



## GCSE Foundation 21

*Shape, space and measure*

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110 minutes

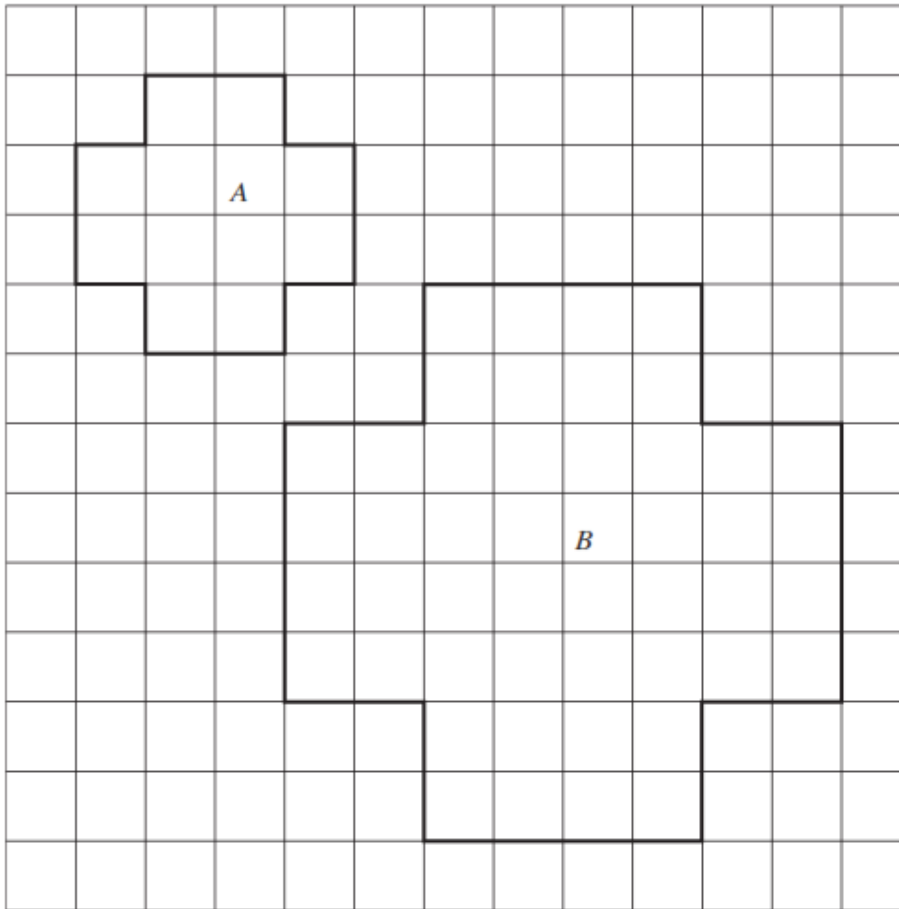


108 marks

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*Mensuration*

**Q1.** Shape *A* and shape *B* are drawn on a centimetre grid.



- (a) Work out the area of shape *A*.  
State the units of your answer.

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Answer .....

(2)

- (b) Shape *B* is an enlargement of shape *A*.

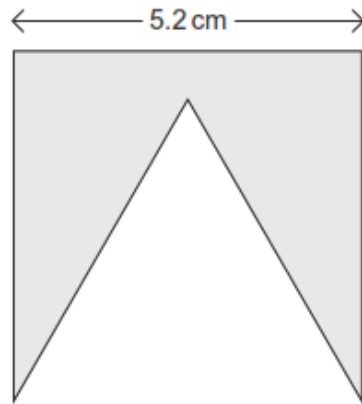
Write down the scale factor of the enlargement.

Answer .....

(1)

(Total 3 marks)

- Q2.** This shape is made by cutting out an equilateral triangle from a square.



Not drawn  
accurately

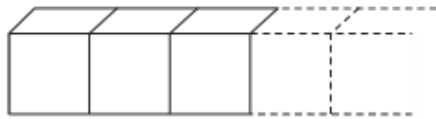
Work out the perimeter of the shape.

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.....

Answer ..... cm

(Total 2 marks)

- Q3.** A shape is made by joining centimetre cubes together in a row as shown.



The surface area of the shape is  $34 \text{ cm}^2$

Work out the number of cubes used to make the shape.

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Answer .....

(Total 3 marks)

**Q4.** Work out the area of a circle of radius 6 m.

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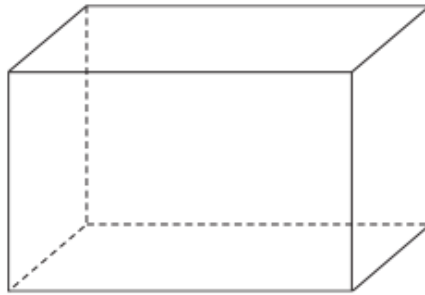
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Answer ..... m<sup>2</sup>

**(Total 2 marks)**

**Q5.** The total length of the 12 edges of a cuboid is 52 cm.  
The length, width and height are all different.



Work out possible dimensions of the cuboid.

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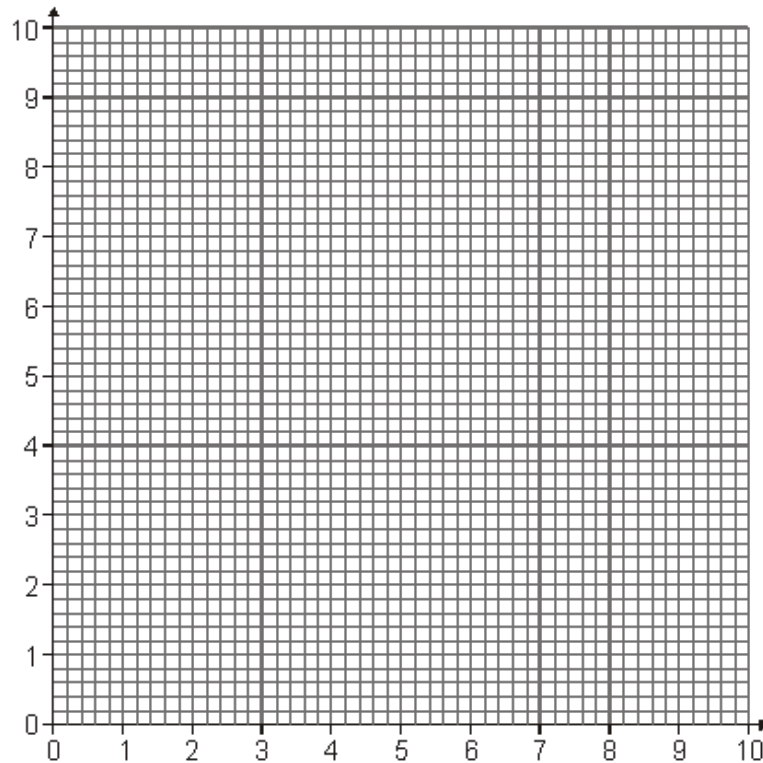
Length = ..... cm

Width = ..... cm

Height = ..... cm

**(Total 3 marks)**

**Q6.** (a) Here is a centimetre grid.



Plot four points  $A$ ,  $B$ ,  $C$  and  $D$  on the grid to make a rectangle  $ABCD$  of length 6 cm and width 4 cm.

(2)

(b) Tick whether each statement is always true, sometimes true or never true.

(i) Rectangles with an area of  $24 \text{ cm}^2$  have a length of 6 cm.

☐

Always true

☐

Sometimes true

☐

Never true

(1)

(ii) Rectangles with a perimeter of 20 cm have a length of 12 cm.

☐

Always true

☐

Sometimes true

☐

Never true

(1)

(iii) Rectangles with length 6 cm and width 4 cm have area  $24 \text{ cm}^2$  and perimeter 20 cm.

☐

Always true

☐

Sometimes true

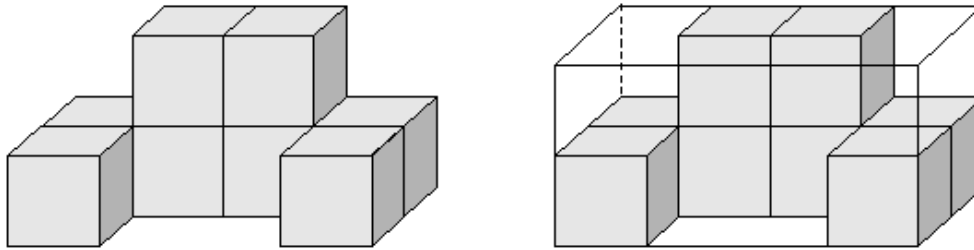
☐

Never true

(1)

(Total 5 marks)

- Q7.** Centimetre cubes are fitted together to make a solid as shown on the left.



The solid is packed into a box as shown on the right.

The box is a cuboid.

Work out the volume of the box.

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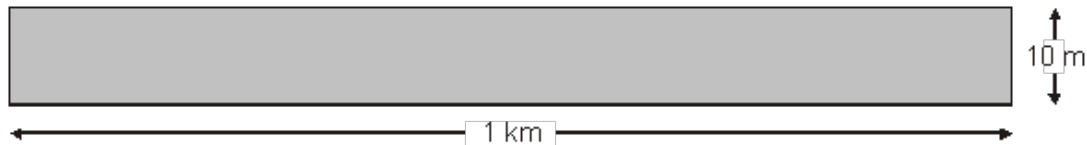
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Answer .....  $\text{cm}^3$

**(Total 3 marks)**

- Q8.** Large areas can be measured in hectares.

1 hectare is  $10\,000\text{ m}^2$ .



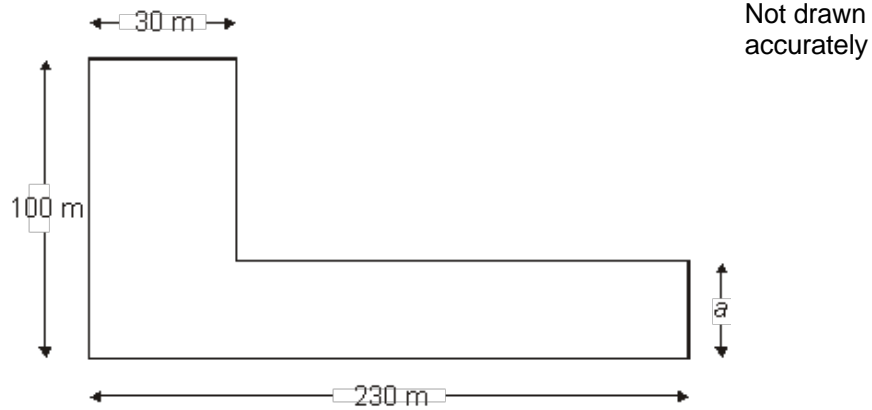
- (a) Explain why the diagram represents 1 hectare.

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**(1)**

- (b) This L-shape has an area of one hectare.  
All lengths are a whole number of metres.



Work out the value of  $a$ .  
Give your answer in metres.

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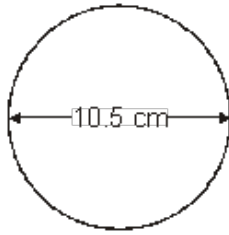
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Answer ..... m

(3)  
(Total 4 marks)

- Q9.** Work out the circumference of a circle of diameter 10.5 cm.



Not drawn accurately

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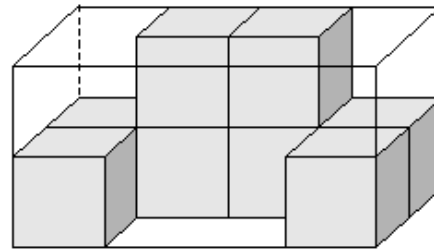
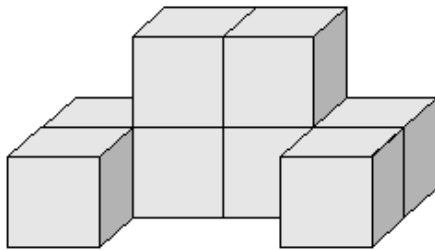
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Answer ..... cm

**(Total 2 marks)**

- Q10.** Centimetre cubes are fitted together to make a solid as shown on the left.



The solid is packed into a box as shown on the right.  
The box is a cuboid.

Work out the volume of the box.

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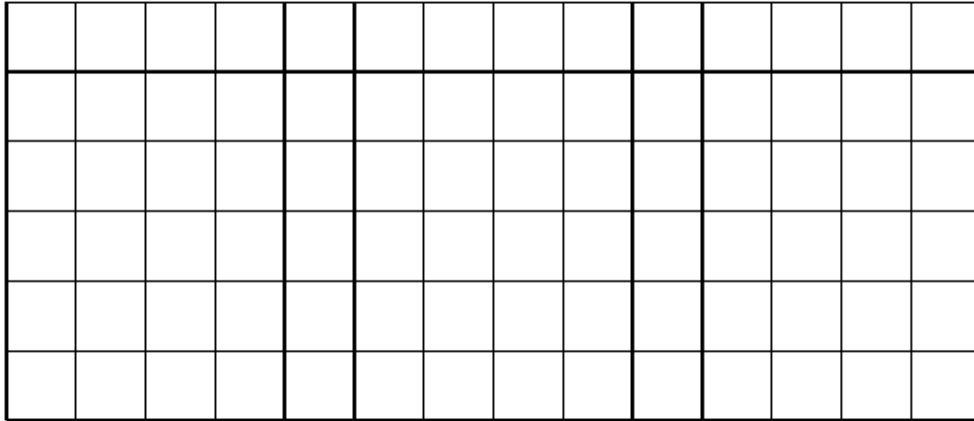
Answer ..... cm<sup>3</sup>

**(Total 3 marks)**

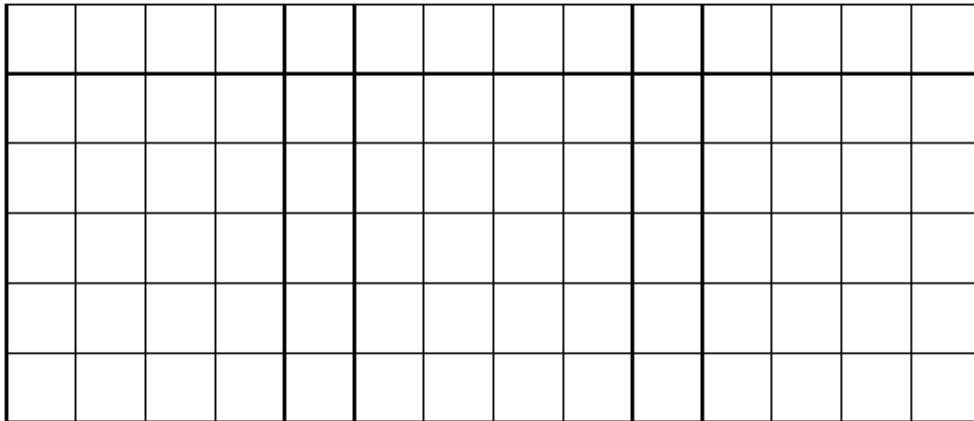


- Q11.** (a) On each of these centimetre grids draw a **different** rectangle.  
Each rectangle must have an area of  $12\text{cm}^2$ .

Rectangle A



Rectangle B



(2)

- (b) Work out the difference between the perimeter of rectangle A and rectangle B.  
You **must** show your working.

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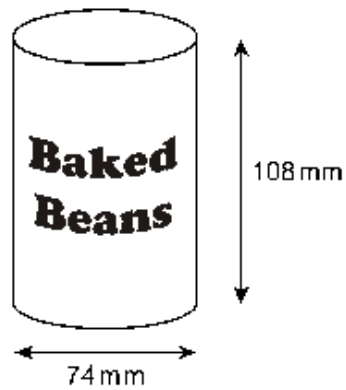
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Answer ..... cm

(2)

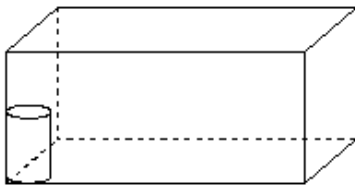
(Total 4 marks)

**Q12.** The diagram shows a can of Baked Beans.



Not drawn accurately

The cans are delivered to shops in cardboard boxes.  
Each box contains 48 cans.



Not drawn accurately

Work out suitable dimensions for one of these cardboard boxes.

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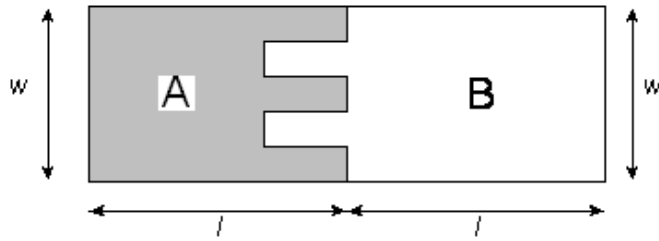
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Answer ..... mm by ..... mm by ..... mm

**(Total 3 marks)**

**Q13.** A and B are two interlocking shapes as shown.



Complete the following using

**greater than** or **less than** or **equal to**

(a) The perimeter of A is ..... the perimeter of B.

(1)

(b) The area of A is ..... the area of B.

(1)

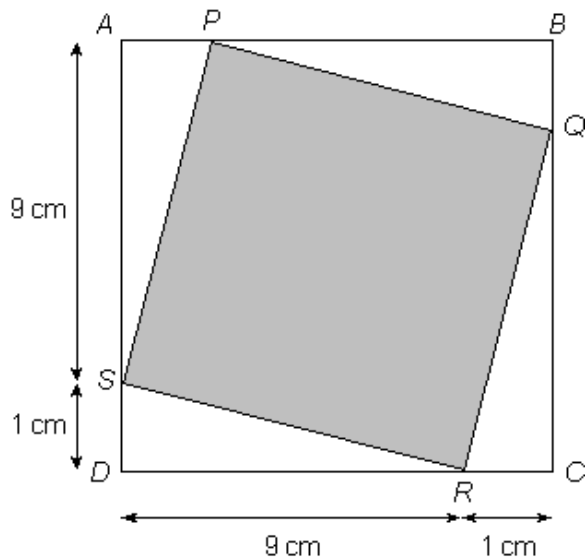
(Total 2 marks)

**Q14.**  $ABCD$  is a square.

$PQRS$  is a square with vertices on the sides of  $ABCD$ .

$AS = DR = CQ = BP = 9$  cm

$PA = SD = RC = QB = 1$  cm



What is the area of the shaded square  $PQRS$ ?

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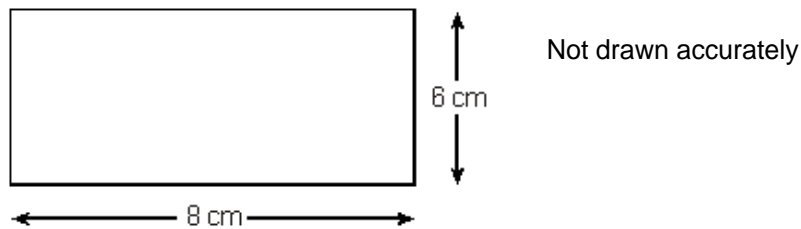
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Answer .....  $\text{cm}^2$

(Total 3 marks)

- Q15.** (a) The diagram shows a rectangle.



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

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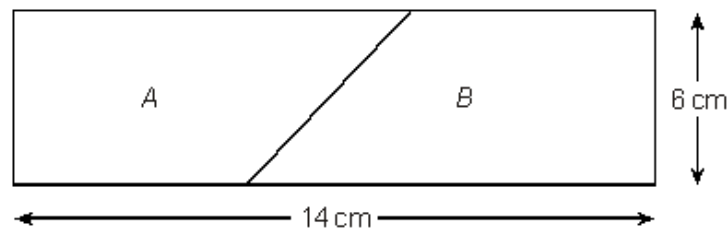
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Answer .....

(3)

- (b) The diagram shows a rectangle made from two congruent shapes  $A$  and  $B$ .



- (i) Write down the mathematical name of shape  $B$ .

Answer .....

(1)

- (ii) Explain how you could work out the area of shape *B*.

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.....

(2)  
(Total 6 marks)

**Q16.** The area of a square is  $387.5\text{cm}^2$ .

- (a) Work out the length of one side of the square.  
Give **all** the figures on your calculator display.

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Answer ..... cm

(2)

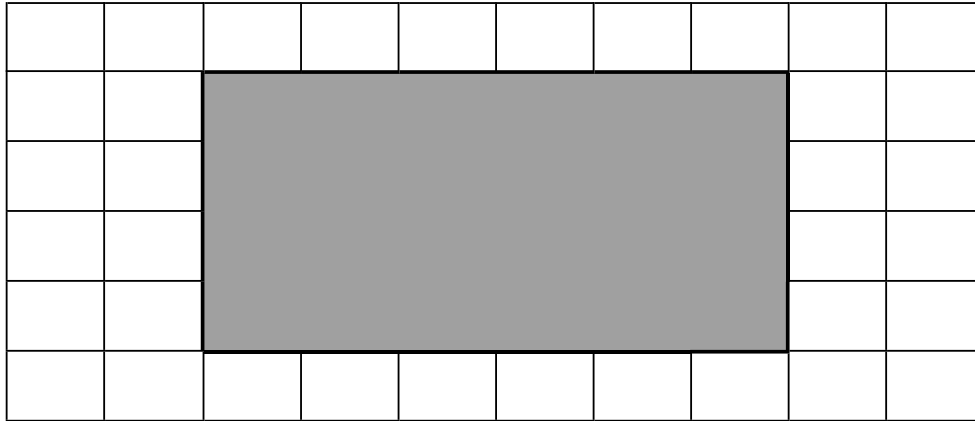
- (b) Give your answer to 1 decimal place.

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Answer ..... cm

(1)  
(Total 3 marks)

- Q17.** (a) The diagram shows a rectangle drawn on a centimetre grid.



Work out the perimeter of the rectangle.

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.....

Answer ..... cm

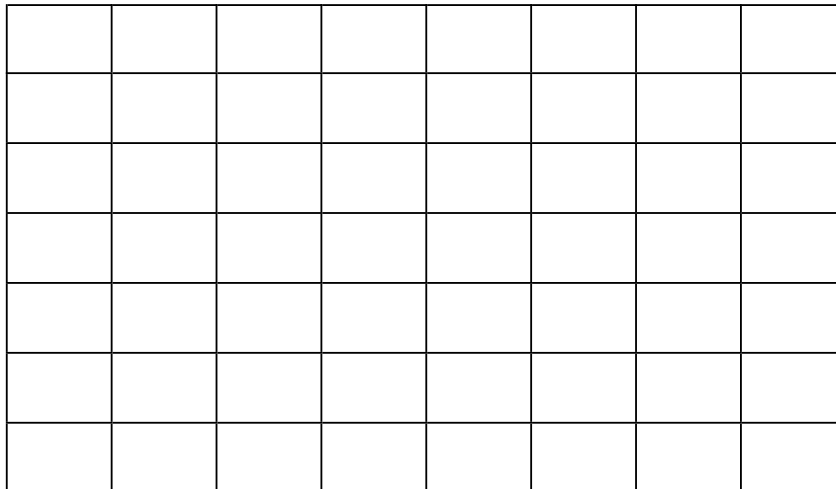
(1)

- (b) The perimeter of a square is 12 cm.

Draw the square on the grid below.

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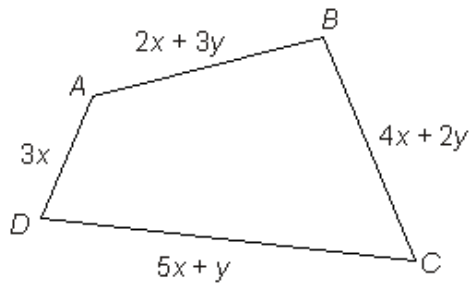
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(2)

(Total 3 marks)

**Q18.**  $ABCD$  is a quadrilateral.



Not drawn accurately

- (a) Write down an expression for the perimeter of the quadrilateral in terms of  $x$  and  $y$ . Simplify your answer.

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Answer .....

(2)

- (b) When  $x = 4$  cm, the perimeter of the quadrilateral is 68 cm.

Find the value of  $y$ .

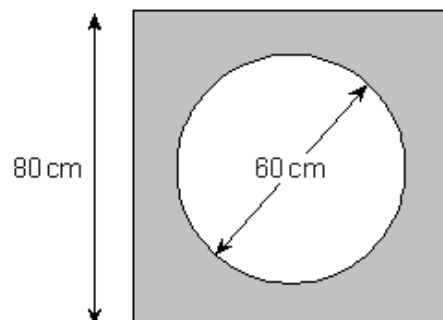
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Answer .....cm

(3)

(Total 5 marks)

**Q19.** A circle of diameter 60 cm is cut out of a square of side 80 cm.



Not drawn accurately

Calculate the shaded area.

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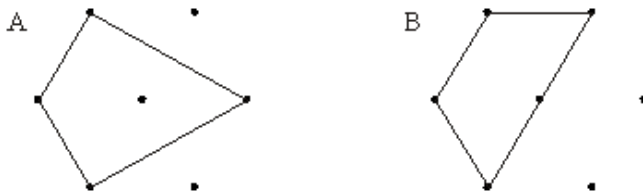
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Answer .....cm<sup>2</sup>

(Total 3 marks)

**Q20.** Frank draws two quadrilaterals on a seven-point triangular grid.



(a) (i) What special name is given to quadrilateral A?

Answer .....

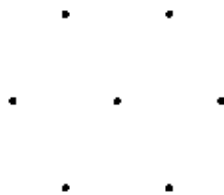
(1)

(ii) What special name is given to quadrilateral B?

Answer .....

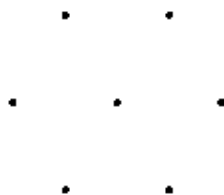
(1)

(b) By joining 4 dots on the seven-point grid below draw a rectangle.



(1)

(c) By joining 3 dots on the seven-point grid below draw an equilateral triangle.



(1)



- (d) The perimeter of quadrilateral A can be found using the formula

$$P = 2a + 2b$$

Find  $P$  when  $a = 3$  and  $b = 5.2$

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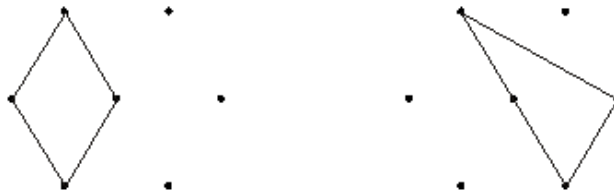
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Answer  $P =$  .....

(2)

- (e) Frank now draws a quadrilateral and a triangle.



Explain why the areas of the two shapes are the same.

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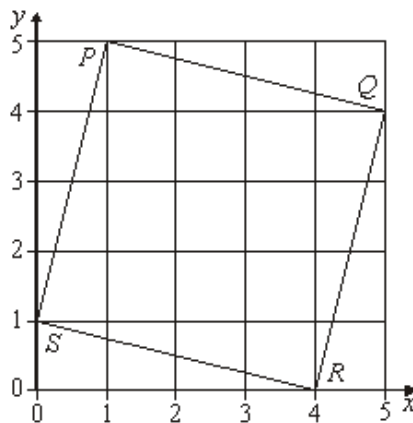
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(2)

(Total 8 marks)

- Q21.** The square  $PQRS$  is drawn on a centimetre square grid.



- (a) The coordinates of  $P$  are  $(1, 5)$ .  
Write down the coordinates of  $Q$ ,  $R$  and  $S$ .

Answer  $Q$  ( ..... , ..... )

$R$  ( ..... , ..... )

$S$  ( ..... , ..... )

(2)

- (b) Calculate the area of square  $PQRS$ .  
You **must** show your working.  
State the units of your answer.

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Answer .....

(4)

(Total 6 marks)

**Q22.** A cuboid is made from centimetre cubes.

The area of the base of the cuboid is  $5 \text{ cm}^2$ .

The volume of the cuboid is  $10 \text{ cm}^3$ .

Work out the surface area of the cuboid.

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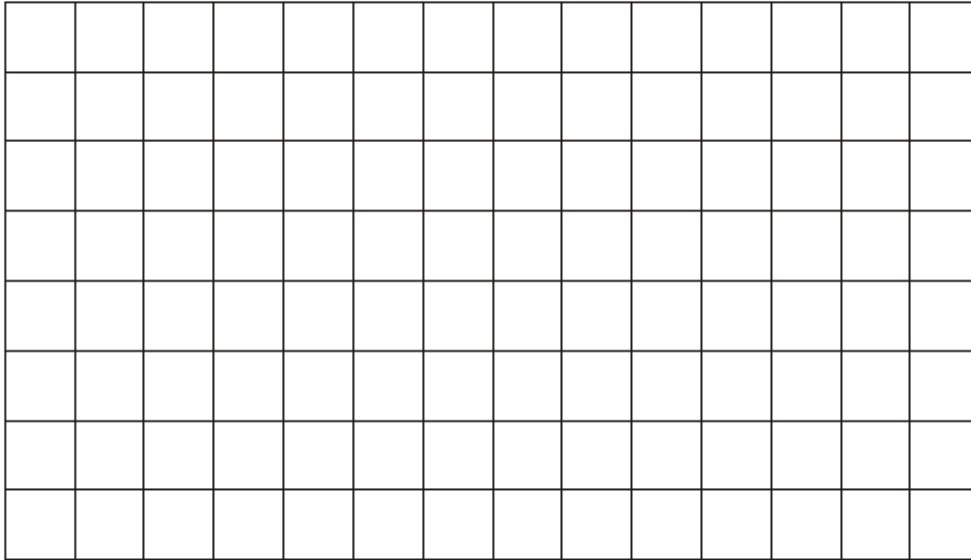
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Answer .....  $\text{cm}^2$

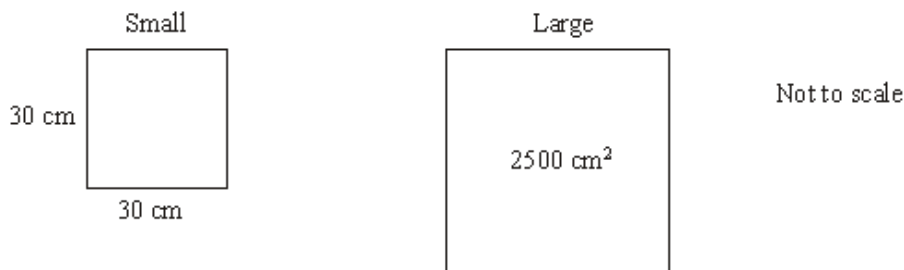
(Total 3 marks)

**Q23.** Draw, on the centimetre square grid below, a rectangle that has an area of  $12 \text{ cm}^2$ .



(Total 2 marks)

**Q24.** A shop sells square carpet tiles in two different sizes.



(a) What is the area of a small carpet tile?

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Answer ..... cm<sup>2</sup>

(2)

- (b) What is the length of a side of a large carpet tile?

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Answer ..... cm

(1)

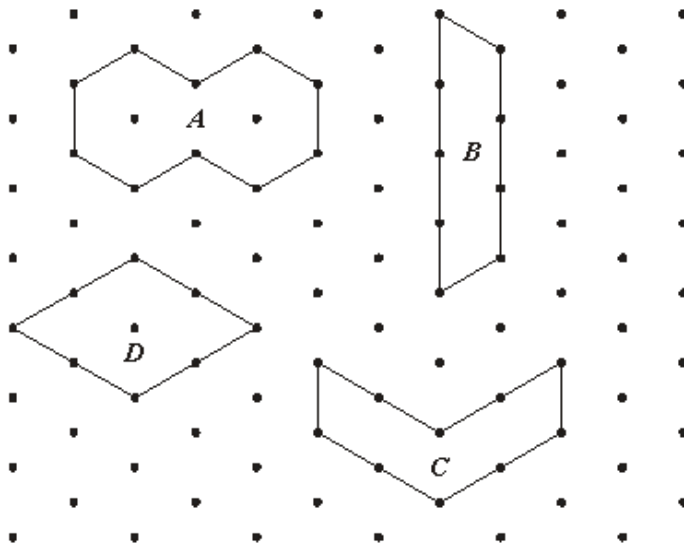
- (c) The floor of a rectangular room is 300 cm long and 180 cm wide.  
How many **small** tiles are needed to carpet the floor?

Answer .....

(3)

(Total 6 marks)

**Q25.** Some shapes are drawn on a 1 centimetre triangular grid.



- (a) Find the perimeter of shape *D*.

.....

Answer ..... cm

(1)

(b) Which **two** shapes have the same perimeter?

.....

Answer .....

(1)

(c) Which **two** shapes have the same area?

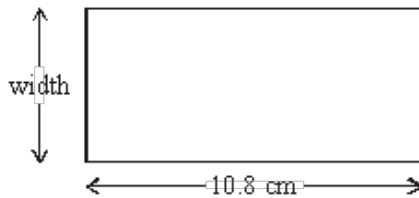
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Answer .....

(2)

(Total 4 marks)

**Q26.** The length of a rectangle is 10.8 cm.  
The perimeter of the rectangle is 28.8 cm.



Not to scale

Calculate the width of the rectangle.

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Answer ..... cm

(Total 3 marks)

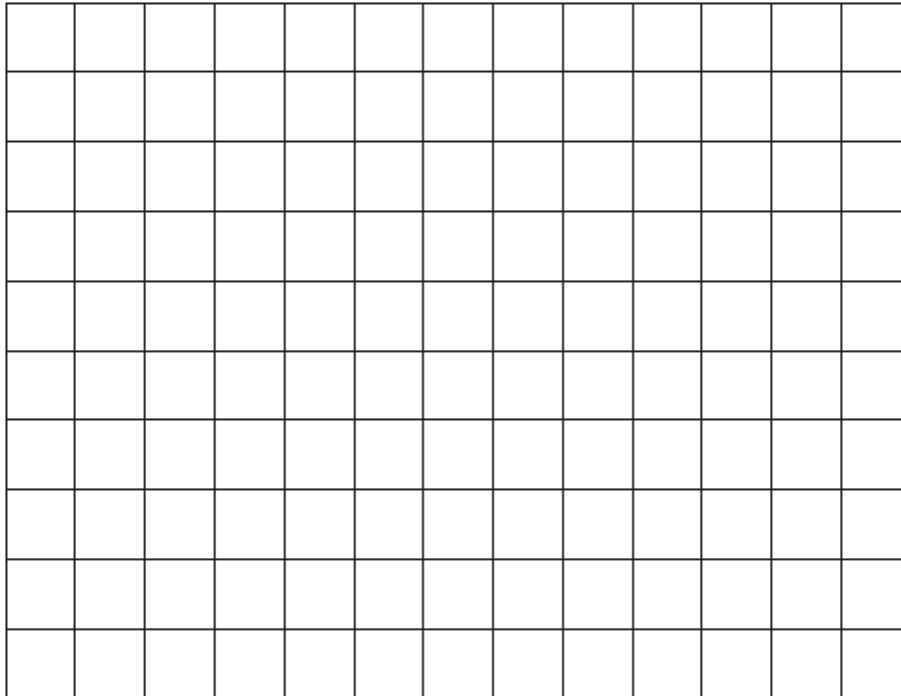
**Q27.** A rectangle has an area of  $40 \text{ cm}^2$  and a perimeter of  $26 \text{ cm}$ .  
 Find the length and width of the rectangle.  
 You may use the grid to help you.

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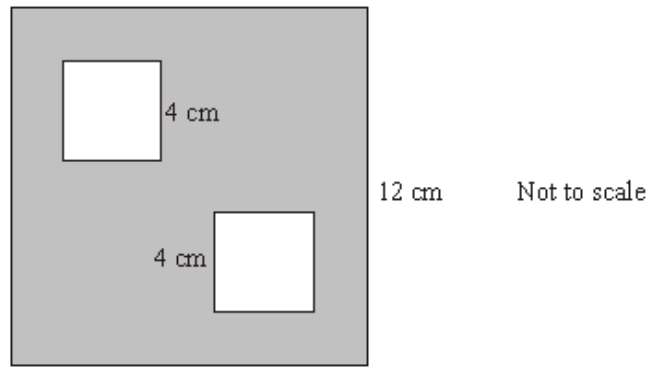


Answer Length ..... cm

Width ..... cm

**(Total 2 marks)**

- Q28.** (a) Two squares of side 4 cm are removed from a square of side 12 cm as shown.



Work out the shaded area.

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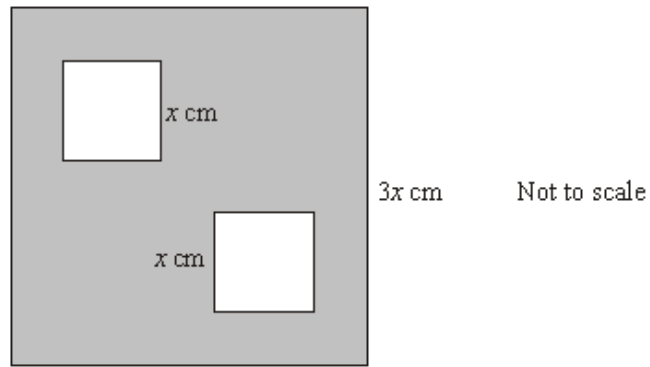
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Answer .....

**(3)**

- (b) Two squares of side  $x$  cm are removed from a square of side  $3x$  cm as shown.



Work out the fraction of the large square which remains.  
Give your answer in its simplest form.

You **must** show your working.

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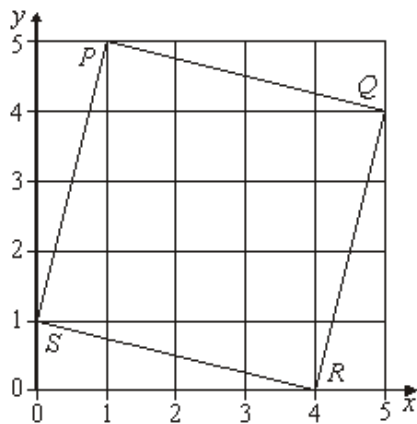
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Answer .....

(3)  
(Total 6 marks)

- Q29.** The square  $PQRS$  is drawn on a centimetre square grid.





- (a) The coordinates of  $P$  are  $(1, 5)$ .  
Write down the coordinates of  $Q$ ,  $R$  and  $S$ .

Answer  $Q$  ( ..... , ..... )

$R$  ( ..... , ..... )

$S$  ( ..... , ..... )

(2)

- (b) Calculate the area of square  $PQRS$ .  
You **must** show your working.  
State the units of your answer.

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Answer .....

(4)

(Total 6 marks)

