

GCSE Mathematics (1MA1) – Aiming for Grade 6 3H

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 6 on similar questions from either the Summer 2023 or November 2023 exam sittings achieved on average 23.8 marks from these questions.

Grade	9	8	7	6	5	4	3
Mark	30.0	28.9	26.0	23.8	18.3	11.1	5.5

Answer all questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 Show that $(x-1)(x+3)(x-5)$ can be written in the form $ax^3 + bx^2 + cx + d$ where a , b , c and d are integers.

$$(x-1)(x+3) \quad 1 \text{ mark}$$
$$= x^2 + 3x - x - 3 = x^2 + 2x - 3$$

$$(x^2 + 2x - 3)(x - 5)$$

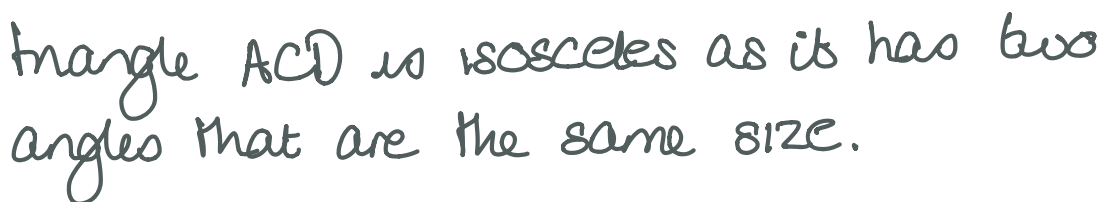
$$= x^3 - 5x^2 + 2x^2 - 10x - 3x + 15 \quad 1 \text{ mark}$$

$$= x^3 - 3x^2 - 13x + 15 \quad \text{Final mark}$$

$$\begin{aligned} \text{where } a &= 1 \\ b &= -3 \\ c &= -13 \\ d &= 15 \end{aligned}$$

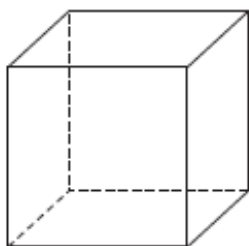
(Total for Question 1 is 3 marks)

4



(Total for Question 2 is 5 marks)

- *3 The diagram shows a solid cube placed on a horizontal table.



$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

$$A = \frac{F}{p}$$

The pressure on the table due to the cube is 3.5 newtons/cm^2

The force exerted by the cube on the table is 504 newtons.

Show that the total surface area of the cube is less than 900 cm^2

$$p = 3.5 \text{ n/cm}^2$$

$$F = 504 \text{ N}$$

$$A = A$$

$$\text{Area} = \frac{504}{3.5} \quad 1 \text{ mark}$$

$$= 144 \text{ cm}^2$$

$$\text{Total surface area} = 144 \times 6 \quad 1 \text{ mark}$$

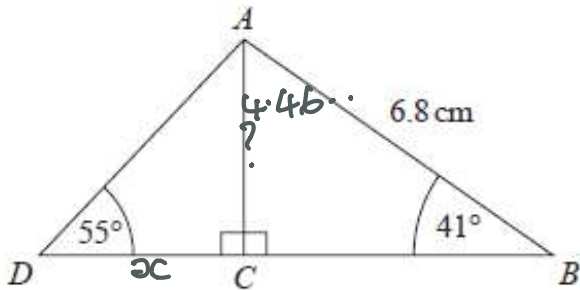
$$= 864 \text{ cm}^2$$

$$864 \text{ cm}^2 < 900 \text{ cm}^2$$

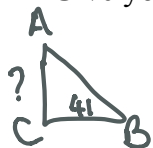
Final mark

(Total for Question 3 is 3 marks)

- 4 ABD is a triangle.
 C is a point on BD .



Work out the length of DC .
 Give your answer correct to 1 decimal place.

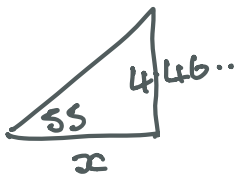


$$\sin 41 = \frac{AC}{6.8}$$

1 mark

$$AC = 6.8 \times \sin 41$$

$$= 4.46120 \dots$$



1 mark

$$\tan 55 = \frac{4.46 \dots}{x}$$

$$x = \frac{4.46 \dots}{\tan 55}$$

$$= 3.1237 \dots$$

Final mark

$$= 3.1 \text{ (1dp)} \dots \text{ cm}$$

Range accepted 3.1 to 3.2 (Total for Question 4 is 3 marks)

- *5 Lava flows from a volcano at a constant rate of $11.9 \text{ m}^3/\text{s}$
 How many days does it take for $67\,205\,600 \text{ m}^3$ of lava to flow from the volcano?
 Give your answer correct to the nearest day.

1 mark

$$67205600 \div 11.9 = 5\,647\,529.412 \text{ seconds}$$

1 mark for
 dividing by 86400
 OR sight of
 '86400'

$$\begin{array}{l} \div 60 \text{ minutes} \\ \div 60 \text{ hours} \\ \div 24 \text{ days} \end{array}$$

$$= 65.36492 \dots$$

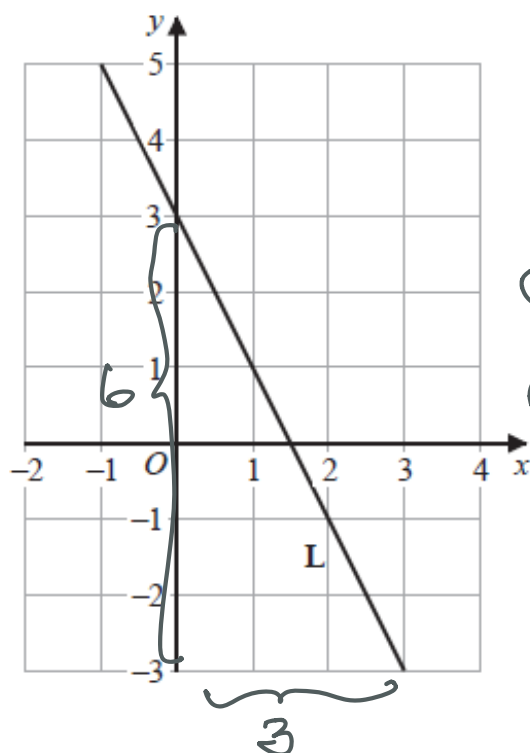
65 nearest day

Final mark

$$65 \dots \text{ days}$$

(Total for Question 5 is 3 marks)

- *6 The line **L** is shown on the grid.



1 mark

y intercept = 3

gradient

$$= -\frac{6}{3} = -2$$

1 mark

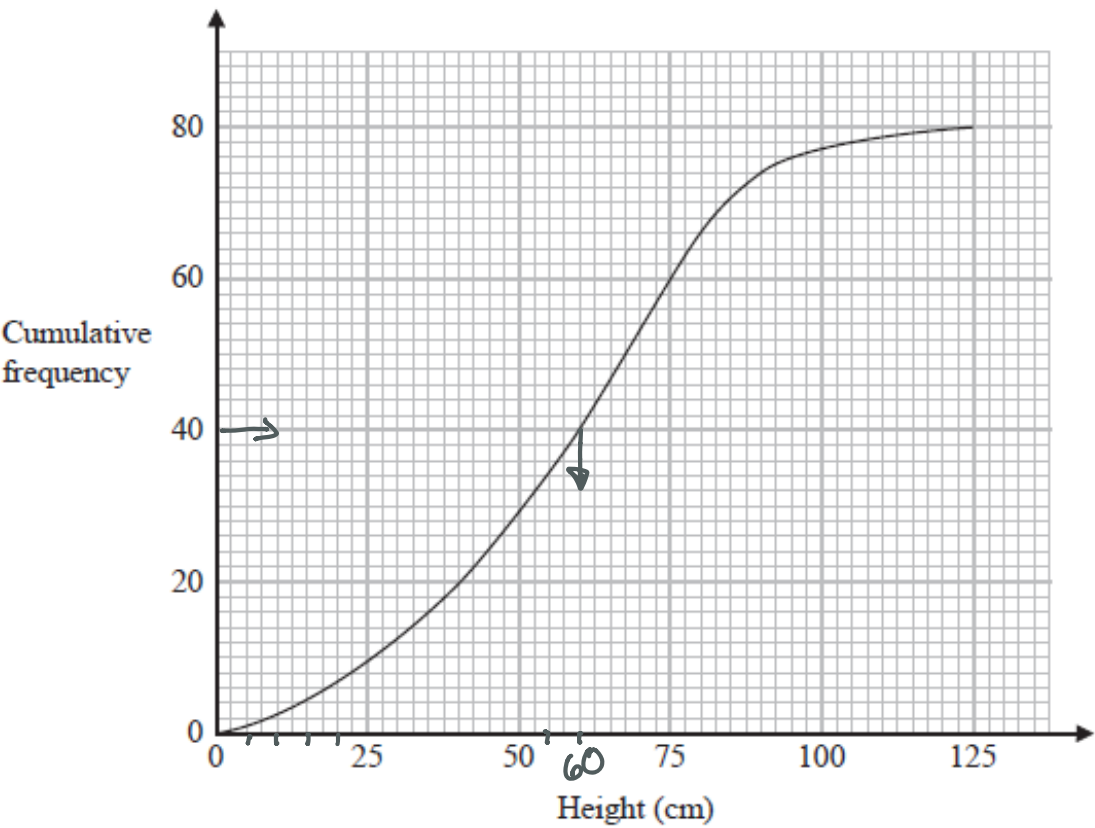
Find an equation for **L**.

Final mark

$$y = -2x + 3$$

(Total for Question 6 is 3 marks)

- 7 Alan grew 80 plants of the same type outside.
The cumulative frequency graph shows information about the heights, in cm, of these plants.



Use the graph to find an estimate for the median height.

1 mark

60

..... cm

Range accepted 58.5 to 61.5 (Total for Question 7 is 1 mark)

- 8 Write $x^2 - 8x + 3$ in the form $(x - a)^2 - b$ where a and b are integers.
1 mark

$$(x-4)^2-16+3$$

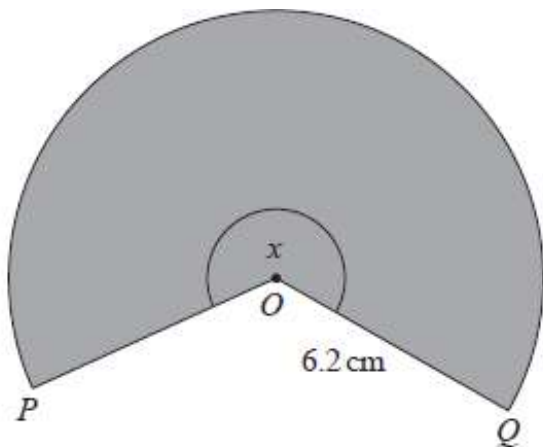
so $(x-4)^2-13$

Final mark

$$(x-4)^2-13$$

(Total for Question 8 is 2 marks)

9 The diagram shows a shaded sector POQ of a circle with centre O and radius 6.2 cm.



The area of the shaded sector is 82.6 cm²
 Calculate the size of angle x .
 Give your answer correct to 3 significant figures.
 1 mark

$$\frac{x}{360} \times \pi \times 6.2^2 = 82.6$$

$$x = \frac{82.6 \times 360}{\pi \times 6.2^2} = 246.2347...$$

246

Final mark

Answers accepted in the range 246 to 247

(Total for Question 9 is 2 marks)

*10 A and B are numbers such that

$$A = 2^2 \times 3^4 \times 7$$

$$B = 3^2 \times 7^2$$

Find the highest common factor (HCF) of A and B .

$$A = 2 \times 2 \times \boxed{3} \times \boxed{3} \times 3 \times 3 \times \boxed{7}$$

$$B = \quad \quad \boxed{3} \times \boxed{3} \quad \quad \times \boxed{7} \times 7$$

$$\begin{aligned} \text{HCF} &= 3 \times 3 \times 7 \\ &= 9 \times 7 \\ &= 63 \end{aligned}$$

1 mark

63

(Total for Question 10 is 1 mark)

- *11 Work out the greatest integer that satisfies the inequality

$$5y - 7 < 16$$

$$\begin{array}{r} +7 \quad +7 \\ 5y < 23 \end{array}$$

1 mark

$$y < \frac{23}{5}$$

$$y < 4.6$$

$$4$$

Final mark

(Total for Question 11 is 2 marks)

- 12 Prove algebraically that $0.1\dot{2}\dot{3}$ can be written as $\frac{61}{495}$

$$\begin{array}{r} 100x = 12.323... \\ x = 0.1232323... \\ \hline \end{array}$$

1 mark. Accept 10x, 1000x etc

$$99x = 12.2$$

1 mark

$$x = \frac{12.2}{99}$$

$$\frac{12.2}{99} = \frac{122}{990}$$

$$\frac{122}{990} = \frac{61}{495}$$

Final mark

(Total for Question 12 is 3 marks)

TOTAL FOR PAPER IS 31 MARKS