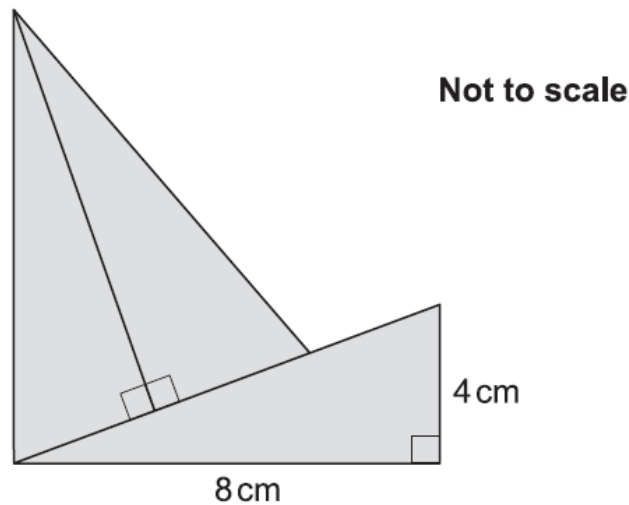


Area & Perimeter (F)

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR, Pearson-Edexcel and WJEC Eduqas.

Name:	C. Boyle
Total Marks:	

1. This shape is made from three congruent right-angled triangles.



Find the total area of the shape.

$$\frac{8 \times 4}{2} \times 3 = 48$$

..... 48 cm² [3]

2. A square has an area of 100 cm².

Find its perimeter.

$$\sqrt{100} = 10 \quad 10 \times 4$$

= 40
..... cm [2]

3. Eva has a display board measuring 45 cm by 60 cm.

She wants to display postcards, each measuring 9 cm by 6 cm.

If no postcards overlap, find the maximum number of postcards she can display on the board.

$$45 \div 9 = 5$$

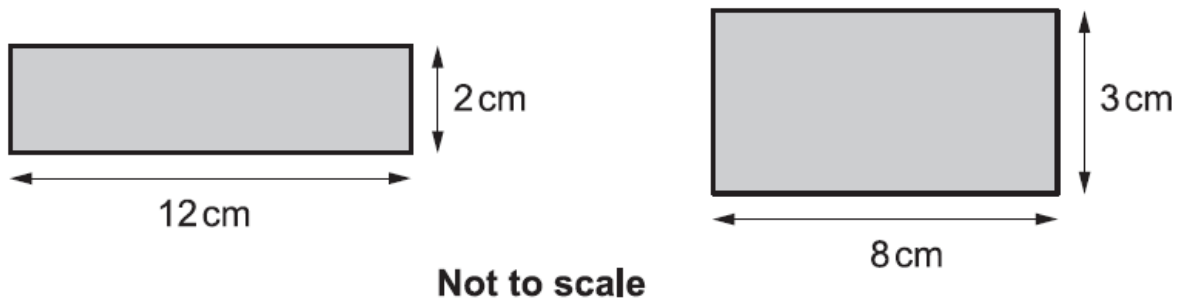
$$60 \div 6 = 10$$

$$5 \times 10 = 50$$

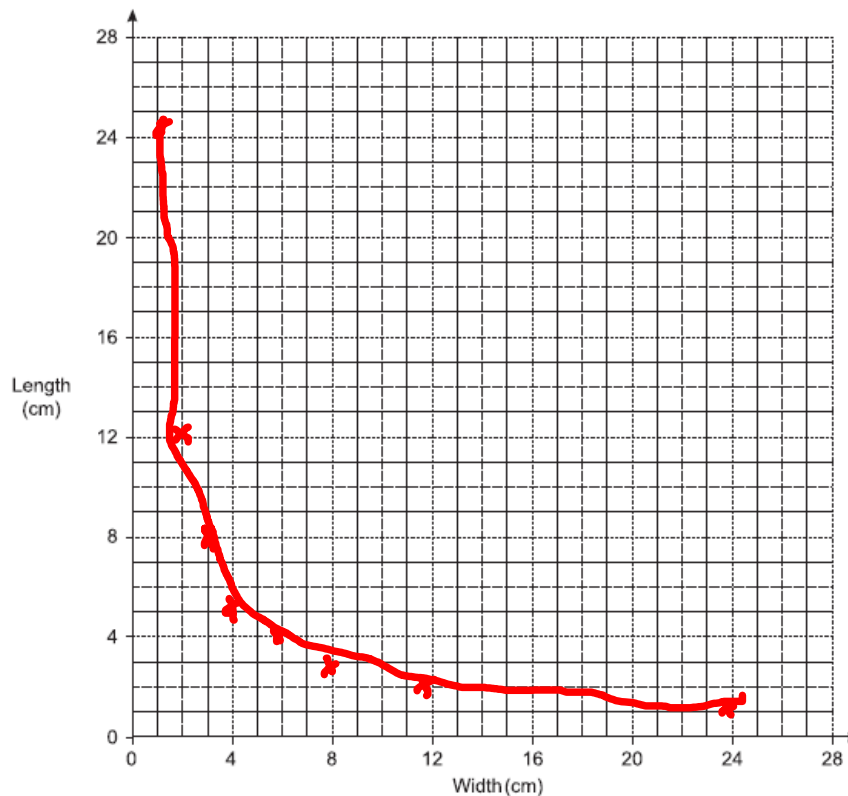
..... [3]

4. It is possible to draw many rectangles that have area 24 cm².

Here are two of them.



(i) Plot the dimensions of these two rectangles on the grid below.

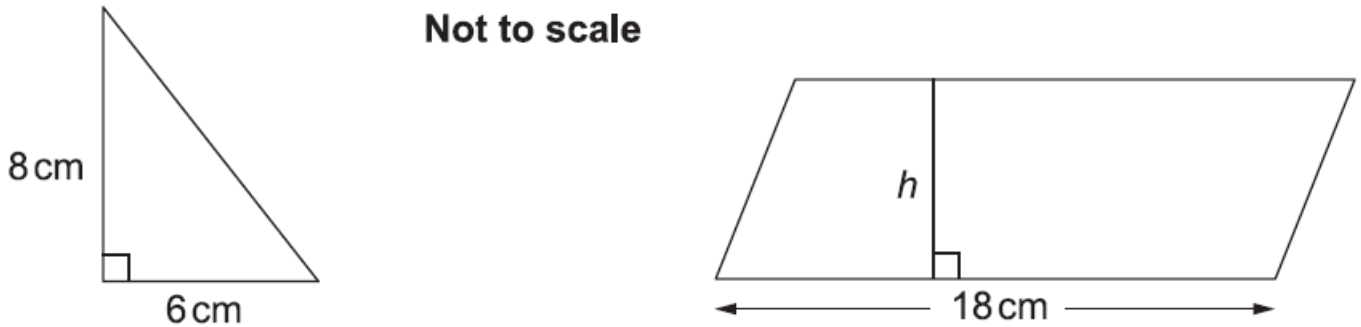


[1]

(ii) Complete the graph to show the relationship between length and width for rectangles with area 24 cm^2 .

[3]

5. The area of the parallelogram is three times the area of the triangle.



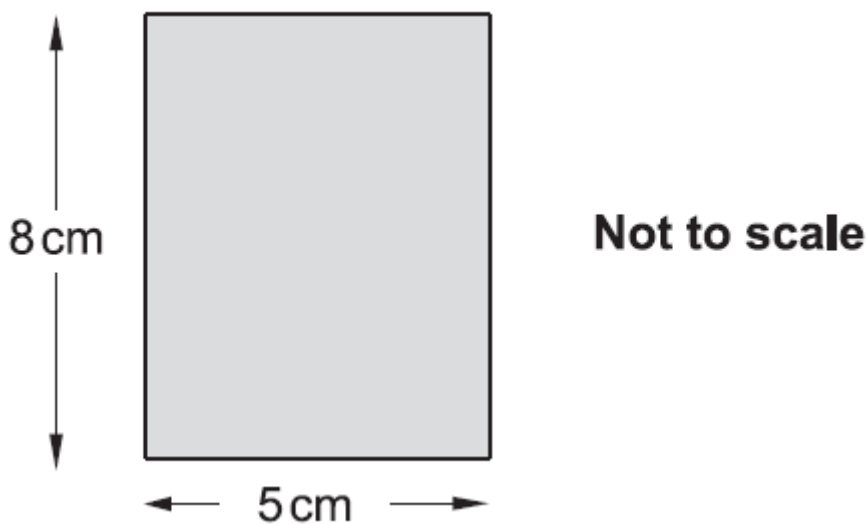
Show that the perpendicular height h of the parallelogram is 4 cm.

$$\frac{6 \times 8}{2} = 24 \qquad 24 \times 3 = 72$$

$$72 \div 18 = 4$$

[4]

6. Jo makes a pendant from a rectangular piece of silver.



Work out the area of this rectangle.

$$8 \times 5 = 40$$

..... cm^2 [1]

7. (a) (i) Draw a rectangle that is congruent to rectangle A.

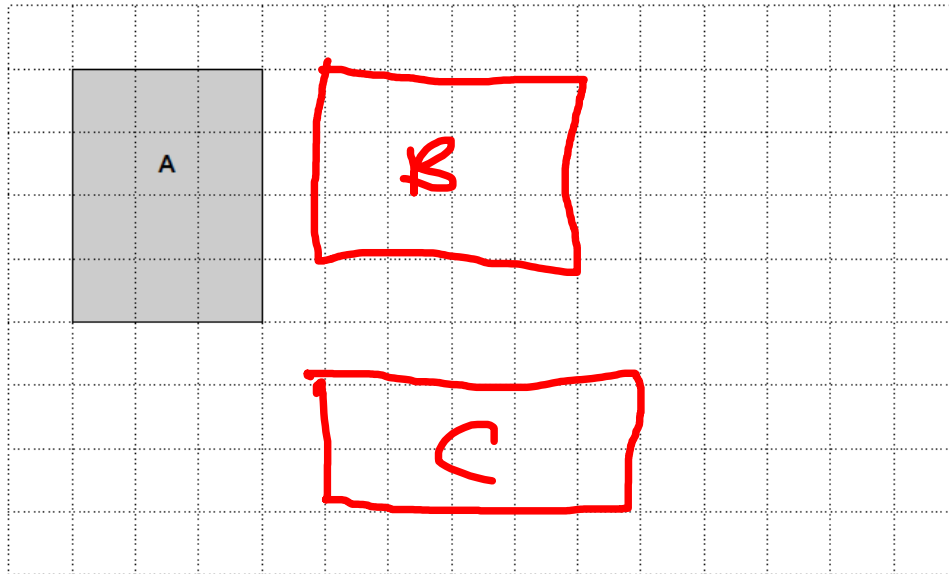
Label it B.

[1]

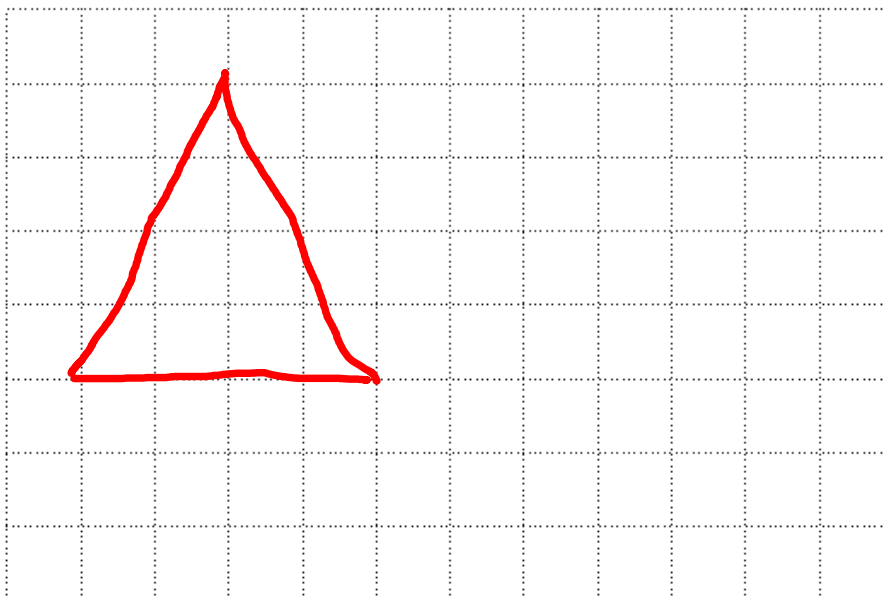
(ii) Draw a rectangle that has the same perimeter as rectangle A, but a different area.

Label it C.

[2]



(b) Draw an isosceles triangle with area 8 cm^2 on the grid below.



[2]

8. Amy is making a rectangular quilt by sewing together squares of fabric.

Each square is 12 cm by 12 cm.

The finished quilt must be at least 1.5m wide and at least 2.1m long.

(a) What is the smallest number of squares that Amy can use?

Show how you decide.

$$150 \div 12 = 12 \text{ . . . } = 13$$

$$210 \div 12 = 17 \text{ . . . } = 18$$

$$13 \times 18 = 234$$

(a) squares [5]

(b) The area of the finished quilt is about 3.4m².

Amy says

3.4m² is the same as 340 cm².

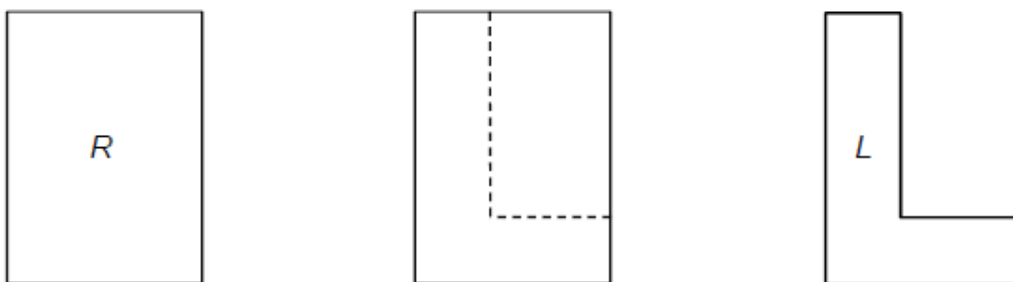
Show that Amy is wrong.



[3]

9. Shape R is a rectangle.

A smaller rectangle is cut from R to form shape L.



Which one of these statements is true?

Circle a statement.

- A The perimeter of R is longer than the perimeter of L
- B The perimeter of R is the same as the perimeter of L ✓
- C The perimeter of R is shorter than the perimeter of L
- D It is not possible to tell which perimeter is longer

[1]

10. Carpet tiles are going to be used to cover a floor.

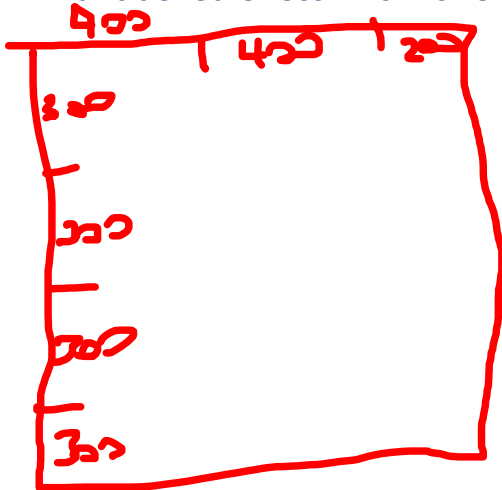
The floor is a 1200mm by 1000mm rectangle.

Each carpet tile is a 40cm by 30cm rectangle.

400 MM 300 MM

Exactly 10 carpet tiles can be used to cover the floor completely.

Show in a labelled sketch how this can be done.

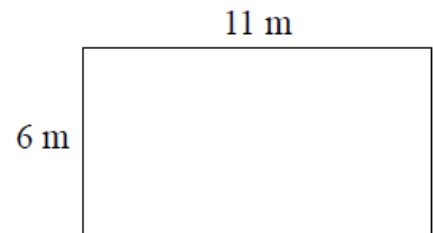


6 full tiles
plus 4 $\frac{1}{2}$ tiles
= 10 total.

[3]

11. 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.

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.

$$6 \times 11 = 66 \quad 66 \div 12 = 5.5 = 6 \text{ tins}$$

$$6 \times 15 = 90$$

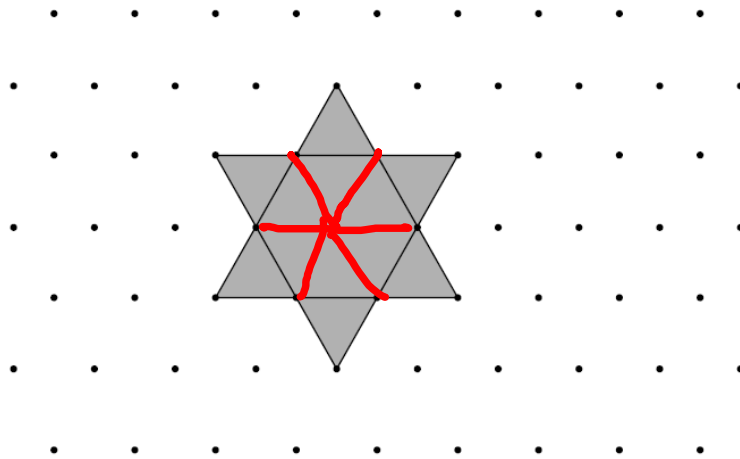
£ [4]

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.

up to 11m² covered per tin she will not need to buy more. [1]
 < 11m²/tin and she will.

12. Here is a star shape.



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

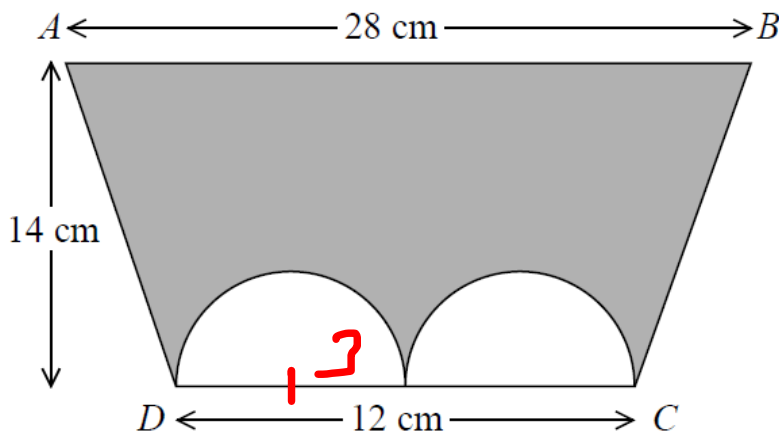
The area of the star shape is 96 cm^2 .

Work out the area of the regular hexagon.

$$96 \div 2 = 48$$

..... **48** cm^2 [2]

13. The diagram shows a trapezium ABCD and two identical semicircles.



The centre of each semicircle is on DC.

Work out the area of the shaded region.

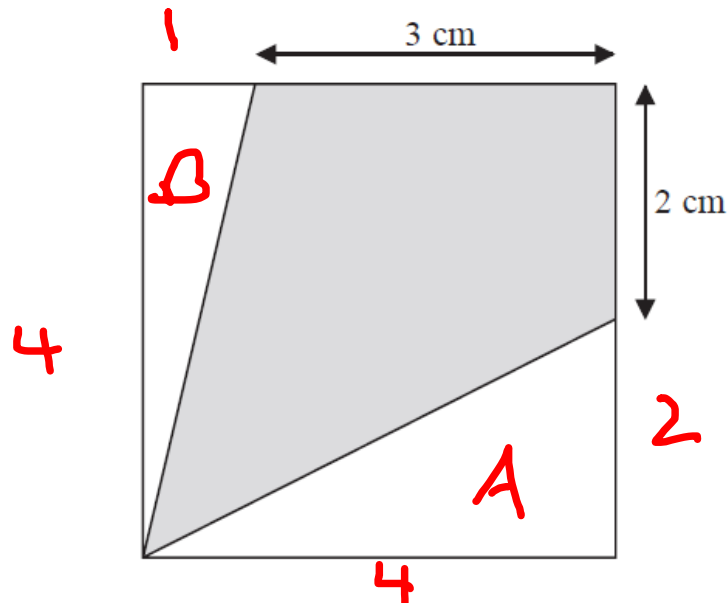
Give your answer correct to 3 significant figures.

$$\frac{12 + 28}{2} \times 14 = 280$$

$$280 - 9\pi = 251.74 = 252$$

..... cm^2 [4]

14. The diagram shows a square with perimeter 16 cm.



Work out the proportion of the area inside the square that is shaded.

$$16 \div 4 = 4$$

$$A = \frac{4 \times 2}{2} = 4$$

$$B = \frac{4 \times 1}{2} = 2$$

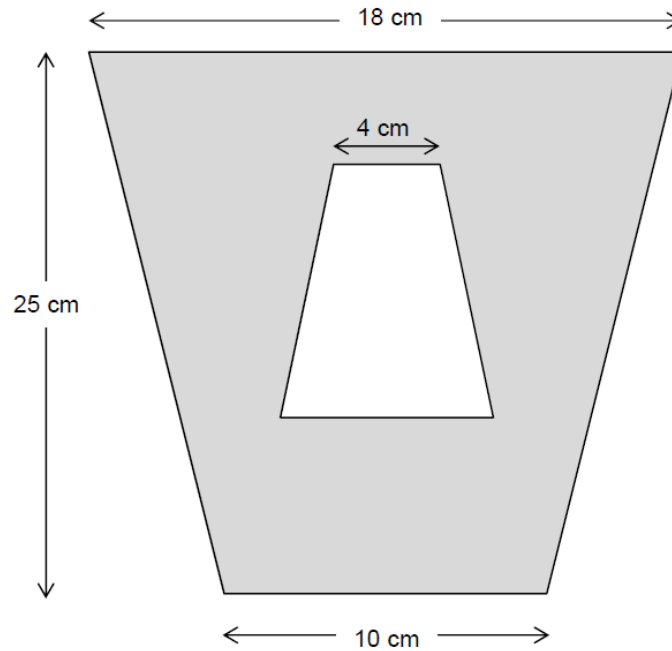
$$4 \times 4 = 16$$

$$16 - 4 - 2 = 10$$

$$\frac{10}{16} = \frac{5}{8}$$

..... [5]

15. A pattern is made from two similar trapeziums.



Show that the shaded area is 294 cm^2

$$\frac{18+10}{2} \times 25 = 14 \times 25 = 350$$

$$\text{sim} = \frac{4}{10}$$

$$\text{Area} \left(\frac{4}{10} \right)^2 = \frac{16}{100}$$

$$350 \times \frac{16}{100} = 56^{[4]}$$

$$350 - 56 = 294$$

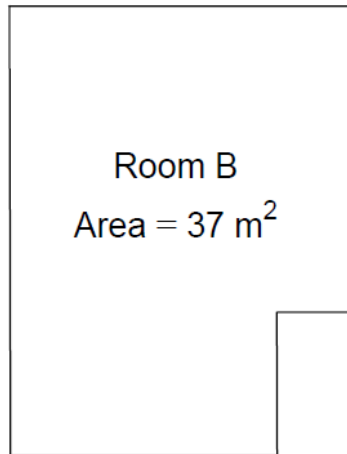
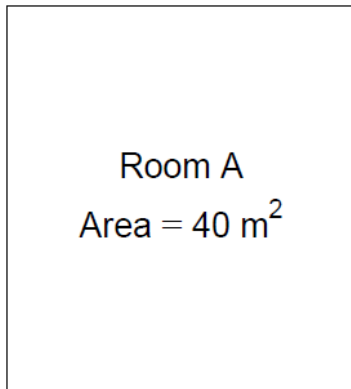
16. The perimeter of an isosceles triangle is 25 cm
The length of each side, in cm, is a prime number.

Work out the lengths of the sides of the two possible isosceles triangles.

First triangle	<u>3</u> cm	<u>3</u> cm	<u>19</u> cm
Second triangle	<u>7</u> cm	<u>7</u> cm	<u>11</u> cm

[4]

17. A children's nursery uses one room for babies and one room for toddlers.



Not drawn accurately

Each baby needs at least 3.5 m² of floor space.

Each toddler needs at least 2.5 m² of floor space.

Show that the total number of children allowed is larger if the toddlers are in Room A and the babies are in Room B.

Handwritten calculations:

$$40 \div 3.5 = 11$$

$$40 \div 2.5 = 16$$

$$37 \div 3.5 = 10$$

$$37 \div 2.5 = 14$$

Handwritten calculation:

$$16 + 10 = 26$$

Handwritten calculation:

$$vs 11 + 14 = 25$$

∴ is 1 child better [1]

18. Three identical rectangles, each measuring 7 cm by 3 cm, are placed together to make the shape shown in the diagram.

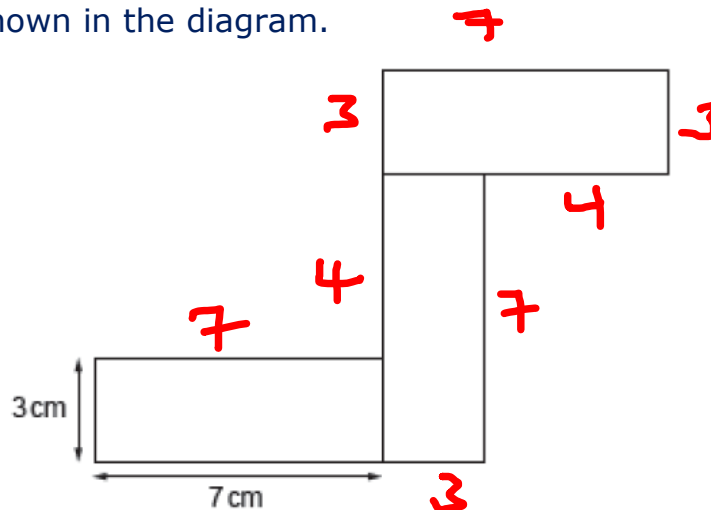


Diagram not drawn to scale

Calculate the perimeter of the shape.

Handwritten answer:

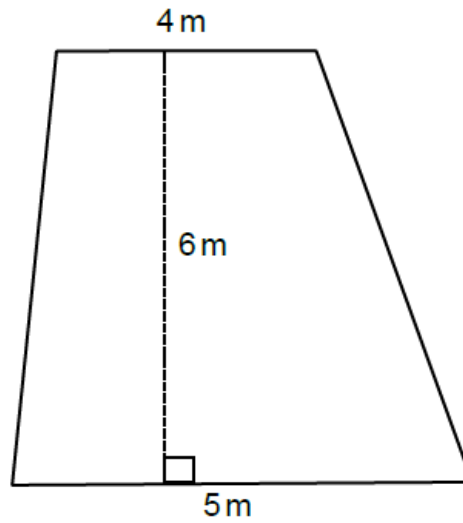
$$48 \text{ cm}$$

[3]

19. The diagram below shows a sign that needs to be painted.

Paint, worth a total of £60, can cover an area of 18m².

How much would it cost to paint the sign below using this paint?



$$\frac{4 + 5 \times 6}{2} = 27$$

$$27 \div 18 = 1.5$$

$$1.5 \times 60 = \pounds 90$$

Diagram not drawn to scale

if can be bought in any amount

or 1.5 = 2 whole cans

2 x 60 = £120 if can only be bought in 18s [4]

20. Peter decides to cover the floor of a room with a striped carpet.

A shop sells this striped carpet from a roll that is 3m wide at a price of £25 per metre length.

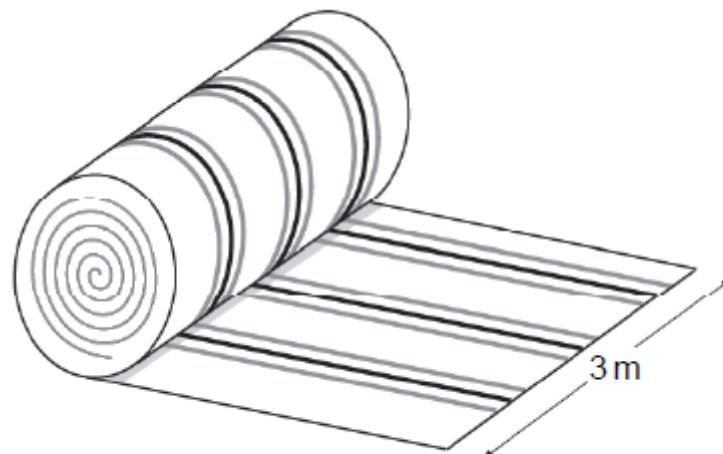
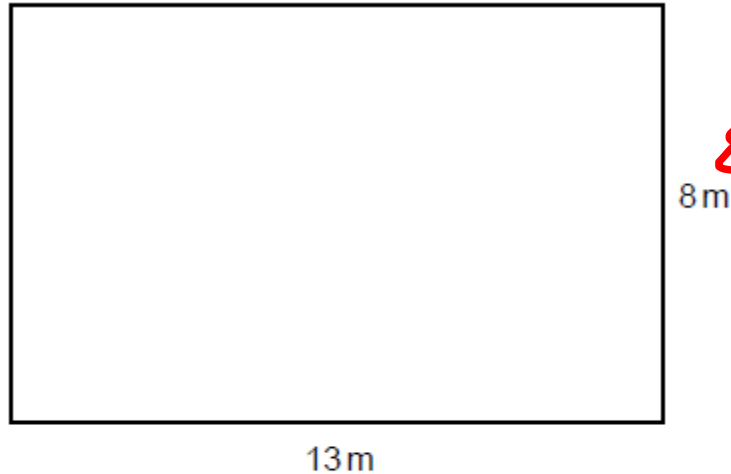


Diagram not drawn to scale

His floor is rectangular in shape with length 13m and width 8 m.



$$13 \div 3 = 4 \dots = 5$$

$$8 \div 3 = 2 \dots = 3$$

Diagram not drawn to scale

The carpet is laid to ensure that the stripes on the carpet are parallel to two of the sides of the room and lie in one direction only.

Find the cost of the cheapest way of covering the floor, and state by how much it is cheaper.

Show all your working.

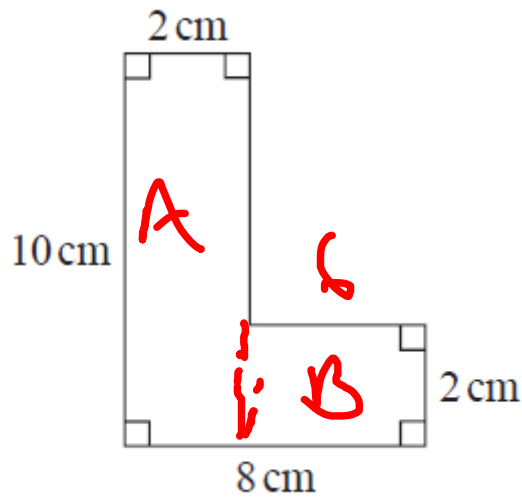
$$3 \times 13 = 39 \text{ horizontal}$$

$$5 \times 8 = 40 \text{ Vertical}$$

Difference of 1 = £25 better going horizontally

[5]

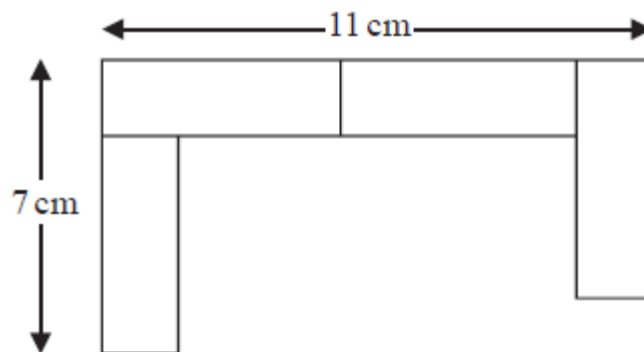
21. Work out the area of the shape.



$A: 10 \times 2 = 20$ $B: 6 \times 2 = 12$
 $= 32 \text{ cm}^2$ [2]

22. A pattern is made using identical rectangular tiles.

Find the total area of the pattern.

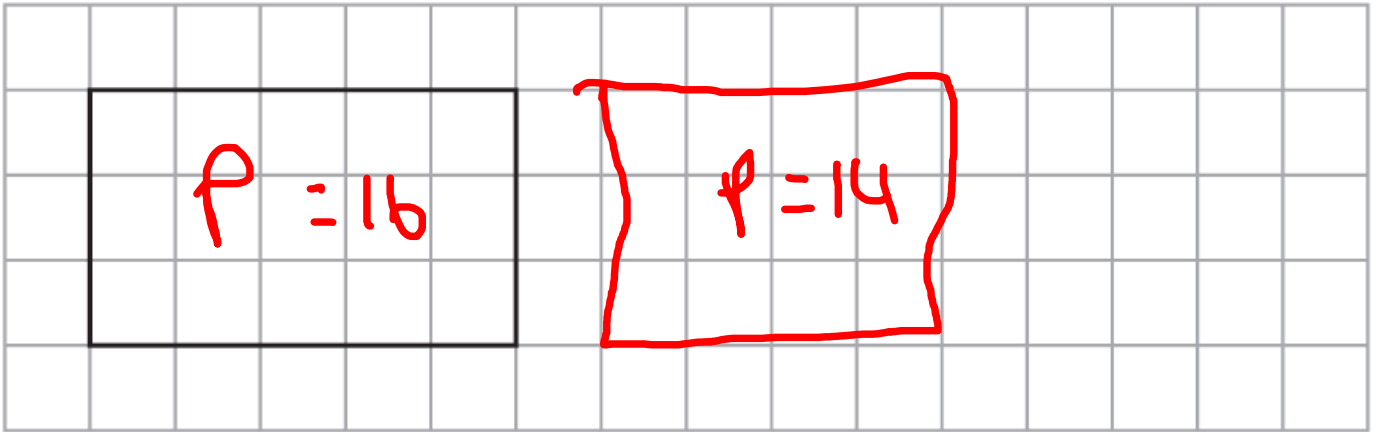


$x + x + 7 - x = 11$
 $x = 11 - 7 = 4$
 $12 \times 4 = 48 \text{ cm}^2$ [4]

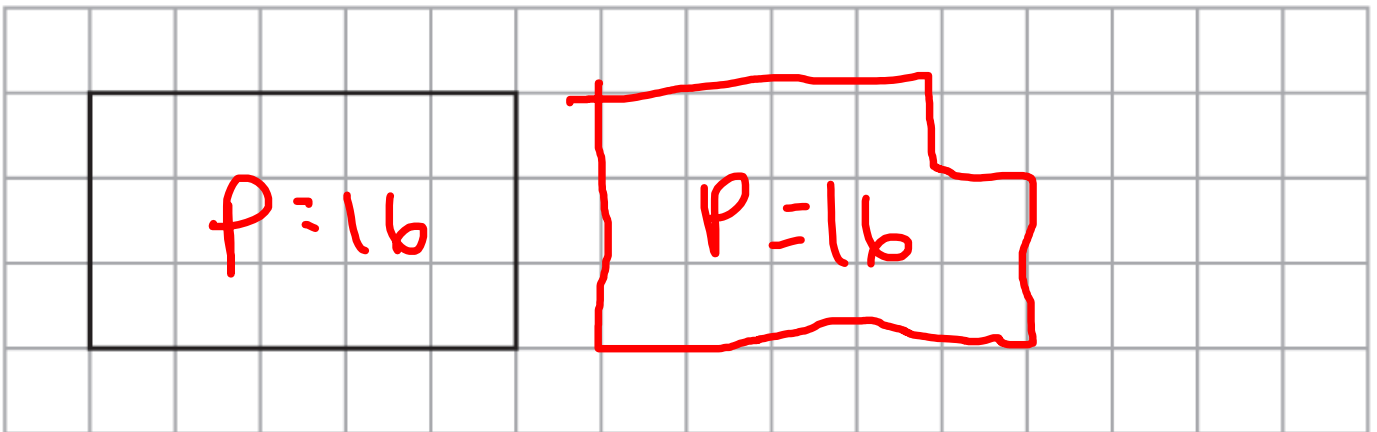
$\begin{matrix} 4 \\ 12 \end{matrix}$

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

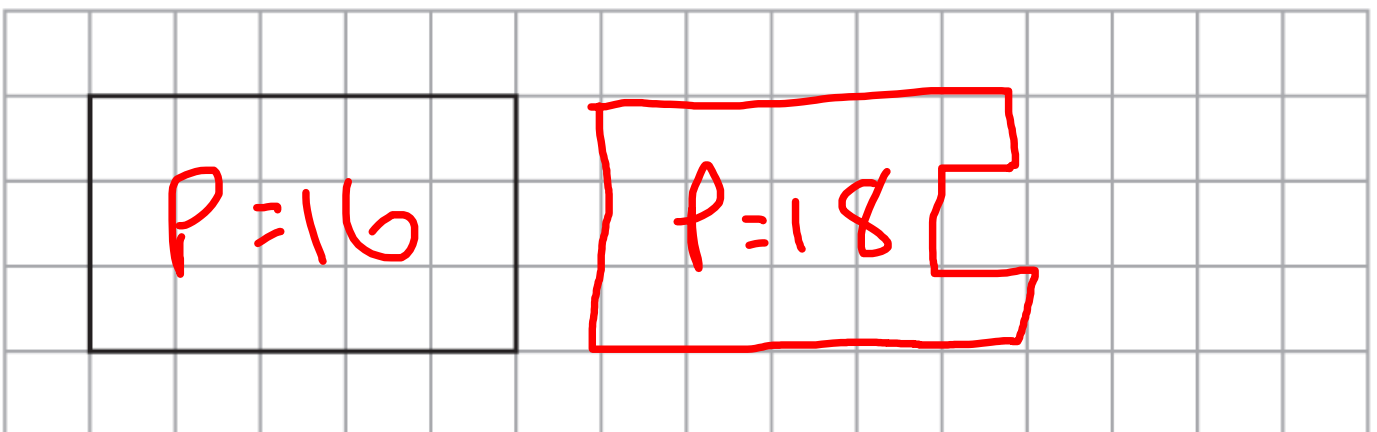
(i) is less than the perimeter of the rectangle,



(ii) is the same as the perimeter of the rectangle,

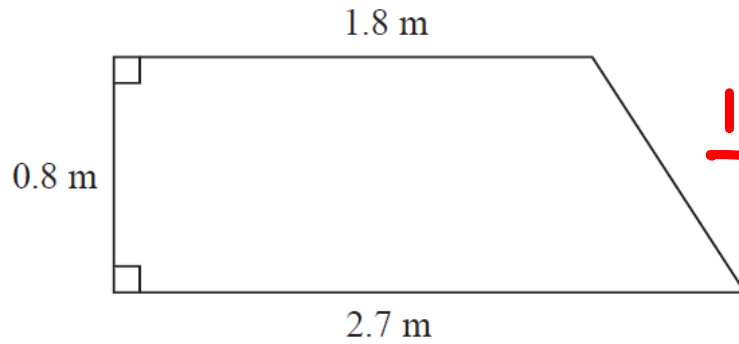


(iii) is greater than the perimeter of the rectangle.



[3]

24. The diagram shows part of a wall in the shape of a trapezium.



$$\frac{1.8 + 2.7}{2} \times 0.8 = 1.8 \text{ m}^2$$

$$= 18000 \text{ cm}^2$$

Karen is going to cover this part of the wall with tiles.

Each rectangular tile is 15 cm by 7.5 cm $= 112.5$

Tiles are sold in packs.

There are 9 tiles in each pack.

Karen divides the area of the wall by the area of a tile to work out an estimate for the number of tiles she needs to buy.

(a) Use Karen's method to work out an estimate for the number of packs of tiles she needs to buy.

$$18000 \div 112.5 = 160 \text{ tiles}$$

$$160 \div 9 = 17.7 \approx 18 \text{ packs}$$

..... [5]

Karen is advised to buy 10% more tiles than she estimated.

Buying 10% more tiles will affect the number of the tiles Karen needs to buy.

She assumes she will need to buy 10% more packs of tiles.

(b) Is Karen's assumption correct?

You must show your working.

$$160 + 10\% = 176$$

$$176 \div 9 = 19.5 \approx 20$$

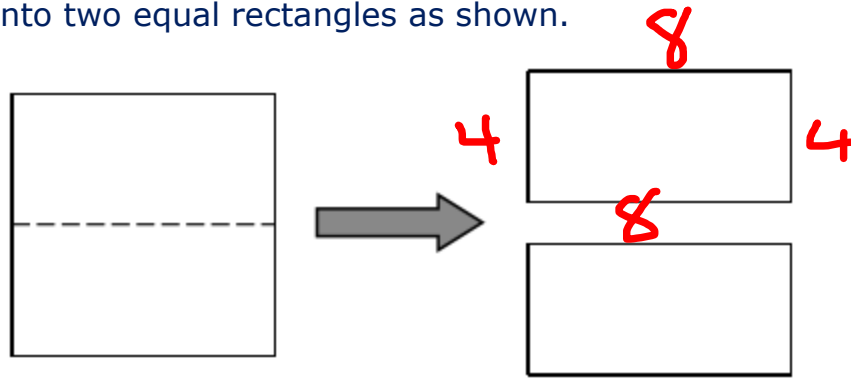
[2]

$$10\% \text{ of } 18 = 1.8 \approx 2$$

$$18 + 2 = 20 \text{ packs}$$

yes

25. A square is cut into two equal rectangles as shown.



a) Tick a box to show whether each statement is true or false.

	True	False
area of the square = 2 × area of one rectangle	<input checked="" type="checkbox"/>	<input type="checkbox"/>
perimeter of the square = 2 × perimeter of one rectangle	<input type="checkbox"/>	<input checked="" type="checkbox"/>
longer side of one rectangle = 2 × shorter side of one rectangle	<input checked="" type="checkbox"/>	<input type="checkbox"/>
diagonal of the square = 2 × diagonal of one rectangle	<input type="checkbox"/>	<input checked="" type="checkbox"/>

[2]

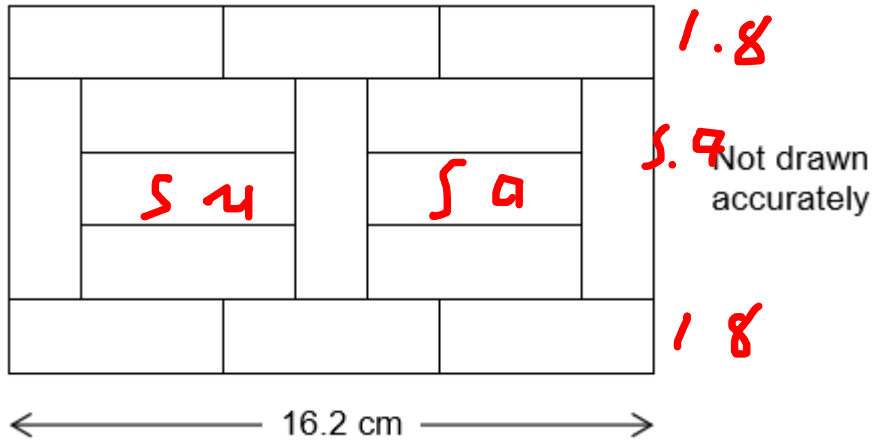
b) The perimeter of each rectangle is 24 cm

Work out the area of the square.

$$8 \times 8 = 64$$

[3]

26. A shape is made using 15 identical rectangles.



$$\begin{array}{r} 1 \\ 5.4 \\ 36 \\ \hline 9.0 \end{array}$$

Work out the area of the shape.

$$16.2 \div 3 = 5.4$$

$$5.4 + 5.4 = 10.8$$

$$16.2 - 10.8 = 5.4$$

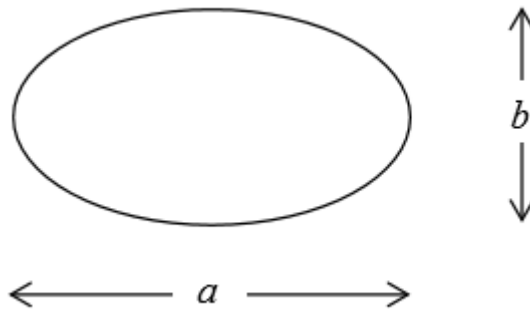
$$5.4 \div 3 = 1.8$$

[4]

27. The area of an ellipse, width a and height b , is given by

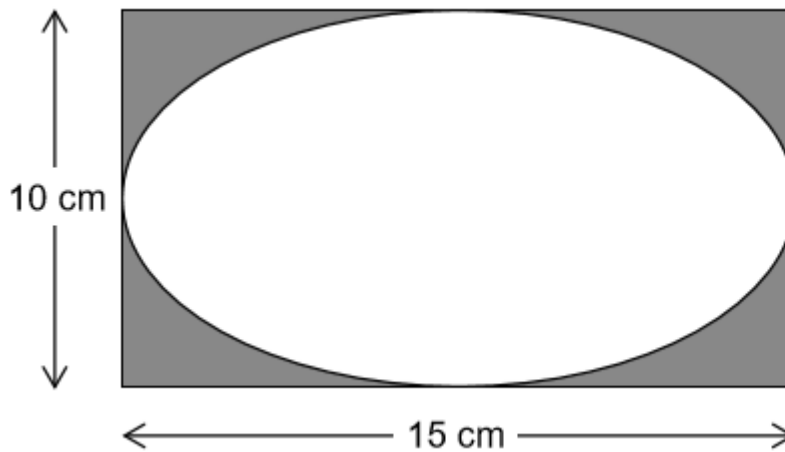
$$\frac{\pi ab}{4}$$

$$16.2 \times 9 = 145.8 \text{ cm}^2$$



A rectangular photograph measures 15 cm by 10 cm

It is put into a frame as shown.



Not drawn accurately

$$\frac{150\pi}{4}$$

The part of the photograph that can be seen is an ellipse.

Work out the percentage of the photograph that can be seen.

[3]

$$\frac{37.5\pi}{150} \times 100 = 25\pi = 78.5\%$$

CREDITS AND NOTES

Q	Awarding Body	Q	Awarding Body	Q	Awarding Body
1	OCR	13	Pearson Edexcel	25	AQA
2	OCR	14	Pearson Edexcel	26	AQA
3	OCR	15	AQA	27	AQA
4	OCR	16	AQA		
5	OCR	17	AQA		
6	OCR	18	WJEC Eduqas		
7	OCR	19	WJEC Eduqas		
8	OCR	20	WJEC Eduqas		
9	AQA	21	Pearson Edexcel		
10	Pearson Edexcel	22	Pearson Edexcel		
11	Pearson Edexcel	23	Pearson Edexcel		
12	Pearson Edexcel	24	Pearson Edexcel		

Notes:

These questions have been retyped from the original sample/specimen assessment materials and whilst every effort has been made to ensure there are no errors, any that do appear are mine and not the exam board s (similarly any errors I have corrected from the originals are also my corrections and not theirs!).

Please also note that the layout in terms of fonts, answer lines and space given to each question does not reflect the actual papers to save space.

These questions have been collated by me as the basis for a GCSE working party set up by the GLOW maths hub - if you want to get involved please get in touch. The objective is to provide support to fellow teachers and to give you a flavour of how different topics "could" be examined. They should not be used to form a decision as to which board to use. There is no guarantee that a topic will or won't appear in the "live" papers from a specific exam board or that examination of a topic will be as shown in these questions.



Links:

AQA <http://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300>

OCR <http://ocr.org.uk/gcsemaths>

Pearson Edexcel <http://qualifications.pearson.com/en/qualifications/edexcel-gcses/mathematics-2015.html>

WJEC Eduqas <http://www.eduqas.co.uk/qualifications/mathematics/gcse/>

Contents:

This version contains questions from:

AQA – Sample Assessment Material, Practice set 1 and Practice set 2

OCR – Sample Assessment Material and Practice set 1

Pearson Edexcel – Sample Assessment Material, Specimen set 1 and Specimen set 2

WJEC Eduqas – Sample Assessment Material