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

Summer 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 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$(x^3)^5 = x^{(3 \times 5)} = x^{15}$	B1	This mark is given for the correct answer only
(b)	$4x + 12 + 28 - 14x$	M1	This mark is given for a method to expand at least one bracket
	$40 - 10x$	A1	This mark is given for the correct answer only
(c)	$3(5x^3 + x^2y)$ **or** $3x(5x^2 + xy)$ **or** $x^2(15x + 3y)$	M1	This mark is given for a method to eliminate at least one factor
	$3x^2(5x + y)$	A1	This mark is given for the correct answer only

Question 2 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Translation $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$	B1	This mark is given for translation stated
		B1	This mark is given for the vector $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$

Question 3 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$89.5 \leq \text{length} < 90.5$	B1	This mark is given for 89.5 shown in the correct position
		B1	This mark is given for 90.5 shown in the correct position

Question 4 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$700 \times 2000 = 1\,400\,000$	P1	This mark is given for a process to find the area available at Festival B
	Festival A: $80\,000 \div 425 = 188.23\ldots$ Festival B: $1\,400\,000 \div = 6750 = 207.40\ldots$	P1	This mark is given a method to find the area available per person at (at least) one Festival
	$207.40\ldots - 188.23\ldots = 19.17\ldots$	P1	This mark is given for finding the difference in area per person
	19 (to the nearest whole number)	A1	This mark is given for the correct answer only
(b)	For example: 300 cm^2 is 0.3 m $\times$ 0.3 m = 0.09 m^2 3 m^2 is 300 cm $\times$ 300 cm = 90 000 cm^2	C1	This mark is given for a valid statement relating scale factor to area

Question 5 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$4 - {-3} = 7$ $9 - 1 = 8$	P1	This mark is given for a process to use coordinates to find the translation of L to M
	$7 \div 2 = 3.5$ $8 \div 2 = 4$	P1	This mark is given for a process to use the ratio 2 : 3
	$5 \times 3.5 + {-3}$ $5 \times 4 + 1$	P1	This mark is given for a process to use coordinates to find the translation of L to N
	(14.5, 21)	A1	This mark is given for the correct answer only

Question 6 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$679 \times 0.96 = 651.84$	M1	This mark is given for a method to find the decrease in value after one year (given also if $679 \times (0.96)^3$ seen)
	$651.84 \times 0.96 \times 0.96$ **or** $679 \times (0.96)^3$	M1	This mark is given for a method to find the decrease in value after three years
	600.74	A1	This mark is given for the correct answer only (accept 600.73)

Question 7 (Total 4 marks)

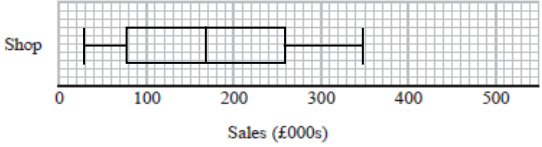| Part	Working or answer an examiner might expect to see	Mark	Notes
	$18 \div 4.5 = 4$ **or** $8 \times 4.5 = 36$ (18 litres = 4 gallons **or** 8 gallons = 36 litres)	P1	This mark is given for a process to convert between litres and gallons
	$40.8 \div 0.85 = 48$ **or** $27 \times 0.85 = 22.95$ (£40.80 = €48 **or** €27 = £22.95)	P1	This mark is given for a process to convert between euros and pounds
	Sam pays £22.95 for 4 gallons Leo pays £20.40 for 4 gallons **or** Sam pays €27 for 18 litres Leo pays €24 for 18 litres	P1	This mark is given for a process to make a comparison between petrol prices
	For example: Sam is wrong, petrol is cheaper in Wales	C1	This mark is given for the valid conclusion supported by correct working

Question 8 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	For example, any of these seen: 6.07(5732…) 2.68(328…) 0.372(6779962…) 1.98(3851871…)	M1	This mark is given for a method to find a partial evaluation
	0.739	A1	This mark is given for an answer in the range 0.739 to 0.745

Question 9 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$187.5 = \dfrac{180}{A}, \quad A = \dfrac{180}{187.5} = 0.96$	P1	This mark is given for a process to find the area of the floor
	$0.96 \div 1.2$	P1	This mark is given for a process to fins the width of the floor
	0.8	A1	This mark is given for the correct answer only

Question 10 (Total 5 marks)

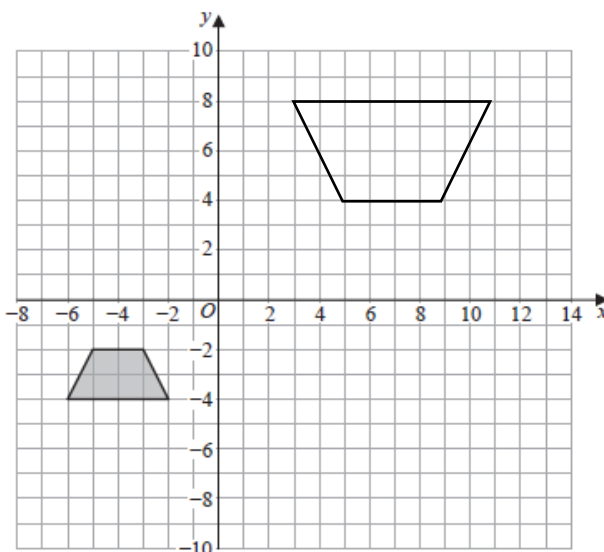| Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	For example: The IQR is half of the data	C1	This mark is given for a correct explanation
(b)		B2	These marks are given for a correctly drawn boxplot (B1 is given for a box and at least three values plotted correctly)
(c)	For example: The shop takes less money from sales in general since the median is lower	C1	This mark is given for a correct comparison of the medians
	For example: The IQR of sales for the online store is greater than the IQR for the sales of the shop	C1	This mark is given for a correct comparison of the measure of spread

Question 11 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$6 \times 14\frac{1}{2} = 87$ **or** $13 \times 7 = 91$	M1	This mark is given for a method to measure the job in worker days
	$87 \div 7$ **or** $87 \div 13$	P1	This mark is given for a process to work out number of workers needed to finish the job in 7 days **or** the number of days needed to finish the job with 13 workers
	12.428 (workers needed for 7 days) **or** 6.692 (days needed with 13 workers)	C1	This mark is given for a correct answer only

Question 12 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$5y = 5(2x + 3) = 10x + 15$ $5y = 10x - 4$ **or** $y - 2x + \frac{4}{5} = 0$ $y = 2x - \frac{2}{5}$	M1	This mark is given for a method to manipulate two equations to make a comparison
	Gradient = 2 for both lines So lines are parallel	A1	This mark is given for equations which show gradients of the two lines are the same

Question 13 (Total 2 marks)

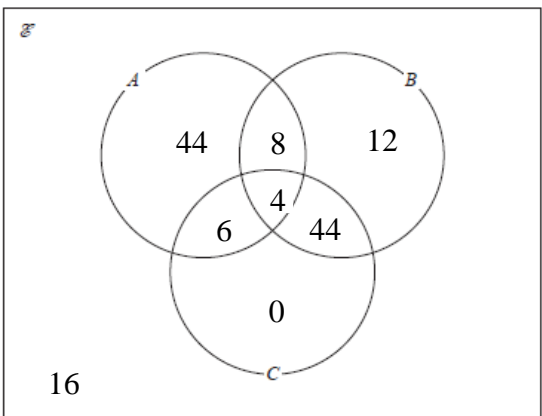| Part	Working or answer an examiner might expect to see	Mark	Notes
		B2	This mark is given for a correct enlargement with coordinates (4, 8), (6, 4) (10,4) and (12, 8) (B1 is given for the correct size and orientation in the wrong position or thee or four vertices correct)

Question 14 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\dfrac{180}{N} = \dfrac{45}{305}$	P1	This mark is given for $\dfrac{45}{305}$ seen
	$N = \dfrac{180 \times 305}{45}$	P1	This mark is given for a process to find N, the number of fish in the lake
	1220	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
	M: $6x + 1.5$ K: $5x + 1.5$	P1	This mark is given for a process to represent algebraically Marta's and Khalid's pay after the increase
	$\dfrac{6x+1.5}{5x+1.5} = \dfrac{13}{11}$	P1	This mark is given for setting up an equation to be solved
	$11(6x + 1.5) = 13(5x + 1.5)$ $66x + 16.5 = 65x + 19.5$ $x = 19.5 - 16.5$ $x = 3$	P1	This mark is given for a process to find the value of x
	Marta £18 Khalid £15	A1	This mark is given for the correct answer only

Question 16 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		C4	These marks are given for a fully correct Venn diagram (C3 is given for 6 or 7 of the 8 regions correct) (C2 is given for 4 or 5 of the 8 regions correct) (C1 is given for 2 or 3 of the 8 regions correct)
(b)	$\dfrac{12}{62}$	M1	This mark is given for $\dfrac{12}{b}$ where $b > 12$ or $\dfrac{a}{62}$ where $a < 62$
		A1	This mark is given for the correct answer only

Question 17 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{1}{2} \times \frac{4}{3} \times \pi \times 3.5^3 = 89.797\ldots$	P1	This mark is given for a process to find the volume of the hemisphere
	$\frac{1}{2} \times \frac{4}{3} \times \pi \times 3.5^3 + \frac{1}{3} \times 3.5^2(y - 3.5) = 120\pi$	P1	This mark is given for a process to find an equation to link the volume of the shape and the height y
	$y = \dfrac{120\pi - \left(\dfrac{2\pi}{3} \times 3.5^3\right) + \left(\dfrac{\pi}{3} \times 3.5^3\right)}{\left(\dfrac{\pi}{3} \times 3.5^2\right)}$	P1	This mark is given for a process to find an equation equal to y
	25.9	A1	This mark is given for a correct answer in the range 25.8 to 26.3
(b)	For example: The hight of the shape would decrease	C1	This mark is given for a valid explanation

Question 18 (Total 4 marks)

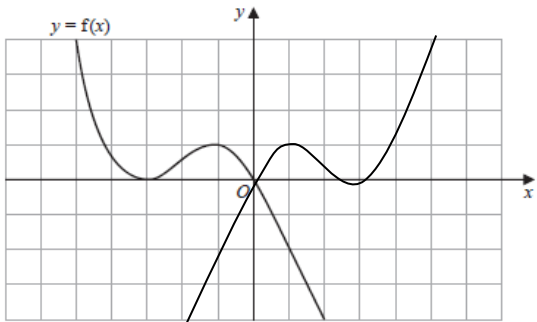| Part	Working or answer an examiner might expect to see	Mark	Notes
	$11^2 + 9.4^2 - (2 \times 11 \times 9.4 \cos 27)$	M1	This mark is given for a method to use the cosine rule to find the length QR
	$QR = \sqrt{209.36 - 206.8 \times \cos 27}$ $QR = \sqrt{25.09}$ $QR = 5.009$	M1	This mark is given for a method to simplify the numerator
	$\dfrac{QS}{\sin 88} = \dfrac{QR}{\sin 41}$ so $QS = \dfrac{QR \times \sin 88}{\sin 41}$	M1	This mark is given for a method to use the sine rule to find the length QS
	7.63	A1	This mark is given for a correct answer in the range 7.61 to 7.632

Question 19 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	$\sqrt[3]{2 \times 16 - 5} = \sqrt[3]{27} = 3$	B1	This mark is given for the correct answer only
(b)	$g^{-1}(x) = \dfrac{x^3 + 5}{2}$	M1	This mark is given for a method to find an expression for $g^{-1}(x)$
	$h\, g^{-1}(x) = \dfrac{1}{\dfrac{x^3 + 5}{2}}$	M1	This mark is given for a method to find an expression for $hg^{-1}(x)$
	$\dfrac{2}{x^3 + 5}$	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
	$BAD = 132 \div 2 = 66$	M1	This mark is given for a method to find one missing angle
	$BCD = 180 - 66 = 114$	M1	This mark is given for a method to find a further angle
	$CDE = 180 - 66 - 16 = 98$	A1	This mark is given for the correct answer only
	The angle at the centre of a circle is twice the angle at the circumference and Opposite angles of a cyclic quadrilateral add up to 180	C1	This mark is given for correctly stating both circle theorems

Question 21 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)		B1	This mark is given for a n appropriate sketch
(b)	For example: $360 - 90$ $\tan (x + 270)°$ $y = \tan (x + a) - 5$	M1	This mark is given for a method to describe one part of the translation
	$\tan (x + 270)° - 5$	A1	This mark is given for the correct answer only

Question 22 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(x + 7)(x - 7) > 0$	M1	This mark is given for a method to solve $x^2 - 49 > 0$
	$\dfrac{--31 \pm \sqrt{(-31)^2 - 4 \times 5 \times (-72)}}{2 \times 5}$ **or** $(5x + 9)(x - 8) > 0$	M1	This mark is given for a method to solve $5x^2 - 31x - 72 > 0$
	$x < -7, \ x > 7$ $x < -1.8, \ x > 8$	M1	This mark is given finding at least two inequalities from $x < -7, \ x > 7, x < -1.8$ and $x > 8$
	$x < -7, \ x > 8$	M1	This mark is given for identifying one of the critical values that satisfy both inequalities
		A1	This mark is given for the correct answer only