

Unit 8

Perimeter and Area

Learning Outcomes

After completing this unit, you will be able to:

- Differentiate between perimeter and area of a square and rectangular region.
- Identify the units for measurement of perimeter and area.
- Find and apply formulas to find perimeter and area of a square and rectangular region.
- Solve real life situations involving perimeter and area of square and rectangular regions.



Wooden fence is to be fixed around a rectangular park. If you know the length and width of the park how can you find the required length of the fence?

Area and Perimeter

Sara and Raza are in the same school. There is a playground in their school.



Do you know what is the shape of our playground? If a wall is to be constructed around the playground, what will be its total length?



The playground is square shaped because its length and width are equal. The length of the wall around it will be equal to its perimeter.



Area

Perimeter

Area

- The space covered by the surface of any 2-dimensional shape is called its area.
- The units to measure the area are m^2 (squared metres) and cm^2 (squared centimetres) etc. (like $15cm^2$, $24m^2$ etc.)
- Example: The space inside the boundary of a park.

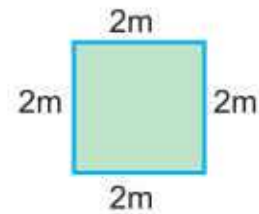
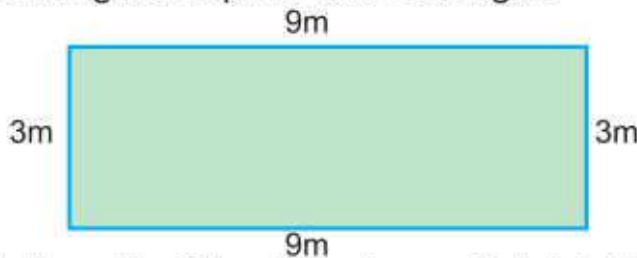
Perimeter

- The total length of the boundary of a closed region is called its perimeter.
- The units to measure the perimeter are m (metres), and cm (centimetres) etc. (like 15cm, 24cm etc.)
- Example: The length of the fence around a region, the total length of a photo frame.



Ask the students to draw squares and rectangles of different measurement on the notebook, use blue colour to show its perimeter and green colour to show its area.

Observe the given square and rectangle.



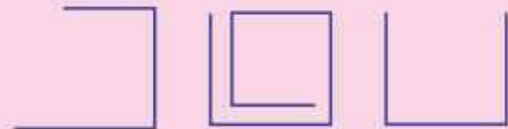
The total length of the boundary which highlighted with blue colour is called their perimeter.

While the green portion, surrounded by their boundaries is called their area.



Try Yourself

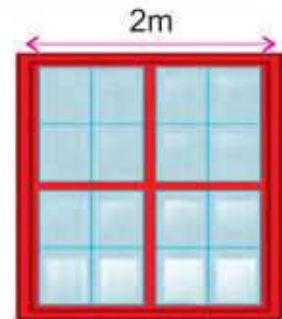
Can we calculate the area and perimeter of the given figures? Give reason to support your answer.



Perimeter of a Square



The window of our classroom is square shaped and length of one side is 2 metres. How can we find its perimeter?



Key Fact

The lengths of all sides of a square are equal.

We can find its perimeter by adding the length of one side of the window 4 times or by multiplying length of one side with 4.



Perimeter of a square = $4 \times$ length of one side

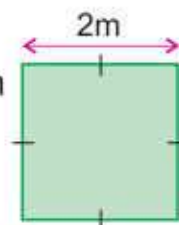
If we represent the length of the square by ℓ , then:

Perimeter of a square = $4 \times \ell$

The length of one side of the window = 2 m

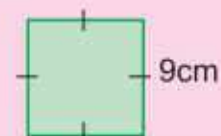
Perimeter of window = $4 \times 2 \text{ m} = 8 \text{ m}$

So, the perimeter of the window is 8m.



Try Yourself

Find the perimeter of the given squared shape.



Usman has a square shaped picture frame with length of one side is 22.5cm. Find the perimeter of the frame.

$$\begin{aligned}\text{Perimeter of squared frame} &= 4 \times \text{length of one side} \\ &= 4 \times 22.5 \text{ cm} \\ &= 90 \text{ cm}\end{aligned}$$

So, the perimeter of the picture frame is 90 cm.



Key Fact

Perimeter of a square
= $4 \times \text{length of one side}$



Try Yourself

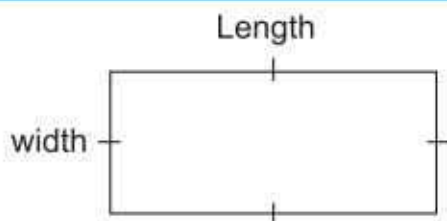
- Draw a square with the perimeter of 12 centimetres.
- A square shaped ground is 20 metre long. If a person takes 5 rounds of the ground, how much total distance does he cover?

Perimeter of a Rectangle

The length of a book is 26 cm and its width is 19.5 cm. How can we find the perimeter of the book?



We can find its perimeter by adding measurements of all sides.



If we denote length of the rectangle with ' ℓ ' and width with ' w ', then:

$$\text{Perimeter of rectangle} = \ell + \ell + w + w$$

or

$$\begin{aligned}\text{Perimeter of rectangle} &= 2\ell + 2w \\ &= 2(\ell + w)\end{aligned}$$



Ask the students to look around, identify square shaped objects and find their perimeter by using the formula.

$$\begin{aligned}
 \text{Perimeter of rectangle} &= 2(\ell + w) \\
 &= 2(26\text{cm} + 19.5\text{cm}) \\
 &= 2(45.5)\text{ cm} \\
 &= 91\text{ cm}
 \end{aligned}$$

So, perimeter of the book is 91 cm.



Key Fact

$$\begin{aligned}
 \text{Perimeter of rectangle} &= 2(\text{length} + \text{width}) \\
 &= 2(\ell + w)
 \end{aligned}$$



Try Yourself

Measure the length and width of your teachers table and find its perimeter by using the formula.

A rectangular pool is 10 metre long and 7.3 metre wide. Find the perimeter of the pool.

$$\begin{aligned}
 \text{Length of the pool} &= 10\text{m} \\
 \text{Width of the pool} &= 7.3\text{m} \\
 \text{Perimeter of rectangle} &= 2(\ell + w) \\
 \text{Perimeter of the pool} &= 2(10\text{m} + 7.3\text{m}) \\
 &= 2(17.3)\text{m} = 34.6\text{m}
 \end{aligned}$$

So, the perimeter of the pool is 34.6m.

The length of a rectangular garden is 21 metres and its width is 16 metres. If the rate of fencing is Rs.170 per metre, find the cost of fencing around it.



$$\begin{aligned}
 \text{Perimeter of the garden} &= 2(\ell + w) \\
 &= 2(21 + 16) \\
 &= 2(37) = 74\text{m} \\
 \text{Cost of 1 metre of fencing} &= \text{Rs } 170 \\
 \text{Cost of 74 metres of fencing} &= 74 \times \text{Rs } 170 \\
 &= \text{Rs } 12\,580
 \end{aligned}$$

So, the cost of fencing is Rs 12 580.



Try Yourself

The perimeter of a rectangular field is 66 metres. If the length of this field is 15 metres, then find the width of the field. Also tell the cost of putting barbed wire around the field if the rate is Rs 220 per metre.

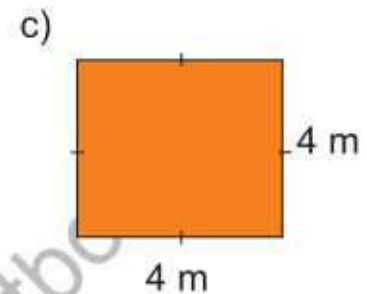
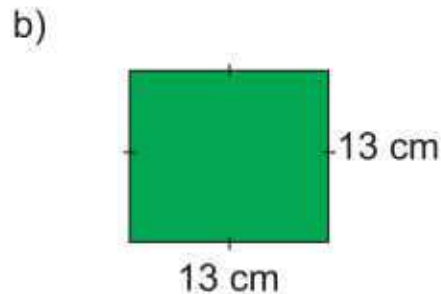
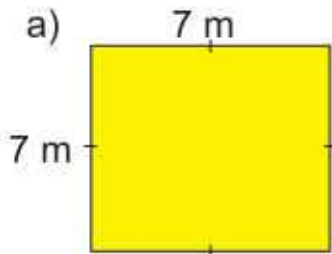


Ask to students to find rectangular objects in their classroom, measure their lengths and width and find the perimeter of each object.

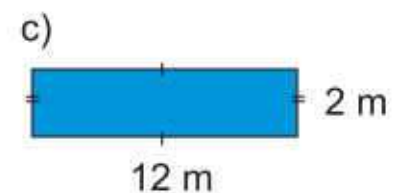
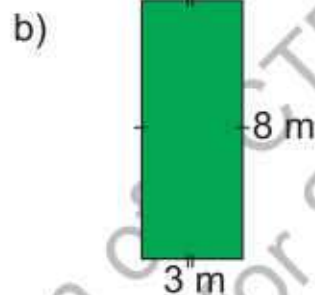
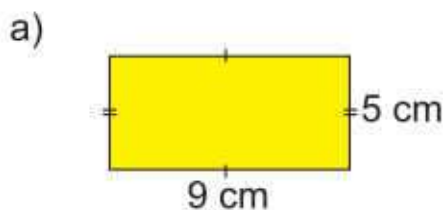


Exercise 1

1. Find the perimeter of the given squares.

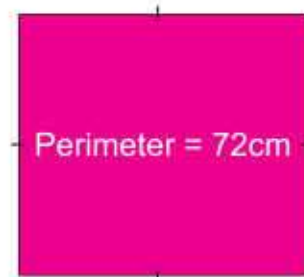


2. Find the perimeter of the given rectangles.



3. If the length of a square shaped crop field is 29m, what will be its perimeter?

4. The perimeter of a square shape is 72 cm. What will be its length?



5. Find the perimeter of the squares of the given lengths by using formula.

- | | | | | | |
|----------|----------|------------|----------|-----------|-----------|
| a) 5 cm | b) 12 cm | c) 6 m | d) 19 cm | e) 26 m | f) 2.5 cm |
| g) 9.7 m | h) 15 m | i) 16.6 cm | j) 10 m | k) 7.1 cm | l) 2.7 cm |

6. Find the perimeter of the rectangles of the given lengths and widths by using formula.

- | | | |
|---|---|---|
| a) $\ell = 3 \text{ cm}$, $w = 2 \text{ cm}$ | b) $\ell = 5.3 \text{ m}$, $w = 2.2 \text{ m}$ | c) $\ell = 6 \text{ cm}$, $w = 4 \text{ cm}$ |
| d) $\ell = 9 \text{ m}$, $w = 1.2 \text{ m}$ | e) $\ell = 10 \text{ m}$, $w = 5.9 \text{ m}$ | f) $\ell = 15 \text{ cm}$, $w = 12 \text{ cm}$ |

7. Children are playing in a square shaped playground. If the length of the playground is 12 metres, find its perimeter.
8. Harris wants to find out the perimeter of the square shaped notice board in his classroom. If the length of one side of the notice board is 2.5 metres, find the perimeter of the notice board.
9. If a rectangular room is 10.8 metres long and 8.8 metres wide. Find the perimeter of the room.
10. Nadia has a rectangular frame. The frame is 12 cm long and 8 cm wide. Nadia wants to put a ribbon around the frame.
 - a) Find the required length of the ribbon.
 - b) What will be the total cost of ribbon if 1 metre of it costs Rs.5.
11. A building is 128 metres long and 96.5 metres wide.
 - a) Find out its perimeter
 - b) Find the total cost for the construction of boundary wall around this building if the rate of construction of wall is Rs. 470 per metre.

**Hint**

By multiplying the cost of the ribbon per metre with the perimeter of the frame will determine the total cost of the ribbon.

Area of a Square



My room is square shaped. Its length is 11 metres. How can I find its area?



We can find the area of a square shaped room by multiplying its length with width.



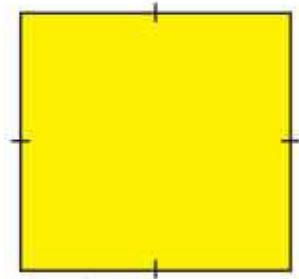
Ask the students to look around for square shaped objects and then find their area.

If we denote length of a side of the square by " ℓ " then:

Area of a square = length of a side $\times$ length of the side

Length of the room = 11 m

$$\begin{aligned}\text{Area of the room} &= \ell \times \ell \\ &= 11 \times 11 \text{ m}^2 \\ &= 121 \text{ m}^2\end{aligned}$$



Key Fact

$$\begin{aligned}\text{Area of square} &= \text{length} \times \text{length} \\ &= \ell \times \ell\end{aligned}$$

A square mirror has a length of 42 cm. What is its area?



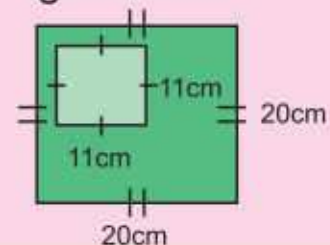
$$\begin{aligned}\text{Length of one side } (\ell) &= 42\text{cm} \\ \text{Area of the mirror} &= \ell \times \ell \\ &= 42\text{cm} \times 42\text{cm} \\ &= 1\,764 \text{ cm}^2\end{aligned}$$

So, the area of the mirror is 1 764 cm².



Try Yourself

Find the area of the coloured portion in the given figure.



Area of a Rectangle



The playground of my school has a rectangular flower bed with length is 7.5 metres and width of 4 metres. How can we find its area?



Ask the students to look for rectangular objects in their classroom, measure their length and width.

The area of a rectangle can be found by multiplying its length with its width.
If we denote the length of the rectangle by " ℓ " and width by " w ", then:

Area of rectangle = Length $\times$ Width

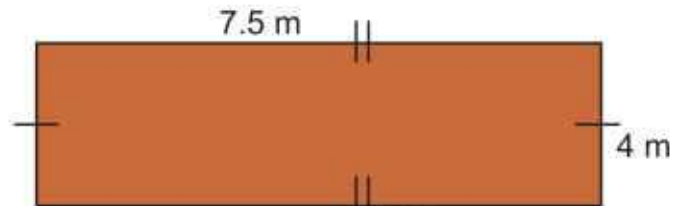
Area of rectangle = $\ell \times w$

Length of the flower bed = 7.5m

Width of the flower bed = 4m

Area of the flower bed = $7.5 \times 4\text{m}^2$
= 30m^2

So, the area of the flower bed is 30m^2 .



Try Yourself

Measure the length and width of your classroom. Then find the cost of tiling your classroom if the rate of tiling is Rs 455 m^2 .



Key Fact

Area of rectangle = length $\times$ width
= $\ell \times w$

A rectangular hospital has a perimeter equals to 294 metres. If its length is 85 metre, find its area.

$$\begin{aligned}\text{Perimeter of rectangle} &= 2(\ell + w) \\ 294\text{m} &= 2(\ell + w) \\ 294\text{m} &= 2(85 + w) \\ 294\text{m} &= 170\text{m} + 2w \\ 294\text{m} - 170 &= 2w \\ 124 &= 2w \\ 124 \div 2 &= w \\ 62\text{m} &= w\end{aligned}$$

Area of rectangle = $\ell \times w$

Area of hospital = $85\text{m} \times 62\text{m}$

Area of hospital = 5270m^2

So, the area of the hospital is 5270m^2 .



Try Yourself

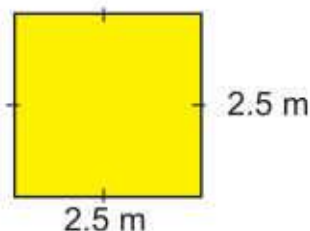
Draw two rectangles with different areas but same perimeters. Draw a square and a rectangle with same areas and perimeters.



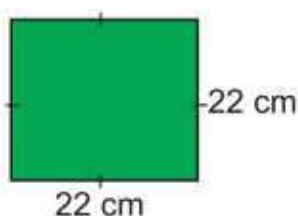
Exercise 2

1. Find the area of the given squares.

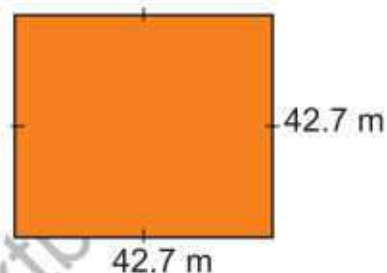
a)



b)

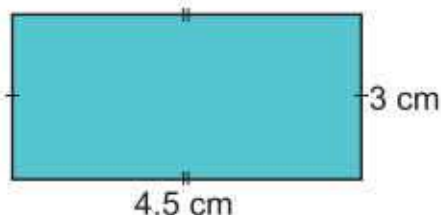


c)



2. Find the area of the given rectangles.

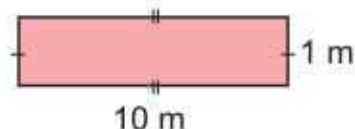
a)



b)



c)



3. The area of a rectangle is 96m^2 . If its width is 3m, then find its length.

4. Find the area of the squares of the given lengths by using formula.

a) 4.5 m

b) 9.3 cm

c) 8.8 m

d) 15 cm

e) 13 cm

f) 3 m

g) 6 m

h) 2.9 m

i) 5 cm

j) 9.2 m

k) 14 m

l) 1.1 cm

5. Find the area of the rectangles of the given lengths and widths by using formula.

a) $\ell = 5\text{ cm}$, $w = 1.9\text{ cm}$

b) $\ell = 4\text{ m}$, $w = 3\text{ m}$

c) $\ell = 6\text{ cm}$, $w = 4\text{ cm}$

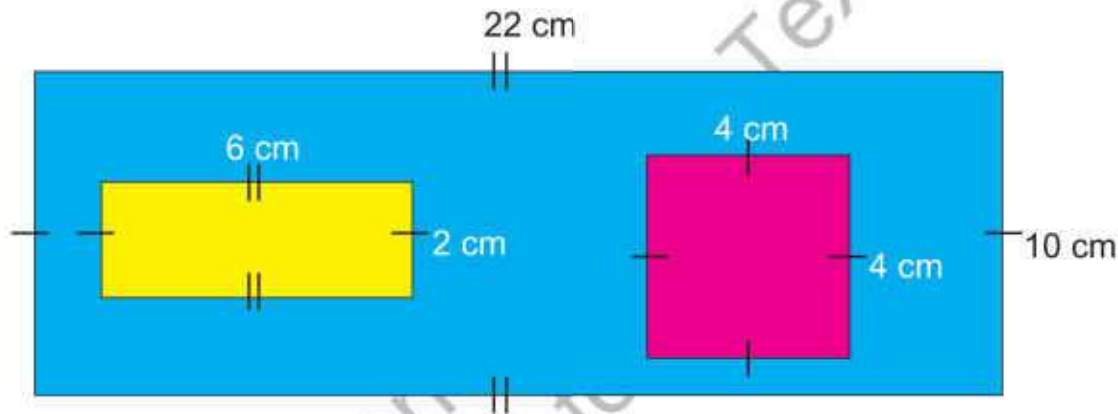
d) $\ell = 7\text{ cm}$, $w = 5\text{ cm}$

e) $\ell = 10.5\text{ cm}$, $w = 9\text{ cm}$

f) $\ell = 20\text{ m}$, $w = 17\text{ m}$

6. A rectangular shaped ground has a length of 122m and width 108m. Find the area of the ground.

7. The area of a school's main gate is 19.55m^2 .
- If the width of the gate is 2.3m , then find its length.
 - Find the cost of painting the gate if the rate of painting is Rs.275 per m^2 .
8. Area of a Masjid is $2\,7540\text{m}^2$ and its length is 255m . Find:
- The perimeter of the Masjid.
 - The cost of carpeting the Masjid, if the rate of carpeting is Rs 275 per m^2 .
9. Find the area of the blue part.



I Have Learnt to:



- differentiate between perimeter and area of a square and rectangular region.
- identify the units for measurement of perimeter and area.
- find and applying formulas to find perimeter and area of a square and rectangular region
- solve real life situations involving perimeter and area of square and rectangular regions.

Vocabulary

- Perimeter
- Area
- Square
- Rectangle
- Unit
- Formula
- Region
- Measurement
- Rectangular
- Width

Review Exercise

1. Choose the correct options and fill in the blanks.

a) If the length of a rectangle is 4 cm and width is 3.4 cm, then its perimeter will be equal to_____.

- i) 11.4 cm ii) 7.4 cm iii) 14.8 cm iv) 10.8 cm

b) Formula to find the perimeter of the square is:

- i) $4 + \ell$ ii) $4 - \ell$ iii) 4ℓ iv) $\ell \times \ell$

c) The formula to find the perimeter of the rectangle is:

- i) $2(\ell + w)$ ii) $2\ell + w$ iii) $\ell + 2w$ iv) $\ell + w$

d) Area of a rectangle is 45m^2 . If its length is 15 m then its width is:

- i) 6m ii) 3m iii) 5m iv) 15m

e) The formula to find the area of the square is:

- i) $\ell \times \ell$ ii) $2(\ell + w)$ iii) $\ell + 2w$ iv) 4ℓ

f) The formula to find the area of the rectangle is:

- i) $\ell \times w$ ii) $2(\ell + w)$ iii) $\ell + 2w$ iv) 4ℓ

g) If the perimeter of the rectangle is 34 cm and we increase its length by 2 cm then there will be difference of _____ cm in its perimeter.

- i) 2 ii) 4 iii) 8 iv) 6

h) If the length of one side of the square is 14 cm, then its perimeter will be _____.

- i) 14 cm ii) 56 cm iii) 256 cm iv) 28 cm

2. Find the perimeter and area of the squares of the given lengths by using formula.
- a) 8.2 cm b) 2.6 m c) 12.8 m d) 7.9 cm
e) 16 cm f) 4.3 m g) 5.7 m h) 11 cm
3. Find the perimeter and area of the rectangles of the given lengths and widths by using formula.
- a) $\ell = 6$ cm, $w = 3.4$ cm b) $\ell = 1.2$ m, $w = 0.3$ m
c) $\ell = 10$ cm, $w = 13$ cm d) $\ell = 17$ cm, $w = 8.5$ cm
4. The perimeter of a book is 100 cm. If it's width is 22 cm, find its length.
5. Laiba wants tiling for the floor of her kitchen. If the length of the kitchen is 3 metres and width is 2.5 metres then find the area of the kitchen.
6. The length of the fence around a square shaped garden is 24m. Find the length of the garden.
7. Daniya took a 42 cm long ribbon and made a rectangle with it. If the length of the rectangle is 15 cm, then find its width.
8. Find the area of the carrom board whose perimeter is 40 cm.