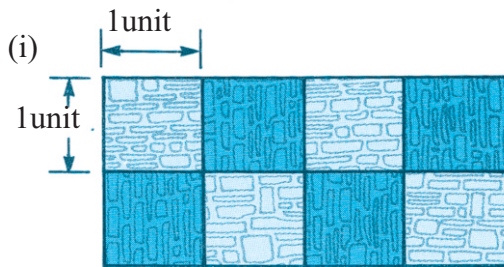


After studying this chapter you will be able to get a good understanding of the following:

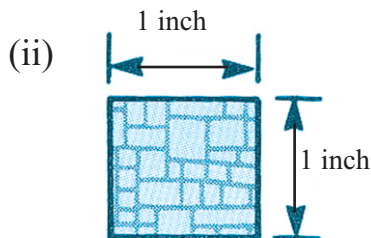
- ★ Identifying the standard units of measuring area.
- ★ Building up and using the formula for the the area of a rectangle.
- ★ Building up and using the formula for the area of a square.
- ★ Finding the area of compound plane figures made with rectangles and squares.
- ★ Using the concept of area to estimate the spaces needed in day -to -day life situations.

14.1 Building up Formulae to find the Area

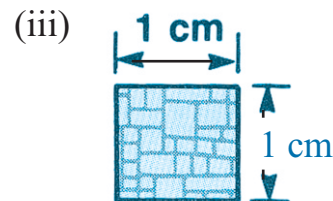
We know that the space covered by a plane figure is known as the area of the plane figure. Observe the figure given below.



This rectangle is made with eight equal squares. The length of each square is 1 unit. Therefore the area of the rectangle is 8 square units. The area of a square is equal to one square unit.

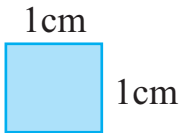


Area of this square is one square inch.



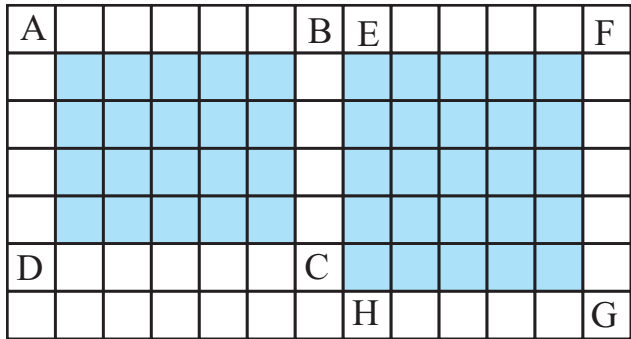
Area of this square is one square centimetre.

Now it is clear that area is measured with square units. As in figure (iii) area of a square of length 1 cm can be used as a unit of measuring area. That is an area of one square centimetre. That is 1cm^2 .



$1\text{cm} \times 1\text{cm} = 1\text{cm}^2$

Activity 14.1



- ★ Given above in a centimetre grid is a rectangle ABCD and a square EFGH. Complete the following table using it.

Figure	Number of squares in one row	Number of rows	Total number of squares	Area in square centimetres
A B C D				
E F G H				

Is there no other method to find the area of a rectangle?



It is not needed to count the squares to find the area.



When the length is multiplied by the breadth you get the area.



◆ If the area of a rectangle with length ' l ' units and breadth ' b ' units is ' A ' Then,

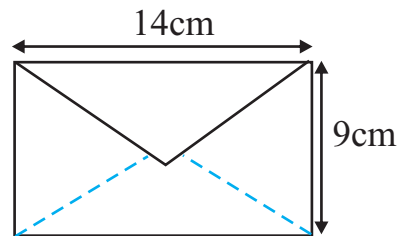
$$A = lb \text{ square units}$$

◆ If the area of a square of one side ' l ' units is ' A ', Then

$$A = l^2 \text{ square units}$$

Example 1

The length and the breadth of a rectangular envelope are 14 cm and 9 cm respectively. Find its area.

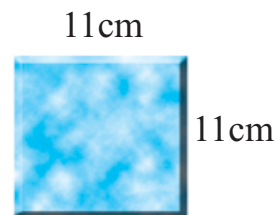


$$\begin{aligned} \text{Area of the envelope} &= lb \\ &= 14 \times 9 \text{ cm}^2 \quad (l = 14 \text{ cm}, b = 9 \text{ cm}) \\ &= \underline{\underline{126 \text{ cm}^2}} \end{aligned}$$

Example 2

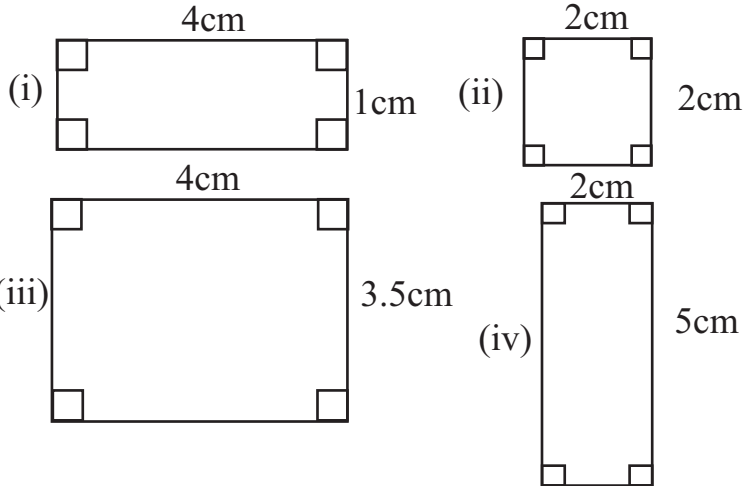
This is the figure of a square floor-tile. Find its area.

$$\begin{aligned} \text{Area of the tile} &= l^2 \\ &= (11 \text{ cm})^2 \\ &= 11 \times 11 \text{ cm}^2 \\ &= \underline{\underline{121 \text{ cm}^2}} \end{aligned}$$



Exercise 14.1

(1) Find the area of each of the following.



(2) The perimeter of a square shaped flower bed is 40 m.

(i) What is the length of a side?

(ii) Find the area of the flower bed.

(3) The surface area of a rectangular wall of a newly built building is 420 m^2 . If its length is 60 m, find its height.

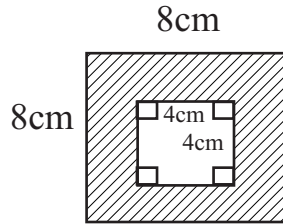
(4) A rectangular piece of paper of area 24 cm^2 has to be cut.

Two values that can be taken as its length and breadth which gives the above area are given in the following table. Write

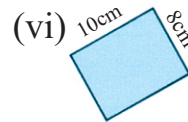
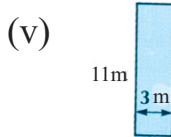
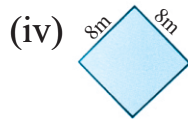
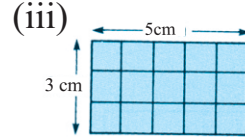
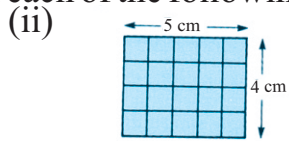
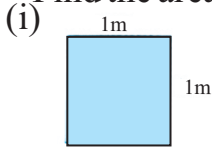
such possible values in whole numbers and complete the table.

Length	Breadth	Area
12 cm	2 cm	$12 \times 2 = 24 \text{ cm}^2$
.....

(5) Find the area of the shaded part of the given figure.



(6) Find the area of each of the following.



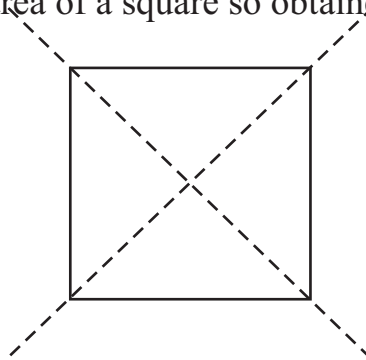
Activity 14.2

Cut out a square piece of cardboard of side 6 cm.

Cut it along the symmetrical axes as shown in the figure and separate it into four parts.

Construct two squares by using two of the above parts for each.

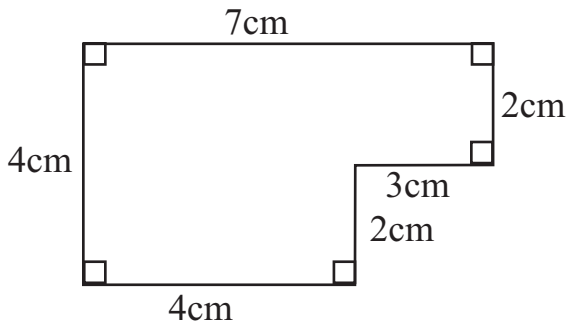
What is the area of a square so obtained ?



14.2 The area of Compound Plane Figures

A figure formed by the union of two or more plane figures is known as a compound figure. Only the compound figures formed by the union of rectangles and squares are considered here.

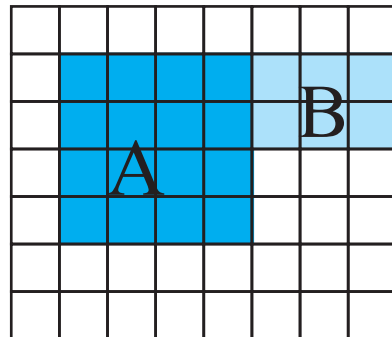
Example 3



Method (i)

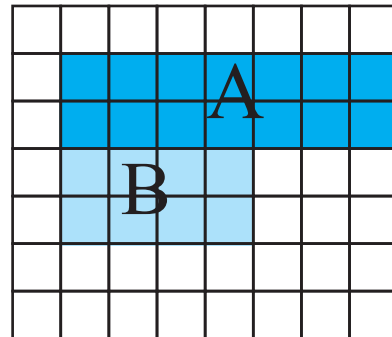
- ◆ The area of square 'A'
 $= 4\text{cm} \times 4\text{cm} = 16\text{ cm}^2$
- ◆ The area of rectangle 'B'
 $= 3\text{cm} \times 2\text{cm} = 6\text{ cm}^2$
- ◆ The area of the whole figure
 $= 16\text{ cm}^2 + 6\text{ cm}^2 = \underline{\underline{22\text{ cm}^2}}$

Area of a square is 1 cm^2



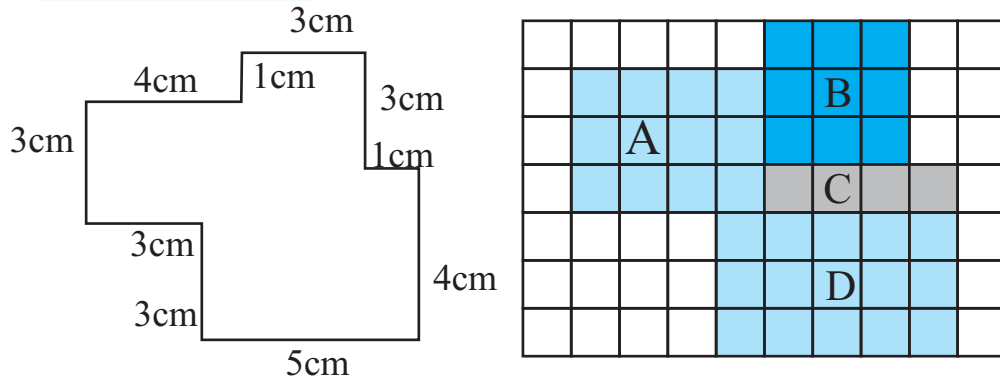
Method (ii)

- ◆ The area of rectangle 'A'
 $= 7\text{cm} \times 2\text{cm} = 14\text{ cm}^2$
- ◆ The area of rectangle 'B'
 $= 4\text{cm} \times 2\text{cm} = 8\text{ cm}^2$
- ◆ The area of the whole figure
 $= 14\text{ cm}^2 + 8\text{ cm}^2$
 $= \underline{\underline{22\text{ cm}^2}}$



The area of a given compound plane figure can be found by dividing it into squares and rectangles and finding their areas.

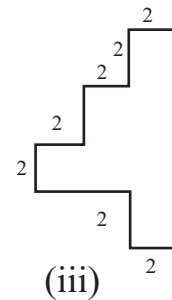
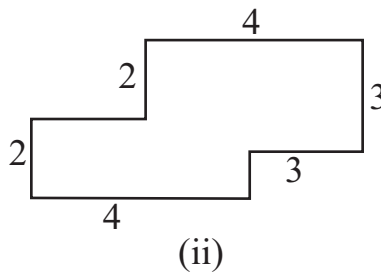
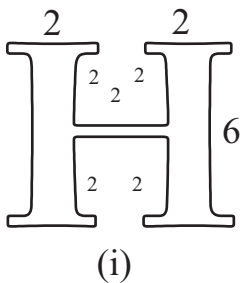
Example 4



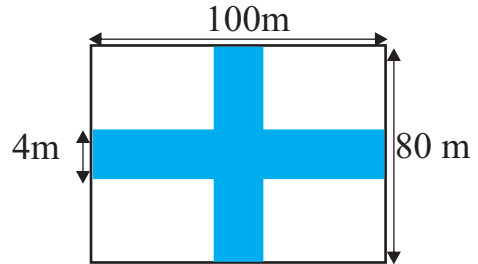
$$\begin{aligned}
 \text{Area of part 'A'} &= 4\text{cm} \times 3\text{ cm} = 12\text{ cm}^2 \\
 \text{Area of part 'B'} &= 3\text{cm} \times 3\text{ cm} = 9\text{ cm}^2 \\
 \text{Area of part 'C'} &= 4\text{cm} \times 1\text{cm} = 4\text{ cm}^2 \\
 \text{Area of part 'D'} &= 5\text{ cm} \times 3\text{ cm} = 15\text{ cm}^2 \\
 \text{Area of the whole figure} &= 12\text{ cm}^2 + 9\text{ cm}^2 + 4\text{ cm}^2 + 15\text{ cm}^2 \\
 &= \underline{\underline{40\text{ cm}^2}}
 \end{aligned}$$

Exercise 14.2

- (1) Find the area of each of the following plane figures. Consider the measurements of the figures are given in centimetres.

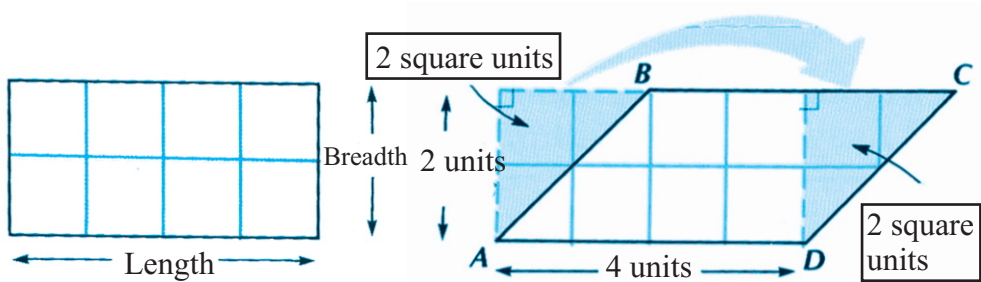


- (2) The way how a land of length 100 m and breadth 80 m was divided equally and given to 4 brothers is shown in this figure. The breadth of the roads which divide the land is 4 m.

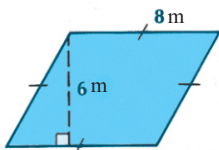


- (i) Find the area of a part each person received.
 (ii) Find the area of the road.

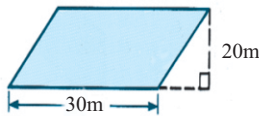
(3)



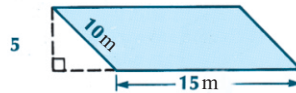
Do you notice that the area of the above two figures are equal? Hence try to find the area of each of the following figures.



(i)



(ii)



(iii)

14.3 Estimation

When keeping the household furniture in the relevant places the beauty is also considered.

In doing so attention is given to the space available in the house. In situations like this the knowledge of estimated area has to be applied.

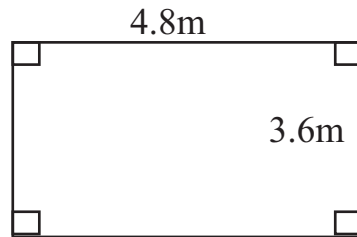
Activity 14.3

In the following table mark the sign " ✓ " in front of the situations in which area is estimated.

Instance	situations the area is estimated
1. Number of sheets needed to cover a roof. 2. Quantity of wood needed to construct a roof. 3. Quantity of paint needed to paint the walls of a house. 4. Quantity of seed paddy needed for a paddy field. 5. Area of land needed to build a house. 6. Quantity of water needed for a house for one week. 7. Glass needed for a window or a shutter.	

Exercise 14.3

- (1) The length of a room is 4.8 m and its breadth is 3.6 m as given in the figure. Square ceiling sheets the length of one side of which is 1 m are needed for its ceiling. Estimate the number of ceiling sheets needed.



- (2) The floor of a rectangular room of length 4 m and breadth 3 m has to be cemented. A bag of cement is needed to cement an area of 5m^2 . Estimate the number of bags of cement necessary to cement the floor.

Summary

- ✱ If the length of a rectangle is ' l ' units and breadth ' b ' units, its area is lb square units.
- ✱ If the length of one side of a square is ' l ' units, its area is ' l^2 ' square units.
- ✱ When finding the area of a compound figure, it should be separated into squares and rectangles, and by finding the areas of them the area of the whole figure can be found.