

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

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 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	$3^5 \times 3^4 = 3^{5+4} (= 3^9)$ or $3^5 \div 3^2 = 3^{5-2} (= 3^3)$ or $3^4 \div 3^2 = 3^{4-2} (= 3^2)$	M1	This mark is given for a first step using a rule of indices
	37	A1	This mark is given for the correct answer only
(b)	1	B1	This mark is given for the correct answer only
(c)	$\frac{1}{9}$	B1	This mark is given for the answer shown (or for 0.111...)

Question 2 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$32 \times \frac{3}{4} = 24$	P1	This mark is given for a process to find the height of the surface of the water or
	$50 \times 32 \times 20 = 32\ 000$		to find the volume of the tank
	$50 \times 24 \times 20 = 24\ 000$ or $32\ 000 \times \frac{3}{4} = 24\ 000$	P1	This mark is given for a process to find the volume of the water and sand or
	$24 \div (5 + 1) \times 5 = 4 \times 5 = 20$		for a process to divide the height in the ratio 5:1
	$24\ 000 \div (5 + 1) \times 5 = 4000 \times 5 = 20\ 000$	P1	This mark is given for a process to divide the volume in the ratio 5:1
	$20 \times 50 \times 20 = 20\ 000$		or for a process to find the volume of the water
	$20\ 000 \div 1000$	P1	This mark is given for a process to convert to litres
	20	A1	This mark is given for the correct answer only

Question 3 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	£200 reduced by 50% = £100 £100 increased by 50% = £150	C1	This mark is given for scale factors of 0.5 for decrease and 1.5 for increase seen
	Betty is not correct since $x \times 0.5 \times 1.5 \neq x$	C1	This mark is given for an explanation supported by correct working

Question 4 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$3x + 10 = 5(x - 10)$	P1	This mark is given for equating opposite angles to give an equation in x
	$5x - 3x = 10 + 50$ $2x = 60$ $x = 30$	P1	This mark is given for expanding the bracket and rearranging terms to find x
	$3 \times 30 + 10 = 100$ $5(30 - 10) = 100$	P1	This mark is given for substituting the value of x into one of the angles
	$360 - 100 - 100 - 110 = 50$	A1	This mark is given for the correct answer only

Question 5 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$6x - 4y = -10$ $2x - 4y = 2$ $4x = -12$ or $6x - 4y = -10$ $6x - 12y = 6$ $8y = -16$	M1	This mark is given for a method to eliminate either x or y
	$x = -3$ $-6 - 4y = 2$ or $y = -2$ $6x + 8 = -10$	M1	This mark is given for correct substitution of the value of x or y or for a method to eliminate the other unknown
	$x = -3, y = -2$	A1	This mark is given for the correct answer only

Question 6 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	interior angle: $(8 - 2) \times 180 \div 8$ or exterior angle: $360 \div 8$	M1	This mark is given for a method to find the size of an interior angle or an exterior angle
	interior angle = 135 or exterior angle = 45	A1	This mark is given for finding the size of an interior angle or an exterior angle
	$CDA = \frac{(360 - 135 \times 2)}{2} = 45$	M1	This mark is given for method to find size of angle CDA
	$CDJ = 180 - 45 = 135$	C1	This mark is given for a correct conclusion from correct working

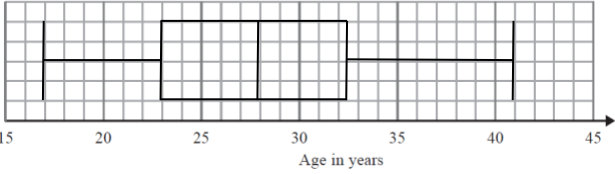
Question 7 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	5.49×10^{-3}	B1	This mark is given for the correct answer only
(b)		M1	for method to square each element, e.g. 64 and $10^{3 \times 2}$ or method to convert to ordinary numbers and square, e.g. 8000×8000
	6.4×10^7	A1	This mark is given for the correct answer only
(c)		M1	for method to convert to ordinary numbers, e.g. $760\,000 + 87\,000$ or $7.6 \times 10^5 + 0.87 \times 10^5$
	8.47×10^5	A1	This mark is given for the correct answer only

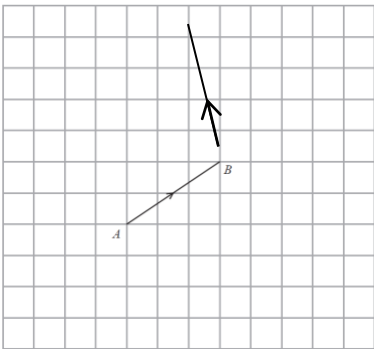
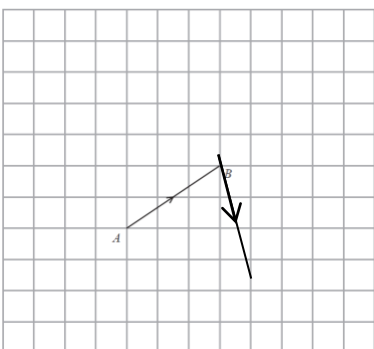
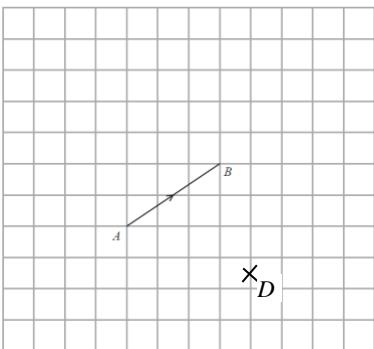
Question 8 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$15.6 \times 10 = 156$ $9.2 \times 10 = 92$ $11.2 \times 40 = 448$	P1	This mark is given for a process to find total scores of either women, children or all people
	$(448 - 156 - 92) \div 20$	P1	This mark is given for a complete process to find average score of men
	10	A1	This mark is given for the correct answer only
	The mean is reduced (since the total is reduced but the number of men stays the same)	C1	This mark is given for a correct reason

Question 9 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		B1	This mark is given for a box drawn with at least two correct values from LQ = 23, Median = 28, UQ = 32.5
		B1	This mark is given for the lowest value (17) and the highest value (41) shown on the grid
		B1	This mark is given for a fully correct diagram
	$\frac{a}{25}, a < 25$ or $\frac{10}{b}, 10 < b \leq 25$	M1	This mark is given for a correct denominator 25 or a correct numerator between 10 and 25
	$\frac{10}{25}$	A1	This mark is given for the correct answer only
	The class intervals are incorrect (they should be $0 < a \leq 30, 40, 50$)	C1	This mark is given for a correct reason

Question 10 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		B1	This mark is given for a correct vector drawn
	<p>Vector $\overrightarrow{AD} = \begin{pmatrix} 3 - -1 \\ 2 - 4 \end{pmatrix} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$</p> <p>or $\begin{pmatrix} 1 \\ -4 \end{pmatrix}$ drawn</p> 	M1	This mark is given for a method to find the vector \overrightarrow{AD} or for the vector $\begin{pmatrix} 1 \\ -4 \end{pmatrix}$ drawn on the grid
		A1	This mark is given for the correct position of D marked on the diagram

Question 11 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$P \propto \frac{1}{\sqrt{m}}$ or $P = \frac{k}{\sqrt{m}}$	M1	This mark is given for an interpretation of the first line
	$10 = \frac{k}{\sqrt{0.25}}$ so $k = 5$	M1	This mark is given for a method to find the constant of proportionality
	$\frac{5}{\sqrt{m}} = 2$ so $\sqrt{m} = 2.5$ $m = 6\frac{1}{4}$	A1	This mark is given for the correct answer only

Question 12 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\pi(2n + 6)^2$ or $\pi(n - 1)^2$ or $\pi(n + 13)^2$	P1	This mark is given for a process to find the area of at least one of the circles in algebraic form
	$\pi(2n + 6)^2 - \pi(n - 1)^2 > \pi(n + 13)^2$	P1	This mark is given for a process to set up an inequality in n
	$4n^2 + 24n + 36 - n^2 + 2n - 1$ $> n^2 + 26n + 169$	P1	This mark is given for a process to remove all brackets
	$n^2 > 67$	P1	This mark is given for isolating the n^2 term
	9	A1	This mark is given for the correct answer only

Question 13 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		M1	This mark is given for drawing a tangent at the point where $t = 5$ and applying a method to find the gradient
	–3	A1	for answer in the range –3.5 to –2.5
(b)	Rate of change of temperature or Cools at a rate of 3 degrees per minute	C1	This mark is given for a correct explanation relating to the ‘rate of change of the temperature’ of the coffee

Question 14 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$5(16t - t^2)$ or $5t(16 - t)$	P1	This mark is given for factorising
	$-5[(t - 8)^2 - 64]$	P1	This mark is given for completing the square
	$(80 \times 8) - (5 \times 64)$	P1	This mark is given for a substitution of $t = 8$ into $s = 80t - 5t^2$
	320	A1	This mark is given for the correct answer only

Question 15 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{n}{2n+1} \times \frac{n-1}{2n}$ or $\frac{n+1}{2n+1} \times \frac{n}{2n}$ or $\frac{n+1}{2n+1} \times \frac{n}{2n}$ or $\frac{n}{2n+1} \times \frac{n+1}{2n}$	C1	This mark is given for a method to find probability of two red balls, two blue balls or two different colours
	$\frac{n}{2n+1} \times \frac{n-1}{2n} + \frac{n+1}{2n+1} \times \frac{n}{2n}$	C1	This mark is given for finding the probability of finding two balls of the same colour
	$\frac{n^2 - n + n^2 - 1}{2n(2n+1)} = \frac{2n^2}{2n(2n+1)}$	C1	This mark is given for method to reduce the expression to a single fraction
	$\frac{n}{2n+1}$	C1	This mark is given for a correct conclusion following accurate algebra

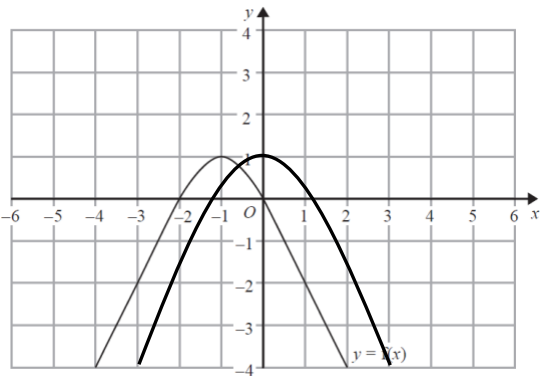
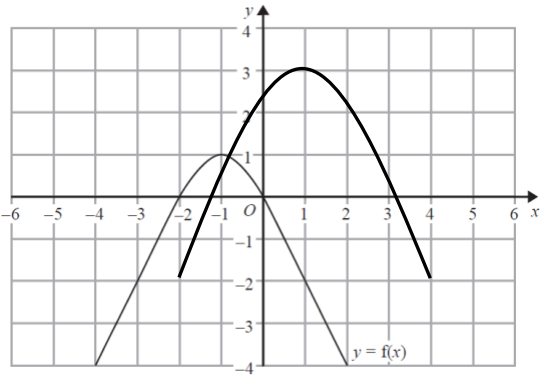
Question 16 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$V_A = \frac{4}{3}\pi \times 2^3$ or $V_B = \frac{4}{3}\pi \times 3^3$	P1	This mark is given for a process to find the volume of at least one sphere
	Gold: $19\,000 \times \frac{1000}{1000000} = 19$ Silver: $10\,000 \times \frac{1000}{1000000} = 10$	P1	This mark is given for a process to convert density to g/cm ³
	Gold: $\frac{4}{3}\pi \times 2^3 \times 19 = \frac{4}{3}\pi \times 152$ Silver: $\frac{4}{3}\pi \times 3^3 \times 10 = \frac{4}{3}\pi \times 270$	P1	This mark is given for a process to find the mass of each sphere (using the formula for the volume of a sphere \times density)
	The silver sphere has greater mass; $\left(\frac{4}{3}\pi \times\right) 270 > \left(\frac{4}{3}\pi \times\right) 152$	C1	This mark is given for a correct comparison from two correct values that can be used to compare mass

Question 17 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{x^2}{y^2} - 9 = 0$, so $\frac{x^2}{y^2} = 9$	M1	This mark is given for finding a relationship between x^2 and y^2
	$\frac{x}{y} = 3$, so $3y = x$	A1	This mark is given for finding a relationship between x and y
	3 : 1	A1	This mark is given for the correct answer only
(b)	$(3 + 2x)(1 - 2x)$	M1	This mark is given for factorising the numerator of the fraction
	$(2x - 1)(x - 3)$	M1	This mark is given for factorising the denominator of the fraction
	$\frac{3 + 2x}{3 - x}$	A1	This mark is given for the correct answer only

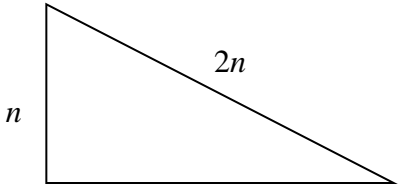
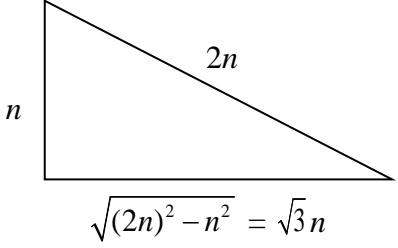
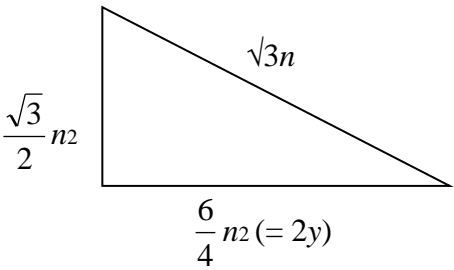
Question 18 (Total 6 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
		B1	This mark is given for the graph translated 1 unit in the positive x -direction
	 <p>(1, 3)</p>	B1	This mark is given for the correct answer only

Question 19 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(3 - \sqrt{2})^2 = 9 - 3\sqrt{2} - 3\sqrt{2} + 2 = 11 - 6\sqrt{2}$	M1	This mark is given for a method to expand the denominator
	$\frac{1 + \sqrt{2}}{11 - 6\sqrt{2}} \times \frac{11 + 6\sqrt{2}}{11 + 6\sqrt{2}}$	M1	This mark is given for a method to rationalise the denominator
	$11 + 6\sqrt{2} + 11\sqrt{2} + 12 = 23 + 17\sqrt{2}$ $121 - 66\sqrt{2} + 66\sqrt{2} + 72 = 49$	M1	This mark is given for a method to expand correctly either the numerator or the denominator
	$a = \frac{23}{49}$	A1	This mark is given for the correct answer only
	$b = \frac{17}{49}$	A1	This mark is given for the correct answer only

Question 20 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\sin 30^\circ = \frac{1}{2}, \cos 30^\circ = \frac{\sqrt{3}}{2}, \tan 30^\circ = \frac{1}{\sqrt{3}}$	B1	This mark is given for using any correct trigonometric value for 30°
		M1	This mark is given for finding the hypotenuse of the large triangle = $2n$
		A1	This mark is given for a method to find the hypotenuse of middle triangle
		A1	This mark is given for a correct equation linking y and n and correct working leading to the given result