Name	ANSWERS	Class	

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Area and perimeter
(9 – 1) Topic booklet
Foundation

These questions have been collated from previous years GCSE Mathematics papers.

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions
- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**
- If the question is a **1F** question you are not allowed to use a calculator.
- If the question is a **2F** or a **3F** question, you may use a calculator to help you answer.

Information
- The marks for **each** question are shown in brackets
 – *use this as a guide as to how much time to spend on each question.*

Advice
- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions
Write your answers in the space provided.
**You must write down all the stages in your working.**

5   The diagram shows a rectangle.

7cm

35 m

4cm   20 m
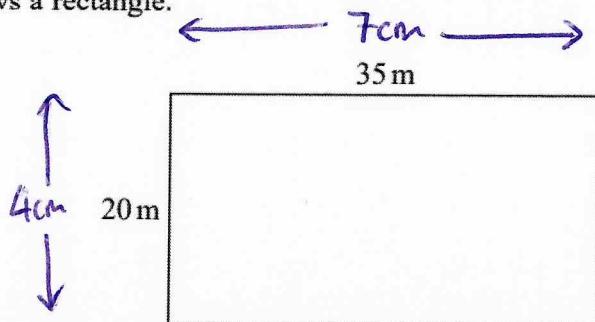
On the centimetre grid below, draw an accurate scale drawing of this rectangle.
Use a scale of 1 cm to represent 5 m.

(Total for Question 5 is 2 marks)
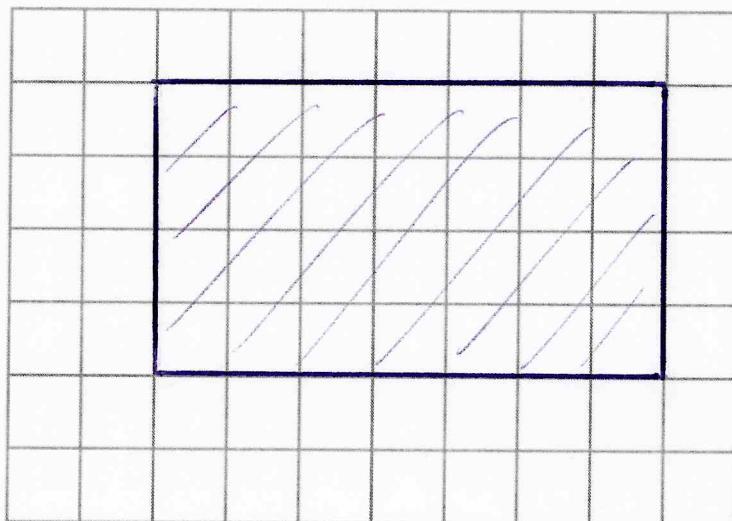
6   The diagram shows a shape on a centimetre grid.
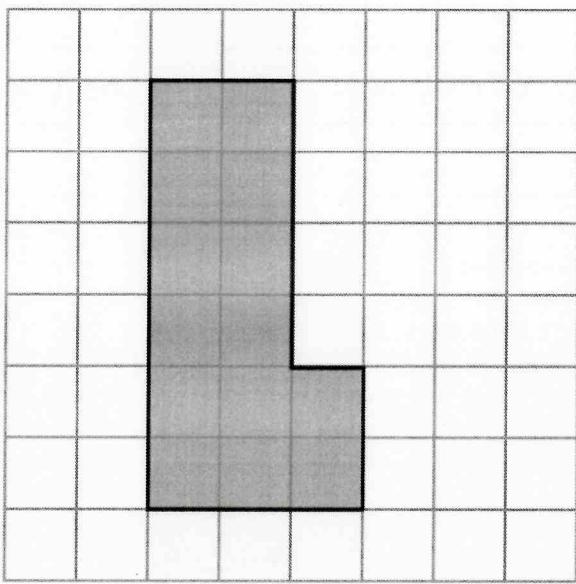
(a) Find the area of the shape.

14 .... cm²

(1)

(b) Find the perimeter of the shape.

18 .... cm

(1)

(Total for Question 6 is 2 marks)

8 The length of a rectangle is twice as long as the width of the rectangle.
The area of the rectangle is 32 cm².

Draw the rectangle on the centimetre grid.

(Total for Question 8 is 2 marks)
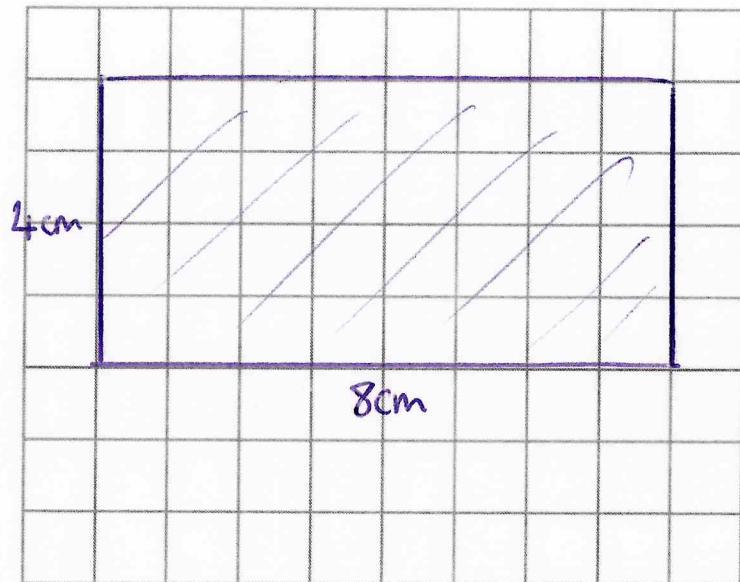
10 The diagram shows two shapes drawn on a centimetre grid.
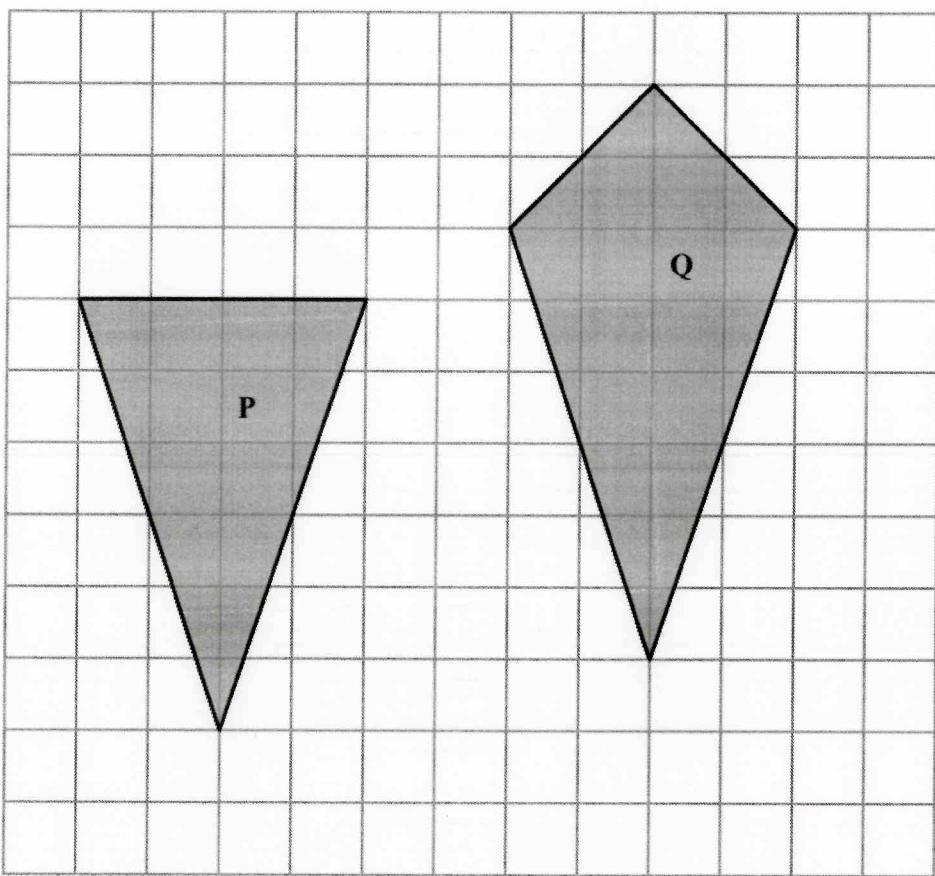
(a) Find the area of shape **P**.

$$\frac{b \times h}{2} = \frac{4 \times 6}{2} = \frac{24}{2}$$

12 cm²

(2)

(b) Write down the mathematical name of quadrilateral **Q**.

kite

(1)

(Total for Question 10 is 3 marks)

12 The diagram shows a triangle and a rectangle.
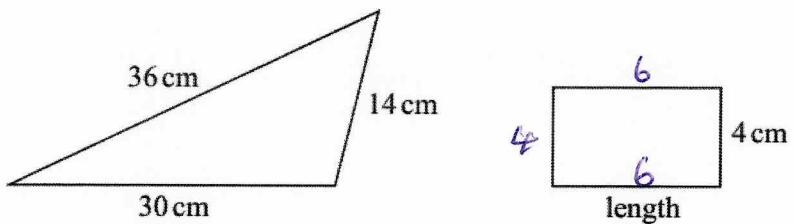
The perimeter of the rectangle is a quarter of the perimeter of the triangle.

Work out the length of the rectangle.

Perimeter of triangle

$= 30 + 36 + 14$ $\longrightarrow$ $\frac{1}{4}$ of 80 = 20cm

$= 80$cm

6 .... cm

(Total for Question 12 is 4 marks)

12 Here is a star shape.
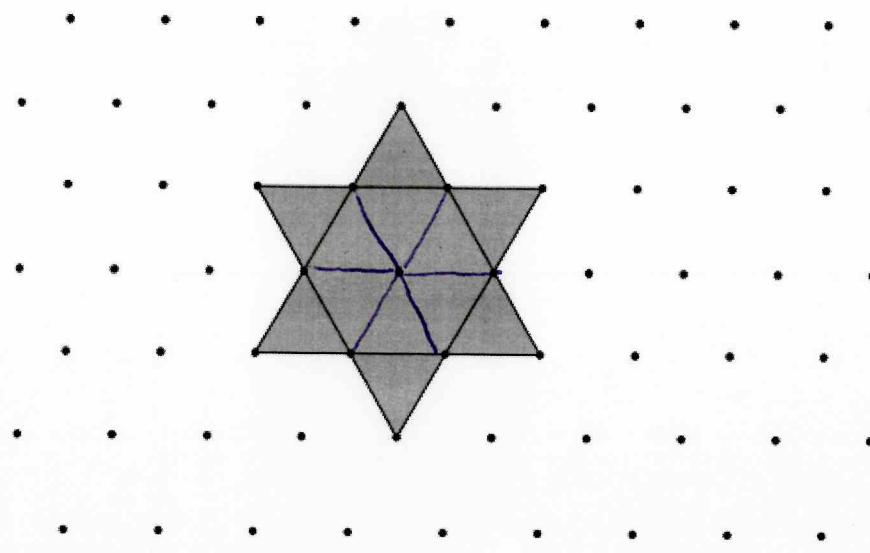
The star shape is made from a regular hexagon and six congruent equilateral triangles.

The area of the star shape is 96 cm².

Work out the area of the regular hexagon.

Star = 12 triangles

96 ÷ 12 = 8cm² for each triangle

Hexagon = 6 triangles

8 × 6 = 48

48 .... cm²

(Total for Question 12 is 2 marks)

13 Milo is trying to find the area of this rectangle.

5 cm

4 cm ⬚ 4 cm

5 cm
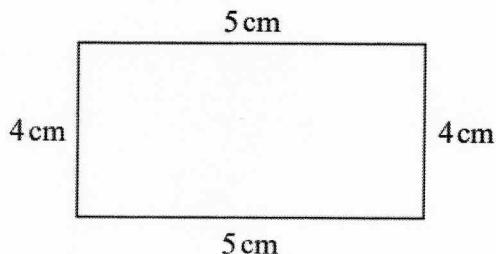
He writes,

"The area is $400\,cm^2$ because $5 \times 4 \times 5 \times 4 = 400$"

(a) Explain what is wrong with Milo's method.

To calculate the area you multiply the base and the height.

$5 \times 4 = 20\,cm^2$

(1)

Anya works out the area of a shape.

Her answer is 86 cm.

(b) Explain why her answer cannot be fully correct.

Area uses cm^2

(1)

(Total for Question 13 is 2 marks)

13
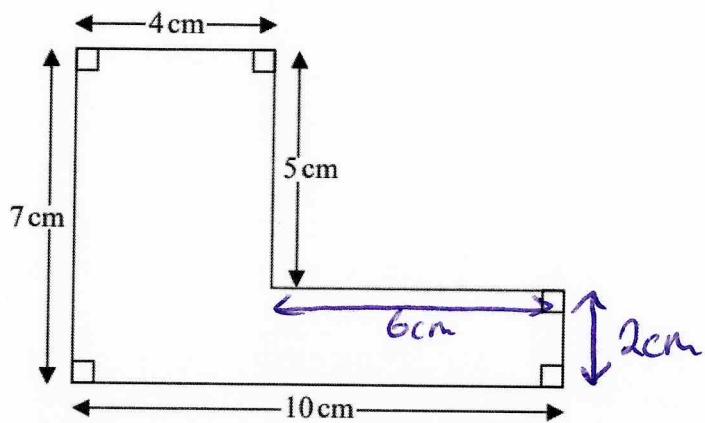
Work out the perimeter of this shape.

_____34_____ cm

(Total for Question 13 is 2 marks)

13 The diagram shows nine identical squares inside a rectangle.


width 10cm
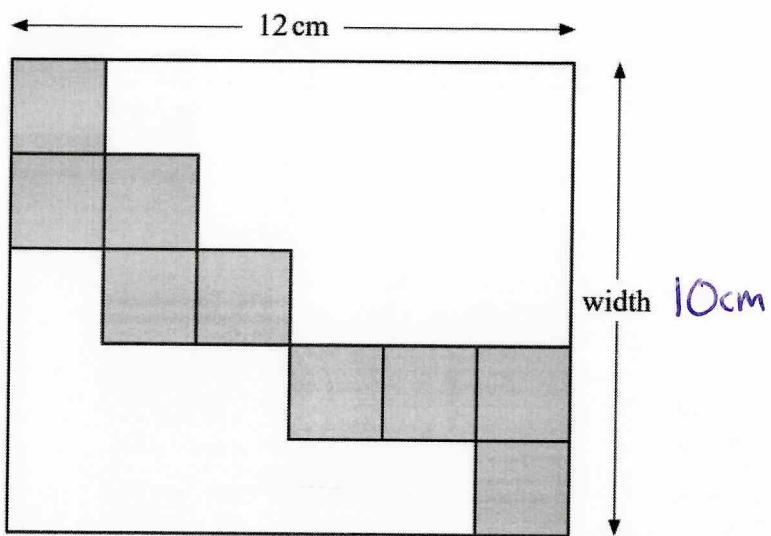
The length of the rectangle is 12 cm.

Work out the width of the rectangle.

2cm ☐
2cm
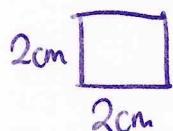
5 squares = 5×2

10 cm

13 A square has an area of 81 cm²

9 cm

9 cm   81 cm²   9 cm

9 cm
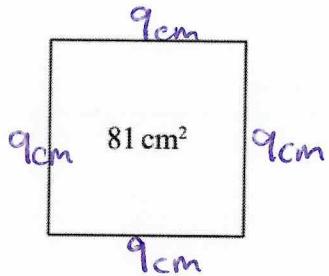
(a) Find the perimeter of the square.

36 cm

(2)

The diagram shows a right-angled triangle and a parallelogram.

16 cm

72

9 cm

h cm

←—— 30 cm ——→
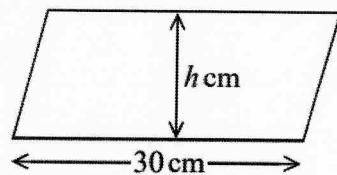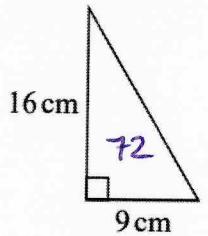
The area of the parallelogram is 5 times the area of the triangle.
The perpendicular height of the parallelogram is h cm.

(b) Find the value of h.

$$\text{Triangle} = \frac{16 \times 9}{2} = 72 \text{cm}^2$$

$$72 \times 5 = 360$$

$$360 \div 30 = 12$$

$h = $ 12 cm

(3)

(Total for Question 13 is 5 marks)

14 Here is a rectangle.

7cm

3cm

3 cm

7 cm
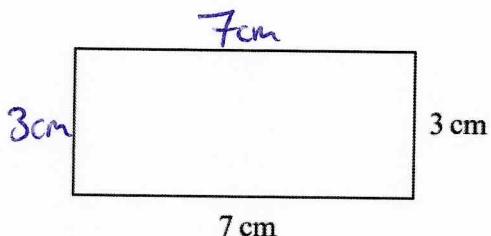
Coby has to find the perimeter of this rectangle.

He writes,

Perimeter = 7×3

(a) What mistake has Coby made?

He has calculated the area, perimeter means add all the sides together.

(1)

Here is a triangle.

$(x + 8)$ cm $(x + 7)$ cm

x cm
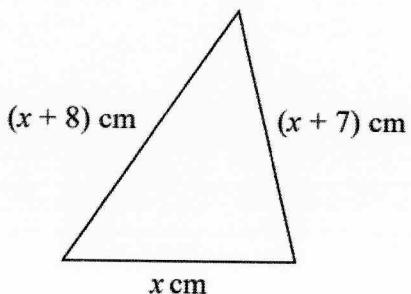
Iram solves a problem about this triangle to find the value of x.

Her answer is

$x = -2$

(b) Explain why Iram's answer must be wrong.

You can not have a negative value as a length of a shape.

(1)

**(Total for Question 14 is 2 marks)**

15 A garden is in the shape of a rectangle 90 m by 60 m.

Flowers are grown in 40% of the garden.
The rest of the garden is grass.

Work out the area of the garden that is grass.

90 m

60 m
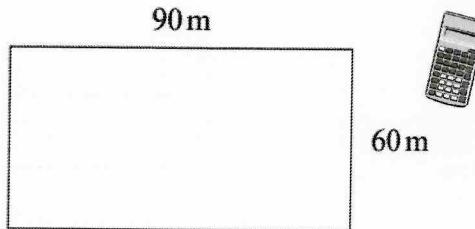
$90 \times 60 = 5400 \text{m}^2$

$40\% = 2160 \text{m}^2 \text{ of flowers}$

$$\begin{array}{r} 5400 \\ -2160 \\ \hline 3240 \end{array}$$

3240 .... m²

(Total for Question 15 is 4 marks)

15 Here are a triangle and a rectangle.

9 cm
36
8 cm

216 width
16 cm
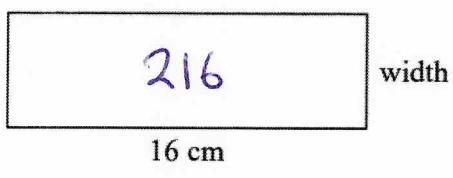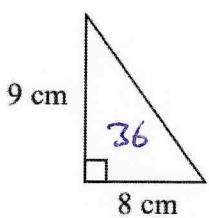
The area of the rectangle is 6 times the area of the triangle.

Work out the width of the rectangle.

$$\text{Triangle} = \frac{9 \times 8}{2} = \frac{72}{2} = 36 \text{ cm}^2$$

$$\begin{array}{r} 36 \\ \times \quad 6 \\ \hline 216 \end{array}$$

$$16 \overline{\smash{)}216.0} \quad 13.5$$

13.5 cm

(Total for Question 15 is 4 marks)

**16** Give an example to show that when a piece is cut off a rectangle the perimeter of the new shape

(i) is less than the perimeter of the rectangle,
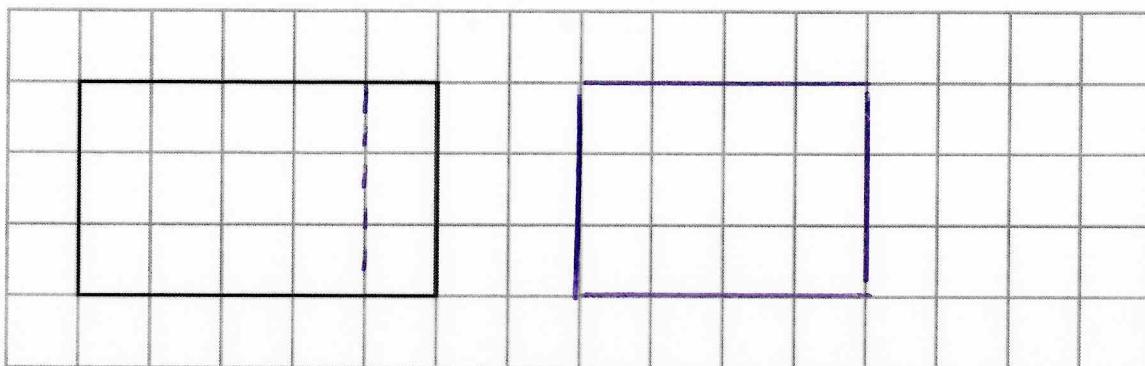
(ii) is the same as the perimeter of the rectangle,

(iii) is greater than the perimeter of the rectangle.

(Total for Question 16 is 3 marks)
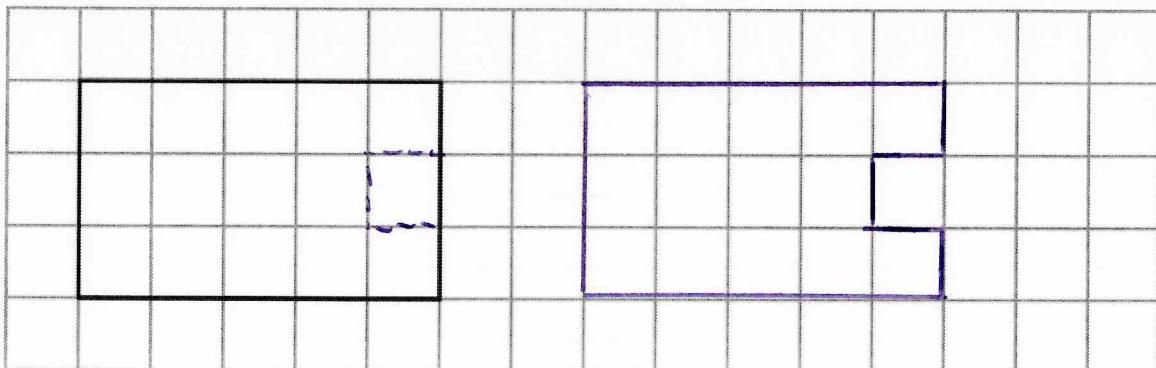
16 Here is a rectangle.

4 cm

6 cm   6 cm

4 cm
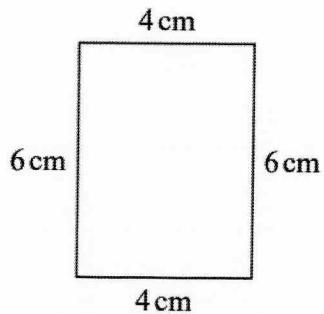
The 6-sided shape below is made from two of these rectangles.

4cm

6cm   2cm   6cm

4cm

4cm   6cm
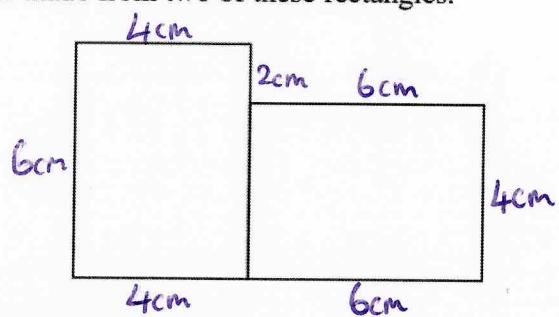
Work out the perimeter of this 6-sided shape.

32

.... cm

(Total for Question 16 is 3 marks)

16

2 cm

8 cm

10 cm

6 cm

2 cm

8 cm
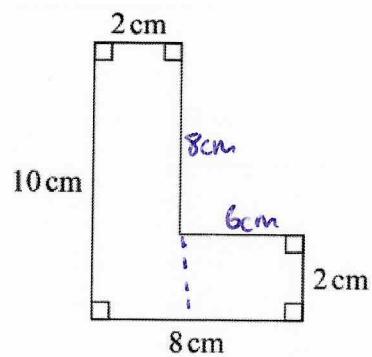
Work out the area of the shape.

10cm | 20 |
2cm

| 12 | 2cm
6cm
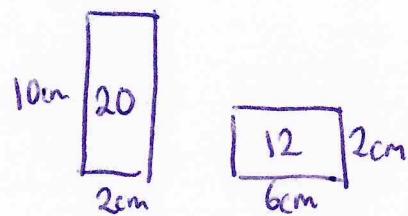
32 _____ cm²

(Total for Question 16 is 2 marks)

17 *ABC* is an isosceles right-angled triangle.
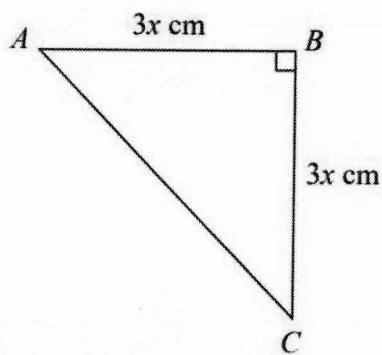
The area of the triangle is $162 \, \text{cm}^2$

Work out the value of *x*.

$$\frac{b \times h}{2} = \frac{3x \times 3x}{2} = \frac{9x^2}{2}$$

$$\frac{9x^2}{2} = 162$$

$$9x^2 = 324$$

$$x^2 = 36$$

$$x = 6$$

$x =$ _____**6cm**_____

(Total for Question 17 is 3 marks)

18 Here is a shape made from a rectangle and a triangle.
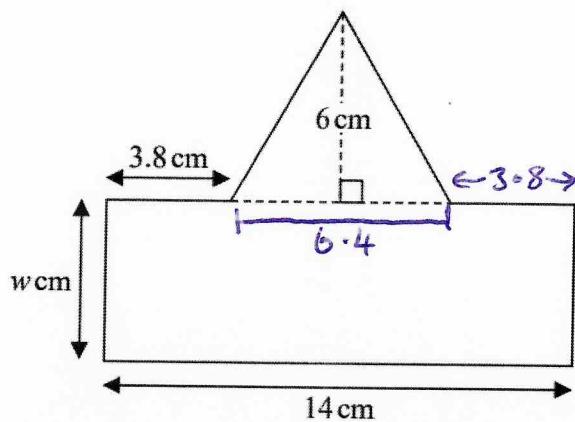
The shape has exactly one line of symmetry.

The area of the rectangle is 3.5 times the area of the triangle.
The width of the rectangle is w cm.

Work out the value of w.
You must show all your working.

$$\text{Triangle} = \frac{b \times h}{2} = \frac{6.4 \times 6}{2} = 19.2 \text{ cm}^2$$

$$\text{Rectangle} =$$
$$19.2 \times 3.5 = 67.2 \text{ cm}^2$$

$$67.2 \div 14 = 4.8$$

$w = $ __4.8 cm__

(Total for Question 18 is 5 marks)

18 The diagram shows a rectangular garden path.

120 cm

20

600 cm
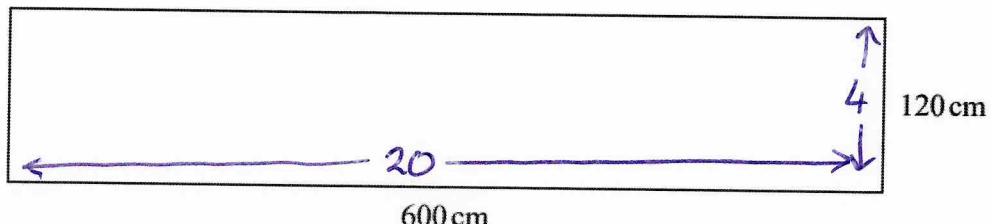
Wasim is going to cover the path with paving stones.
Each paving stone is a square of side 30 cm.
Each paving stone costs £2.50

Wasim has £220 to spend on paving stones.

Show that he has enough money to buy all the paving stones he needs.

$20 \times 4 = 80$ paving stones

$80 \times 2.5 = £200$

Wasim has enough

19 This diagram shows two squares.
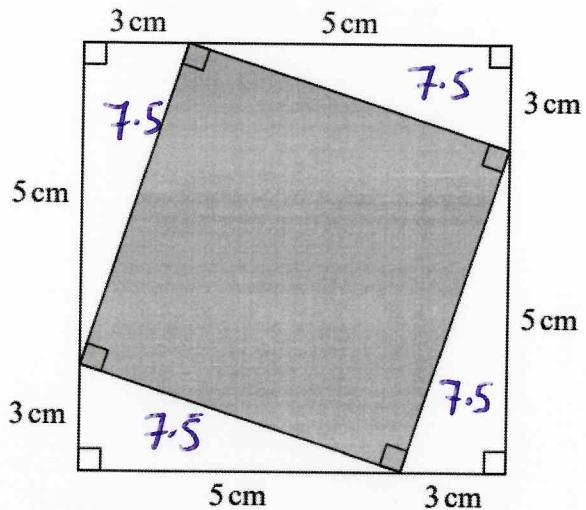
Work out the area of the square shown shaded in the diagram.

$8cm$ | $64cm^2$
$8cm$

3 | 7.5
5
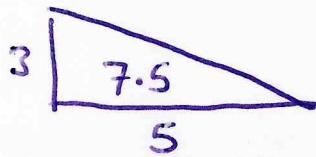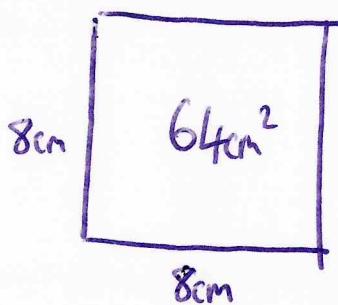
$$\frac{b \times h}{2} = \frac{5 \times 3}{2} = \frac{15}{2} = 7.5$$

$$7.5 \times 4 \text{ triangles} = 30$$

$$64 - 30$$

$34cm^2$

(Total for Question 19 is 4 marks)

20 The diagram shows a square with perimeter 16 cm.

1 cm 3 cm

2 cm²

4 cm

2 cm

4 cm²

2

4 cm
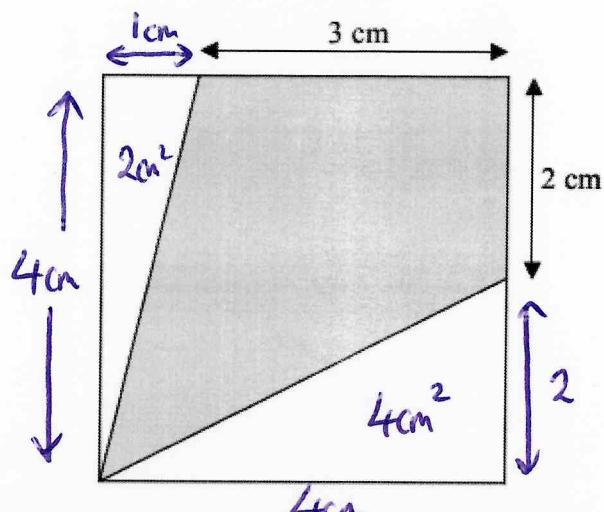
Work out the proportion of the area inside the square that is shaded.
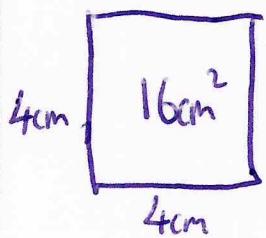
4 cm | 16 cm² | 4 cm

$16 cm^2 - 4 cm^2 - 2 cm^2$

$= 10 cm^2$

$proportion = \dfrac{10}{16} = \dfrac{5}{8}$

$\dfrac{5}{8}$

(Total for Question 20 is 5 marks)

21 The diagram shows a plan of Jason's garden.

ABCO and *DEFO* are rectangles.
*CDO* is a right-angled triangle.
AFO is a sector of a circle with centre *O* and angle *AOF* = 90°

$\frac{49\pi}{4}$ 7

7

$\frac{1}{4} \times \pi \times 7^2$

A ———— 11 m ———— B

$77m^2$ 7 m

F ---- O ---- C

9 m $63m^2$ $49.5m^2$

E ———— 7 m ———— D

11
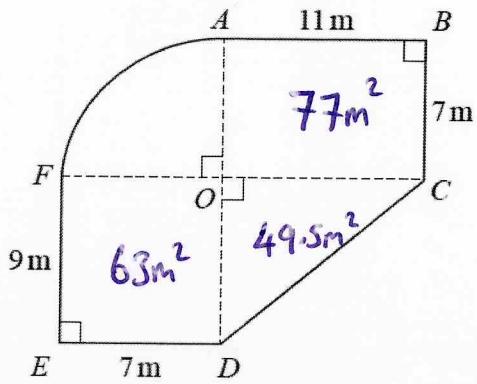
9   $= 49.5m^2$

Jason is going to cover his garden with grass seed.
Each bag of grass seed covers 14 m² of garden.
Each bag of grass seed costs £10.95

Work out how much it will cost Jason to buy all the bags of grass seed he needs.

Total area = $\frac{49\pi}{4}$ + 77 + 63 + 49.5

= 227.9845 m²

$\frac{227.9845}{14}$ = 16.28 bags

17 bags × £10.95 = £186.15

£ 186.15

**(Total for Question 21 is 5 marks)**

21 Here is a trapezium drawn on a centimetre grid.

2

4

18cm²

7

$\frac{1}{2}(2+7) \times 4$

$= 18cm^2$

6cm

6cm
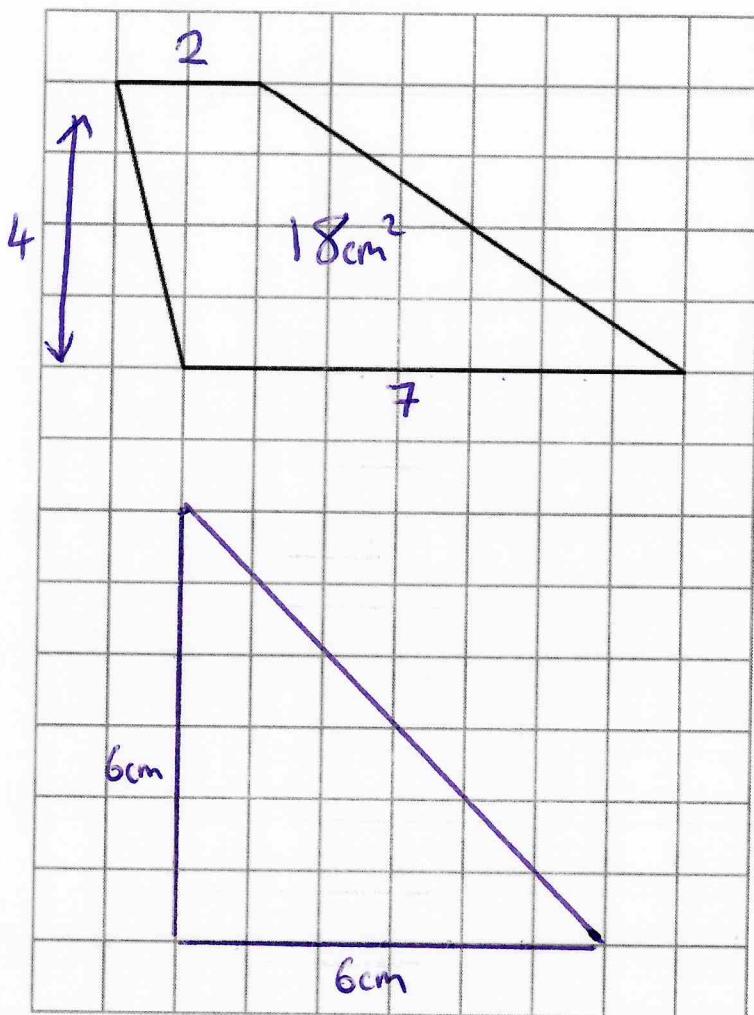
On the grid, draw a triangle equal in area to this trapezium.

(Total for Question 21 is 2 marks)

22 The diagram shows a plan of a floor.

10 m

50m²   5 m

8 m

= 68m²

18m²   3m

6 m
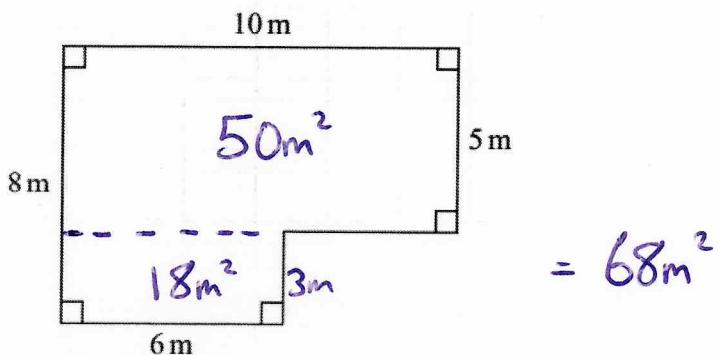
Petra is going to cover the floor with paint.

Petra has 3 tins of paint.
There are 2.5 litres of paint in each tin.

Petra thinks 1 litre of paint will cover $10\,m^2$ of floor.

(a) Assuming Petra is correct, does she have enough paint to cover the floor?
You must show all your working.

3 tins x 2.5 litres = 7.5 litres

7.5 litres x 10 = 75m²

75 > 68
Yes Petra has enough.

(4)

Actually, 1 litre of paint will cover $11\,m^2$ of floor.

(b) Does this affect your answer to part (a)?
You must give a reason for your answer.

No the paint will be able to cover even more of the floor. She will still have enough.

(1)

22 A tin of varnish costs £15

A rectangular floor has dimensions 6 m by 11 m.
The floor is going to be covered in varnish.

11 m

6 m | $66m^2$
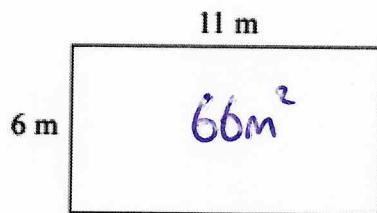
Helen assumes that each tin of this varnish covers an area of 12 m².

(a) Using Helen's assumption, work out the cost of buying the varnish for this floor.

$5 tins = 60m^2$
$6 tins = 72m^2$

$6 \times £15$

£ 90

(4)

Helen finds that each tin of varnish covers less than 12 m².

(b) Explain how this might affect the number of tins she needs to buy.

She may need to buy more tins

(1)

(Total for Question 22 is 5 marks)

24 Here is a triangle and a rectangle.

$6x$

$24x$

8

$5(4x-1)$
$=20x-5$

$4x-1$

5
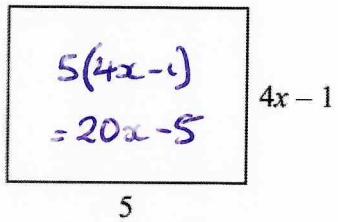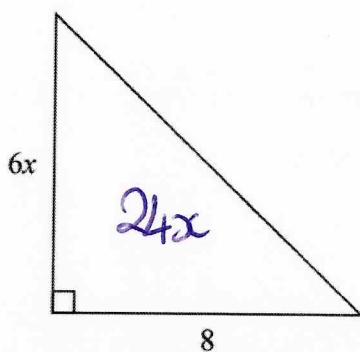
All measurements are in centimetres.

The area of the triangle is $10\,\text{cm}^2$ greater than the area of the rectangle.

Work out the value of x.

$$\frac{b \times h}{2} = \frac{8 \times 6x}{2} = \frac{48x}{2} = 24x$$

$$24x = 20x - 5 + 10$$

$$24x = 20x + 5$$

$$4x = 5$$

$$x = \frac{5}{4}$$

$$x = 1\tfrac{1}{4}$$

$x = \underline{1\tfrac{1}{4}}$

(Total for Question 24 is 4 marks)

26 Maisie knows that she needs 3 kg of grass seed to make a rectangular lawn 5 m by 9 m.

Grass seed is sold in 2 kg boxes.

Maisie wants to make a rectangular lawn 10 m by 14 m.
She has 5 boxes of grass seed.

(a) Has Maisie got enough grass seed to make a lawn 10 m by 14 m?
You must show all your working.

5 $\boxed{45m^2}$
9
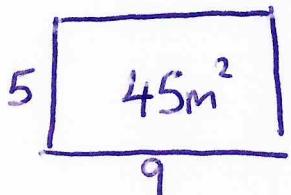
$45m^2 = 3kg$
$15m^2 = 1kg$
$30m^2 = 2kg$

10 $\boxed{140m^2}$
14

5 boxes $\times$ 2kg = 10kg
10kg = 150m²
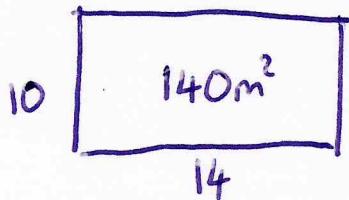
150 > 140
Yes maisie has enough

(4)

Maisie opens the 5 boxes of grass seed.

She finds that 4 of the boxes contain 2 kg of grass seed.
The other box contains 1 kg of grass seed.

(b) Does this affect whether Maisie has enough grass seed to make her lawn?
Give a reason for your answer.

Yes, 1kg of grass seed covers 15m²
She ~~may a~~ now has enough for 135m²

(1)

(Total for Question 26 is 5 marks)

28 Here are two rectangles.

A B

4·5   45cm   4·5

D C

P Q

10cm   45cm^2 10cm

S R

4·5
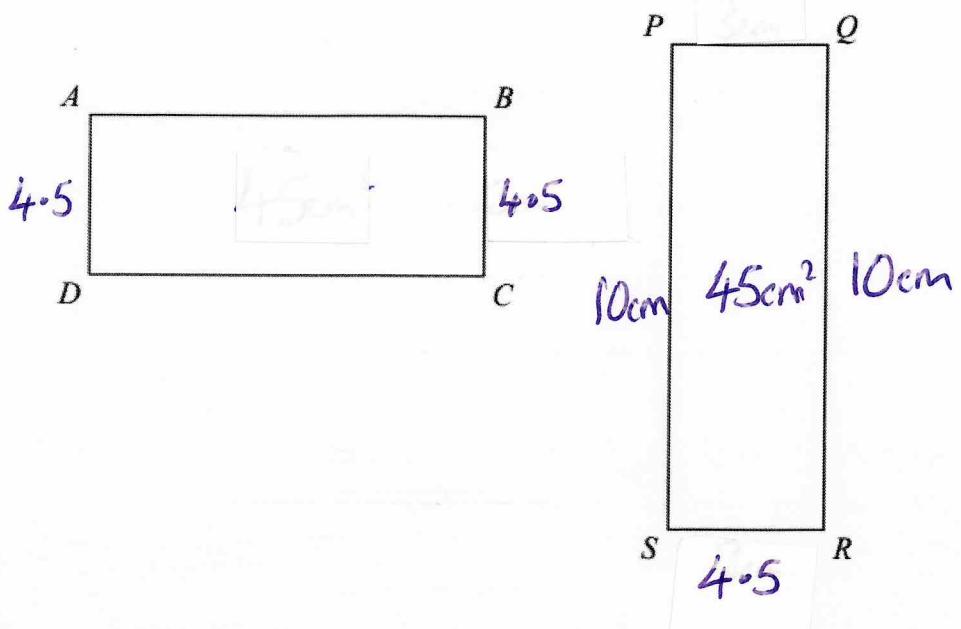
$QR = 10 \, \text{cm}$
$BC = PQ$

The perimeter of $ABCD$ is 26 cm
The area of $PQRS$ is 45 cm^2

Find the length of AB.

$$26 \text{cm} - 9 \text{cm} = 17 \text{cm}$$

$$17 \text{cm} \div 2 = 8.5 \text{cm}$$

8·5   cm