

GCSE Mathematics (1MA1) – Aiming for 9 Paper 2H

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 an or answer examiner might expect to see	Mark	Notes
	$(2x \pm 3)(3x \pm 2)$ or $\frac{-5 \pm \sqrt{5^2 - 4 \times 6 \times -6}}{2 \times 6}$	M1	This mark is given for a method to factorise the equation or to substitute into the quadratic formula
	$(2x + 3)(3x - 2)$ or $\frac{-5 \pm \sqrt{169}}{12}$	M1	This mark is given for a correct factorisation of the equation or a simplified version of the substitution
	$-\frac{3}{2}$ and $\frac{2}{3}$	A1	This mark is given for two correct solutions only (accept decimal solutions)

Question 2 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{10914.75}{0.81} = 13475$	P1	This mark is given for a process to find the value of the car at the end of year 1
	$\frac{13475}{0.77}$	P1	This mark is given for a process to find the value of the car when it was bought
	17500	A1	This mark is given for the correct answer only

Question 3 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(-5 - 6)^2 + (8 - -7)^2$ $-11^2 + 15^2$ $121 + 225 = 346$	M1	This mark is given for a method to use Pythagoras' theorem to work out the length of AB
	$\sqrt{346} = 18.6$	A1	This mark is given for the correct answer only (to 1 decimal place)

Question 4 (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 5 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{1587.762}{58.806} = 27$	P1	This mark is given for a process to find the scale factor of the volumes of the prisms
	$\frac{2 \times 43.74}{8.1} = 10.8$	P1	This mark is given for a process to find the height of B
	$\frac{10.8}{\sqrt[3]{27}}$	P1	This mark is given for a process to find the height, <i>h</i> , of A
	3.6	A1	This mark is given for the correct answer only

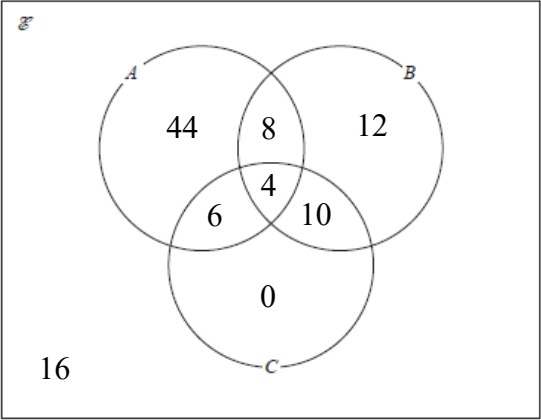
Question 6 (Total 4 marks)

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 7 (Total 2 marks)

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

Question 8 (Total 6 marks)

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

Question 9 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)		M1	This mark is given for a tangent drawn at $t = 17.5$
	For example: $\frac{18.5}{17.5}$	M1	This mark is given for a method to find the gradient of the tangent
	1.06	A1	This mark is given for an answer in the range 0.9 to 1.2
(b)	For example: The gradient represents the rate of change of the volume over time	C1	This mark is given for a valid explanation

Question 10 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$y \leq 6$	M1	This mark is given for an expression with $y = 6$ indicated
	$x \geq -3$	M1	This mark is given for an expression with $x = -3$ indicated
	$y \geq 3x + 6$	M1	This mark is given for an expression with $y = 3x + 6$ indicated
	$y \geq -\frac{x}{2} + 1$	A1	This mark is given for four correct inequalities found

Question 11 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$h(x) = \sqrt[3]{2x+3}$	M1	This mark is given for a method to find $h(x)$
	$x^3 = 2y + 3$	M1	This mark is given for a first step of a method to find $h^{-1}(x)$
	$\frac{x^3 - 3}{2}$	A1	This mark is given for the correct answer only

Question 12 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$1.13^2 = 1.2769$ $1.13^3 = 1.442897$ $1.13^4 = 1.6304736\dots$ $1.13^5 = 1.8424351\dots$ $1.13^6 = 2.08191516\dots$	M1	This mark is given for a method to evaluate 1.13^n with $n > 1$
	6 years	A1	This mark is given for the correct answer only, having shown $1.13^6 > 2$
(b)	For example: The number of years will decrease We can't tell since we don't know how much it is increasing by	C1	This mark is given for a valid explanation

Question 13 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{1}{2} \times \frac{4}{3} \times \pi \times 3.5^3 = 89.797\dots$	P1	This mark is given for a process to find the volume of the hemisphere
	$\frac{1}{2} \times \frac{4}{3} \times \pi \times 3.5^3 + \frac{\pi}{3} \times 3.5^2 (y - 3.5) = 120\pi$	P1	This mark is given for a process to find an equation to link the volume of the shape and the height y
	$y = \frac{120\pi - \left(\frac{2\pi}{3} \times 3.5^3\right) + \left(\frac{\pi}{3} \times 3.5^3\right)}{\left(\frac{\pi}{3} \times 3.5^2\right)}$	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 height of the shape would decrease	C1	This mark is given for a valid explanation

Question 14 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\sqrt{13^2 - 9^2} = \sqrt{169 - 81} = \sqrt{88}$ 9.3808...	P1	This mark is given for a correct process to use Pythagoras' theorem to find the length AF
	$\frac{9}{\cos 49} = \frac{9}{0.656\dots}$ 13.7182...	P1	This mark is given for a correct process to find the length FH
	$\tan FAH = \frac{13.7182\dots}{9.3808\dots}$	P1	This mark is given for a process to find the size of angle FAH
	56	A1	This mark is given for a correct answer only (to the nearest degree)

Question 15 (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 $x^2 - 49 > 0$
	$\frac{- -31 \pm \sqrt{(-31)^2 - 4 \times 5 \times (-72)}}{2 \times 5}$ 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

Question 16 (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 17 (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)	$g^{-1}(x) = \frac{x^3 + 5}{2}$	M1	This mark is given for a method to find an expression for $g^{-1}(x)$
	$h g^{-1}(x) = \frac{1}{2} \frac{x^3 + 5}{2}$	M1	This mark is given for a method to find an expression for $h g^{-1}(x)$
	$\frac{2}{x^3 + 5}$	A1	This mark is given for the correct answer only

Question 18 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$\frac{2.8 - 0}{2.1 - 0} = \frac{4}{3}$	M1	This mark is given for a process to find the gradient of the radius of the circle
	Gradient of tangent = $-\frac{3}{4}$	M1	This mark is given for a process to find the gradient of the tangent using $-\frac{1}{m}$
	$y = -\frac{3}{4}x + c$ $2.8 = -1.575 + c, c = 4.375$	M1	This mark is given for a process to substitute (2.1, 2.8) into $y = -\frac{3}{4}x + c$
	$\frac{3}{4}x + y = 4.375$ or (multiplied through by 8) $6x + 8y = 35$	A1	This mark is given for a correct answer in the form $ax + by = c$

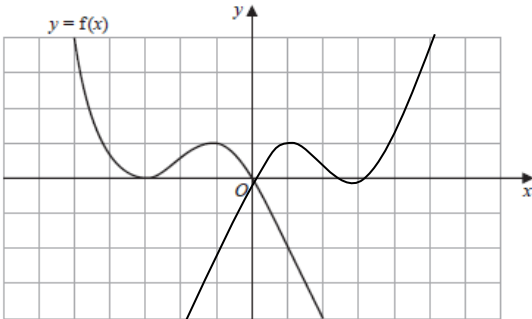
Question 19 (Total 4 marks)

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
	$\frac{6x + 1.5}{5x + 1.5} = \frac{13}{11}$	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

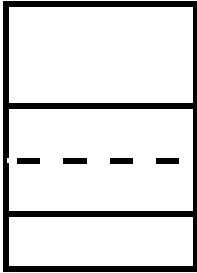
Question 20 (Total 5 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	distance: $10.55 \leq d \leq 10.65$ time: $31 \text{ min } 47.5 \text{ sec} \leq t \leq 31 \text{ min } 48.5 \text{ sec}$	P1	This mark is given for a process to find upper and lower bounds for the distance and the time
	time in hours: $\frac{1907.5}{3600} \leq t \leq \frac{1908.5}{3600}$ time in hours: $0.529861 \leq t \leq 0.530138$	A1	This mark is given for a process to find upper and lower bounds for the time in hours
	Speed: $\frac{10.55}{0.530138} \leq s \leq \frac{10.65}{0.529861}$	P1	This mark is given for a process to find either the upper or lower bound for the speed
	Speed: $19.9004... \leq s \leq 20.0996...$	P1	This mark is given for a process to find both the upper or lower bound for the speed
	20 km/hour (agreed to 2 significant figures)	A1	This mark is given for the correct answer to 2 significant figures

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: $360 - 90$ $\tan(x + 270)^\circ$ $y = \tan(x + a) - 5$	M1	This mark is given for a method to describe one part of the translation
	$\tan(x + 270)^\circ - 5$	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
	 A diagram of a rectangular prism (cuboid) shown in a perspective view. The front face is a rectangle. The top and bottom edges of the front face are solid lines. The vertical edges of the front face are solid lines. The back edge of the top face is a dashed line, indicating it is hidden. The back edge of the bottom face is a solid line.	B2	These marks are given for a fully correct elevation 5 squares high and 3 squares wide

Aiming for 9 Paper 2H (Set 3)				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 quadratic equations	0.93	3	31	0.93	2.91	2.76	2.25	1.62	0.78	0.37	0.10	0.79
2	Growth and decay, compound interest	0.74	3	25	0.74	2.91	2.57	1.83	1.26	0.53	0.26	0.08	0.03
3	Pythagoras's Theorem and Trigonometry	0.35	2	18	0.35	1.94	1.70	0.99	0.54	0.22	0.06	0.00	0.14
4	Circle theorems	1.76	4	44	1.76	3.74	3.11	2.20	1.30	0.64	0.25	0.05	0.01
5	Relationships between lengths, areas and volumes in similar figures	1.05	4	26	1.05	3.67	3.07	2.36	1.63	1.11	0.43	0.07	0.02
6	Geometrical problems on coordinate axes	1.87	4	47	1.87	3.60	3.07	2.41	1.55	0.76	0.27	0.09	0.04
7	Transformations	0.73	2	37	0.73	1.80	1.38	0.89	0.47	0.21	0.08	0.02	0.01
8	Conditional probability	3.15	6	53	3.15	5.39	4.47	3.54	2.69	2.08	1.58	1.11	0.72
9	Gradient at a point on a curve as the instantaneous rate of change	0.74	4	19	0.74	3.37	2.46	2.07	1.35	0.55	0.13	0.03	0.37
10	Solve linear inequalities	0.58	4	15	0.58	3.27	2.39	1.61	0.94	0.39	0.10	0.02	0.02
11	Inverse and composite functions; formal function notation	0.56	3	19	0.56	2.42	2.31	1.75	0.98	0.32	0.07	0.03	0.40
12	Growth and decay, compound interest	0.47	3	16	0.47	2.42	1.52	1.06	0.71	0.43	0.17	0.08	0.52
13	Surface area and volume of spheres, pyramids, cones and composite solids	1.96	5	39	1.96	3.93	3.10	2.43	1.67	0.87	0.32	0.08	0.02
14	Pythagoras's Theorem and Trigonometry	0.44	4	11	0.44	3.09	1.73	1.28	0.68	0.26	0.09	0.01	0.05
15	Solve quadratic inequalities	1.28	5	26	1.28	3.71	2.29	1.47	0.78	0.31	0.11	0.04	0.01
16	Transformations	0.83	2	42	0.83	1.47	1.20	0.96	0.73	0.50	0.28	0.13	0.06
17	Inverse and composite functions; formal function notation	1.50	4	38	1.50	2.94	2.31	1.83	1.25	0.74	0.39	0.15	0.02
18	Equation of a circle	0.47	4	12	0.47	2.88	2.49	1.58	0.76	0.17	0.03	0.00	0.14
19	Translate situations or procedures into algebraic expressions, formulae or equations	0.63	4	16	0.63	2.66	1.06	0.48	0.26	0.16	0.10	0.04	0.04
20	Limits of accuracy; bounds	0.50	5	10	0.50	3.03	1.53	1.30	0.80	0.40	0.15	0.03	0.04
21	Graphs of trigonometric functions	0.56	3	19	0.56	1.77	0.94	0.51	0.32	0.24	0.16	0.10	0.04
22	Plans and elevations of 3D shapes	0.27	2	14	0.27	0.76	0.63	0.44	0.35	0.33	0.17	0.09	0.03
		21.37	80	27	21.37	63.68	48.09	35.24	22.64	12.00	5.57	2.35	3.52

Suggested grade boundaries

Grade	9	8	7	6	5	4	3
Mark	56	42	29	17	9	4	1