$x^3 = 2y + 3$	M1	This mark is given for a first step of a method to find $h^{-1}(x)$
	$\frac{x^3 - 3}{2}$	A1	This mark is given for the correct answer only

Question 23 (Total 5 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	distance: $10.55 \leq d \leq 10.65$ time: $31 \text{ min } 47.5 \text{ sec} \leq t \leq 31 \text{ min } 48.5 \text{ sec}$	P1	This mark is given for a process to find upper and lower bounds for the distance or the time in minutes and seconds
	time in hours: $\frac{1907.5}{3600} \leq t \leq \frac{1908.5}{3600}$ time in hours: $0.529861 \leq t \leq 0.530138$	A1	This mark is given for a process to find upper and lower bounds for the time in hours
	Speed: $\frac{10.55}{0.530138} \leq s \leq \frac{10.65}{0.529861}$	P1	This mark is given for a process to find either the upper or lower bound for the speed
	Speed: $19.9004... \leq s \leq 20.0996...$	P1	This mark is given for a process to find both the upper or lower bound for the speed
	20 km/hour (agreed to 2 significant figures)	A1	This mark is given for the correct answer to 2 significant figures

Question 24 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$\frac{2.8 - 0}{2.1 - 0} = \frac{4}{3}$	M1	This mark is given for a process to find the radius of the circle
	Gradient of tangent = $-\frac{3}{4}$	M1	This mark is given for a process to find the gradient of the tangent using $-\frac{1}{m}$
	$y = -\frac{3}{4}x + c$ $2.8 = -1.575 + c, \quad c = 4.375$	M1	This mark is given for a process to substitute (2.1, 2.8) into $y = -\frac{3}{4}x + c$
	$\frac{3}{4}x + y = 4.375$ or (multiplied through by 8) $6x + 8y = 35$	A1	This mark is given for a correct answer in the form $ax + by = c$