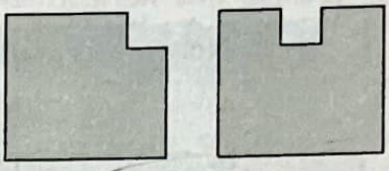
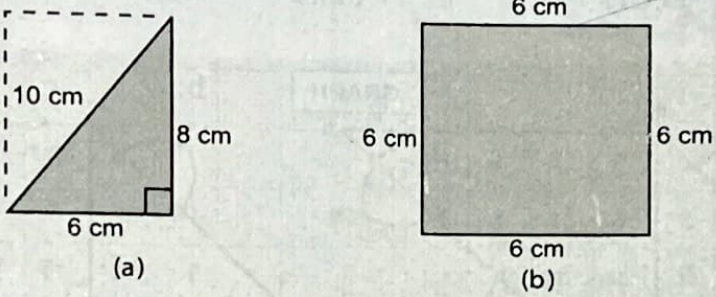
## EXERCISE 7.1

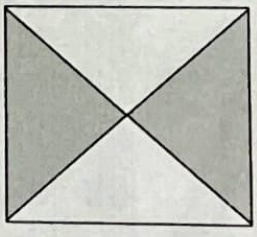
1. Find the area of a square park whose perimeter is 80 m.
2. The perimeter of a rectangular sheet is 70 cm. If its breadth is 15 cm, find the length. Also find its area.
3. The length and breadth of a rectangular piece of land are 200 m and 150 m respectively. Find the total cost of the land if 1 sq m of the land costs ₹5000.
4. The area of a square of side 18 cm is the same as that of a rectangle of length 27 cm. What is the breadth of the rectangle?
5. The cost of flooring a room at ₹25 per square metre is ₹1125. If the room is 5 m wide, find its length.
6. A carpet is placed in the middle of a floor of a room 15 m long and 12 m broad so that it leaves a uniform width of 1 meter around it. Find the area and cost of the carpet at ₹500 per sq m.
7. A wire is in the shape of a rectangle. Its length is 40 cm and breadth 22 cm. If the same wire is given the shape of a square, what will be the measure of each side? Also find which shape—rectangle or square—encloses more area? CQ
8. If you cut a small square from a square or a rectangular sheet of paper, will the perimeter of the sheet increase or decrease? What will happen to the area of the remaining sheet? Observe the two figures.



9. You are given two pieces of bread cut in the two following shapes.
   a. Triangular shape
   b. Square shape.
   Compare their perimeters and find their areas.

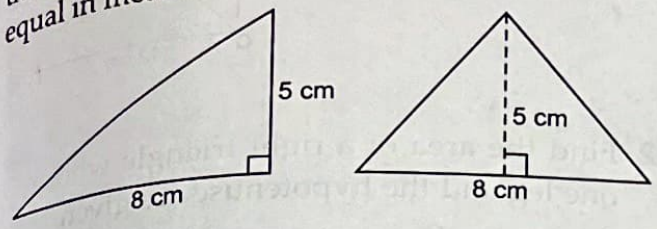



10. Find the area of a rectangular plot whose one side is 8 m long and diagonal is of length 17 m.
11. The length and breadth of a rectangular plot are in ratio 4 : 3. If the area of the plot is 1728 $m^2$, find its perimeter.
12. Find the area of a square whose diagonal length is
    a. 14 m
    b. 0.8 cm
13. A door of length 2.2 m and breadth 0.9 m is fitted in a wall. The dimensions of the wall are 5 m and 3.5 m. Find the cost of whitewashing the wall at ₹35 per sq m.
14. The area of 4 walls of a room is 210 $m^2$. If the length of the room is twice its breadth and the walls are 5 m high, find the area of the floor.
15. Find the area of the shaded part of the square of diagonal 12 cm.



### Relation between Area and Congruence

Now consider the two given triangles that have the same area because their base and height are equal in measure.



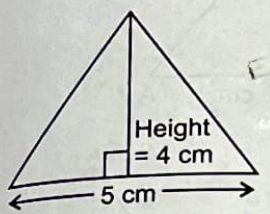

Are the above two triangles congruent too? No, they are not.

The triangles which are equal in area, need not be congruent. But, all the congruent triangles are equal in area.

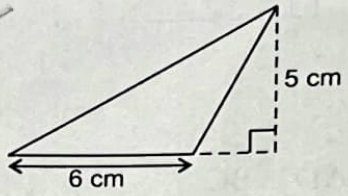
## EXERCISE 7.2

1. Find the area of the following triangles.

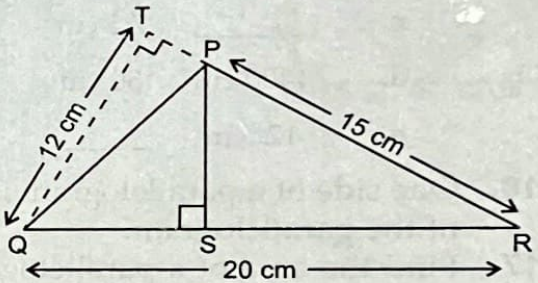
a.



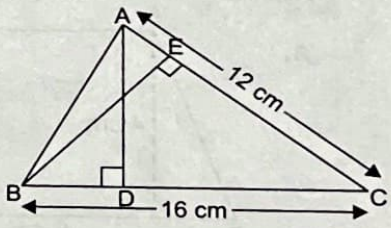

b.



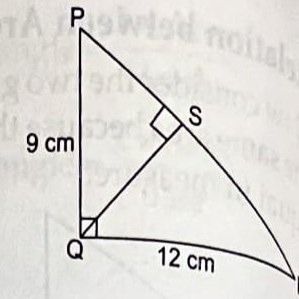

2. The area of a triangle whose base is 2.4 cm and corresponding height 1.5 cm is _____.
3. The base and height of a triangle are in the ratio 3 : 2 and its area is 108 sq cm. Find its base and height.
4. Find the area of an isosceles right triangle if one of its equal sides is 30 cm long.
5. If the base and altitude of a triangle are doubled, what will happen to its area?
6. The area of a triangle is 600 sq cm. If its base and the corresponding altitude are in the ratio of 4 : 3, find their lengths.
7. In the adjoining figure, find the area of △PQR and the height PS.



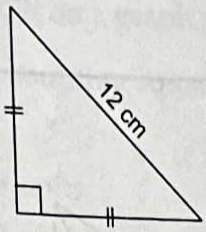

8. The base and height of a triangle are in the ratio 6 : 5. If its area is 135 $cm^2$, find the base and the height of the triangle.
9. In the figure, in ΔABC, BC = 16 cm, AC = 12 cm, AB = 10 cm and altitude AD = 6 cm. Find (a) BE (b) altitude on side AB.



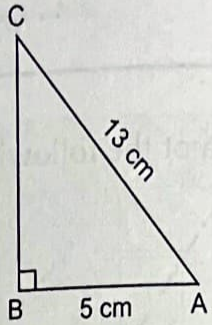
**10.** PQR is a right angled triangle, if PQ = 9 cm, QR = 12 cm, find the (*a*) the area of ΔPQR (*b*) the length of PR (*c*) length of altitude QS.



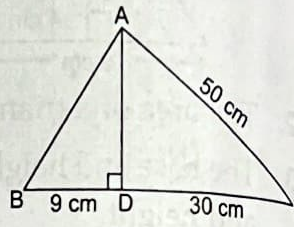

**11.** The hypotenuse of an isosceles right angled triangle is 12 cm. Find its area.




**12.** Find the area of a right triangle whose one leg and the hypotenuse are given.




**13.** In ΔABC, AD ⊥ BC
AC = 50 cm, BD = 9 cm, DC = 30 cm.
Find (a) AD (b) area of ΔABC (c) Perimeter of ΔABC.




**14.** Find the missing values.

| S. No. | Base | Height | Area of Triangle |
|---|---|---|---|
| a. | 6 cm | 4.4 cm | _____ |
| b. | 22 cm | _____ | 170.5 sq cm |
| c. | _____ | 7.5 cm | 75 sq cm |
| d. | 1400 cm | 80 cm | – |
| e. | 12.5 m | _____ | 26.25 sq m |

**15.** Complete the following table.

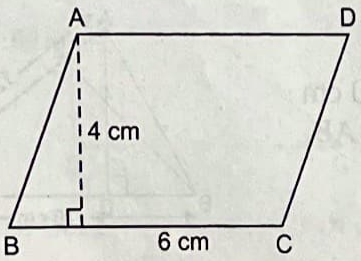
| S. No. | Base | Height | Area of the Parallelogram |
|---|---|---|---|
| a. | 5.8 cm | 5 cm | _____ |
| b. | 3.5 cm | _____ | 9.45 sq cm |
| c. | _____ | 15 cm | 270 sq cm |
| d. | 43 m | _____ | 215 sq m |
| e. | _____ | 14 cm | 91 sq cm |

**16.** One side of a parallelogram is 2.2 cm and its corresponding height is 1.4 cm. Find the are of the parallelogram.

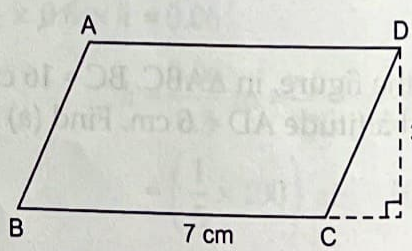
**17.** Find the area of a parallelogram whose base is 18.5 cm and the corresponding height i 10 cm.

**18.** Find the area of the parallelogram in the following figures

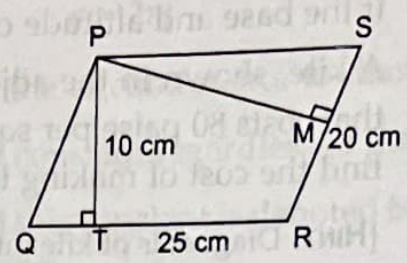
a.




b.



19. Two sides of a parallelogram are 20 cm and 25 cm. If the altitude corresponding to the sides of length 25 cm is 10 cm, find the altitude corresponding to the other pair of sides.

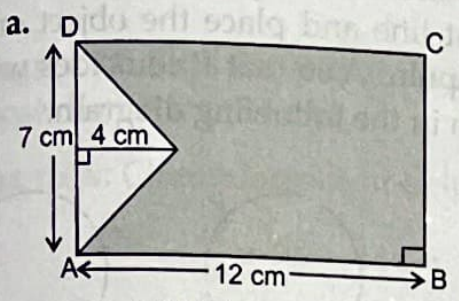



20. Two adjacent sides of a parallelogram are of lengths 27 cm and 18 cm. If the area of the parallelogram is 540 sq cm, find the heights corresponding to the adjacent sides.

21. The base and the corresponding altitude of a parallelogram are 35 cm and 42 cm respectively. If the other altitude is 30 cm, find the length of the other pair of parallel sides.

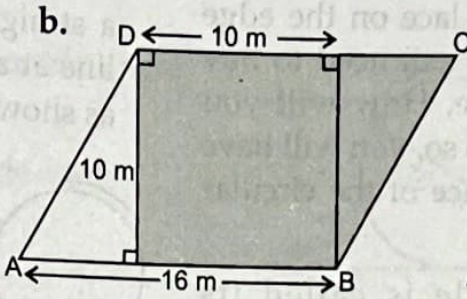
22. In the following figures, find the area of the shaded region.

a.



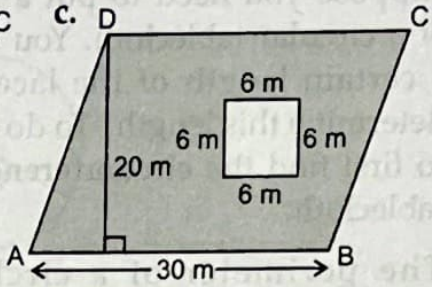

(ABCD is a rectangle)

b.




(ABCD is a parallelogram)

c.




(ABCD is a parallelogram)

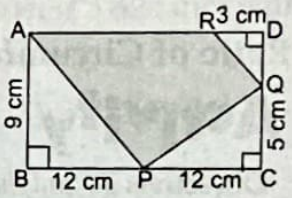
23. Find the area of a rhombus whose side is 7.5 cm and whose altitude is 35 dm.

24. The diagonals of a rhombus measure 12 cm and 8.5 cm. Find its area.

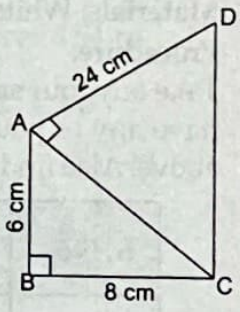
25. The perimeter of a rhombus is 100 cm and one diagonal is 48 cm. Find (a) the length of the other diagonal (b) the area of the rhombus.

26. The side of a rhombus is 25 cm and one diagonal is 40 cm. Find its area.

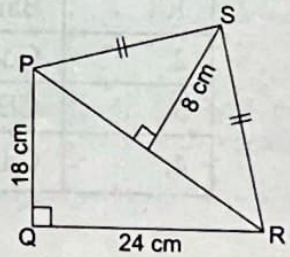
27. ABCD is a rectangle, AB = 9 cm, BP = PC = 12 cm, QC = 5 cm and RD = 3 cm. Find the area and perimeter of the shaded region.



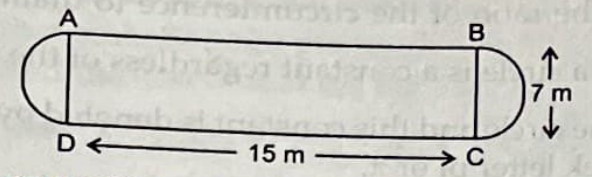

28. Find the area and perimeter of figure ABCD where $\angle B = 90°$ and $\angle DAC = 90°$. AB = 6 cm, BC = 8 cm and DA = 24 cm.




29. In the quadrilateral PQRS, PQ = 18 cm, QR = 24 cm, $\angle Q = 90°$ and ST is the perpendicular bisector of PR. If ST = 8 cm. Find the area and perimeter of PQRS.



**Example 15:** Find the perimeter of the given figure.




**Solution:** Diameter of semicircular ends = 7 m

$\therefore$ radius $= \frac{7}{2}$ m $= 3.5$ m

Now, the circumference of 2 semicircular ends

$$= 2 \times \frac{1}{2} \times \pi d = \pi d = \frac{22}{7} \times 7 = 22 \text{ m}$$

AB = CD = 15 m

Perimeter of the given figure

= Circumference of 2 semicircular ends + AB + CD

= (22 + 15 + 15) m = 52 m.

**NOTE**

To the find perimeter of a figure, do not find the perimeters of 2 different figures and add. Only find the length of the boundary.

## EXERCISE 7.3

1. The circumference of a circle of diameter 28 cm is _____.
2. The radius of a circle whose circumference is 132 cm is _____.
3. The ratio of the radii of two circles is 3 : 4. The ratio of their circumferences is _____.
4. The diameter of a bicycle wheel is 70 cm. The number of times the wheel will rotate in order to cover a distance of 110 m _____.
5. The wheel of a car makes 50000 revolutions while travelling 121 km. The diameter of the wheel is _____.

### Area of a Circle

Suppose your study table has a circular top of radius 1 m. You want to get the tabletop polished. The cost of polishing the table is ₹15 per square metre. How will you find the total cost of polishing?

To find the cost of polishing, what will you need—area or circumference—of the circle? In such cases, you need to find the area of the circular region.

**REMEMBER**

In a circle of radius r

- Circumference = $2\pi r$
- Area = $\pi r^2$

## Activity

**Objective:** *To find the area of the circle by dividing it into equal parts.*

**Materials:** White chart sheets, sketch pens, pencil, ruler and a pair of scissors.

**Procedure:**

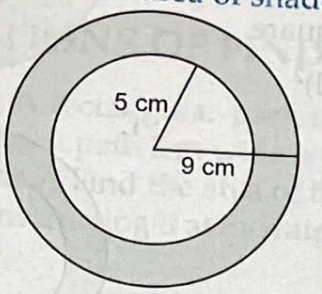
Draw a circle of any radius. Divide this circle into 16 equal parts by drawing straight lines from the centre to the circle as shown in the given figure. Colour the alternate parts using different colours, say, red and blue. Carefully cut these equal parts of the circle and paste them on a piece of paper as shown below.

$$= \pi r^2 = \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2}$$

$$= \frac{33 \times 21}{2} = \frac{693}{2} = 346.5 \text{ sq cm}$$

Shaded area = 630 – 346.5 = 283.5 sq cm.

**Example 23:** Find the area of shaded region




**Solution:** R = 9 cm, r = 5 cm

Area of ring = $\pi R^2 - \pi r^2 = \pi(R^2 - r^2)$

$$= \frac{22}{7}(9^2 - 5^2) = \frac{22}{7}(81 - 25)$$

$$= \frac{22}{7} \times 56^{8} = 176 \text{ sq cm}$$

**Example 24:** Find the shaded area. Take $\pi = 3.14$.

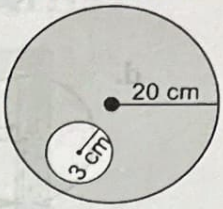
**Solution:** Shaded area

$= \pi R^2 - \pi r^2 = \pi(20^2 - 3^2)$

$= 3.14\ (400 - 9)$

$= 3.14 \times 391$

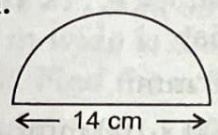
$= 1227.74$ sq cm



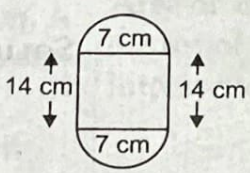

## EXERCISE 7.4

1. Find the circumference and area of a circle of radius
   a. 10.5 cm  b. 4.2 cm
2. Find the circumference and area of a circle of diameter
   a. 42 m  b. 60 cm
   [Use $\pi = 3.14$]
3. The area of a circle whose diameter is 14 cm is _____.
4. If the circumference of a circle is 308 mm, find the area of the circle.
5. The radii of two concentric circles (circles having the same centre) are 10 cm and 20 cm respectively. By how much does the area of the outer circle exceed the area of the inner circle? [Take $\pi = 3.14$]
6. The diameter of a wheel is 1.26 m. How far will it travel in 500 rotations?
7. The diameter of a cycle wheel is 70 cm. How far will it go in 24 rotations?
8. The inner circumference of a circular garden is 440 m. Find its radius and area.
9. How many times must a wheel of radius 28 cm rotate to go 352 m?
10. Find the area of a circle whose circumference is the same as the perimeter of a square of side 22 m.
11. Which has greater area, a square of perimeter 44 cm or a circle having circumference 44 cm?
12. Find the cost of polishing a circular table top of diameter 1.4 m if the rate of polishing is ₹25/sq m.
13. Find the cost of fencing a circular garden of radius 5.6 m if the rate of fencing is ₹13/m.
14. Find the perimeter of the following shapes.

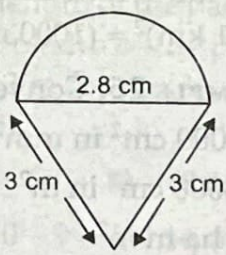
a.




b.

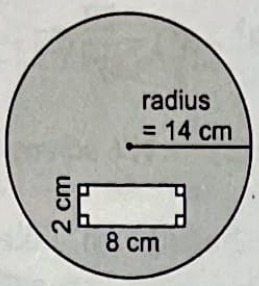



c.

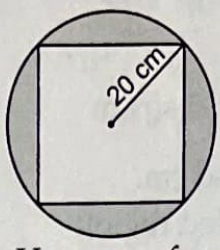


**15.** Find the area of the shaded region in the following figures. [Take $\pi = 3.14$ in b and c]

a.

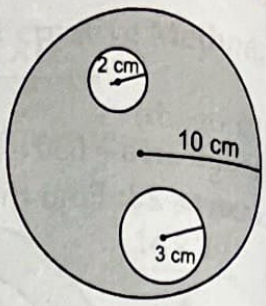



b.

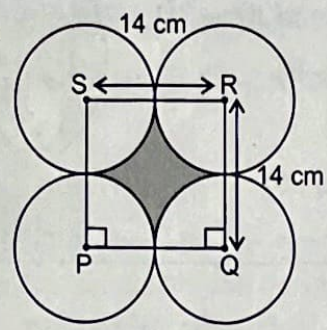



**Hint:** Use area of square $= \frac{1}{2}(\text{diagonal})^2$

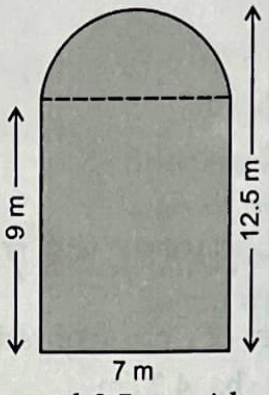
c.



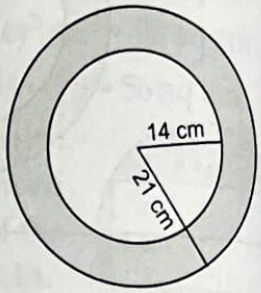

d.




e.




f.




**16.** A circular park of radius 20 m has a road 3.5 m wide running outside around it. Find the area of the road. [Hint: Use area of road $= \pi (R + r)(R - r)$]

**17.** A water sprinkler in a lawn sprays water as far as 5 m in all directions. Find the length of the outer edge of wet grass. [Take $\pi = 3.14$]

**18.** Two concentric circles have radii 280 m and 350 m. Find the difference of their circumferences.

**19.** A piece of wire in the form of a rectangle 18 cm long and 15 cm broad is bent and reshaped as a circle. Find the radius of the circle.

**20.** Find the area between 2 concentric circles with radii 7 cm and 10.5 cm.

**21.** Find the area and perimeter of a circle with radius 1.4 cm.

## CONVERSION OF UNITS

1. $1 \text{ cm} = 10 \text{ mm}$
   $\therefore (1 \text{ cm})^2 = (10 \text{ mm})^2$
   $\boxed{1 \text{ cm}^2 = 100 \text{ mm}^2}$

2. $1 \text{ m} = 100 \text{ cm}$
   $\therefore (1 \text{ m})^2 = (100 \text{ cm})^2$
   $\boxed{1 \text{ m}^2 = 10000 \text{ cm}^2}$

3. $1 \text{ km} = 1000 \text{ m}$
   $(1 \text{ km})^2 = (1000 \text{ m})^2$
   $\boxed{1 \text{ km}^2 = 1000000 \text{ m}^2 = 10^6 \text{ m}^2}$

Area of land is also measured in hectares and ares written in short as 'ha' and 'are'.

- An hectare is an area of a square having each side 100 m.
  $1 \text{ hectare} = 100 \times 100 \text{ m}^2$
  $\boxed{1 \text{ ha} = 10000 \text{ m}^2 = 10^4 \text{ m}^2}$
- A square of side 10 m has an area of 1 are.
  $1 \text{ are} = 10 \times 10 \text{ m}^2 = 100 \text{ m}^2$

**Example 25:** Convert the following.

a. $2000 \text{ cm}^2$ in $\text{mm}^2$

b. $3000 \text{ cm}^2$ in $\text{m}^2$

c. 4 ha in $\text{m}^2$

**Solution:** a. We know that

$1 \text{ cm}^2 = 100 \text{ mm}^2$

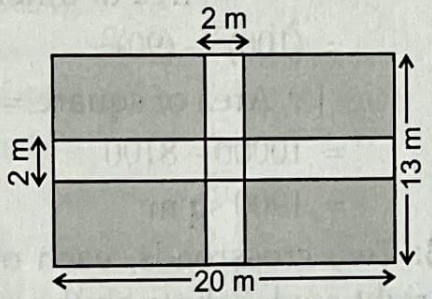
$\therefore \quad 2000 \text{ cm}^2 = 2000 \times 100 \text{ mm}^2$

$= 200000 \text{ mm}^2$

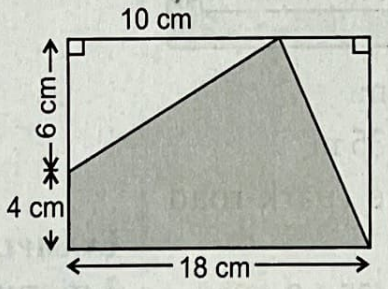
## EXERCISE 7.5

1. Convert the following into given units.
   a. 75 $cm^2$ in $mm^2$ b. 250 $km^2$ in $m^2$ c. 500 $cm^2$ in $m^2$
   d. 95 ha in $m^2$ e. 100 $m^2$ in $km^2$ f. 2 are in $m^2$
2. A garden is 95 m long and 80 m broad. A path of 5 m wide is to be built outside around it. Find the area of the path.
3. A square lawn is of side 110 m. A road 5 m wide is made all around inside the lawn. Find the area of the road.
4. A garden is 75 m long and 60 m wide. There is a swimming pool of length 20 m and breadth 7 m in it. Find the cost of putting grass in the remaining part of the garden at ₹45 per square metre.
5. Two crossroads, each of width 4 m, run at right angles through the centre of a park of length 65 m and breadth 45 m and parallel to its sides. Find the area of the roads. Also find the cost of constructing the roads at the rate of ₹500 per 10 sq m.
6. A school auditorium is 40 m long and 25 m wide. This auditorium is surrounded by a verandah 4.5 m wide. Find the area of the verandah.
7. Find the area of the shaded region in the following figures.

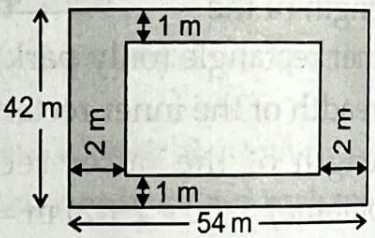
a.




b.




c.




8. A picture is painted on a cardboard 11 cm long and 8 cm wide, leaving a margin of 1.5 cm along each of its sides. Find the total area of the margin in $m^2$.
9. A square lawn of length 24 m is surrounded by a path 5 m wide. Find the cost of levelling the path at ₹22.50/sq m.