Surname _____

Forename(s) _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

I declare this is my own work.

# GCSE

# MATHEMATICS H

## Higher Tier Paper 2 Calculator

## 8300/2H

**Monday 3 June 2024 Morning**

**Time allowed: 1 hour 30 minutes**

**[Turn over]**

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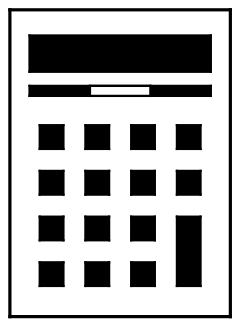
**On the front of this book, write your surname and forename(s), your centre number, your candidate number and add your signature.**

**MATERIALS**

**For this paper you must have:**



- **a calculator**
- **mathematical instruments**
- **the Formulae Sheet (enclosed).**

**INSTRUCTIONS**

- **Use black ink or black ball-point pen. Draw diagrams in pencil.**
- **Answer ALL questions.**

**[Turn over]**

- **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.**

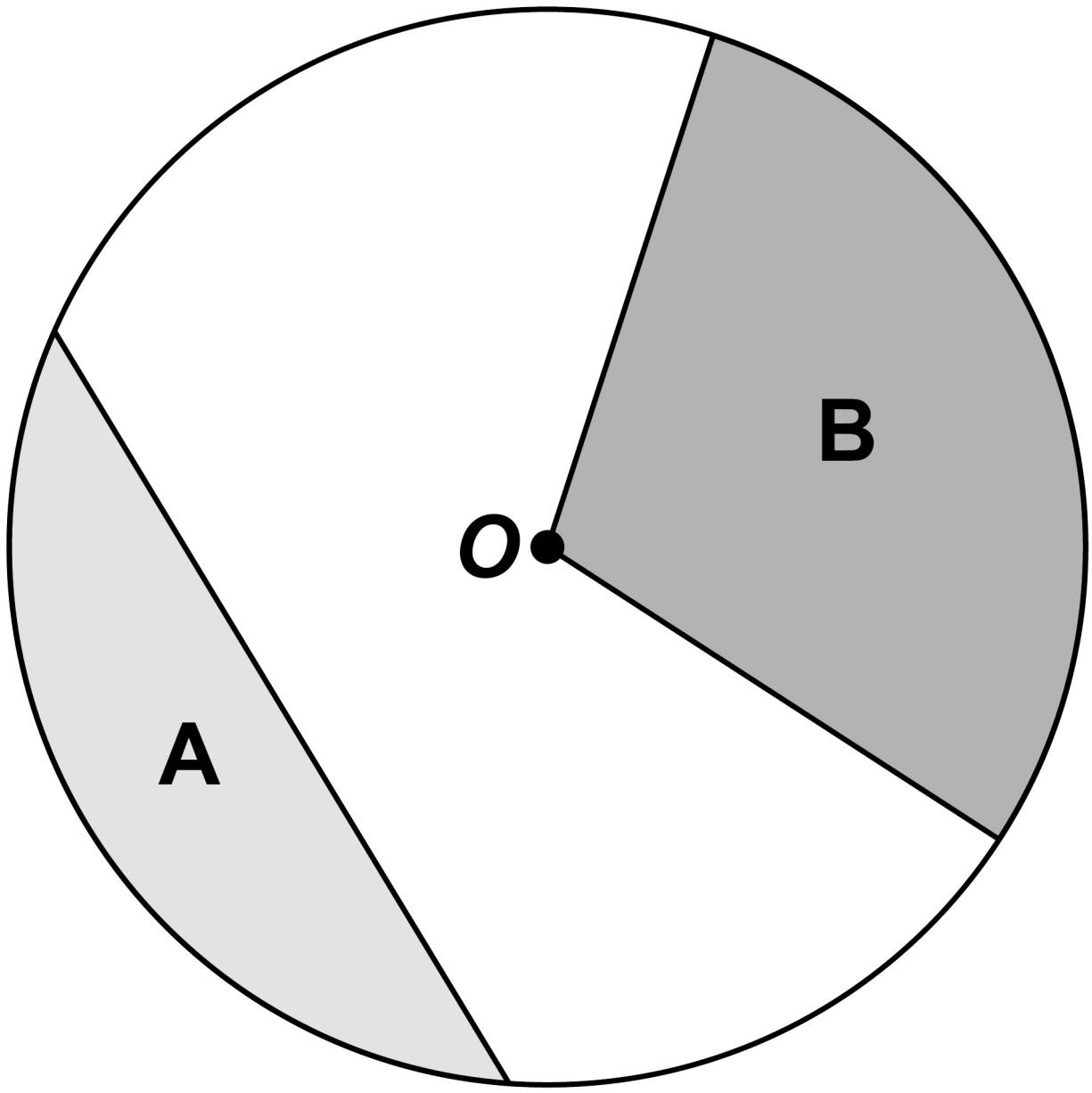
**ADVICE**

**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** **The diagram shows a circle, centre *O*, and three straight lines.**



**Use ONE word to describe each shaded region.**

**Choose from**

- **arc**
- **chord**
- **sector**
- **segment**
- **tangent**

**[2 marks]**

**Region A** _____

**Region B** _____

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2 The mass of an iceberg is
2 200 000 kg

This value is a 12% reduction from the ORIGINAL mass of the iceberg.

Work out the ORIGINAL mass of the iceberg.

Give your answer in standard form.
[3 marks]

Answer _____ kg

3 A chef has a tub of blueberries.

She wants to

- use all the blueberries
- put the same number of blueberries on each dessert.

$$D = \frac{k}{b}$$

$D$ is the number of desserts.

$b$ is the number of blueberries on each dessert.

3(a) What does the constant $k$ represent?

Tick the correct box. [1 mark]

☐ The number of blueberries in the tub

☐ The number of desserts

☐ The number of blueberries on each dessert

☐ None of the above

3(b) Complete the table. [2 marks]

| | | | |
|---|---|---|---|
| $b$ | 2 | 6 | |
| $D$ | 120 | | 30 |

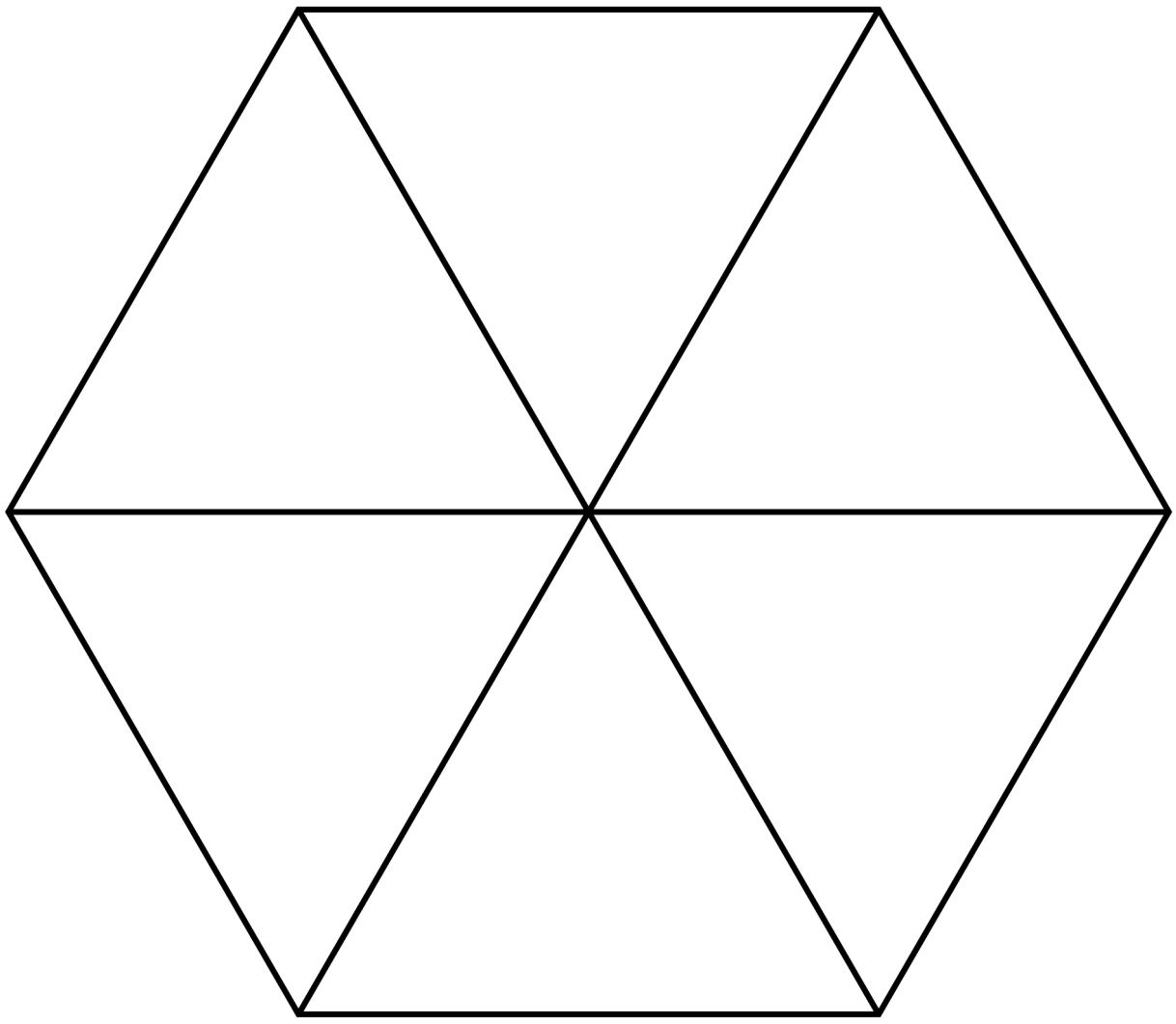
4 (a) A fair spinner has six equal sections, each with the number 5, 6, 7 or 8

Each number appears at least once.

P(even number) = P(7)

Work out P(5)

You may use the blank spinner, on the opposite page, to help you. [3 marks]



**Answer** _____

**4(b)** **A different spinner has ten sections, each labelled A, B, C or D.**

| | A | B | C | D |
|---|---|---|---|---|
| **PROBABILITY** | **0.1** | **0.5** | **0.2** | **0.3** |

**Give ONE reason why there MUST be a mistake in the table. [1 mark]**

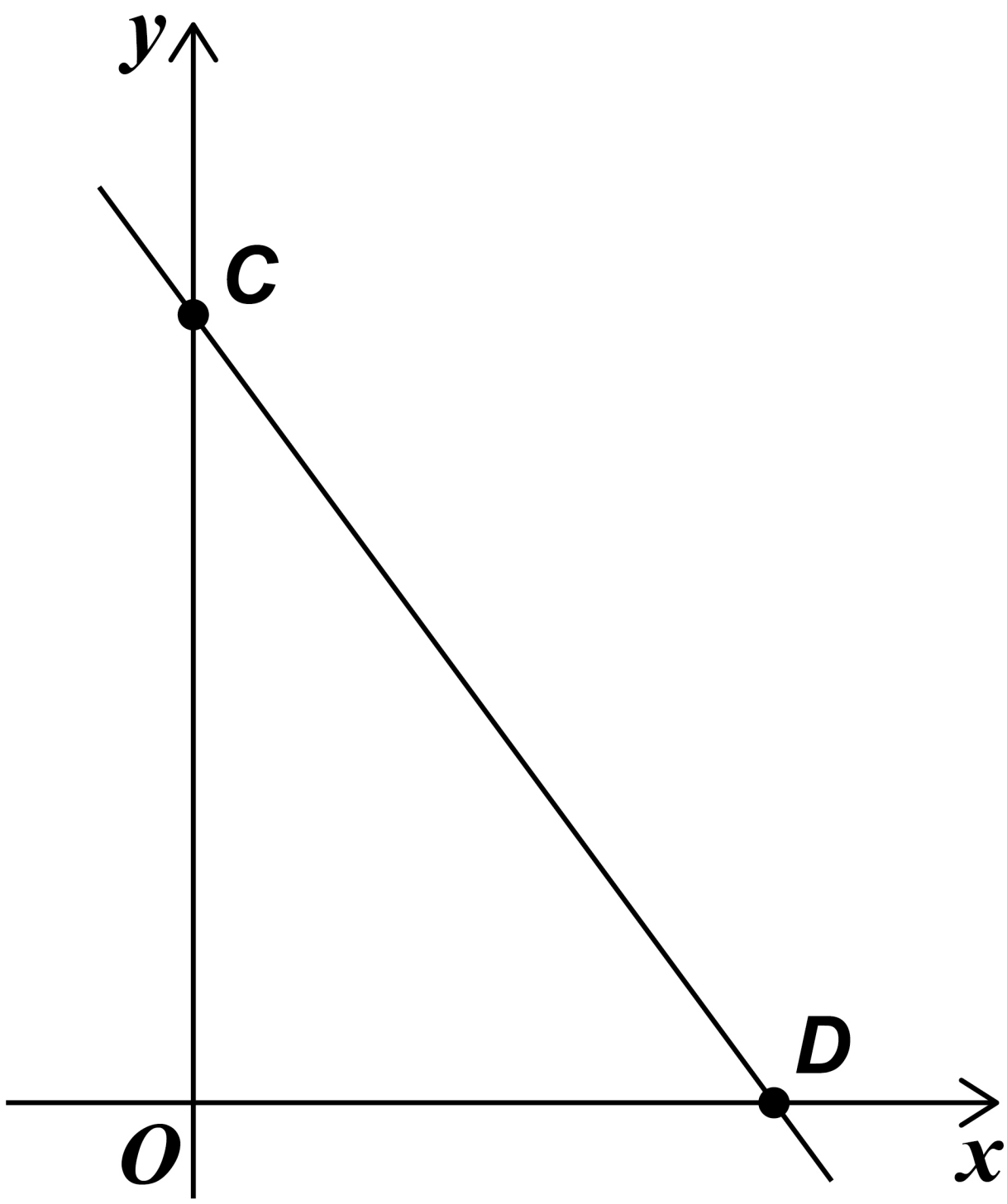
_____

_____

_____

**7**

**5(a)** **Here is a sketch of the graph $y = -2x + 6$**

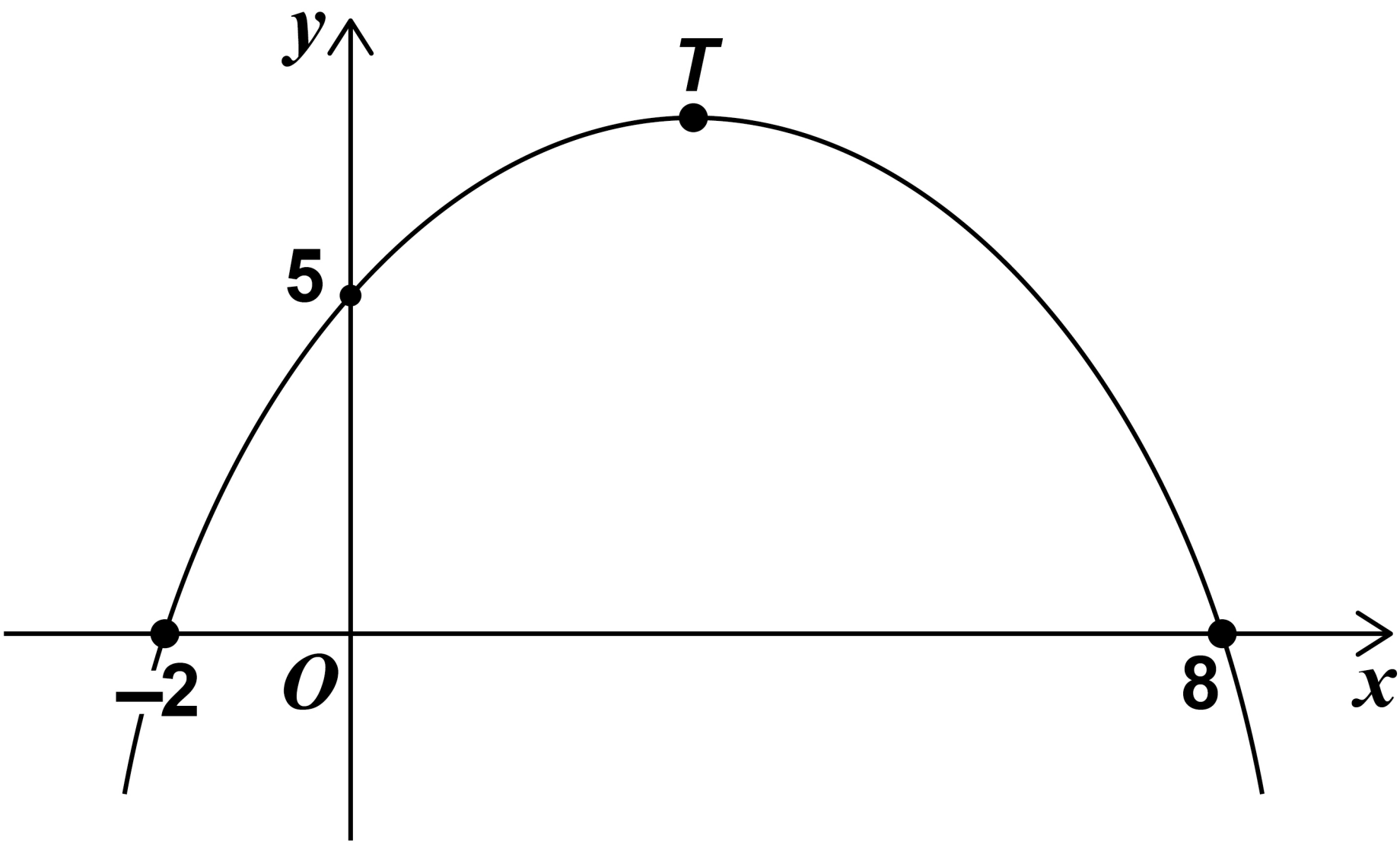



**Complete the coordinates of *C* and *D*. [2 marks]**

***C*** **(0, _____ )** ***D*** **( _____ , 0)**

**[Turn over]**

**5(b)** **Here is a sketch of a quadratic graph.**



**Complete the following statements. [2 marks]**

**The value of the $y$-INTERCEPT is**

_____

**The $x$-COORDINATE of the turning point, $T$, is**

_____

6 Work out $(2.5 \times 10^4)^{-3}$

Give your answer in standard form.
[1 mark]

Answer _____

7 Archie flips a biased coin 200 times.

Here is some information about the outcomes after each 50 flips.

| TOTAL NUMBER OF FLIPS | 50 | 100 | 150 | 200 |
|---|---|---|---|---|
| NUMBER OF HEADS | 10 | 27 | 37 | 52 |

**Work out the best estimate for the probability of flipping a head.**

**Give a reason for your answer.**
**[2 marks]**

**Answer** _____

_____

**Reason** _____

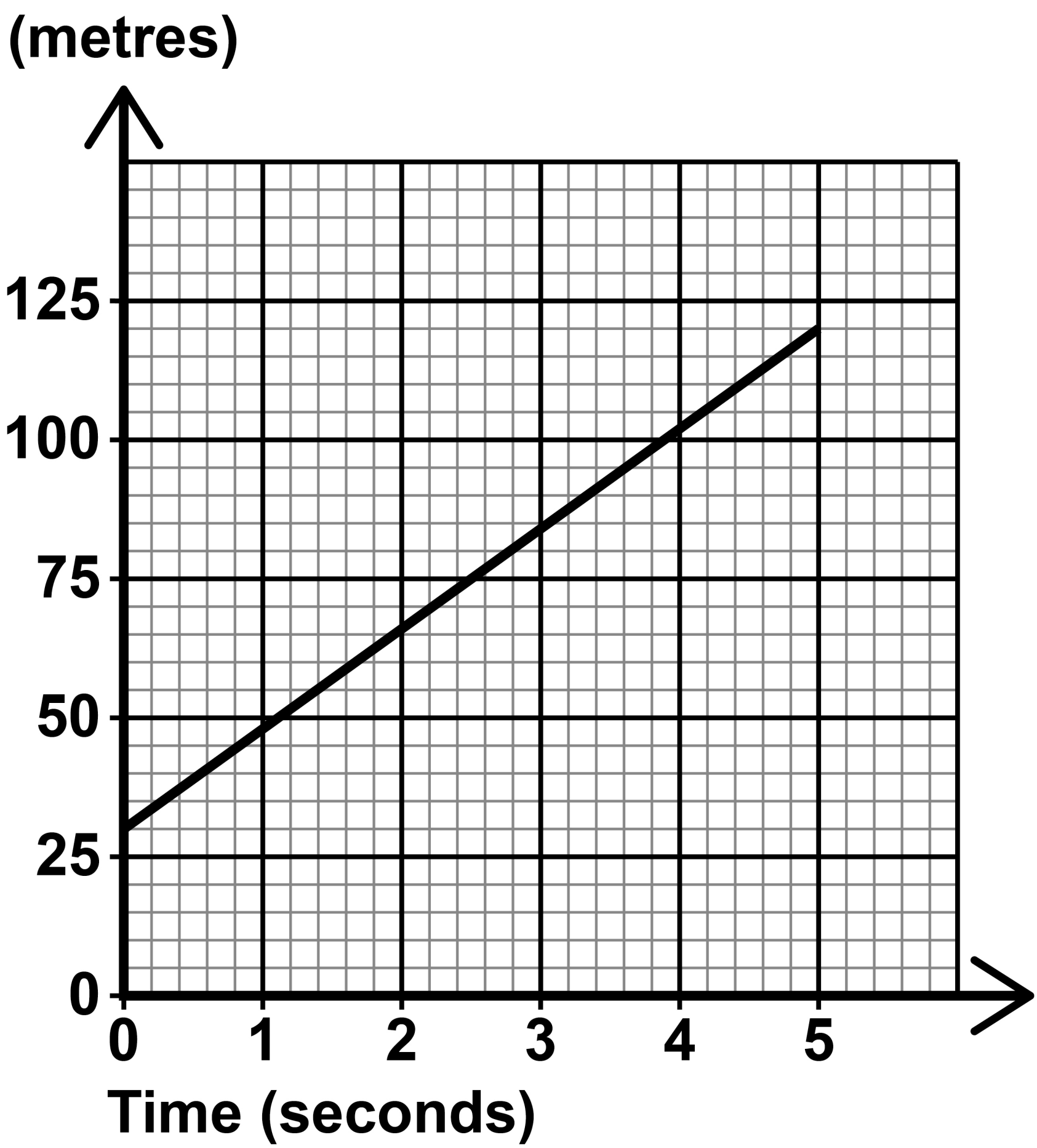
_____

_____

_____

8 A lion is sprinting in a straight line away from its den.

The graph shows the lion's distance from the den.



**Work out the speed of the lion in metres per second. [3 marks]**

**Answer** _____ **m/s**

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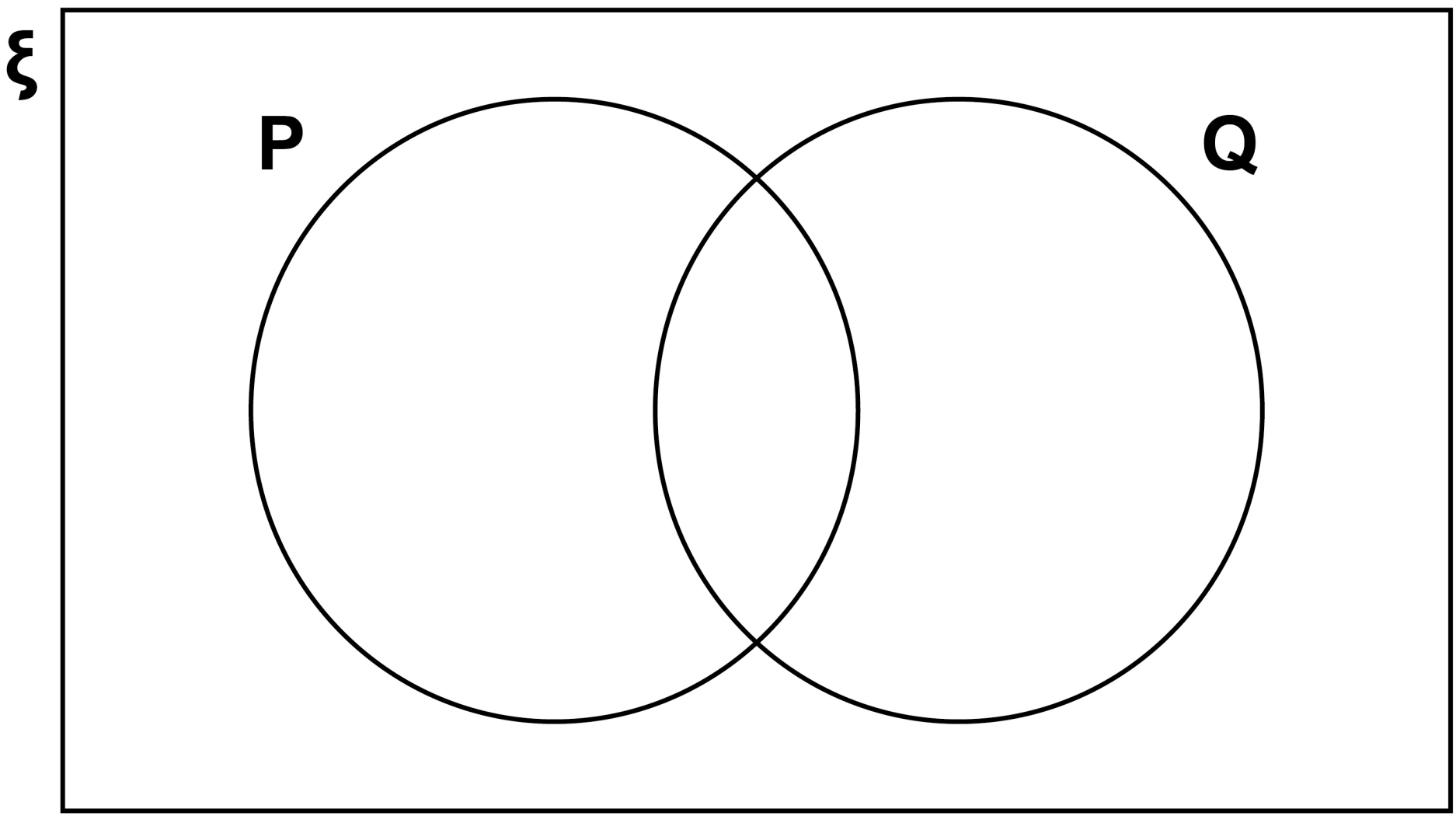
9 On the Venn diagram, shade the section represented by $P \cap Q$
[1 mark]




[Turn over]

10 A bus route had 90 000 passengers last year.

The number of passengers was predicted to increase

by 3% this year

and then

by 8% next year.

Is the predicted number of passengers for NEXT year more than 100 000 ?

You MUST show your working.

[3 marks]

11 A map has a scale of 1 : 20 000

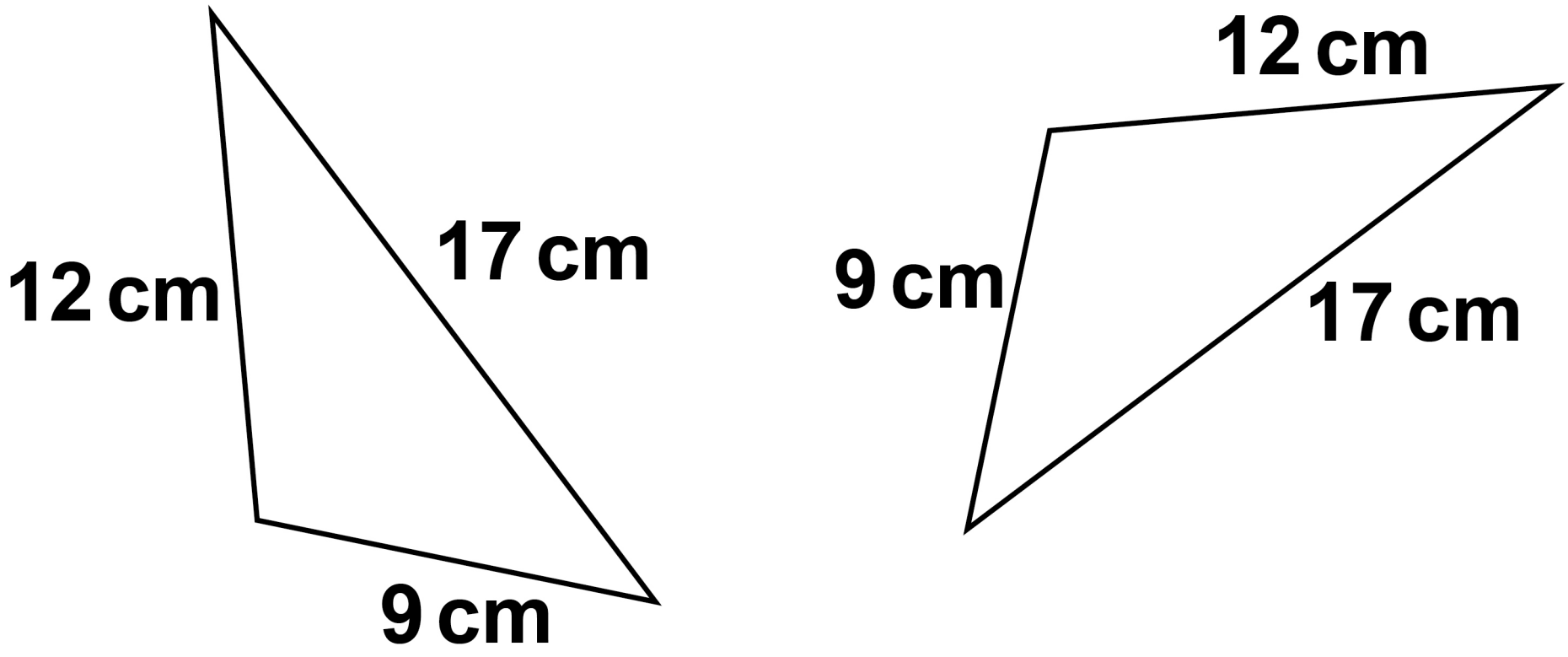
Two churches are 15 cm apart on the map.

Work out the actual distance between them.

Give your answer in KILOMETRES.
[3 marks]

Answer _____ km

12 The diagrams are not drawn accurately.




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

ASA RHS SAS SSS

13 Liam takes part in long jump competitions.

Here is some information about 40 of his jumps.

| Length of jump, $d$ metres | Number of jumps | Midpoint | |
|---|---|---|---|
| $7.0 \leqslant d < 7.4$ | 15 | | |
| $7.4 \leqslant d < 7.8$ | 18 | | |
| $7.8 \leqslant d < 8.2$ | 7 | | |
| | Total = 40 | | |

Work out an estimate of the mean distance of these 40 jumps.

Give your answer as a decimal.
[3 marks]

Answer _____ m

[Turn over]

7

**14** **A graph passes through the points (3, 15) and (7, $w$)**

**14 (a)** **Assume that the equation of the graph has the form $y = x^2 + c$**

**Work out the value of $w$ that this would give. [3 marks]**

$w$ = _____

**14 (b)** **In fact, the graph is a straight line.**

**What does this mean about the actual value of $w$?**

**Tick ONE box. [1 mark]**

☐ **It must be the same as the value in part (a)**

☐ **It must be different to the value in part (a)**

☐ **It is impossible to tell**

**15 Concrete from a truck is poured at 10.9 kg PER SECOND for 30 minutes.**

**1000 kg = 1 tonne**

**Is more than 20 tonnes of concrete poured?**

**Tick a box.**

☐ **Yes**

☐ **No**

**You MUST show your working.**
**[4 marks]**

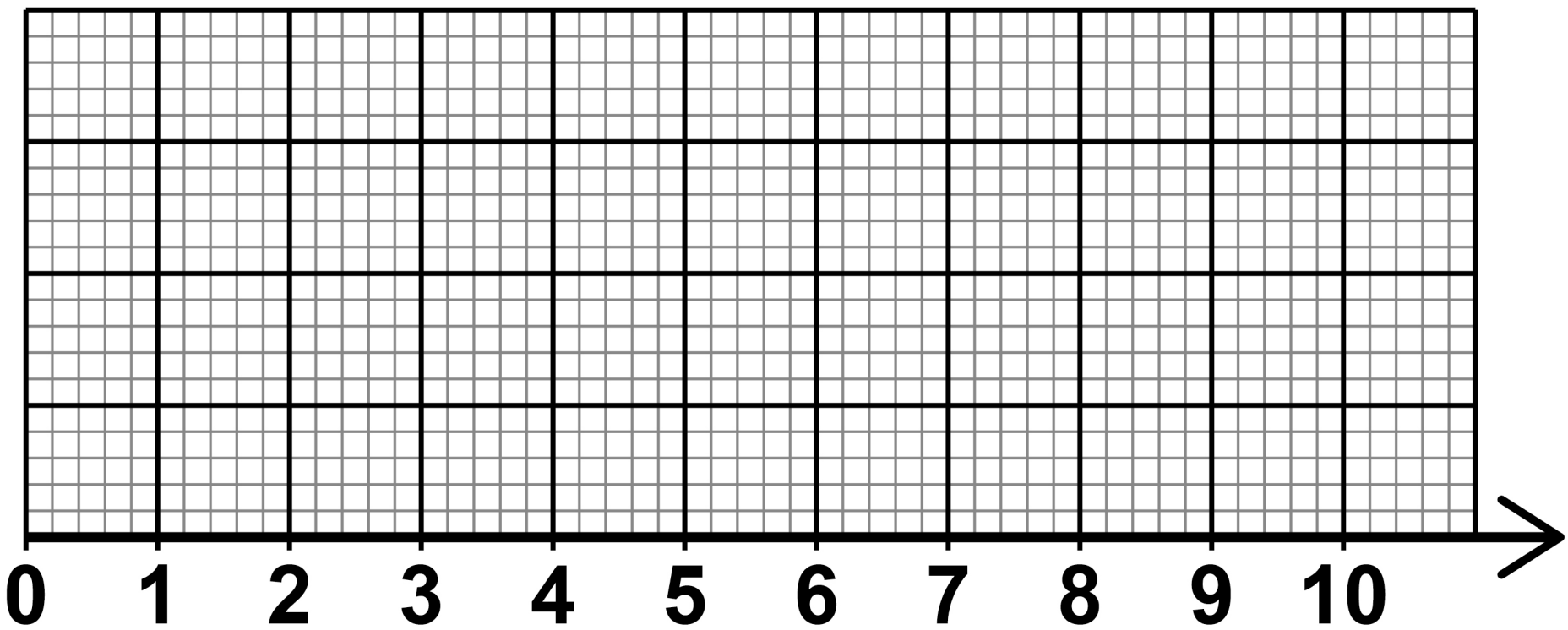
[Turn over]

8

16 Here is some information about the lengths, in cm, of leaves.

- Shortest length = 2.4
- Longest length = 9
- Upper quartile = 7
- Median length = 6
- Interquartile range = 3

On the opposite page, draw a box plot to show this information.
[3 marks]



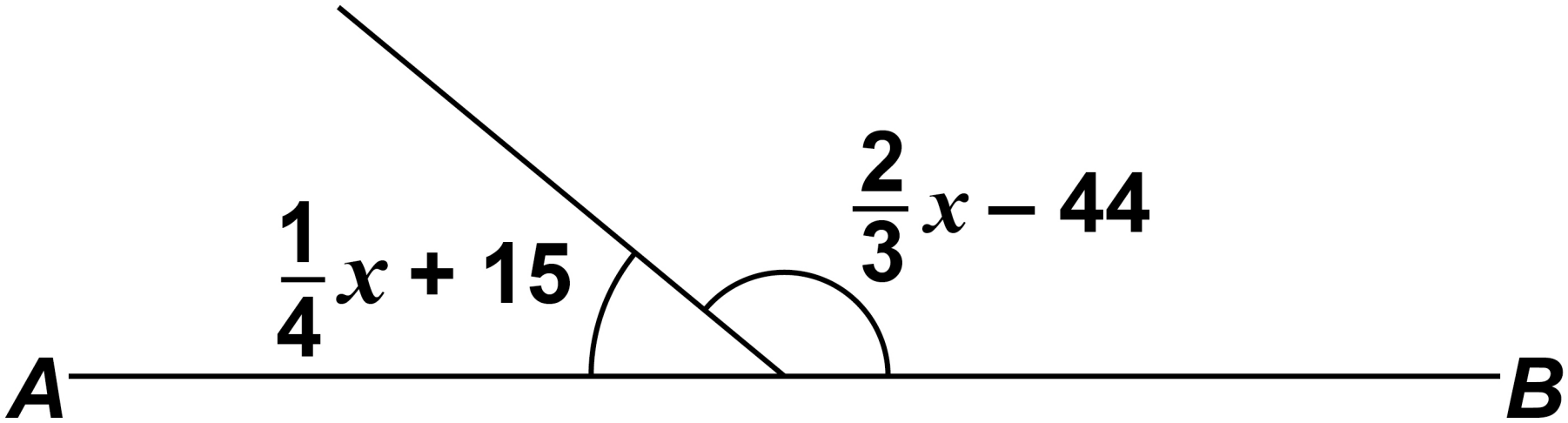

Length (cm)

[Turn over]

**17** ***AB*** **is a straight line.**

**Both angles are given in degrees.**

**The diagram is not drawn accurately.**




**By working out the value of $x$,**

**work out the ratio**
**smaller angle : larger angle**
**[4 marks]**

**Answer** _____ : _____

**[Turn over]**

7

18 A diagonal of a rectangle is 23.7 cm long.

The diagonal makes an angle of 52° with a side of length $x$ cm

Work out the value of $x$. [3 marks]

$x$ = _____

[Turn over]

**19(a)** **Show that**

$$4x(3x + 2) - 2x^2\left(6 - \frac{5}{x}\right) - 6x\left(3 + \frac{7}{x}\right)$$

**simplifies to an integer. [3 marks]**

19(b) **Factorise** $8x^2 - 18x - 35$

**[2 marks]**

**Answer**



8

**20** $(x - 9) = \dfrac{2(6 - x^2)}{x + 3}$ **and** $x = \dfrac{d \pm \sqrt{e}}{f}$

**Work out one set of possible values for $d$, $e$ and $f$. [4 marks]**

$d =$

$e =$

$f =$

[Turn over]

**21 People in a stadium are in the North Stand, East Stand, South Stand or West Stand.**

**Of the people in the stadium,**

**$\frac{1}{4}$ are in the North Stand**

**$\frac{3}{10}$ are in the East Stand**

**number in South Stand : number in West Stand = 2 : 7**

**There are 4480 people in the West Stand.**

**How many people are in the stadium? [4 marks]**

**Answer**

**[Turn over]**

8

22 $x_{n+1} = 5 - \frac{1}{x_n}$

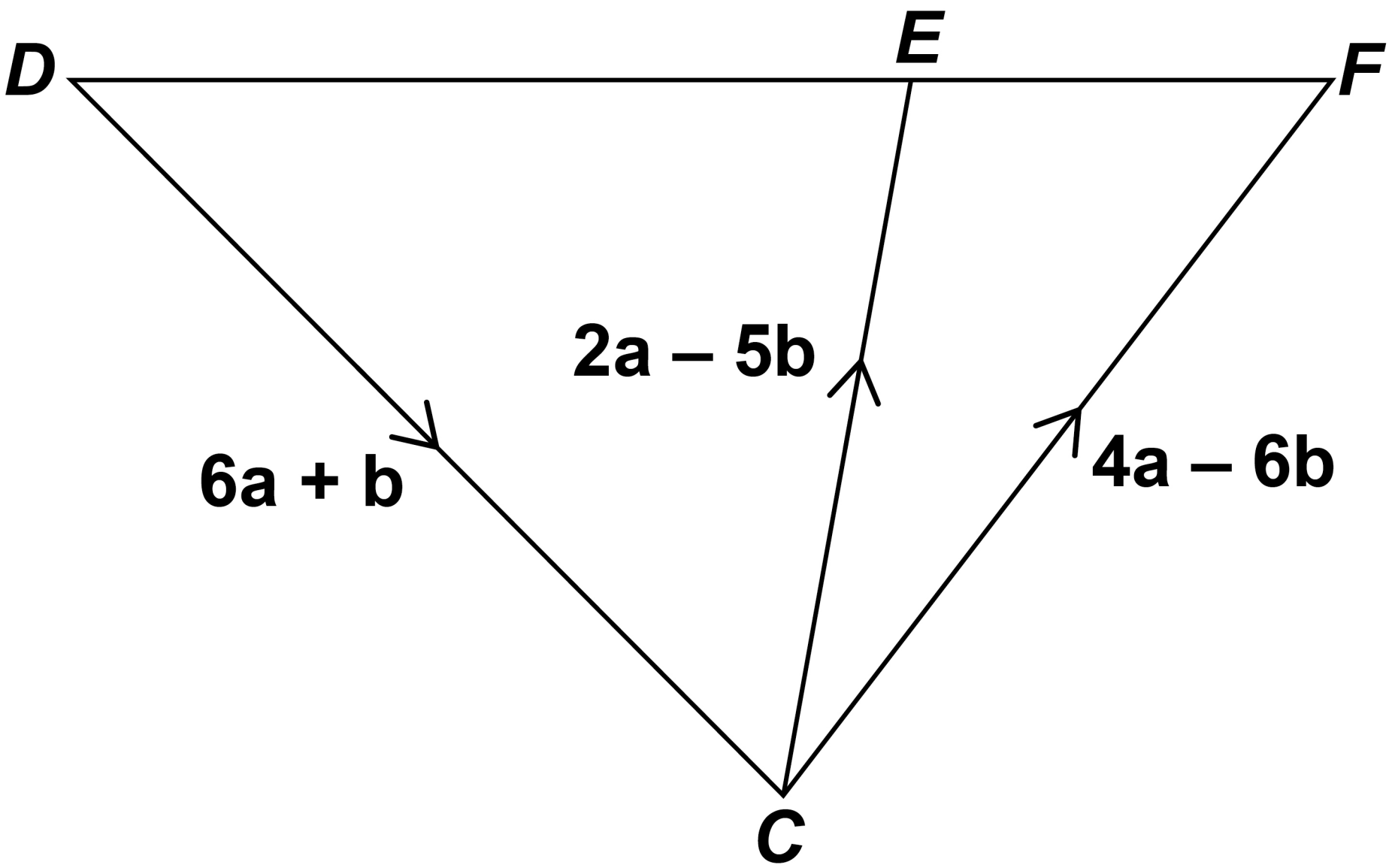
**Use $x_1 = 1$ to work out an approximate solution to $x = 5 - \frac{1}{x}$**

**Give your answer to 4 significant figures. [3 marks]**

$x$ = _____

[Turn over]

**23 The diagram is not drawn accurately.**

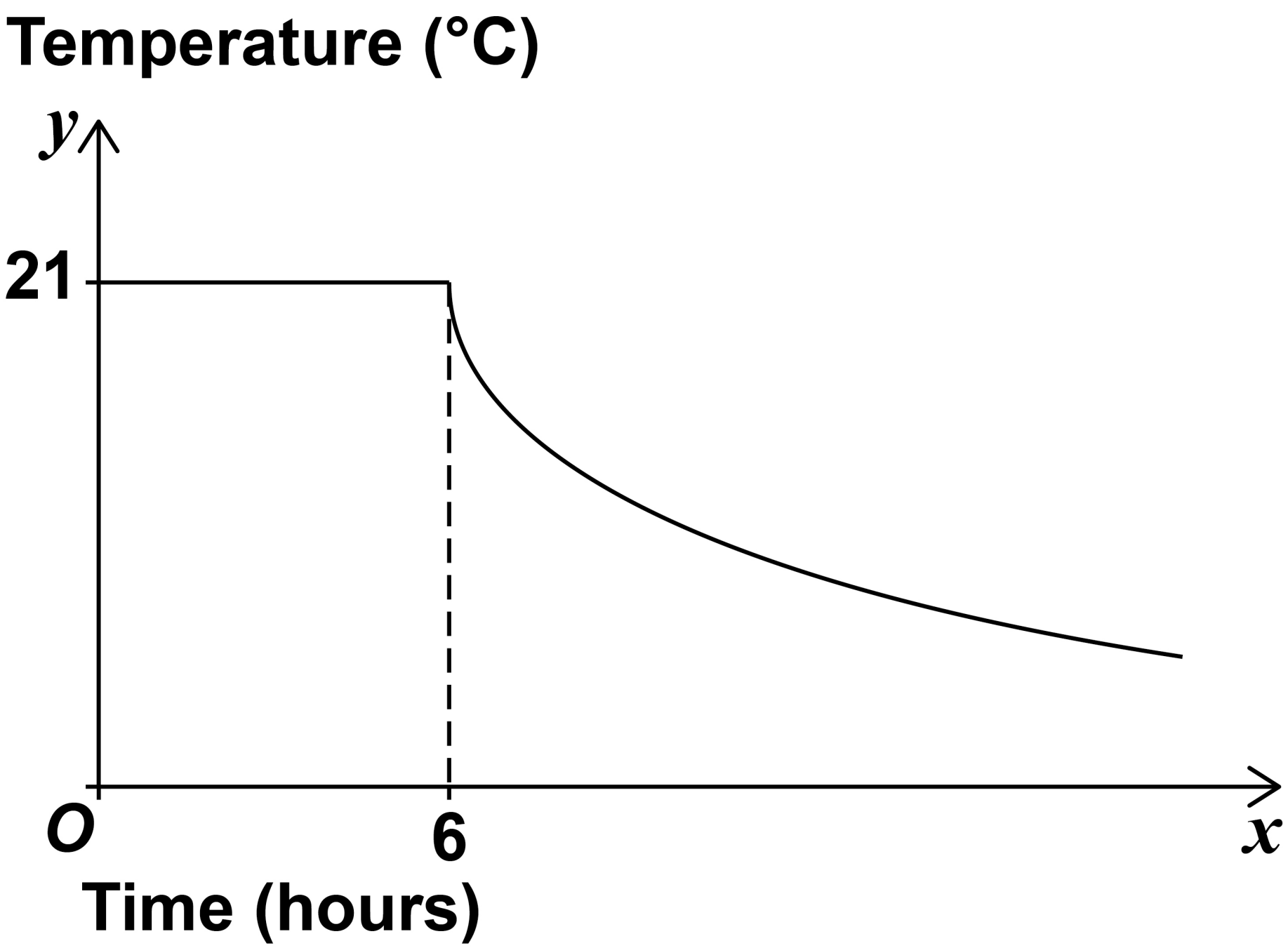



**Prove that *DEF* is a straight line.**
**[4 marks]**

**24** A room is kept at a constant temperature of 21 °C for 6 hours.

The heating is then turned off and the room begins to cool.

Here is a sketch graph showing the temperature, $y$ °C, of the room at time $x$ hours.



24(a) Assume the equation of the curved part is $y = \frac{k}{x}$ where $k$ is a constant.

Work out the value of $y$ when $x = 12$ [2 marks]

$y =$ _____

**24 (b)** **In fact,**

**the equation of the curved part is**

$y = A \times \left(\frac{1}{3}\right)^{\frac{1}{6}x}$ **where** $A$ **is a DIFFERENT constant.**

**How does this affect the value of** $y$ **when** $x = 12$ **?**

**Tick ONE box, on the opposite page.**

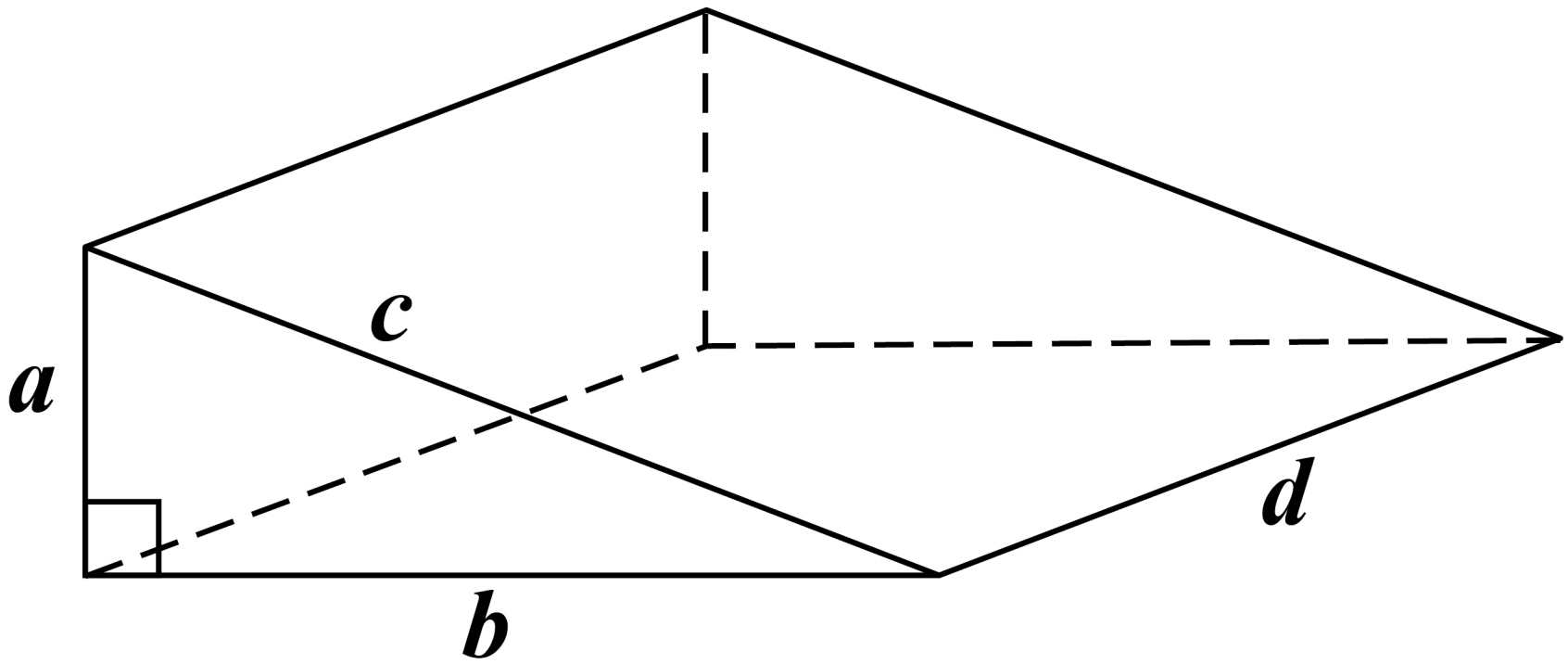
**You MUST show working to support your answer. [2 marks]**

☐ The value of $y$ is greater than the answer to part (a).

☐ The value of $y$ is less than the answer to part (a).

☐ The value of $y$ is the same as the answer to part (a).

**25 Here is a right-angled triangular prism.**




**The ratio of the edges is**
**$a : b : c : d = 3 : 4 : 5 : 12$**

**The VOLUME of the prism is 1125 $cm^3$**

**Work out the total length of ALL of the edges of the prism. [5 marks]**

**Answer** _____ **cm**

**END OF QUESTIONS**

5

**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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| For Examiner's Use | |
|---|---|
| Pages | Mark |
| 6–9 | |
| 10–14 | |
| 15–19 | |
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| 26–29 | |
| 30–33 | |
| 34–37 | |
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| 42–45 | |
| 46–49 | |
| 50–53 | |
| 54–55 | |
| **TOTAL** | |