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| Surname | | | | | | Other Names | | | | | |
| Centre Number | | | | | | Candidate Number | | | | | |
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General Certificate of Secondary Education
June 2006

MATHEMATICS (MODULAR) (SPECIFICATION B)
Module 5 Intermediate Tier
Paper 1 Non-Calculator

33005/I1



Monday 5 June 2006 1.30 pm to 2.45 pm

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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>For this paper you must have:</p> <ul style="list-style-type: none"> mathematical instruments <p>You must not use a calculator.</p> | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

Time allowed: 1 hour 15 minutes

Instructions

- Use blue or black ink or ball-point pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book.

Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You may ask for more answer paper, graph paper and tracing paper. This must be tagged securely to this answer book.

Advice

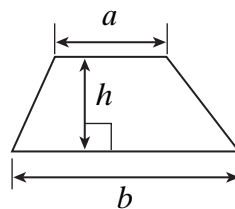
- In all calculations, show clearly how you work out your answer.

| For Examiner's Use | |
|---------------------|------|
| Pages | Mark |
| 3 | |
| 4–5 | |
| 6–7 | |
| 8–9 | |
| 10–11 | |
| 12–13 | |
| 14–15 | |
| 16–17 | |
| 18–19 | |
| 20 | |
| TOTAL | |
| Examiner's Initials | |

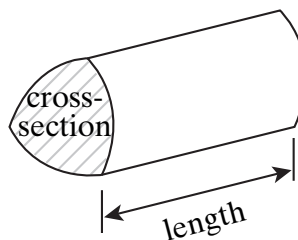
Formulae Sheet: Intermediate Tier

You may need to use the following formulae:

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



Volume of prism = area of cross-section \times length



Answer **all** questions in the spaces provided.

- 1 Isaac is thinking of two numbers.
The sum of the numbers is 100.
One of the numbers is a square number greater than 1.

Write down **two** different possible pairs of values of the numbers.

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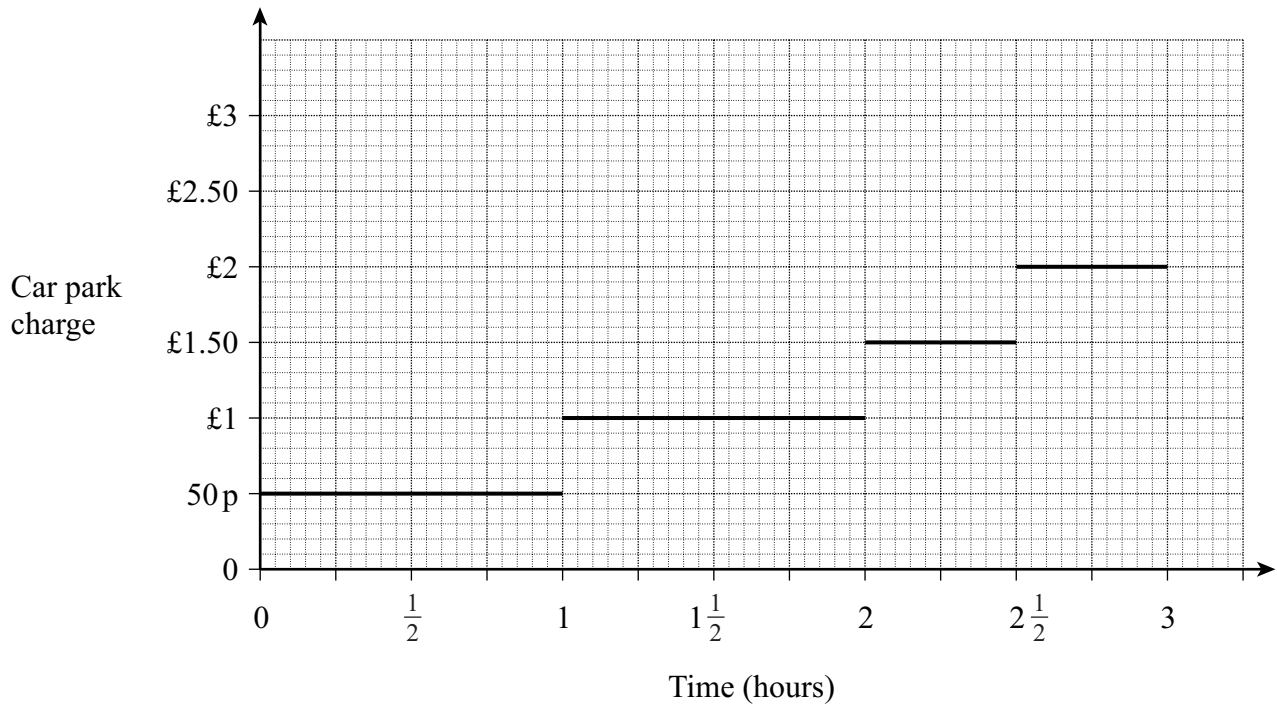
Answer and

..... and (3 marks)

Turn over for the next question

Turn over ►

- 2 The graph shows the charges for a short-stay car park.
It costs 50p to park for up to 1 hour.
The maximum stay allowed is 3 hours.



A blue car and a red car both enter the car park at the same time.
The red car leaves the car park ten minutes later than the blue car.
The charge for the red car is twice as much as the charge for the blue car.

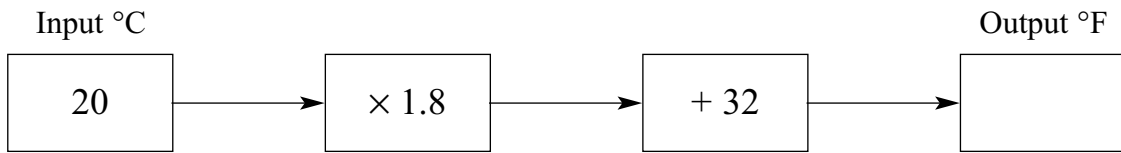
How much were the charges for the two cars?

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Answer and (2 marks)

- 3 (a) The flow diagram shows an exact rule to convert Celsius ($^{\circ}\text{C}$) to Fahrenheit ($^{\circ}\text{F}$).

Use the flow diagram to convert 20°C to $^{\circ}\text{F}$.



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Answer $^{\circ}\text{F}$ (2 marks)

- (b) To convert Celsius ($^{\circ}\text{C}$) to Fahrenheit ($^{\circ}\text{F}$), an approximate two-step rule is

| | |
|---------|---------------|
| Step 1: | Multiply by 2 |
| Step 2: | Add 30 |

Work out the difference between the conversion of 20°C using this method and the exact answer you found in part (a).

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Answer $^{\circ}\text{F}$ (2 marks)

Turn over for the next question

4 The scale of a model car is 1 : 20

(a) The width of the model car is 70 mm.

Calculate the actual width of the car.

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Answer mm (2 marks)

(b) The actual length of the car is 3600 mm.

Calculate the length of the model car.

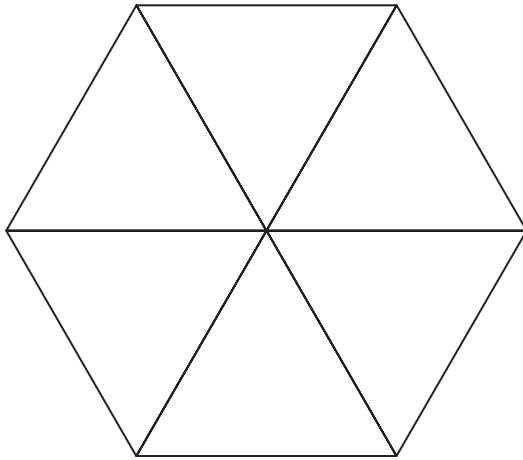
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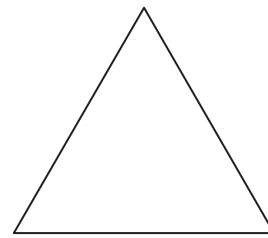
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Answer mm (2 marks)

- 5 A regular hexagon is made from 6 equilateral triangles as shown.
The perimeter of the hexagon is 54 centimetres.



Not drawn accurately



Work out the perimeter of one of the equilateral triangles.

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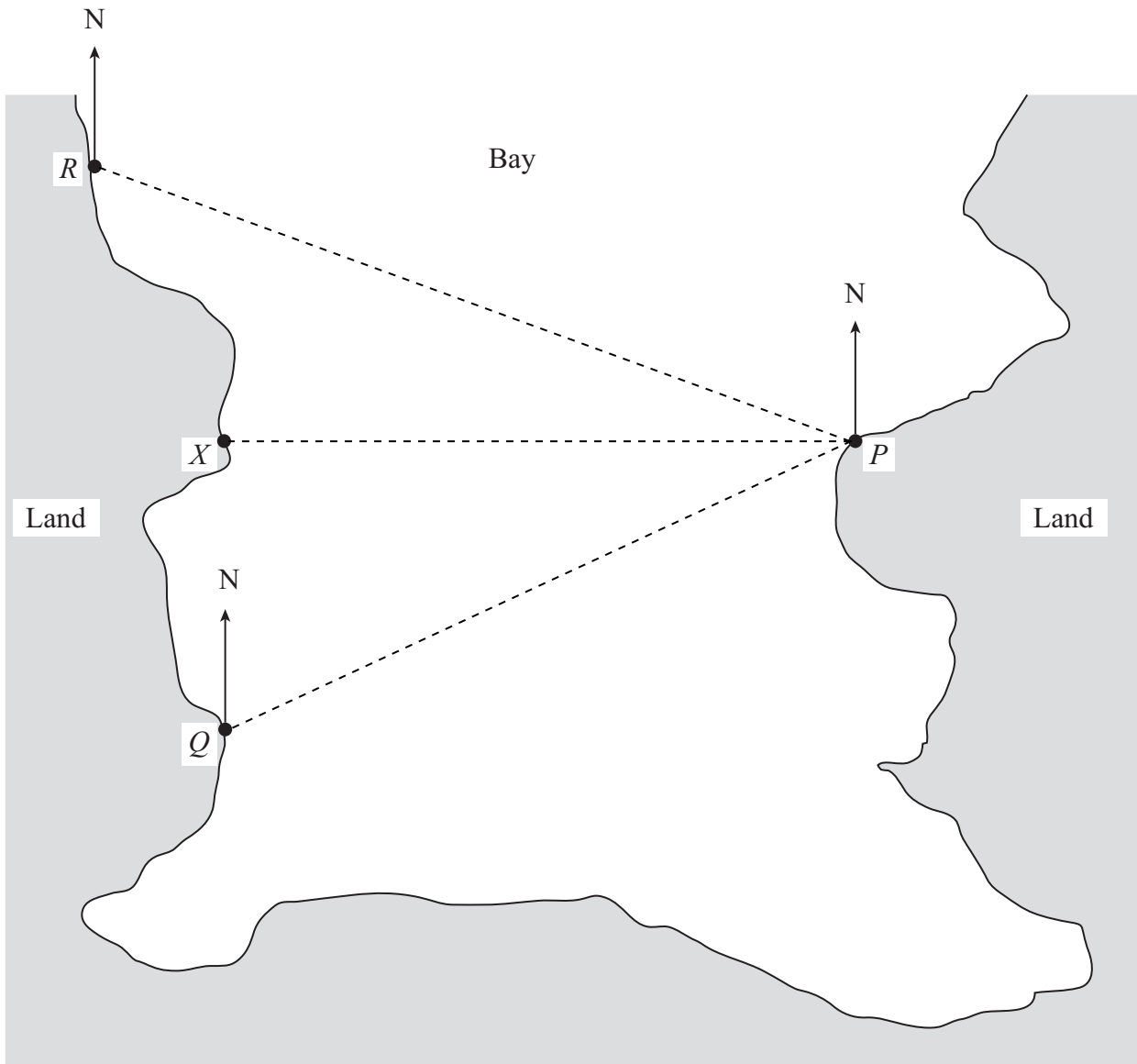
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Answer cm (3 marks)

Turn over for the next question

Turn over ►

6 The diagram shows a map of a bay and four ports P , Q , R and X .



- (a) A ship sails due west to X from P .

Write down the three-figure bearing of X from P .

Answer $^{\circ}$ (1 mark)

- (b) A boat sails to P from Q .

Measure and write down the three-figure bearing of P from Q .

Answer $^{\circ}$ (1 mark)

- (c) A yacht sails to P from R on a bearing of 110°

Work out the three-figure bearing of R from P .

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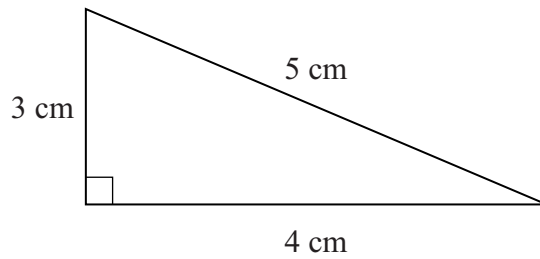
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Answer $^\circ$ (2 marks)

Turn over for the next question

Turn over ►

- 7 (a) The diagram shows a right-angled triangle.



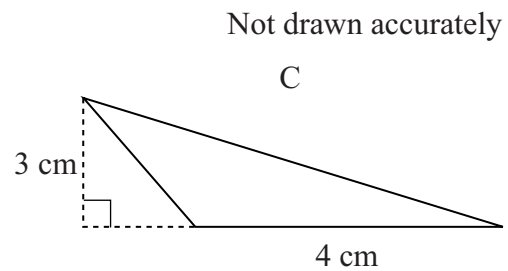
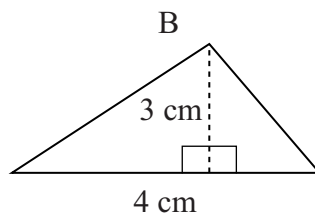
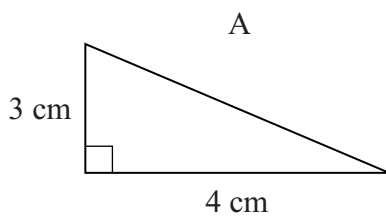
Not drawn accurately

Work out the area of the triangle.
State the units of your answer.

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Answer (3 marks)

- (b) Three triangles are shown, A, B and C.



Here are four statements.

- | | |
|-------------|-----------------------------------------|
| Statement 1 | Triangle A has the greatest area. |
| Statement 2 | Triangle B has the greatest area. |
| Statement 3 | Triangle C has the greatest area. |
| Statement 4 | All three triangles have the same area. |

Which statement is correct?
Give a reason for your answer.

Statement

Reason

..... (2 marks)

- 8 (a) Simplify $3a + 5b - 2a + 4b$

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Answer (2 marks)

- (b) Multiply out $4(x + 5)$

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Answer (1 mark)

- (c) (i) Multiply out $6(3p + q)$

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Answer (1 mark)

- (ii) Multiply out $-2(2p + 3q)$

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Answer (1 mark)

- (iii) Multiply out and simplify $6(3p + q) - 2(2p + 3q)$

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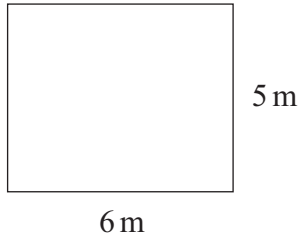
Answer (1 mark)

Turn over for the next question

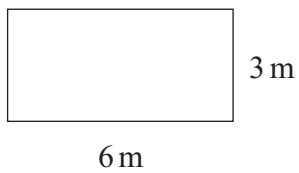
Turn over 

- 9 A room is in the shape of a cuboid.
The diagrams show the plan view, front elevation and side elevation.

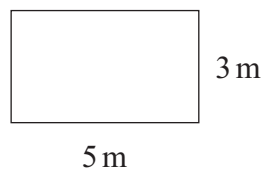
Plan view



Front elevation



Side elevation



Calculate the volume of the room.

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Answer m^3 (3 marks)

- 10 (a) Here is a table about squares.

Complete the table for n squares.

| Number of squares | Total number of sides |
|-------------------|-----------------------|
| 1 | 4 |
| 2 | 8 |
| 3 | 12 |
| 4 | 16 |
| 5 | 20 |
| n | |

(1 mark)

- (b) Here is a sequence of numbers.

5 9 13 17

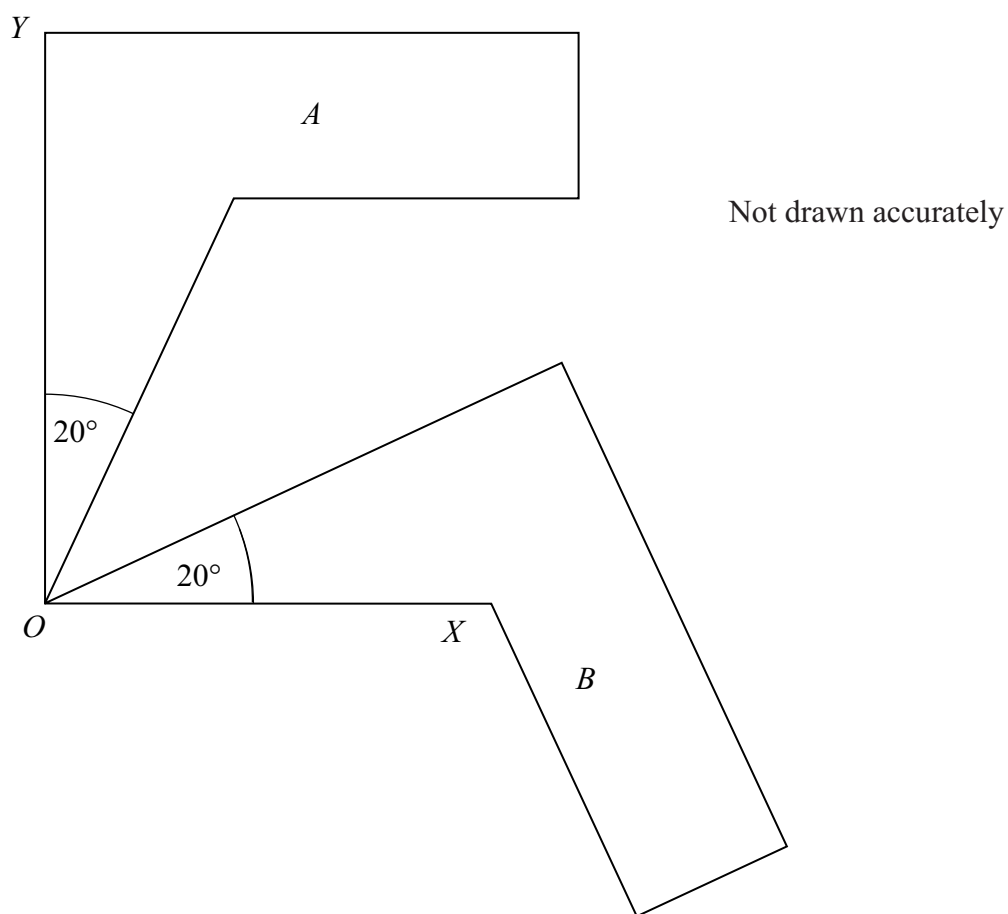
Write down an expression for the n th term.

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Answer (2 marks)

Turn over for the next question

- 11 (a) The diagram shows a rotation of shape A to shape B .
 OX and OY are perpendicular.



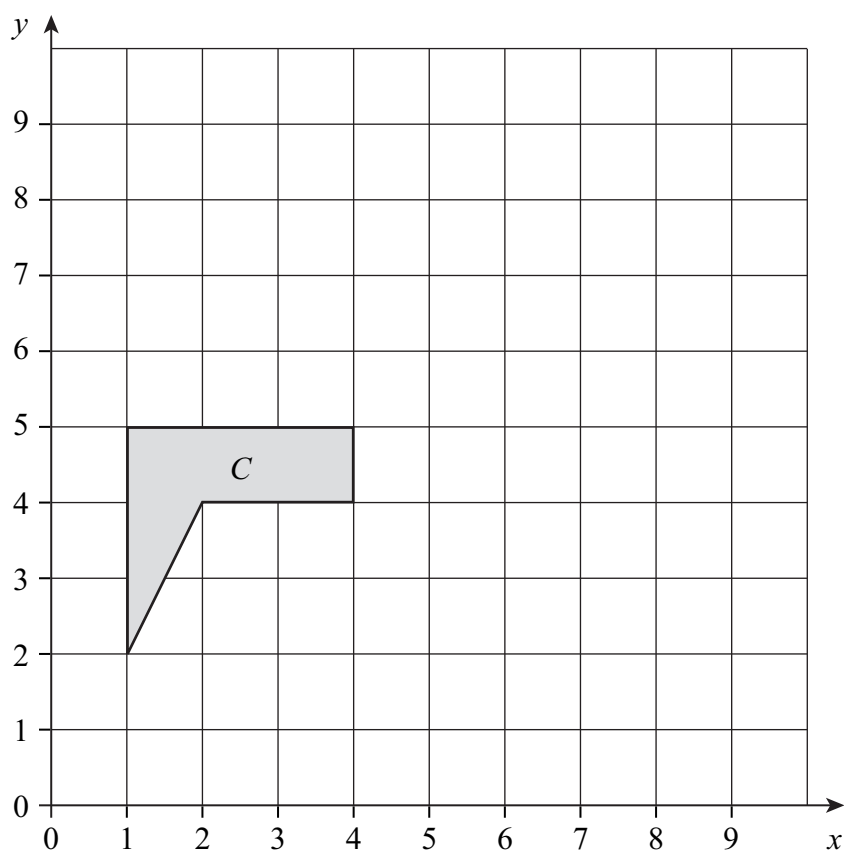
Work out the angle of rotation.

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Answer degrees (2 marks)

- (b) (i) Translate the shaded shape C by the vector $\begin{pmatrix} 4 \\ -1 \end{pmatrix}$



(2 marks)

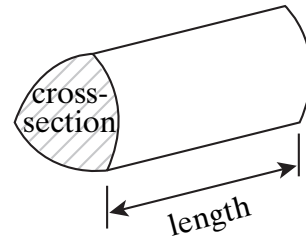
- (ii) Write down the translation vector that would return C back to its original position.

Answer

$\begin{pmatrix} \\ \end{pmatrix}$

(1 mark)

- 12** The diagram shows a prism.
The area of cross-section is 14 cm^2 .
The length of the prism is 14 cm .



Calculate the volume of the prism.

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Answer cm^3 (2 marks)

- 13** (a) Expand $2x(x^2 - 4)$

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Answer (2 marks)

- (b) Factorise $y^2 - 4y$

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Answer (1 mark)

- (c) Make x the subject of the formula $y = 3 + x$

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Answer $x =$ (1 mark)

- 14 (a) Here is a number pattern.

Complete Line 3 and Line 5.

Line 1: $-1 \times 4 + 5 = 1^2$

Line 2: $0 \times 5 + 4 = 2^2$

Line 3: $\dots \times \dots + \dots = \dots$

Line 4: $2 \times 7 + 2 = 4^2$

Line 5: $\dots \times \dots + \dots = \dots$

(4 marks)

- (b) The n th line of the pattern in part (a) is

Line n : $(n-2) \times (n+3) + (6-n) = n^2$

Show clearly that $(n-2)(n+3) + (6-n) = n^2$

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(4 marks)

15 In each of the following expressions x , y and z represent lengths.

For each expression state whether it could represent a length, an area, a volume or none of these.

(a) $x + y$

Answer (1 mark)

(b) xy

Answer (1 mark)

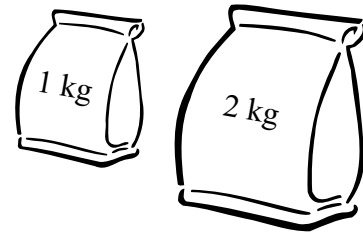
(c) $\frac{xy}{z}$

Answer (1 mark)

(d) $\frac{x}{y + z}$

Answer (1 mark)

- 16** There are 70 bags of sugar on a shelf.
There are x bags that weigh 1 kg.
There are y bags that weigh 2 kg.



- (a) Write down an equation connecting x and y .

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Answer (1 mark)

- (b) The total weight of the bags is 96 kg.

Use algebra to work out the values of x and y .
You **must** show your working.

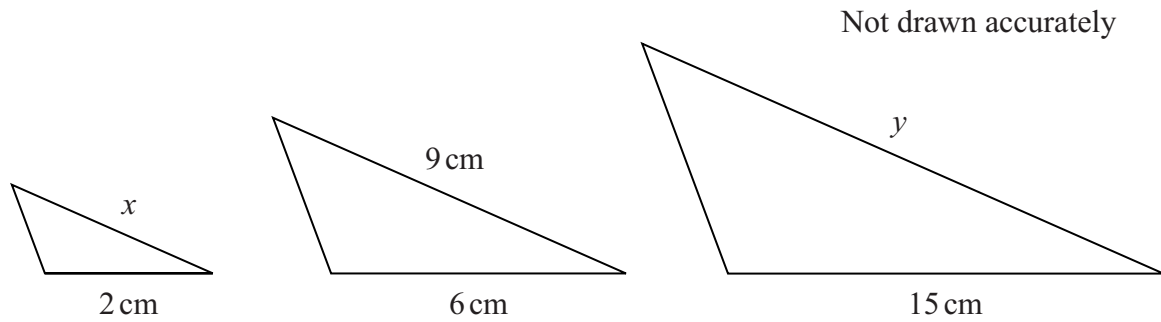
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Answer $x =$, $y =$ (4 marks)

Turn over for the next question

Turn over ►

17 The diagram shows three similar triangles.



(a) Work out the value of x .

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Answer cm (2 marks)

(b) Work out the value of y .

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Answer cm (3 marks)

END OF QUESTIONS