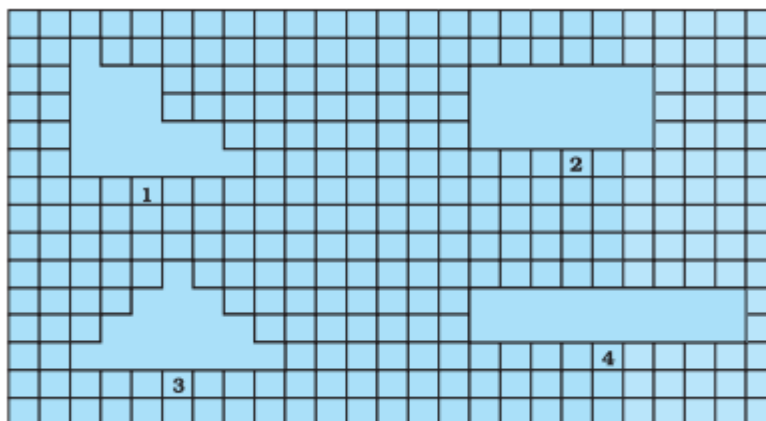


Chapter - 9 Perimeter and Area

Exercise

In the Questions 1 to 37, there are four options, out of which one is correct. Choose the correct one.

1. Observe the shapes 1, 2, 3 and 4 in the figures. Which of the following statements is not correct?

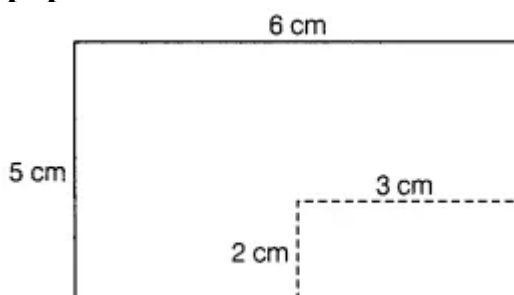


- (a) Shapes 1, 3 and 4 have different areas and different perimeters.
- (b) Shapes 1 and 4 have the same area as well as the same perimeter.
- (c) Shapes 1, 2 and 4 have the same area.
- (d) Shapes 1, 3 and 4 have the same perimeter.

Solution:-

(a) Shapes 1, 3 and 4 have different areas and different perimeters.
As,
Shapes 1, 3 and 4 have same area and same perimeter.

2. A rectangular piece of dimensions $3\text{ cm} \times 2\text{ cm}$ was cut from a rectangular sheet of paper of dimensions $6\text{ cm} \times 5\text{ cm}$ (Fig. 9.14). Area of remaining sheet of paper is



- (a) 30 cm^2
- (b) 36 cm^2
- (c) 24 cm^2
- (d) 22 cm^2

Solution:-

(c) 24 cm^2

$$\begin{aligned}\text{Area of rectangular piece} &= \text{length} \times \text{breadth} \\ &= 2 \text{ cm} \times 3 \text{ cm} \\ &= 6 \text{ cm}^2\end{aligned}$$

So,

$$\begin{aligned}\text{Area of sheet of paper} &= 6 \text{ cm} \times 5 \text{ cm} \\ &= 30 \text{ cm}^2\end{aligned}$$

Therefore,

$$\begin{aligned}\text{Area of remaining sheet of paper is} &= 30 \text{ cm}^2 - 6 \text{ cm}^2 \\ &= 24 \text{ cm}^2\end{aligned}$$

3. 36 unit squares are joined to form a rectangle with the least perimeter.

Perimeter of the rectangle is

(a) 12 units (b) 26 units (c) 24 units (d) 36 units

Solution:-

(b) 26 units

We have,

$$\text{Area of rectangle} = 36 \text{ units}^2$$

$$\begin{aligned}36 &= 6 \times 6 \\ &= (2 \times 3) \times (2 \times 3) \\ &= 2^2 \times 3^2 \\ &= 4 \times 9\end{aligned}$$

So, the sides of the rectangle are 4 cm and 9 cm.

Also,

$$\begin{aligned}\text{Perimeter of the rectangle} &= 2 (\text{length} + \text{breadth}) \\ &= 2 (4 + 9) \\ &= 2 (13) \\ &= 26 \text{ units}\end{aligned}$$

4. A wire is bent to form a square of side 22 cm. If the wire is rebent to form a circle, its radius is

(a) 22 cm (b) 14 cm (c) 11 cm (d) 7 cm

Solution:-

(b) 14 cm

We have,
Side of square = 22 cm.

And also, perimeter of a square and circumference of circle are equal, because the length of the wire is same.

Perimeter of square = Circumference of circle

$$4 \times \text{side} = 2 \times \pi \times r$$

$$4 \times 22 = 2 \times \frac{22}{7} \times r$$

$$r = 14 \text{ cm}$$

Therefore, radius of circle is 14 cm.

5. Area of the circle obtained in Question 4 is

(a) 196 cm^2 (b) 212 cm^2 (c) 616 cm^2 (d) 644 cm^2

Solution:-

(c) 616 cm^2

$$\begin{aligned} \text{Area of circle} &= \pi r^2 \\ &= \frac{22}{7} \times 14 \times 14 \\ &= 22 \times 14 \times 2 \\ &= 616 \text{ cm}^2 \end{aligned}$$

6. Area of a rectangle and the area of a circle are equal. If the dimensions of the rectangle are $14 \text{ cm} \times 11 \text{ cm}$, then radius of the circle is

(a) 21 cm (b) 10.5 cm (c) 14 cm (d) 7 cm.

Solution:-

(d) 7 cm

We have,
length = 14 cm,
breadth = 11 cm

Also,
area of rectangle = area of circle
length $\times$ breadth = πr^2

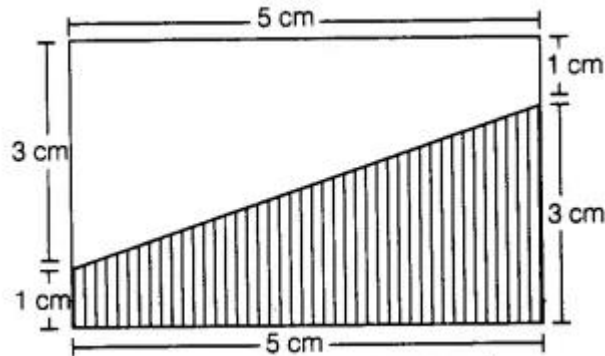
$$14 \times 11 = \frac{22}{7} \times r^2$$

$$r^2 = 49$$

$$r = 7 \text{ cm}$$

7. Area of shaded portion in Fig. 9.15 is

- (a) 25 cm^2 (b) 15 cm^2 (c) 14 cm^2 (d) 10 cm^2



Solution:-

(d) 10 cm^2

We have,
length of rectangle = 5 cm,
breadth of the rectangle = 3 cm + 1 cm
= 4 cm

So,
Area of rectangle = length $\times$ breadth
= 5×4
= 20 cm^2

By observing the figure, the shaded part covered exactly half of the rectangle,
Therefore,

$$\begin{aligned} \text{Area of shaded part is} &= \frac{\text{Area of rectangle}}{2} \\ &= \frac{20}{2} \\ &= 10 \text{ cm}^2 \end{aligned}$$

8. Area of parallelogram ABCD (Fig. 9.16) is not equal to

- (a) $DE \times DC$ (b) $BE \times AD$ (c) $BF \times DC$ (d) $BE \times BC$

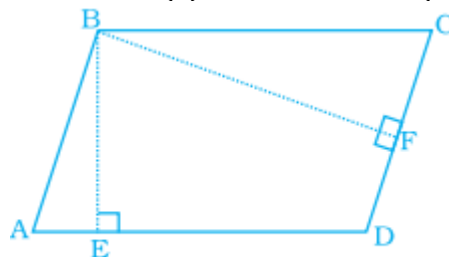


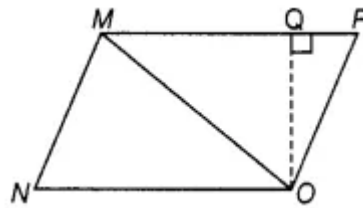
Fig. 9.16

Solution:-(a) $DE \times DC$

We have,

Area of parallelogram = base $\times$ corresponding height

So,

Area of parallelogram ABCD = $DC \times BF$ $AD \times BE = BC \times BE$ [as, $AD = BC$]**9. Area of triangle MNO of Fig. 9.17 is**

- (a) $\frac{1}{2} MN \times NO$ (b) $\frac{1}{2} NO \times MO$ (c) $\frac{1}{2} MN \times OQ$ (d) $\frac{1}{2} NO \times OQ$

Solution:-(d) $\frac{1}{2} NO \times OQ$

MNO is a triangle.

We have,

$$\begin{aligned} \text{Area of triangle} &= \frac{1}{2} (\text{base} \times \text{height}) \\ &= \frac{1}{2} \times NO \times OQ \end{aligned}$$

10. Ratio of area of $\triangle MNO$ to the area of parallelogram MNOP in the same figure 9.17 is

- (a) 2 : 3 (b) 1 : 1 (c) 1 : 2 (d) 2 : 1

Solution:-

(c) 1 : 2

From figure, we have,

$$\begin{aligned} \text{Area of } \triangle MNO &= \frac{1}{2} \times \text{base} \times \text{height} \\ &= \frac{1}{2} \times NO \times OQ \end{aligned}$$

Area of parallelogram MNOP = base $\times$ corresponding height

$$\begin{aligned}
 &= MP \times OQ \\
 &= NO \times OQ
 \end{aligned}$$

[as, $MP = NO$]

So,

$$\begin{aligned}
 \text{Ratio of parallelogram and triangle} &= \frac{\frac{1}{2} \times NO \times OQ}{NO \times OQ} \\
 &= \frac{1}{2} \\
 &= 1:2
 \end{aligned}$$

11. Ratio of areas of $\triangle MNO$, $\triangle MOP$ and $\triangle MPQ$ in Fig. 9.18 is
(a) 2 : 1 : 3 (b) 1 : 3 : 2 (c) 2 : 3 : 1 (d) 1 : 2 : 3

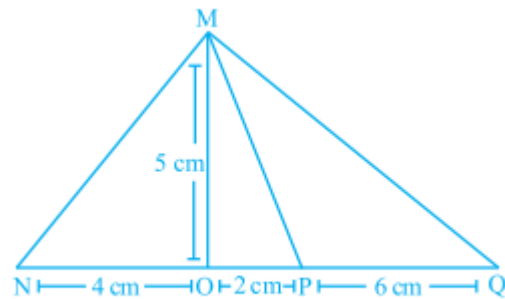


Fig. 9.18

Solution:-

(a) 2 : 1 : 3

We have,

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

So,

$$\begin{aligned}
 \text{Area of triangle MNO} &= \frac{1}{2} \times NO \times MO \\
 &= \frac{1}{2} \times 5 \times 4 \\
 &= \frac{1}{2} \times 20 \\
 &= 10 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of triangle MOP} &= \frac{1}{2} \times MO \times OP \\
 &= \frac{1}{2} \times 5 \times 2
 \end{aligned}$$

$$= \frac{1}{2} \times 10$$

$$= 5 \text{ cm}^2$$

$$\text{Area of triangle MPQ} = \frac{1}{2} \times \text{MO} \times \text{PQ}$$

$$= \frac{1}{2} \times 5 \times 6$$

$$= \frac{1}{2} \times 30$$

$$= 15 \text{ cm}^2$$

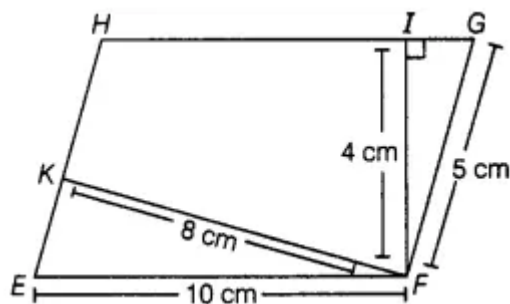
So,

$$\text{Ratios of area} = 10: 5: 15$$

$$= 2: 1: 3$$

[divide each by 5]

12. In Fig. 9.19, EFGH is a parallelogram, altitudes FK and FI are 8 cm and 4cm respectively. If EF = 10 cm, then area of EFGH is
(a) 20 cm² (b) 32 cm² (c) 40 cm² (d) 80 cm²



Solution:-

(c) 40 cm²

From figure,

Taking the parallelogram EFGH,

$$\text{EF} = \text{HG} = 10 \text{ cm}$$

[from the question]

We know that,

$$\text{Area of parallelogram EFGH} = \text{Base} \times \text{corresponding height}$$

$$= 10 \times 4$$

$$= 40 \text{ cm}^2$$

13. In reference to a circle the value of π is equal to

(a) $\frac{\text{area}}{\text{circumference}}$

(b) $\frac{\text{area}}{\text{diameter}}$

(c) $\frac{\text{circumference}}{\text{diameter}}$

(d) $\frac{\text{circumference}}{\text{radius}}$

Solution:-

(c) $\frac{\text{circumference}}{\text{diameter}}$

We know that,
Circumference of circle = $2\pi r$

So,

$$\pi = \frac{\text{circumference}}{2r}$$

Therefore,

$$\pi = \frac{\text{circumference}}{\text{diameter}} \quad [2r = \text{diameter}]$$

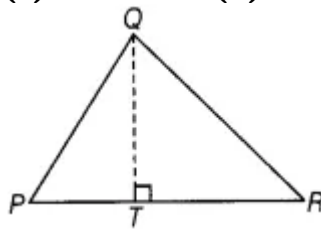
- 14. Circumference of a circle is always**
(a) more than three times of its diameter
(b) three times of its diameter
(c) less than three times of its diameter
(d) three times of its radius

Solution:-

- (a) more than three times of its diameter

15. Area of triangle PQR is 100 cm^2 (Fig. 9.20). If altitude QT is 10 cm, then its base PR is

- (a) 20 cm (b) 15 cm (c) 10 cm (d) 5 cm



Solution:-

- (a) 20 cm

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

Also,

$$\text{Area of triangle PQR} = 100 \text{ cm}^2$$

$$\text{Height of the triangle} = 10 \text{ cm}$$

Therefore,

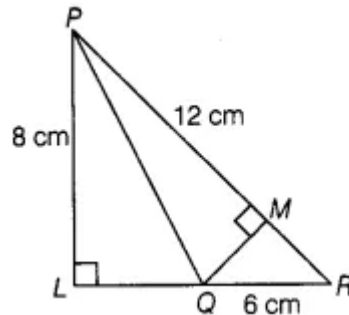
$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$100 = \frac{1}{2} \times PR \times 10$$

$$PR = \frac{2 \times 100}{10}$$

$$PR = 20 \text{ cm}$$

16. In Fig. 9.21, if $PR = 12 \text{ cm}$, $QR = 6 \text{ cm}$ and $PL = 8 \text{ cm}$, then QM is



- (a) 6 cm (b) 9 cm (c) 4 cm (d) 2 cm

Solution:-

(c) 4 cm

17. In Fig. 9.22 $\triangle MNO$ is a right-angled triangle. Its legs are 6 cm and 8 cm long. Length of perpendicular NP on the side MO is

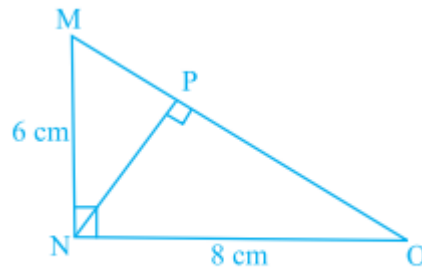


Fig. 9.22

- (a) 4.8 cm (b) 3.6 cm (c) 2.4 cm (d) 1.2 cm

Solution:-

(a) 4.8 cm

$\triangle MNO$ is a right-angled triangle, its legs are 6 cm and 8 cm long.

By Pythagoras theorem,

$$\text{Hypotenuse}^2 = \text{perpendicular}^2 + \text{base}^2$$

$$MO^2 = MN^2 + NO^2$$

$$MO^2 = 6^2 + 8^2$$

$$MO^2 = 36 + 64$$

$$MO^2 = 100$$

$$MO = 10 \text{ cm}$$

Considering the triangle MNO,

$$\text{Area of triangle MNO} = \frac{1}{2} \times MN \times NO$$

$$= \frac{1}{2} \times MO \times NP$$

$$= \frac{1}{2} \times 6 \times 8$$

$$= \frac{1}{2} \times 10 \times NP$$

Therefore,

$$NP = \frac{24}{5}$$

$$NP = 4.8 \text{ cm}$$

18. Area of a right-angled triangle is 30 cm^2 . If its smallest side is 5 cm, then its hypotenuse is

(a) 14 cm (b) 13 cm (c) 12 cm (d) 11cm

Solution:-

(b) 13 cm

19. Circumference of a circle of diameter 5 cm is

(a) 3.14 cm (b) 31.4 cm (c) 15.7 cm (d) 1.57 cm

Solution:-

(c) 15.7 cm

$$\text{Diameter} = 5 \text{ cm}$$

$$\begin{aligned} \text{Radius} &= \frac{5}{2} \\ &= 2.5 \text{ cm} \end{aligned}$$

$$\text{Circumference of a circle} = 2\pi r$$

$$= 2 \times \left(\frac{22}{7}\right) \times 2.5$$

$$= 15.7 \text{ cm}$$

20. Circumference of a circle disc is 88 cm. Its radius is
(a) 8 cm (b) 11 cm (c) 14 cm (d) 44 cm

Solution:-

(c) 14 cm

Circumference of a circle = $2\pi r$

$$88 = 2 \times \left(\frac{22}{7}\right) \times r$$

$$r = 14 \text{ cm}$$

21. Length of tape required to cover the edges of a semi-circular disc of radius 10 cm is
(a) 62.8 cm (b) 51.4 cm (c) 31.4 cm (d) 15.7 cm

Solution:-

(b) 51.4 cm

Radius of semi-circular disc = 10 cm

We know that,

perimeter of semi-circular disc = circumference of semicircle + diameter

$$\text{Circumference of semicircle} = \frac{2\pi r}{2}$$

$$= \pi r$$

$$= \frac{22}{7} \times 10$$

$$= 31.4 \text{ cm}$$

$$\text{So, total tape required} = 31.4 + 10 + 10$$

$$= 51.4 \text{ cm}$$

22. Area of circular garden with diameter 8 m is
(a) $12.56m^2$ (b) $25.12m^2$ (c) $50.24m^2$ (d) $2000.96m^2$

Solution:-

(c) 50.24 m^2

We know that,
Area of circle = πr^2
Diameter = 8m

Then,
Radius = 4 m
Area = $\frac{22}{7} \times 4 \times 4$
= 50.24 m²

23. Area of a circle with diameter ‘m’ radius ‘n’ and circumference ‘p’ is

- (a) $2\pi n$ (b) πm^2 (c) πp^2 (d) πn^2

Solution:-

(d) πn^2

24. A table top is semi-circular in shape with diameter 2.8 m. Area of this table top is

- (a) 3.08 m² (b) 6.16 m² (c) 12.32 m² (d) 24.64 m²

Solution:-

(a) 3.08 m²

Diameter of semi-circular shape = 2.8 m

So,

Radius of semi-circular shape = 1.4 m

Then,

$$\begin{aligned}\text{Area of semi-circular shape of table top} &= \frac{\pi r^2}{2} \\ &= \left(\left(\frac{22}{7}\right) \times 1.4 \times 1.4\right) \div 2 \\ &= 3.08 \text{ m}^2\end{aligned}$$

25. If 1m² = x mm², then the value of x is

- (a) 1000 (b) 10000 (c) 100000 (d) 1000000

Solution:-

(d) 1000000

26. If p squares of each side 1mm makes a square of side 1cm, then p is equal to

- (a) 10 (b) 100 (c) 1000 (d) 10000

Solution:-

- (b) 100 mm^2

27. 12 m^2 is the area of

- (a) a square with side 12 m (b) 12 squares with side 1m each
(c) 3 squares with side 4 m each (d) 4 squares with side 3 m each

Solution:-

- (b) 12 squares with side 1m each

28. If each side of a rhombus is doubled, how much will its area increase?

- (a) 1.5 times (b) 2 times (c) 3 times (d) 4 times

Solution:-

- (c) 3 times

Let us assume x be the side of the rhombus and h be the height of the rhombus.

Therefore,

$$\begin{aligned}\text{Area of rhombus} &= x \times h \\ &= xh\end{aligned}$$

Now, side of a rhombus is doubled,

$$\text{Area of new rhombus} = 4xh$$

(the area of new rhombus after its sides are doubled is 4 times the original rhombus)

Hence, the area will increase by 3 times the area of the original rhombus.

29. If the sides of a parallelogram are increased to twice its original lengths, how much will the perimeter of the new parallelogram?

- (a) 1.5 times (b) 2 times (c) 3 times (d) 4 times

Solution:-

- (b) 2 times

$$\text{Perimeter of parallelogram} = 2 (\text{length} + \text{breadth})$$

If the sides of a parallelogram are increased to twice its original lengths,

$$\text{Perimeter} = 2 (2\text{length} + 2\text{breadth})$$

$$= 2 \times 2 (\text{length} + \text{breadth})$$

Hence, the perimeter will increase by 2 times the perimeter of the original parallelogram.

30. If radius of a circle is increased to twice its original length, how much will the area of the circle increase?

- (a) 1.4 times (b) 2 times (c) 3 times (d) 4 times

Solution:-

(c) 3 times

$$\text{Area of the circle} = \pi r^2$$

Where,

r = radius of original circle

As,

radius is doubled = 2r

Then,

$$\begin{aligned} \text{area of new circle} &= \pi(2r)^2 \\ &= 4 \pi r^2 \end{aligned}$$

Hence, the area will increase by 3 times the area of the original circle.

31. What will be the area of the largest square that can be cut out of a circle of radius 10 cm?

- (a) 100 cm² (b) 200 cm² (c) 300 cm² (d) 400 cm²

Solution:-

(b) 200 cm²

32. What is the radius of the largest circle that can be cut out of the rectangle measuring 10 cm in length and 8 cm in breadth?

- (a) 4 cm (b) 5 cm (c) 8 cm (d) 10 cm

Solution:-

(a) 4 cm

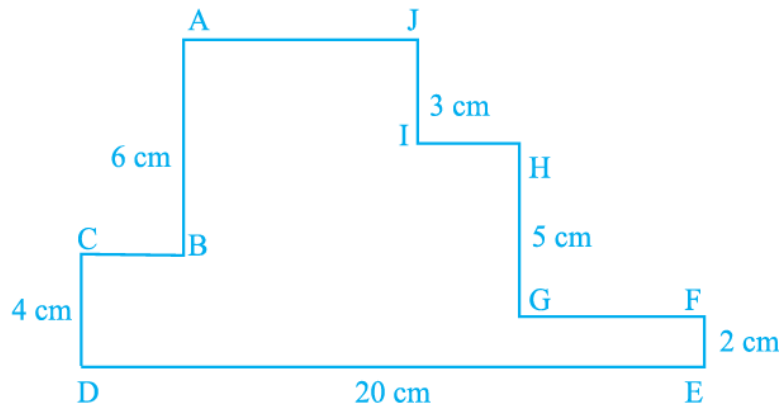
It is given that, the largest circle that can be cut out of the rectangle measuring 10 cm in length and 8 cm in breadth.

Diameter of circle = 8 cm

So,

$$\begin{aligned}
 \text{Radius} &= \text{diameter}/2 \\
 &= 8/2 \\
 &= 4 \text{ cm}
 \end{aligned}$$

33. The perimeter of the figure ABCDEFGHIJ is
(a) 60 cm (b) 30 cm (c) 40 cm (d) 50 cm



Solution:-

(a) 60 cm

$$\begin{aligned}
 \text{Perimeter of the given figure} &= AB + BC + CD + DE + EF + FG + GH + HI + IJ + AJ \\
 &= (AJ + IH + GF + BC = DE) + 3 + 5 + 2 + 20 + 4 + 6 \\
 &= 20 + 40 \\
 &= 60 \text{ cm}
 \end{aligned}$$

34. The circumference of a circle whose area is $81 \pi r^2$, is

(a) $9\pi r$ (b) $18\pi r$ (c) $3\pi r$ (d) $81\pi r$

Solution:-

(b) $18\pi r$

Let us assume R be the radius of circle

We know that,

$$\text{Area of circle} = \pi R^2$$

$$81\pi r^2 = \pi R^2$$

$$R = \sqrt{81} r$$

$$R = 9r$$

$$\text{Circumference} = 2 \pi r$$

$$= 2 \pi (9r)$$

$$= 18\pi r$$

35. The area of a square is 100 cm^2 . The circumference (in cm) of the largest circle cut of it is

- (a) 5π (b) 10π (c) 15π (d) 20π**

Solution: –

- (b) 10π

36. If the radius of a circle is tripled, the area becomes

- (a) 9 times (b) 3 times (c) 6 times (d) 30 times**

Solution:-

- (a) 9 times

$$\text{Area of circle} = \pi r^2$$

When

Radius of a circle is tripled = $3r$

So,

$$\begin{aligned}\text{Area} &= \pi(3r)^2 \\ &= 9\pi r^2\end{aligned}$$

37. The area of a semicircle of radius $4r$ is

- (a) $8\pi r^2$ (b) $4\pi r^2$ (c) $12\pi r^2$ (d) $2\pi r^2$**

Solution:-

- (a) $8\pi r^2$

In Questions 38 to 56, fill in the blanks to make the statements true.

38. Perimeter of a regular polygon = length of one side $\times$ _____.

Solution:-

$$\text{Perimeter of a regular polygon} = \text{length of one side} \times \underline{\text{(number of sides)}}$$

39. If a wire in the shape of a square is rebent into a rectangle, then the _____ of both shapes remain same, but _____ may vary.

Solution:-

If a wire in the shape of a square is rebent into a rectangle, then the perimeter of both shapes remain same, but area may vary.

40. Area of the square MNOP of Fig. 9.24 is 144 cm^2 . Area of each triangle is _____.

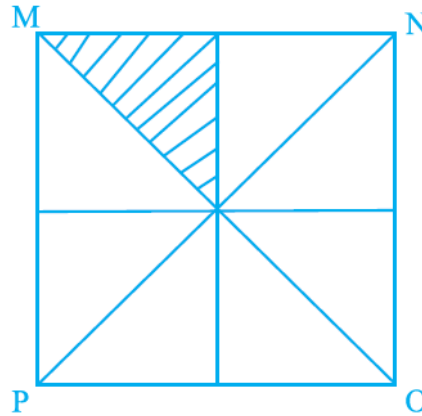


Fig. 9.24

Solution:-

Area of the square MNOP of Fig. 9.24 is 144 cm^2 . Area of each triangle is 18 cm^2 .

As,

Area of the square MNOP is 144 cm^2 .

So,

$$\begin{aligned} \text{Area of triangle} &= \frac{1}{8} \times \text{Area of the square MNOP} \\ &= \frac{1}{8} \times 144 \\ &= 18 \text{ cm}^2 \end{aligned}$$

41. In Fig. 9.25, area of parallelogram BCEF is _____ cm^2 where ACDF is a rectangle.

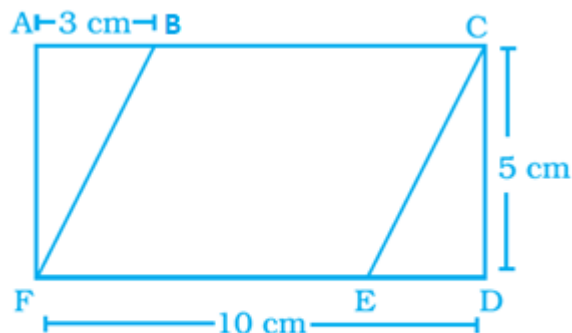


Fig. 9.25

Solution:-

In area of parallelogram BCEF is 35cm^2 where ACDF is a rectangle.

42. To find area, any side of a parallelogram can be chosen as _____ of the parallelogram.

Solution:-

To find area, any side of a parallelogram can be chosen as base of the parallelogram.

43. Perpendicular dropped on the base of a parallelogram from the opposite vertex is known as the corresponding _____ of the base.

Solution:-

Perpendicular dropped on the base of a parallelogram from the opposite vertex is known as the corresponding height/altitude of the base.

44. The distance around a circle is its _____.

Solution:-

The distance around a circle is its circumference.

45. Ratio of the circumference of a circle to its diameter is denoted by symbol _____.

Solution:-

Ratio of the circumference of a circle to its diameter is denoted by symbol π .

46. If area of a triangular piece of cardboard is 90 cm^2 , then the length of altitude corresponding to 20 cm long base is _____ cm.

Solution:-

If area of a triangular piece of cardboard is 90 cm^2 , then the length of altitude corresponding to 20 cm long base is 9cm.

We know that,

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$90 = \frac{1}{2} \times 20 \times \text{height}$$

$$\text{Height} = 9\text{ cm}$$

47. Value of π is _____ approximately.

Solution:-

Value of π is ($\frac{22}{7}$) or 3.14 approximately.

48. Circumference 'C' of a circle can be found by multiplying diameter 'd' with _____.

Solution:-

Circumference 'C' of a circle can be found by multiplying diameter 'd' with π .

We know that,

Circumference of circle when radius is considered = $2\pi r$

If diameter is considered = πd

49. Circumference 'C' of a circle is equal to $2\pi \times$ _____.

Solution:-

Circumference 'C' of a circle is equal to $2\pi \times$ r .

50. $1 \text{ m}^2 =$ _____ cm^2 .

Solution:-

$1 \text{ m}^2 =$ 100 cm^2 .

We know that,

$1 \text{ m} = 100 \text{ cm}$

51. $1 \text{ cm}^2 =$ _____ mm^2 .

Solution:-

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

We know that,

$1 \text{ cm} = 10 \text{ mm}$

52. 1 hectare = _____ m^2 .

Solution:-

$$1 \text{ hectare} = \underline{10,000} \text{ m}^2$$

53. Area of a triangle = $\frac{1}{2}$ base $\times$ _____.

Solution:-

$$\text{Area of a triangle} = \frac{1}{2} \times \text{base} \times \underline{\text{height}}.$$

54. $1 \text{ km}^2 =$ _____ m^2 .

Solution: –

$$1 \text{ km}^2 = \underline{10,00,000} \text{ m}^2.$$

We know that,

$$1 \text{ km} = 1000 \text{ m}$$

55. Area of a square of side 6 m is equal to the area of _____ squares of each side 1 cm.

Solution:-

Area of a square of side 6 m is equal to the area of 3,60,000 squares of each side 1 cm.

Let us assume the number of squares having side of 1 cm be 'x'.

56. $10 \text{ cm}^2 =$ _____ m^2 .

Solution:-

$$10 \text{ cm}^2 = \underline{0.001} \text{ m}^2$$

In Questions 57 to 72, state whether the statements are True or False.

57. In Fig. 9.26, perimeter of (ii) is greater than that of (i), but its area is smaller than that of (i).



Fig. 9.26

Solution:-

True.

Perimeter of a closed figure is the distance around it while area is the measure of the part of plane or region enclosed by it.

Hence, perimeter of (ii) is greater than that of (i), but its area is smaller than that of (i).

58. In Fig. 9.27,

(a) area of (i) is the same as the area of (ii).

(b) Perimeter of (ii) is the same as (i).

(c) If (ii) is divided into squares of unit length, then its area is 13 unit squares.

(d) Perimeter of (ii) is 18 units.

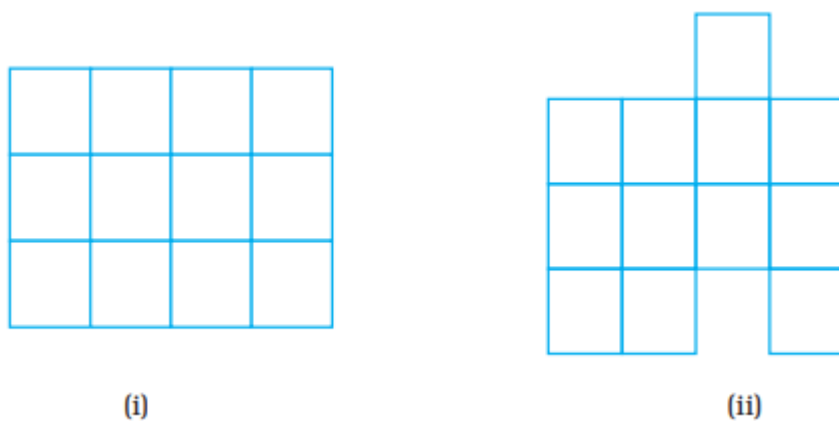


Fig. 9.27

Solution:-

(a) True.

By observing the figure, we can say that area of both figure same, because number of blocks used in both figures are same.

(b) Perimeter of (ii) is the same as (i).

False.

By observing the figure, we can say that there are 2 new sides are added in figure (ii).

Therefore, the perimeter of (ii) is not same as (i).

(c) If (ii) is divided into squares of unit length, then its area is 13 unit squares.

False.

We know that,

area of square = side $\times$ side

Area of 1 square = 1×1
= 1 unit squares

There are 12 squares in figure (ii).

Therefore, area of figure (ii) = 12×1
= 12 unit squares

(d) Perimeter of (ii) is 18 units.

True.

The perimeter refers to the total length of the sides or edges of a polygon.

59. If perimeter of two parallelograms are equal, then their areas are also equal.

Solution:-

False.

60. All congruent triangles are equal in area.

Solution:-

True.

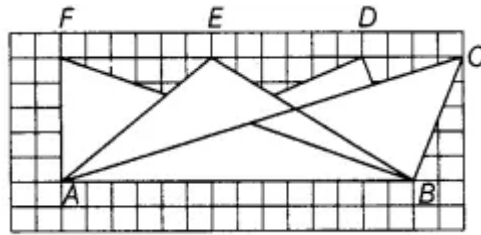
We know that congruent triangle have equal size and shapes.

61. All parallelograms having equal areas have same perimeters.

Solution:-

False

Observe all the four triangles FAB, EAB, DAB and CAB as shown in Fig. 9.28:



Now answer Questions 62 to 65:

62. All triangles have the same base and the same altitude.

Solution:-

True.

From the figure, all triangles have the same base and the same altitude.

63. All triangles are congruent.

Solution:-

False.

64. All triangles are equal in area.

Solution:-

True.

From the figure, all triangles have the same base and the same altitude.

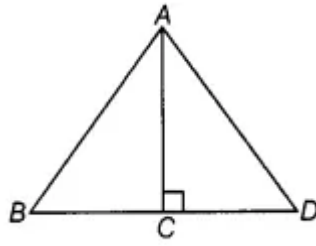
65. All triangles may not have the same perimeter.

Solution:-

True.

From the figure, we can say that all triangles may not have the same perimeter.

66. In Fig. 9.29 ratio of the area of triangle ABC to the area of triangle ACD is the same as the ratio of base BC of triangle ABC to the base CD of triangle ACD.



Solution:

True

$$\begin{aligned}\text{Area of triangle ABC} &= \frac{1}{2} \times BC \times AC : \frac{1}{2} \times CD \times AC \\ &= BC:CD\end{aligned}$$

67. Triangles having the same base have equal area.

Solution:

False

68. Ratio of circumference of a circle to its radius is always $2\pi : 1$.

Solution:

True

$$\begin{aligned}\text{Circumference: Radius} &= 2\pi r : r \\ &= 2\pi : 1\end{aligned}$$

69. 5 hectare = 500 m²

Solution:

False

70. An increase in perimeter of a figure always increases the area of the figure.

Solution:

False

It is not necessary, because the perimeter is the sum of all sides of closed shapes or polygons while the area is just bounded space inside.

71. Two figures can have the same area but different perimeters.

Solution:

True

Yes, because the perimeter is the sum of all sides of closed shapes or polygons while the area is just bounded space inside.

Therefore, it can be different.

72. Out of two figures if one has larger area, then its perimeter need not to be larger than the other figure.

Solution:

True

73. A hedge boundary needs to be planted around a rectangular lawn of size 72 m × 18 m. If 3 shrubs can be planted in a metre of hedge, how many shrubs will be planted in all?

Solution:

Length of rectangular lawn = 72 meters

Breadth of rectangular lawn = 18 meters

Perimeter of rectangle = $2(\text{Length} + \text{Breadth})$

$$\begin{aligned}\text{Perimeter of rectangle} &= 2(72 + 18) \\ &= 2(90) \\ &= 180 \text{ metres}\end{aligned}$$

If three shrubs can be planted in a meter of hedge.

So,

$$\begin{aligned}\text{Number of shrubs} &= 3 \times 180 \\ &= 540\end{aligned}$$

74. People of Khejadli village take good care of plants, trees and animals. They say that plants and animals can survive without us, but we can not survive without them. Inspired by her elders Amrita marked some land for her pets (camel and ox) and plants. Find the ratio of the areas kept for animals and plants to the living area.

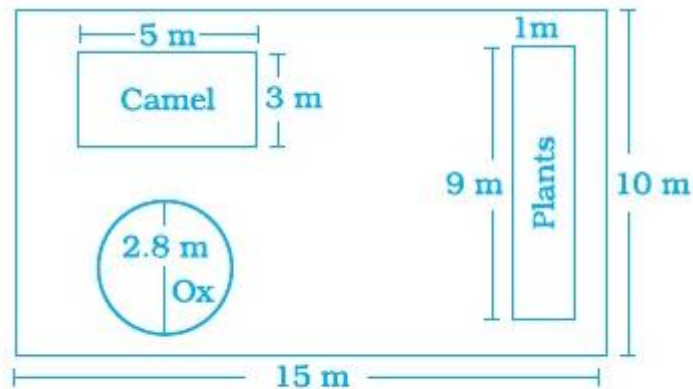


Fig. 9.30

Solution:

Area of covered land by plants = 9 m^2

Area of rectangular land = 150 m^2

Area of covered land by camel = 15×3
 $= 15 \text{ m}^2$

Hence,

Region of land covered by ox in circular area.

So,

diameter, $d = 2.8 \text{ m}$

Radius = 1.4 m

$$\begin{aligned} \text{Region of land covered by ox} &= \pi r^2 \\ &= \frac{22}{7} \times 1.4 \times 1.4 \\ &= 6.16 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Total area covered by Camels, plants and ox} &= 9 + 15 + 6.16 \\ &= 30.16 \text{ m}^2 \end{aligned}$$

Therefore,

$$\begin{aligned} \text{Remaining land} &= 150 - 30.16 \\ &= 119.84 \text{ m}^2 \end{aligned}$$

Ratio of areas kept for animals and plants to the living areas = $30.16 : 119.84$

We should save our environment and balance the environment.

75. The perimeter of a rectangle is 40 m. Its length is four metres less than five times its breadth. Find the area of the rectangle.

Solution:

Let, breadth of rectangle is x , so,

$5x - 4$ be the length of the rectangle.

Perimeter of rectangle = $2(l + b)$

$$40 = 2(l + b)$$

$$40 = 2(5x - 4 + x)$$

$$12x - 8 = 40 + 8$$

$$12x = 48$$

$$x = 4$$

So,

$$b = 4$$

$$l = 5 \times 4 - 4$$

$$= 16$$

Therefore,

$$\begin{aligned}\text{Area of rectangle} &= 4 \times 16 \\ &= 64 \text{ m}^2\end{aligned}$$

76. A wall of a room is of dimensions $5 \text{ m} \times 4 \text{ m}$. It has a window of dimensions $1.5 \text{ m} \times 1 \text{ m}$ and a door of dimensions $2.25 \text{ m} \times 1 \text{ m}$. Find the area of the wall which is to be painted.

Solution:

Given,

Length of the room = 5 m

Breadth of the room = 4 m

$$\begin{aligned}\text{Area of the room} &= 5 \times 4 \\ &= 20 \text{ m}^2\end{aligned}$$

Also,

Length of the window = 1.5 m

Breadth of the window = 1 m

$$\begin{aligned}\text{Area of the window} &= 1.5 \times 1 \\ &= 1.5 \text{ m}^2\end{aligned}$$

Now,

Length of the door = 2.25 m

Breadth of the door = 1 m

$$\begin{aligned}\text{Area of the door} &= 2.25 \times 1 \\ &= 2.25 \text{ m}^2\end{aligned}$$

Now,

$$\begin{aligned}\text{Area of the wall to be painted} &= \text{Area of the room} - (\text{Area of the window} + \text{Area of the door}) \\ &= 20 - (1.5 + 2.25)\end{aligned}$$

$$= 20 - 3.75$$

$$= 16.25 \text{ m}^2$$

77. Rectangle MNOP is made up of four congruent rectangles (Fig. 9.31). If the area of one of the rectangles is 8 m^2 and breadth is 2 m , then find the perimeter of MNOP.

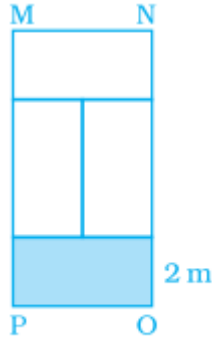
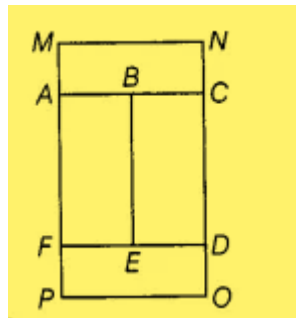


Fig. 9.31

Solution:



Given,

Area of one rectangle = 8 m^2

Breadth = 2 m

Also,

$$l \times b = 8$$

$$l \times 2 = 8$$

$$l = 4 \text{ m}$$

Now,

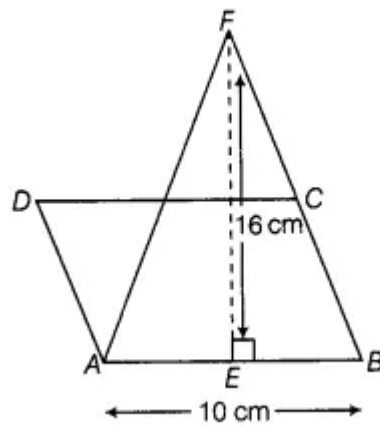
$$\begin{aligned} \text{Perimeter of rectangle MNOP} &= MN + NC + CD + DO + PO + PF + FA + MA \\ &= 4 + 2 + 4 + 2 + 4 + 2 + 4 + 2 \\ &= 24 \text{ m} \end{aligned}$$

Therefore,

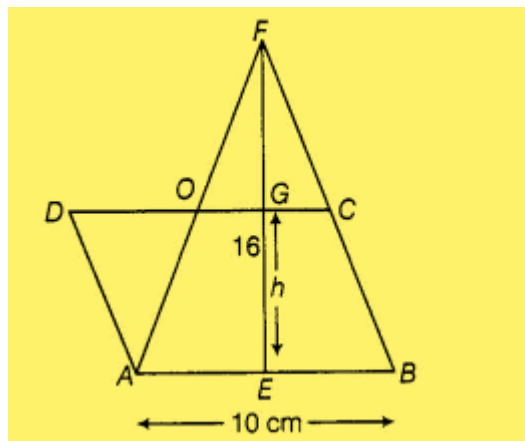
Perimeter of MNOP is 24 meters .

78. In Fig. 9.32, area of $\triangle AFB$ is equal to the area of parallelogram ABCD. If altitude EF is 16 cm long, find the altitude of the parallelogram to the

base AB of length 10 cm. What is the area of $\triangle DAO$, where O is the mid point of DC?



Solution:



Given,

Area of triangle AFB = Area of parallelogram ABCD

$$\frac{1}{2} \times AB \times EF = CD \times EG$$

$$\frac{1}{2} \times 10 \times 16 = 10 \times h$$

$$h = 8 \text{ cm}$$

In triangle DAO,

$$DO = 5 \text{ cm}$$

$$\text{Area of triangle DAO} = \frac{1}{2} \times OD \times h$$

$$\begin{aligned}
&= \frac{1}{2} \times 5 \times 8 \\
&= 20 \text{ cm}^2
\end{aligned}$$

79. Ratio of the area of $\triangle WXY$ to the area of $\triangle WZY$ is 3 : 4 (Fig. 9.33). If the area of $\triangle WXZ$ is 56 cm² and $WY = 8$ cm, find the lengths of XY and YZ .

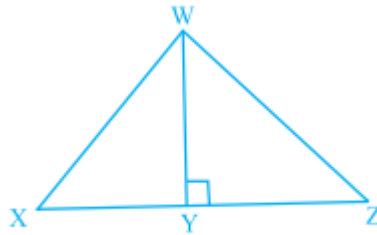


Fig. 9.33

Solution:

Area of triangle $WXZ = 56 \text{ cm}^2$

$$56 = \frac{1}{2} \times WY \times XZ$$

$$56 = \frac{1}{2} \times 8 \times XZ$$

$$XZ = 14 \text{ cm}$$

Area of triangle WXY : Area of triangle $WZY = 3:4$

$$\frac{\frac{1}{2} \times WY \times XY}{\frac{1}{2} \times WZ \times WY} = \frac{3}{4}$$

$$\frac{XY}{YZ} = \frac{3}{4}$$

$$\frac{XY}{14 - XY} = \frac{3}{4}$$

$$4XY = 42 - 3XY$$

$$XY = 6 \text{ cm}$$

Hence,

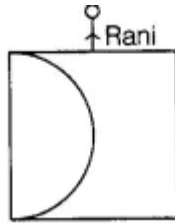
$$YZ = 14 - 6$$

$$YZ = 8 \text{ cm}$$

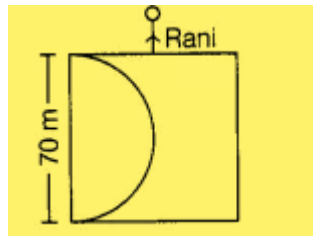
80. Rani bought a new field that is next to one she already owns (Fig. 9.34). This field is in the shape of a square of side 70 m. She makes a semi circular lawn of maximum area in this field.

(i) Find the perimeter of the lawn.

(ii) Find the area of the square field excluding the lawn.



Solution:



i.

Given,

Side of a square = 70 m

From the given figure,

Diameter of semi-circle = 70 cm

Side of square = Diameter of semi-circle
= 70 cm

Radius = 35 m

Hence,

Perimeter of the lawn = $\pi r + 2r$

$$= \frac{22}{7} \times 35 + 2 \times 35$$

$$= 180 \text{ m}$$

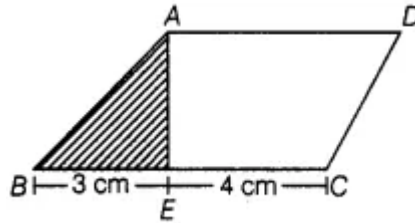
ii.

$$\begin{aligned} \text{Area of square} &= 70 \times 70 \\ &= 4900 \text{ m}^2 \end{aligned}$$

Hence,

$$\begin{aligned} \text{Required area} &= 4900 - \frac{1}{2} \times \pi \times (35)^2 \\ &= 4900 - 1925 \\ &= 2975 \text{ m}^2 \end{aligned}$$

81. In Fig. 9.35, find the area of parallelogram ABCD if the area of shaded triangle is 9 cm^2 .



Solution:

Given,

Area of shaded portion = 9 cm^2

Base of triangle = 3 cm

Now,

Area of triangle,

$$9 = \frac{1}{2} \times 3 \times h$$

$$h = 6 \text{ cm}$$

$$\begin{aligned} \text{Area of parallelogram} &= 6 \times (3+4) \\ &= 42 \text{ cm}^2 \end{aligned}$$

82. Pizza factory has come out with two kinds of pizzas. A square pizza of side 45 cm costs rupees 150 and a circular pizza of diameter 50 cm costs rupees 160 (Fig. 9.36). Which pizza is a better deal?

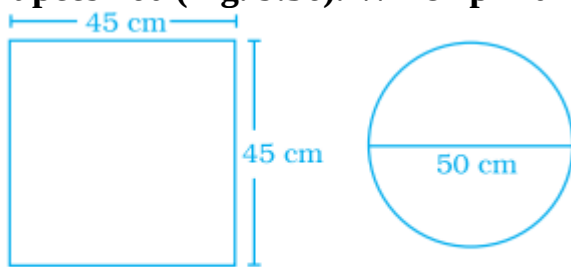


Fig. 9.36

Solution:

Given,

Side of square pizza = 45 cm

Diameter of circular pizza = 50 cm

Radius = 25 cm

Area of square pizza = 45×45

$$= 2025 \text{ cm}^2$$

$$\text{Area of circular pizza} = \frac{22}{7} \times 25 \times 25$$

$$= 1964.28 \text{ cm}^2$$

$$\text{Hence, price of 1 cm square pizza} = \frac{2052}{150}$$

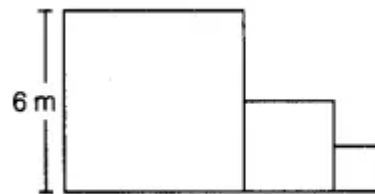
$$= \text{Rs. } 13.5$$

$$\text{Price of 1 cm circular pizza} = \frac{1964.28}{160}$$

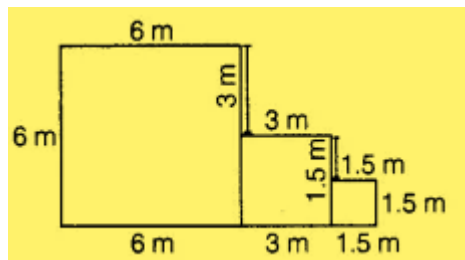
$$= \text{Rs. } 12.27$$

Therefore, the best deal is circular pizza.

83. Three squares are attached to each other as shown in Fig. 9.37. Each square is attached at the mid point of the side of the square to its right. Find the perimeter of the complete figure.



Solution:



$$\text{Perimeter of the complete figure} = 6 + 6 + 6 + 3 + 1.5 + 1.5 + 1.5 + 3 + 3 + 1.5$$

$$= 33\text{m}$$

84. In Fig. 9.38, ABCD is a square with AB = 15 cm. Find the area of the square BDFE.

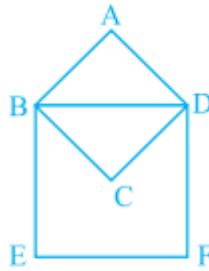


Fig. 9.38

Solution:

Given,

$$AB = 15\text{cm}$$

$$\begin{aligned}\text{Diagonal of square } ABCD &= \sqrt{2}a \\ &= 15\sqrt{2}\end{aligned}$$

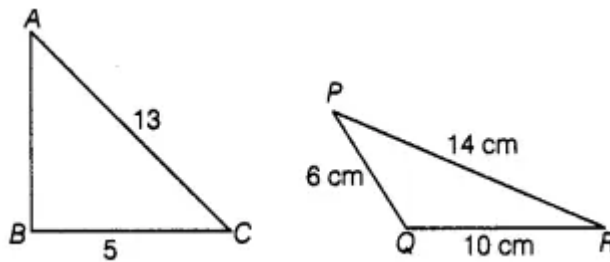
From the figure,

Diagonal of square ABCD is the side of square BDEF

Hence,

$$\begin{aligned}\text{Area of the square BDEF} &= (15\sqrt{2})^2 \\ &= 225 \times 2 \\ &= 450 \text{ cm}^2\end{aligned}$$

85. In the given triangles of Fig. 9.39, perimeter of $\triangle ABC$ = perimeter of $\triangle PQR$. Find the area of $\triangle ABC$.



Solution:

Given,

Perimeter of triangle PQR = Perimeter of triangle ABC

$$\begin{aligned}\text{Perimeter of triangle PQR} &= 14+6+10 \\ &= 30\text{cm}\end{aligned}$$

Now,

$$\text{Perimeter of triangle ABC} = AB+BC+CA$$

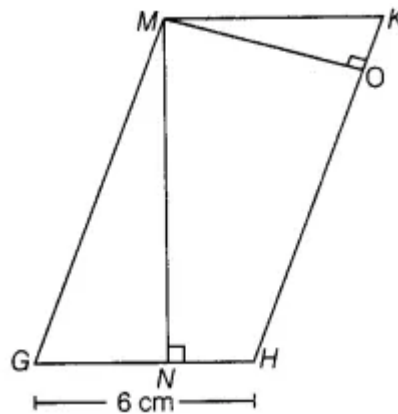
$$AB = 30 - 18$$

$$AB = 12 \text{ cm}$$

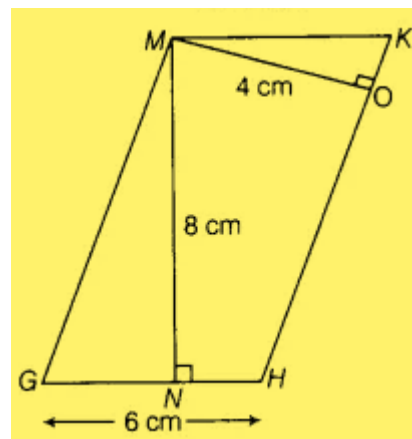
Therefore,

$$\begin{aligned}\text{Area of triangle ABC} &= \frac{1}{2} \times 5 \times 12 \\ &= 30 \text{ cm}^2\end{aligned}$$

86. Altitudes MN and MO of parallelogram MGHK are 8 cm and 4 cm long respectively (Fig. 9.40). One side GH is 6 cm long. Find the perimeter of MGHK.



Solution:



Given,

$$MN = 8 \text{ cm}$$

$$MO = 4 \text{ cm}$$

$$GH = 6 \text{ cm}$$

Now,

$$\begin{aligned}\text{Area of parallelogram MGHK, when base is GH} &= GH \times MN \\ &= 6 \times 8 \\ &= 48 \text{ cm}^2\end{aligned}$$

Now,

$$\begin{aligned}\text{Area of parallelogram MGHK, when base is HK,} \\ 48 &= HK \times 4\end{aligned}$$

$$HK = 12$$

In parallelogram, opposite sides are equal

So,

$GH = 6\text{ cm} = MK$, and

$MG = HK = 12\text{ cm}$

Therefore,

$$\begin{aligned}\text{Perimeter of parallelogram} &= 6 + 6 + 12 + 12 \\ &= 36\text{ cm}\end{aligned}$$

87. In Fig. 9.41, area of $\triangle PQR$ is 20 cm^2 and area of $\triangle PQS$ is 44 cm^2 . Find the length RS , if PQ is perpendicular to QS and QR is 5 cm .

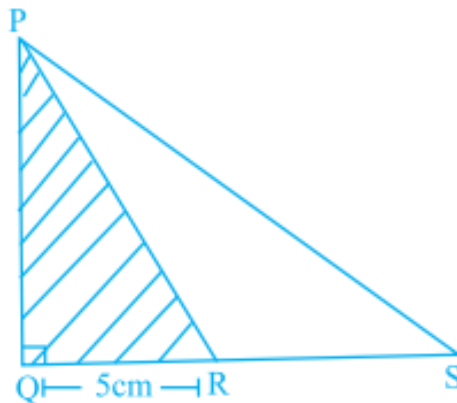
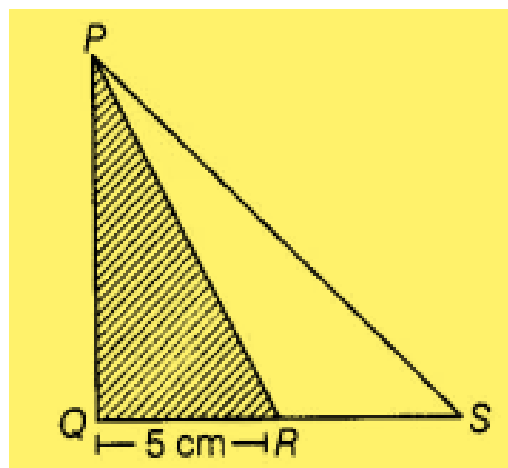


Fig. 9.41

Solution:



Given,

Area of triangle $PQR = 20\text{ sq. cm}$

Area of triangle $PQS = 44\text{ sq. cm}$

Area of triangle PQR ,

$$20 = \frac{1}{2} \times PQ \times 5$$

$$PQ = 8\text{cm}$$

Area of triangle PQS,

$$44 = \frac{1}{2} \times PQ \times QS$$

$$QS = \frac{44 \times 2}{8}$$
$$= 11\text{cm}$$

Now,

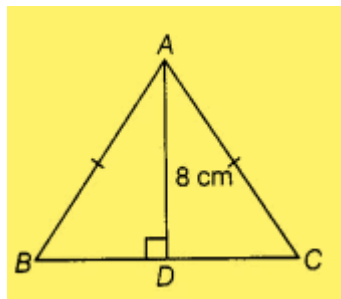
$$RS = QS - QR$$

$$= 11 - 5$$

$$= 6\text{cm}$$

88. Area of an isosceles triangle is 48 cm^2 . If the altitudes corresponding to the base of the triangle is 8 cm, find the perimeter of the triangle.

Solution:



Given,

Area of triangle ABC = 48 sq. cm

Height = 8cm

Area of triangle ABC,

$$48 = \frac{1}{2} \times BC \times AD$$

$$BC = \frac{48 \times 2}{8}$$
$$= 12\text{cm}$$

Now,

In a isosceles triangle, $BD = DC = 6\text{cm}$

Applying Pythagoras theorem in triangle ADB,

$$AB^2 = BD^2 + AD^2$$

$$AB^2 = 6^2 + 8^2$$

$$AB = 10\text{cm}$$

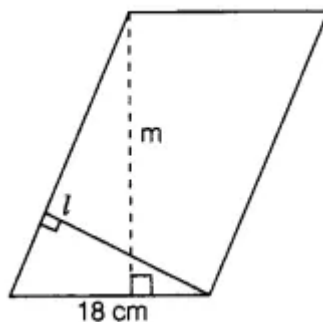
Now,

$$\text{Perimeter of triangle} = AB + AC + BC$$

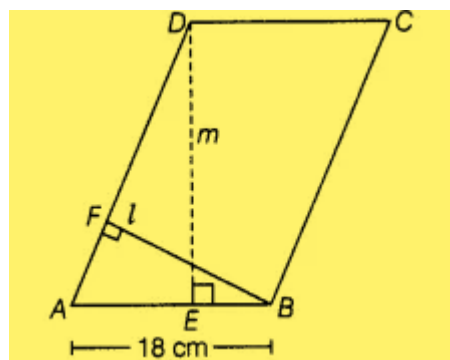
$$= 10 + 10 + 12$$

$$= 32\text{cm}$$

89. Perimeter of a parallelogram shaped land is 96 m and its area is 270 square metres. If one of the sides of this parallelogram is 18 m, find the length of the other side. Also, find the lengths of altitudes l and m (Fig. 9.42).



Solution:



Given,

Perimeter of parallelogram = 96 cm

Area of parallelogram = 270 sq. m

In parallelogram ABCD,

$$AB=CD=18\text{m}$$

$$AD=BC$$

We know,

$$\text{Perimeter of a parallelogram } ABCD = AB+BC+CD+AD$$

$$96 = 18 + 18 + AD + AD$$

$$96 = 35 + 2AD$$

$$AD = 30 \text{ cm}$$

So,

$$AD = BC = 30 \text{ cm}$$

Now, area of parallelogram ABCD,

$$270 = AB \times DE$$

$$DE = \frac{270}{18}$$

$$= 15\text{cm}$$

Now, area of parallelogram ABCD,

$$270 = 30 \times l$$

$$l = 9\text{m}$$

90. Area of a triangle PQR right-angled at Q is 60 cm^2 (Fig. 9.43). If the smallest side is 8cm long, find the length of the other two sides.

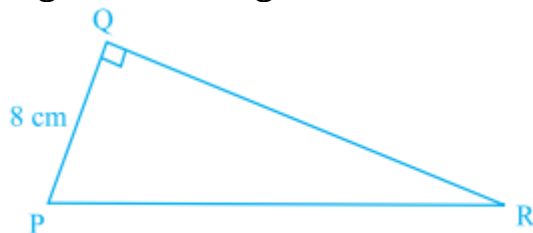


Fig. 9.43

Solution:

Given,

$$\text{Area of triangle PQR} = 60 \text{ sq. cm}$$

$$PQ = 8\text{cm}$$

Area of triangle PQR,

$$60 = \frac{1}{2} \times 8 \times QR$$

$$QR = 15\text{cm}$$

Applying Pythagoras theorem in triangle PQR,

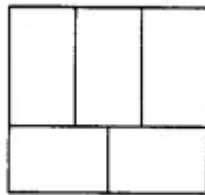
$$PR^2 = PQ^2 + QR^2$$

$$PR^2 = 8^2 + 15^2$$

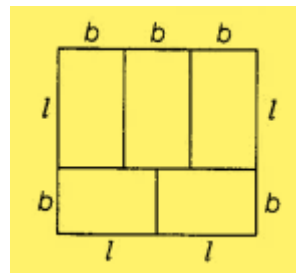
$$PR = 17\text{cm}$$

Therefore, 15 cm and 17cm are lengths of sides of a triangle.

91. In Fig. 9.44 a rectangle with perimeter 264 cm is divided into five congruent rectangles. Find the perimeter of one of the rectangles.



Solution:



Let b and l be the breadth and length of each rectangle.

Given,

Perimeter of a rectangle = 264cm

According to the figure,

$$4l + 5b = 264$$

... (i)

$$2l = 3b$$

... (ii)

Now, put the value of $3b$ into equation ii from equation i ,

$$2 \times 3b + 5b$$

$$(6+5) b = 264$$

$$b = \frac{264}{11}$$

$$b = 24 \text{ cm}$$

$$l = \frac{3b}{2}$$

$$l = 36 \text{ cm}$$

Therefore,

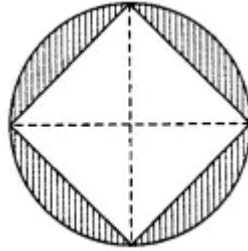
$$\text{Perimeter of the rectangle} = 2(l+b)$$

$$= 2(36+24)$$

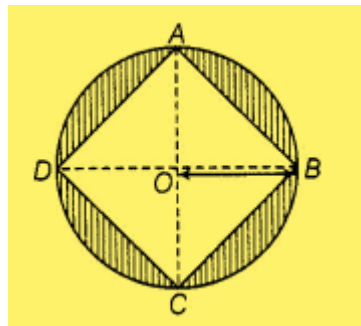
$$= 120 \text{ cm}$$

92. Find the area of a square inscribed in a circle whose radius is 7 cm (Fig. 9.45).

[Hint: Four right-angled triangles joined at right angles to form a square]



Solution:



ABCD is a square.

Area of square ABCD = 4 times of area of right-angled triangle AOB

Now,

$$\begin{aligned} \text{Area of square } ABCD &= 4 \times \frac{1}{2} \times AO \times BO \\ &= 2 \times 7 \times 7 \\ &= 98 \text{ cm}^2 \end{aligned}$$

Therefore, the area of inscribed square is 98 cm^2

93. Find the area of the shaded portion in question 92.

Solution:

ABCD is a square.

Area of square ABCD = 4 times of area of right-angled triangle AOB

$$\begin{aligned}
 \text{Area of square } ABCD &= 4 \times \frac{1}{2} \times AO \times BO \\
 &= 2 \times 7 \times 7 \\
 &= 98 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Now, Area of shaded portion} &= \pi r^2 - 98 \\
 &= \frac{22}{7} \times 7 \times 7 - 98 \\
 &= 154 - 98 \\
 &= 56 \text{ cm}^2
 \end{aligned}$$

In Questions 94 to 97 find the area enclosed by each of the following figures:

94.

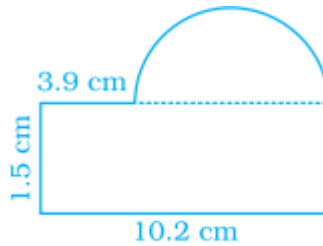


Fig. 9.46

Solution:

The Sample contains a semi-circle and a rectangle.

$$\begin{aligned}
 \text{Area of rectangle} &= 10.2 \times 1.5 \\
 &= 15.3 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Diameter of semi-circle} &= 10.2 - 3.9 \\
 &= 6.3 \text{ cm}
 \end{aligned}$$

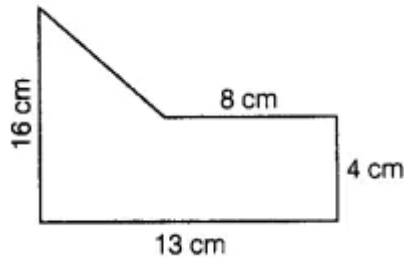
$$\text{Radius} = 3.15 \text{ cm}$$

$$\begin{aligned}
 \text{Area of semi-circle} &= \frac{1}{2} \pi r^2 \\
 &= \frac{1}{2} \times \frac{22}{7} \times 3.15 \times 3.15 \\
 &= 15.59 \text{ cm}^2
 \end{aligned}$$

Therefore,

$$\begin{aligned}
 \text{Total area} &= 15.3 + 15.59 \\
 &= 30.89 \text{ cm}^2
 \end{aligned}$$

95.



Solution:

The Sample contains a triangle and a rectangle.

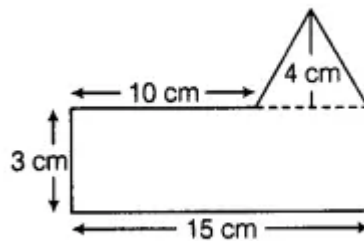
$$\begin{aligned}\text{Area of rectangle} &= 13 \times 4 \\ &= 52 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Area of triangle} &= \frac{1}{2} \times 5 \times 12 \\ &= 30 \text{ cm}^2\end{aligned}$$

Therefore,

$$\begin{aligned}\text{Total area enclosed in shape} &= 52 + 30 \\ &= 82 \text{ cm}^2\end{aligned}$$

96.



Solution:

The Sample contains a triangle and a rectangle.

$$\begin{aligned}\text{Area of rectangle} &= 15 \times 3 \\ &= 45 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{According to the figure the base BE} &= 15 - 10 \\ &= 5 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Now, area of triangle} &= \frac{1}{2} \times 5 \times 4 \\ &= 10 \text{ cm}^2\end{aligned}$$

Therefore,

$$\begin{aligned}\text{Total area enclosed in shape} &= 45 + 10 \\ &= 55 \text{ cm}^2\end{aligned}$$

97.

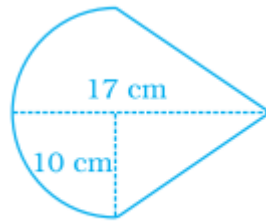


Fig. 9.49

Solution:

The sample contains a semi-circle and a triangle.

$$\begin{aligned} \text{Area of semi-circle} &= \frac{1}{2} \pi r^2 \\ &= \frac{1}{2} \times \frac{22}{7} \times 10 \times 10 \\ &= \frac{1100}{7} \text{ cm}^2 \end{aligned}$$

Now,

$$\begin{aligned} \text{Area of triangle} &= \frac{1}{2} \times 20 \times 17 \\ &= 170 \text{ cm}^2 \end{aligned}$$

Therefore,

$$\begin{aligned} \text{Total area enclosed in shape} &= \frac{1100}{7} + 170 \\ &= 327 \text{ cm}^2 \end{aligned}$$

In Questions 98 and 99 find the areas of the shaded region:

98.

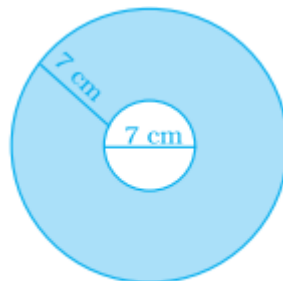


Fig. 9.50

Solution:

Let R be radius of bigger circle and r be radius of smaller circle,

From the figure,

$$r = \frac{7}{2}$$

and,

$$R = \frac{7}{2} + 7 \\ = \frac{21}{2}$$

Now,

$$\begin{aligned} \text{Area of shaded region} &= \text{area of bigger circle} - \text{area of smaller circle} \\ &= \pi(R^2 - r^2) \\ &= \frac{22}{7} \left[\left(\frac{21}{2} \right)^2 - \left(\frac{7}{2} \right)^2 \right] \\ &= 308 \text{ cm}^2 \end{aligned}$$

Therefore, 308cm^2 is the area of shaded portion.

99.

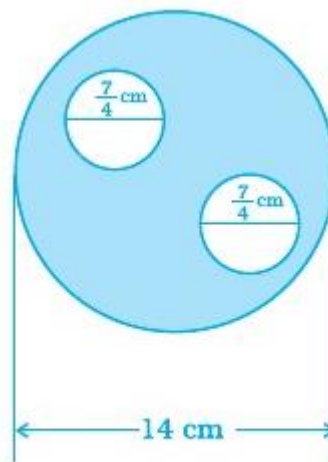


Fig. 9.51

Solution:

Diameter of the complete circle = 14cm

Radius = 7cm

From the figure,

$$\begin{aligned} \text{Area of the complete circle} &= \frac{22}{7} \times 7 \times 7 \\ &= 154 \text{ cm}^2 \end{aligned}$$

$$\text{Diameter of smaller circle} = \frac{7}{4}$$

$$\text{Radius} = \frac{7}{8}$$

$$\begin{aligned}\text{Area of two smaller circles} &= 2 \times \pi r^2 \\ &= 2 \times \frac{22}{7} \times \frac{7}{8} \times \frac{7}{8} \\ &= \frac{77}{16} \text{ cm}^2\end{aligned}$$

Now,

Area of shaded portion = area of complete circle – area of two smaller circles

$$\begin{aligned}&= 154 - \frac{77}{16} \\ &= 149 \frac{3}{16} \text{ cm}^2\end{aligned}$$

100. A circle with radius 16 cm is cut into four equal parts and rearranged to form another shape as shown in Fig. 9.52:

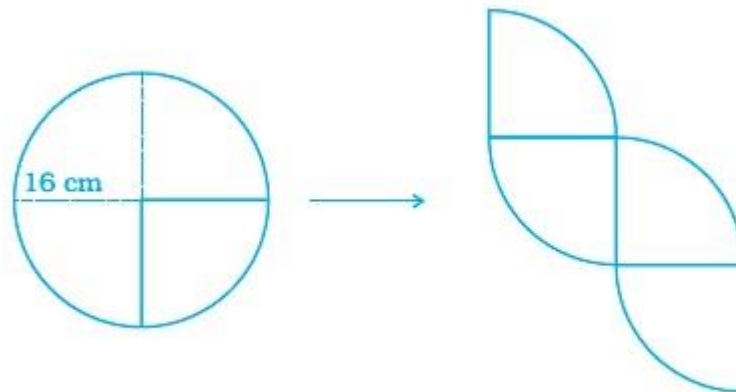


Fig. 9.52

Does the perimeter change? If it does change, by how much does it increase or decrease?

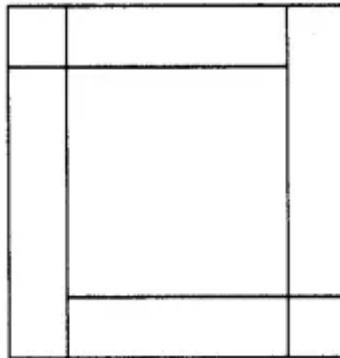
Solution:

Yes, the perimeter changes.

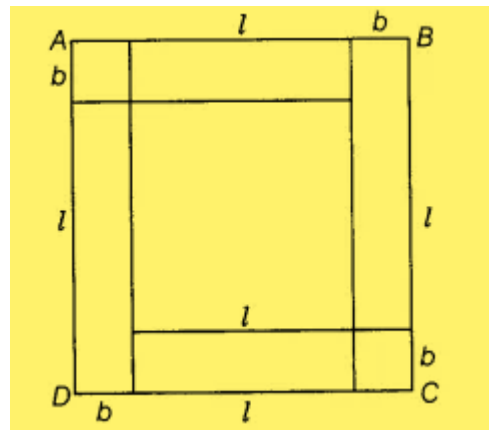
The perimeter is increased by 32 cm

$$\begin{aligned}2r &= 2 \times 16 \\ &= 32 \text{ cm}\end{aligned}$$

101. A large square is made by arranging a small square surrounded by four congruent rectangles as shown in Fig. 9.53. If the perimeter of each of the rectangle is 16 cm, find the area of the large square.



Solution:



Let b and l be the breadth and length of rectangle.

Given,

Perimeter of one rectangle = 16 cm

$$2(l + b) = 16 \text{ cm}$$

$$(l + b) = 8 \text{ cm}$$

As the side of larger square is $(l + b)$

Therefore,

$$\begin{aligned} \text{Area} &= (l + b)^2 \\ &= 8^2 \\ &= 64 \text{ cm}^2 \end{aligned}$$

102. ABCD is a parallelogram in which AE is perpendicular to CD (Fig. 9.54). Also $AC = 5$ cm, $DE = 4$ cm, and the area of $\triangle AED = 6 \text{ cm}^2$. Find the perimeter and area of ABCD.

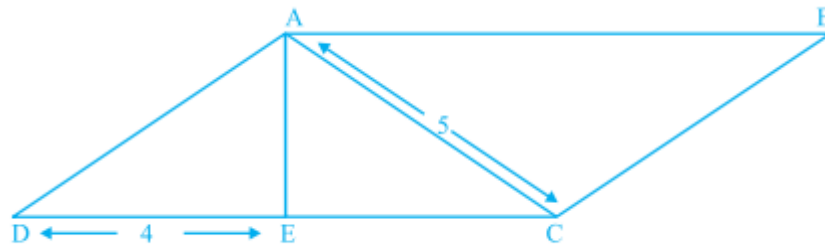


Fig. 9.54

Solution:

Given,

Area of triangle

AED = 6 sq. cm

AC = 5cm,

DE = 4cm

Area of triangle AED,

$$6 = \frac{1}{2} \times 4 \times AE$$

$$AE = 3\text{cm}$$

Now,

Area of right-angled triangle AEC,

AE = 3cm,

AC = 5cm

$$EC^2 = AC^2 + AE^2$$

$$EC^2 = 5^2 + 3^2$$

$$EC = 4\text{cm}$$

We have,

$$DE + EC = DC$$

$$DC = 4 + 4$$

$$= 8\text{cm}$$

Since, ABCD is a parallelogram,

$$AB = DC = 8\text{cm}$$

Now, applying Pythagoras theorem in triangle AED

So,

$$AD^2 = AE^2 + ED^2$$

$$AD^2 = 3^2 + 5^2$$

$$AD = 5\text{cm}$$

Hence,
 $AD=BD= 5\text{cm}$

$$\begin{aligned}\text{Perimeter of parallelogram } ABCD &= 2(l + b) \\ &= 2(DC+AD) \\ &= 2(8 + 5) \\ &= 26 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Area of parallelogram } ABCD &= DC \times AE \\ &= 8 \times 3 \\ &= 24 \text{ cm}^2\end{aligned}$$

103. Ishika has designed a small oval race track for her remote control car. Her design is shown in the figure 9.55. What is the total distance around the track? Round your answer to the nearest whole cm.

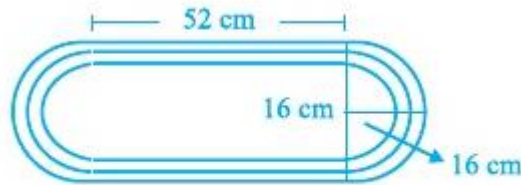


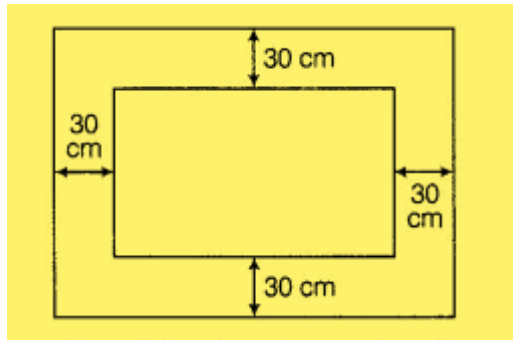
Fig. 9.55

Solution:

$$\begin{aligned}\text{Total distance around the track} &= \text{Length of two semicircles} + \text{Length of two parallel strips} \\ &= 2 \times \pi \times 16 + 2 \times 52 \\ &= 2 \times 3.14 \times 16 + 2 \times 52 \\ &= 10.5009 + 104 \\ &= 205 \text{ cm}\end{aligned}$$

104. A table cover of dimensions 3 m 25 cm $\times$ 2 m 30 cm is spread on a table. If 30 cm of the table cover is hanging all around the table, find the area of the table cover which is hanging outside the top of the table. Also find the cost of polishing the table top at rupees 16 per square metre.

Solution:



To find the cost of polishing the table top, we have to find out its area,

Given,

Length of cover = 3.25 m

Breadth of cover = 2.30 m

Now,

$$\begin{aligned}\text{Area of the table cover} &= 3.25 \times 2.30 \\ &= 7.475 \text{ m}^2\end{aligned}$$

Given,

30 cm width of cloth is outside the table on each side.

So,

$$\begin{aligned}\text{Length of table} &= 3.25 - 2 \times 30 \\ &= 2.65 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{Breadth of table} &= 2.30 - 2 \times 30 \\ &= 1.70 \text{ m}\end{aligned}$$

Now,

$$\begin{aligned}\text{Area of the top of the table} &= 2.65 \times 1.70 \\ &= 4.505 \text{ m}^2\end{aligned}$$

Now,

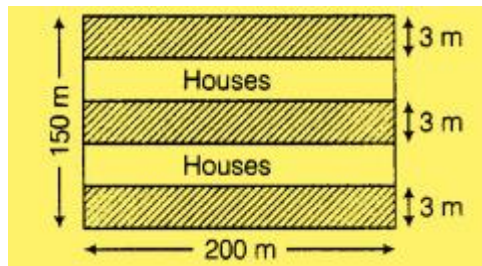
$$\begin{aligned}\text{Area of hanging cover of table} &= \text{Area of cover of table} - \text{area of the top of the table} \\ &= 7.475 - 4.505 \\ &= 2.97 \text{ m}^2\end{aligned}$$

It has been given that Rs.16 per square meter is the cost of polishing the table.

$$\begin{aligned}\text{Total cost} &= 4.505 \times 16 \\ &= \text{Rs. } 7.208\end{aligned}$$

105. The dimensions of a plot are $200 \text{ m} \times 150 \text{ m}$. A builder builds 3 roads which are 3 m wide along the length on either side and one in the middle. On either side of the middle road he builds houses to sell. How much area did he get for building the houses?

Solution:



Given,

Dimension of plot = 200×150

Width of road = 3m

$$\begin{aligned}
 \text{Total area required for houses} &= \text{Area of total plot} - \text{Area of three roads} \\
 &= 200 \times 150 - 3 (3 \times 200) \\
 &= 30000 - 1800 \\
 &= 28200 \text{ m}^2
 \end{aligned}$$

106. A room is 4.5 m long and 4 m wide. The floor of the room is to be covered with tiles of size 15 cm by 10 cm . Find the cost of covering the floor with tiles at the rate of rupees 4.50 per tile.

Solution:

Given,

Length of room = 4.5 m

Size of tiles = $15 \times 10\text{ cm}$

Width of room = 4m

$$\begin{aligned}
 \text{Area of room} &= 4.5 \times 4 \\
 &= 18 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of one tile} &= 15 \times 10 \\
 &= 150 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Number of tiles} &= \frac{\text{Area of room}}{\text{Area of 1 tile}} \\
 &= \frac{180000}{150} \\
 &= 1200
 \end{aligned}$$

Therefore,

$$\begin{aligned}
 \text{Cost of covering the floor with tiles} &= 4.5 \times 1200 \\
 &= \text{Rs. } 5400
 \end{aligned}$$

107. Find the total cost of wooden fencing around a circular garden of diameter 28 m, if 1m of fencing costs rupees 300.

Solution:

Given,

Diameter of circular garden = 28m

$$\begin{aligned}\text{Length of the fencing} &= \text{circumference of circle} \\ &= \pi d \\ &= \frac{22}{7} \times 28 \\ &= 88m\end{aligned}$$

$$\begin{aligned}\text{Total cost of fencing} &= 88 \times 300 \\ &= \text{Rs. } 26400\end{aligned}$$

108. Priyanka took a wire and bent it to form a circle of radius 14 cm. Then she bent it into a rectangle with one side 24 cm long. What is the length of the wire? Which figure encloses more area, the circle or the rectangle?

Solution:

Given,

Radius of circle = 14cm

Length of rectangle = 24cm

So,

$$\begin{aligned}\text{Length of the wire} &= \text{circumference of circle} \\ &= 2\pi r \\ &= 2 \times \frac{22}{7} \times 14 \\ &= 88m\end{aligned}$$

Let b be the width of rectangle.

Since, the wire is rebent in the form of rectangle

So,

Perimeter of rectangle = circumference of circle

$$2(24 + b) = 88$$

$$b = 20 \text{ cm}$$

$$\begin{aligned}\text{Area of circle} &= \pi r^2 \\ &= \frac{22}{7} \times 14 \times 14\end{aligned}$$

$$= 616 \text{ cm}^2$$

$$\begin{aligned}\text{Area of rectangle} &= 24 \times 20 \\ &= 480 \text{ cm}^2\end{aligned}$$

Therefore, the circle encloses more area than rectangle.

109. How much distance, in metres, a wheel of 25 cm radius will cover if it rotates 350 times?

Solution:

Given,

$$\begin{aligned}\text{Radius of wheel} &= 25\text{cm} \\ &= \frac{1}{4} \text{ m}\end{aligned}$$

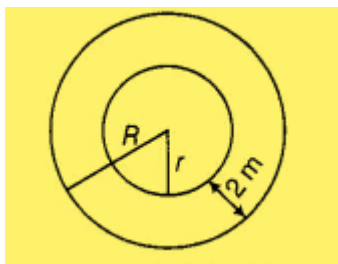
$$\begin{aligned}\text{Distance travelled in one rotation,} \\ &= 2\pi r \\ &= 2 \times \frac{22}{7} \times \frac{1}{4} \\ &= \frac{11}{7}\end{aligned}$$

Distance travelled in 350 rotations

Therefore, the wheel covers 550 m distance.

110. A circular pond is surrounded by a 2 m wide circular path. If outer circumference of circular path is 44 m, find the inner circumference of the circular path. Also find area of the path.

Solution:



Let R be radius of outer circle and r be radius of inner circle,
It has been given that 44 m is the circumference of outer circle,

$$2\pi R = 44m$$

$$R = \frac{44}{2 \times \frac{22}{7}}$$

$$R = 7m$$

Since,

$$r = R - 2$$

$$= 7 - 2$$

$$= 5m$$

$$2\pi r = 2 \times \frac{22}{7} \times 5$$

$$= 31.43m$$

Therefore,

Area of the path = area of outer circle – area of inner circle

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

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

$$= 75.43m^2$$

111. A carpet of size 5 m × 2 m has 25 cm wide red border. The inner part of the carpet is blue in colour (Fig. 9.56). Find the area of blue portion. What is the ratio of areas of red portion to blue portion?

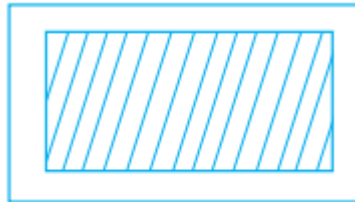
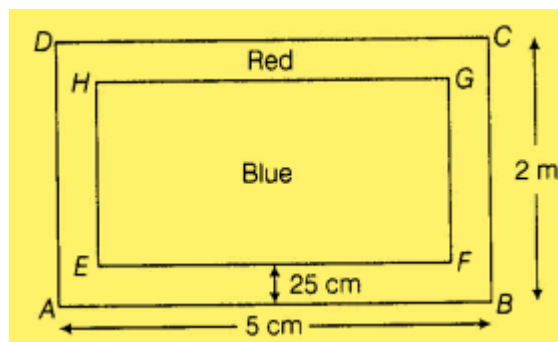


Fig. 9.56

Solution:



Given,

Size of carpet = 5 x 2

$$= 10 \text{ m}$$

$$\begin{aligned}\text{Width of border} &= 25\text{cm} \\ &= 0.25\text{m}\end{aligned}$$

$$\begin{aligned}\text{Area of carpet ABCD} &= AB \times BC \\ &= 5 \times 2 \\ &= 10 \text{ cm}^2\end{aligned}$$

Now,

length of inner blue portion,

$$\begin{aligned}EF &= AB (2 \times 0.25) \\ &= 5 - 0.50 \\ &= 4.5 \text{ m}\end{aligned}$$

Breadth of inner blue portion=

$$\begin{aligned}FG &= GC (2 \times 0.25) \\ &= 2 - 0.50 \\ &= 1.5 \text{ m}\end{aligned}$$

Area of blue portion = area of rectangle EFGH

$$\begin{aligned}&= EF \times FG \\ &= 4.5 \times 1.5 \\ &= 6.75 \text{ m}^2\end{aligned}$$

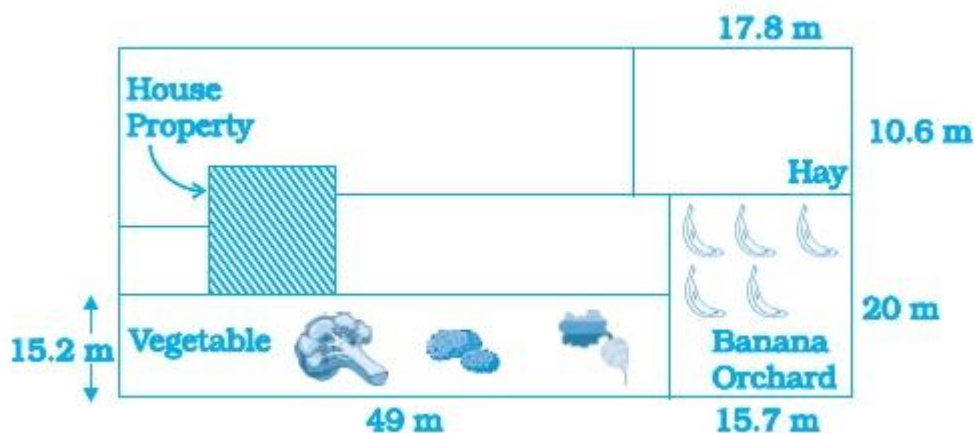
Now,

$$\begin{aligned}\text{Area of red portion} &= \text{area of rectangle ABCD} - \text{area of rectangle EFGH} \\ &= 10 - 6.75 \\ &= 3.25 \text{ m}^2\end{aligned}$$

Therefore,

$$\begin{aligned}\text{Ratio of area of red and blue portions} &= 3.25 : 6.75 \\ &= 13 : 27\end{aligned}$$

112. Use the Fig. 9.57 showing the layout of a farm house:



(a) What is the area of land used to grow hay?

(b) It costs rupees 91 per m^2 to fertilise the vegetable garden. What is the total cost?

(c) A fence is to be enclosed around the house. The dimensions of the house are 18.7 m × 12.6 m. At least how many metres of fencing are needed?

(d) Each banana tree required 1.25 m² of ground space. How many banana trees can there be in the orchard?

Solution:

(a) Area of land used to grow hay = 17.8×10.6
= 188.68 m²

(b) Area of vegetable garden = 49×15.2
= 744.80 m²

As,

Cost to fertilize 1 m² vegetable garden = Rs.91

Hence,

cost to fertilize 744.80 m² vegetable garden = $91 \times 744.80 \text{ m}^2$
= Rs. 67776.80

(c) Fence is of dimension around the house (18.7 × 12.6) around the house

Perimeter of the house = $2(l + b)$

Hence,

Total lengths of the fence = $2(18.7 + 12.6)$
= 2×31.3
= 62.6 m

(d) Area covered by banana orchard = 20×15.7
= 314 m²

As,

1.25 sq. area required by 1 banana tree.

So,

Number of bananas required to fill area of 314 m² = $\frac{314}{1.25}$
= 251 trees

113. Study the layout given below in Fig. 9.58 and answer the questions:

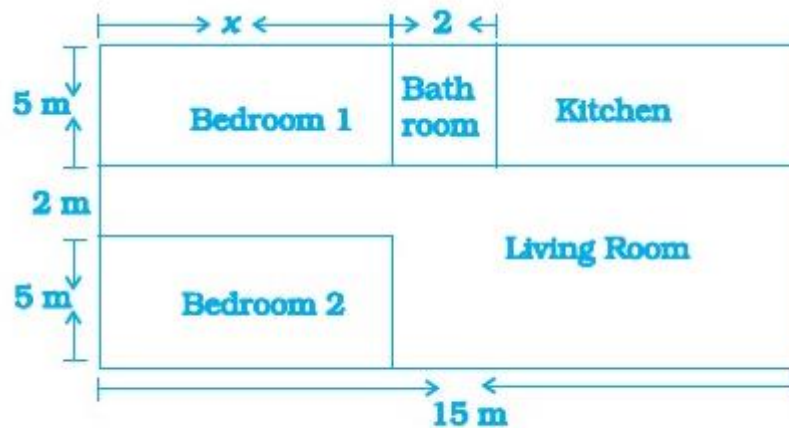


Fig. 9.58

- Write an expression for the total area covered by both the bedrooms and the kitchen.
- Write an expression to calculate the perimeter of the living room.
- If the cost of carpeting is rupees $50/\text{m}^2$, write an expression for calculating the total cost of carpeting both the bedrooms and the living room.
- If the cost of tiling is rupees $30/\text{m}^2$, write an expression for calculating the total cost of floor tiles used for the bathroom and kitchen floors.
- If the floor area of each bedroom is 35 m^2 , then find x .

Solution:

$$\begin{aligned}
 \text{(a) Area of both kitchen and bedrooms} &= 2 \text{ times of area of bedroom} + \text{area of kitchen} \\
 &= 2(5 \times x) + [15 - (x + 2)] \times 5 \\
 &= 10x + 75 - 5x - 10 \\
 &= (65 + 5x) \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) Perimeter of the living room} &= 15 + 2 + 5 + (15 - x) + 5 + x + 2 \\
 &= 44 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{(c) Total area of both living the room and the bedrooms} &= 5 \times x + 7 \times 15 \\
 &= (5x + 105) \text{ m}^2
 \end{aligned}$$

Therefore,

$$\begin{aligned}
 \text{Total cost of carpeting} &= (5x + 105) \times 50 \\
 &= 250 (x + 21) \text{ Rs.}
 \end{aligned}$$

$$\text{(d) Total area of bathroom and kitchen} = (15 - x) \times 5 \text{ m}^2$$

Therefore,

$$\begin{aligned}
 \text{Total cost of tiling} &= (15 - x) \times 5 \times 30 \\
 &= 150 (15 - x)
 \end{aligned}$$

(e) Given,

Area of floor of each bedroom = 35 m^2

Area of one bedroom = $5x \text{ m}^2$

Therefore,

$$5x = 35$$

$$x = 7$$

114. A 10 m long and 4 m wide rectangular lawn is in front of a house. Along its three sides a 50 cm wide flower bed is there as shown in Fig. 9.59. Find the area of the remaining portion.

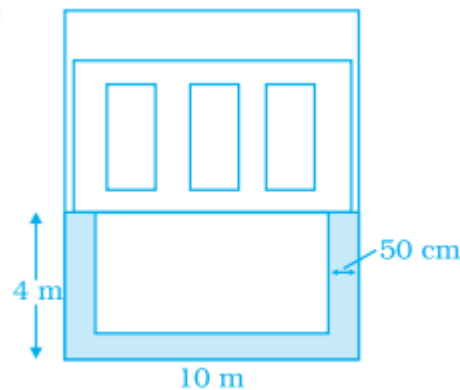
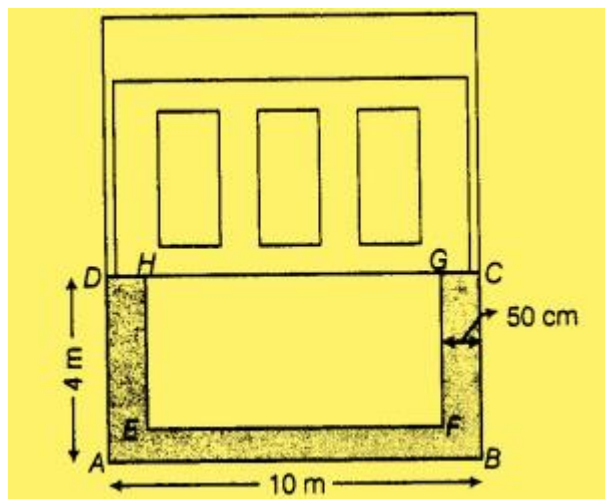


Fig. 9.59

Solution:



Given,

Dimension of rectangular lawn = $10 \times 4 \text{ m}$

Width of flowerbed = 50cm

Length of remaining portion,

$$EF = AB - (50 \times 2\text{cm})$$

$$= 10 - 100\text{cm}$$

$$= 10 - 1 \text{ m}$$

$$= 9 \text{ m}$$

Breadth of remaining region,

$$\begin{aligned} EH &= AD - 50\text{cm} \\ &= 4 - 0.5 \\ &= 3.5 \text{ m} \end{aligned}$$

Therefore,

$$\begin{aligned} \text{Required area} &= \text{area of EFGH} \\ &= EF \times EH \\ &= 9 \times 3.5 \\ &= 31.5 \text{ m}^2 \end{aligned}$$

115. A school playground is divided by a 2 m wide path which is parallel to the width of the playground, and a 3 m wide path which is parallel to the length of the ground (Fig. 9.60). If the length and width of the playground are 120 m and 80 m respectively, find the area of the remaining playground.

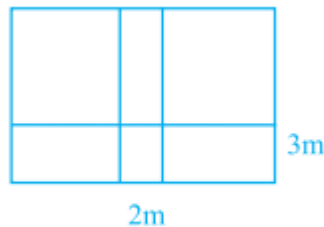
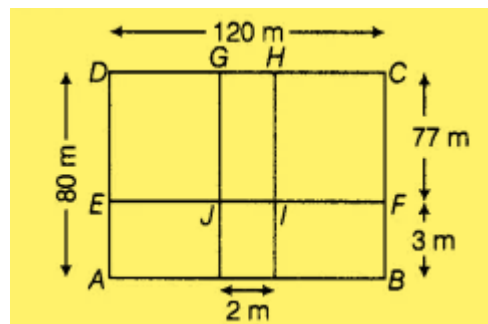


Fig. 9.60

Solution:



Given,

Dimension of playground = 120 x 80 m

$$\begin{aligned} \text{Area of rectangle ABCD} &= 120 \times 80 \\ &= 9600 \text{ m}^2 \end{aligned}$$

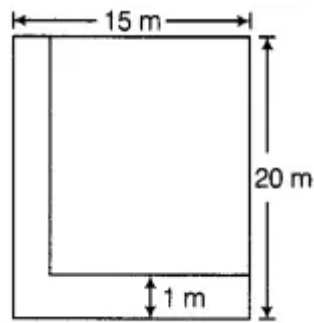
$$\begin{aligned} \text{Area of rectangle ABFE} &= AB \times BF \\ &= 120 \times 3 \\ &= 360 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of rectangle GHJI} &= JI \times IH \\ &= 2 \times 77 \\ &= 154 \text{ m}^2 \end{aligned}$$

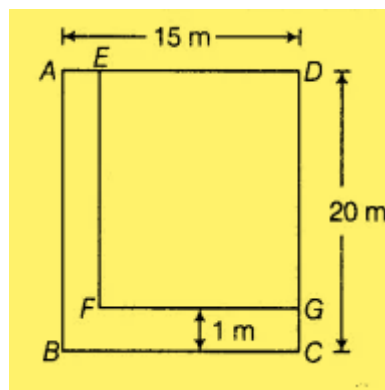
Area of Remaining ground rectangle GHJI,

$$\begin{aligned}
&= \text{Area of rectangle } ABCD - \text{Area of rectangle } ABFE - \text{Area of rectangle } GHJ \\
&= 9600 - 360 - 154 \\
&= 9086 \text{ m}^2
\end{aligned}$$

116. In a park of dimensions $20 \text{ m} \times 15 \text{ m}$, there is a L shaped 1 m wide flower bed as shown in Fig. 9.61. Find the total cost of maturing for the flower bed at the rate of Rs 45 per m^2 .



Solution:



Given,
Dimensions of a given park = $20 \times 15 \text{ m}$
Width of flowerbed = 1 m

From figure,

$$\begin{aligned}
FG &= BC - 1\text{m} \\
&= 15 - 1 \\
&= 14 \text{ m} \\
EF &= DC - 1 \\
&= 20 - 1 \\
&= 19 \text{ m}
\end{aligned}$$

Therefore,

$$\begin{aligned}
\text{Area of flowerbed} &= \text{Area of rectangle } ABCD - \text{Area of rectangle } EFGD \\
&= 20 \times 15 - 19 \times 14 \\
&= 34 \text{ m}^2
\end{aligned}$$

Rs. 45 is the cost for manuring of 1 square meter of flower bed.

Therefore,

$$\begin{aligned}\text{Cost of manuring of 34 square meters of flowerbed} &= 34 \times 45 \\ &= \text{Rs. } 1530\end{aligned}$$

117. Dimensions of a painting are 60 cm × 38 cm. Find the area of the wooden frame of width 6 cm around the painting as shown in Fig. 9.62.

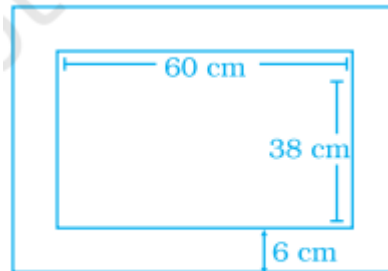


Fig. 9.62

Solution:

Given,

Length of inner rectangle = 60 cm

Breadth of inner rectangle = 38 cm

So,

$$\begin{aligned}\text{Area of inner rectangle} &= 60 \times 38 \\ &= 2280 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Length of outer rectangle} &= 38 + 6 + 6 \\ &= 50 \text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Breadth of outer rectangle} &= 60 + 6 + 6 \\ &= 72 \text{ cm}\end{aligned}$$

Now,

$$\begin{aligned}\text{Area of outer rectangle} &= 50 \times 72 \\ &= 3600 \text{ cm}^2\end{aligned}$$

Now,

$$\begin{aligned}\text{Area of wooden frame} &= 3600 - 2280 \\ &= 1320 \text{ cm}^2\end{aligned}$$

118. A design is made up of four congruent right triangles as shown in Fig. 9.63. Find the area of the shaded portion.

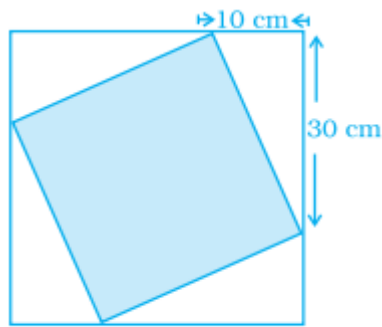
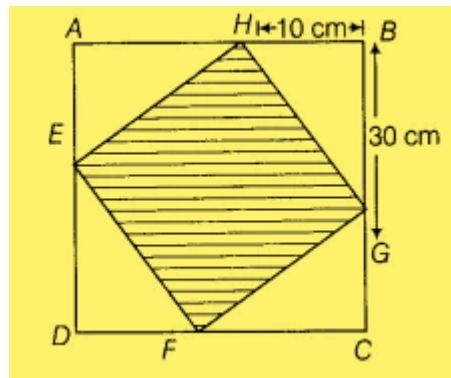


Fig. 9.63

Solution:



$$\begin{aligned}
 \text{Area of one right-angled triangle} &= \frac{1}{2} \times BA \times BG \\
 &= \frac{1}{2} \times 10 \times 30 \\
 &= 150 \text{ cm}^2
 \end{aligned}$$

So,

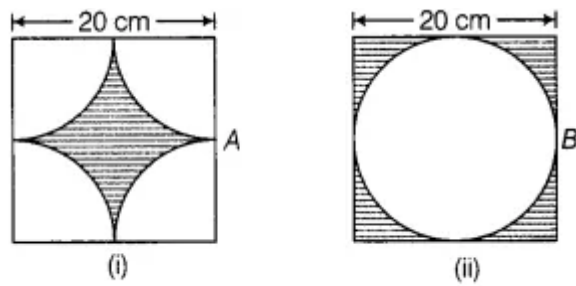
$$\begin{aligned}
 \text{Area of 4 right-angled triangles} &= 4 \times 150 \\
 &= 600 \text{ cm}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{Area of portion ABCD} &= (30 + 10)^2 \\
 &= 1600 \text{ cm}^2
 \end{aligned}$$

Therefore,

$$\begin{aligned}
 \text{Area of shaded portion} &= 1600 - 600 \\
 &= 1000 \text{ cm}^2
 \end{aligned}$$

119. A square tile of length 20 cm has four quarter circles at each corner as shown in Fig. 9.64(i). Find the area of shaded portion. Another tile with same dimensions has a circle in the centre of the tile [Fig. 9.64 (ii)]. If the circle touches all the four sides of the square tile, find the area of the shaded portion. In which tile, area of shaded portion will be more?



Solution:

i. Area of shaded portion = Area of square - 4 times of Area of quarter circle

$$\begin{aligned}
 &= 20 \times 20 - 4 \times \frac{\pi r^2}{4} \\
 &= 400 - \frac{22}{7} \times 10 \times 10 \\
 &= 86 \text{ cm}^2
 \end{aligned}$$

ii. Area of shaded portion = Area of square - Area of circle

$$\begin{aligned}
 &= 20 \times 20 - \pi r^2 \\
 &= 400 - \frac{22}{7} \times 10 \times 10 \\
 &= 86 \text{ cm}^2
 \end{aligned}$$

Therefore, both cases have equal areas.

120. A rectangular field is 48 m long and 12 m wide. How many right triangular flower beds can be laid in this field, if sides including the right angle measure 2 m and 4 m, respectively?

Solution:

Given,

Dimensions of field = 48 x 12 m

Dimension of right-angled triangle = 2 x 4 m

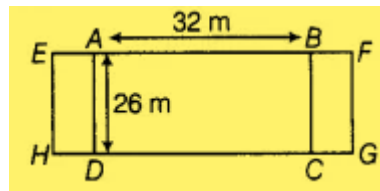
Therefore,

Number of right-angled triangular flowerbeds,

$$\begin{aligned}\text{Number of right-angled triangular flowerbeds} &= \frac{48 \times 12}{\frac{1}{2} \times 2 \times 4} \\ &= 114\end{aligned}$$

121. Ramesh grew wheat in a rectangular field that measured 32 metres long and 26 metres wide. This year he increased the area for wheat by increasing the length but not the width. He increased the area of the wheat field by 650 square metres. What is the length of the expanded wheat field?

Solution:



Given,

Dimensions of field = 32 x 26 m

Increased area = 650 sq meters

So,

Increased area of wheat field = Area of rectangle EFGH- Area of rectangle ABCD (wheat field)

$$650 = EF \times EH - AB \times AD$$

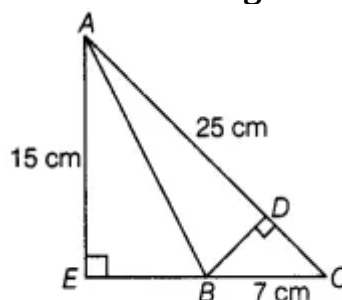
$$650 = EF \times 26 - 32 \times 26$$

$$EF = 57 \text{ m}$$

Therefore,

Increased length of wheat field is 57m.

122. In Fig. 9.65, triangle AEC is right-angled at E, B is a point on EC, BD is the altitude of triangle ABC, AC = 25 cm, BC = 7 cm and AE = 15 cm. Find the area of triangle ABC and the length of DB.



Solution:

Given,

$$AC = 25\text{cm},$$

$$AE = 15\text{cm},$$

$$BC = 7\text{cm}$$

Applying Pythagoras theorem in triangle AEC,

$$AC^2 = AE^2 + EC^2$$

$$EC^2 = 25^2 - 15^2$$

$$EC = 20\text{cm}$$

Now,

$$EB = EC - BC$$

$$= 20 - 7$$

$$= 13\text{cm}$$

Area of triangle AEC,

$$= \frac{1}{2} \times AE \times EC$$

$$= \frac{1}{2} \times 15 \times 20$$

$$= 150\text{cm}^2$$

Now,

Area of triangle AEB,

$$= \frac{1}{2} \times AE \times EB$$

$$= \frac{1}{2} \times 15 \times 13$$

$$= 97.5\text{cm}^2$$

Thus,

$$\text{Area of triangle ABC} = \text{Area of triangle AEC} - \text{Area of triangle AEB}$$

$$= 150 - 97.5$$

$$= 52.5 \text{ cm}^2$$

Now,

$$\text{Area of triangle ABC} = \frac{1}{2} \times BD \times AC$$

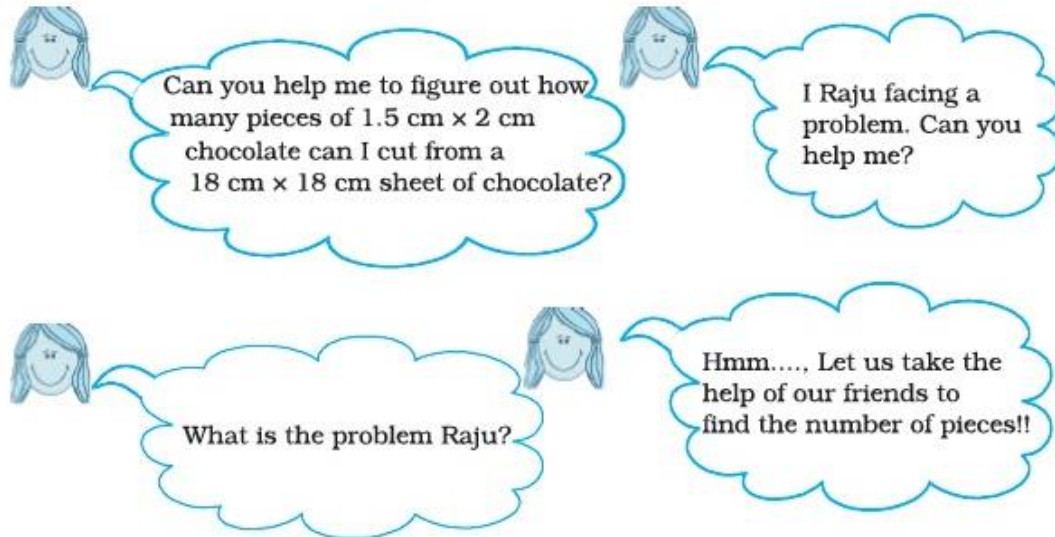
$$52 = \frac{1}{2} \times BD \times 25$$

$$BD = 4.2\text{cm}$$

Therefore,

52.5 cm^2 is the area of triangle ABC and length is 4.2 cm.

123.



Solution:

$$\begin{aligned} \text{Number of pieces of chocolate} &= \frac{18 \times 18}{1.5 \times 2} \\ &= \frac{324}{3} \\ &= 108 \end{aligned}$$

Therefore, number of pieces of chocolate are 108.

124. Calculate the area of shaded region in Fig. 9.66, where all of the short line segments are at right angles to each other and 1 cm long.

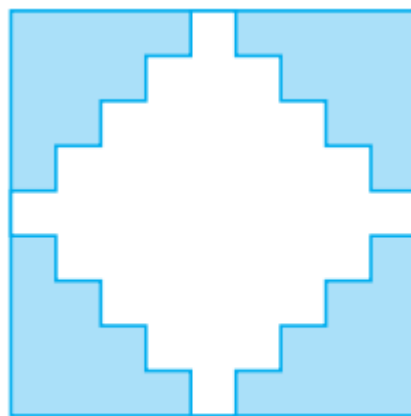
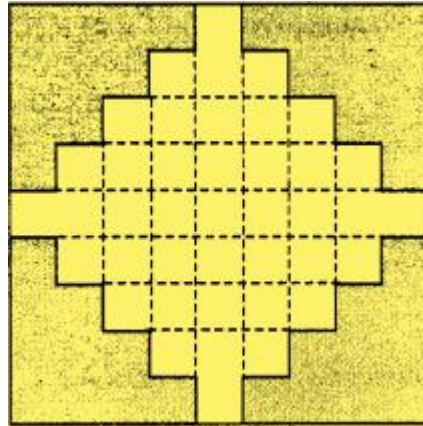


Fig. 9.66

Solution:



Length of the larger rectangle = 9 cm

Breadth of the larger rectangle = 9 cm

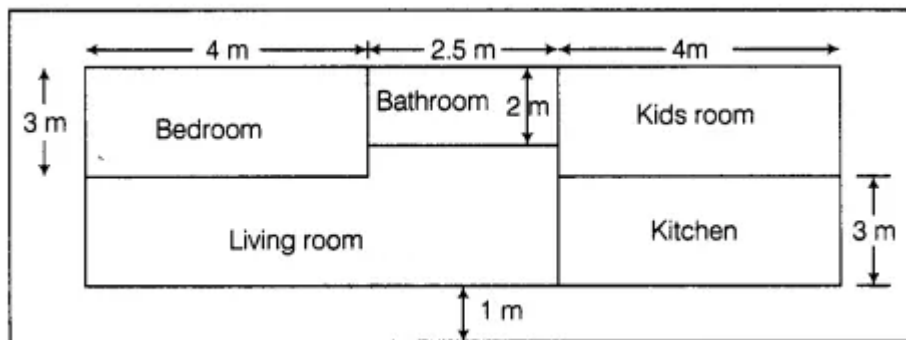
So,

$$\begin{aligned}\text{Area of shaded portion} &= \text{area of larger circle} - \text{Area of 41 small identical squares} \\ &= 9 \times 9 - 41 \times 1 \times 1 \\ &= 81 - 41 \\ &= 40 \text{ cm}^2\end{aligned}$$

Therefore,

Area of shaded portion is 40 cm^2 .

125. The plan and measurement for a house are given in Fig. 9.67. The house is surrounded by a path 1m wide.



Find the following:

(i) Cost of paving the path with bricks at rate of rupees 120 per m^2 .

(ii) Cost of wooden flooring inside the house except the bathroom at the cost of rupees 1200 per m^2 .

(iii) Area of Living Room.

Solution:

According to question,

(i)

$$\begin{aligned}\text{Area of path} &= \text{Area of rectangle PQRS} - \text{area of rectangle ADFH} \\ &= PQ \times QR - AD \times DF\end{aligned}\quad \dots(i)$$

Given,

$$PQ = (4 + 2.5 + 4 + 1 + 1) = 12.5$$

$$QR = (3 + 3 + 1 + 1) = 8$$

$$AD = (4 + 2.5 + 4) = 10.5$$

$$DF = (3 + 3) = 6$$

By putting these values in equation (i),

$$\begin{aligned}\text{Area of path} &= 12.5 \times 8 - 10.5 \times 6 \\ &= 37 \text{ m}^2\end{aligned}$$

Now,

$$\begin{aligned}\text{Cost of paving the path with bricks} &= \text{cost per unit m}^2 \times \text{total area of path} \\ &= 120 \times 37 \\ &= \text{Rs. 4440}\end{aligned}$$

$$\begin{aligned}\text{ii) Area of house except bathroom} &= \text{area of house} - \text{Area of bathroom} \\ &= \text{Area of rectangle ADFH} - \text{area of rectangle BCLK} \quad \dots(ii)\end{aligned}$$

Given,

$$\text{Area of rectangle ADFH} = 63 \text{ m}$$

$$\text{Area of rectangle BCLK} = 5 \text{ m}$$

By putting these values in equation (ii);

$$\begin{aligned}\text{Area of house except bathroom} &= 63 - 5 \\ &= 58 \text{ m}^2\end{aligned}$$

Now,

$$\begin{aligned}\text{The cost of flouring} &= \text{cost per unit m}^2 \times \text{Total area} \\ &= 1200 \times 58 \\ &= \text{Rs. 69600}\end{aligned}$$

$$\begin{aligned}\text{iii) Area of living room} &= \text{Area of rectangle ACGH} - \text{Area of rectangle ABJI} - \\ &\quad \text{Area of rectangle BCLK} \quad \dots (iii)\end{aligned}$$

Given,

$$\text{Area of rectangle ACGH} = 39,$$

$$\text{Area of rectangle ABJI} = 12$$

$$\text{Area of rectangle BCLK} = 5$$

By putting these values in equation (iii), we get

$$\begin{aligned}\text{Area of living room} &= 39 - 12 - 5 \\ &= 22 \text{ m}^2\end{aligned}$$

126. Architects design many types of buildings. They draw plans for houses, such as the plan shown in Fig. 9.68:

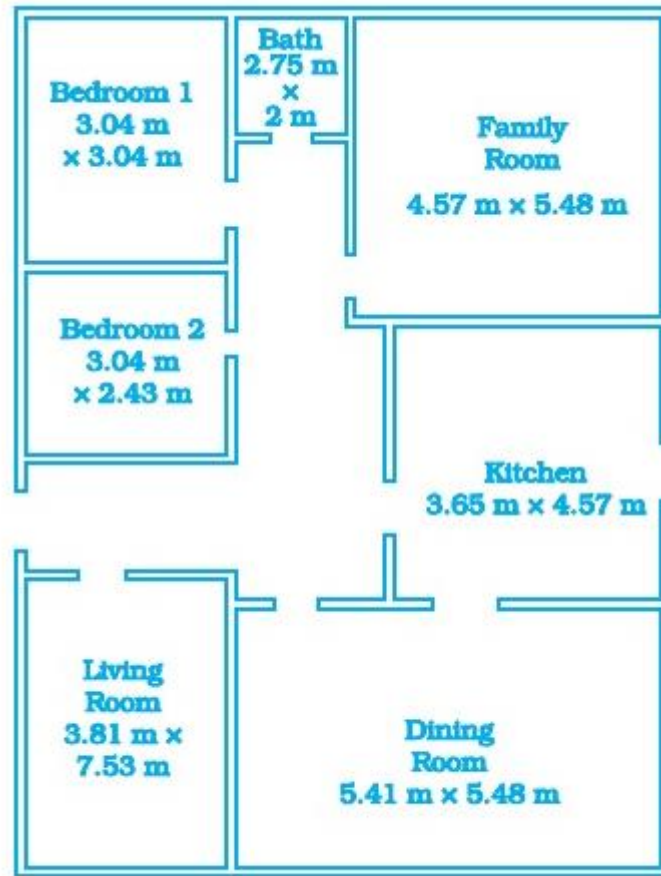


Fig. 9.68

An architect wants to install a decorative moulding around the ceilings in all the rooms. The decorative moulding costs rupees 500/metre.

(a) Find how much moulding will be needed for each room.

(i) family room (ii) living room (iii) dining room (iv) bedroom 1
(v) bedroom 2

(b) The carpet costs rupees 200/m². Find the cost of carpeting each room.

(c) What is the total cost of moulding for all the five rooms.

Solution:

According to question,

(a)

(i) Perimeter of family room = 2(length + breath)

Given,

length = 5.48 m

breadth = 4.57 m

By putting these values in above formula, we get

Perimeter = 2 x (5.48 + 4.57)

$$= 2 \times 10.05$$

$$= 20.10 \text{ m}$$

(ii) Perimeter of living room = $2(\text{length} + \text{breadth})$

Given,
length = 3.81 m
breadth = 7.53 m

By putting these values in above formula, we get
Perimeter = $2 \times (3.81 + 7.53)$
 $= 2 \times 11.34$
 $= 22.68 \text{ m}$

(iii) Perimeter of dining room = $2 (\text{length} + \text{breadth})$

Given,
length = 5.41 m
breadth = 5.48 m

By putting these values in above formula, we get
Perimeter = $2 \times (5.41 + 5.48)$
 $= 2 \times 10.89$
 $= 21.78 \text{ m}$

(iv) Perimeter of bedroom 1 = $2 (\text{length} + \text{breadth})$

Given,
length = 3.04 m
breadth = 3.04 m

By putting these values in above formula, we get
Perimeter = $2 \times (3.04 + 3.04)$
 $= 2 \times 6.08$
 $= 12.16 \text{ m}$

(v) Perimeter of bedroom 2 = $2 (\text{length} + \text{breadth})$

Given,
length = 3.04 m
breadth = 2.43 m

By putting these values in above formula, we get
Perimeter = $2 \times (3.04 + 2.43)$
 $= 2 \times 5.47$
 $= 10.94 \text{ m}$

(b) For bedroom 1,

Given,

length of bedroom 1 = 304 m

breadth of bedroom 1 = 304 m

$$\begin{aligned}\text{Area of bedroom 1} &= \text{Length} \times \text{Breadth} \\ &= 304 \times 304 \\ &= 9.2416 \text{ sq m}\end{aligned}$$

Cost of carpeting 1 sq m = Rs. 200

$$\begin{aligned}\text{Cost of carpeting } 9.2416 \text{ m}^2 &= 9.2416 \times 200 \\ &= \text{Rs}1848\end{aligned}$$

For bedroom 2,

Given,

length of bedroom 2 = 304 m

breadth of bedroom 2 = 2.43 m

$$\begin{aligned}\text{Area of bedroom 2} &= \text{Length} \times \text{Breadth} \\ &= 304 \times 2.43 \\ &= 7.3872 \text{ m}^2\end{aligned}$$

Cost of carpeting 1 m² = Rs. 200

$$\begin{aligned}\text{Cost of carpeting } 7.3872 \text{ m}^2 &= 7.3872 \times 200 \\ &= \text{Rs}1477\end{aligned}$$

For living room,

Given,

length of living room = 3.81 m

breadth of living room = 7.53 m

$$\begin{aligned}\text{Area of living room} &= 3.81 \times 7.53 \\ &= 28.6893 \text{ m}^2\end{aligned}$$

Cost of carpeting of living room 1 m² = Rs. 200

$$\begin{aligned}\text{Cost of carpeting } 28.6893 \text{ m}^2 &= \text{Rs. } 200 \times 28.6893 \\ &= \text{Rs. } 5737.86\end{aligned}$$

For dining room,

Given,

length of dining room = 5.41 m

breadth of dining room = 5.48 m

$$\begin{aligned}\text{Area of dining room} &= 5.41 \times 5.48 \\ &= 29.6468 \text{ m}^2\end{aligned}$$

Cost of carpeting 1 m² = Rs. 200

$$\begin{aligned}\text{Cost of carpeting } 29.6468 \text{ m}^2 &= 29.6468 \times 200 \\ &= \text{Rs } 5929.36\end{aligned}$$

For family room,

Given,

length of family room = 4.57 m

Breadth of family room = 5.48 m

$$\begin{aligned}\text{Area of family room} &= 5.48 \times 4.57 \\ &= 5.0436 \text{ m}^2\end{aligned}$$

Therefore,

$$\begin{aligned}\text{Cost of carpeting family room} &= 5.0436 \times 200 \\ &= \text{Rs. } 5008.72\end{aligned}$$

(c) Total perimeter of all the five rooms,

$$\begin{aligned}&= 20.10 \text{ m} + 22.68 \text{ m} + 21.78 \text{ m} + 12.16 \text{ m} + 10.94 \text{ m} \\ &= 87.66 \text{ m}\end{aligned}$$

Given, cost of moulding each room = Rs. 500 per m

Now,

$$\begin{aligned}\text{Total cost of moulding all 5 rooms} &= 87.66 \times 500 \\ &= \text{Rs. } 43830\end{aligned}$$

127. ABCD is a given rectangle with length as 80 cm and breadth as 60 cm. P, Q, R, S are the mid points of sides AB, BC, CD, DA respectively. A circular rangoli of radius 10 cm is drawn at the centre as shown in Fig. 9.69. Find the area of shaded portion.

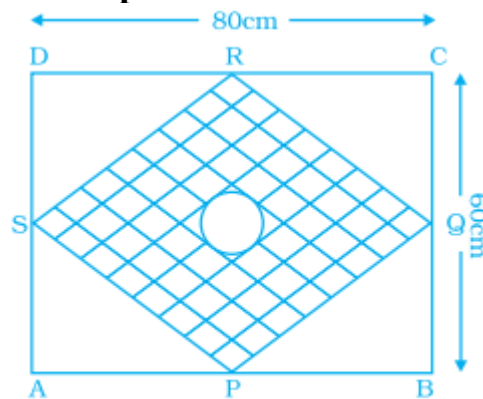


Fig. 9.69

Solution:

$$\begin{aligned}AP &= \frac{1}{2} AB \\ &= \frac{1}{2} \times 80 \\ &= 40 \text{ cm}\end{aligned}$$

and,

$$\begin{aligned} AS &= \frac{1}{2} AD \\ &= \frac{1}{2} \times 60 \\ &= 30 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Area of triangle APS} &= \frac{1}{2} \times AP \times AS \\ &= \frac{1}{2} \times 40 \times 30 \\ &= 600 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of portion PQRS} &= \text{Area of rectangle ABCD} - 4 \text{ times of triangle APS} \\ &= 80 \times 60 - 4 \times 600 \\ &= 48000 - 2400 \\ &= 2400 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of circular rangoli} &= \pi \times (10)^2 \\ &= 314 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of shaded portion} &= 2400 - 314 \\ &= 2086 \text{ cm}^2 \end{aligned}$$

128. 4 squares each of side 10 cm have been cut from each corner of a rectangular sheet of paper of size 100 cm × 80 cm. From the remaining piece of paper, an isosceles right triangle is removed whose equal sides are each of 10 cm length. Find the area of the remaining part of the paper.

Solution:

$$\text{Area of each square} = 100 \text{ cm}^2$$

$$\begin{aligned} \text{Area of rectangular sheet} &= 100 \times 80 \text{ cm}^2 \\ &= 8000 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of an isosceles right triangle} &= \frac{1}{2} \times 10 \times 10 \\ &= 50 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of remaining part of paper} &= 8000 - 4 \times 100 - 50 \\ &= 7550 \text{ cm}^2 \end{aligned}$$

129. A dinner plate is in the form of a circle. A circular region encloses a beautiful design as shown in Fig. 9.70. The inner circumference is 352 mm and outer is 396 mm. Find the width of circular design.

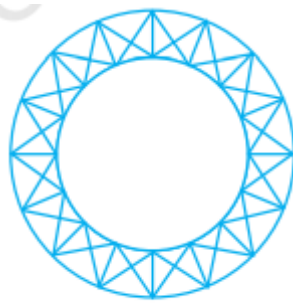


Fig. 9.70

Solution:

Let R be radius of outer circle and r be radius of inner circle.

Also,

It has been given that 352 mm is the circumference of inner circle,

$$2\pi r = 352\text{mm}$$

$$\begin{aligned} r &= \frac{352 \times 7}{22 \times 2} \\ &= \frac{2464}{44} \\ &= 56\text{mm} \end{aligned}$$

And,

396 mm is the circumference of outer circle,

$$2\pi R = 396\text{mm}$$

$$\begin{aligned} R &= \frac{396 \times 7}{22 \times 2} \\ &= 63\text{mm} \end{aligned}$$

Therefore,

$$\begin{aligned} \text{Width of circular design} &= R - r \\ &= 63 - 56 \\ &= 7\text{mm} \end{aligned}$$

130. The moon is about 384000 km from earth and its path around the earth is nearly circular. Find the length of path described by moon in one complete revolution.

Solution:

$$\begin{aligned} \text{Length of path described by moon in one complete revolution} &= 2\pi r \\ &= 2 \times 3.14 \times 384000 \end{aligned}$$

$$= 2411520 \text{ km}$$

131. A photograph of Billiard/Snooker table has dimensions as 1/10 th of its actual size as shown in Fig. 9.71:

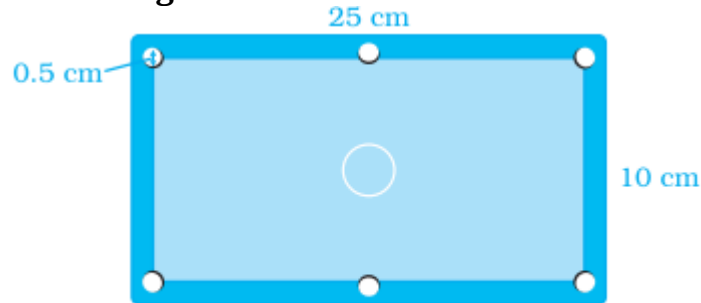


Fig. 9.71

The portion excluding six holes each of diameter 0.5 cm needs to be polished at rate of rupees 200 per m². Find the cost of polishing.

Solution:

$$\begin{aligned} \text{Actual breadth} &= 10 \times 10 \\ &= 100 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Actual length} &= 25 \times 10 \\ &= 250 \text{ cm} \end{aligned}$$

$$\begin{aligned} \text{Area of table} &= 250 \times 100 \\ &= 25000 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Radius on one hole} &= \frac{0.5}{2} \\ &= 0.25 \end{aligned}$$

$$\begin{aligned} \text{Area of 6 holes} &= 6\pi r^2 \\ &= 6 \times \frac{22}{7} \times (0.25)^2 \\ &= 1.28 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of excluding holes} &= 2500 - 1.18 \\ &= 24998.8 \text{ cm}^2 \end{aligned}$$

Therefore,

$$\begin{aligned} \text{Cost of polishing} &= \frac{24999}{10000} \times 200 \\ &= \text{Rs. 500} \end{aligned}$$