

**Monday 11 June 2012 – Afternoon**

**GCSE MATHEMATICS A**

**A502/02** Unit B (Higher Tier)

Candidates answer on the Question Paper.

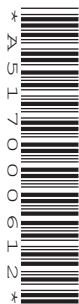
**OCR supplied materials:**

None

**Other materials required:**

- Geometrical instruments
- Tracing paper (optional)

**Duration:** 1 hour



|                       |  |                      |  |
|-----------------------|--|----------------------|--|
| Candidate<br>forename |  | Candidate<br>surname |  |
| Centre number         |  | Candidate number     |  |

**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- Your Quality of Written Communication is assessed in questions marked with an asterisk (\*).
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

**WARNING**

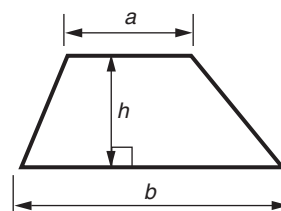


**No calculator can be  
used for this paper**

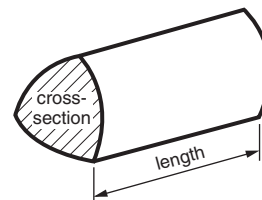
This paper has been pre modified for carrier language

## Formulae Sheet: Higher Tier

**Area of trapezium**  $= \frac{1}{2} (a + b)h$



**Volume of prism**  $= (\text{area of cross-section}) \times \text{length}$

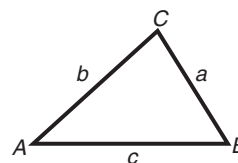


**In any triangle ABC**

**Sine rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

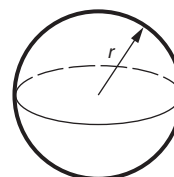
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle**  $= \frac{1}{2} ab \sin C$



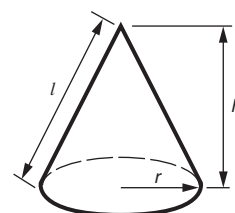
**Volume of sphere**  $= \frac{4}{3} \pi r^3$

**Surface area of sphere**  $= 4\pi r^2$



**Volume of cone**  $= \frac{1}{3} \pi r^2 h$

**Curved surface area of cone**  $= \pi r l$



**The Quadratic Equation**

The solutions of  $ax^2 + bx + c = 0$ ,  
where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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1 (a) Work out.

(i)  $\frac{5}{8} - \frac{1}{3}$

(a)(i) \_\_\_\_\_ [2]

(ii)  $\frac{5}{6} \times 4$

Give your answer as a mixed number in its simplest form.

(ii) \_\_\_\_\_ [3]

(b) Work out the reciprocal of 0.25.

(b) \_\_\_\_\_ [1]

**4**

- 2** Last year, one week's holiday in Spain cost £660.  
This year, the cost has increased by 15%.

Calculate the cost of the holiday this year.

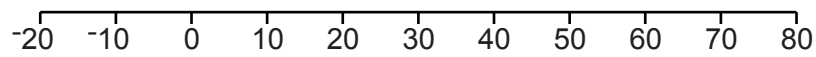
£ \_\_\_\_\_ **[3]**

- 3 (a) Solve this inequality.

$$\frac{x}{4} - 5 < 10$$

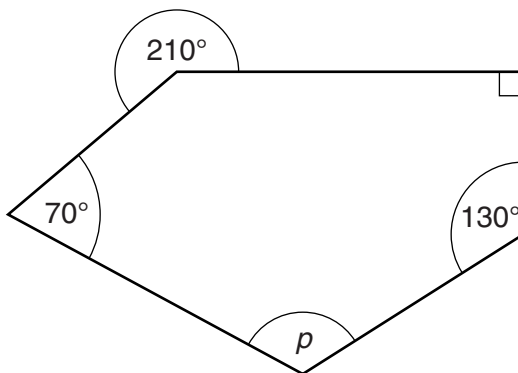
(a) \_\_\_\_\_ [2]

- (b) Represent your solution to part (a) on this number line.



[1]

- 4 Calculate angle  $p$ .



Not to scale

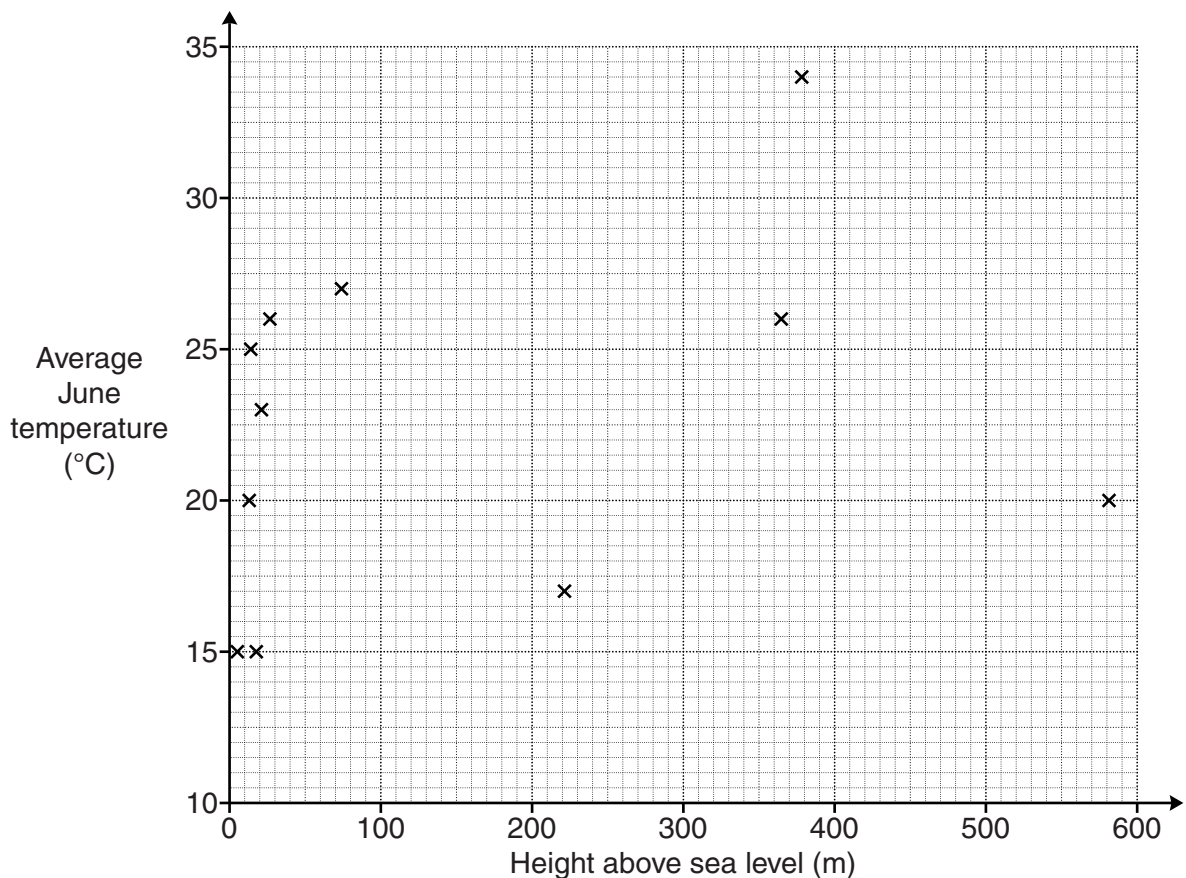
\_\_\_\_\_ ° [3]

- 5 Lizzie and Sam discuss where to go on holiday.  
They collect this data about cities in the Northern Hemisphere from the Internet.

| City       | Latitude (degrees) | Average June temperature ( $^{\circ}\text{C}$ ) | Height above sea level (m) |
|------------|--------------------|-------------------------------------------------|----------------------------|
| Oslo       | 59                 | 15                                              | 17                         |
| Copenhagen | 55                 | 15                                              | 4                          |
| Dijon      | 47                 | 17                                              | 221                        |
| Madrid     | 40                 | 20                                              | 581                        |
| Rome       | 41                 | 20                                              | 13                         |
| Athens     | 37                 | 23                                              | 21                         |
| Cairo      | 30                 | 27                                              | 74                         |
| Khartoum   | 15                 | 34                                              | 379                        |
| Freetown   | 8                  | 26                                              | 27                         |
| Bangui     | 4                  | 26                                              | 365                        |
| Libreville | 0                  | 25                                              | 14                         |

- (a) Lizzie wants to go to somewhere that is near to sea level as she thinks places that are higher will be cooler.

Lizzie draws a scatter graph of average June temperature against height above sea level for these cities.



- (i) Describe the relationship between height above sea level and average June temperature shown on the scatter diagram.

(a)(i) \_\_\_\_\_ [1]

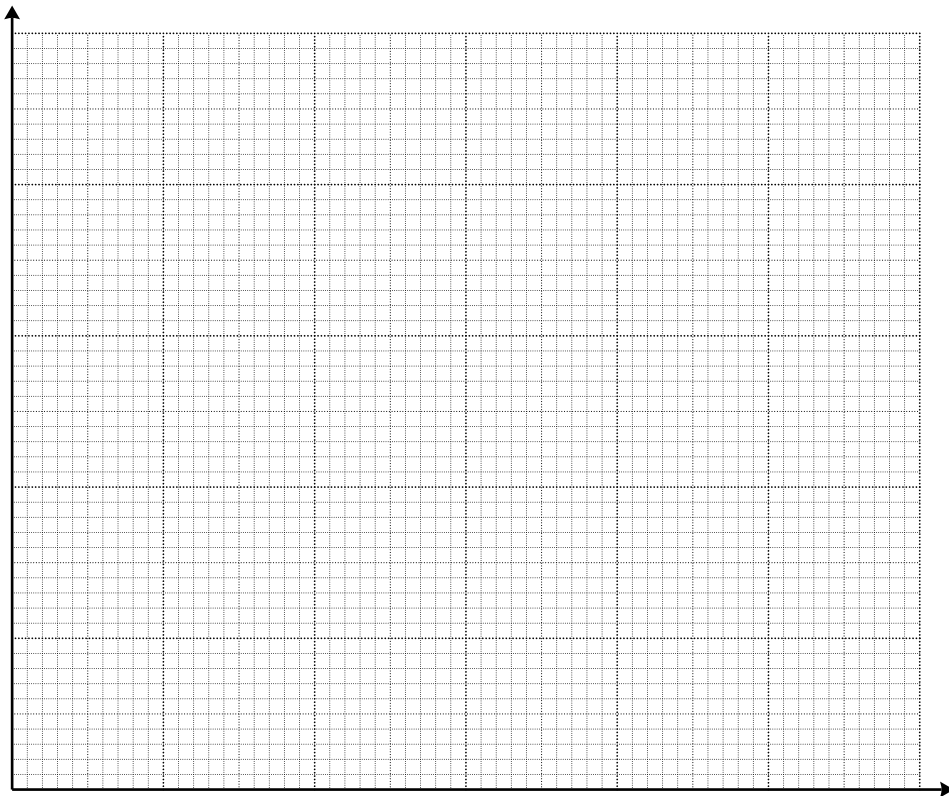
- (ii) Does the scatter diagram support Lizzie's view about the relationship between temperature and height above sea level?  
Explain your answer.

\_\_\_\_\_ because \_\_\_\_\_  
\_\_\_\_\_ [1]

- (b) Sam wants to go somewhere near the equator as he thinks these places will be warmer.

'Latitude' gives information about how far from the equator you are. So Libreville, at latitude 0 degrees, is on the equator and Oslo, at latitude 59 degrees, is a long way north of the equator.

- (i) Use Latitude and Average June temperatures to draw and label another scatter diagram to test Sam's idea.

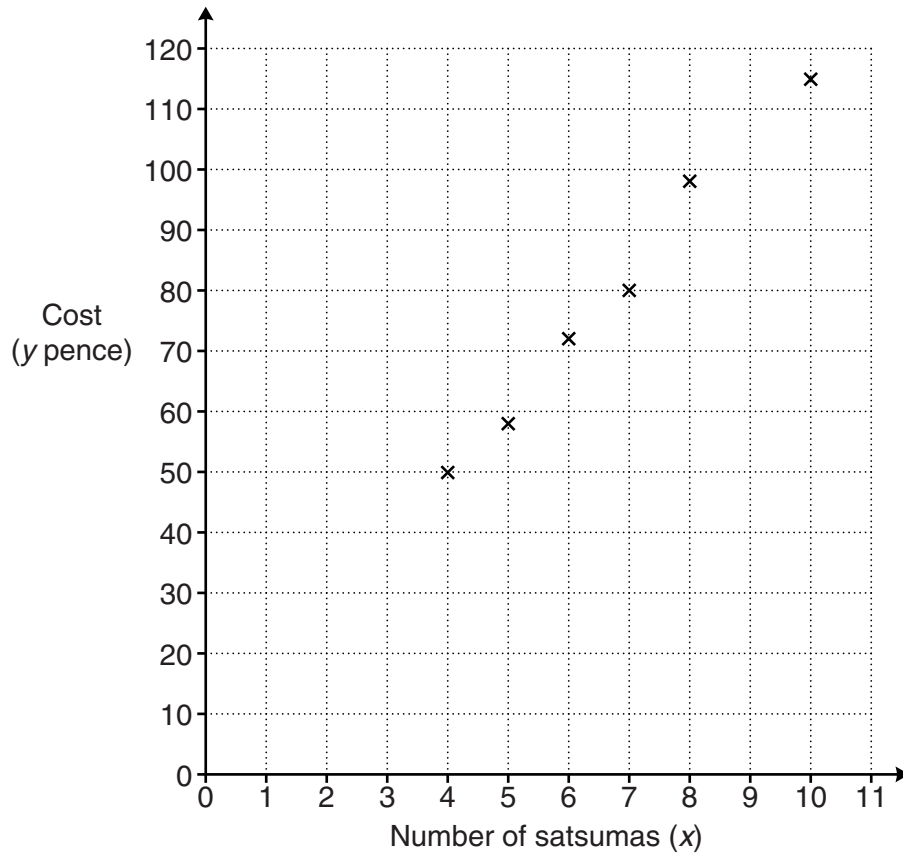


[4]

- (ii) Does your scatter diagram support Sam's view about the relationship between temperature and distance from the equator?  
Explain your answer.

\_\_\_\_\_ because \_\_\_\_\_  
\_\_\_\_\_ [2]

- 6 Wibke buys satsumas from the market each week. She keeps a record of how many satsumas she gets and how much they cost her. She plots this information on a grid.



(a) Draw a line of best fit. [1]

(b) Calculate the gradient of your line.  
Give your answer to the nearest whole number.

(b) \_\_\_\_\_ [2]

(c) What information about satsumas does the gradient represent?

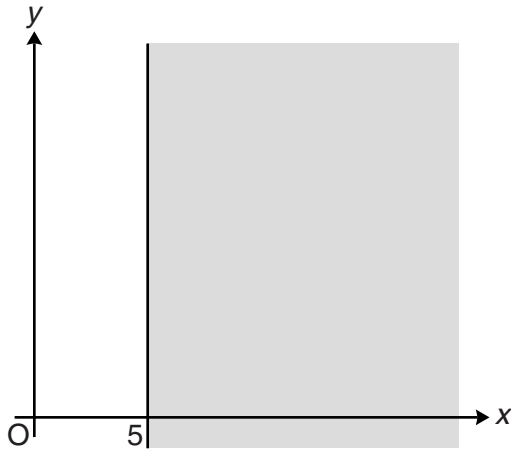
(c) \_\_\_\_\_ [1]

(d) Write down the equation of your line in terms of  $y$  and  $x$ .

(d) \_\_\_\_\_ [2]

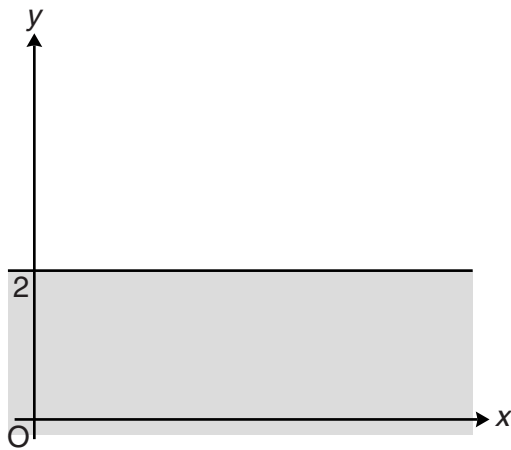
7 Write down the inequality represented by each of these shaded regions.

(a)



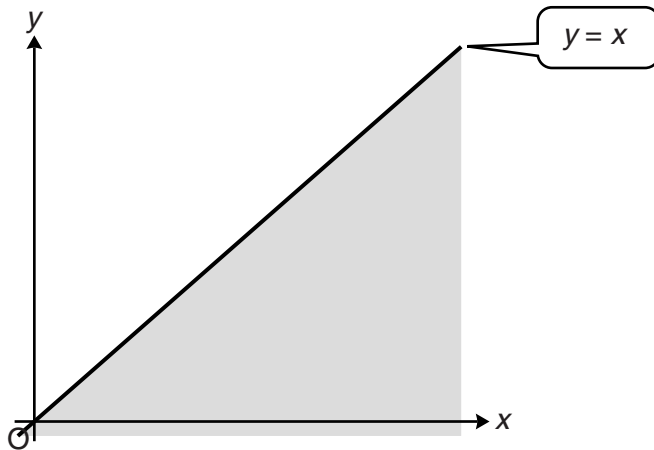
(a) \_\_\_\_\_ [1]

(b)



(b) \_\_\_\_\_ [1]

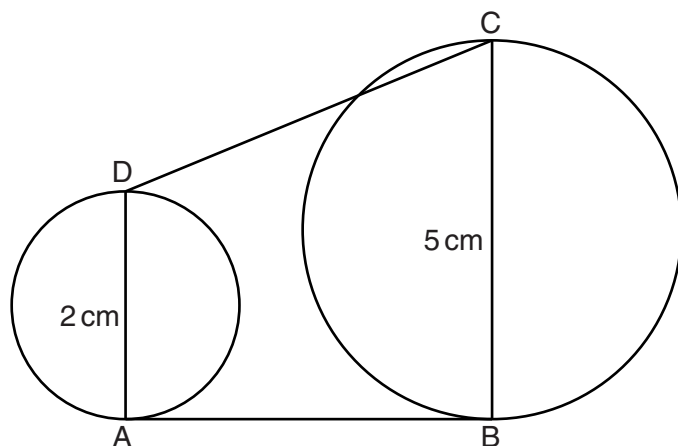
(c)



(c) \_\_\_\_\_ [1]

- 8 (a) The diagram shows a small circle and a large circle.  
 AB is a tangent to both circles.  
 AD and BC are diameters.  
 AD = 2 cm, BC = 5 cm.

- (i) Find the scale factor of the enlargement from the small circle to the large circle.



Not to scale

(a)(i) \_\_\_\_\_ [1]

Any two circles of different size are mathematically similar.

- (ii) Name another shape where **all** sizes of the shape will be mathematically similar to each other.

(ii) \_\_\_\_\_ [1]

- (iii)\* Prove that ABCD is a trapezium.

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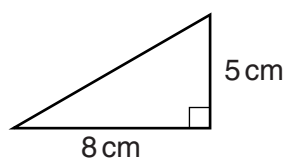
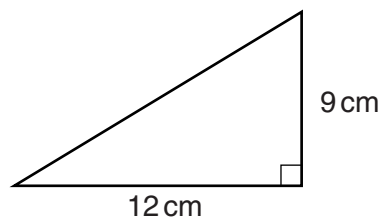
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[3]

(b) (i)\* Show that these two triangles are **not** similar.



Not to scale

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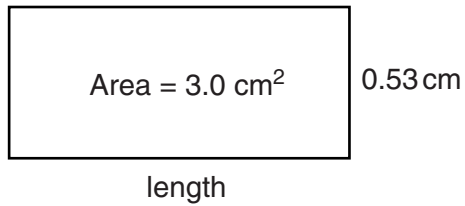
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[3]

(ii) Change **one** measurement on **one** triangle so that the triangles will be similar.

(b)(ii) Change the \_\_\_\_\_ cm side to \_\_\_\_\_ cm [3]

- 9 Martha and Sukh are doing a task on area.  
They have a rectangle with the information shown.



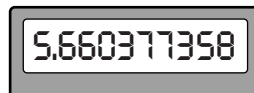
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Martha works out the length and writes down her answer as 0.566 cm.  
Sukh says she must be wrong.

- (a) Complete Sukh's explanation.

*0.566 is clearly the wrong size.*  
I know the answer should be close to 6 because \_\_\_\_\_  
\_\_\_\_\_ [1]

- (b) Sukh's calculator gives the answer as



Martha now rounds this answer to 4 decimal places.

- (i) Round 5.660377358 correct to 4 decimal places.

(b)(i) \_\_\_\_\_ [1]

Sukh says that 4 decimal places is not to an appropriate degree of accuracy.

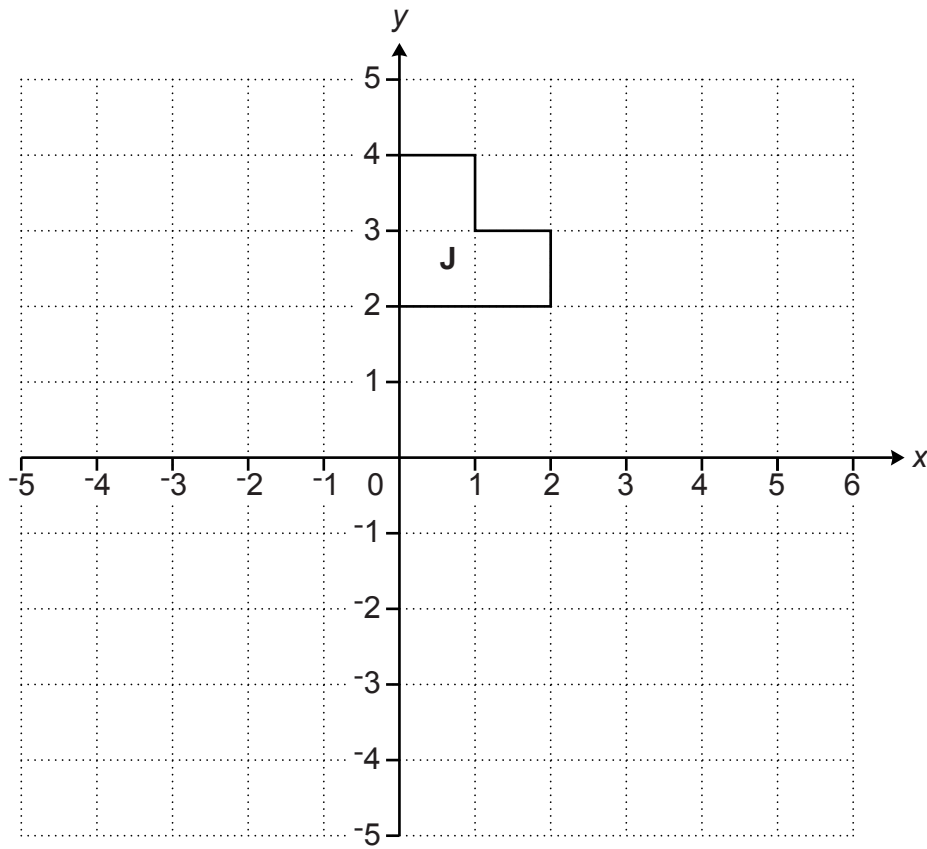
- (ii) To what degree of accuracy should the answer be given?

(ii) \_\_\_\_\_ [1]

- (iii) Use your answer to part (ii) to write the length to an appropriate degree of accuracy.

(iii) \_\_\_\_\_ cm [1]

- 10 Enlarge shape **J** using scale factor  $\times 2$  and centre  $(0, 2)$ .  
Label your image **K**.



[3]

11 (a) Simplify.

$$(3a^3b^4)^2$$

(a) \_\_\_\_\_ [3]

(b) Given that  $f(x) = 3x - 5$ , evaluate  $f(3) - f(1)$ .

(b) \_\_\_\_\_ [3]

(c) Evaluate.

$$125^{-\frac{1}{3}}$$

(c) \_\_\_\_\_ [2]

(d) Rationalise the denominator and simplify.

$$\frac{24}{\sqrt{6}}$$

(d) \_\_\_\_\_ [2]

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