CHAPTER

21

Perimeter

Vocabulary:

perimeter
breadth
formula

Chapter Outcomes:

- Solve problems involving linear measure.
- Develop and use proficiently the formulae to calculate perimeter of squares and rectangles in problem solving.

An artist paints a scenery using beautiful colours. He wants to display his artwork in the best possible way so that others can enjoy it. What is the length of the wooden strip he would need to frame the painting? He finds out by measuring the perimeter of the painting? Perimeter is used for many things in everyday life. Finding the perimeter is important in construction, interior designing and art to name a few.

Getting Ready for Chapter 21

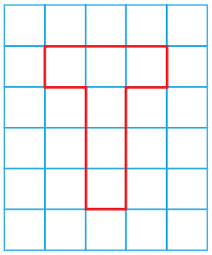
Choose a word from the list below to fill each space in the sentences.

perimeter	square
rectangle	area

1. A _____ has two pairs of opposite sides that are equal in length.
2. _____ is the distance around a figure.
3. A _____ has four sides that are equal in length.

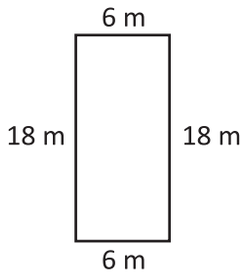
Find the perimeter of the figure in the grid below. Each unit represents 1 centimetre.

4.



Calculate the perimeter of the figure below.

5.



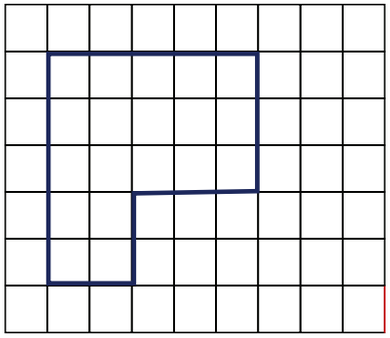
Model Perimeter

Teaching Point 1:

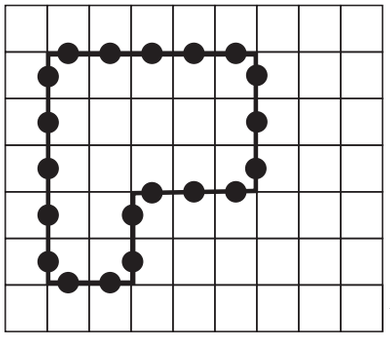
How can you find the perimeter?

Perimeter is the distance around a shape.

Find the perimeter of the shape.



1. Choose a unit, begin counting and label it. Mark off each unit as you count.

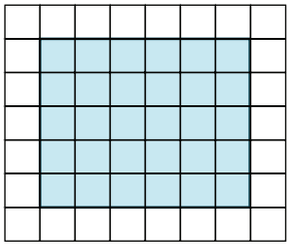


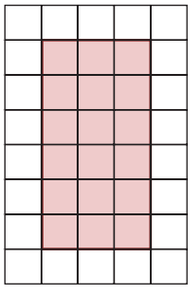
2. Count each unit around the shape to find the perimeter.

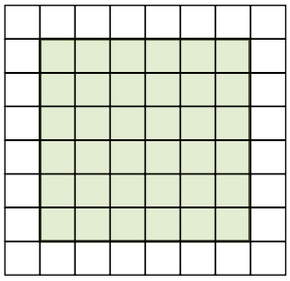
So, the perimeter is 20 units.

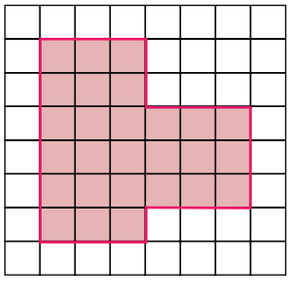
Activity 1:

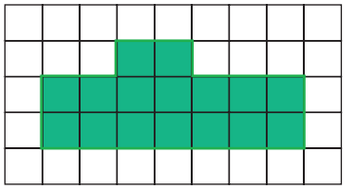
Find the perimeter of each shape. Each unit is 1 centimetre.

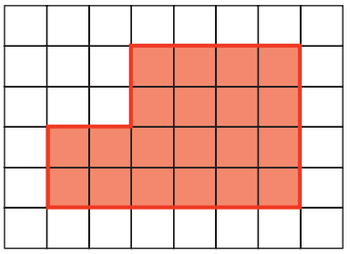
1. 

2. 

3. 

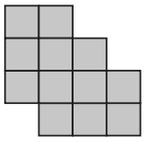
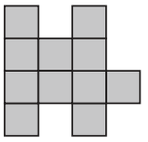
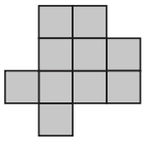
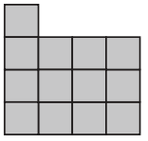
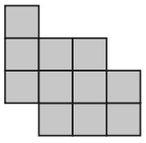
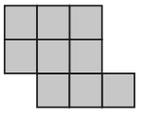
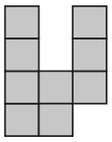
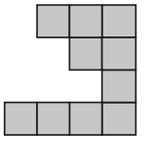
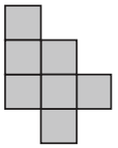
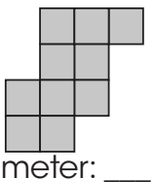
4. 

5. 

6. 

Activity 2:

Calculate the perimeter of each shape.

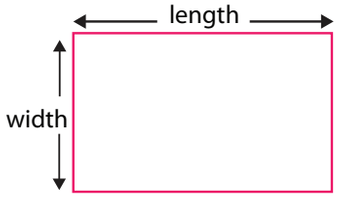
1.  Perimeter: ___ units	2.  Perimeter: ___ units
3.  Perimeter: ___ units	4.  Perimeter: ___ units
5.  Perimeter: ___ units	6.  Perimeter: ___ units
7.  Perimeter: ___ units	8.  Perimeter: ___ units
9.  Perimeter: ___ units	10.  Perimeter: ___ units

Measure and Calculate Perimeter

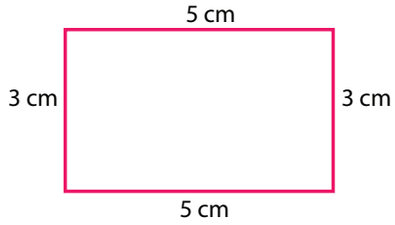
Teaching Point 1:

How can you measure the perimeter?

Find the perimeter of the shape.



1. Use a ruler to measure the length and width of the shape.



2. Add the lengths of all sides.
   5 cm + 3 cm + 5 cm + 3 cm = 16 cm

So, the perimeter of the shape is 16 cm.

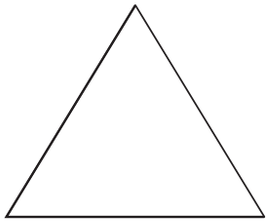
Activity 1:

Use a ruler to find the perimeter of each shape.

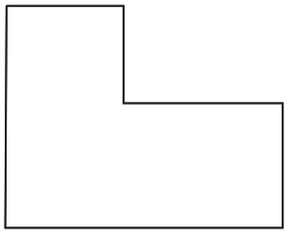
1.

2.

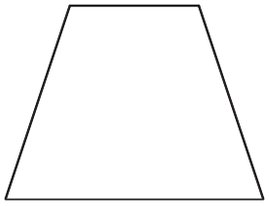
3.



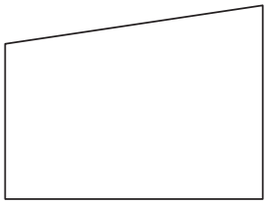
4.



5.



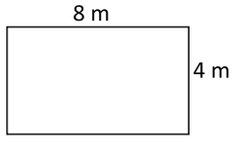
6.



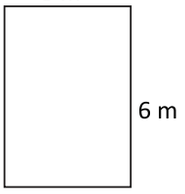
Activity 2:

Find the perimeter of each rectangle.

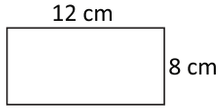
1.



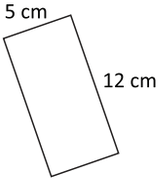
2.



3.

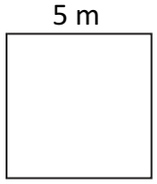


4.

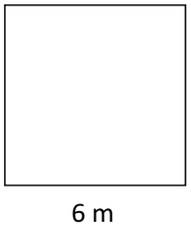


Find the perimeter of each square.

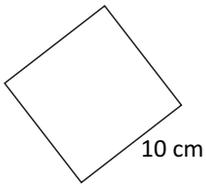
5.



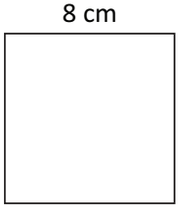
6.



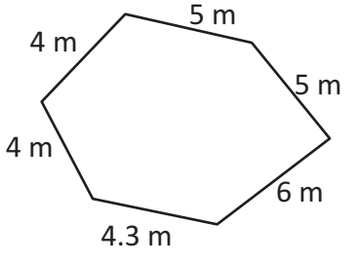
7.



8.



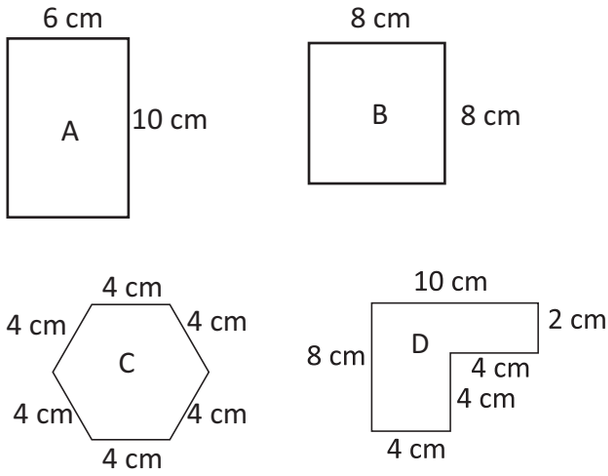
9. Manny wants to put a fence around his garden below. What is the length of fence that he needs?



10. The width of a rug is 1.5 metres. Its length is twice its width. What is the perimeter of the rug?

11. The length of a rectangular playground is 150 metres. Its length is three times its width. Mark jogs around the playground once. How far did he jog?

12. Which of the figures below have the same perimeter?

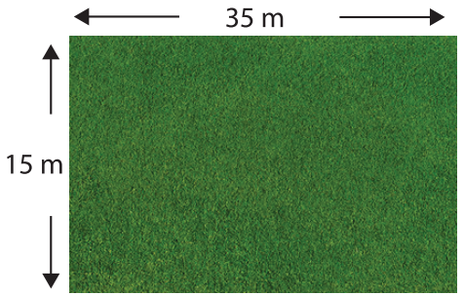


Use a Formula to Find the Perimeter

Teaching Point 1:

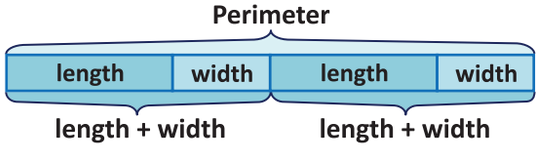
How can you use a formula to find the perimeter of rectangles?

What is the perimeter of the field below?



Formula for Perimeter of a rectangle:

Perimeter = length + width + length + width



The length + width is added **two** times to find the perimeter of a rectangle.

So, length + width is equal to $\frac{1}{2}$ of the perimeter.

Perimeter = (L + W) x 2

(L + W) x 2 = (35 m + 15 m) x 2
= 50 m x 2
= 100 m

So, the perimeter of the field is 100 m.

The **perimeter** (***P***) of a **rectangle** is the sum of the lengths and the widths. It is also two times the length (***l***) plus two times the width (***w***).

Teaching Point 2:

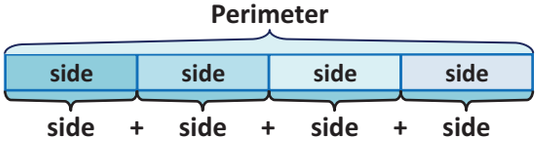
How can you use a formula to find the perimeter of squares?

What is the perimeter of the square?

0.66 km

Formula for Perimeter of a square:

Perimeter = side + side + side + side



The side is added **four** times to find the perimeter of a square.

So, one side is equal to $\frac{1}{4}$ of the perimeter

Perimeter = s x 4

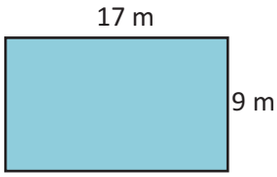
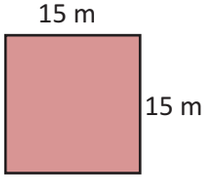
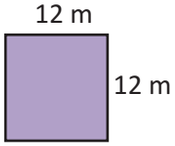
s x 4 = 0.66 x 4
= 2.64 km

So, the perimeter the square is 2.64 km.

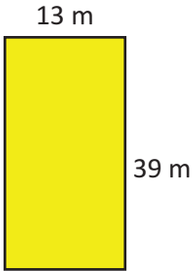
The **perimeter** (***P***) of a **square** is 4 times the measure of any of its sides (***s***).

Activity 1:

Use the formula to calculate the perimeter of the squares and rectangles.

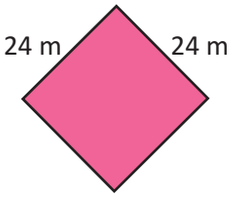
1.		Length = 22 m Width = 12 m Perimeter =
2.		Length = 17 m Width = 9 m Perimeter =
3.		Side = 15 m Perimeter =
4.		Side = 12 m Perimeter =

5.



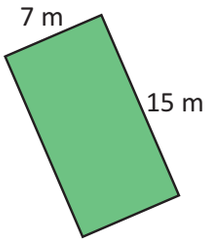
Length = 39 m
Width = 13 m
Perimeter =

6.



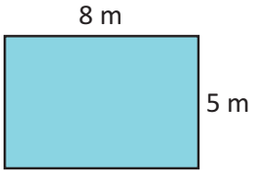
Side = 24 m
Perimeter =

7.



Length = 15 m
Width = 7 m
Perimeter =

8.



Length = 8 m
Width = 5 m
Perimeter =

Activity 2:

Use the formula for perimeter to complete the table.

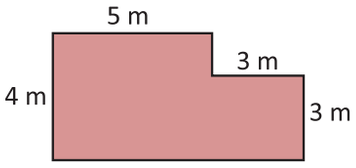
	Length	Width	Perimeter
1.	6 cm	6 cm	
2.	12 cm	9 cm	
3.	18 cm	13 cm	
4.	25 cm	15 cm	
5.	19 m	10 m	
6.	5 m	5 m	
7.	16 m	9 m	
8.	1.5 m	0.7 m	
9.	3 km	2 km	
10.	0.6 cm	0.6 km	

Apply the Formula with Simple Composite Figures

Teaching Point 1:

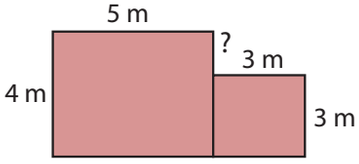
How can you use the formula to find perimeter of composite figures?

Find the perimeter of the figure below.



The figure is made up of a rectangle and a square. It is a **composite figure.**

Step 1: Separate the figure into a rectangle and a square.



Step 2: Find the length of the missing side.

Length of missing side: 4 m – 3 m = 1 m.

Step 3: Find the perimeter of the whole shape.

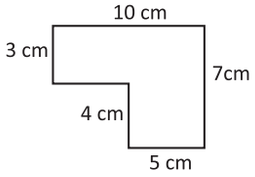
Perimeter: 5 m + 4 m + 5 m + 3 m + 3 m + 3 m + 1 m = 24 m

So the perimeter of the figure is 24 m.

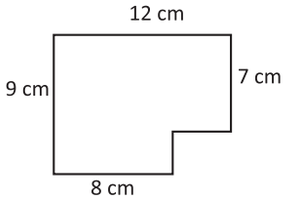
Activity 1:

Calculate the perimeter of these simple composite figures.

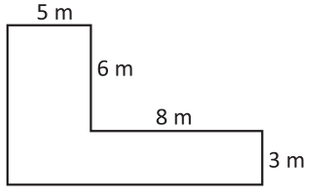
1.



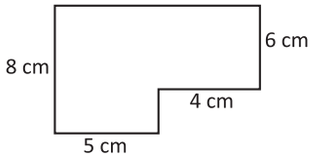
2.



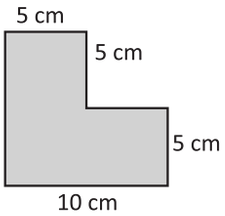
3.



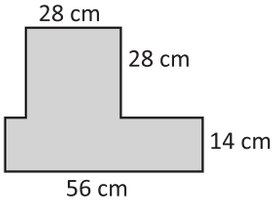
4.



5.



6.



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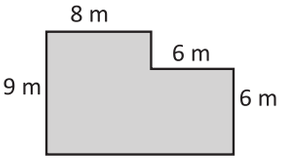

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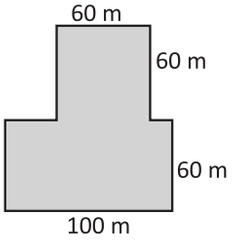

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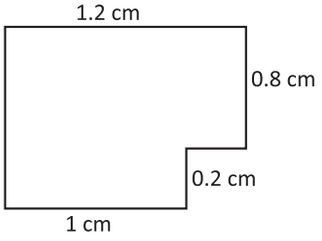

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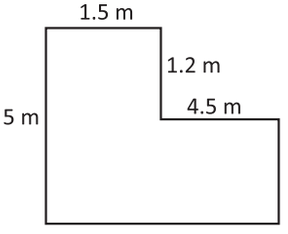
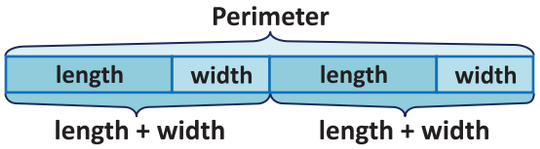


Find One Side Given the Perimeter

Teaching Point 1:

How can you find one side of a rectangle given the perimeter?

The perimeter of a rectangle is 24 metres. Its width is 5 metres. Find its length.



length + width = $\frac{1}{2}$ of perimeter

L + W = 24 m ÷ 2
= 12 m

L + 5 m = 12 m
Length = 12 m – 5 m
= 7 m

So the length of the rectangle is 7 metres.

Activity 1:

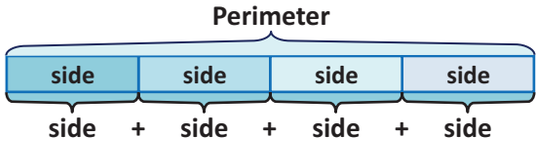
Complete the table. Find the length of the missing side.

Length	Width	Perimeter
1. 12 cm	_____	32 cm
2. 26 cm	_____	64 cm
3. _____	8 cm	38 cm
4. _____	9 cm	36 cm
5. 17 cm	_____	48 cm
6. _____	3 m	18 m
7. 20 m	_____	60 m
8. 2.5 m	_____	6 m
9. _____	2 km	12 km
10. 0.8 km	_____	2.4 km

Teaching Point 2:

How can you find one side of a square given the perimeter?

The perimeter of a square is 52 metres. Find the length of one side.



side = $\frac{1}{4}$ of perimeter

side = 52 m ÷ 4
= 13 m

So the length of one side is 13 metres.

Activity 2:

Complete the table. Find the length of one side of the square.

Side	Perimeter
1. _____	48 cm
2. _____	96 cm
3. _____	28 cm
4. _____	56 cm
5. _____	100 m
6. _____	36 m
7. _____	72 m

Activity 3:

Solve the problems below.

1. A fountain in the middle of a park has a square base. The perimeter of the base is 12 metres. Calculate the length of each side.
2. The perimeter of a rectangular car park is 134 metres. Its length is 27 metres. Find the width of the car park.
3. Aaron jogged twice around the rectangular field. The total distance he jogged was 1.6 km. If the length of the field is 300 m, what is the width of the field?

Draw Rectangles and Squares for Given Perimeters

Teaching Point 1:

How can you draw rectangles and squares for given perimeters?

Draw a rectangle with a perimeter of 12 cm.

In a rectangle the length is the longer side.

Step 1: Calculate the length and width of the rectangle.

length + width = 12 cm ÷ 2
= 6 cm

length + width = 6 cm
4 cm + 2 cm = 6 cm ← one choice

Step 2: Draw the rectangle.

Draw a square with a perimeter of 8 cm.

Step 1: Calculate the length of each side of the square.

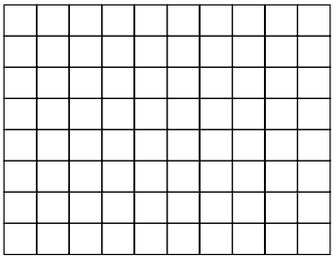
side = 8 cm ÷ 4
= 2 cm

Step 2: Draw the square.

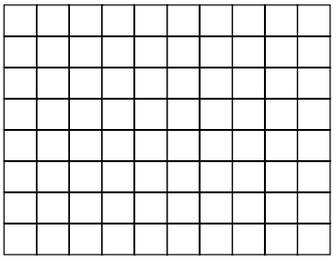
Activity 3:

Draw a square or rectangle on each grid to match the perimeter shown.

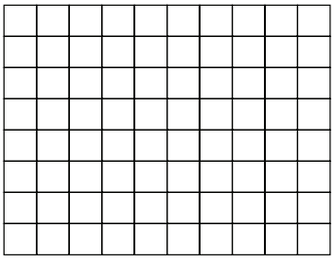
1. 16 units



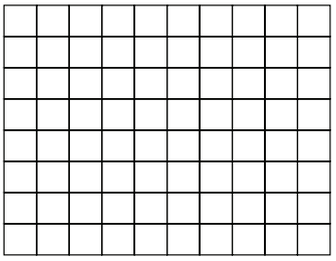
2. 18 units



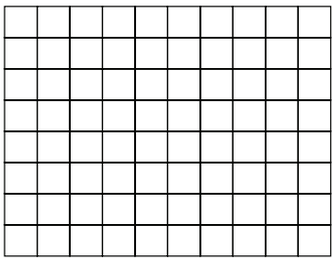
3. 12 units



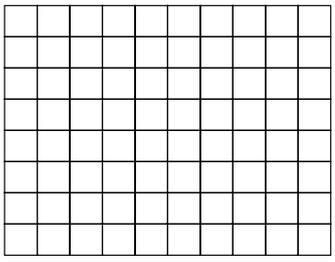
4. 10 units



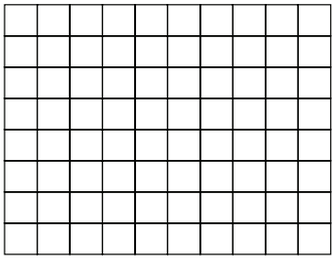
5. 24 units



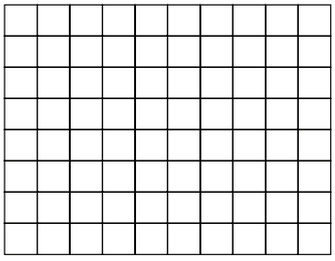
6. 32 units



7. 20 units



8. 28 units



Activity 2:

Draw rectangles that have the following perimeters.

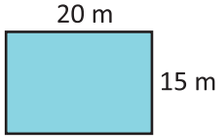
1. 24 cm
2. 24 cm
3. 18 cm
4. 10 cm
5. 16 cm
6. 28 cm
7. 32 cm
8. 12 cm
9. 8 cm
10. 14 cm

Draw squares that have the following perimeters.

11. 12 cm
12. 16 cm
13. 24 cm
14. 40 cm
15. 28 cm
16. 4 cm

Solve Problems in Perimeter

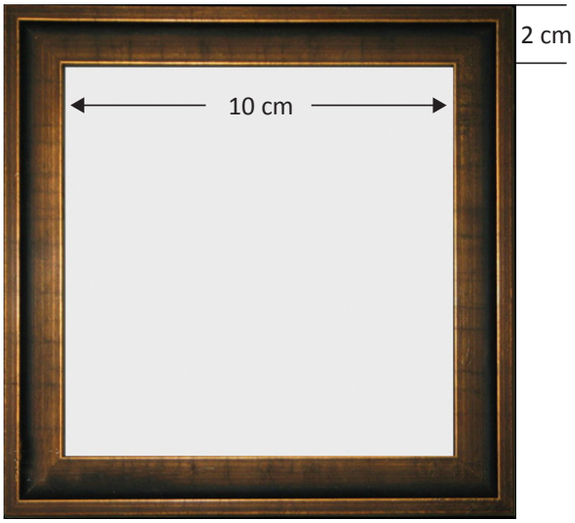
1. Mr. Wong is putting a brick edge around his rectangular swimming pool. What is the perimeter of the pool?



2. Calculate the width of a garden plot that is 24 metres long and which has a perimeter of 88 metres.

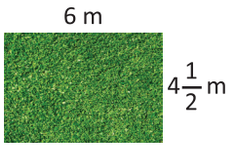
3. The perimeter of a rectangular garden is 60 metres. The width of the fence around the garden is 14 metres. Find its length.

4. Nadia has a square picture frame that holds a 10 cm by 10 cm photograph. The frame has a border that is 2 cm thick all the way around. How much larger is the perimeter of the frame than the perimeter of the photograph?



5. Mother plans to sew a lace border around the edge of a rectangular pillow. The length of the pillow is 58 cm. The width is one half the length. How much lace does Mother need?

6. The perimeter of the garden below is to be fenced.

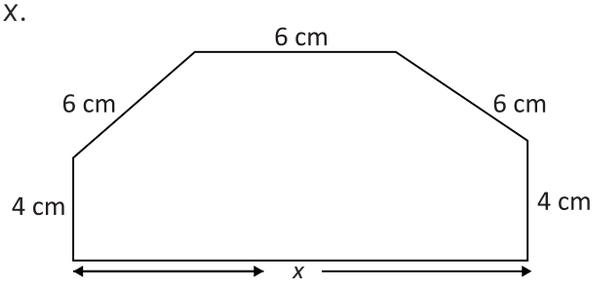


(a) Calculate the length of the fence needed.

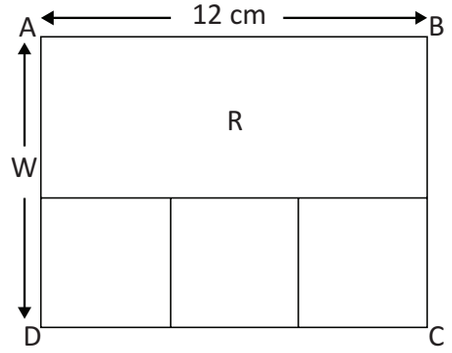
(b) If fencing is sold at $150.00 per metre, calculate the cost of fencing for the whole garden.

7. Jada will make a frame for her picture. The length of the picture is 45 cm. The width is one third of the length. How much wood does Jada need for the frame?

8. The perimeter of the shape below is 41 cm. Find the length of the side marked x.



9. Rectangle ABCD below is made with one rectangle, R, and three small identical squares as shown in the diagram below.

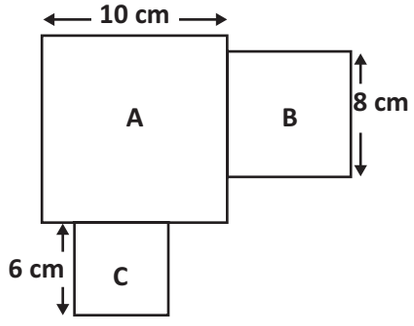


(c) Calculate the length of EACH of the sides of the small squares.

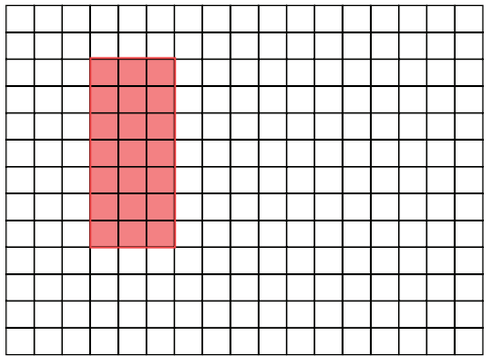
(d) If the perimeter of rectangle ABCD is 42 cm, what is the width, W?

(e) Calculate the width of rectangle R.

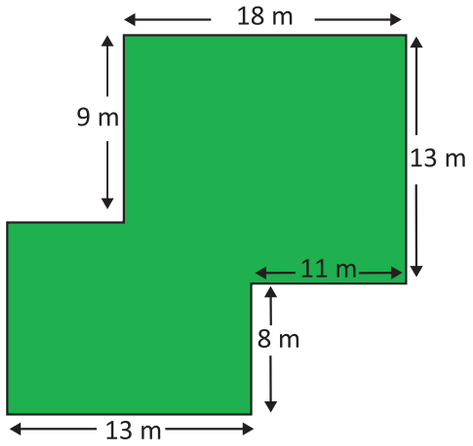
10. The figure below is made up of 3 squares, A, B and C. Find the perimeter of the figure.



11. On the grid, draw a DIFFERENT rectangle that has the SAME perimeter as the one shown below.



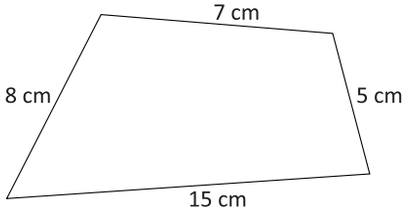
12. The figure below shows the courtyard of a school. Find the perimeter of the courtyard.



Chapter Review

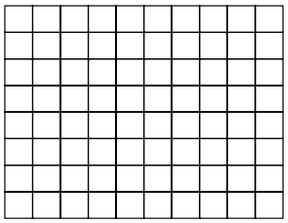
Answer the questions.

1. Calculate the perimeter of the shape below.



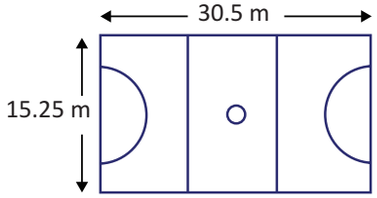
2. The perimeter of a square is 96 cm. What is the length of one side of the square?

3. In the grid below the length of each small square is 1 cm.

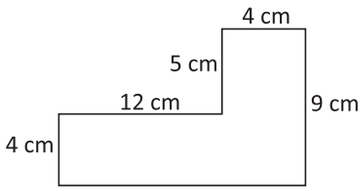


Draw a rectangle on the grid that has a perimeter of 22 cm.

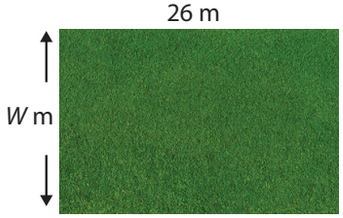
4. What is the perimeter of the netball court below?



5. Calculate the perimeter of the shape shown below.

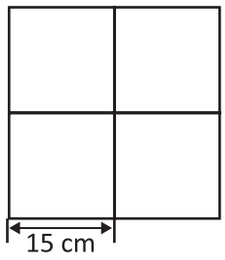


6. The length of a rectangular garden shown below is 26 m and the perimeter is 90 m. Find the width, *W*, of the garden.

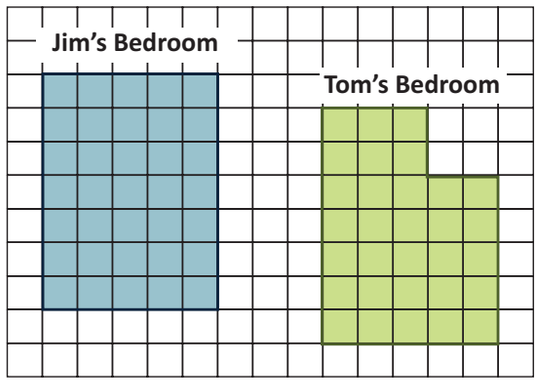


7. Josiah ran 3 times around a square field. He covered a distance of 12 km. What is the length of one side of the field?

8. Four square tiles are joined together to make a square as shown below. The length of each side of each tile is 15 cm. What is the perimeter of the square?



9. The floors of Jim's and Tom's bedrooms are shown in the diagram below.



Which room has the floor with the smaller perimeter?

10. Rectangle B has a perimeter of 96 cm. The perimeter of Square A is $\frac{6}{8}$ of the perimeter of Rectangle B. Find the length of one side of Square A.