Mathematics

(Chapter – 11) (Perimeter and Area)

(Class – VII)

Exercise 11.1

Question 1:

The length and breadth of a rectangular piece of land are 500 m and 300 m respectively. Find:

(i) Its area.

(ii) The cost of the land, if 1 m^2 of the land costs ₹10,000.

Answer 1:

Given: Length of a rectangular piece of land = 500 m and
Breadth of a rectangular piece of land = 300 m

(i) Area of a rectangular piece of land = Length x Breadth
= 500 x 300
= 1,50,000 m^2

(ii) Since, the cost of 1 m^2 land = ₹10,000
Therefore, the cost of 1,50,000 m^2 land = 10,000 x 1,50,000
= ₹1,50,00,00,000

Question 2:

Find the area of a square park whose perimeter is 320 m.

Answer 2:

Given: Perimeter of square park = 320 m

$\Rightarrow$ 4 x side = 320

$\Rightarrow$ side = $\frac{320}{4}$ = 80 m

Now, Area of square park = side x side = 80 x 80 = 6400 m^2

Thus, the area of square park is 6400 m^2.

Question 3:

Find the breadth of a rectangular plot of land, if its area is 440 m^2 and the length is 22 m. Also find its perimeter.

Answer 3:

Area of rectangular park = 440 m^2

$\Rightarrow$ length x breadth = 440 m^2

$\Rightarrow$ 22 x breadth = 440

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$\Rightarrow$ breadth = $\frac{440}{22}$ = 20 m

Now, Perimeter of rectangular park = 2 (length + breadth)
= 2 (22 + 20)
= 2 x 42 = 84 m

Thus, the perimeter of rectangular park is 84 m.

Question 4:

The perimeter of a rectangular sheet is 100 cm. If the length is 35 cm, find its breadth. Also find the area.

Answer 4:

Perimeter of the rectangular sheet = 100 cm

$\Rightarrow$ 2 (length + breadth) = 100 cm

$\Rightarrow$ 2 (35 + breadth) = 100

$\Rightarrow$ 35 + breadth = $\frac{100}{2}$

$\Rightarrow$ 35 + breadth = 50

$\Rightarrow$ breadth = 50 – 35

$\Rightarrow$ breadth = 15 cm

Now, Area of rectangular sheet = length x breadth
= 35 x 15 = 525 cm^2

Thus, breadth and area of rectangular sheet are 15 cm and 525 cm^2 respectively.

Question 5:

The area of a square park is the same as of a rectangular park. If the side of the square park is 60 m and the length of the rectangular park is 90 cm, find the breadth of the rectangular park.

Answer 5:

Given: The side of the square park = 60 m

The length of the rectangular park = 90 m

According to the question,

Area of square park = Area of rectangular park

$\Rightarrow$ side x side = length x breadth

$\Rightarrow$ 60 x 60 = 90 x breadth

$\Rightarrow$ breadth = $\frac{60 \times 60}{90}$ = 40 m

Thus, the breadth of the rectangular park is 40 m.

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Question 6:

A wire is in the shape of a rectangle. Its length is 40 cm and breadth is 22 cm. If the same wire is rebent in the shape of a square, what will be the measure of each side. Also find which shape encloses more area?

Answer 6:

According to the question,

Perimeter of square = Perimeter of rectangle

$\Rightarrow$ 4 x side = 2 (length + breadth)

$\Rightarrow$ 4 x side = 2 (40 + 22)

$\Rightarrow$ 4 x side = 2 x 62

$\Rightarrow$ side = $\frac{2\times62}{4}$ = 31 cm

Thus, the side of the square is 31 cm.

Now, Area of rectangle = length x breadth = 40 x 22 = 880 cm^2

And Area of square = side x side = 31 x 31 = 961 cm^2

Therefore, on comparing, the area of square is greater than that of rectangle.

Question 7:

The perimeter of a rectangle is 130 cm. If the breadth of the rectangle is 30 cm, find its length. Also, find the area of the rectangle.

Answer 7:

Perimeter of rectangle = 130 cm

$\Rightarrow$ 2 (length + breadth) = 130 cm

$\Rightarrow$ 2 (length + 30) = 130

$\Rightarrow$ length + 30 = $\frac{130}{2}$

$\Rightarrow$ length + 30 = 65

$\Rightarrow$ length = 65 – 30 = 35 cm

Now area of rectangle = length x breadth = 35 x 30 = 1050 cm^2

Thus, the area of rectangle is 1050 cm^2.

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Question 8:

A door of length 2 m and breadth 1 m is fitted in a wall. The length of the wall is 4.5 m and the breadth is 3.6 m. Find the cost of white washing the wall, if the rate of white washing the wall is ₹ 20 per m^2.

Answer 8:

Area of rectangular door = length x breadth = 2 m x 1 m = 2 m^2

Area of wall including door = length x breadth = 4.5 m x 3.6 m = 16.2 m^2

Now, Area of wall excluding door

= Area of wall including door – Area of door

= 16.2 – 2 = 14.2 m^2

Since, The rate of white washing of 1 m^2 the wall = ₹20

Therefore, the rate of white washing of 14.2 m^2 the wall = 20 x 14.2

= ₹284

Thus, the cost of white washing the wall excluding the door is ₹284.

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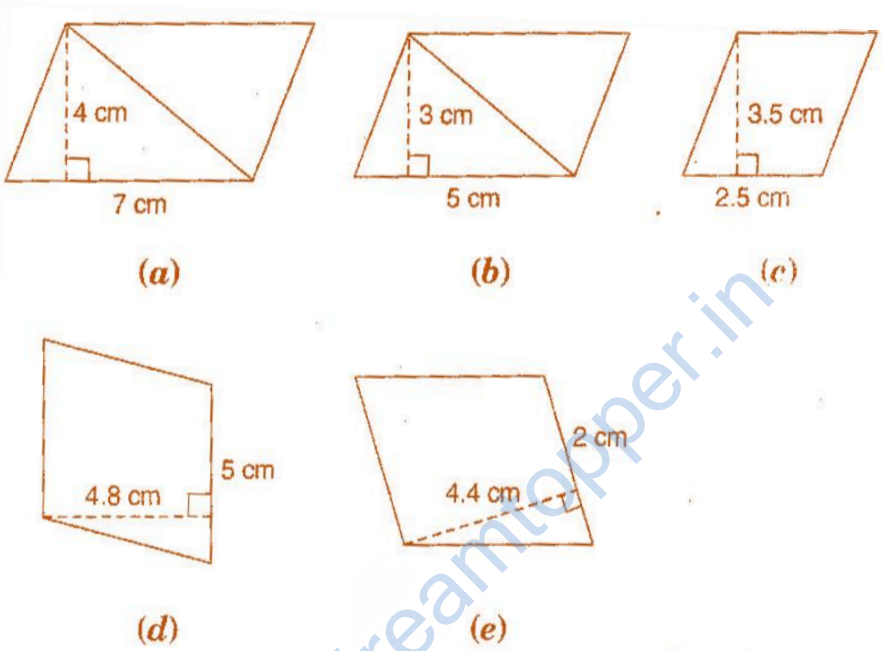
Exercise 11.2

Question 1:

Find the area of each of the following parallelograms:



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Answer 1:

We know that the area of parallelogram = base x height

(a) Here base = 7 cm and height = 4 cm

∴ Area of parallelogram = 7 x 4 = 28 cm^2

(b) Here base = 5 cm and height = 3 cm

∴ Area of parallelogram = 5 x 3 = 15 cm^2

(c) Here base = 2.5 cm and height = 3.5 cm

∴ Area of parallelogram = 2.5 x 3.5 = 8.75 cm^2

(d) Here base = 5 cm and height = 4.8 cm

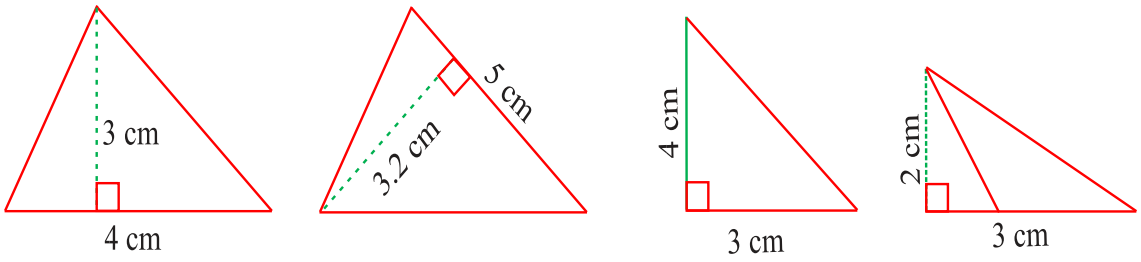
∴ Area of parallelogram = 5 x 4.8 = 24 cm^2

(e) Here base = 2 cm and height = 4.4 cm

∴ Area of parallelogram = 2 x 4.4 = 8.8 cm^2

Question 2:

Find the area of each of the following triangles:



(a) (b) (c) (d)

Answer 2:

We know that the area of triangle = $\frac{1}{2}$ x base x height

(a) Here, base = 4 cm and height = 3 cm

$\therefore$ Area of triangle = $\frac{1}{2}$ x 4 x 3 = 6 cm^2

(b) Here, base = 5 cm and height = 3.2 cm

$\therefore$ Area of triangle = $\frac{1}{2}$ x 5 x 3.2 = 8 cm^2

(c) Here, base = 3 cm and height = 4 cm

$\therefore$ Area of triangle = $\frac{1}{2}$ x 3 x 4 = 6 cm^2

(d) Here, base = 3 cm and height = 2 cm

$\therefore$ Area of triangle = $\frac{1}{2}$ x 3 x 2 = 3 cm^2

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Question 3:

Find the missing values:

S. No.	Base	Height	Area of the parallelogram
a.	20 cm		246 cm^2
b.		15 cm	154.5 cm^2
c.		84 cm	48.72 cm^2
d.	15.6 cm		16.38 cm^2

Answer 3:

We know that the area of parallelogram = base x height

(a) Here, base = 20 cm and area = 246 cm^2

$\therefore$ Area of parallelogram = base x height

$\Rightarrow$ 246 = 20 x height

$\Rightarrow$ height = $\frac{246}{20}$ = 12.3 cm

(b) Here, height = 15 cm and area = 154.5 cm^2

$\therefore$ Area of parallelogram = base x height

$\Rightarrow$ 154.5 = base x 15

$\Rightarrow$ base = $\frac{154.5}{15}$ = 10.3 cm

(c) Here, height = 8.4 cm and area = 48.72 cm^2

$\therefore$ Area of parallelogram = base x height

$\Rightarrow$ 48.72 = base x 8.4

$\Rightarrow$ base = $\frac{48.72}{8.4}$ = 5.8 cm

(d) Here, base = 15.6 cm and area = 16.38 cm^2

$\therefore$ Area of parallelogram = base x height

$\Rightarrow$ 16.38 = 15.6 x height

$\Rightarrow$ height = $\frac{16.38}{15.6}$ = 1.05 cm

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Thus, the missing values are:

S. No.	Base	Height	Area of the parallelogram
a.	20 cm	**12.3 cm**	246 cm^2
b.	**10.3 cm**	15 cm	154.5 cm^2
c.	**5.8 cm**	84 cm	48.72 cm^2
d.	15.6 cm	**1.05**	16.38 cm^2

Question 4:

Find the missing values:

Base	Height	Area of triangle
15 cm	-----	87 cm^2
-----	31.4 mm	1256 mm^2
22 cm	-----	170.5 cm^2

Answer 4:

We know that the area of triangle = $\frac{1}{2}$ x base x height

In first row, base = 15 cm and area = 87 cm^2

$\therefore$ $87 = \frac{1}{2} \times 15 \times \text{height}$

$\Rightarrow$ $\text{height} = \frac{87 \times 2}{15}$ 11.6 cm

In second row, height = 31.4 mm and area = 1256 mm^2

$\therefore$ $1256 = \frac{1}{2} \times \text{base} \times 31.4$

$\Rightarrow$ $\text{base} = \frac{1256 \times 2}{31.4}$ 80 mm

In third row, base = 22 cm and area = 170.5 cm^2

$\therefore$ $170.5 = \frac{1}{2} \times 22 \times \text{height}$

$\Rightarrow$ $\text{height} = \frac{170.5 \times 2}{22}$ 15.5 cm

Thus, the missing values are:

Base	Height	Area of triangle
15 cm	**11.6 cm**	87 cm^2
80 mm	31.4 mm	1256 mm^2
22 cm	**15.5 cm**	170.5 cm^2

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Question 5:

PQRS is a parallelogram (Fig 11.23). QM is the height from Q to SR and QN is the height from Q to PS. If SR = 12 cm and QM = 7.6 cm. Find:

(a) the area of the parallelogram PRS

(b) QN, if PS = 8 cm

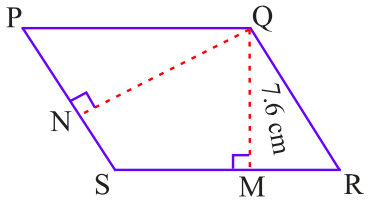

Fig 11.23

Answer 5:

Given: SR = 12 cm, QM= 7.6 cm, PS = 8 cm.

(a) Area of parallelogram = base x height

= 12 x 7.6 = 91.2 cm^2

(b) Area of parallelogram = base x height

$\Rightarrow$ 91.2 = 8 x QN

$\Rightarrow$ $QN = \frac{91.2}{8} = 11.4$ cm

Question 6:

DL and BM are the heights on sides AB and AD respectively of parallelogram ABCD (Fig 11.24). If the area of the parallelogram is 1470 cm^2, AB = 35 cm and AD = 49 cm, find the length of BM and DL.

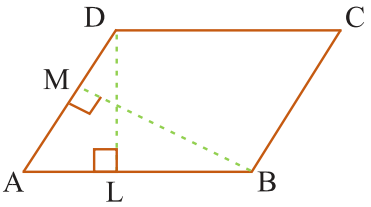

Fig 11.24

Answer 6:

Given: Area of parallelogram = 1470 cm^2

Base (AB) = 35 cm and base (AD) = 49 cm

Since Area of parallelogram = base x height

$\Rightarrow$ 1470 = 35 x DL

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$\Rightarrow$ DL = $\frac{1470}{35}$

$\Rightarrow$ DL = 42 cm

Again, Area of parallelogram = base x height

$\Rightarrow$ 1470 = 49 x BM

$\Rightarrow$ BM = $\frac{1470}{49}$

$\Rightarrow$ BM = 30 cm

Thus, the lengths of DL and BM are 42 cm and 30 cm respectively.

Question 7:

ΔABC is right angled at A (Fig 11.25). AD is perpendicular to BC. If AB = 5 cm, BC = 13 cm and AC = 12 cm, find the area of ΔABC. Also, find the length of AD.

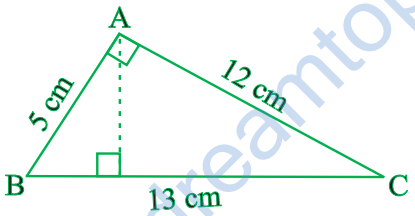

Fig 11.25

Answer 7:

In right angles triangle BAC, AB = 5 cm and AC = 12 cm

Area of triangle = $\frac{1}{2}$ x base x height = $\frac{1}{2}$ x AB x AC

= $\frac{1}{2}$ x 5 x 12 = 30 cm^2

Now, in ΔABC,

Area of triangle ABC = $\frac{1}{2}$ x BC x AD

$\Rightarrow$ 30 = $\frac{1}{2}$ x 13 x AD

$\Rightarrow$ AD = $\frac{30\times 2}{13}$ = $\frac{60}{13}$ cm

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Question 8:

ΔABC is isosceles with AB = AC = 7.5 cm and BC = 9 cm (Fig 11.26). The height AD from A to BC, is 6 cm. Find the area of ΔABC. What will be the height from C to AB i.e., CE?

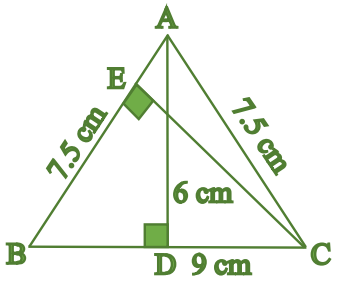

Fig 11.26

Answer 8:

In ΔABC, AD = 6 cm and BC = 9 cm

Area of triangle = $\frac{1}{2}$ x base x height = $\frac{1}{2}$ x BC x AD

= $\frac{1}{2}$ x 9 x 6 = 27 cm^2

Again, Area of triangle = $\frac{1}{2}$ x base x height = $\frac{1}{2}$ x AB x CE

$\Rightarrow$ $27 = \frac{1}{2} \times 7.5 \times CE$

$\Rightarrow$ $CE = \frac{27 \times 2}{7.5}$

$\Rightarrow$ CE = 7.2 cm

Thus, height from C to AB i.e., CE is 7.2 cm.

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Exercise 11.3

Question 1:

Find the circumference of the circles with the following radius: $\left(\text{Take } \pi = \frac{22}{7}\right)$

(a) 14 cm (b) 28 mm (c) 21 cm

Answer 1:

(a) Circumference of the circle = $2\pi r = 2 \times \frac{22}{7} \times 14 = 88$ cm

(b) Circumference of the circle = $2\pi r = 2 \times \frac{22}{7} \times 28 = 176$ mm

(c) Circumference of the circle = $2\pi r = 2 \times \frac{22}{7} \times 21 = 132$ cm

Question 2:

Find the area of the following circles, given that: $\left(\text{Take } \pi = \frac{22}{7}\right)$

(a) radius = 14 mm (b) diameter = 49 m (c) radius 5 cm

Answer 2:

(a) Area of circle = $\pi r^2 = \frac{22}{7} \times 14 \times 14$

= 22 x 2 x 14

= 616 mm^2

(b) Diameter = 49 m

$\therefore$ radius = $\frac{49}{2}$ = 24.5 m

$\therefore$ Area of circle = $\pi r^2 = \frac{22}{7} \times 24.5 \times 24.5$

= 22 x 3.5 x 24.5

= 1886.5 m^2

(c) Area of circle = $\pi r^2 = \frac{22}{7} \times 5 \times 5$

= $\frac{550}{7}$ cm^2

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Question 3:

If the circumference of a circular sheet is 154 m, find its radius. Also find the area of the sheet. $\left(\text{Take } \pi = \frac{22}{7}\right)$

Answer 3:

Circumference of the circular sheet = 154 m

$\Rightarrow \quad 2\pi r = 154$ m

$\Rightarrow \quad r = \frac{154}{2\pi}$

$\Rightarrow \quad r = \frac{154 \times 7}{2 \times 22} = 24.5$ m

Now Area of circular sheet = $\pi r^2 = \frac{22}{7} \times 24.5 \times 24.5$

$= 22 \times 3.5 \times 24.5 = 1886.5 \text{ m}^2$

Thus, the radius and area of circular sheet are 24.5 m and 1886.5 m^2 respectively.

Question 4:

A gardener wants to fence a circular garden of diameter 21 m. Find the length of the rope he needs to purchase, if he makes 2 rounds of fence. Also, find the costs of the rope, if it cost ₹4 per meter. $\left(\text{Take } \pi = \frac{22}{7}\right)$

Answer 4:

Diameter of the circular garden = 21 m

$\therefore$ Radius of the circular garden = $\frac{21}{2}$ m

Now Circumference of circular garden $= 2\pi r = 2 \times \frac{22}{7} \times \frac{21}{2}$

$= 22 \times 3 = 66$ m

The gardener makes 2 rounds of fence so the total length of the rope of fencing

$= 2 \times 2\pi r$

$= 2 \times 66 = 132$ m

Since, the cost of 1 meter rope = ₹ 4

Therefore, cost of 132 meter rope = 4 x 132 = ₹ 528

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Question 5:

From a circular sheet of radius 4 cm, a circle of radius 3 cm is removed. Find the area of the remaining sheet. $(\text{Take } \pi = 3.14)$

Answer 5:

Radius of circular sheet (R) = 4 cm and

radius of removed circle (r) = 3 cm

Area of remaining sheet

= Area of circular sheet – Area of removed circle

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

$= \pi\left(4^2 - 3^2\right) = \pi(16-9)$

= 3.14 x 7 = 21.98 cm^2

Thus, the area of remaining sheet is 21.98 cm^2.

Question 6:

Saima wants to put a lace on the edge of a circular table cover of diameter 1.5 m. Find the length of the lace required and also find its cost if one meter of the lace costs ₹15. $(\text{Take } \pi = 3.14)$

Answer 6:

Diameter of the circular table cover = 1.5 m

$\therefore$ Radius of the circular table cover = $\frac{1.5}{2}$ m

Circumference of circular table cover = $2\pi r$

$= 2 \times 3.14 \times \frac{1.5}{2}$

= 4.71 m

Therefore the length of required lace is 4.71 m.

Now the cost of 1 m lace = ₹ 15

Then the cost of 4.71 m lace = 15 x 4.71

= ₹ 70.65

Hence, the cost of 4.71 m lace is ₹ 70.65.

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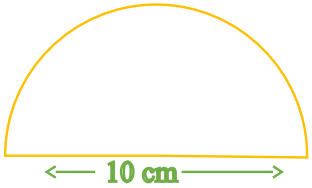
Question 7:

Find the perimeter of the adjoining figure, which is a semicircle including its diameter.



Answer 7:

Diameter = 10 cm

$\therefore$ Radius = $\frac{10}{2}$ = 5 cm

According to question,

Perimeter of figure = Circumference of semi-circle + diameter

$= \pi r + D$

$= \frac{22}{7} \times 5 + 10 = \frac{110}{7} + 10$

$= \frac{110+70}{7} = \frac{180}{7}$ = 25.71 cm

Thus, the perimeter of the given figure is 25.71 cm.

Question 8:

Find the cost of polishing a circular table-top of diameter 1.6 m, if the rate of polishing is ₹15/m^2. (Take π = 3.14)

Answer 8:

Diameter of the circular table top = 1.6 m

$\therefore$ Radius of the circular table top = $\frac{1.6}{2}$ = 0.8 m

Area of circular table top $= \pi r^2$

= 3.14 x 0.8 x 0.8

= 2.0096 m^2

Now cost of 1 m^2 polishing = ₹15

Then cost of 2.0096 m^2 polishing = 15 x 2.0096 = ₹ 30.14 (approx.)

Thus, the cost of polishing a circular table top is ₹ 30.14 (approx.)

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Question 9:

Shazli took a wire of length 44 cm and bent it into the shape of a circle. Find the radius of that circle. Also find its area. If the same wire is bent into the shape of a square, what will be the length of each of its sides? Which figure encloses more area, the circle or the square? $\left(\text{Take } \pi = \frac{22}{7}\right)$

Answer 9:

Total length of the wire = 44 cm

$\therefore$ the circumference of the circle = $2\pi r$ = 44 cm

$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 44$

$\Rightarrow \quad r = \frac{44 \times 7}{2 \times 22}$ = 7 cm

Now Area of the circle = πr^2

= $\frac{22}{7} \times 7 \times 7$ = 154 cm^2

Now the wire is converted into square.

Then perimeter of square = 44 cm

$\Rightarrow$ 4 x side = 44

$\Rightarrow$ side = $\frac{44}{4}$ = 11 cm

Now area of square = side x side = 11 x 11 = 121 cm^2

Therefore, on comparing, the area of circle is greater than that of square, so the circle enclosed more area.

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Question 10:

From a circular card sheet of radius 14 cm, two circles of radius 3.5 cm and a rectangle of length 3 cm and breadth 1 cm are removed (as shown in the adjoining figure). Find the area of the remaining sheet. $\left(\text{Take } \pi = \frac{22}{7}\right)$

Answer 10:

Radius of circular sheet (R) = 14 cm and Radius of smaller circle (r) = 3.5 cm

Length of rectangle (l) = 3 cm and breadth of rectangle (b) = 1 cm

According to question,

Area of remaining sheet=Area of circular sheet– (Area of two smaller circle + Area of rectangle)

$$= \pi R^2 - \left[2\left(\pi r^2\right) + (l \times b)\right]$$

$$= \frac{22}{7} \times 14 \times 14 - \left[\left(2 \times \frac{22}{7} \times 3.5 \times 3.5\right) - (3 \times 1)\right]$$

= 22 x 14 x 2 – [44 x 0.5 x 3.5 + 3]

= 616 – 80

= 536 cm^2

Therefore the area of remaining sheet is 536 cm^2.

Question 11:

A circle of radius 2 cm is cut out from a square piece of an aluminium sheet of side 6 cm. What is the area of the left over aluminium sheet? $(\text{Take } \pi = 3.14)$

Answer 11:

Radius of circle = 2 cm and side of aluminium square sheet = 6 cm

According to question,

Area of aluminium sheet left = Total area of aluminium sheet – Area of circle

= side x side - πr^2

= 6 x 6 – $\frac{22}{7}$ x 2 x 2

= 36 – 12.56

= 23.44 cm^2

Therefore, the area of aluminium sheet left is 23.44 cm^2.

Question 12:

The circumference of a circle is 31.4 cm. Find the radius and the area of the circle. $(\text{Take } \pi = 3.14)$

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Answer 12:

The circumference of the circle = 31.4 cm

$\Rightarrow \quad 2\pi r = 31.4$

$\Rightarrow \quad 2 \text{ x } 3.14 \text{ x } r = 31.4$

$\Rightarrow \quad r = \frac{31.4}{2 \times 3.14} = 5 \text{ cm}$

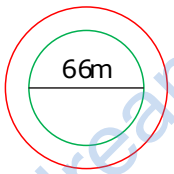
Then area of the circle = $\pi r^2 = 3.14 \text{ x } 5 \text{ x } 5$

$= 78.5 \text{ cm}^2$

Therefore, the radius and the area of the circle are 5 cm and 78.5 cm^2 respectively.

Question 13:

A circular flower bed is surrounded by a path 4 m wide. The diameter of the flower bed is 66 m. What is the area of this path? $(\text{Take } \pi = 3.14)$

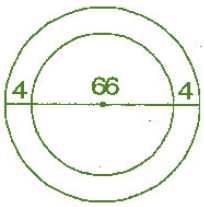


Answer 13:

Diameter of the circular flower bed = 66 m

$\therefore \quad$ Radius of circular flower bed $(r) = \frac{66}{2} = 33 \text{ m}$

$\therefore \quad$ Radius of circular flower bed with 4 m wide path (R) = 33 + 4 = 37 m



According to the question,

Area of path = Area of bigger circle – Area of smaller circle

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

$= \pi\left[(37)^2 - (33)^2\right]$

$= 3.14 \text{ [(37 + 33) (37 – 33)]} \qquad \left[\because a^2 - b^2 = (a+b)(a-b)\right]$

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= 3.14 x 70 x 4

= 879.20 m^2

Therefore, the area of the path is 879.20 m^2.

Question 14:

A circular flower garden has an area of 314 m^2. A sprinkler at the centre of the garden can cover an area that has a radius of 12 m. Will the sprinkler water the entire garden? (Take $\pi = 3.14$)

Answer 14:

Circular area by the sprinkler = πr^2

= 3.14 x 12 x 12

= 3.14 x 144

= 452.16 m^2

Area of the circular flower garden = 314 m^2

Since Area of circular flower garden is smaller than area by sprinkler.

Therefore, the sprinkler will water the entire garden.

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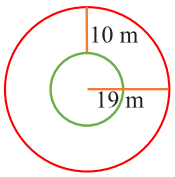
Question 15:

Find the circumference of the inner and the outer circles, shown in the adjoining figure. (Take $\pi = 3.14$)



Answer 15:

Radius of outer circle (r) = 19 m

$\therefore$ Circumference of outer circle = $2\pi r$ = 2 x 3.14 x 19

= 119.32 m

Now radius of inner circle (r') = 19 – 10 = 9 m

$\therefore$ Circumference of inner circle = $2\pi r'$ = 2 x 3.14 x 9

= 56.52 m

Therefore, the circumferences of inner and outer circles are 56.52 m and 119.32 m respectively.

Question 16:

How many times a wheel of radius 28 cm must rotate to go 352 m? $\left(\text{Take } \pi = \frac{22}{7}\right)$

Answer 16:

Let wheel must be rotate n times of its circumference.

Radius of wheel = 28 cm and Total distance = 352 m = 35200 cm

$\therefore$ Distance covered by wheel = n x circumference of wheel

$\Rightarrow \quad 35200 = n \times 2\pi r$

$\Rightarrow \quad 35200 = n \times 2 \times \frac{22}{7} \times 28$

$\Rightarrow \quad n = \frac{35200 \times 7}{2 \times 22 \times 28}$

$\Rightarrow \quad n$ = 200 revolutions

Thus, wheel must rotate 200 times to go 352 m.

Question 17:

The minute hand of a circular clock is 15 cm long. How far does the tip of the minute hand move in 1 hour? $(\text{Take } \pi = 3.14)$

Answer 17:

In 1 hour, minute hand completes one round means makes a circle.

Radius of the circle (r) = 15 cm

Circumference of circular clock = $2\pi r$

= 2 x 3.14 x 15

= 94.2 cm

Therefore, the tip of the minute hand moves 94.2 cm in 1 hour.

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Exercise 11.4

Question 1:

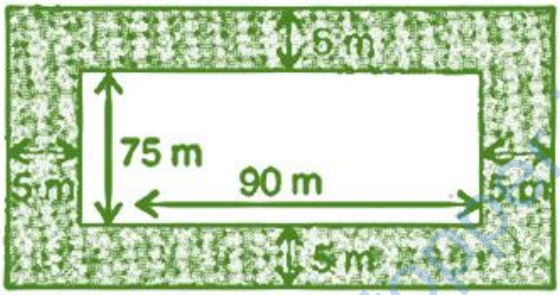
A garden is 90 m long and 75 m broad. A path 5 m wide is to be built outside and around it. Find the area of the path. Also find the area of the garden in hectares.

Answer 1:

Length of rectangular garden = 90 m and breadth of rectangular garden = 75 m

Outer length of rectangular garden with path = 90 + 5 + 5 = 100 m

Outer breadth of rectangular garden with path = 75 + 5 + 5 = 85 m



Outer area of rectangular garden with path = length x breadth = 100 x 85 = 8,500 m^2

Inner area of garden without path = length x breadth = 90 x 75 = 6,750 m^2

Now, Area of path = Area of garden with path – Area of garden without path

= 8,500 – 6,750

= 1,750 m^2

Since, $1\ m^2 = \frac{1}{10000}$ hectares

Therefore, $6{,}750\ m^2 = \frac{6750}{10000} = 0.675$ hectares

Question 2:

A 3 m wide path runs outside and around a rectangular park of length 125 m and breadth 65 m. Find the area of the path.

Answer 2:

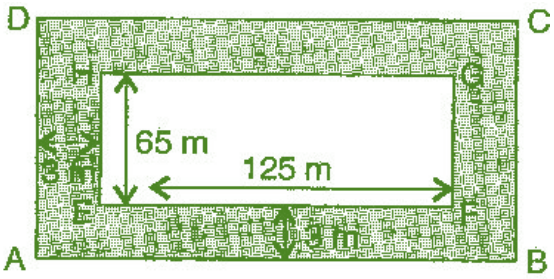
Length of rectangular park = 125 m,

Breadth of rectangular park = 65 m and

Width of the path = 3 m

Length of rectangular park with path = 125 + 3 + 3 = 131 m

Breadth of rectangular park with path = 65 + 3 + 3 = 71 m



∴ Area of path = Area of park with path – Area of park without path

= (AB x AD) – (EF x EH)

= (131 x 71) – (125 x 65)

= 9301 – 8125

= 1,176 m^2

Thus, area of path around the park is 1,176 m^2.

Question 3:

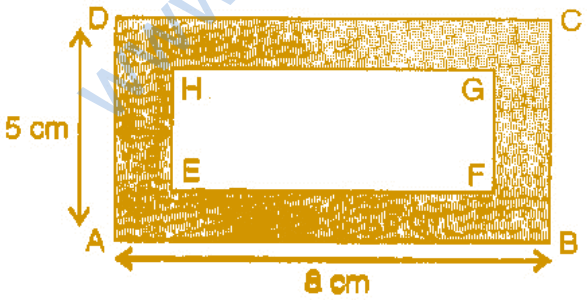
A picture is painted on a cardboard 8 cm long and 5 cm wide such that there is a margin of 1.5 cm along each of its sides. Find the total area of the margin.

Answer 3:

Length of painted cardboard = 8 cm and breadth of painted card = 5 cm

Since, there is a margin of 1.5 cm long from each of its side.

Therefore reduced length = 8 – (1.5 + 1.5) = 8 – 3 = 5 cm



And reduced breadth = 5 – (1.5 + 1.5) = 5 – 3 = 2 cm

∴ Area of margin = Area of cardboard (ABCD) – Area of cardboard (EFGH)

= (AB x AD) – (EF x EH)

= (8 x 5) – (5 x 2)

= 40 – 10

= 30 cm^2

Thus, the total area of margin is 30 cm^2.

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Question 4:

A *verandah* of width 2.25 m is constructed all along outside a room which is 5.5 m long and 4 m wide. Find:

(i) the area of the *verandah*.

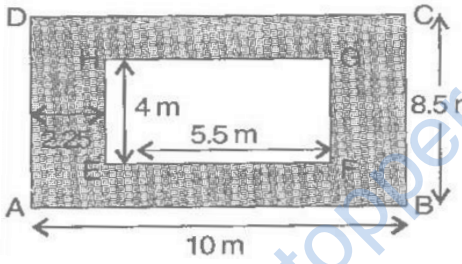
(ii) the cost of cementing the floor of the *verandah* at the rate of ₹200 per m^2.

Answer 4:

(i) The length of room = 5.5 m and width of the room = 4 m

The length of room with verandah = 5.5 + 2.25 + 2.25 = 10 m

The width of room with verandah = 4 + 2.25 + 2.25 = 8.5 m



Area of verandah

= Area of room with verandah – Area of room without verandah

= Area of ABCD – Area of EFGH

= (AB x AD) – (EF x EH)

= (10 x 8.5) – (5.5 x 4)

= 85 – 22

= 63 m^2

(ii) The cost of cementing 1 m^2 the floor of verandah = ₹ 200

The cost of cementing 63 m^2 the floor of verandah = 200 x 63 = ₹12,600

Question 5:

A path 1 m wide is built along the border and inside a square garden of side 30 m. Find:

(i) the area of the path.

(ii) the cost of planting grass in the remaining portion of the garden at the rate of ₹ 40 per m^2.

Answer 5:

(i) Side of the square garden = 30 m and

Width of the path along the border = 1 m

Side of square garden without path = 30 – (1 + 1) = 30 – 2 = 28 m

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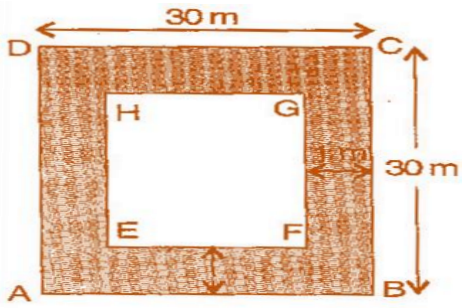
Now Area of path = Area of ABCD – Area of EFGH
= (AB x AD) – (EF x EH)
= (30 x 30) – (28 x 28)
= 900 – 784
= 116 m^2



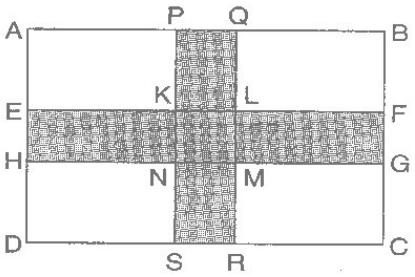
(ii) Area of remaining portion = 28 x 28 = 784 m^2
The cost of planting grass in 1 m^2 of the garden = ₹ 40
The cost of planting grass in 784 m^2 of the garden = ₹40 x 784 = ₹ 31,360

Question 6:

Two cross roads, each of width 10 m, cut at right angles through the centre of a rectangular park of length 700 m and breadth 300 m and parallel to its sides. Find the area of the roads. Also find the area of the park excluding cross roads. Give the answer in hectares.

Answer 6:

Here, PQ = 10 m and PS = 300 m, EH = 10 m and EF = 700 m
And KL = 10 m and KN = 10 m



Area of roads = Area of PQRS + Area of EFGH – Area of KLMN
[∵ KLMN is taken twice, which is to be subtracted]
= PS x PQ + EF x EH – KL x KN

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= (300 x 10) + (700 x 10) – (10 x 10)
= 3000 + 7000 – 100
= 9,900 m^2

Area of road in hectares, $1\ m^2 = \frac{1}{10000}$ hectares

$\therefore$ $9{,}900\ m^2 = \frac{9900}{10000} = 0.99$ hectares

Now, Area of park excluding cross roads
= Area of park – Area of road
= (AB x AD) – 9,900
= (700 x 300) – 9,900
= 2,10,000 – 9,900
= 2,00,100 m^2
= $\frac{200100}{10000}$ hectares = 20.01 hectares

Question 7:

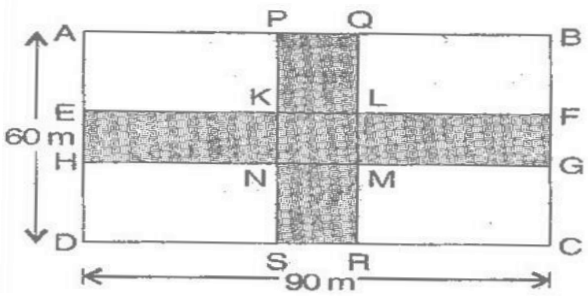
Through a rectangular field of length 90 m and breadth 60 m, two roads are constructed which are parallel to the sides and cut each other at right angles through the centre of the fields. If the width of each road is 3 m, find:

(i) the area covered by the roads.

(ii) the cost of constructing the roads at the rate of ₹110 per m^2.

Answer 7:

(i) Here, PQ = 3 m and PS = 60 m, EH = 3 m and
EF = 90 m and KL = 3 m and KN = 3 m



Area of roads = Area of PQRS + Area of EFGH – Area of KLMN
[$\because$ KLMN is taken twice, which is to be subtracted]
= PS x PQ + EF x EH – KL x KN

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= (60 x 3) + (90 x 3) – (3 x 3)
= 180 + 270 – 9
= 441 m^2

(ii) The cost of 1 m^2 constructing the roads = ₹110
The cost of 441 m^2 constructing the roads = ₹110 x 441 = ₹48,510
Therefore, the cost of constructing the roads = ₹48,510

Question 8:

Pragya wrapped a cord around a circular pipe of radius 4 cm (adjoining figure) and cut off the length required of the cord. Then she wrapped it around a square box of side 4 cm (also shown). Did she have any cord left? (Take $\pi = 3.14$)

Answer 8:

Radius of pipe = 4 cm
Wrapping cord around circular pipe = $2\pi r$
= 2 x 3.14 x 4 = 25.12 cm
Again, wrapping cord around a square = 4 x side
= 4 x 4 = 16 cm
Remaining cord = Cord wrapped on pipe – Cord wrapped on square
= 25.12 – 16
= 9.12 cm
Thus, she has left 9.12 cm cord.

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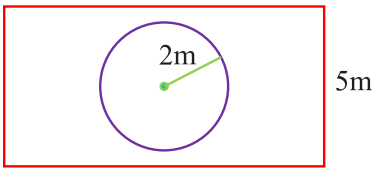
Question 9:

The adjoining figure represents a rectangular lawn with a circular flower bed in the middle. Find:



(i) the area of the whole land.
(ii) the area of the flower bed.
(iii) the area of the lawn excluding the area of the flower bed.
(iv) the circumference of the flower bed.

Answer 9:

Length of rectangular lawn = 10 m,
breadth of the rectangular lawn = 5 m
And radius of the circular flower bed = 2 m

(i) Area of the whole land = length x breadth
= 10 x 5 = 50 m^2

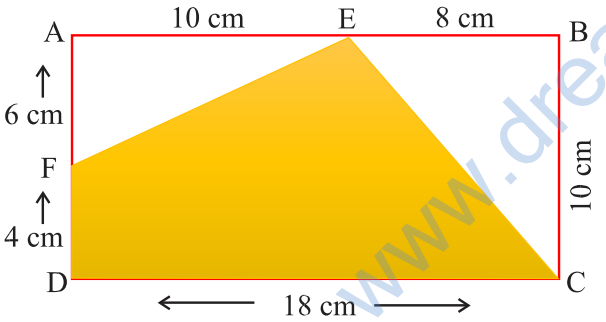
(ii) Area of flower bed = πr^2
= 3.14 x 2 x 2 = 12.56 m^2

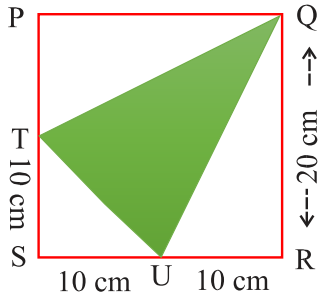
(iii) Area of lawn excluding the area of the flower bed
= area of lawn – area of flower bed
= 50 – 12.56
= 37.44 m^2

(iv) The circumference of the flower bed = $2\pi r$
= 2 x 3.14 x 2 = 12.56 m

Question 10:

In the following figures, find the area of the shaded portions:





Answer 10:

(i) Here, AB = 18 cm, BC = 10 cm, AF = 6 cm, AE = 10 cm and BE = 8 cm
Area of shaded portion
= Area of rectangle ABCD – (Area of ΔFAE + area of ΔEBC)

$= (AB \times BC) - (\frac{1}{2} \times AE \times AF + \frac{1}{2} \times BE \times BC)$

$= (18 \times 10) - (\frac{1}{2} \times 10 \times 6 + \frac{1}{2} \times 8 \times 10)$

= 180 – (30 + 40)
= 180 – 70
= 110 cm^2

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(ii) Here, SR = SU + UR = 10 + 10 = 20 cm, QR = 20 cm

PQ = SR = 20 cm, PT = PS – TS = 20 – 10 cm

TS = 10 cm, SU = 10 cm, QR = 20 cm and UR = 10 cm

Area of shaded region

= Area of square PQRS – Area of ΔQPT – Area of ΔTSU – Area of ΔUQR

$= (SR \times QR) - \frac{1}{2} \times PQ \times PT - \frac{1}{2} \times ST \times SU - \frac{1}{2}$

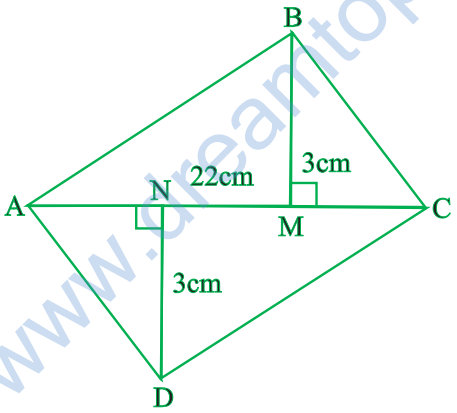
$= 20 \times 20 - \frac{1}{2} \times 20 \times 10 - \frac{1}{2} \times 10 \times 10 - \frac{1}{2} \times 20 \times 10$

= 400 – 100 – 50 – 100

= 150 cm^2

Question 11:

Find the area of the equilateral ABCD. Here, AC = 22 cm, BM = 3 cm, DN = 3 cm and BM $\perp$ AC, DN $\perp$ AC.



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Answer 11:

Here, AC = 22 cm, BM = 3 cm, DN = 3 cm

Area of quadrilateral ABCDF = Area of ΔABC + Area of ΔADC

$= \frac{1}{2} \times AC \times BM + \frac{1}{2} \times AC \times DN$

$= \frac{1}{2} \times 22 \times 3 + \frac{1}{2} \times 22 \times 3$

$= 3 \times 11 + 3 \times 11$

= 33 + 33

= 66 cm^2

Thus, the area of quadrilateral ABCD is cm^2.