

GCSE Mathematics (1MA1) – Aiming for Grade 9 1H

Student-friendly mark scheme

Please note that this mark scheme is not the one used by examiners for marking 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.

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).

The following table shows the marks scored on average at certain grades on similar questions from live exams.

For example: A student who achieved a Grade 9 on similar questions from either the Summer 2023 or November 2023 exam sittings achieved on average 33.9 marks from these questions.

Grade	9	8	7	6	5	4	3
Mark	33.9	23.7	15.6	9.7	6.0	3.4	1.8

Answer all questions.
Write your answers in the spaces provided.
You must write down all the stages in your working.

- 1 Alice recorded the number of cars going into a village on each of 80 days.
 The incomplete table and the incomplete box plot give information about her results.

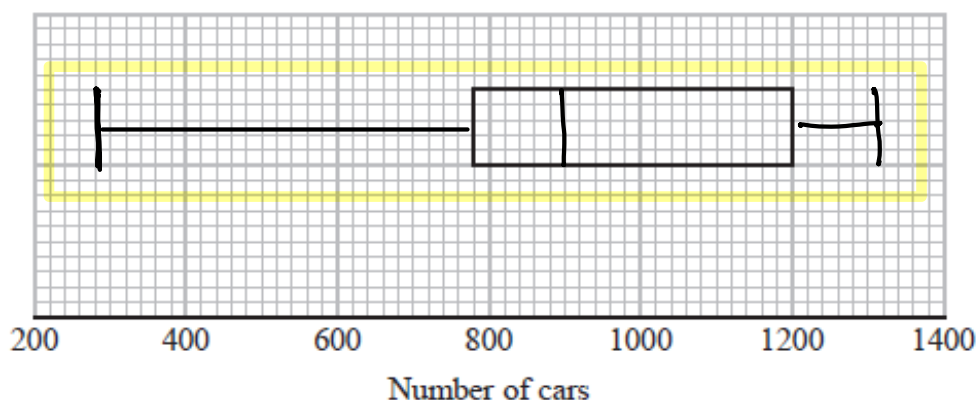
	Number of cars
Least number	300
Lower quartile	780
Median	900
Upper quartile	1200
Range	1000

3 marks for 780, 1200, median plotted and both whiskers drawn

2 marks for two of the above

1 mark for any one of the above

largest
 $= 300 + 1000$
 $= 1300$



- (a) (i) Use the information in the table to complete the box plot.
 (ii) Use the information in the box plot to complete the table.

(3)

On some of these 80 days Alice saw fewer than 1200 cars going into the village.

- (b) Work out an estimate for the number of days Alice saw fewer than 1200 cars going into the village.

$1200 \rightarrow \frac{3}{4} (75\%)$

$\frac{3}{4} \times 80 = \frac{80}{4} \times 3$
 $= 60$

1 mark

60

Final mark

(2)

(Total for Question 1 is 5 marks)

2 To cook rice

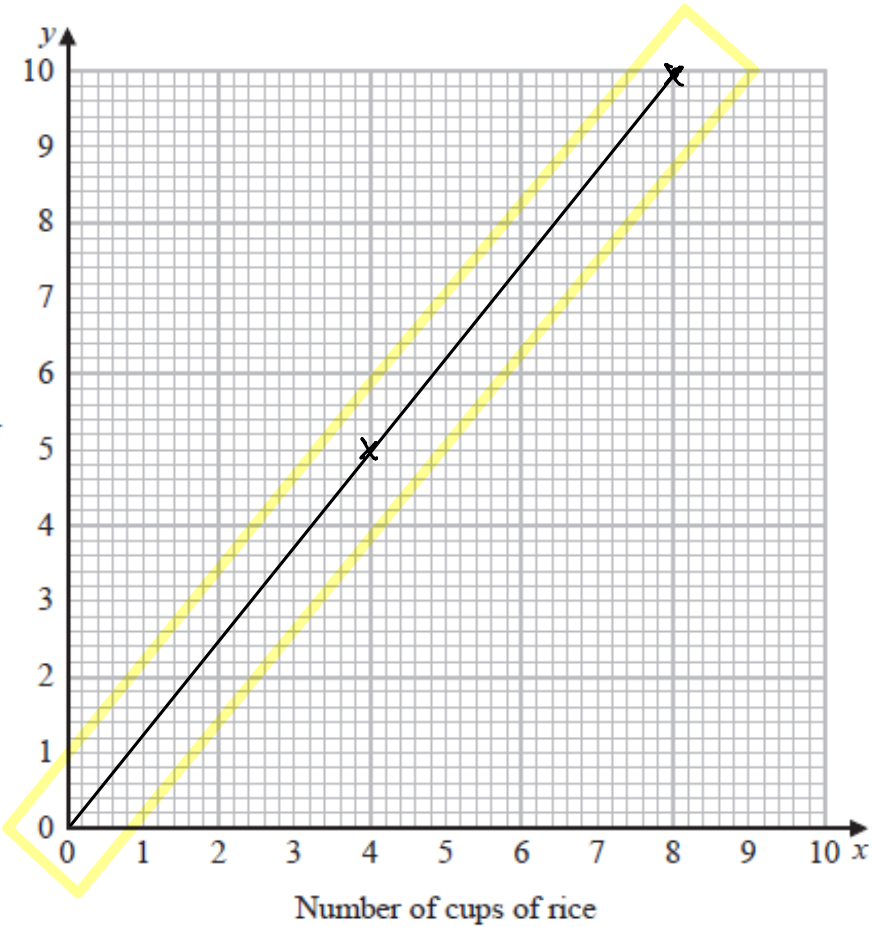
the number of cups of rice (x) : the number of cups of water (y) = 4 : 5

(a) Use this information to draw a graph to show the relationship between the number of cups of rice and the number of cups of water needed to cook rice.

$x : y$
 $4 : 5$
 $= 8 : 10$

2 marks for correct line drawn

1 mark for plotting two correct points on the line



(2)

(b) (i) Find the gradient of the line drawn in part (a).

$\frac{\text{change in } y}{\text{change in } x} = \frac{10}{8} = \frac{5}{4} = 1.25$

1.25 1 mark

(1)

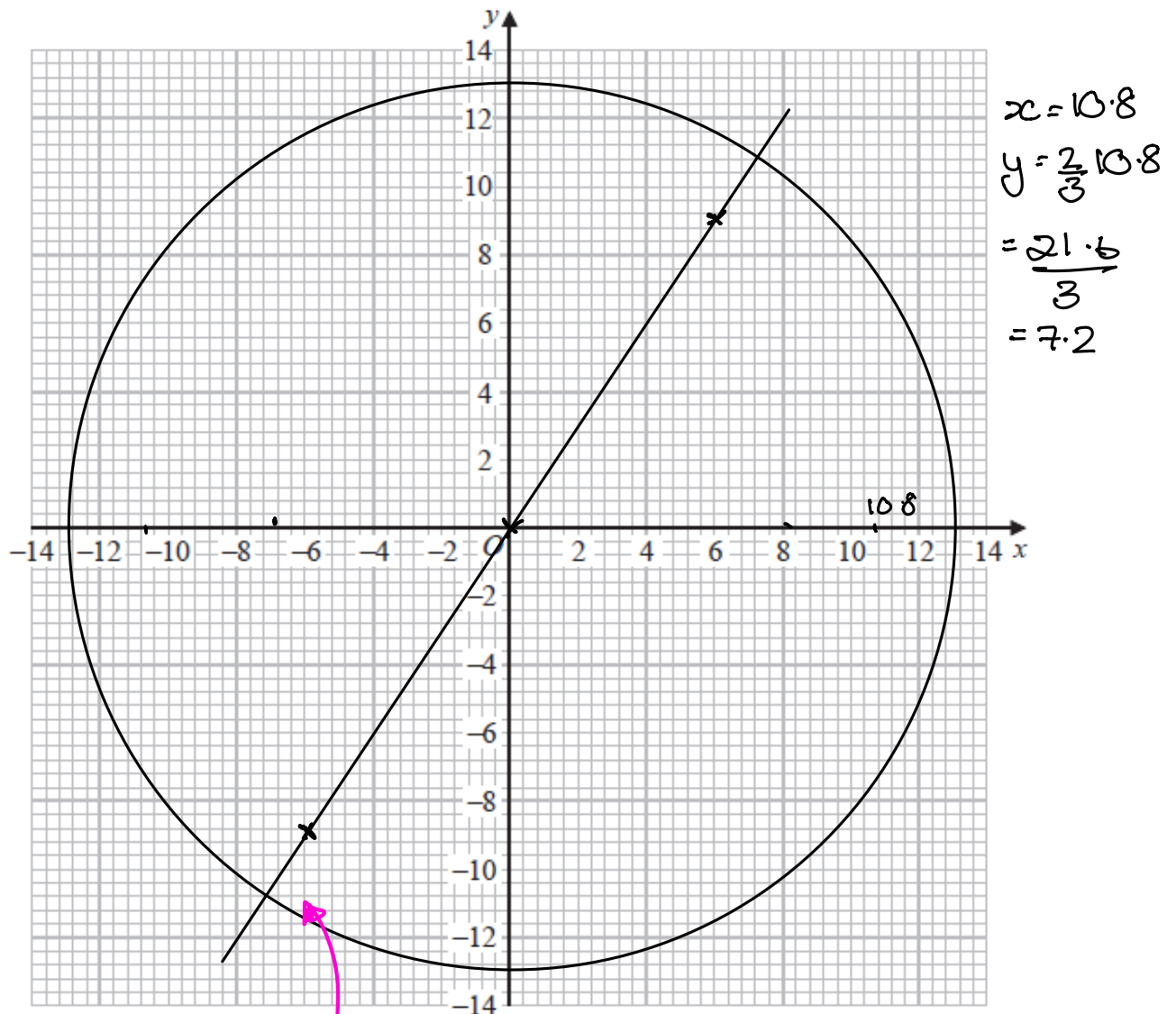
(ii) Explain what this gradient represents.

The number of cups of water for each cup of rice 1 mark

(1)

(Total for Question 2 is 4 marks)

3 (a) On the grid, draw the graph of $x^2 + y^2 = 169$



(b) Use your graph to find estimates for the solutions of the simultaneous equations

2 marks for correct circle drawn (2)

Final 2 marks for correct values given as pairs

$2y = 3x$

$y = \frac{3}{2}x$

1 mark for correct line drawn

$x^2 + y^2 = 169$

$2y = 3x$

$x = 0 \quad y = 0$

$x = -6 \quad y = -9$

$x = 6 \quad y = 9$

$x = 7.2 \quad x = -7.2$

$y = 10.8 \quad y = -10.8$

(3)

(Total for Question 3 is 5 marks)

1 mark may be awarded for both correct x values, both correct y values or one correct pair if two marks is not awarded

7 kg of carrots and 5 kg of tomatoes cost a total of 480p

cost of 1 kg of carrots : cost of 1 kg of tomatoes = 5 : 9

Work out the cost of 1 kg of carrots and the cost of 1 kg of tomatoes.

check.
 $7 \times 30 + 5 \times 54 = 210 + 270 = 480 \checkmark$

carrots : toms
 5 : 9

$$\frac{t}{c} = \frac{9}{5}$$

$$t = \frac{9}{5}c$$

1 mark.

$$7c + 5t = 480$$

$$7c + 5\left(\frac{9}{5}c\right) = 480$$

$$16c = 480$$

1 mark

$$c = \frac{480}{16} = 30$$

$$t = \frac{9}{5} \times 30 = \frac{270}{5} = 54$$

Final mark

carrots 30p

tomatoes 54p

(Total for Question 4 is 4 marks)

5 Write $\frac{3\sqrt{3}}{4-\sqrt{3}} - \frac{2}{\sqrt{3}}$ in the form $\frac{a\sqrt{3}+b}{c}$ where a , b and c are integers.

1 mark

$$\frac{3\sqrt{3}}{4-\sqrt{3}} \times \frac{4+\sqrt{3}}{4+\sqrt{3}} = \frac{12\sqrt{3} + 3\sqrt{3}\sqrt{3}}{16 + 4\sqrt{3} - 4\sqrt{3} - 3} = \frac{12\sqrt{3} + 9}{13}$$

1 mark

$$\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

1 mark

so: $\frac{12\sqrt{3} + 9}{13} - \frac{2\sqrt{3}}{3} = \frac{3(12\sqrt{3} + 9) - 13 \times 2\sqrt{3}}{39}$

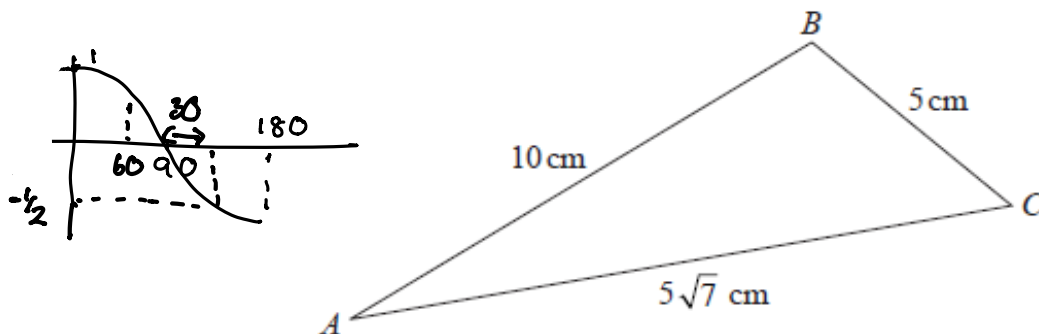
$$= \frac{36\sqrt{3} + 27 - 26\sqrt{3}}{39}$$

$$\frac{10\sqrt{3} + 27}{39}$$

Final mark

(Total for Question 5 is 4 marks)

6 Here is triangle ABC .



Find the size of angle ABC .

You must show all your working.

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$(5\sqrt{7})^2 = 10^2 + 5^2 - 2 \times 10 \times 5 \times \cos B \quad 1 \text{ mark}$$

$$\cos B = \frac{5^2 + 10^2 - (5\sqrt{7})^2}{2 \times 5 \times 10} \quad 1 \text{ mark}$$

$$= \frac{125 - 175}{100}$$

$$= \frac{-50}{100} = -\frac{1}{2} \quad 1 \text{ mark}$$

$$\text{so } 90 + 30 = 120$$

(see my graph at the top)

$$120 \quad \text{Final mark}$$

(Total for Question 6 is 4 marks)

- 7 Solid A and solid B are similar.
The ratio of the height of solid A to the height of solid B is 2 : 5
The volume of solid A is 12 cm³
Work out the volume of solid B.

	A	:	B	
height	2	:	5	
length of	$\times \frac{5}{2}$			1 mark
Volume	12	:	?	
	$12 \times \left(\frac{5}{2}\right)^3$			1 mark
	$= 12 \times \frac{125}{8} = \frac{375}{2}$			
				Final mark
				187.5 cm ³
(Total for Question 7 is 3 marks)				

- 8 The 2nd term of a geometric sequence is $3 + 2\sqrt{2}$
The 3rd term of the sequence is $13 + 9\sqrt{2}$
Find the value of the common ratio of the sequence.
Give your answer in the form $a + \sqrt{b}$ where a and b are integers.
You must show all your working.

$\frac{13 + 9\sqrt{2}}{3 + 2\sqrt{2}}$	1 mark
$= \frac{13 + 9\sqrt{2}}{3 + 2\sqrt{2}} \times \frac{3 - 2\sqrt{2}}{3 - 2\sqrt{2}}$	1 mark
$= \frac{39 - 26\sqrt{2} + 27\sqrt{2} - 18\sqrt{2}\sqrt{2}}{9 - 6\sqrt{2} + 6\sqrt{2} - 4\sqrt{2}\sqrt{2}}$	1 mark
$= \frac{39 + \sqrt{2} - 36}{9 - 8}$	
$= \frac{3 + \sqrt{2}}{1}$	
	Final mark
	$3\sqrt{2}$
(Total for Question 8 is 4 marks)	

- 9 Find the set of possible values of x for which
 $4x^2 - 25 < 0$ and $12 - 5x - 3x^2 > 0$
 You must show all your working.

$$(2x - 5)(2x + 5) < 0 \quad 1 \text{ mark}$$

$$\frac{5}{2} \quad \frac{-5}{2}$$

$$2.5 \quad \underline{\underline{-2.5}} \quad 1 \text{ mark}$$

$$-3x^2 - 5x + 12 > 0 \quad -36$$

$$4, 9$$

$$-3x^2 - 9x + 4x + 12 > 0$$

$$-3x(x + 3) + 4(x + 3) > 0$$

$$(-3x + 4)(x + 3) > 0 \quad 1 \text{ mark}$$

$$\frac{4}{3} \quad \frac{1}{3} \quad -3$$

1 mark

$$x < \frac{4}{3}$$

$$x > -3$$

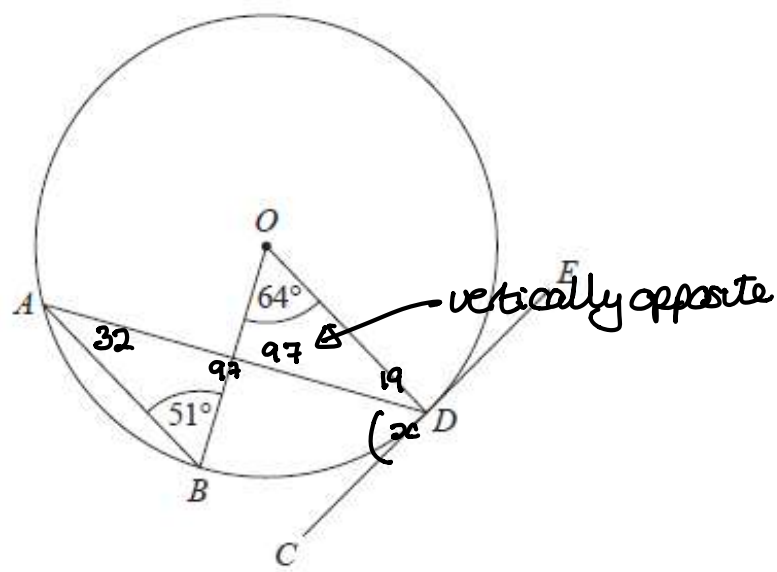
$$\text{so } -2.5 \text{ OR } -\frac{5}{2}$$

Final mark

$$-2.5 < x < \frac{4}{3}$$

(Total for Question 9 is 5 marks)

- 10 A, B and D are points on a circle with centre O .
 CDE is the tangent to the circle at D .



Work out the size of angle ADC .
 Write down any circle theorems you use.

let $ADC = x$

1 mark $\angle BAD = 32$ $\angle BOD$ angle at the centre is twice the angle at the circumference ($\angle BAD$)

$180 - (51 + 32) = 180 - 83 = 97$ angle in a triangle = 180

$\angle ODA = 180 - (97 + 64) = 180 - 161 = 19$ 1 mark

$x = 90 - 19 = 71$ angle between tangent and radius = 90°

Final mark awarded for correct reasons

71 1 mark

(Total for Question 10 is 4 marks)

TOTAL FOR PAPER IS 42 MARKS