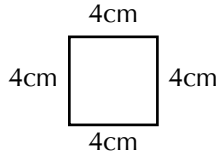
The distance around and the space inside

Sheela Iyer and Sagarika Mishra

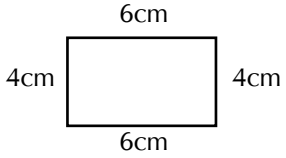
Perimeter

A farmer has a piece of land where he grows crops. But goats and cows eat all his crops. What can he do to protect his crops? Build a fence around his farm? What is fencing? It is nothing but a boundary (in layman's language) or perimeter (in mathematical language). Perimeter can be defined as the distance around the outside of a closed shape or the sum of the lengths of all sides of a closed geometrical figure.

Perimeter of square: sum of all its sides or four times its one side. If each side measures 4cm then: 4cm + 4cm + 4cm + 4cm = 16cm OR 4 times 4 sides = 4cm x 4cm = 16 cm.

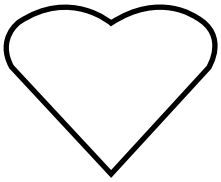


Perimeter of rectangle: sum of all the sides or twice the sum of length and breadth. If the length and breadth measure 6cm and 4cm respectively then: 6cm + 4cm + 6cm + 4cm = 20cm OR 2 times (length plus breadth) = 2x (l + b) = 2 x (6cm + 4cm) = 2 x (10cm) = 20cm.



Since perimeter is the distance around the boundary of a closed shape, its unit is the same as that of the distance, i.e., m, cm, etc.

It is also possible to find out the perimeter of irregular shapes. These shapes can be measured with the help of a thread, string, or wool, which in turn can be measured with the help of a scale.



Copy & Use

Activity 1

1. Find the perimeter of the following figures using a ruler. Measure the sides of each shape to calculate the perimeter. Label the length of each side in cm.

Figure: 1

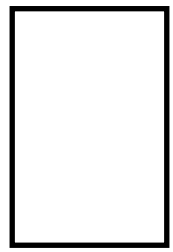


Figure: 2

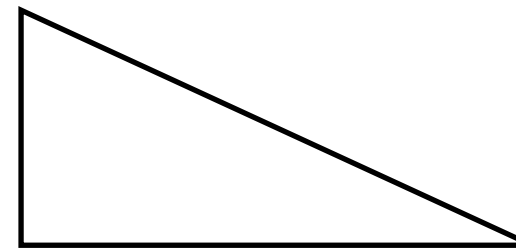


Figure: 3

Figure: 4

Activity 2

Q.1 How many kms would you have covered if you walked around the edge of each of these fields? They have sides of 5cm each.

Fig: 1

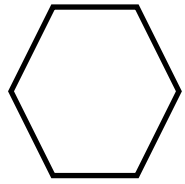


Fig:2

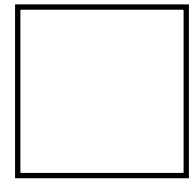
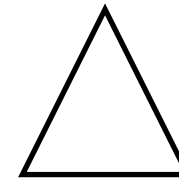


Fig:3



The perimeter is: _____cm _____cm _____cm

Q.2 Measure the perimeters of these irregular polygons? (use a string or ruler)

Fig: 1

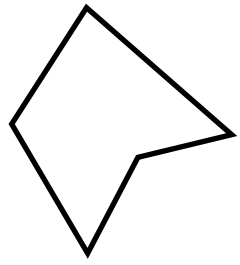


Fig: 2

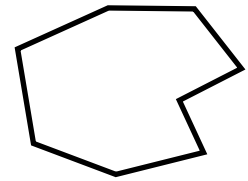
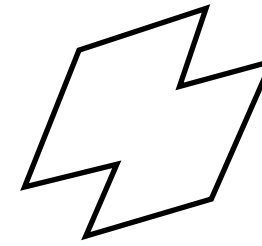


Fig: 3



_____cm _____cm _____cm

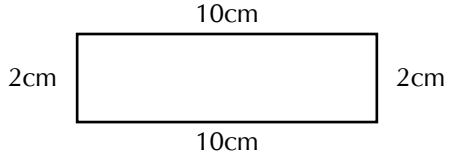
Q.3 Solve these:

1. Somabhai has a square field. Each side measures 120m. He wants to put a fence all around it. How much fencing does he need? Draw and represent your answer in the space below.

2. His brother Rajubhai has another field which is rectangle in shape. Two sides are 15 metres and two are 21 metres. What is the perimeter of the field? Draw and represent your answer in the space below.

3. The rectangle below has a perimeter of 24cm.

Rectangle No. 1:



Draw two more rectangles, in the space below, whose perimeters are also 24 cm but whose lengths and breadths are different.

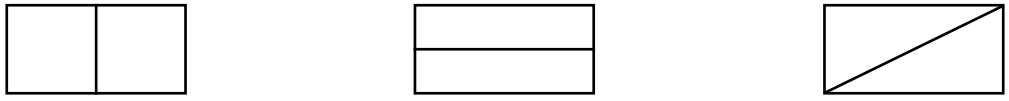
Rectangle No. 2 **Rectangle No. 3**

Area

Area and perimeter are forms of measurement that are normally used in day to day transactions and should be taught simultaneously. It is very important to clear the concepts of Perimeter and Area. Children need to understand that perimeter is the distance around the outside of the shape, whereas area is the space inside the shape.

Let us define area in a simple context. Area is nothing but the size of a surface. It is the amount of space inside the boundary of flat (2-dimensional) objects such as rectangles, squares, triangles, or circles. The area of an object does not change even when the shape of the object changes. Different shapes may have the same size or area.

For instance:



Help the children understand that rectangles can be halved in different ways creating different shapes, but all the shapes have the same area.

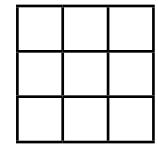
Area is expressed in square units – cm square, m square.

1. The area in square units of a square is calculated by the number of square units in its closed shape.

   (1 sq unit: ☐)

   Area of square: side × side or side square (s^2)

   3 x 3 = 9 sq units

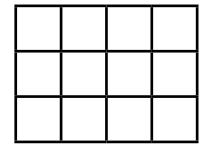


2. The area in square units of a rectangle is given by the number of units in its length x the number of units in its breadth.

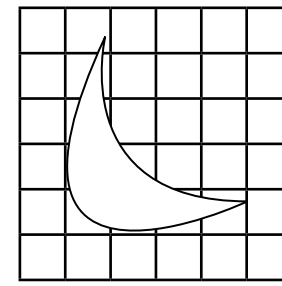
   4 Square units x 3 square units

   Area of rectangle: l x b

   4 x 3 = 12 sq units



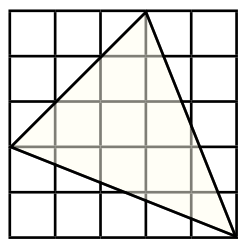
3. For irregular shapes a thread graph (geoboard) can be easily made. Place the figure over the board/graph and count the number of squares the figure covers. (If the figure covers more than half a square, it should be taken as one square, if it covers half square it should be taken as half, and if it covers less than half a square then it should be ignored).The total squares the figure covers is approximately the area of the irregular shape.

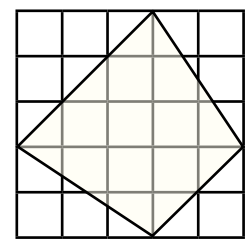


The area of this irregular shape is 6 sq units.

Activity 3

Q.1 Find the area of the given shapes (take each square as 1 unit):





_____ _____

Activity 4

Q.1 State true or false:

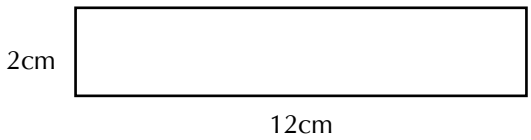
a. Shapes with same area can have different perimeters. ( )
b. Area is expressed in centimetre/metre squares. ( )
c. Perimeter of a square is equal to length × length. ( )
d. Reshaping or rearranging the pieces of any shape does not change the area. ( )

Q.2 Choose the best option from the given alternatives:

a. A fence is put up to protect a flower bed of beautiful roses. The length and breadth of the fence is 3m by 2m. Total fencing =_____.

   i) 6m ii) 10m iii) 15m iv) none

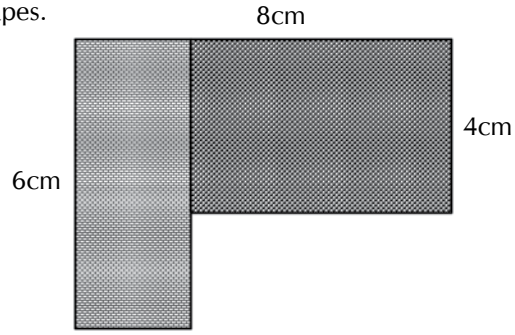
b. The area of the figure given below is: _____



i) 14 sq cm ii) 28 sq cm iii) 24sq cm iv) 24 cm

Activity 5

Q.1 Find the perimeter and area of these attached compound shapes.

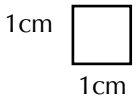


Area 1 = _____

Area 2 = _____ Perimeter = _____

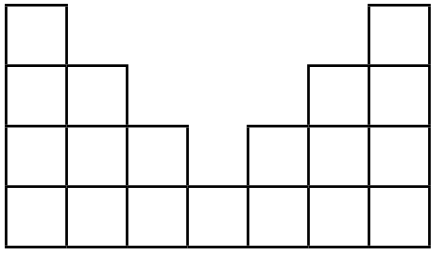
Total Area = _____

Q.2 Find the area and the perimeter of the following figures:



Area = _____

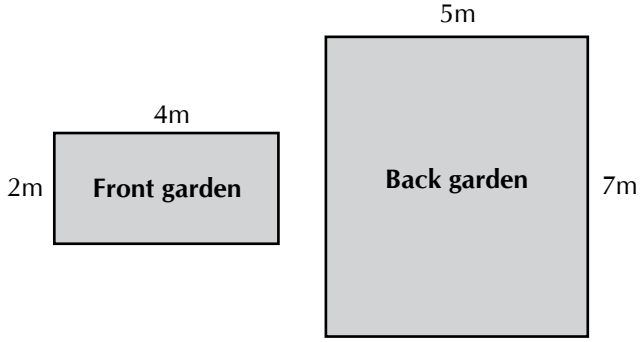
Perimeter = _____



Activity 6

Word problems

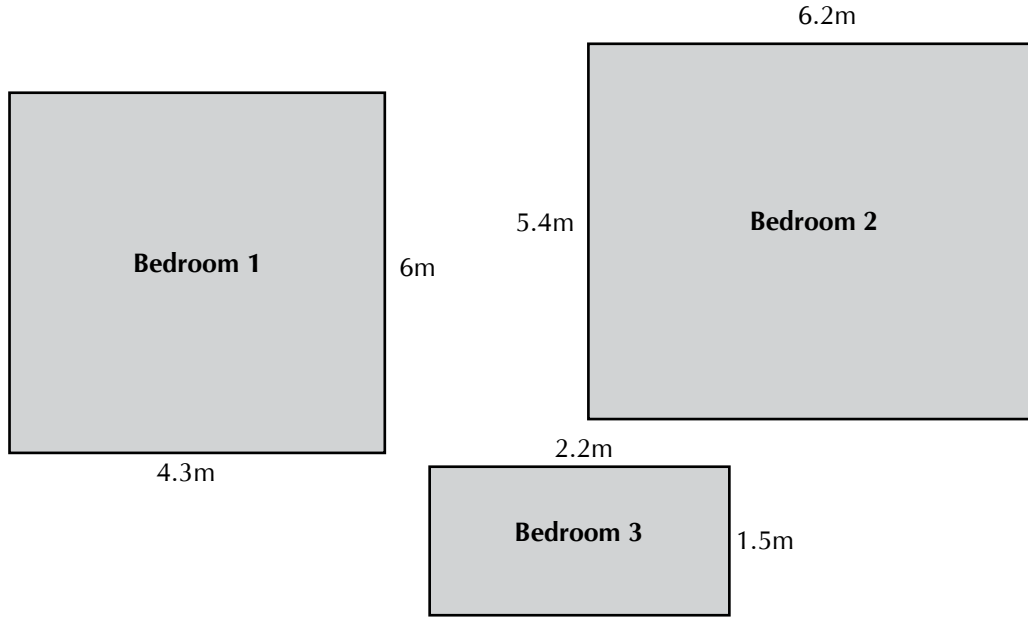
Q.1. Mrs. Shanti needs to fence her entire garden. Calculate how many metres of fence she will need for each garden.



Q.2 If each metre of fence costs Rs.100/-. How much will the total cost be?

Q.3 Miss Renu's bed measures 1.5m by 2m. How big does the mattress have to be?

Q.4 Mrs. Sunanda needs to replace all the carpets in her three bedrooms. The carpets cost Rs. 125/- per square metre. How much will each bedroom cost her?



Activity 7

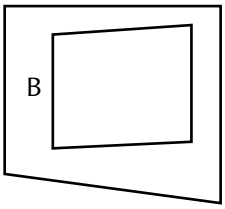
Combined topic: perimeter and area

1. Choose the correct option:

a. The length of the boundary of a closed figure is its _____

i) perimeter ii) area iii) volume

b. Figure B is inside figure A as shown. Which statement is correct?

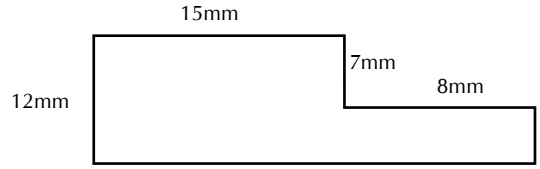


i) The perimeter of A is equal to the perimeter of B

ii) The perimeter of A is smaller than the perimeter of B

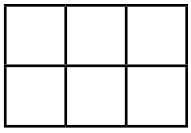
iii) The perimeter of A is larger than the perimeter of B

c. The perimeter of the given shape is:



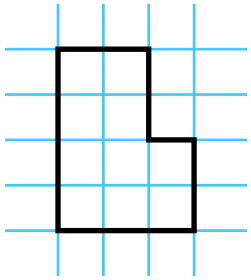
i) 42 mm ii) 70mm iii) 75mm

d. The area of the given shape is _____.
(take each side as 1 cm)



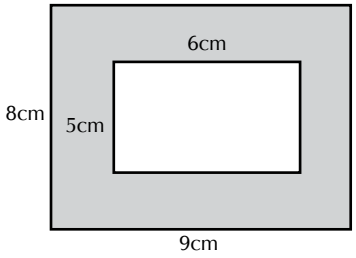
i) 6 cm ii) 10 sq cm iii) 6 sq cm

e. The area and perimeter of the given shape is _____
Take each side as 1 cm



i) 10 cm, 14 sq cm ii) 10 sq cm, 14 cm iii) 10 sq cm, 12 cm

f. The area of the shaded portion is _____



i) 42 sq cm ii) 30 sq cm iii) 72 sq cm

2. Fill in the blanks:

a. The measure of a surface enclosed by a closed figure is called _____.

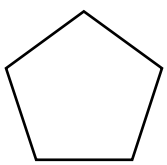
b. The area of a square having one side equal to 1cm is _____.

c. The perimeter of a triangle is 15cm. If length of one side is 4cm, the sum of the other two sides will be _____.

d. If the perimeter of a square is 20 mm, the length of each side is _____.

e. The area of a triangle is _____.

3. Do as directed



a. The perimeter of the pentagon is 30cm. Find the length of each side.

_____

b. Find the perimeter of a square whose area is 25 sq cm.

_____

c. If the length of a rectangle is 12 cm and its breadth is 4cm less than the length. Find its area.

_____

d. Find the area of a triangle with base 12cm and height 15cm.

_____

e. Find the breadth of a rectangular box of perimeter 80cm and length 25cm.

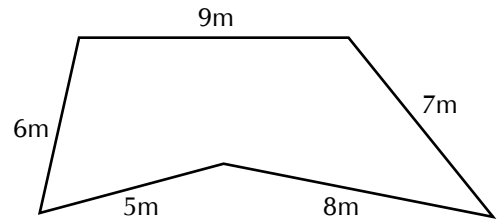
_____

f. Draw a shape with area 16 sq cm and perimeter 16cm.

_____

4. Word problems:

a. Mr Patel has a farmhouse. The shape of boundary of his farmhouse is given below:



Mr Patel wants to fence his farmhouse with barbed wire. If the cost of fencing is Rs 28 per metre, find the amount he has to spend on fencing.

_____

b. Rene has a rectangular paddy field. It has a length of 16m and breadth of 9m. If she has ploughed an area of 98 sq m of the field, how much more area is to be ploughed?

_____

c. A wooden sheet is 12m long and 8m broad. It has to be painted on both sides. Find the cost of painting at Rs 20 per sq m.

_____

d. Raj ran around a rectangular garden of length 12m and breadth 8m. Maya ran around a square field of side 11m. Who covered more distance and by how much?

_____

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