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

November 2020 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 2 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	1 4 7 10 13 3 3 3 3	M1	This mark is given for a method to use differences to find the coefficient of n
	$3n - 2$	A1	This mark is given for the correct answer only

Question 2 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$2\frac{1}{3} = \frac{7}{3}$, $3\frac{3}{4} = \frac{15}{4}$	M1	This mark is given for a conversion to improper fractions
	$\frac{7}{3} \times \frac{15}{4} = \frac{105}{12}$	M1	This mark is given for a method to find the multiplication as a single improper fraction
	$\frac{105}{12} = 8\frac{9}{12} = 8\frac{3}{4}$	A1	This mark is given for the correct working to show the result as required

Question 3 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Equation / **Letter of graph** $y = x^3$ — **B** $y = x^3$ — **C** $y = x^3$ — **D** $y = \frac{1}{x}$ — **A**	B2	This mark is given for all four graphs correct (B1 is given for two or three graphs correct)

Question 4 (Total 1 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
	A and **D**	C2	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
	$24 \times 50p = £12$ $£12 - £10 = £2$	M1	This mark is given for a process to find the overall profit
	$\frac{2}{10} \times 100$	M1	This mark is given for a method to find the percentage profit
	20%	A1	This mark is given for the correct answer only

Question 6 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$AEB = 63$	M1	This mark is given for a method to find the size of angle *AEB*
	Corresponding angles are equal	C1	This mark is given for a correct reason stated
	$BCD = 180 - 148 = 32$	M1	This mark is given for a method to find the size of angle *EBA*
	Angles on a straight line add up to 180	C1	This mark is given for a correct reason stated
	$EAB = 180 - 63 - 32 = 85$ Angles in a triangle add up to 180	A1	This mark is given for the correct answer with a correct reason stated

Question 7 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Range of the girls = 170 – 150 = 20 Range of the boys = 182 – 158 = 24 Median of the girls = 165 Median of the boys = 168	B1	This mark is given for identifying the range of the girls' heights or the range of the boys' heights or the median of the boys' heights
	For example: the median for girls (165) is less than the median for boys (168)	C1	This mark is given for a correct comparison of medians
	For example: the range for girls (20) is smaller than the range for boys (24)	C1	This mark is given for a correct comparison of ranges

Question 8 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$18 \div 3 = 6$	M1	This mark is given for method to find the area of the base of the prism
	$75 = \frac{\text{Force}}{6}$	M1	This mark is given for a method to substitute into the formula $\text{Pressure} = \frac{\text{Force}}{\text{Area}}$
	Force $= 75 \times 6 = 450$	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
	$67.2 \times 10^{-4} = 6.72 \times 10^{-3}$ $672 \times 10^{4} = 6.72 \times 10^{6}$ $0.000672 = 6.72 \times 10^{-4}$	M1	This mark is given for converting each number into standard form
	0.000672, 67.2×10^{-4}, 6.72×10^{5}, 672×10^{4}	A1	This mark is given for all terms in the correct order

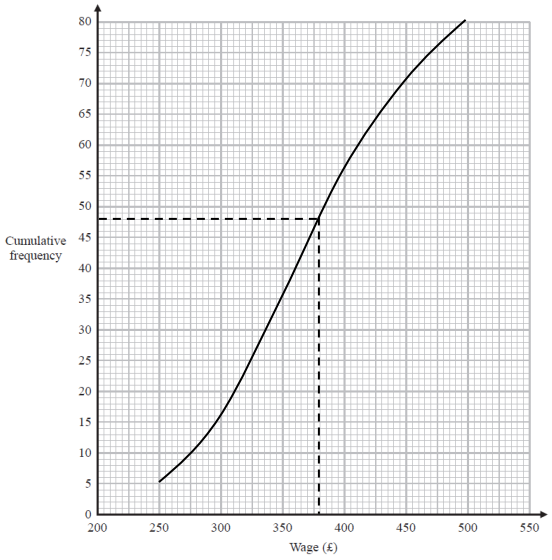
Question 10 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{2}{5} \times 3$ and $\frac{3}{4} \times 5$	P1	This mark is given for a process to find a multiplier to equate the fractions in terms of b
	$\frac{6}{15}$ and $\frac{15}{20}$	P1	This mark is given for a process to use these terms to find the ratio
	6 : 15 : 20	A1	This mark is given for the correct answer only

Question 11 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\sqrt[4]{81\times10^8} = \sqrt[4]{81} \times \sqrt[4]{10^8}$ $= 3 \times 10^2$	M1	This mark is given for a method to find the fourth root of 81 or 10^8
	= 300	A1	This mark is given for the correct answer only
(b)	$\frac{1}{\sqrt{64}} =$	M1	This mark is given for recognising the expression as the reciprocal of $\sqrt{64}$
	$\frac{1}{8}$	A1	This mark is given for the correct answer only
(c)	$3^n \times 9^{-(n-1)} =$ $3^n \times 3^{2(n-1)} =$	M1	This mark is given for a method to find the expression as a single power of 3
	3^{2-n}	A1	This mark is given for the correct answer only

Question 12 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	5, 15, 35, 55, 70, 80	B1	This mark is given for a fully correct table
(b)		M1	This mark is given for at least five of the points (250, 5), (300, 15), (350, 35), (400, 55), (450, 70), and (500, 80) correctly plotted
		A1	This mark is given for a fully correct graph
(c)	60% × 80 = 48	M1	This mark is given for reading off the graph for 60% of people
	Point on curve is (380, 48)	M1	This mark is given for identifying the point (380, 48)
	Juan is incorrect 60% of people have a weekly wage of £380 or less	C1	This mark is given for a correct conclusion following correct working

Question 13 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Volume of liquid **A** = $\frac{1400}{70}$ = 20 Mass of liquid **B** = 280 × 30 = 8400	P1	This mark is given for a process to find the volume of liquid **A** and the mass of liquid **B**
	Density of liquid **C** = $\frac{1400 + 8400}{20 + 30} = \frac{9800}{50}$	P1	This mark is given for a process to find the density of liquid **C**
	196	A1	This mark is given for the correct answer only

Question 14 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$1 - 0.3 = 0.7$	P1	This mark is given for a process to find the probability that Sally will **not** win
	$(0.3 \times 0.7) + (0.7 \times 0.3)$	P1	This mark is given for a process to find the probability that Sally will win exactly one of the two games
	0.42	B1	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
	Gradient of $L_2 = -\frac{1}{m} = -\frac{1}{3}$	M1	This mark is given for a method to find the gradient of the line L_2
	When $x = 5$, $9 = (-\frac{1}{3} \times 5) + c$	M1	This mark is given for a method to substitute using the common point (9, 5) to find the value of c
	$y = -\frac{1}{3}x + 8$	A1	This mark is given for the correct answer only

Question 16 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{20}{120} = \frac{90}{N}$	P1	This mark is given for the expressions $\frac{20}{120}$ or $\frac{90}{N}$ seen
		P1	This mark is given for a process to work out an equation in terms of N
	$N = \frac{90 \times 120}{20} = 540$	A1	This mark is given for the correct answer only
(b)	For example: If the marks fall off Shirley will have over-estimated the number of bees	A1	This mark is given for a correct effect stated

Question 17 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$d(f-4) = 3(1-f)$ $df - 4d = 3 - 3f$	M1	This mark is given for a method to find an equation with no fraction
	$df + 3f = 4d + 3$	M1	This mark is given for a method to isolate the terms in f
	$f(d+3) = 4d + 3$	M1	This mark is given for a method to factorise
	$f = \dfrac{4d+3}{d+3}$	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
	$x = k\sqrt{y}$	P1	This mark is given for correct statement of proportionality
	$x' = k\sqrt{(1.44)y}$ $x' = 1.2$	P1	This mark is given for a process to find the increased value of x
	20	A1	This mark is given for the correct percentage increase only

Question 19 (Total 5 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	$g(5) = 3 \times (2 \times 5 + 1) = 33$	B1	This mark is given for the correct answer only
(b)	$f(9) = \dfrac{12}{\sqrt{9}} = 4$	M1	This mark is given for a method to find the value of f(9)
	$gf(9) = g(4) = 3 \times (2 \times 4 + 1) = 27$	A1	This mark is given for the correct answer only
(c)	$g^{-1}(y) = \dfrac{1}{2}\left(\dfrac{y}{3} - 1\right) = \dfrac{y-3}{6}$	M1	This mark is given for a method to find the inverse of g(x)
	$g(6) = \dfrac{6-3}{6} = \dfrac{1}{2}$	A1	This mark is given for the correct answer only

Question 20 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\sqrt{180} = \sqrt{(36 \times 5)} = 6\sqrt{5}$	P1	This mark is given for writing $\sqrt{180}$ as $6\sqrt{5}$
	$\frac{6\sqrt{5}-2\sqrt{5}}{5\sqrt{5}-5} \times \frac{5\sqrt{5}+5}{5\sqrt{5}+5}$	P1	This mark is given for a process to rationalise the denominator
	$= \frac{100+20\sqrt{5}}{125-25}$	P1	This mark is given for expanding terms
	$= 1 + \frac{\sqrt{5}}{5}$	A1	This mark is given for a fully simplified correct answer only

Question 21 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$\overrightarrow{DQ} = \frac{1}{2}(\mathbf{b} - \mathbf{a})$	B1	This mark is given for a vector equation for $\overrightarrow{DQ}$
	$\overrightarrow{PQ} = \frac{1}{2}\mathbf{a} + \overrightarrow{DQ}$	M1	This mark is given for a vector equation for $\overrightarrow{PQ}$
	$\overrightarrow{PQ} = \frac{1}{2}\mathbf{a} + \frac{1}{2}(\mathbf{b} - \mathbf{a}) = \frac{1}{2}\mathbf{b}$	B1	This mark is given for a vector equation for $\overrightarrow{PQ}$ in terms of **b**
	$\overrightarrow{PQ} = \frac{1}{2}\mathbf{b}$ and $\overrightarrow{FE} = \mathbf{b}$ Therefore *PQ* is parallel to *FE*	C1	This mark is given for a correct conclusion supported by correct working

Question 22 (Total 5 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$\frac{\pi}{8}[(5x-1)^2-(3x-1)^2] = \frac{\pi}{8}(16x^2-4x)$	P1	This mark is given for process to find the area of shape **A**
	$\pi(1-x)^2 = \pi(x^2-2x+1)$	P1	This mark is given for process to find the area of circle **B**
	$(2x^2 - \frac{1}{2}x) = x^2 - 2x + 1$ $4x^2 - x = 2x^2 - 4x + 2$ $2x^2 + 3x - 2 = 0$	P1	This mark is given for equating and rearranging to form a quadratic equation to be solved
	$(2x-1)(x+2) = 0$	P1	This mark is given for a process to find the value of x
	$x = \frac{1}{2}$	A1	This mark is given for the correct answer only

Question 23 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$\frac{3}{8}$ and $\frac{7}{9}$	P1	This mark is given for finding the fraction of cards with a black shape and the fraction of cards with a triangle
	$\frac{3}{8} \div \frac{7}{9}$	P1	This mark is given for a process to find the total number of cards with a black shape as a fraction of the total number of cards with a triangle
	$\frac{27}{56}$	A1	This mark is given for the correct answer only