Extension White Rose Maths

Reasoning and Problem Solving

Question 1

Here is a square inside another square.

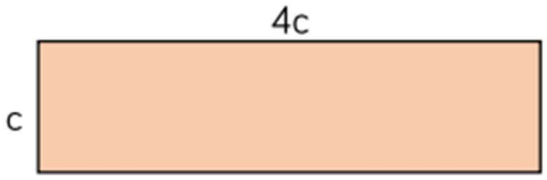
The perimeter of the inner square is 16 cm

The outer square's perimeter is four times the size of the inner square.

What is the length of one side of the outer square?

How do you know? What do you notice?

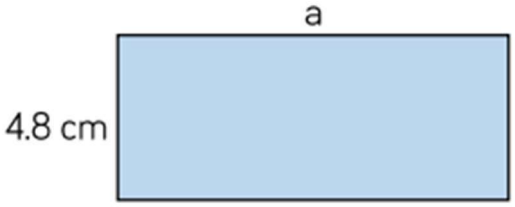
Question 2



The value of c is 14 m.

What is the total perimeter of the shape?

Question 3

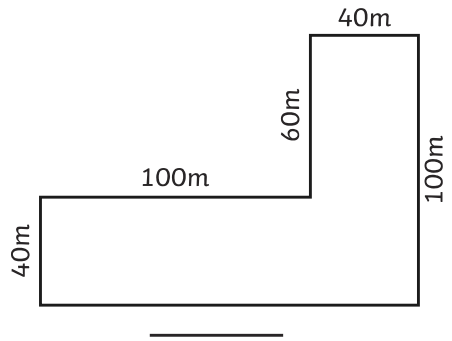


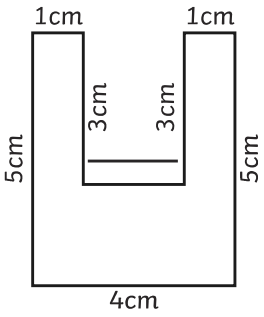
The blue rectangle has a perimeter of 38 cm.

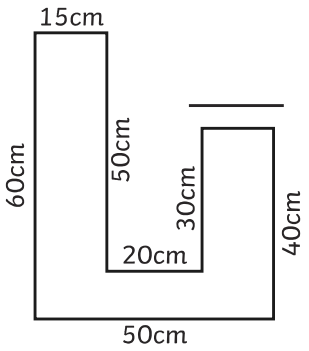
What is the value of a?

1) **a)** Use the labelled sides to find the length of the unlabelled side on each of these shapes.

b) Calculate the perimeter of each shape.





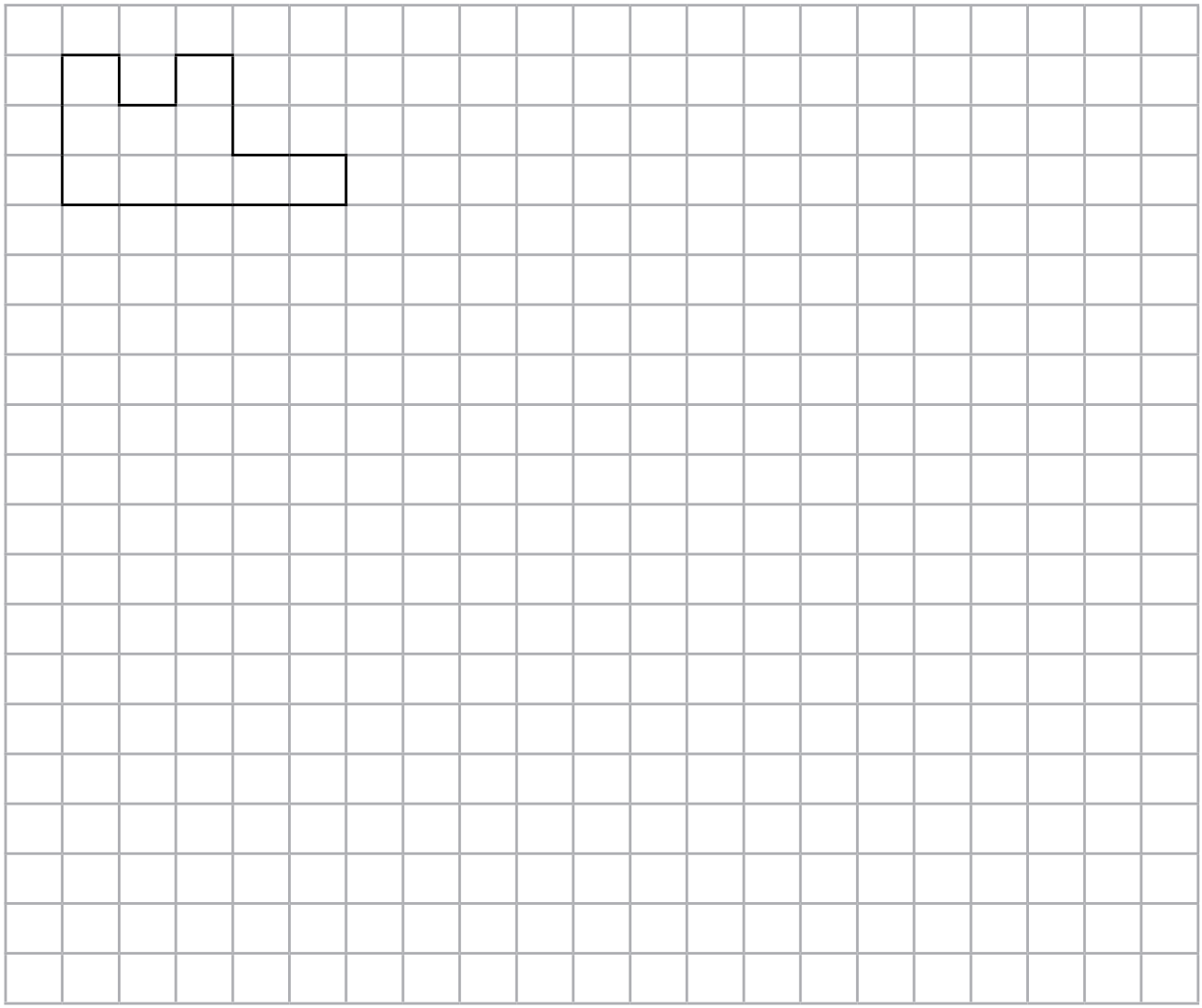


Perimeter = _____ Perimeter = _____ Perimeter = _____

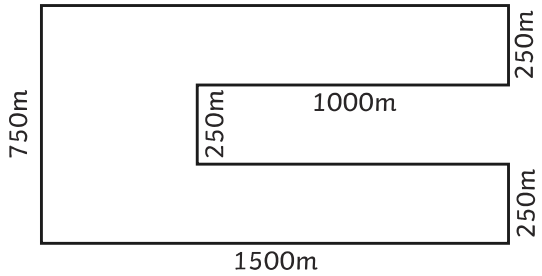
2) Each square has an area of $1cm^2$.

a) What is the perimeter of the shape? _____

b) Draw two other rectilinear shapes with the same perimeter.



1) Toby says, "This shape has a perimeter of 4000m."



a) Explain his mistake:

b) Calculate the correct perimeter:

Perimeter: _____

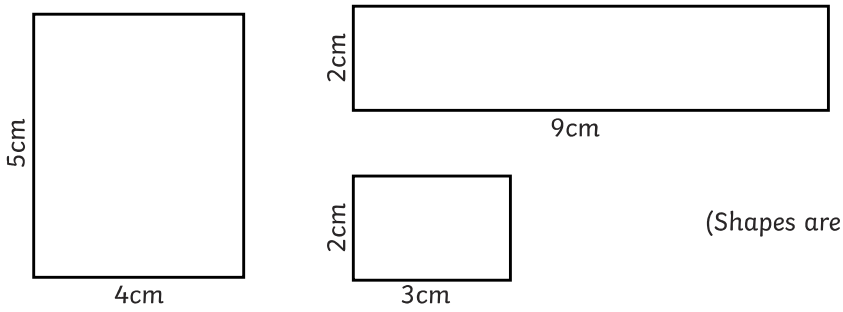
2) Are these statements true or false? Explain how you know.

a) A rectangle with sides 2cm and 8cm, will have the same perimeter as a square with 5cm sides.

b) A long, thin rectangle will always have a longer perimeter than a shorter, wider rectangle.

c) If you put a square with sides of 4cm and a square with sides of 6cm side by side on a straight line, they make a rectilinear shape with a perimeter of 40cm.

1) a) Use these shapes to create a compound rectilinear shape.



(Shapes are not drawn to scale.)

What is the perimeter of your new shape? _____

b) Amma says, "I can rearrange the rectangles to make a new shape with a different perimeter."

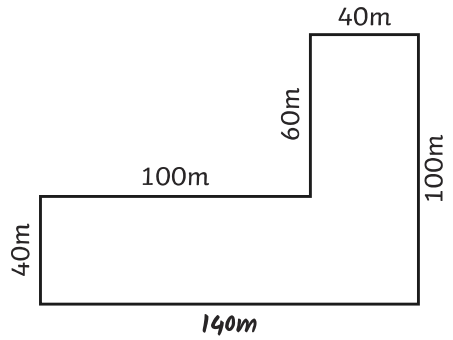
Is she correct? _____

Prove It!

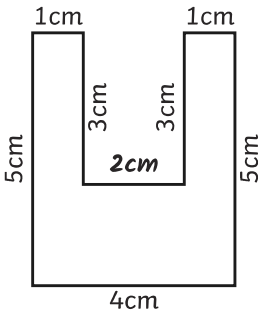
2) a) How many different rectilinear shapes, which are not rectangles or squares, can you make that have a perimeter of 42cm?

b) Tarj thinks that adding one more square to all of the shapes he has drawn on centimetre squared paper with perimeters of 42cm will change them into shapes with perimeters of 45cm. Is he right? How do you know?

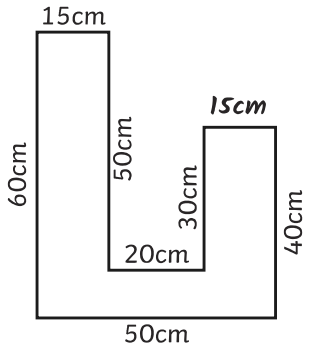
1)



Perimeter = **480m**



Perimeter = **24cm**



Perimeter = **280cm**

2) a) **18cm**
   b) **Multiple shapes are possible. Both should have a perimeter of 18cm.**

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1) **He has only added the measurements labelled.**
   6500m

2) a) **This is true because 2cm + 2cm + 8cm + 8cm = 20cm so the perimeter of the rectangle is 20cm and the square also has a perimeter of 20cm because 4 × 5cm = 20cm.**
   b) **False. Look for explanations giving examples that disprove the statement, e.g. A long, thin rectangle with sides of 6cm and 1cm has a perimeter of 14cm, which is smaller than the perimeter of a shorter, wider rectangle with sides of 5cm and 3cm, which would be 16cm.**
   c) **This is false because the rectilinear shape will have a perimeter of 32cm (no matter which way round you put the two squares).**

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1) a) **Answers will vary.**
   b) **Yes. Children should demonstrate that they can rearrange the shape and calculate the new perimeter accurately.**

2) a) **Multiple answers possible. Check that shapes have the specified perimeters.**
   b) **Tarj is partly right because if you draw an extra square onto the outside of a shape, touching only 1 edge, you are adding 3 more sides. Each side on centimetre square paper is 1cm so adding an extra square adds 3cm to the perimeter. However, if you add the square into a corner of the shape, touching 2 edges, the perimeter will not change, and if you add it into a notch in the shape, touching 3 edges, the perimeter will decrease.**