A

AQA

Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

GCSE MATHEMATICS

H

Higher Tier Paper 2 Calculator

8300/2H

Thursday 6 June 2019 Morning

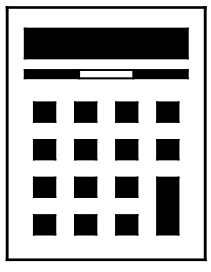
Time allowed: 1 hour 30 minutes

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.**
- **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

Circle the point that lies on the curve $y = x^2 - 4x + 1$ [1 mark]

(–1, 4)

(–1, –4)

(–1, –2)

(–1, 6)

2

The height of a tree is 12 metres, correct to the nearest metre.

Circle the error interval. [1 mark]

11.5 m $\leqslant$ height $<$ 12.5 m

11.5 m $\leqslant$ height $\leqslant$ 12.5 m

11.5 m $<$ height $\leqslant$ 12.5 m

11.5 m $<$ height $<$ 12.5 m

3

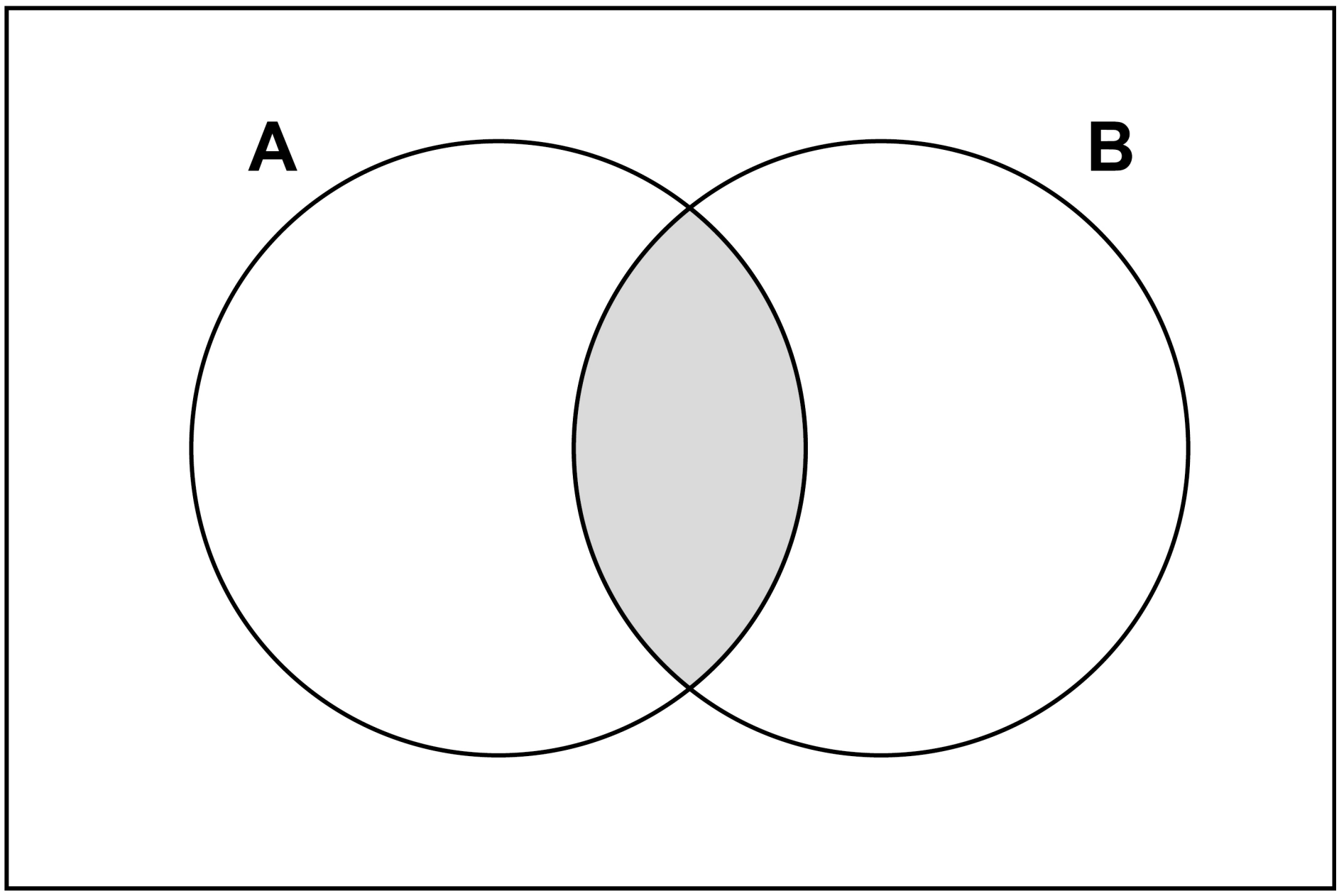
2a is five times bigger than b.

Circle the ratio a : b [1 mark]

10 : 1 1 : 10 5 : 2 2 : 5

[Turn over]

4



Which of these represents the shaded region?

Circle your answer. [1 mark]

A U B **$(A \cap B)'$**

$A \cap B$ **$A' \cup B'$**

4

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[Turn over]

5

Using ruler and compasses, show the region inside the grid, on the opposite page, that is

less than 4 cm from *A*

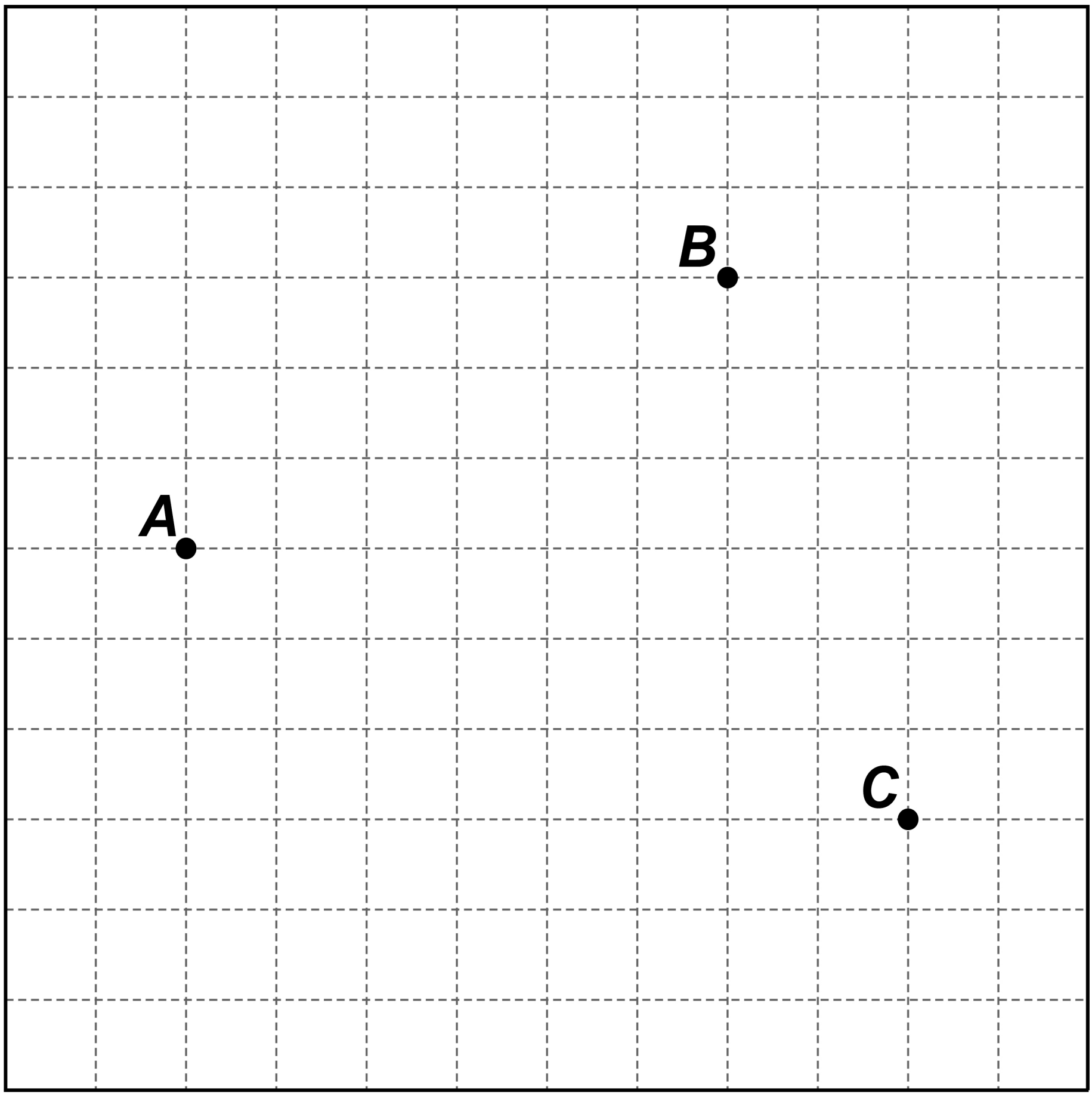
and

nearer to *B* than to *C*.

Label the region R.

Show all your construction lines.
[3 marks]

Take each square to represent 1 cm^2



[Turn over]

6

Beth drives 200 miles in 4 hours.

She drives the first 18 miles at an average speed of 36 mph

Work out her average speed for the rest of the journey. [3 marks]

Answer _____ mph

6

BLANK PAGE

[Turn over]

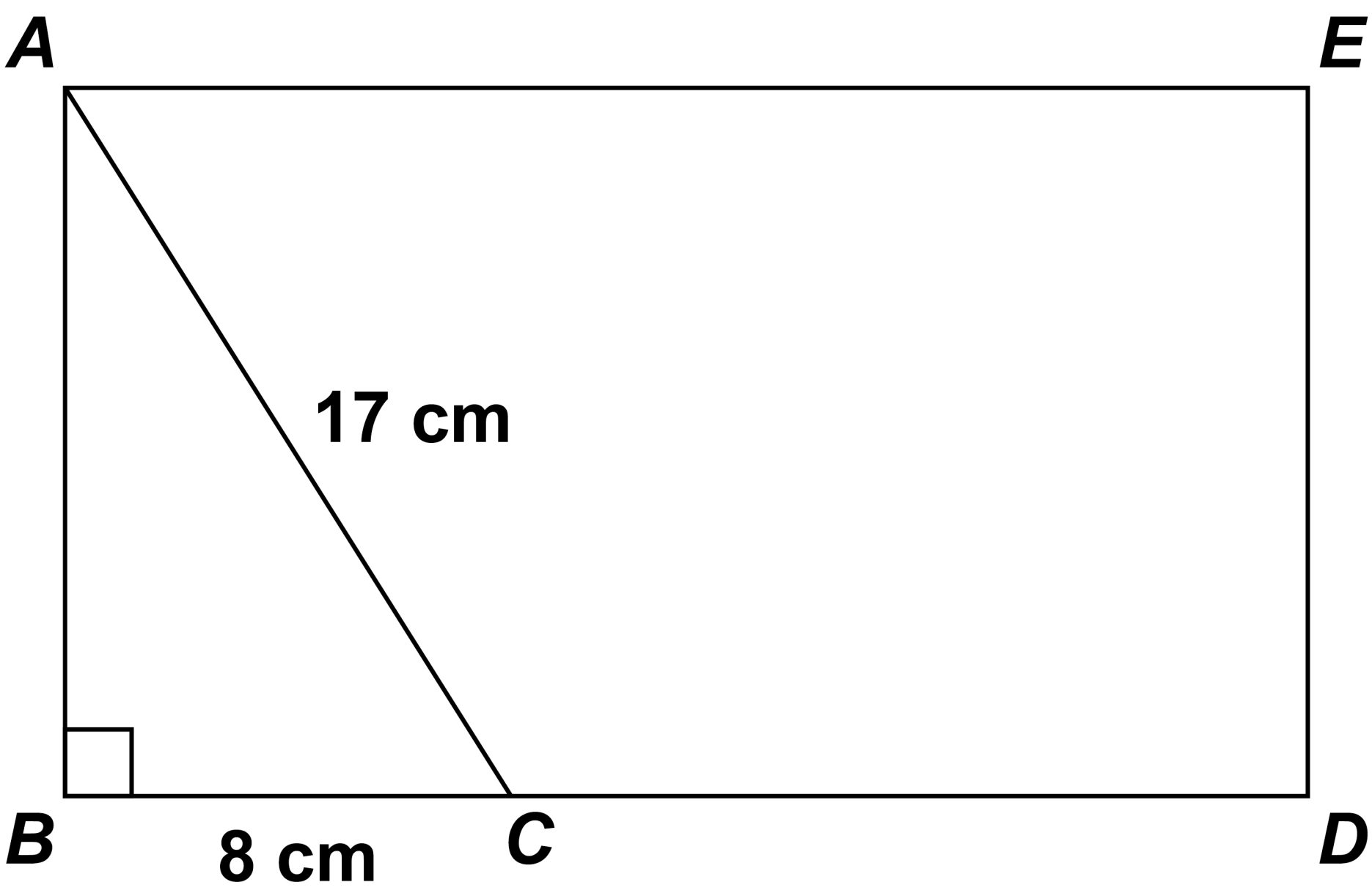
7

The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

***AC* = 17 cm**

***BC* = 8 cm**

The diagram is NOT drawn accurately.



***BC* : *CD* = 1 : 2**

Work out the area of rectangle *ABDE*.
[4 marks]

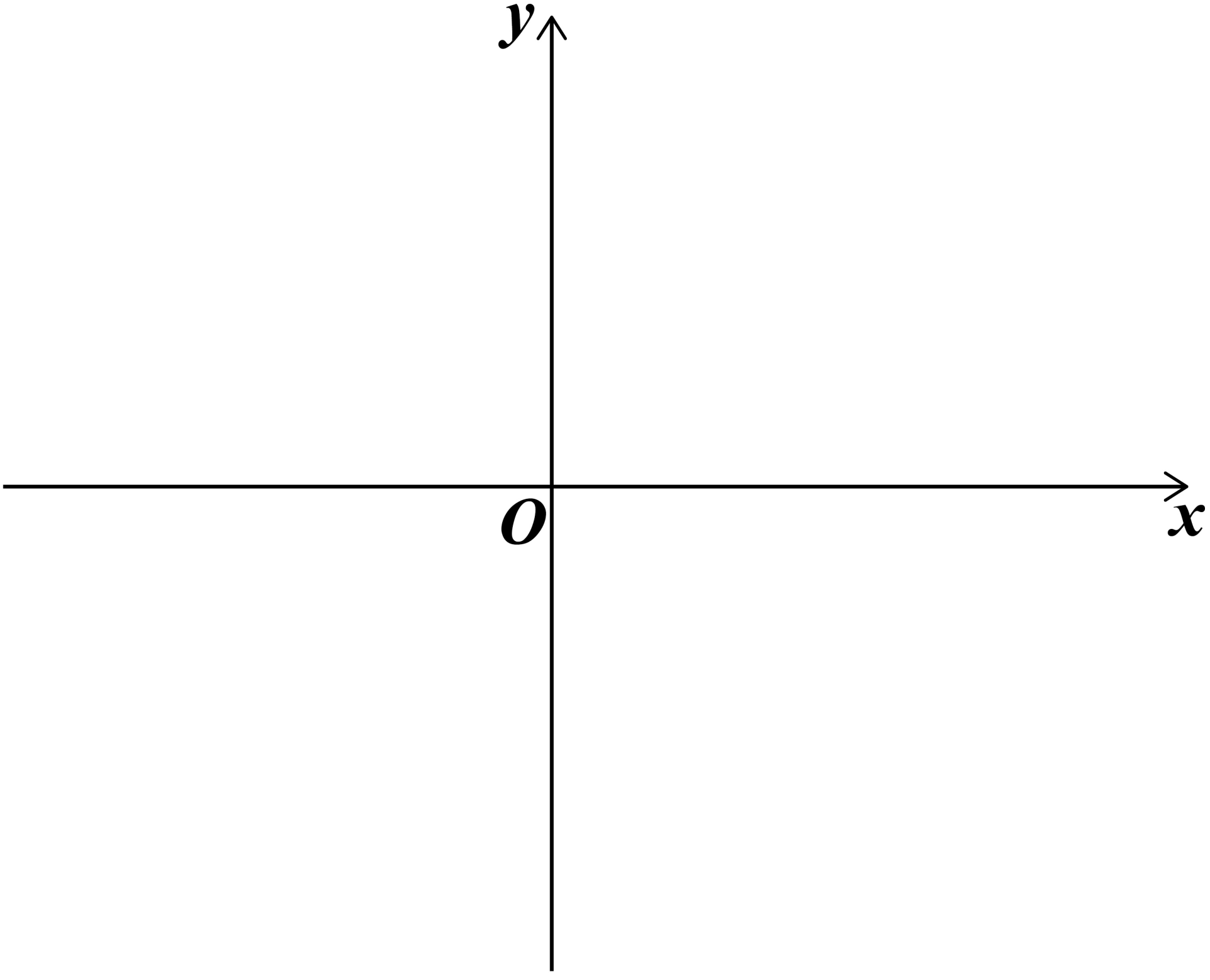
Answer _____ cm^2

[Turn over]

8

On the axes, sketch the curve $y = x^3 - 2$

You MUST show the coordinates of the y-intercept. [2 marks]



6

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[Turn over]

9

In a sport, injury time is added time played at the end of a match.

The table shows the injury time, t (minutes) played in 380 matches.

Injury time, t (minutes)	Frequency
$0 < t \leqslant 2$	59
$2 < t \leqslant 4$	158
$4 < t \leqslant 6$	106
$6 < t \leqslant 8$	45
$8 < t \leqslant 10$	12

9 (a)

Circle the TWO words that describe the data on the previous page. [1 mark]

continuous **discrete**

grouped **ungrouped**

9 (b)

Which class interval contains the median?

You MUST show your working. [2 marks]

Answer _____ $< t \leqslant$ _____

9 (c)

What percentage of the matches had MORE THAN 6 minutes of injury time?
[2 marks]

Answer **%**

10

x is an integer.

$-4 < x \leqslant 2$

and

$2 \leqslant x + 3 < 9$

Work out all the possible values of x.
[3 marks]

Answer

[Turn over]

8

11

Joe and Kyle share an amount of money in the ratio 7 : n

Joe gets 35% of the money.

Work out the value of n. [2 marks]

Answer

12

A biased coin is thrown 250 times.

The relative frequency of Heads is worked out after every 50 throws.

Total number of throws	50	100	150	200	250
Relative frequency	0.4	0.29	0.4	0.32	0.3

Circle the best estimate of the probability of Heads. [1 mark]

0.3 0.32 0.342 0.4

[Turn over]

13

The amounts spent on clothes by 40 boys and 40 girls in one month were recorded.

The table shows information about the amounts spent by the boys.

Amount, x (£)	Midpoint	Number of boys	
$0 \leqslant x < 20$		22	
$20 \leqslant x < 40$		9	
$40 \leqslant x < 60$		6	
$60 \leqslant x < 80$		3	
		Total = 40	

The mean for the girls was £35

Estimate the mean for the girls as a percentage of the mean for the boys. [5 marks]

[Turn over]

BLANK PAGE

Answer _____ **%**

8

[Turn over]

14

Ali and Mel are making 3-digit codes.

The digit 0 is NOT used.

Ali only uses odd digits.

Mel only uses even digits.

14 (a)

Ali can make x more codes than Mel.

Assume that digits CANNOT be repeated.

Work out the value of x. [3 marks]

Answer _____

14 (b)

In fact, digits CAN be repeated.

What does this tell you about the actual value of x?

Tick ONE box. [1 mark]

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

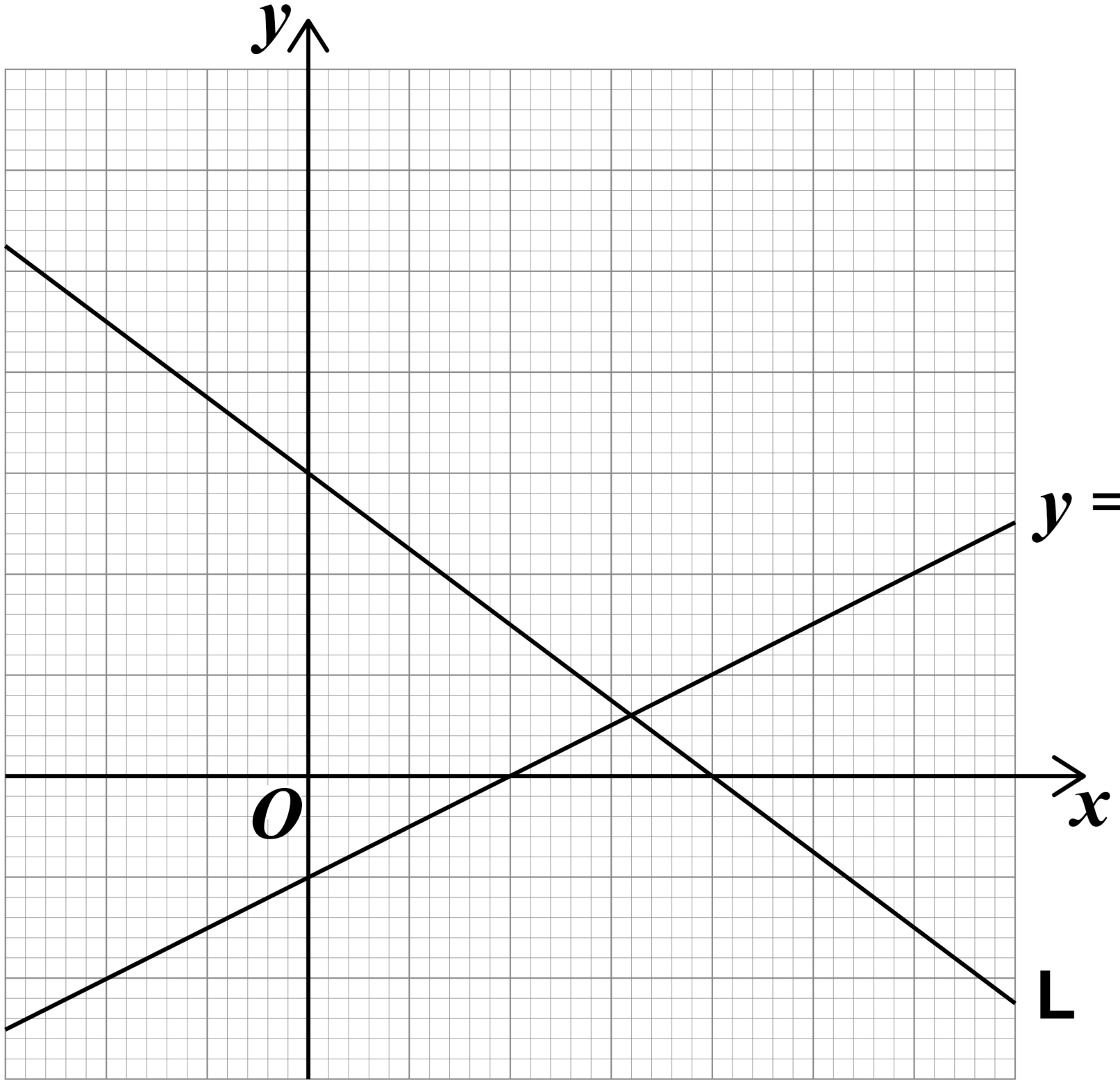
☐ It is smaller than my answer to part (a)

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

15

Here is line L and the graph of $y = x - 1$

The scales of the axes are not shown.



Work out the equation of line L. [4 marks]

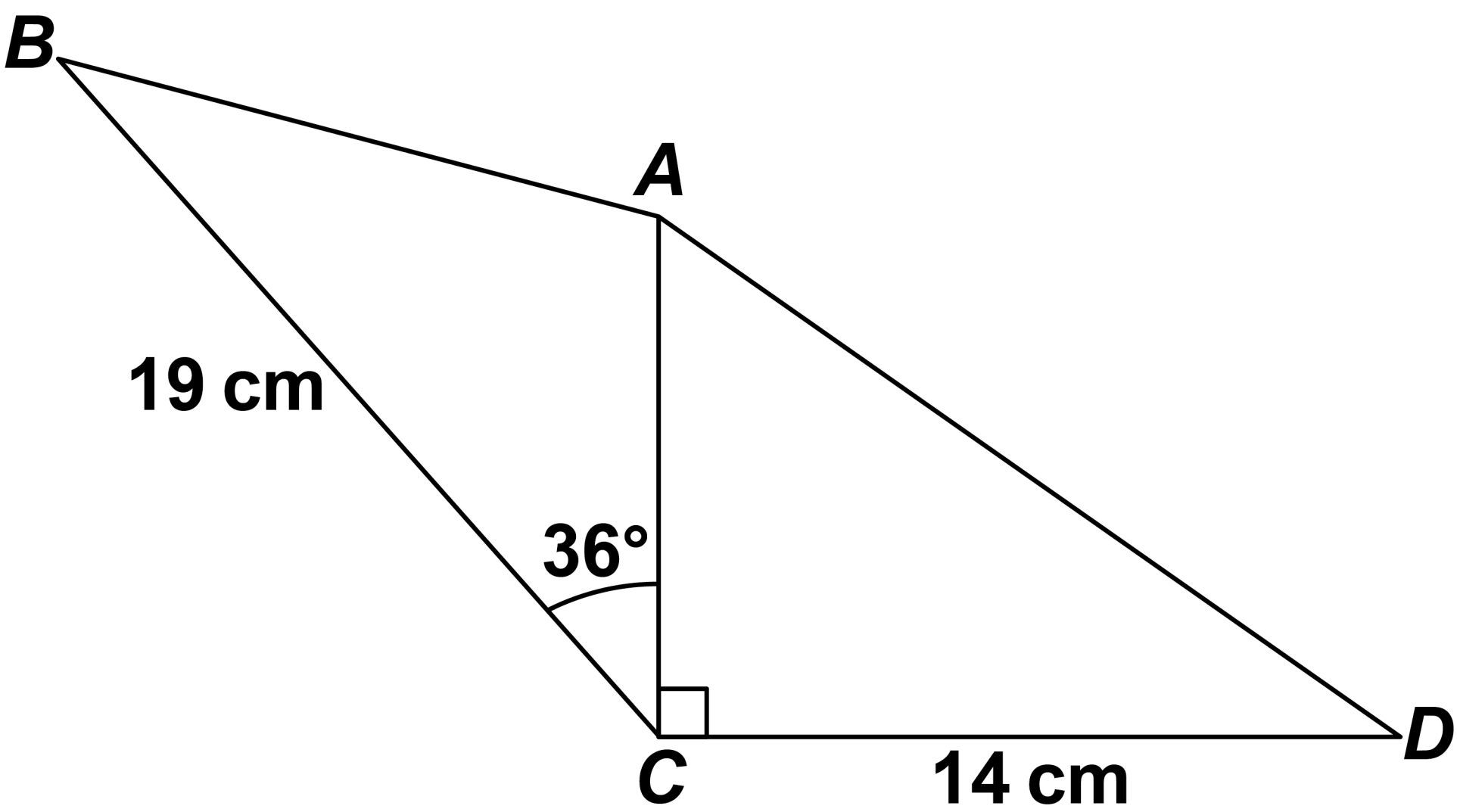
Answer

8

16

***ABC* and *ACD* are triangles.**

The diagram is not drawn accurately.



The area of *ACD* is 80.5 cm^2

Work out the area of *ABC*.

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

Answer _____ **cm^2**

[Turn over]

17

$$m = \frac{p - 2b}{2}$$

p = 68.3 correct to 1 decimal place.

b = 8.7 correct to 1 decimal place.

Work out the lower bound for m.
[3 marks]

Answer

7

BLANK PAGE

[Turn over]

18

In a bag there are blue discs, green discs and white discs.

There are four times as many blue discs as green discs.

number of blue discs : number of white discs = 3 : 5

One disc is selected at random.

Work out the probability that the disc is either blue or white. [3 marks]

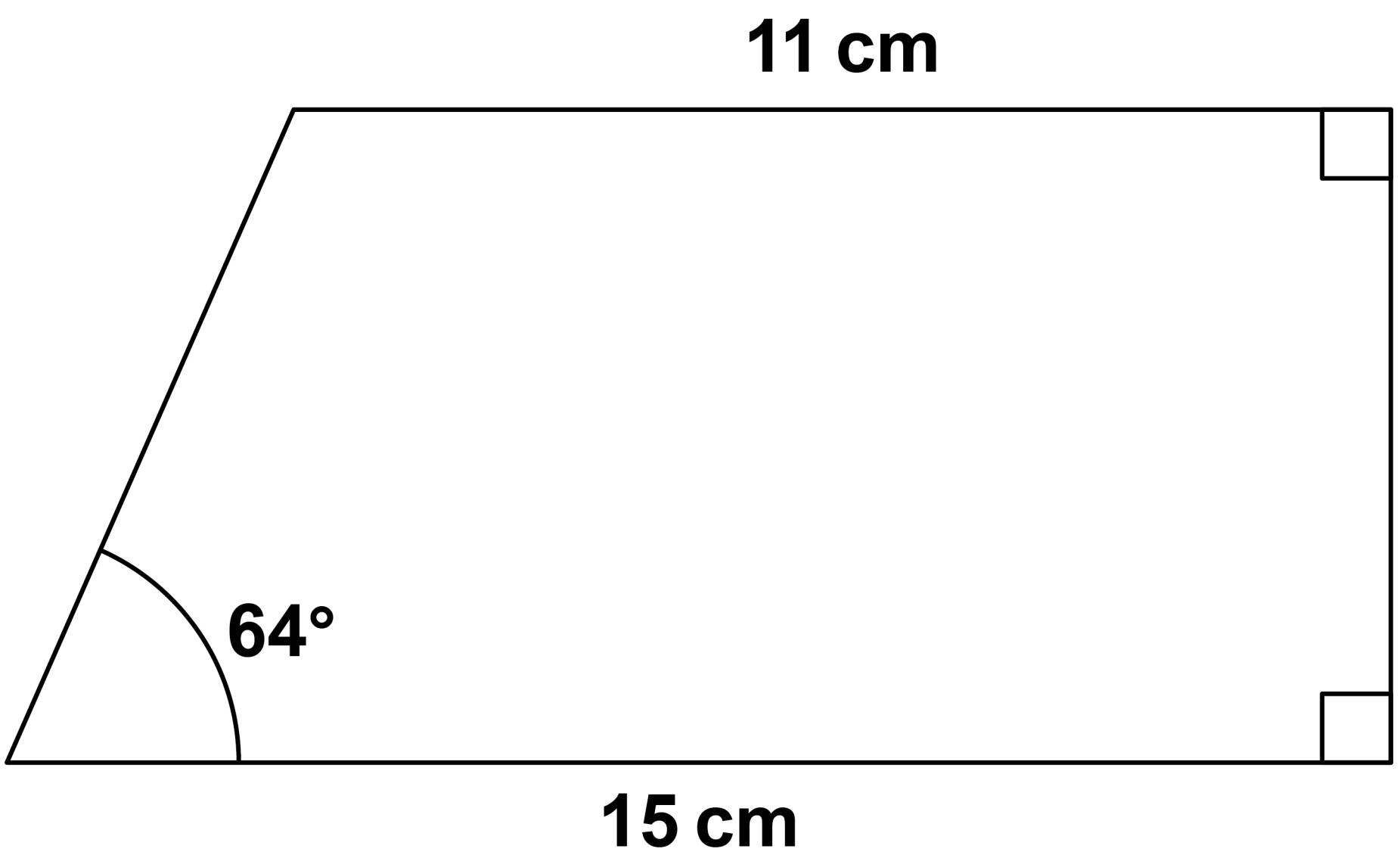
Answer _____

[Turn over]

19

Work out the area of the trapezium.

The diagram is not drawn accurately.
[4 marks]



Answer _____ cm^2

7

[Turn over]

20

Expressions for consecutive triangular numbers are

$$\frac{n\,(n+1)}{2} \quad \text{and} \quad \frac{(n+1)\,(n+2)}{2}$$

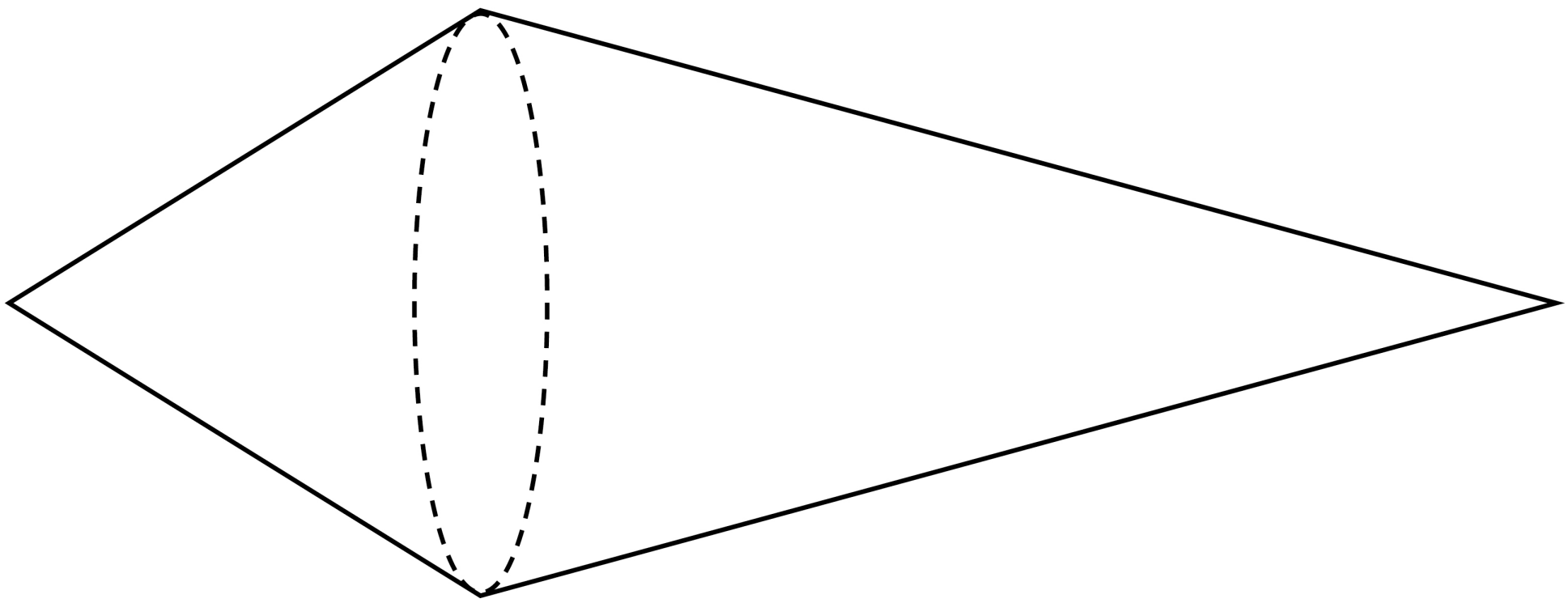
Prove that the sum of two consecutive triangular numbers is always a square number. [4 marks]

[Turn over]

21

A solid shape is made by joining two cones.

Each cone has the same radius.



One cone has slant height = 2 × radius

The other cone has slant height = 3 × radius

The total surface area of the shape is 57.8π cm^2

Curved surface area of a cone = πrl
where r is the radius and l is the slant height

Work out the radius. [3 marks]

Answer _____ **cm**

[Turn over]

7

22

Show that $\left(5\sqrt{3}-\sqrt{12}\right)^2$ simplifies to an integer. [3 marks]

23

A and B are similar cuboids.

surface area of A : surface area of B = 16 : 25

Work out volume of A : volume of B

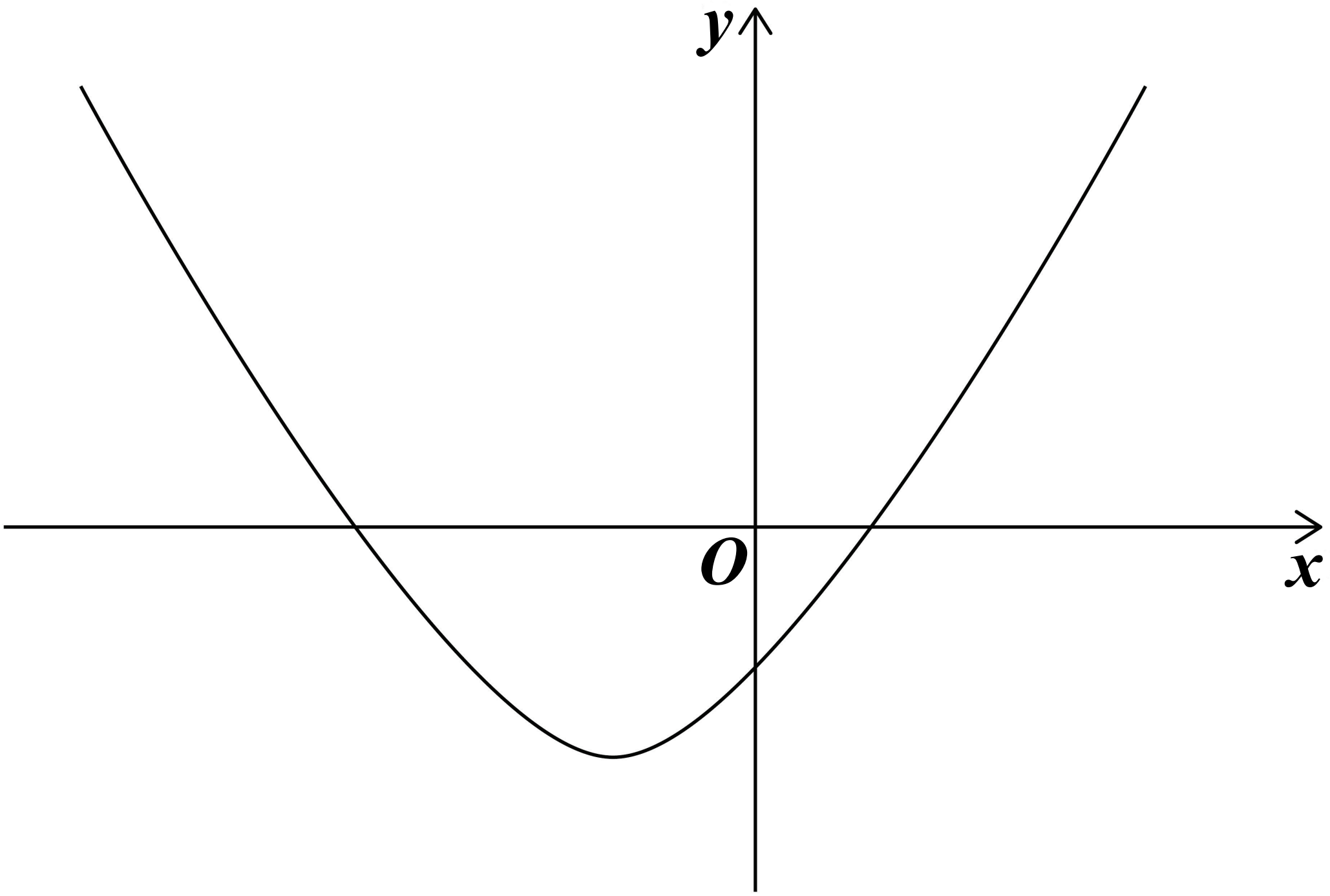
Circle your answer. [1 mark]

4 : 5 **16 : 25**

64 : 125 **256 : 625**

24

Here is a sketch of the curve
$y = x^2 + 4x - 12$



Work out the values of x for which

$$x^2 + 4x - 12 < 0$$

Give your answer as an inequality.
[3 marks]

Answer

7

25

A sample of 50 eggs is taken from Farm A.

The table shows information about the masses of the eggs from Farm A.

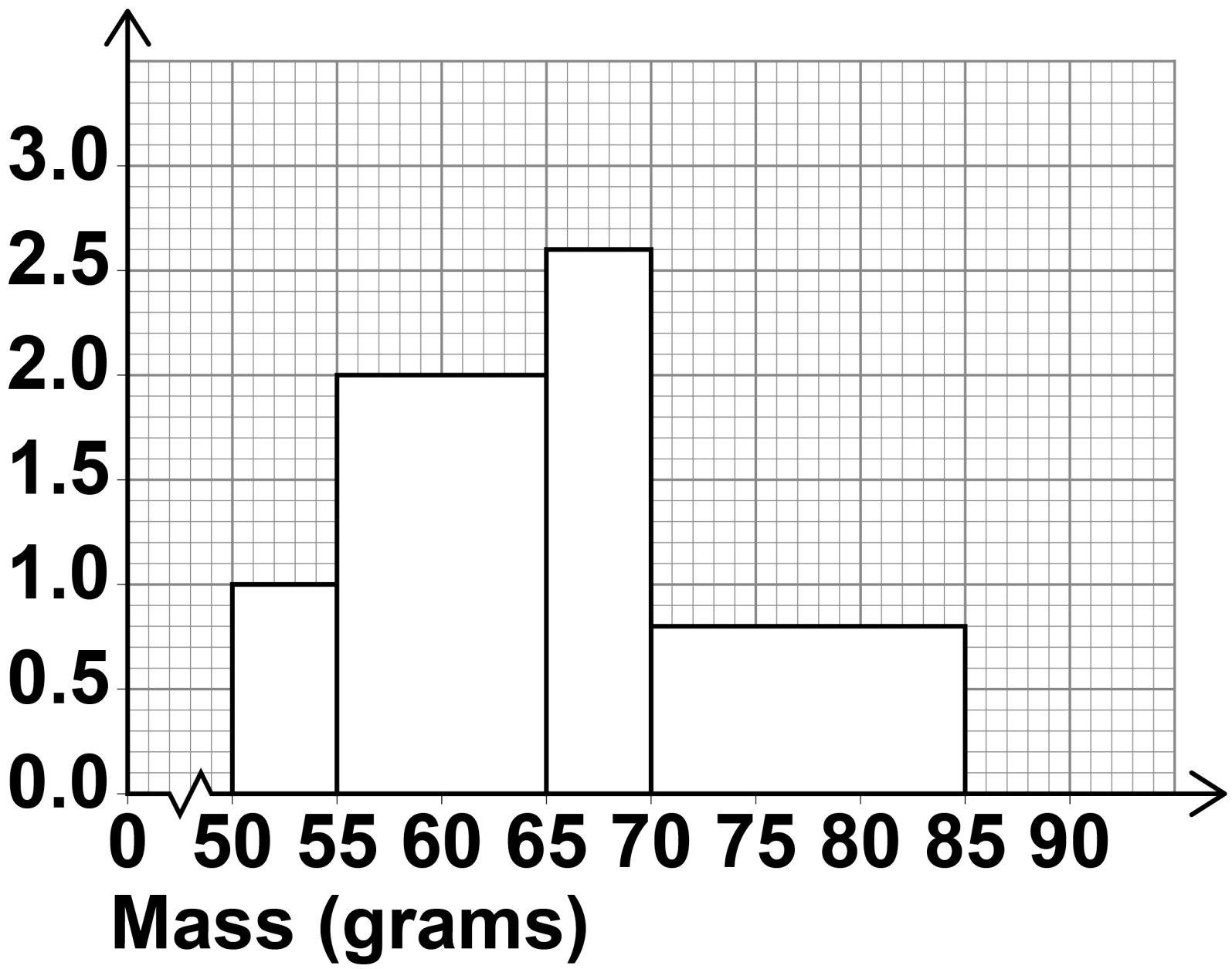
FARM A

Mass, m (grams)	Frequency
$53 < m \leqslant 58$	8
$58 < m \leqslant 63$	19
$63 < m \leqslant 68$	15
$68 < m \leqslant 73$	8

A sample of 50 eggs is taken from Farm B.

The histogram, on the opposite page, shows information about the masses of the eggs from Farm B.

FARM B



[Turn over]

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For medium eggs, $53\text{ g} < \text{mass} \leqslant 63\text{ g}$

The Farm A sample has more medium eggs than the Farm B sample.

Using the table and the histogram, on pages 46 and 47, estimate how many more.

You MUST show your working. [4 marks]

Answer _____

[Turn over]

4 9

4

26

$(x + 5)(x + 2)(x + a) \equiv x^3 + bx^2 + cx - 30$

Work out the values of the integers a, b and c. [3 marks]

$a =$

$b =$

$c =$

BLANK PAGE

[Turn over]

27

$$f(x) = \frac{2x}{5} - 1$$

Work out the value of $f^{-1}(3) + f(-0.5)$
[5 marks]

Answer _____

END OF QUESTIONS

8

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For Examiner's Use	
Pages	Mark
4–6	
8–10	
12–14	
16–19	
20–25	
26–29	
30–32	
34–37	
38–41	
42–45	
46–49	
50–53	
TOTAL	