

GCSE Mathematics (1MA1) – Aiming for 7 Paper 3H (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.

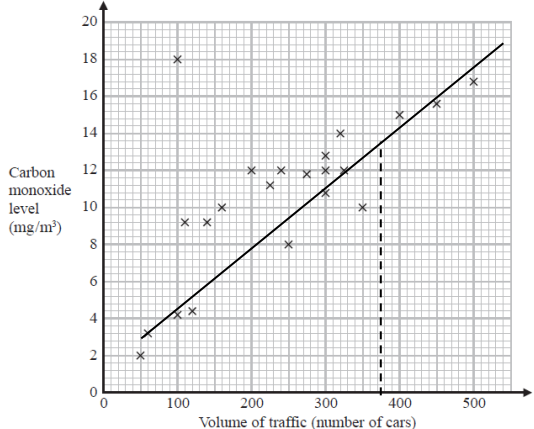
NOTES ON MARKING PRINCIPLES

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 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$n^{3+5} = n^8$	B1	This mark is given for the correct answer only
(b)	$c^{3-2} \times d^{4-1}$	M1	This mark is given for either c or d^3 seen
	cd^3	A1	This mark is given for the correct answer only
(c)	$5x > 14$	M1	This mark is given for a method to remove the fraction from the inequality
	$x > \frac{14}{5}$	A1	This mark is given for the correct answer only

Question 2 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	(100, 18)	B1	This mark is given for the correct answer only
(b)		M1	This mark is given for a method to read off a line of best fit or to find a point on the grid at (370, y), where y is in the range 12.8 to 14.6
	13.7	A1	This mark is given for a correct answer in the range 12.8 to 14.6
(c)	For example: No, this point can be disregarded from the general trend	C1	This mark is given for a correct reason

Question 3 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	450 000	B1	This mark is given for a correct answer only
(b)	7×10^{-3}	B1	This mark is given for a correct answer only
(c)	$4200 + 530 = 4730$	M1	This mark is given for a method to find the calculation as an ordinary number
	4.73×10^3	A1	This mark is given for the correct answer only

Question 4 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$1 - 0.32 - 0.2 = 0.48$	P1	This mark is given for a process to find the total of the unknown probabilities
	$0.48 \times \frac{1}{6} = 0.08$	P1	This mark is given for a process to find the probability the counter will be yellow
	$0.08 \times 300 = 24$	A1	This mark is given for a correct answer only

Question 5 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{1}{3}, \frac{2}{3}; \frac{1}{3}, \frac{2}{3}, \frac{1}{3}, \frac{2}{3}$	B2	These marks are given for six fully correct probabilities (B1 is given for at least two correct probabilities)
(b)	$\frac{1}{3} \times \frac{2}{3}$	M1	This mark is given for a method to find the probability
	$\frac{2}{9}$	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
	$\frac{30}{24} = 1.25, \frac{12}{8} = 1.5$	P1	This mark is given for a process to find out how many hours Andy cycles and runs for
	1 hour 15 minutes + 1 hour 30 minutes	P1	This mark is given for a process to convert into hours and minutes
	2 hours and 45 minutes	A1	This mark is given for the correct answer only

Question 7 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$9.35 \leq m < 9.45$	B1	This mark is given for 9.35 in the correct position
		B1	This mark is given for 9.45 in the correct position

Question 8 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$1 - 0.05 - 0.15 = 0.8$	P1	This mark is given for a process to find the probability of picking a green or pink counter
	0.5, 0.3	A1	This mark is given for the correct answer only
(b)	$\frac{18}{0.15}$	M1	This mark is given for a method to find the total number of counters in the bag
	120	A1	This mark is given for the correct answer only

Question 9 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$5 \times 9 = 45$ 3 kg $10 \times 14 = 140$ 5 boxes = 10 kg	P1	This mark is given for a process to find the areas of the lawns and the amount of grass seed required
	$\frac{140}{45} = 3.111\dots$	P1	This mark is given for a process to find the comparative sizes of the lawns
	$3 \times 3.111\dots = 9.333\dots$ kg	P1	This mark is given for a process to find the amount of grass seed needed for the larger lawn
	Yes, Maisie has enough grass seed	C1	This mark is given for a valid conclusion supported by correct working
(b)	Yes, there is an effect. 9 kg is not enough grass seed since 9.333... kg is required	C1	This mark is given for a valid conclusion supported by correct working

Question 10 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$9 + 2 + 1 = 12$	M1	This mark is given for a method to work with the ratio given
	$6000 \times \frac{2}{12} = 1000$	M1	This mark is given for a method to find the total weight of the cheese needed
	$\frac{1000}{175} = 5.71\dots$	M1	This mark is given for a method to find the number of lots of 175 g of cheese needed
	$2.25 \times 5.71\dots = 12.857\dots$	A1	This mark is given for a correct truncated or rounded answer of 12.85 or 12.86

Question 11 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Company A: $\frac{2400}{8} \times 1.666 = 500$ minutes	P1	This mark is given for a process to find the amount of time taken by Company A
	$2.2 \times 4.54 = 9.988$ litres per minute	P1	This mark is given for a process to convert gallons to litres
	Company B: $\frac{2400}{9.988} = 240.29\dots$ minutes	P1	This mark is given for a process to find the amount of time taken by Company B
	$500 - 240.29\dots = 259.30\dots$ 260	A1	This mark is given for the correct answer (to the nearest minute) only

Question 12 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$10^5 \times 81 \times 365 = 2.9565 \times 10^9$	P1	This mark is given for a process to estimate the number of heartbeats
	3.0×10^9 (to 2 significant figures)	A1	This mark is given for a correct answer in the range 2.4×10^9 to 3.2×10^9
(b)	$\frac{90}{2 \times 10^{12}}$	P1	This mark is given for a process to find the mass of one blood cell
	4.5×10^{-11}	A1	This mark is given for a conclusion and reason

Question 13 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$6.35 \leq x < 6.45$	B1	This mark is given for 6.35 in the correct position
		B1	This mark is given for 6.45 in the correct position

Question 14 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$18 \times 16.2 = 291.6$ $27 \times 16.7 = 450.9$	M1	This mark is given for a method to find the total ages of the boys and the total ages of the girls
	$\frac{291.6 + 450.9}{45}$	M1	This mark is given for a method to find the mean age
	16.5	A1	This mark is given for the correct answer only

Question 15 (Total 6 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{2x(x+2) + x(x-4)}{(x-4)(x+2)}$	M1	This mark is given for a method to find a common denominator
		M1	This mark is given for a method to find an unsimplified numerator
	$\frac{3x^2}{(x-4)(x+2)}$	A1	This mark is given for a correct answer only
(b)	$(x-3)(2x+3) = 2x^2 - 6x + 3x - 9$ or $(2x+3)(4x+5) = 8x^2 + 12x + 20x + 15$	M1	This mark is given for a method to find the product of two brackets
	$(2x^2 - 3x - 9)(4x+5) =$ or $(x-3)(8x^2 + 22x + 15) =$	M1	This mark is given for a method to find the product of two further brackets
	$8x^3 - 2x^2 - 51x - 45$	A1	This mark is given for a correct answer only

Question 16 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$x = -2, y = 4$	B1	This mark is given for the correct answer only
(b)	0.6, 3.4	M1	This mark is given for correct answers shown on the graph or given as coordinates (for example (0.6, 0) and (3.4, 0))
		A1	This mark is given for the correct answer only (in the ranges 0.55 to 0.6 and 3.4 to 3.45)

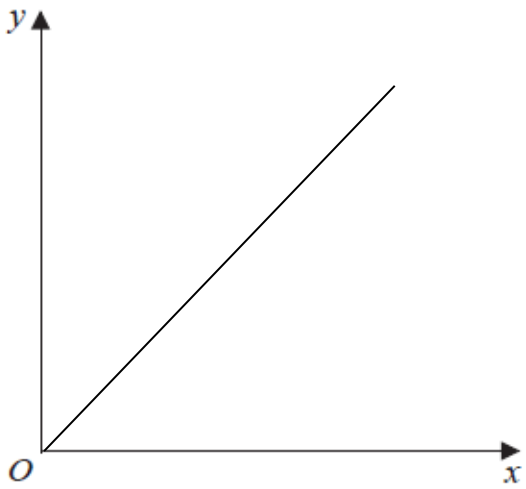
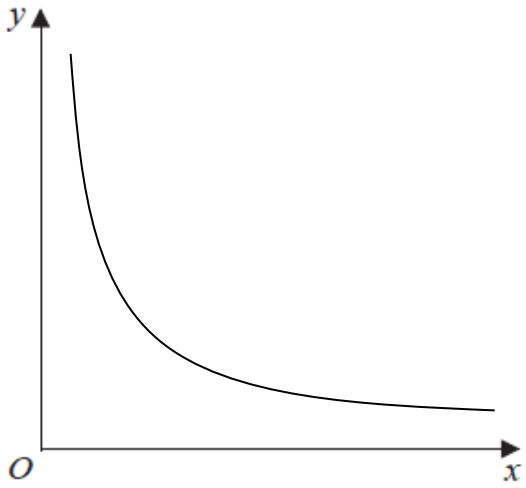
Question 17 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Area of triangle = $\frac{1}{2} \times 8 \times 8 = 32$	P1	This mark is given for a process to find the area of the triangle
	Area of $\frac{1}{4}$ circle = $\frac{\pi r^2}{4} = \frac{64}{4\pi} = 16\pi$	P1	This mark is given for a process to find the area of the quarter circle
	Area of shaded section = $32 - 16\pi$	P1	This mark is given for a process to find the area of the shaded segment
	18.3	A1	This mark is given for a correct answer (to 3 significant figures)

Question 18 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{12 \times 5}{15}$	P1	This mark is given for a process to find out many hours were needed to clean the cars
	4	A1	This mark is given for the correct answer only
(b)	For example: It could take more time It could take less time	C1	This mark is given for a correct statement

Question 19 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		C1	This mark is given for a correct graph sketched
		C1	This mark is given for a correct graph sketched

Question 20 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		M1	This mark is given for a method to find the positions of triangles Q and R Q has coordinates $(-1, -2)$, $(-1, -5)$ and $(-2, -5)$ R has coordinates $(4, -4)$, $(4, -7)$ and $(3, -7)$
	Rotation of 180° about $(2.5, -1)$	A2	These marks are given for a fully described transformation (A1 is given for any two of the three aspects)
(b)	$(2.5, -1)$	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
	$\frac{9+6}{6} = 2.5$	P1	This mark is given for a process to find the scale factor
	$AC = 2.5 \times DE = 5$	P1	This mark is given for a process to find the length AC
	$CB = \sqrt{15^2 - 5^2} = \sqrt{200}$	P1	This mark is given for a process to find the length CB
	14.14	A1	This mark is given for the correct answer (given to 2 decimal places)

Question 22 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Fifth term = $3a + 5a = 8a$	P1	This mark is given for a process to find the value of the fifth term of the sequence
	$a + 2a + 3a + 5a + 8a = 19a$ $19a = 228$	P1	This mark is given for finding an equation in a to be solved
	$a = \frac{228}{19} = 12$	A1	This mark is given for the correct answer only

Aiming for 9 - Paper 3H		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	Solve linear inequalities	4.00	5	80	4.00	4.95	4.90	4.80	4.54	4.03	3.20	2.16	1.38
2	Correlation and causation	3.09	4	77	3.09	3.70	3.63	3.63	3.49	3.23	2.93	2.23	1.53
3	Standard form	3.09	4	77	3.09	3.83	3.79	3.61	3.41	3.15	2.89	2.34	1.82
4	Probability	2.25	3	75	2.25	2.96	2.89	2.83	2.63	2.24	1.64	1.06	0.40
	Enumerate sets and combinations of sets systematically; two-way tables, Venn diagrams and tree diagrams	2.96	4	74	2.96	3.96	3.93	3.73	3.50	2.92	2.06	1.36	0.73
5	Use compound units	2.17	3	72	2.17	2.94	2.78	2.65	2.46	2.17	1.60	1.23	0.76
6	Rounding; Inequality notation to specify error interval	1.37	2	69	1.37	1.95	1.91	1.76	1.66	1.39	0.91	0.36	0.13
7	Samples and theoretical probability distributions	2.73	4	68	2.73	3.92	3.82	3.67	3.31	2.98	2.25	1.40	0.70
8	Solve problems involving direct and inverse proportion	3.19	5	64	3.19	4.76	4.61	4.14	3.83	3.21	1.92	1.02	0.51
9	Ratio in real context	2.52	4	63	2.52	3.45	3.61	3.33	3.23	2.84	1.98	1.14	0.43
10	Use compound units	2.36	4	59	2.36	3.66	3.48	3.11	2.91	2.52	1.90	1.20	0.43
11	Standard form	2.23	4	56	2.23	3.75	3.43	3.13	2.73	2.05	1.17	0.64	0.37
12	Rounding; Inequality notation to specify error interval	1.10	2	55	1.10	1.96	1.74	1.59	1.58	1.18	0.72	0.25	0.11
13	Measures of central tendency (median, mean, mode and modal class)	1.60	3	53	1.60	2.98	2.81	2.37	1.99	1.34	0.71	0.38	0.06
14	Expand expressions	3.18	6	53	3.18	5.71	5.41	4.77	3.93	2.74	1.46	0.54	0.19
15	Solve quadratic equations	1.48	3	49	1.48	2.94	2.79	2.44	1.83	1.13	0.52	0.16	0.04
16	Areas of composite shapes	1.88	4	47	1.88	3.94	3.83	3.31	2.77	1.82	0.79	0.40	0.11
17	Solve problems involving direct and inverse proportion	1.37	3	46	1.37	2.65	2.23	1.96	1.74	1.37	0.96	0.58	0.32
18	Solve problems involving direct and inverse proportion	0.91	2	46	0.91	1.67	1.37	1.24	1.07	0.92	0.74	0.45	0.24
19	Transformations	1.50	4	38	1.50	3.21	2.70	2.22	1.69	1.23	0.68	0.51	0.19
20	Relationships between lengths, areas and volumes in similar figures	1.30	4	33	1.30	3.35	2.98	2.36	1.87	1.26	0.41	0.16	0.01
21	Linear and non-linear sequences of diagrams and numbers	0.86	3	29	0.86	2.75	2.05	1.52	1.11	0.74	0.35	0.14	0.01
22		47.14	80	59	47.14	74.99	70.69	64.17	57.28	46.46	31.79	19.71	10.47

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.