GCSE
MATHEMATICS

H

Higher Tier   Paper 2 Calculator

8300/2H

**Thursday 4 June 2020   Morning**

Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]

For this paper you must have:
- a calculator
- mathematical instruments.
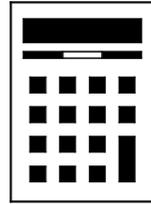
INSTRUCTIONS

- Use black ink or black ball-point pen. Draw diagrams in pencil.

- Answer ALL questions.

- You must answer the questions in the spaces provided. Do not write on blank pages.

- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).

- Do all rough work in this book. Cross through any work you do not want to be marked.

INFORMATION

- **The marks for questions are shown in brackets.**

- **The maximum mark for this paper is 80.**

- **You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.**

ADVICE

In all calculations, show clearly how you work out your answer.

DO NOT TURN OVER UNTIL TOLD TO DO SO

Answer ALL questions in the spaces provided.

1   **Which of these is a correct identity?**

Circle your answer. [1 mark]

$x + 4x \equiv 5x$ $6x \equiv 18$

$2x + 1 \equiv 7$ $7x + 9 \equiv x$

2

9 cm

20°

5 cm

5 cm

20°

9 cm
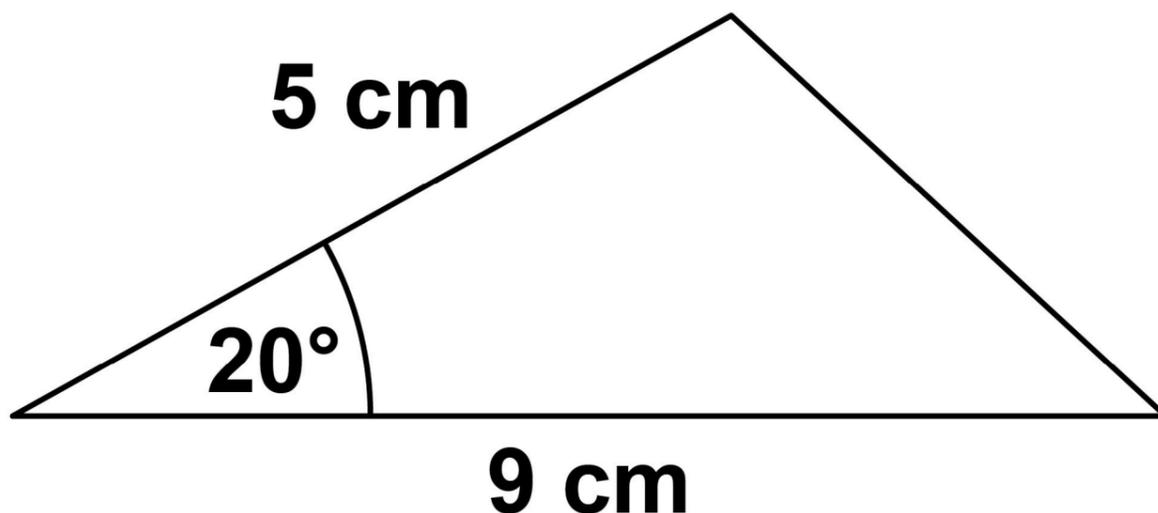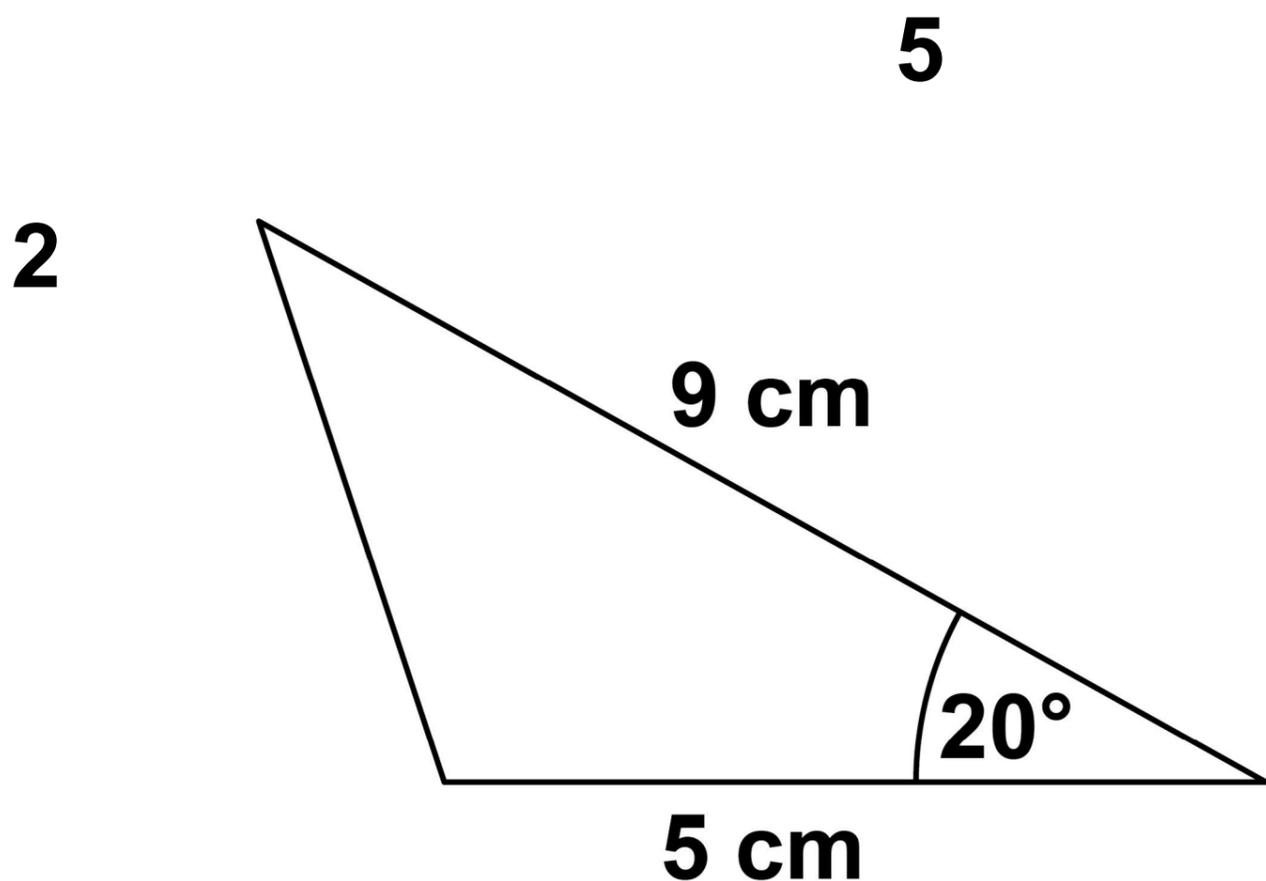
The diagrams are not drawn accurately.

Circle the reason why these triangles are congruent. [1 mark]

RHS   ASA   SSS   SAS

[Turn over]

3   **Circle the number that is written in standard form. [1 mark]**

0.9×10^{-3} $6 \times 10^{0.5}$

5.2×10^{-4} 12×10^{7}

4   **Circle the expression that has the LARGEST value when** $a < -1$
[1 mark]

$\frac{1}{2}a$ a a^{2} a^{3}

4

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[Turn over]

5   The time students spent watching TV was recorded.

The table shows the average daily time per student each year from 2012 to 2019

| Year	Time (minutes)
2012	157
2013	148
2014	138
2015	124
2016	113
2017	100
2018	90
2019	82

A time series graph, on page 9, is drawn to represent the data.

The first four points have been plotted.

5 (a) Complete the graph. [2 marks]

Time (minutes)

Year
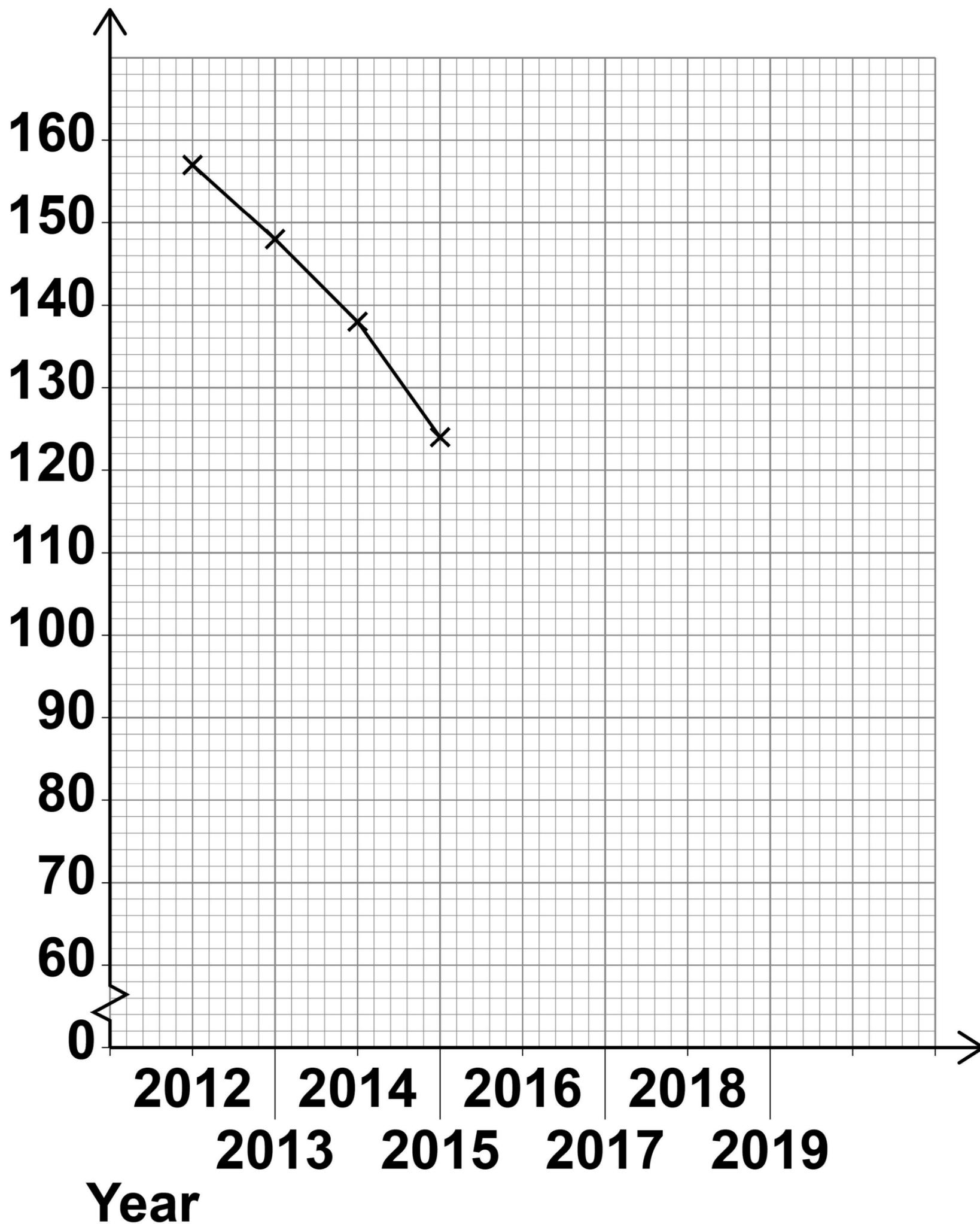
[Turn over]

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5 (b) **Use the graph, on page 9, to estimate the average daily time per student in 2020 [1 mark]**

_____

_____

_____

Answer _____minutes

[Turn over]

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6 **Work out the highest common factor (HCF) of 75 and 105 [2 marks]**

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Answer _____

[Turn over]

5

7   **Here is the graph of**
   $y = x^2 - 7x + 10$ **for values of** x
   from 0 to 7
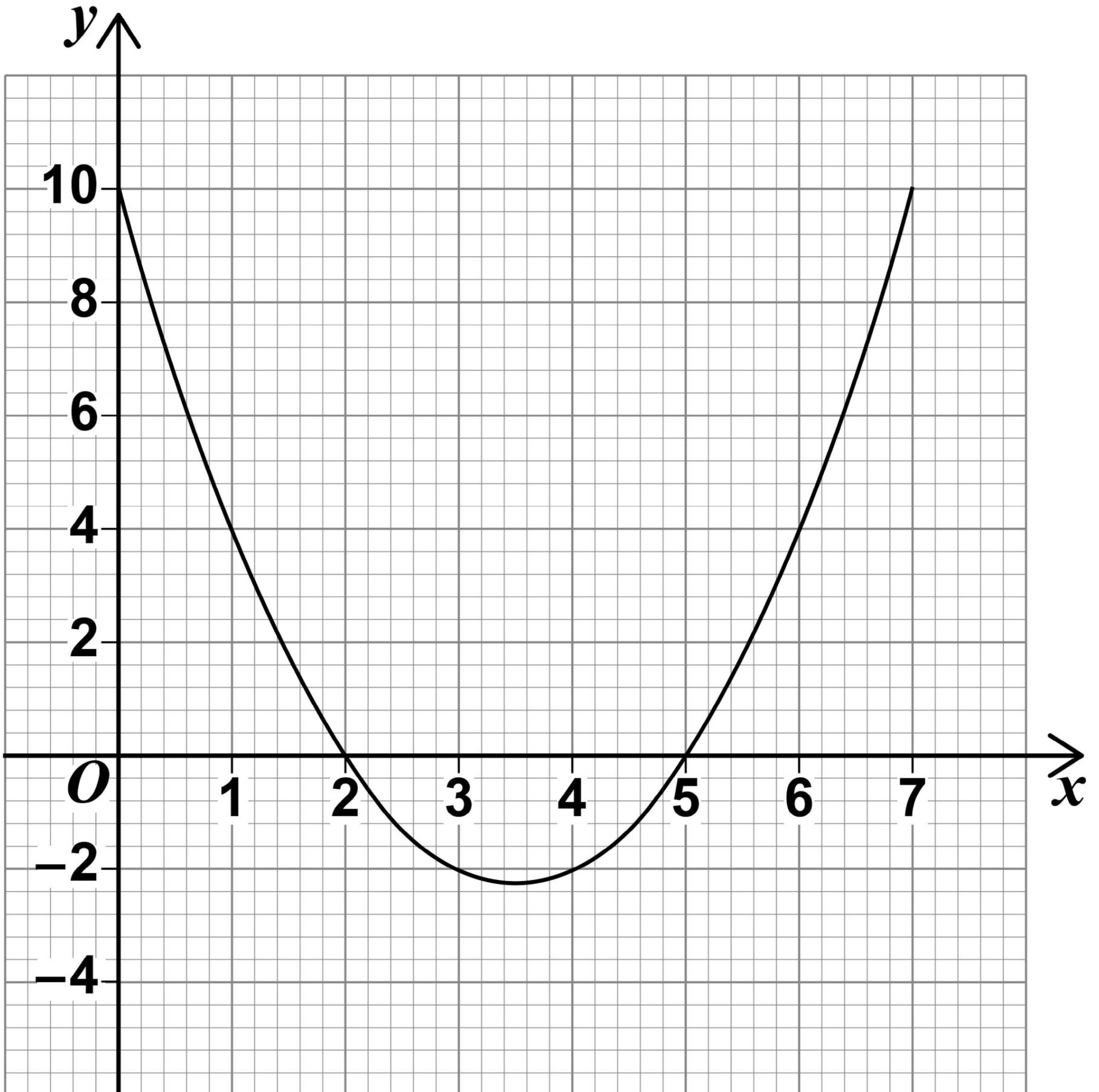
7 **(a)** Write down the roots of

$x^2 - 7x + 10 = 0$ **[2 marks]**

Answer _____

7 **(b)** Write down the x-coordinate of the turning point of the curve. **[1 mark]**

_____

_____

Answer _____

[Turn over]

8   **At a party there are 90 people.**

48 are women and 42 are men.

Some women leave.

Some men arrive.

The ratio of women to men is now 10 : 11

Are there now more than 90 people at the party?

Tick ONE box.

☐ **Yes**

☐ **No**

☐ **Cannot tell**

Show working to support your answer. [2 marks]

_____

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[Turn over]

5

9   **Here is a cuboid.**

      The diagram is not drawn accurately.

5 cm

5 cm

y **cm**
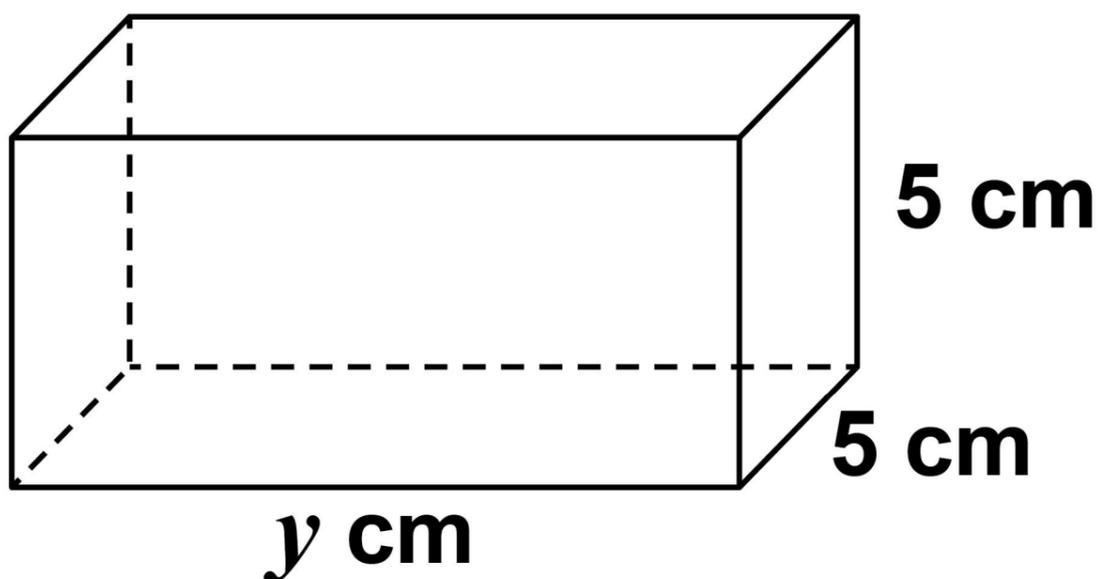
9   **(a)** **Assume that the total surface area of the cuboid is 200 cm^2**

      Work out the volume of the cuboid.
[3 marks]

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Answer _____ cm^3

[Turn over]

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9 (b) In fact, the total surface area of the cuboid is smaller than 200 cm^2

What does this mean about the volume of the cuboid?

Tick ONE box. [1 mark]

☐ It is smaller than the answer to part (a)

☐ It is bigger than the answer to part (a)

☐ It is the same as the answer to part (a)

☐ It could be any of the above

[Turn over]

4

**10** **Alex and Bev sat six tests, each with 50 marks.**

The table shows their mean percentages after five tests.

Alex	60%
Bev	52%

After all six tests, their mean percentages were equal.

In the sixth test, Alex scored 24 out of 50

Work out Bev's score, out of 50, in the sixth test. [4 marks]

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Answer _____ **out of 50**

[Turn over]

11 A solid piece of silver has

mass 2.625 kilograms

volume 250 cm^3

Work out the density of the piece
of silver.

Give your answer in grams per cubic
centimetre. [2 marks]

_____

_____

_____

_____

Answer _____ g/cm^3

12 **Work out the gradient of the straight line through (–2, 3) and (1, 9)**
[2 marks]

_____

_____

_____

_____

Answer _____

[Turn over]

8

13 **The diagram shows a wall.**

The diagram is not drawn accurately.

2.8 m

2.1 m
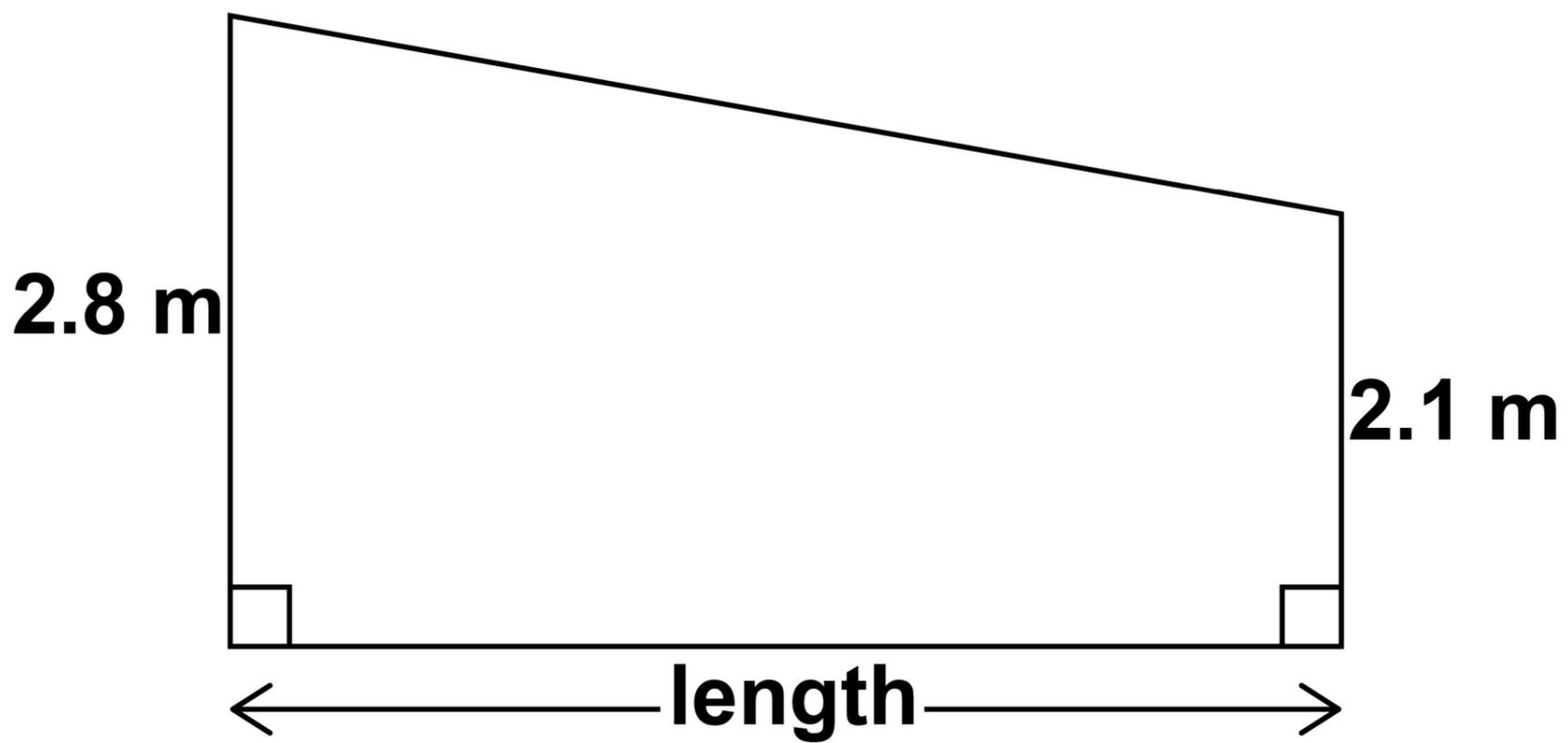
←———————length———————→

The area of the wall is 39.2 m^2

Work out the length of the wall.
[3 marks]

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Answer _____ **m**

[Turn over]

14 **A marathon takes place each year.**

In 2020 there were 6500 runners.

> **PREDICTION**
>
> **For each of the next 3 years the number of runners will increase by 5%**

Does this predict that in 2023 there will be more than 7500 runners?

You MUST show your working.
[3 marks]

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[Turn over]

6

15 Rearrange $a = \dfrac{b}{c} + 5$ to make c the subject. **[3 marks]**

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Answer _____

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[Turn over]

16 **On a restaurant menu there are**

22 main dishes, of which $\dfrac{4}{11}$ are gluten-free

7 rice dishes, which are all gluten-free

5 naan breads, of which 40% are gluten-free.

This Meal Deal is on the menu.

Choose one main dish, one rice dish and one naan bread

How many of the possible Meal Deals are totally gluten-free? [3 marks]

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Answer _____

[Turn over]

| 6 |

17   **The cumulative frequency graph, on the opposite page, shows information about the masses of 200 apples.**

17 (a)   **Estimate the median mass. [1 mark]**

           Answer _____ **grams**

Cumulative frequency

Mass, grams
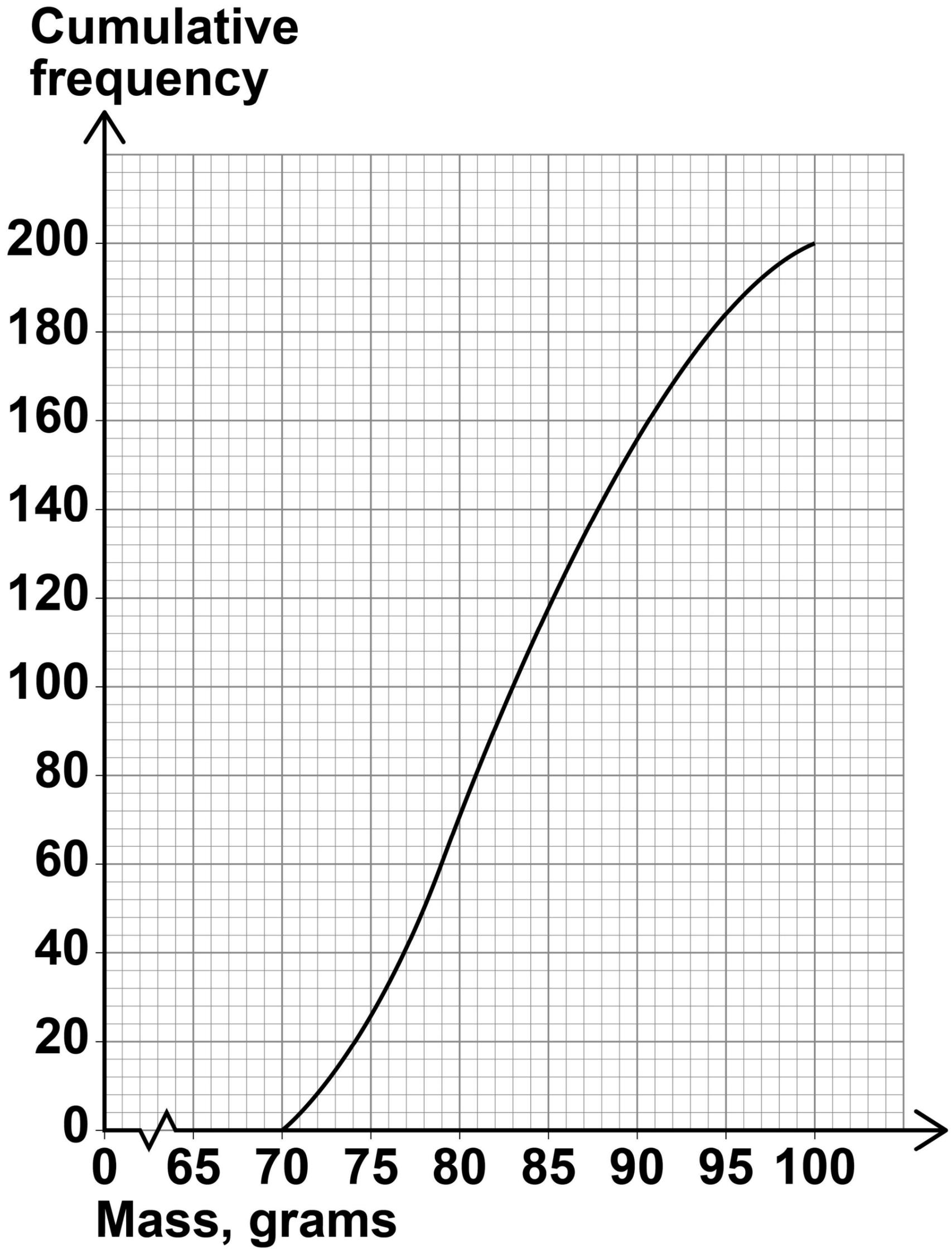
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17 (b) Apples with mass 90 grams or less cost 32p each.

Apples with mass more than 90 grams cost 39p each.

Estimate the TOTAL cost of the 200 apples. [3 marks]

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Answer £ _____

[Turn over]

4

18 **This shape is made from two right-angled triangles and a rectangle.**

The diagram is not drawn accurately.
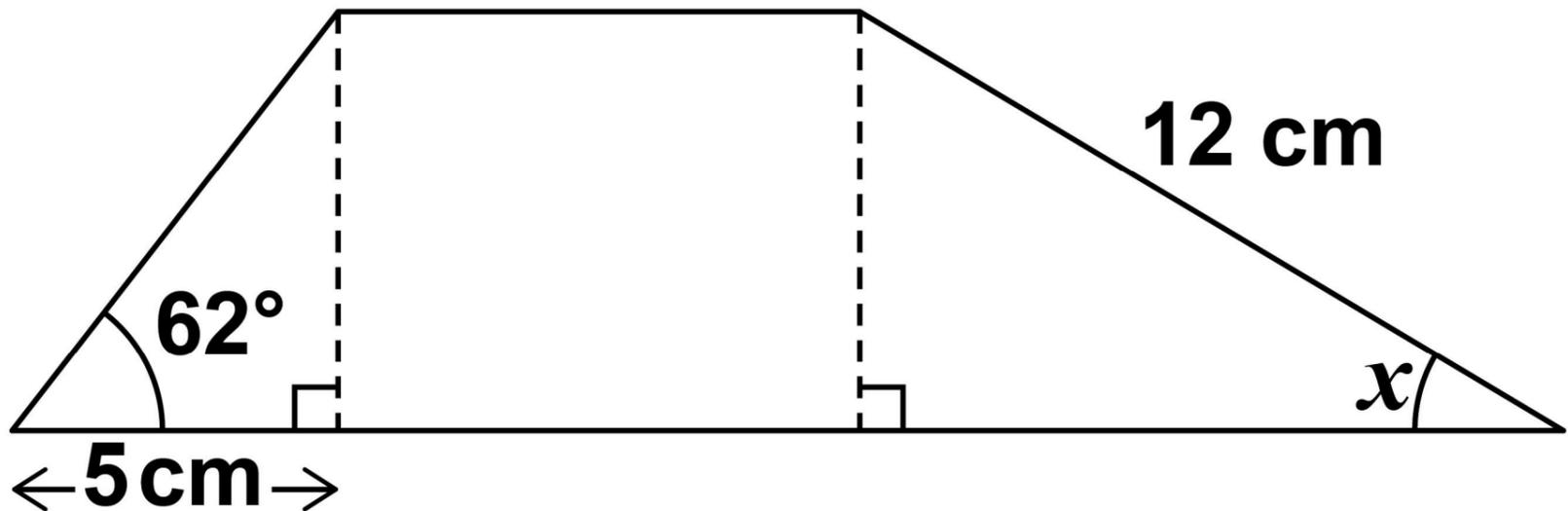
Work out the size of angle x.
[4 marks]

_____

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Answer _____ **degrees**

[Turn over]

19 a and b are positive values.

Show that $\dfrac{7a + 2b - 3a}{8a + 6b + 2a - b}$ always

simplifies to the same value.
[3 marks]

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7

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[Turn over]

20 *AB*, *BC*, *CD* and *DE* are four of the sides of a regular decagon.

The diagram is not drawn accurately.
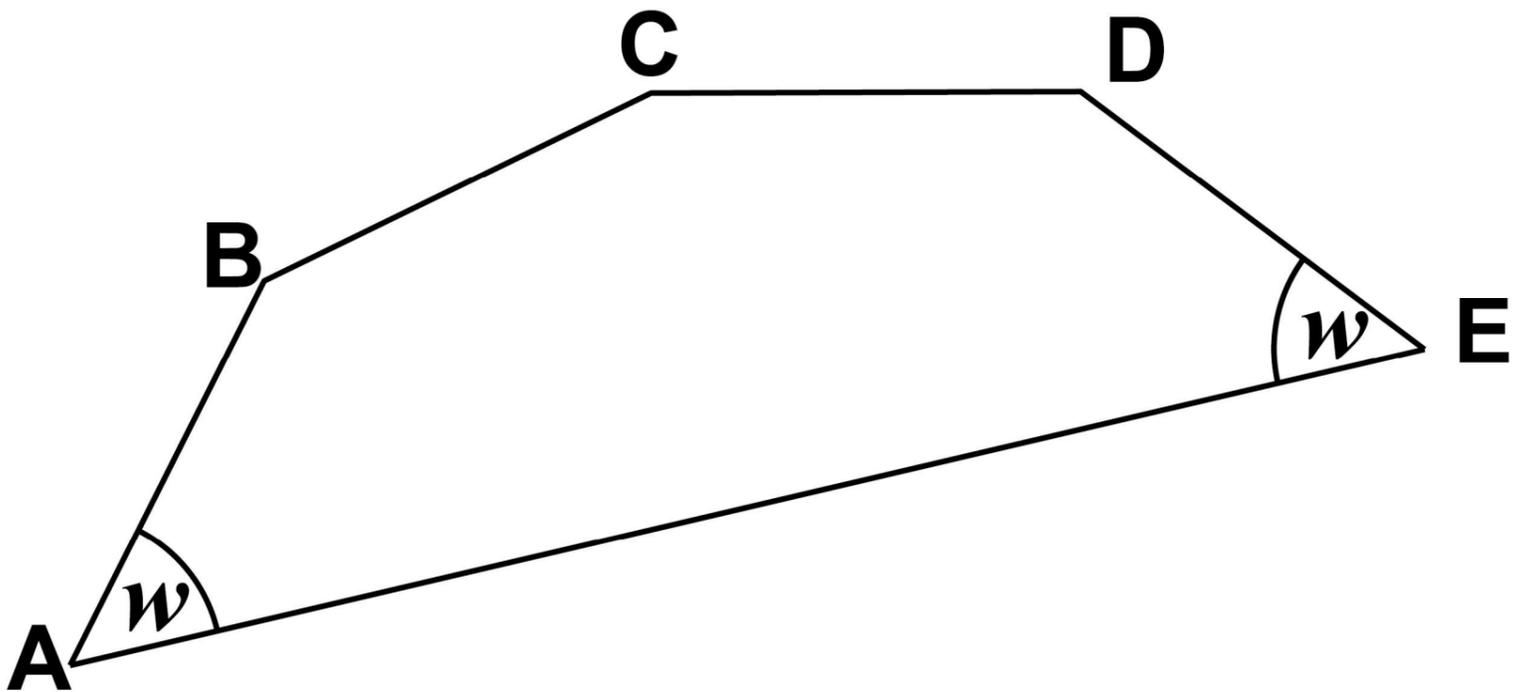
Work out the size of angle *w*.
[3 marks]

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Answer _____ **degrees**

[Turn over]

21 (a) Circle the point that is on the graph
of $y = \dfrac{1}{x}$ [1 mark]

(–1, 1)   (0.3, 3)

(0.8, 0.2)   (2.5, 0.4)

21 (b) Leo wants to draw the graph of
$y = 2^x$ for values of x from 0 to 4

Here is his graph, on the
opposite page.

Make one criticism of his graph.
[1 mark]

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$y = 2^x$

5
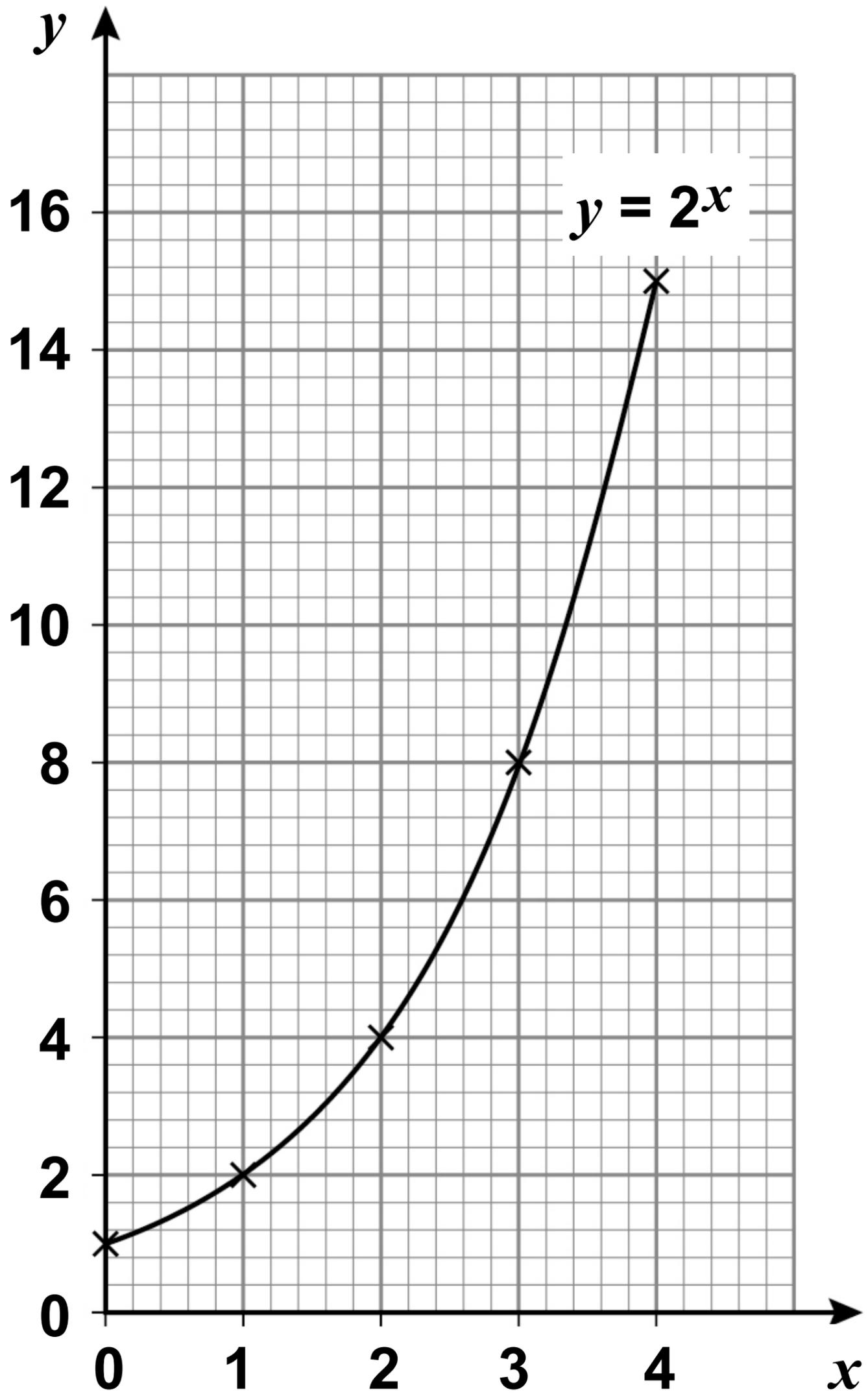
22 One of these is the graph of $y = 1 + \sin x$ for
$0° \leqslant x \leqslant 360°$

Circle the letter above the correct graph. [1 mark]

A

B

D

C
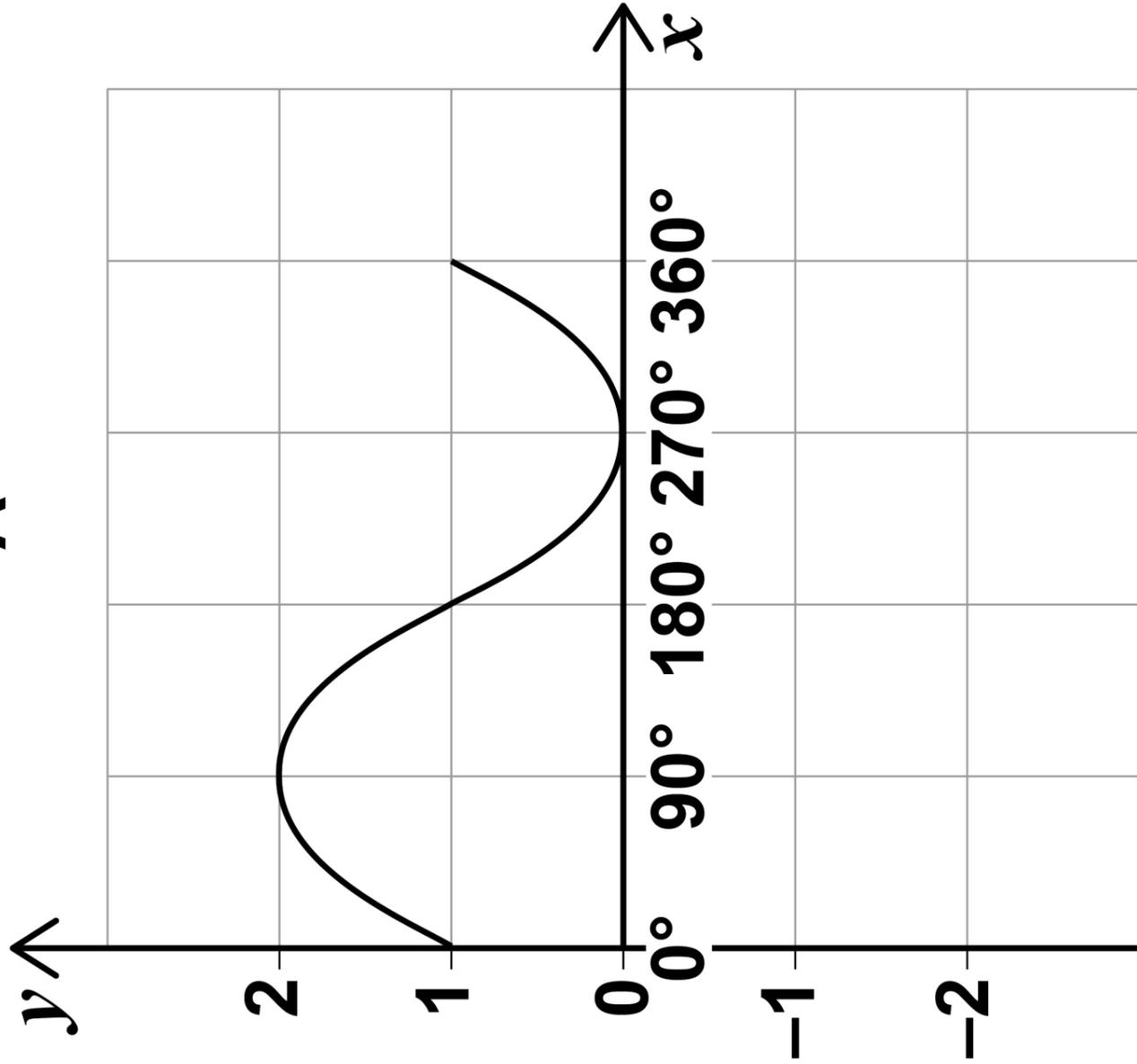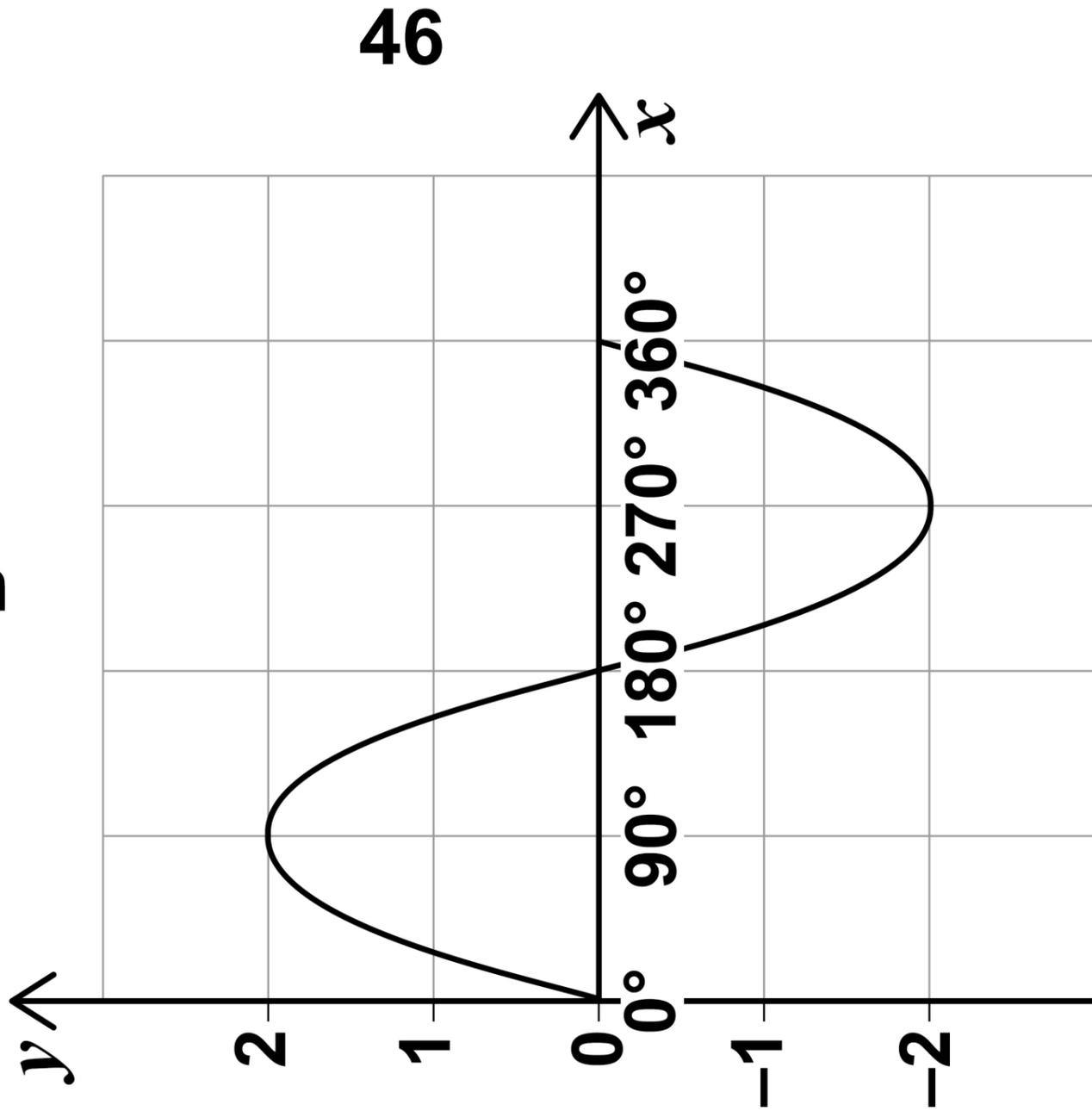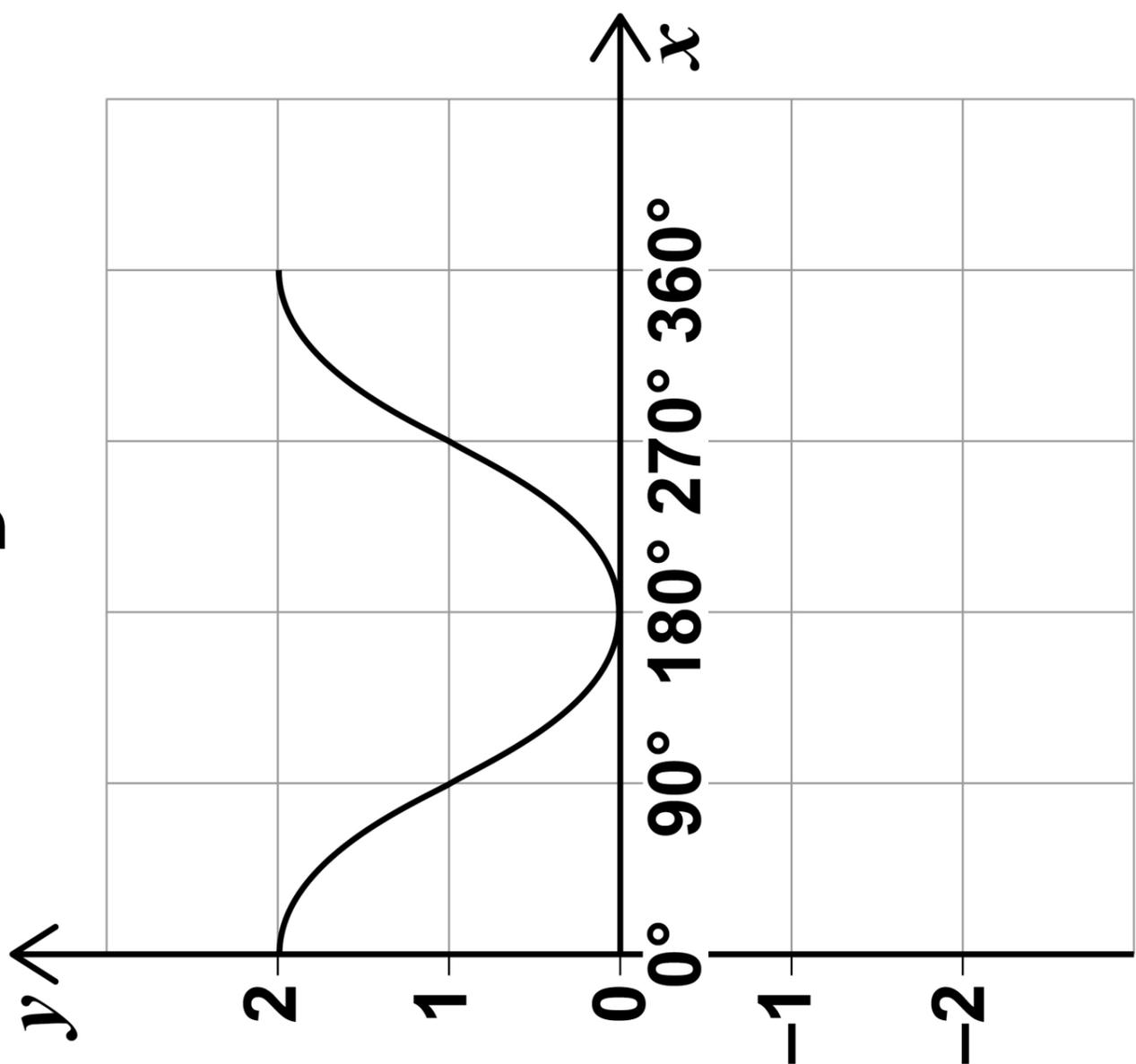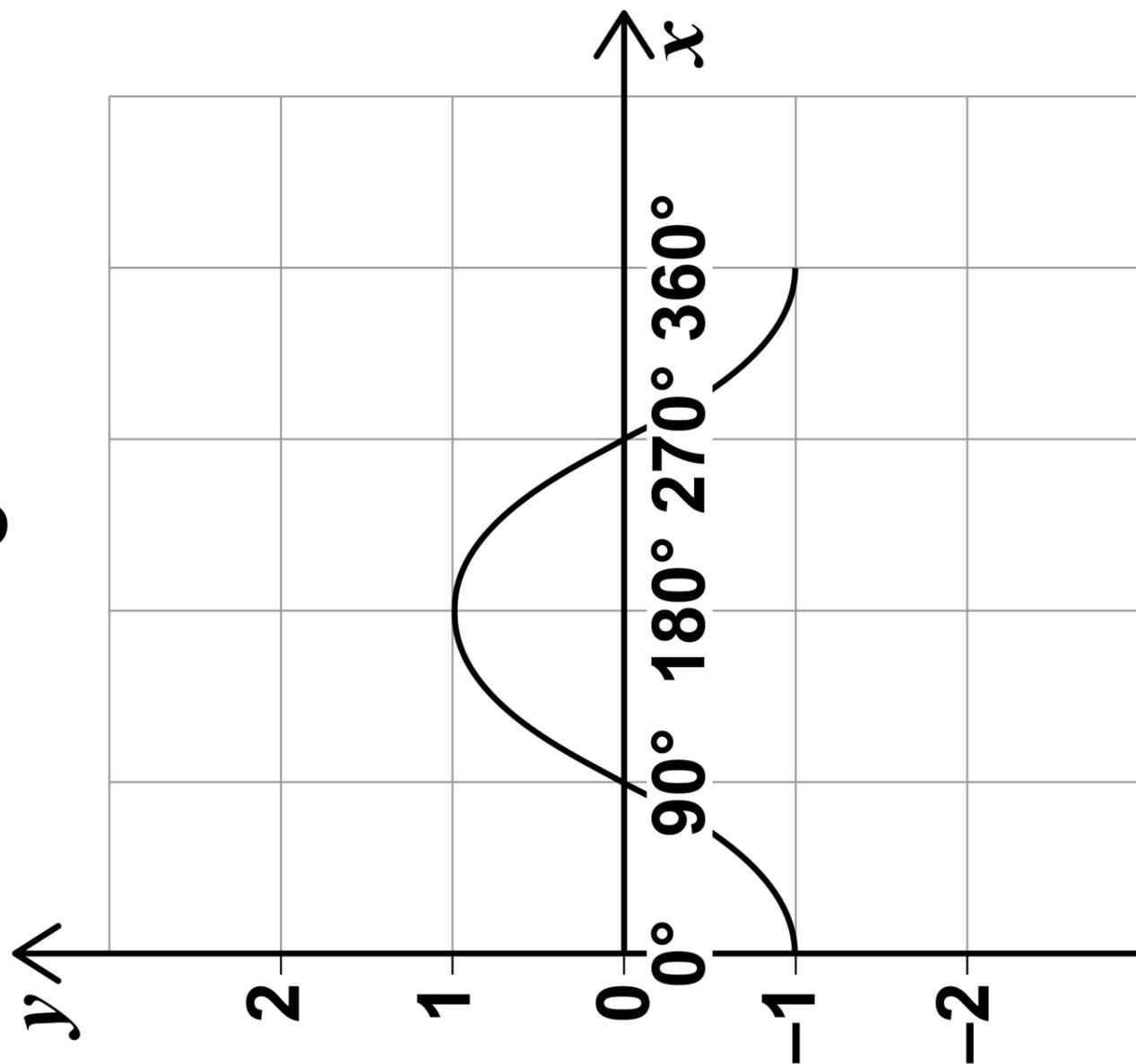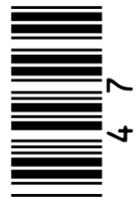
23 **Right-angled triangle *ABC* is the cross section of a prism.**

AB = 5 cm   BC = 12 cm

M is the midpoint of CF.

AM = 16 cm

The diagram is not drawn accurately.

Work out the volume of the prism.
[4 marks]

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Answer _____ cm^3

5
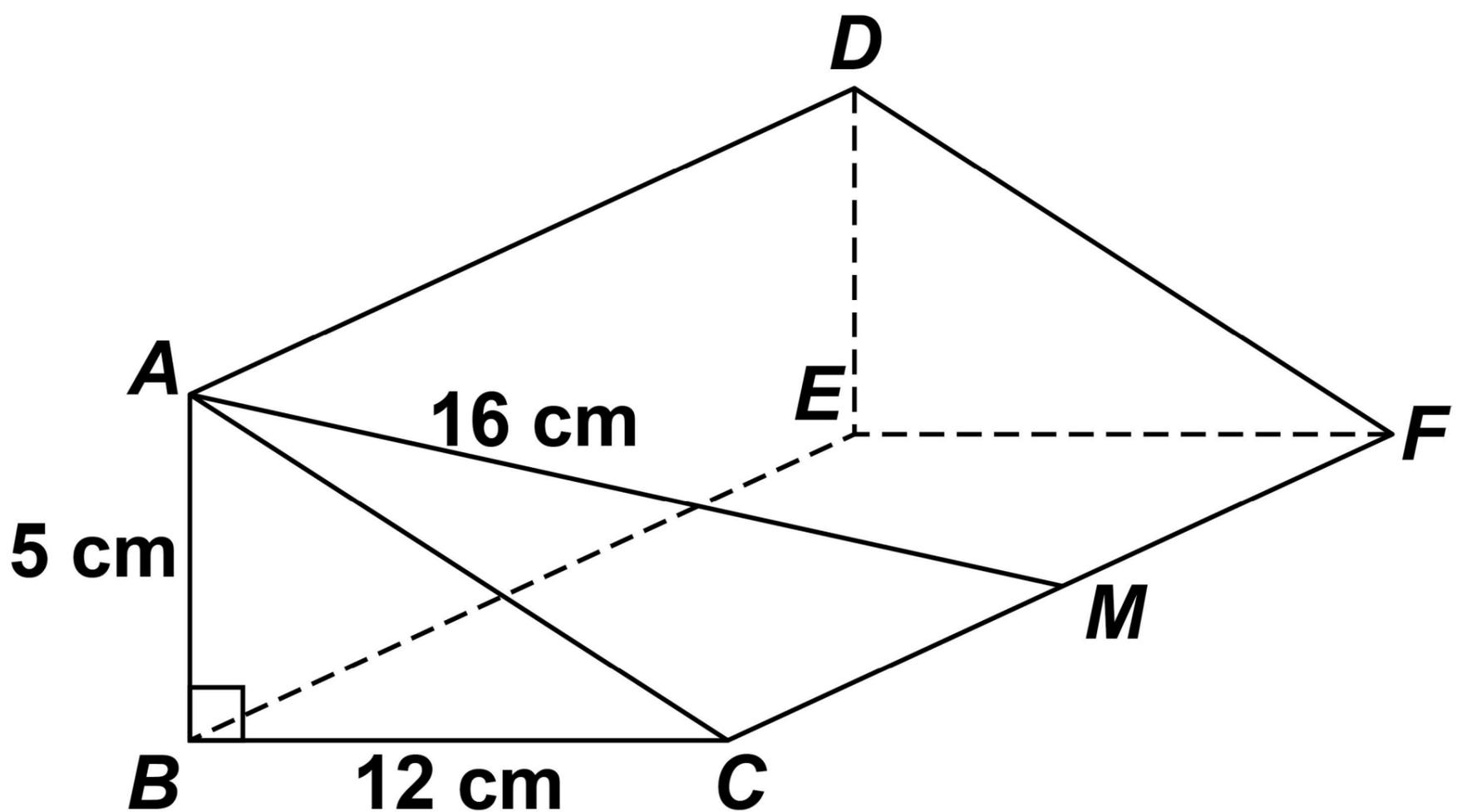
**24**   **Quadrilateral *ABCD* is shown.**
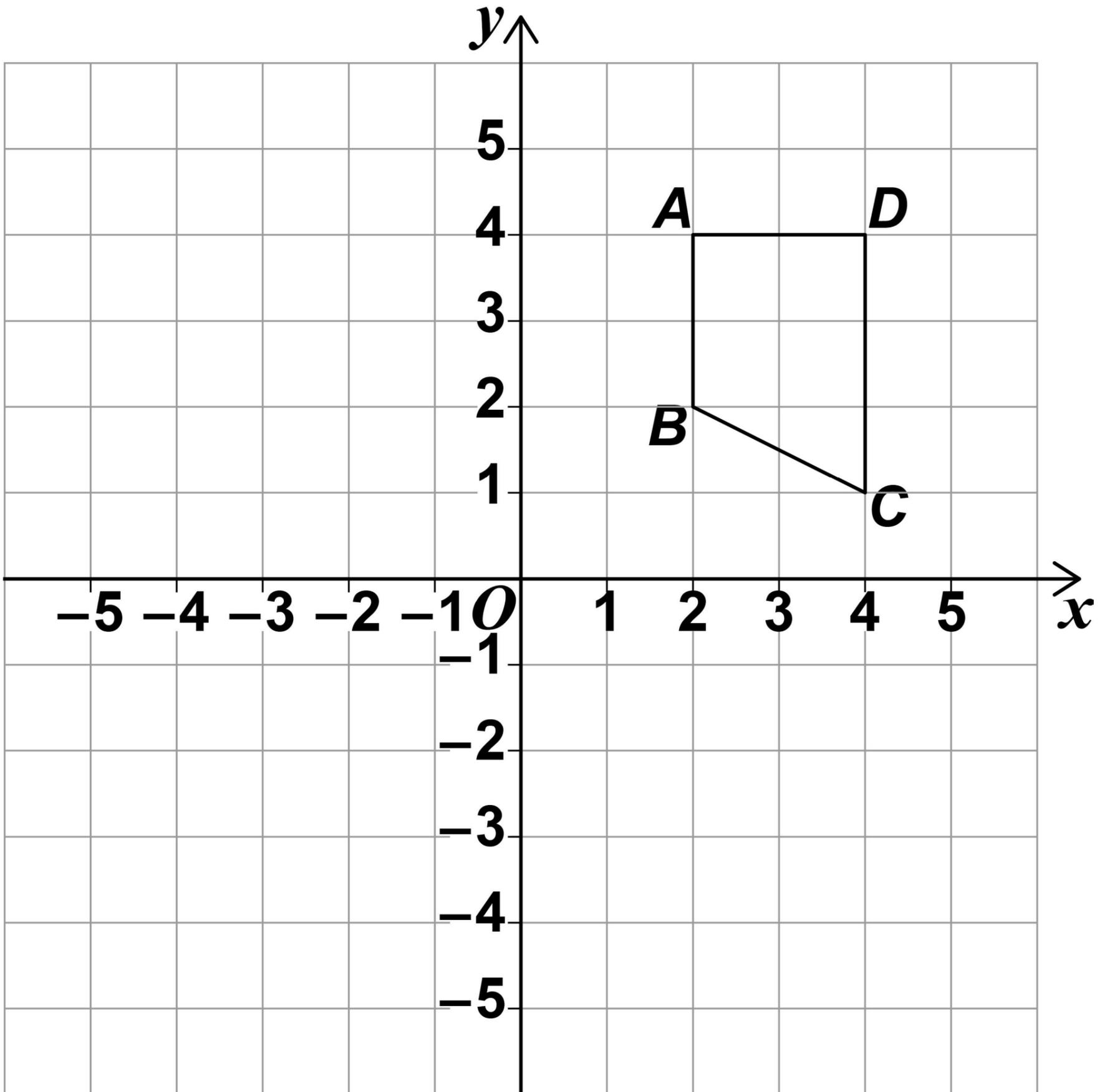
24 (a) **Work out the coordinates of *C* when *ABCD* is**

rotated 90° clockwise about *O* then

translated by $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$

[2 marks]

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Answer (_____ , _____)

[Turn over]

24 (b) Triangle *PQR* is shown.
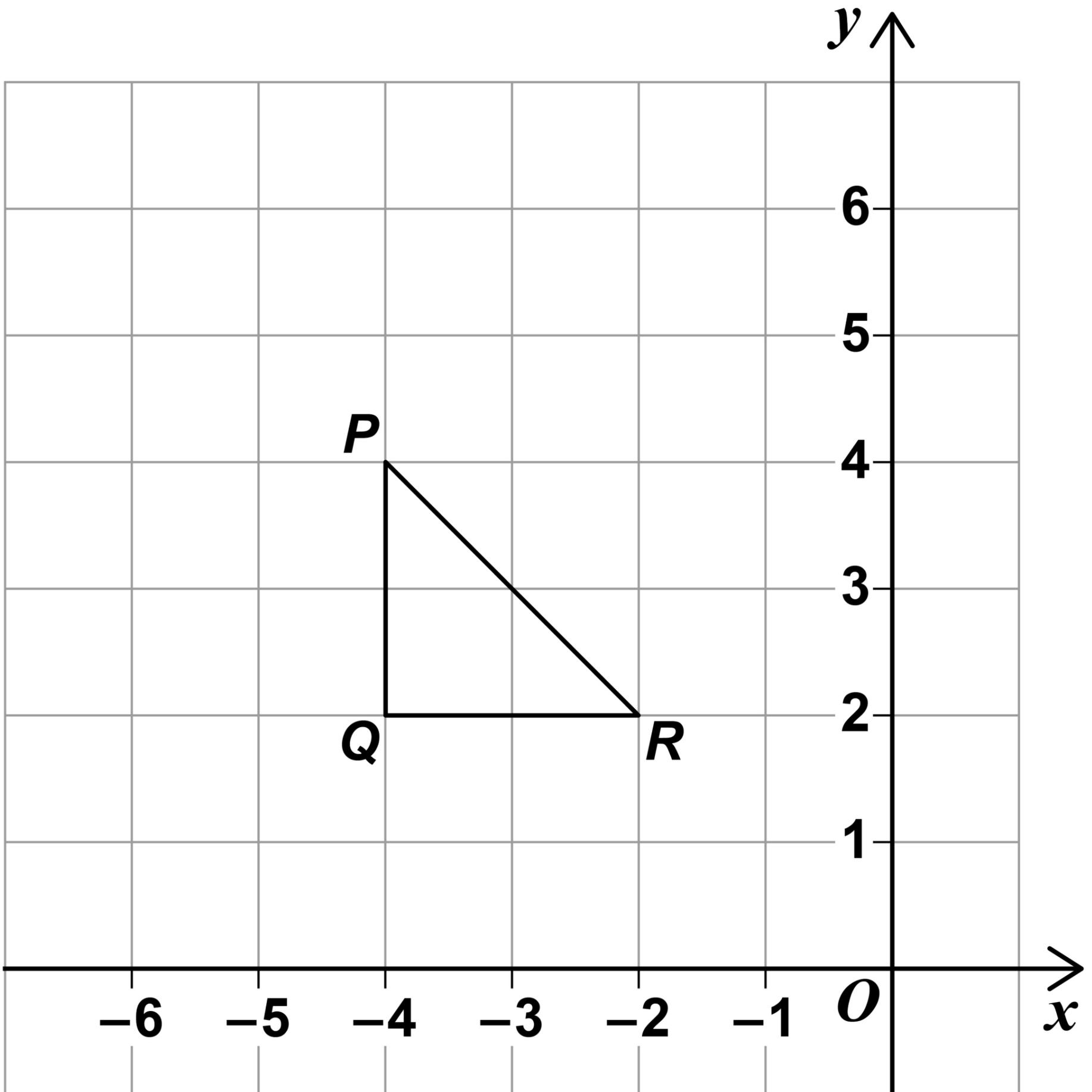
When *PQR* is reflected in a line, *P* AND *R* are invariant points.

Circle the equation of the line.
[1 mark]

$y = x + 6$ $y = -x$

$y = 2$ $x = -4$

25 Factorise $3x^2 + 11x - 20$ [2 marks]

_____

_____

_____

Answer _____

5

26 **Edith's van can safely carry a maximum load of 920 kilograms.**

She wants to use her van to carry

30 sacks of potatoes, each of mass 25 kilograms to the nearest kilogram

and

**20 sacks of carrots, each of mass 7.5 kilograms to 1 decimal place.**

Can she definitely use her van safely in one journey?

You MUST show your working.
[4 marks]

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[Turn over]

27 These 20 discs are in a bag.

(11) (11) (11) (11)

(22) (22) (22) (22) (22) (22)

(33) (33) (33) (33) (33) (33) (33)

(44) (44) (44)

Two of the discs are taken at random from the bag.

Work out the probability that the first disc has a SMALLER number than the second disc. [4 marks]

_____

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8

Answer _____

28 A horse runs in a field.

The speed-time graph, on the opposite page, represents the first 12 seconds of the run.

After how many seconds had the horse run a distance of 75 metres? [3 marks]

Answer _____ seconds

Speed (metres per second)

Time (seconds)

29 **Solve** $\dfrac{5}{4x+1} = \dfrac{2x}{x^2+3}$

Give your solutions to 3 significant figures.

You MUST show your working.
[5 marks]

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Answer _____

END OF QUESTIONS

8

Additional page, if required.

Write the question numbers in the left-hand margin.

Additional page, if required.

Write the question numbers in the left-hand margin.

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