

GCSE Mathematics (1MA1) – Aiming for 7 Paper 2H (Set 2)

Spring 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.

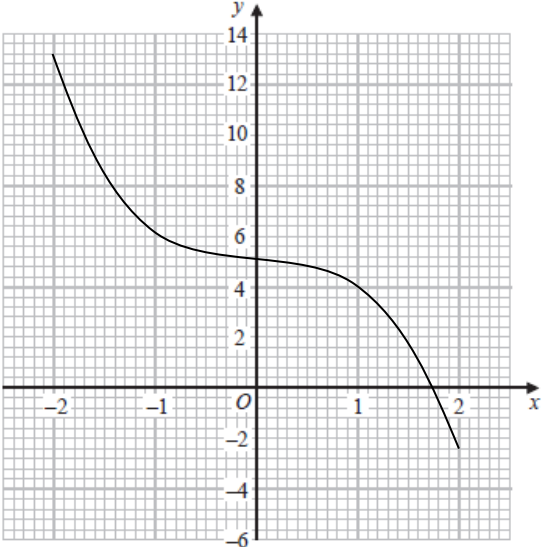
A1 – accuracy mark. This mark is generally given for a correct answer following correct working.

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)	<table border="1"><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>	x	-2	-1	0	1	2	y	13	6	5	4	-3	B2	These marks are given for all 4 points correct (B1 is given for two or three points correct)
x	-2	-1	0	1	2										
y	13	6	5	4	-3										
(b)		B1	This mark is given for five points plotted correctly												
		A1	This mark is given for a fully correctly plotted graph												

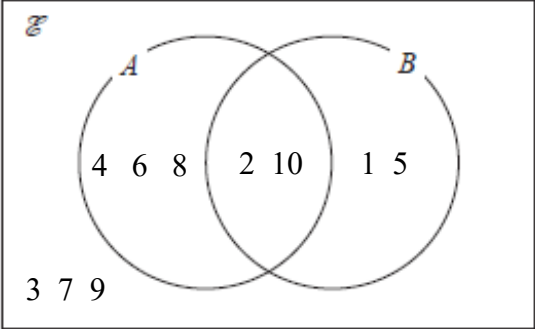
Question 2 (Total 4 marks)

Part	Working or answer an 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 $84 = 2 \times 2 \times 3 \times 7$ $60 = 2 \times 2 \times 3 \times 5$ $\text{LCM} = 2 \times 2 \times 3 \times 5 \times 7$	M1	This mark is given for a method to find the LCM
	420	A1	This mark is given for the correct answer only

Question 3 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	For example: $60 = 2 \times 2 \times 3 \times 5$ $84 = 2 \times 2 \times 3 \times 7$	M1	This mark is given for a method to find the highest common factor (HCF)
	$HCF = 2 \times 2 \times 3 = 12$	A1	This mark is given for a correct answer only
(b)	For example: $24 = 2 \times 2 \times 2 \times 3$ $40 = 2 \times 2 \times 2 \times 5$	M1	This mark is given for a method to find the lowest common multiple (LCM)
	$LCM = 2 \times 2 \times 2 \times 3 \times 5 = 120$	A1	This mark is given for a correct answer only

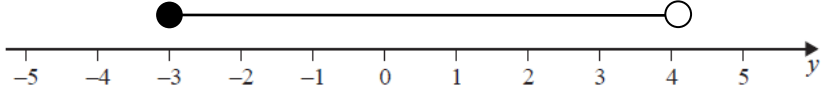
Question 4 (Total 5 marks)

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 $A \cap B$
	$\frac{2}{10}$	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
	$\sin 34^\circ = \frac{x}{178}$ $x = 178 \times \sin 34^\circ$ $x = 178 \times 0.559$	M1	This mark is given for a method to find the value of x
	$x = 99.5 \text{ (mm)}$	A1	This mark is given for the correct answer only (in the range 99.5 – 99.54)

Question 6 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$x > -1$	B1	This mark is given for the correct answer only
		C2	These marks are given for a fully correct diagram (C1 is given for an open circle at 4 or a closed circle at -3)

Question 7 (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 8 (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 2a and 3b
	$\begin{pmatrix} 6 \\ 8 \end{pmatrix} - \begin{pmatrix} 15 \\ -6 \end{pmatrix} = \begin{pmatrix} -9 \\ 14 \end{pmatrix}$	A1	This mark is given for the correct answer only

Question 9 (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 <i>CB</i>
	$= \sqrt{45}$	P1	This mark is given for correctly finding the length <i>CB</i> (accept 6.7)
	$\frac{1}{4} \times \pi \times (\sqrt{45})^2 = 11.25\pi$	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 10 (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 11 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{551}{0.95}$	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

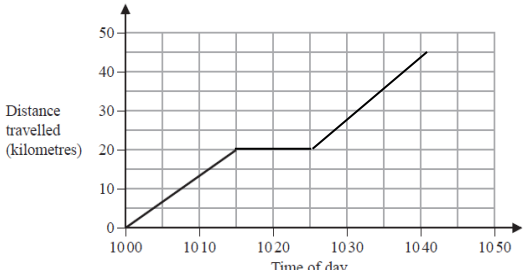
Question 12 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$BC = 12 \times \tan 56^\circ = 12 \times 1.482\dots$	M1	This mark is given for a method to find the length BC
	17.8	A1	This mark is given for an answer in the range 17.7 to 17.8
(b)	$\cos x = \frac{15}{18}$	M1	This mark is given for a method to find the size of angle x
	33.6	A1	This mark is given for an answer in the range 33.5 to 33.6

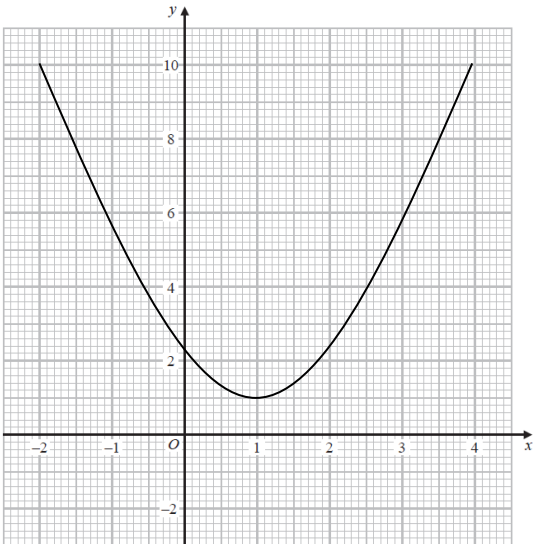
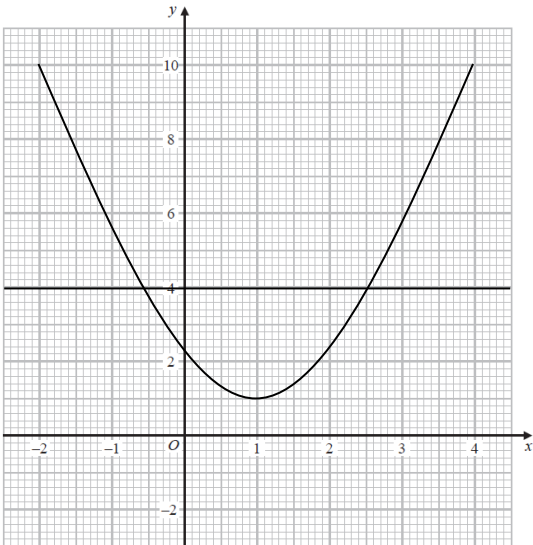
Question 13 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(x - 2)(3x + 2) = 3x^2 - 4x - 4$ or $(3x + 2)(2x + 3) = 6x^2 + 13x + 6$	M1	This mark is given for a method to find the product of two linear expressions
	$(3x^2 - 4x - 4)(2x + 3)$ or $(x - 2)(6x^2 + 13x + 6)$	B1	This mark is given for a method to multiply out the remaining products
	$6x^3 + x^2 - 20x - 12$	A1	This mark is given for the correct answer only

Question 14 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{20 \times 60}{15}$	M1	This mark is given for a method to find Sam's speed
	80	A1	This mark is given for a correct answer only
(b)	$\frac{75 \times 20}{60} = 25$	M1	This mark is given for a method to find the distance travelled in the final 20 minutes
		C2	This mark is given for a fully correct travel graph (C1 is given for one correct line added to the graph)

Question 15 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	5, 1, 2, 10	B2	These marks are given for all 4 values correct (B1 is given for 2 or 3 values correct)
(b)		M1	This mark is given for at least 5 marks plotted correctly
		A1	This mark is given for a fully correct curve drawn
(c)		M1	This mark is given for $y = 4$ drawn or intersections with $y = 4$ drawn or $y = x^2 - 2x - 2$ drawn
	2.7, -0.7	A1	This mark is given for answers in the ranges 2.65 to 2.8 and -0.65 to -0.8

Question 16 (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
	$\frac{1200}{6} : \frac{1800}{20} = 200 : 90$	P1	This mark is given for a process to find the ratio of the number of small boxes to the number of large boxes
	$\frac{90}{290} = 0.3103448... \approx 31\%$	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 17 (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)	$\frac{8}{x-4}$	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 18 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$8^2 + 10^2 = 164$	P1	This mark is given for a process to find the length of the hypotenuse of the triangle
	$\sqrt{164} = 12.8\dots$	P1	This mark is given for finding the length of the hypotenuse of the triangle
	$8 + 8 + 12.8 + (12.8 - 10) + 10$	P1	This mark is given for a process to find the length of the perimeter of the shape
	41.6	A1	This mark is given for an answer in the range 41 to 42

Question 19 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(1.8 \times 80) + (1.2 \times 40) = 192$	P1	This mark is given for a process to find the total mass of liquids A and B
	$192 \div 120$	P1	This mark is given for a process to find the density of liquid C
	1.6	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
(a)	upper quartile = 188 lower quartile = 50	M1	This mark is given for a method to find the interquartile range
	$188 - 50 = 138$	A1	This mark is given for the correct answer only
(b)	Yes, because the median waiting time is 2 hours (120 minutes)	C1	This mark is given for a correct explanation
(c)	For example: The median is lower on Tuesday (higher on Monday) The upper quartile is lower on Tuesday (higher on Monday) There may just have been one person waiting for 210 minutes We don't know how many people were waiting for each time	C1	This mark is given for a correct explanation

Question 21 (Total 3 marks)

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

Question 22 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$16 \times 120 \times 100$	M1	This mark is given for a method to find the number of combinations
	192 000	A1	This mark is given for the correct answer only

Aiming for 7 - Paper 2H				Edexcel averages: mean scores of students who achieved grade									
Qn	Skill tested	Mean score	Max score	Mean %	ALL	9	8	7	6	5	4	3	U
1	Graphs of simple cubic functions	3.36	4	84	3.36	3.96	3.85	3.69	3.62	3.48	3.02	2.42	1.37
2	Primes, factors, multiples	3.18	4	80	3.18	3.90	3.71	3.65	3.49	3.18	2.83	1.98	1.24
3	Primes, factors, multiples	3.04	4	76	3.04	3.93	3.73	3.56	3.37	3.20	2.75	2.29	1.73
4	Probabilities of an exhaustive set of outcomes	3.70	5	74	3.70	4.72	4.49	4.24	3.89	3.56	3.25	2.85	1.87
5	Pythagoras's Theorem and Trigonometry	1.39	2	70	1.39	1.98	1.95	1.92	1.70	1.40	0.87	0.18	0.18
6	Represent the solution set of inequality on a number line	2.04	3	68	2.04	2.84	2.62	2.52	2.39	2.08	1.79	1.38	0.91
7	Listing strategies/Product rule for counting	1.35	2	68	1.35	1.94	1.81	1.73	1.53	1.32	0.94	0.62	0.32
8	Vectors	1.32	2	66	1.32	1.91	1.82	1.68	1.49	1.31	0.95	0.56	0.24
9	Circumference and area of a circle	2.63	4	66	2.63	3.92	3.80	3.70	3.38	2.69	1.30	0.30	0.05
10	Box plots	1.24	2	62	1.24	1.97	1.80	1.74	1.47	1.14	0.77	0.44	0.17
11	Growth and decay, compound interest	3.05	5	61	3.05	4.83	4.58	4.20	3.70	2.91	1.69	0.79	0.51
12	Pythagoras's Theorem and Trigonometry	2.25	4	56	2.25	3.91	3.77	3.57	3.06	2.53	1.46	0.47	0.10
13	Expand expressions	1.67	3	56	1.67	2.90	2.69	2.59	2.35	1.94	0.98	0.42	0.08
14	Distance-time graphs, velocity-time graphs	2.75	5	55	2.75	4.90	4.45	3.97	3.67	2.77	1.93	1.06	0.73
15	Solve quadratic equations	3.30	6	55	3.30	5.74	5.23	4.67	4.01	3.37	2.62	1.54	0.66
16	Ratio in real context	2.74	5	55	2.74	4.60	4.14	3.55	3.19	2.62	1.69	0.97	0.38
17	Simplify and manipulate algebraic expressions and fractions	2.18	4	55	2.18	3.84	3.58	3.11	2.62	1.92	1.12	0.50	0.29
18	Pythagoras's Theorem and Trigonometry	2.07	4	52	2.07	3.93	3.54	3.25	2.87	2.35	1.19	0.48	0.20
19	Units of mass, length, time, money and other measures (including standard compound measures)	1.38	3	46	1.38	2.84	2.65	2.47	1.89	1.38	0.74	0.22	0.16
20	Box plots	1.82	4	46	1.82	3.44	2.85	2.70	2.26	1.85	1.33	0.81	0.26
21	The nth term of a sequence	1.12	3	37	1.12	2.85	2.49	2.06	1.29	0.73	0.22	0.08	0.01

22	Listing strategies/Product rule for counting	0.63	2	32	0.63	1.83	1.41	1.16	0.93	0.60	0.21	0.01	0.00
		48.21	80	60	48.21	76.68	70.96	65.73	58.17	48.33	33.65	20.37	11.46

Aiming for 7 – Set 2 (Spring 2022)

Suggested grade boundaries

	Max	9	8	7	6	5	4	3
1H	80	70	63	55	45	34	22	14
2H	80	74	68	62	53	41	27	16
3H	80	73	67	61	52	39	26	15
Total	240	217	198	178	150	114	75	45

Grade boundaries are based on the average performance data for students answering these questions who gained grades 3-9 in the November 2020 & 2021 GCSE Mathematics examinations at Higher tier.

Students did not answer these questions as 90-minute tests, of course; so there is some scope for adjustment. These boundaries are for guidance only.