

GCSE Mathematics (1MA1)

Aiming for Grade 7 papers – Paper 2 – Non-Calculator

Compiled from student-friendly mark schemes

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 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$3T + 2C = 7.80$ $5T + 4C = 14.20$	1	This mark is given for setting up two equations
	$6T + 4C = 15.60$ $5T + 4C = 14.20$ $T = 1.40$	1	This mark is given for eliminating one variable
	$4.20 + 2C = 7.80$ $2C = 3.60$	1	This mark is given for substituting the value of one variable to find the other
	One tea costs £1.40 and one coffee costs £1.80	1	This mark is given for the correct answer only

Question 2 (Total 3 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(x + 1)(x + 2) = x^2 + x + 2x + 2$ or $(x + 2)(x + 3) = x^2 + 2x + 3x + 6$ or $(x + 1)(x + 3) = x^2 + x + 3x + 3$	M1	This mark is given for a method to find the product of any two of three linear expressions
	$(x + 3)(x^2 + x + 2x + 2)$ or $(x + 1)(x^2 + 2x + 3x + 6)$ or $(x + 2)(x^2 + x + 3x + 3)$ $= x^3 + x^2 + 2x^2 + 3x^2 + 2x + 3x + 6x + 6$	M1	This mark is given for a for method to find the full expansion of three brackets
	$x^3 + 6x^2 + 11x + 6$ $(a = 1, b = 6, c = 11, d = 6)$	A1	This mark is given for the correct answer only

Question 3 (Total 4 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$4 \times \frac{450}{15}$	1	This mark is given for a method to work out the total of pies made on Monday
	120	1	This mark is given for the correct answer only
(b)	$5.5 \times \frac{450}{15} = 165$ and $6.5 \times \frac{450}{15} = 195$	1	This mark is given for finding the smallest possible and greatest possible number of steak pies made on Tuesday
	$\frac{165}{450}$	1	This mark is given for the correct answer only

Question 4 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	59, 53, 66	B2	This mark is given for a correct median, lower quartile and upper quartile (B1 is given for one value correct)
(b)	Yes; all the values are lower for Coach A so the people on that coach are younger	C1	This mark is given for a correct statement with a valid reason
(c)	No; there is a greater difference between the greatest and lowest age on Coach B	C1	This mark is given for a correct statement with a valid reason

Question 5 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{22}{\sqrt{11}} \times \frac{\sqrt{11}}{\sqrt{11}} = \frac{22\sqrt{11}}{11}$	M1	This mark is given for a method to multiply the numerator and denominator by $\sqrt{11}$
	$= 2\sqrt{11}$	A1	This mark is given for the correct answer only
(b)	$\frac{\sqrt{3}}{2\sqrt{3}-1} \times \frac{2\sqrt{3}+1}{2\sqrt{3}+1} = \frac{(2 \times 3) + \sqrt{3}}{(4 \times 3) - 1}$	M1	This mark is given for a method to multiply the numerator and denominator by $2\sqrt{3} + 1$
	$\frac{6 + \sqrt{3}}{11}$	M1	This mark is given for either a correct numerator or correct denominator seen
	$(a = 6, b = 11)$	A1	This mark is given for a completely correct answer only

Question 6 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\left(\frac{64}{125}\right)^{\frac{2}{3}} = \left(\frac{64^{\frac{2}{3}}}{125^{\frac{2}{3}}}\right)$ $64^{\frac{2}{3}} = \left(64^{\frac{1}{3}}\right)^2 = (\sqrt[3]{64})^2 = 4^2 = 16$ $125^{\frac{2}{3}} = \left(125^{\frac{1}{3}}\right)^2 = (\sqrt[3]{125})^2 = 5^2 = 25$	M1	This mark is given for a method to find the cube root of 64 and 125 or 16 or 25 seen
	$\frac{16}{25}$	A1	This mark is given for the correct answer only

Question 7 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Let $x = 0.418181818\dots$ $1000x = 418.181818\dots$ $10x = 4.181818\dots$	M1	This mark is given for finding values for $1000x$ and $10x$
	$1000x - 10x =$ $418.181818\dots - 4.181818\dots = 414$	M1	This mark is given for a method to eliminate recurring decimals
	$990x = 418$ $x = \frac{414}{990}$	A1	This mark is given for the correct answer only (or an equivalent fraction)

Question 8 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Cone: $\frac{1}{3} \times \pi \times 3^2 \times 10 = 30\pi$ Hemisphere: $\frac{1}{2} \times \frac{4}{3} \times \pi \times 3^3 = 18\pi$	M1	This mark is given for a method to use the formulae to find the volumes of the cone and the hemisphere
	$(\frac{1}{3} \times \pi \times 3^2 \times 10) + (\frac{1}{2} \times \frac{4}{3} \times \pi \times 3^3)$	M1	This mark is given for a complete method to find the total volume of the shape
	$30\pi + 18\pi$	M1	This mark is given for a correct partial simplification
	48	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
	$\frac{15x}{3x(x+1)} + \frac{2(x+1)}{3x(x+1)}$	M1	This mark is given for a method to find a common denominator and at least one correct numerator
	$\frac{17x+2}{3x(x+1)}$	A1	This mark is given for a correct single simplified fraction

Question 10 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$4 \times 5 = 20 \text{ kg}$ $5 \times 9 = 45 \text{ kg}$	P1	This mark is given for a process to find the weight of the red bricks or the blue bricks
	$20 + 45 + 6 = 71 \text{ kg}$	P1	This mark is given for a process to find the weight of all the bricks
	Average weight of bricks is $\frac{71}{10} = 7.1 \text{ kg}$ so Donna is incorrect	C1	This mark is given for finding the average weights of the bricks with a correct conclusion stated

Question 11 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$y = \frac{k}{x^2}$ Substituting, $9 = \frac{k}{1^2}$ or $2\frac{1}{4} = \frac{k}{2^2}$ or $1 = \frac{k}{3^2}$ or $2\frac{9}{16} = \frac{k}{4^2}$ so $k = 9$	M1	This mark is given for a method to find an equation for y in the form $y = \frac{k}{x^2}$ and thus the constant k
	$y = \frac{9}{x^2}$	A1	This mark is given for the correct answer only
(b)	$16 = \frac{9}{x^2}$ so $x^2 = \frac{9}{16}$, $x = \sqrt{\frac{9}{16}}$	M1	This mark is given for a method to substitute $y = 16$ into the proportional formula and rearrange
	$x = \frac{3}{4}$	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
	$OAB = 90 - 56$ $= 34$	C1	This mark is given for a method to find angle OAB
	$BOA = 112$ $BCA = 56$	C1	This mark is given for a method to find angle CAD (angle at the centre is twice that at the circumference)
	$CAO = 180 - 34 - 34 - 35 - 56$ $= 21$	C1	This mark is given for the correct answer only

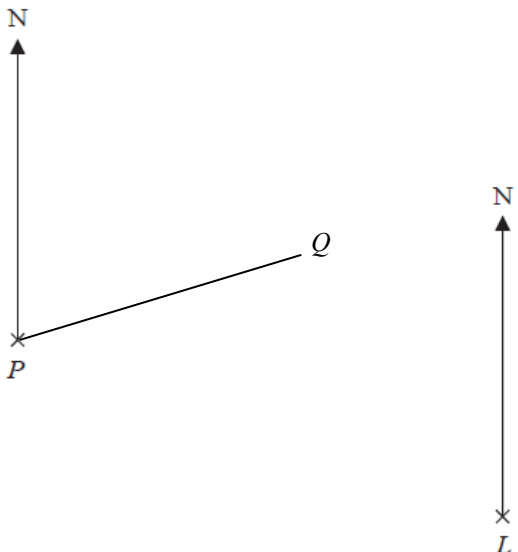
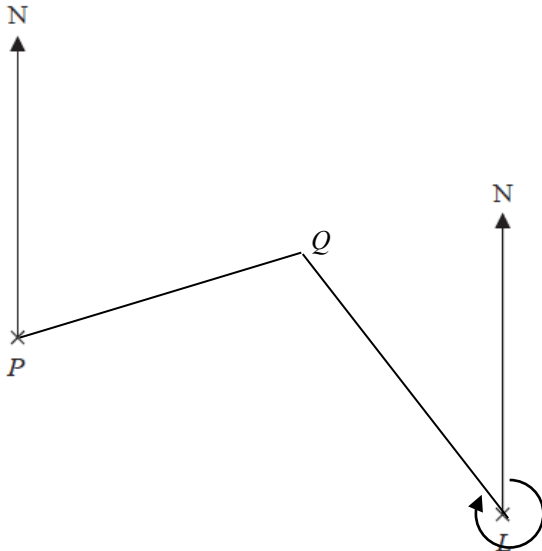
Question 13 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$h = \frac{k}{p}$ and $p = K\sqrt{t}$	P1	This mark is given for a method to set up proportional relationships between h and p and between p and $\sqrt{t}$
	$10 = \frac{k}{6}$ so $k = 60$ $6 = K \times 12$ so $K = 0.5$	P1	This mark is given for a process to find values for both k and K
	$h = \frac{60}{p}$ $p = 0.5\sqrt{t}$	P1	This mark is given for a process to find expressions for both h and p
	$h = \frac{60}{0.5\sqrt{t}} = \frac{120}{\sqrt{t}}$	A1	This mark is given for the correct answer only

Question 14 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	P : Q = 1 : 1.5 Q : R = 1.5 : 2.25	P1	This mark is given for a process to find the ratio of the volumes of P and Q , and of Q and R
	P : R = 1 : 2.25 = 4 : 9	P1	This mark is given for a process to find the ratio of the volume of P to the volume of R
	$\frac{4}{9}$	A1	This mark is given for a correct answer only

Question 15 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(i)		P1	This mark is given for a process to draw a line at a bearing of 070° from P
	$PQ = 12 \times 1.5 = 18 \text{ km}$	P1	This mark is given for a process to work out the actual distance PQ
	Distance on scale drawing: $18 \div 4 = 4.5 \text{ cm}$	P1	This mark is given for a process to work out the distance PQ on the scale drawing
	Distance QL on scale drawing = 5 cm Actual distance $QL = 5 \times 4 = 20 \text{ km}$	A1	This mark is given for finding the distance QL (in the range 20 – 23 km)
(ii)	 Bearing from L to Q is 320°	A1	This mark is given for a bearing of Q from L (in the range 317 – 330)

Question 16 (Total 7 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{x+1}{3}$	M1	This mark is given for a method to change the subject, for example $y = 3x - 1$ or $y + 1 = 3x$
		A1	This mark is given for the correct answer only
(b)	$fg(x) = 3(x^2 + 4) - 1$	M1	This mark is given for a finding the angle BDC
	$gf(x) = (3x - 1)^2 + 4$	M1	This mark is given for a an appropriate reason stated
	$3x^2 + 11 = 2(9x^2 - 6x + 5)$	M1	This mark is for setting up the equation of $fg(x) = 2gf(x)$
	$3x^2 + 11 = 18x^2 - 12x + 10$	M1	This mark is given for multiplying out the expression for $2gf(x)$
	$15x^2 - 12x - 1 = 0$	C1	This mark is given for a correct conclusion following from correct working

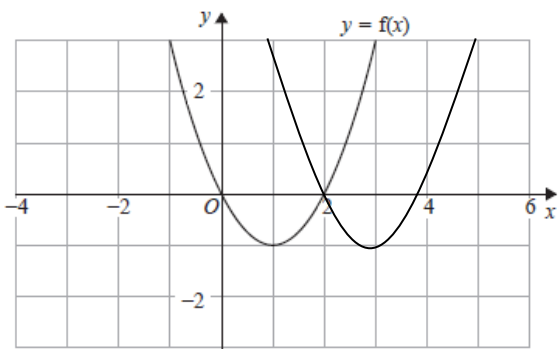
Question 17 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(b)	$2(25 - y^2)$	M1	This mark is given for taking out a factor of 2
	$2(5 + y)(5 - y)$	A1	This mark is given for the correct answer only

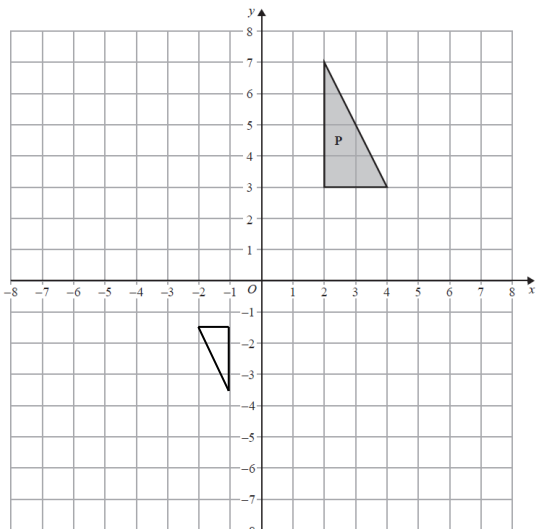
Question 18 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$5 \times 5 \times 5 = 5^3$	M1	This mark is given for a method to find the number of three-digit combinations
	125	A1	This mark is given for the correct answer only

Question 19 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)		B1	This mark is given for a correct sketch with a curve that crosses the x -axis at (2, 0) and (4, 0), with minimum point (3, -1) and endpoints (1, 3) and (5, 3)
(b)	$y = g(-x)$	B1	This mark is given for the correct answer only

Question 20 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
		2	These two marks are given for a correct enlargement (position, size and orientation) with coordinate points $(-1, -1.5)$, $(-1, -3.5)$ and $(-2, -1.5)$ [1 mark is given for an enlargement with correct size and orientation in the incorrect position]

Question 21 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Gradient of $DB = \frac{1}{2}$	P1	This mark is given for finding the gradient of the line DB
	Gradient of $AC = -\frac{1}{\frac{1}{2}} = -2$, so equation for AC is $y = -2x + c$	P1	This mark is given for understanding that the line AC is perpendicular to DB and using $-\frac{1}{m}$ to find its gradient
	$11 = -10 + c$ $c = 21$	P1	This mark is given for substituting the values for the coordinates of A ($x = 5$ and $y = 11$) into $y = -2x + c$ to find the value of c
	$y = -2x + 21$	A1	This mark is given for the correct answer only

Question 22 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(i)	$x^2 - 6x + 9 = (x - 3)^2$ $a = 3$	M1	This mark is given for method to find a value for a
	$x^2 - 6x + 1 = (x - 3)^2 - 8$ $b = 8$	A1	This mark is given for method to find a value for b
(ii)	$(3, -8)$	B1	This mark is given for the correct answer only

Question 23 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$(x - 1)(3x - 2) = 3x^2 - 5x + 2$ $\frac{1}{2} 2x^2 = x^2$	1	This mark is given for deriving expressions for the areas of both the rectangle and triangle
	$2x^2 - 5x + 2 > 0$	1	This mark is given for finding an inequality
	$(2x - 1)(x - 2) > 0$	1	This mark is given for finding a method to solve the inequality
	$x > 2$ and $x > \frac{1}{2}$	1	This mark is given for finding the two critical values
	$x > 2$ only (since $x - \frac{1}{2} < 0$)	1	This mark is given for the correct answer only

Question	Taken from Paper			Number of Marks	Edexcel averages: scores of candidates who achieved grade 7	%
1	1H	Nov 17	11	4	3.68	92
2	1H	June 17	10	3	2.65	88
3a	1H	Nov 17	13(a)	2	1.65	83
3b	1H	Nov 17	13(b)	2	0.69	35
4a	1H	June 19	11a	2	1.62	81
4b	1H	June 19	11b	1	0.65	65
4c	1H	June 19	11c	1	0.75	75
5a	1H	Nov 19	16a	2	1.58	79
5b	1H	Nov 19	16b	3	1.37	46
6	1H	June 17	12b	2	1.55	78
7	1H	Nov 19	15	3	2.17	72
8	1H	June 19	15	4	2.78	70
9	1H	Nov 19	13a	2	1.36	68
10	1H	Nov 19	6	3	2.06	69
11a	1H	June 17	13a	2	1.32	66
11b	1H	June 17	13b	2	0.91	46
12	1H	Nov 18	12	3	1.91	64
13	1H	June 19	20	4	2.57	64
14	1H	June 19	12	3	1.68	56
15	1H	Nov 19	8	5	2.74	55
16a	1H	June 19	21a	2	1.22	61
16b	1H	June 19	21b	5	3.19	64
17	1H	Nov 18	10b	2	1.09	55
18	1H	June 19	16(a)	2	1.08	54
19a	1H	Nov 18	18a	1	0.57	57
19b	1H	Nov 18	18b	1	0.29	29
20	1H	Nov 17	18	2	1.09	55
21	1H	June 17	18	4	2.00	50
22i	1H	June 19	19i	2	0.90	45
22ii	1H	June 19	19ii	1	0.37	37
23	1H	Nov 17	23	5	1.58	32

Suggested Grade Boundaries for Aiming for 7: Paper 2

Grade	7	6	5	4
Mark	49	35	23	11

For example:

A student aiming for Grade 7 would be expected to score at least 49 marks on this practice paper.