

GCSE Mathematics (1MA1)

Aiming for Grade 7 practice papers – Paper 1 – 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 5 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$1 - 0.15 = 0.85$	M1	This mark is given for finding the probability of 'not late'
	<p style="text-align: center;">Thursday Friday</p> <p style="margin-left: 150px;">0.15 late</p> <p style="margin-left: 150px;">0.85 not late</p> <p style="margin-left: 150px;">0.15 late</p> <p style="margin-left: 150px;">0.85 not late</p>	A1	This mark is given for a fully correct diagram
(b)	$0.85 \times 0.85 = 0.7225$	M1	This mark is given for a method to find the probability of being not late on both days
	$1 - 0.7225$	M1	This mark is given for a method to find the probability that Mary's train will be late on at least one of the two days
	0.2775	C1	This mark is given for the correct answer only

Question 2 (Total 4 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$4 \sin 23^\circ = 4 \times 0.3907311$ $= 1.5629245$ $= 1.56$	B1	This mark is given for the correct answer to three significant figures
(b)	$g(34) = (2 \times 34) - 3$ $= 65$ $f(65) = 4 \sin 65^\circ$ $= 4 \times 0.9063077$	M1	This mark is given for a method to find $g(34)$ and $f(65)$
	$= 3.6252311$ $= 3.63$	A1	This mark is given for the correct answer to three significant figures
(c)	Both the positive and negative square roots are required for a fully correct solution	C1	This mark is given for a correct statement

Question 3 (Total 3 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$9 \times 15 = 135$	M1	This mark is given for one correct calculation
	$15 \times 8 = 120$	M1	This mark is given for all three calculations correct
	$9 \times 15 \times 8 = 1080$		
	$135 + 120 + 1080 = 1335$	C1	This mark is given for the correct answer only

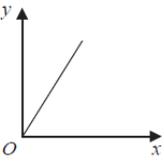
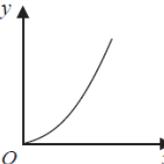
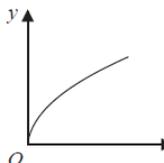
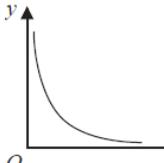
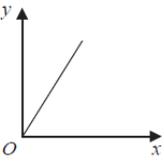
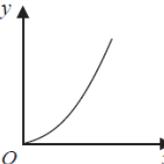
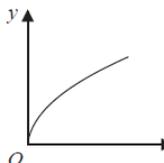
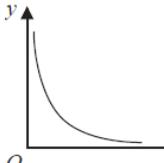
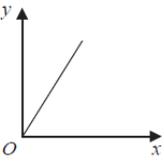
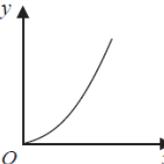
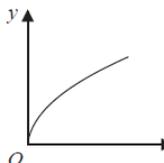
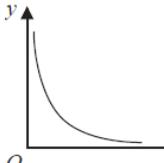
Question 4 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{3.9 \times 10^7}{3 \times 10^5}$	P1	This mark is given for a process to find how long the signal took to reach Mars
	$= 1.3 \times 10^2$	A1	This mark is given for finding the number of seconds the signal takes to reach Mars
	$= 130$		
(b)	The signal will take longer to reach Mars	C1	This mark is given for a correct explanation

Question 5 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$y = 3x + c$ Using the coordinates for point <i>A</i> , $9 = (3 \times 5) + c \quad c = -6$	P1	This mark is given for a process to use the gradient given
	$y = 3x - 6$ Using the coordinates for point <i>B</i> , $15 = (3 \times d) - 6$ $3d = 21$	P1	This mark is given for a process to find a value for <i>d</i>
	$d = 7$	A1	This mark is given for the correct answer only

Question 6 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes										
	<table border="1"> <thead> <tr> <th>Type of proportionality</th> <th>Graph</th> </tr> </thead> <tbody> <tr> <td>$y \propto x$</td> <td>Graph B </td> </tr> <tr> <td>$y \propto x^2$</td> <td>Graph D </td> </tr> <tr> <td>$y \propto \sqrt{x}$</td> <td>Graph A </td> </tr> <tr> <td>$y \propto \frac{1}{x}$</td> <td>Graph C </td> </tr> </tbody> </table>	Type of proportionality	Graph	$y \propto x$	Graph B 	$y \propto x^2$	Graph D 	$y \propto \sqrt{x}$	Graph A 	$y \propto \frac{1}{x}$	Graph C 	B2	<p>These marks are given for all four graphs identified correctly</p> <p>(B1 is given for at least 2 identified correctly)</p>
Type of proportionality	Graph												
$y \propto x$	Graph B 												
$y \propto x^2$	Graph D 												
$y \propto \sqrt{x}$	Graph A 												
$y \propto \frac{1}{x}$	Graph C 												

Question 7 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes															
	<table style="border-collapse: collapse; margin-left: 20px;"> <tr> <td style="padding: 5px 15px;">0</td> <td style="padding: 5px 15px;">2</td> <td style="padding: 5px 15px;">6</td> <td style="padding: 5px 15px;">12</td> <td style="padding: 5px 15px;">20</td> </tr> <tr> <td style="padding: 5px 15px;"></td> <td style="padding: 5px 15px;">2</td> <td style="padding: 5px 15px;">4</td> <td style="padding: 5px 15px;">6</td> <td style="padding: 5px 15px;">8</td> </tr> <tr> <td style="padding: 5px 15px;"></td> <td style="padding: 5px 15px;">2</td> <td style="padding: 5px 15px;">2</td> <td style="padding: 5px 15px;">2</td> <td></td> </tr> </table>	0	2	6	12	20		2	4	6	8		2	2	2		M1	This mark is given for using the method of differences; second difference of 2 implies n^2
0	2	6	12	20														
	2	4	6	8														
	2	2	2															
	$n^2 - n$	A1	This mark is given for the correct answer only															

Question 8 (Total 1 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Patrick needs to find the fourth root of 64 rather than a quarter of 64	C1	This mark is given for a correct explanation

Question 9 (Total 1 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\sqrt{42.25} = 6.5$	B1	This mark is given for a correct answer only

Question 10 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$8029.35 \div 6000 = 1.338225$	P1	This mark is given for a process to start to solve the problem
	$\sqrt[5]{1.338225} = 1.0599$	P1	This mark is given for a process to find the fifth root
	6 (%)	A1	This mark is given for an answer in the range 5.99 – 6

Question 11 (Total 2 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$x^2 + 6x - 7 = x^2 + 2ax + a^2 + b$	1	This mark is given for a method to complete the square
	$(x + 3)^2 - 16$	1	This mark is given for the correct answer only

Question 12 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$0.65 \times (1 - 0.65) + 0.65 \times (1 - 0.65)$	M1	This mark is given for a method to find the probability that counters of different colours are found
	0.455	A1	This mark is given for a correct answer only

Question 13 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{44}{\pi} = 14.0056$	P1	This mark is given for a process to find the diameter of the circle
	$\frac{1}{2} \times 14.0056 \times 14.0056 \times \sin 60^\circ$ $= \frac{1}{2} \times 14.0056 \times 14.0056 \times \frac{\sqrt{3}}{2}$	P1	This mark is given for a process to use $\frac{1}{2}ab \sin C$ to find the area of the triangle
	84.9	A1	This mark is given for an answer in the range 84.8 – 85

Question 14 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{BD}{\sin 34^\circ} = \frac{12.5}{\sin 109^\circ}$	P1	This mark is given for using the sine rule as a start of the process to find the length BD
	$BD = \frac{12.5}{\sin 109^\circ} \times \sin 34^\circ$ $= 7.39$	P1	This mark is given for a complete process to find the length BD
	$AD^2 =$ $11.4^2 + 7.39^2 - (2 \times 11.4 \times 7.39 \times \cos 86^\circ)$	P1	This mark is given for using the cosine rule as a start of the process to find the length AD
	$AD^2 = 129.96 + 54.6 - 11.75$ $= 172.85$	P1	This mark is given for a complete process to find the length AD
	$AD = 13.1$	A1	This mark is given for the correct answer only

Question 15 (Total 3 mark)

Part	Working or answer an examiner might expect to see	Mark	Notes
(b)	$\frac{5 \times 4}{2} + \frac{(4+12)}{2} \times 5$ $+ \frac{(12+18)}{2} \times 5 + \frac{(18+20)}{2} \times 5$	P1	This mark is given for splitting the area in to 4 strips (one triangle, three trapezia)
	$10 + 40 + 75 + 95$	P1	This mark is given for a process to find an estimate for the area under the curve the
	220	A1	This mark is given for a correct answer in the range 215 – 225

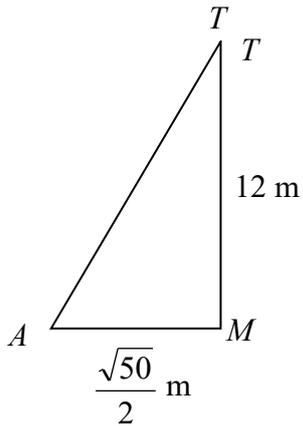
Question 16 (Total 2 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$\frac{4}{12} \times \frac{3}{11} \times \frac{2}{10}$	1	This mark is given for a method to find the probability of taking 3 red counters
	$\frac{1}{55}$	1	This mark is given for the answer shown or an equivalent fraction

Question 17 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$1.1 \times 10 = 11$ $2.8 \times 10 = 28$ $2.3 \times 20 = 46$ $1.4 \times 20 = 28$ $1.4 \times 10 = 14$ $0.7 \times 30 = 21$	P1	This mark is given for a correct process to find any frequency (frequency density \times age)
	$\frac{1}{2}(1.4 \times 20) + (0.7 \times 30) = 35$	P1	This mark is given for a complete process to find the number of members aged over 50
	$\frac{20}{100} \times 35 = 7$	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
	$AC = \sqrt{5^2 + 5^2}$	P1	This mark is given for a process to find the distance AC
	Distance from A to midpoint M of AC $= \frac{\sqrt{50}}{2}$	P1	This mark is given for a process to find the distance from A to midpoint M of AC
	 $\tan TAC = \frac{2 \times 12}{\sqrt{50}} = 3.394$	P1	This mark is given for a process to find an expression for the tangent of angle TAC
	$\angle TAC = 73.6^\circ$	A1	This mark is given for the correct answer only

Question 19 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$2n - 1, 2n + 1$	C1	This mark is given for a correct representation of two consecutive odd numbers
	$(2n + 1)^2 - (2n - 1)^2$ $= (4n^2 + 4n + 1) - (4n^2 - 4n + 1)$ $= 4n^2 + 4n + 1 - 4n^2 + 4n - 1$	C1	This mark is given for multiplying out brackets and collecting terms
	$= 8n$ Always a multiple of 8	C1	This mark is given for stating a correct conclusion

Question 20 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$MB^2 = MA^2 + AB^2$ $MA = 15 \times \frac{3}{5} = 9$ $MB^2 = 9^2 + 15^2 = 306$ $MB = 17.49$	P1	This mark is given for a process to find the length of length MB
	$BE = \tan 35^\circ \times 15 = 10.5$	P1	This mark is given for a process to find the length of length BE
	$\tan EMB = \frac{10.5}{17.49} = 0.6$	P1	This mark is given for a process to find the angle EMB
	$EMB = 30.1$	A1	This mark is given for the correct answer only

Question 21 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(b)	Small cubes = $\frac{88}{11} \times 4 = 32$ Large cubes = $\frac{88}{11} \times 7 = 56$	P1	This mark is given for a process to find the number of small cubes and the number of large cubes
	Red cubes = $\frac{88}{8} \times 3 = 33$ Yellow cubes = $\frac{88}{8} \times 5 = 55$	P1	This mark is given for a process to find the number of red cubes and the number of yellow cubes
	All small cubes are yellow, so the least number of large yellow cubes = $55 - 32 = 23$	A1	This mark is given for the correct answer only

Question 22 (Total 5 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	$\frac{360-140}{360} \times \pi \times 2r = \frac{360-140}{360} \times \pi \times 12$ = 23.038...	P1	This mark is given for a process to find the length of the major arc
	$\frac{14}{\sin 140} = \frac{OD}{\sin 24}$	P1	This mark is given for a process to use the sine rule to find the distance <i>OD</i>
	$OD = \frac{14 \sin 24}{\sin 140} = \frac{5.6943...}{0.6427...} = 8.858...$	P1	This mark is given for finding the length <i>OD</i>
	$23.038 + 14 + (8.858 - 6) = 39.896$	P1	This mark is given for a complete process to find the perimeter
	39.9 (3 s.f.)	A1	This mark is given for an answer to three significant figures in the range 39.8 to 40

Question 23 (Total 4 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	265 to 275 km 107.5 to 112.5 minutes	P1	This mark is given for finding the range of values for the length of the track and the time taken
	107.5 to 112.5 minutes = 1.791666... to 1.875 hours	P1	This mark is given for a process to work in consistent units of time
	$\frac{265}{1.875}$ to $\frac{275}{1.791666...}$ 141.33... to 153.488... mph	P1	This mark is given for a process to find the range of possible speeds
	No, the greatest speed possible is 153.49 mph	C1	This mark is given for a conclusion supported with correct working

Question 24 (Total 3 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
	Lower bound for distance travelled is 147.5 Upper bound for petrol used is 11.85	1	This mark is given for finding the bounds
	$\frac{100 \times 11.85}{147.5} = 8.03$	1	This mark is given for finding the maximum possible petrol consumption
	Yes, Nathan could be wrong – his car might have used over 8 litres of petrol	1	This mark is given for a correct conclusion supported by working

Question 25 (Total 3 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
	$(x + 1)(x - 2)x$	M1	This mark is given for finding a common denominator
	$\frac{3x(x - 2) + (x + 1)x - 4(x + 1)(x - 2)}{x(x + 1)(x - 2)}$	M1	This mark is given for finding a numerator
	$= \frac{3x^2 - 6x + x^2 + x - 4x^2 + 4x + 8}{x(x + 1)(x - 2)}$ $= \frac{-x + 8}{x(x + 1)(x - 2)}$	A1	This mark is given for the correct answer only

Question 26 (Total 4 marks)

Part	Working an or answer examiner might expect to see	Mark	Notes
(a)	$DBO = x$	M1	This mark is given for a method to find one missing angle
	Base angles of an isosceles triangle are equal	C1	This mark is given for a correct supporting reason
	$BCD = \frac{1}{2}BOD = 90 - x$ Angle at the centre is double the angle at the circumference $y + 90 - x = 180$ Opposite angles in a cyclic quadrilateral are equal Thus $y - x = 90$	A1	This mark is given for a complete correct method leading to $y - x = 90$ with all correct reasons given
(b)	No; y must be less than 180 because it is an angle in a triangle.	C1	This mark is given for a correct explanation

Question	Taken from Paper/Q			Number of Marks	Edexcel averages: scores of candidates who achieved grade 7	%
1a	2H	June 19	10a	2	1.99	100
1b	2H	June 19	10b	3	2.18	73
2a	3H	Nov 18	10a	1	0.95	95
2b	3H	Nov 18	10b	2	1.52	76
2c	3H	Nov 18	10c	1	0.31	31
3	2H	Nov 18	11	3	2.67	89
4a	3H	June 19	11a	2	1.89	95
4b	3H	June 19	11b	1	0.92	92
5	2H	Nov 18	6	3	2.54	85
6	2H	June 18	12	2	1.64	82
7	3H	June 18	16b	2	1.59	80
8	3H	June 19	12	1	0.80	80
9	2H	Nov 18	15	1	0.81	81
10	3H	June 17	10	3	2.16	72
11	3H	Nov 17	13	2	1.41	71
12	2H	Nov 18	16a	2	1.38	69
13	2H	Nov 18	13	3	2.07	69
14	3H	June 18	17	5	3.39	68
15	2H	June 19	14b	3	1.98	66
16	2H	Nov 17	21(a)	2	1.08	54
17	2H	June 17	13	3	1.86	62
18	3H	Nov 18	12	4	2.33	58
19	3H	Nov 18	15	3	1.45	48
20	2H	June 19	19	4	2.26	57
21	2H	June 19	17b	3	1.41	47
22	3H	Nov 18	16	5	2.79	56
23	3H	June 17	17a	4	1.98	50
24	3H	Nov 17	16	3	1.28	43
25	2H	Nov 18	12b	3	1.26	42
26	2H	June 18	13(a),(b)	4	1.60	40

Suggested Grade Boundaries for Aiming for 7, Calculator: Paper 1

Grade	7	6	5	4
Mark	52	38	35	14

For example:

A student aiming for Grade 7 would be expected to score at least 52 marks on this practice paper.