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

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 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	$2 \times 2 \times 3 \times 7$	M1	This mark is given for a 2, 2 3 and 7 seen
		A1	This mark is given for the correct answer only
(b)	60, 120, 180, 240, 300, 360, 420 … 84, 168, 252, 336, 420 … **or** $84 = 2 \times 2 \times 3 \times 7$ $60 = 2 \times 2 \times 3 \times 5$ LCM $= 2 \times 2 \times 3 \times 5 \times 7$	M1	This mark is given for a method to find the LCM
	420	A1	This mark is given for the correct answer only

Question 2 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		M1	This mark is given for 2 and 10 correctly placed in the intersection
		M1	This mark is given for 4, 6 and 8 placed in *A* only or 1 and 5 placed in *B* only or 3, 7 and 9 placed in $(A \cup B)'$
		C1	This mark is given for all numbers correctly placed in the Venn diagram
(b)	$n(A \cap B) = 2$	M1	This mark is given for a method to identify the number of elements in $A \cap B$
	$\dfrac{2}{10}$	A1	This mark is given for the correct answer only

Question 3 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$3000 \div 5 = 600$	P1	This mark is given for a start to the process to solve the problem
	$1200 : 1800$	P1	This mark is given for a process to find the ratio of the number of tins in small boxes to the number of tins in large boxes
	$\dfrac{1200}{6} : \dfrac{1800}{20} = 200 : 90$	P1	This mark is given for a process to find the ratio of the number of small boxes to the number of large boxes
	$\dfrac{90}{290} = 0.3103448\ldots \approx 31\%$	P1	This mark is given for a process to find to find the percentage of tins in large boxes
	Carlo is not correct; 31% of the boxes filled with tins are large boxes	C1	This mark is given for a valid conclusion supported by correct working

Question 4 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	<table><tr><td>x</td><td>−2</td><td>−1</td><td>0</td><td>1</td><td>2</td></tr><tr><td>y</td><td>**13**</td><td>6</td><td>**5**</td><td>**4**</td><td>**−3**</td></tr></table>	B2	These marks are given for all 4 points correct (B1 is given for two or three points correct)
(b)		B1	This mark is given for five points plotted correctly
		A1	This mark is given for a fully correctly plotted graph

Question 5 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\sin 34° = \dfrac{x}{178}$ $x = 178 \times \sin 34°$ $x = 178 \times 0.559$	M1	This mark is given for a method to find the value of x
	$x = 99.5$ (mm)	A1	This mark is given for the correct answer only (in the range 99.5 – 99.54)

Question 6 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$2 \times \begin{pmatrix} 3 \\ 4 \end{pmatrix} = \begin{pmatrix} 6 \\ 8 \end{pmatrix}$ $3 \times \begin{pmatrix} 5 \\ -2 \end{pmatrix} = \begin{pmatrix} 15 \\ -6 \end{pmatrix}$	M1	This mark is given for a method to find the vectors 2**a** and 3**b**
	$\begin{pmatrix} 6 \\ 8 \end{pmatrix} - \begin{pmatrix} 15 \\ -6 \end{pmatrix} = \begin{pmatrix} -9 \\ 14 \end{pmatrix}$	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
	$CB = \sqrt{(9^2 - 6^2)} = \sqrt{45}$	P1	This mark is given for a process to find the length CB
	$= \sqrt{45}$	P1	This mark is given for correctly finding the length CB (accept 6.7)
	$\dfrac{1}{4} \times \pi \times (\sqrt{45})^2 = 11.25\pi$	P1	This mark is given for a process to find the area of the quarter circle
	35.3 (to 3 significant figures)	A1	This mark is given for the correct answer only (in the range 35.2 to 35.3)

Question 8 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\dfrac{551}{0.95}$	M1	This mark is given for a method to find the normal price of the laptop
	580	A1	This mark is given for the correct answer only
(b)	$6000 \times 1.024 = 6144$	M1	This mark is given for a method to find the value of the investment after one year
	$6144 \times (1.017)^2$	M1	This mark is given for a method to find the value of the investment after three years
	6354.67	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
	For example: the median should be plotted at 162 rather than 161 the upper quartile should be plotted at 171 rather than at 172	C2	These marks are given for two correct things Aisha should do stated

Question 10 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	1	B1	This mark is given for the correct answer only
(b)	$\dfrac{8}{x-4}$	B1	This mark is given for the correct answer only
(c)	$3^3 \times n^{4 \times 3} \times w^{2 \times 3}$ $= 27n^{12}w^6$	B2	These marks are given for a correct answer only (B1 is given for any two of 27, n^{12} or w^6 seen)

Question 11 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$5 \times 8 \times d = 240$ $$d = \frac{240}{40}$$	P1	This mark is given for a process to find the number of combinations
	Yes, Jack is correct – the number of desserts is 6	C1	This mark is given for a correct explanation which mentions 6 desserts

Question 12 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$$\frac{27}{300}$$	M1	This mark is given for a method to find the gradient
	$= -0.09$	A1	This mark is given for the correct answer only
(b)	For example: the volume of petrol used each km litres / km	C1	This mark is given for a correct interpretation of the gradient

Question 13 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$$\frac{AB}{\sin 34°} = \frac{23.8}{\sin 120°}$$	M1	This mark is given for a method to use the sine rule to find the length AB
	$$AB = \frac{23.8}{\sin 120°} \times \sin 34°$$ $$AB = \frac{23.8}{0.866...} \times 0.559…$$	M1	This mark is given for a method to rearrange to find the length AB
	15.4 (to 1 decimal place)	A1	This mark is given for the correct answer only

Question 14 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(x + 4)^2 - x^2 = 70$	P1	This mark is given for a process to set up an equation relating **A** and **B**
	$8x + 16 = 70$ $8x = 54$	P1	This mark is given for a process to multiply out terms to produce a linear equation
	$x = \dfrac{54}{8} = 6.75$	A1	This mark is given for finding the length of the side of square **A**
	Area of **B** $= (6.75 + 4)^2$ $= 116$ (to 3 significant figures)	B1	This mark is given for a correct answer only

Question 15 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Enlargement, scale factor –1.5	B1	This mark is given for a correct transformation and scale factor stated
	Centre of enlargement (1, 1)	B1	This mark is given for a correct centre of enlargement stated

Question 16 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	10 21 38 61 90 11 17 23 29 6 6 6 Coefficient of $n^2 = \dfrac{6}{2} = 3$	M1	This mark is given for a method to use difference to find the coefficient of n^2
	7 9 11 13 15 2 2 2 2 Coefficient of $n = 2$	M1	This mark is given for a method to use difference to find the coefficient of n
	$3n^2 + 2n + 5$	A1	This mark is given for the correct answer only

Question 17 (Total 1 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
	–12, –7	B1	This mark is given for the correct answer only

Question 18 (Total 2 marks)

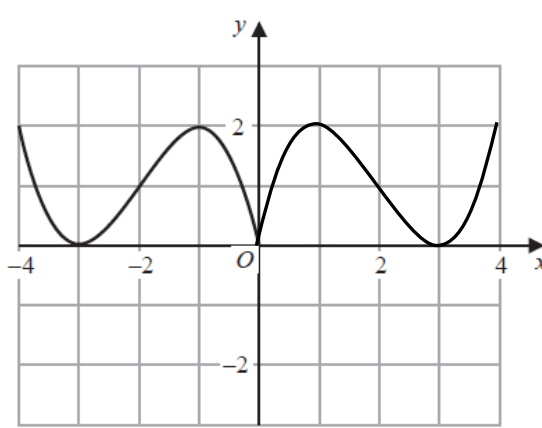| Part	Working or answer an examiner might expect to see	Mark	Notes
	$\pi \times 10 \times 25 = 250\pi$	P1	This mark is given for a process to find the surface area of the whole cone
	$\dfrac{15}{25} \times 10 = 6$	P1	This mark is given for a process to find the radius of the smaller cone
	$\pi \times 6 \times 15 = 90\pi$	P1	This mark is given for a process to find the surface area of the smaller cone
	$250\pi - 90\pi = 160\pi$	A1	This mark is given for the correct answer only

Question 19 (Total 4 marks)

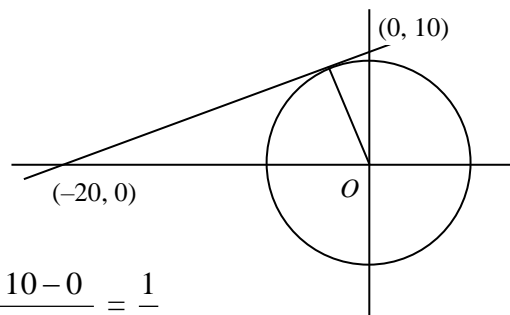| Part	Working or answer an examiner might expect to see	Mark	Notes
	$h_1 = K \times 1200 + 20 = 1040$	P1	This mark is given for a process to find an equation for h_1
	$K = \dfrac{1040 - 20}{1200} = 0.85$	P1	This mark is given for a process to find the value of K
	At 09 17, $h_2 = 0.85 \times 1040 + 20 = 904$	P1	This mark is given for a process to find the value of h_2 at 09 17
	At 09 18, $h_3 = 0.85 \times 904 + 20 = 788.4$	A1	This mark is given for a process to find the value of h_3 at 09 18

Question 20 (Total 8 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	If P(red) = $\dfrac{7}{10}$ then $\dfrac{n}{n+8} = \dfrac{7}{10}$	M1	This mark is given for a method to set up an equation in terms of n
	$10n = 7(n+8)$ $10n = 7n + 56$ $n = \dfrac{56}{3}$	M1	This mark is given for a process to find a value for n
	n is not a whole number, therefore P(red) cannot be $\dfrac{7}{10}$	C1	This mark is given for a valid conclusion supported by correct working
(b)	P(1st red sweet) = $\dfrac{n}{n+8}$ P(2nd red sweet) = $\dfrac{n-1}{n+7}$	P1	This mark is given for a process to work out the probabilities of the first sweet being red and the second sweet being red
	$\dfrac{n}{n+8} \times \dfrac{n-1}{n+7} = \dfrac{3}{5}$	P1	This mark is given for a process to form an appropriate equation
	$5(n^2 - n) = 3(n^2 + 15n + 56)$ $2n^2 - 50n - 168 = 0$ $n^2 - 25n - 84 = 0$	P1	This mark is given for a process to find a quadratic equation to be solved
	$(n - 28)(n + 3) = 0$	P1	This mark is given for factorising a quadratic equation (or quadratic formula may be used)
	$n = 28$	A1	This mark is given for the correct answer only

Question 21 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		C2	These marks are given for a fully correct graph (a curve reflected in the *y*-axis passing through points (0, 0), (1, 2), (2,1), (3, 0) and (4, 2))
			(C1 is given for a curve reflected in the *y*-axis or a curve passing through four of the five points)
(b)	$y = 5 + 2(x - 3) - (x - 3)^2$	C2	These marks are given for a fully correct equation
			(C1 is given for an equation of the form $y = 5 + 2(x - a) - (x - a)^2$, $a \neq 3$

Question 22 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\dfrac{10 - 0}{0 - -20} = \dfrac{1}{2}$	P1	This mark is given for a process to find the gradient of the tangent to **C**
	gradient of normal to tangent = 2	P1	This mark is given for a process to use $-\dfrac{1}{m}$ to find the gradient of the normal to the tangent to **C**
	equation of tangent is $y = \dfrac{1}{2}x + 10$ equation of radius of **C** is $y = -2x$	P1	This mark is given for a process to find equations for the tangent to **C** and the radius of **C**
	When $\dfrac{1}{2}x + 10 = -2x$, $x = -4$ and $y = 8$	P1	This mark is given for a process to find the *x* and *y*-coordinates of the point where the tangent meets **C**
	$x^2 + y^2 = 80$	A1	This mark is given for a correct equation of **C** only