

chapter-21 Mensuration-II

Exercise-21.1

Solution-2:

(i) 7cm.

Diameter of a circle = 7cm.

$$\begin{aligned}\text{Radius of a circle} &= \frac{\text{Diameter}}{2} \\ &= \frac{7\text{cm}}{2} \\ &= 3.5\text{cm}\end{aligned}$$

$$\text{circumference of a circle} = \pi D = \frac{22}{7} \times 7\text{cm} = 22\text{cm}.$$

(ii) Diameter of a circle = 4.2cm

$$\begin{aligned}\text{circumference of the circle} &= \pi D \text{ cm} \\ &= \frac{22}{7} \times 4.2 \text{ cm} \\ &= 13.2\text{cm}.\end{aligned}$$

(iii) Diameter of a circle = 11.2km

$$\begin{aligned}\text{circumference of the circle} &= \pi D \text{ km} \\ &= \frac{22}{7} \times 11.2 \text{ km} \\ &= 35.2\text{km}\end{aligned}$$

Solution-03:-

(i) It is Given that

$$\begin{aligned}\text{circumference of a circle} &= 2\pi r = 52.8\text{cm} \\ \Rightarrow r &= \frac{52.8}{2 \times 22} \times 7 \text{ cm} \\ \Rightarrow r &= 8.4\text{cm}.\end{aligned}$$

(ii) It is Given that,

$$\begin{aligned}\text{Circumference of a circle} &= 2\pi r = 42\text{cm} \\ \Rightarrow r &= \frac{42}{2\pi} = \frac{42}{2 \times 22} \times 7 \text{ cm} \\ \Rightarrow \text{radius} &= 6.68\text{cm}\end{aligned}$$

\therefore radius of a circle = 6.68cm.

(iii) we have,

$$\begin{aligned}\text{Circumference of a circle} &= 6.6\text{km} \\ \Rightarrow 2\pi r &= 6.6\text{km} \\ \Rightarrow r &= \frac{6.6}{2 \times 22} \times 7 \text{ km} \\ \Rightarrow r &= 1.05\text{km}.\end{aligned}$$

Solution-04:-

(i) We have,

Circumference of a circle = 12.56 cm = πD

$$\Rightarrow \pi D = 12.56 \text{ cm}$$

$$\Rightarrow \text{Diameter} = \frac{12.56}{2.2} \times 7 \text{ cm}$$

$$\Rightarrow \text{Diameter} = 3.99 \text{ cm.}$$

(ii) We have,

Circumference of a circle = 88 cm = πD

$$\Rightarrow \pi D = 88 \text{ m}$$

$$\Rightarrow \text{Diameter} = \frac{88}{2.2} \times 7 \text{ m}$$

$$\Rightarrow \text{Diameter} = 28 \text{ m.}$$

(iii) We have,

Circumference of a circle = 11.0 km = πD

$$\Rightarrow \pi D = 11.0 \text{ km}$$

$$\Rightarrow \text{Diameter} = \frac{11.0}{2.2} \times 7 \text{ km}$$

$$\Rightarrow \text{Diameter} = 3.5 \text{ km.}$$

\therefore Diameter of a circle = 3.5 km.

Solution-05:-

We have, ratio of radii = ~~3:2~~ 3:2

So, let the radii of two circles be $3r$ and $2r$ respectively.

Let C_1 and C_2 be the circumference of two circles radii $3r$ and $2r$ respectively. Then,

$$C_1 = 2\pi \times 3r = 6\pi r \text{ and } C_2 = 2\pi \times 2r = 4\pi r$$

$$\therefore \frac{C_1}{C_2} = \frac{6\pi r}{4\pi r} = \frac{3}{2}.$$

Solution-06:-

We have,

$$\text{Length of the wire} = 2(1+6) \text{ cm}$$

$$= (18.7 + 14.3) \text{ cm}$$

$$= 33 \text{ cm.}$$

Let the wire be bent into the form of a circle of radius r cm. Then,

$$\text{circumference} = 33 \text{ cm}$$

$$\Rightarrow 2\pi r = 33 \text{ cm}$$

$$\Rightarrow r = \frac{33}{2\pi} \text{ cm}$$

$$\Rightarrow r = \frac{33}{2 \times 2.2} \times 7 = \frac{31}{4} \text{ cm}$$

$$\Rightarrow \text{radius} = 5.25 \text{ cm.}$$

\therefore radius of a circle = 5.25 cm

Solution-07:-

We have,

$$\begin{aligned}\text{Length of the equilateral triangle} &= 6.6\text{cm} + 6.6\text{cm} + 6.6\text{cm} \\ &= 20.8\text{cm}.\end{aligned}$$

Let the wire be bent into the form of a circle of diameter D cm. Then

$$\text{Circumference} = 20.8\text{cm}$$

$$\Rightarrow 2\pi r = 20.8\text{cm}$$

$$\Rightarrow r = \frac{20.8}{2\pi} \times 7\text{cm}$$

$$\Rightarrow \text{Diameter} = 6.3\text{cm}$$

$$\text{Diameter of a circle} = 6.3\text{cm}.$$

Solution-08:-

We have,

$$\text{Diameter of a wheel of a car is } 98\text{cm}.$$

$$\text{Circumference of a circle} = \frac{22}{7} \times 98\text{cm}$$

$$= 22 \times 14\text{cm}$$

$$= 308\text{cm}$$

$$\begin{aligned}\text{The wheel makes 1000 revolutions} &= 1000 \times 308\text{cm} \\ &= 308000\text{cm}.\end{aligned}$$

\therefore The distance travelled by the car is 3080m.

Solution-09:-

The diameter of a wheel of a car is 98cm.

$$\text{Circumference of a circle} = \pi D\text{cm}$$

$$= \frac{22}{7} \times 98\text{cm}$$

$$= 22 \times 14\text{cm}$$

$$= 308\text{cm}$$

$$\text{Distance travelled by a wheel} = 6160\text{m}.$$

$$\text{One revolution distance} = C = 308\text{cm}$$

$$\text{Number of revolutions} = \frac{6160 \times 100\text{cm}}{308\text{cm}} \quad [\because 1\text{m} = 100\text{cm}]$$

$$= 2000\text{ revolutions}.$$

\therefore 2000 revolutions will it take to travel 6160 metres.

Solution-10:-

We know that

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

We have,

$$\text{radius} = 38400 \text{ km}$$

$$\begin{aligned}\text{Circumference (C)} &= 2\pi \times 38400 \\ &= 2 \times \frac{22}{7} \times 38400 \text{ km}\end{aligned}$$

$$\therefore \text{circumference} = 241622.857 \text{ km}.$$

Solution-11:-

Circular field of radius = 21m

John cycling at the speed = 8 km/hr

$$= \frac{8 \times 1000}{3600} \text{ s}$$

$$\begin{aligned}\text{Circumference } C &= 2\pi r = 2 \times \frac{22}{7} \times 21 \\ &= 2 \times 22 \times 3 \\ &= 132 \text{ m}.\end{aligned}$$

$$\begin{aligned}\text{Time} &= \frac{\text{Distance}}{\text{Speed}} = \frac{132 \times 3600}{8000} \\ &= \frac{132 \times 36}{80} \\ &= \frac{33 \times 18}{10} \\ &= 59.4 \text{ seconds}.\end{aligned}$$

Solution-12:-

Radius of hour hand = 4cm

minute hand = 6cm.

The distance travelled by their tips in 2 days.

= 2 [Circumference of hour hand in day + circumference of minute hand in one day]

$$= 2 \left[2 \times \frac{22}{7} \times 4 + 2 \times \frac{22}{7} \times 24 \times 6 \right]$$

$$= 2 \left(\frac{44}{7} \right) [4 + 144] = \frac{88}{7} [148] = 1910.8 \text{ cm}$$

The sum of the distances travelled by their tips in 2 days = 1910.8 cm

Solution-13:-

We have,

$$\text{side of a rhombus} = 2.2 \text{ m}.$$

$$\begin{aligned}\text{perimeter of a rhombus} &= 4(2.2 \text{ m}) \\ &= 8.8 \text{ m}\end{aligned}$$

In the given information

A rhombus has the same perimeter as the circumference of a circle.

We know that,

$$\text{Circumference of a circle} = 2\pi r = 8.8 \text{ m}$$

$$\Rightarrow r = \frac{8.8}{2 \times \pi} = \frac{8.8}{2 \times 22} \times 7$$

$$\Rightarrow r = 1.4 \text{ m}.$$

Solution-14:-

We have, Radius of a circle = 28 cm

$$\begin{aligned}\text{Circumference of a circle} &= 2 \times \frac{22}{7} \times 28 \text{ cm} \\ &= 8 \times 22 \text{ cm} \\ &= 176 \text{ cm.}\end{aligned}$$

Length of circle is bent into a form of the square.

Given,

Length of circle circumference = Square circumference.

$$176 \text{ cm} = 4(\text{side})$$

$$\text{side} = 44 \text{ cm.}$$

∴ Side of the square = 44 cm.

Solution-15:-

Number of Revolutions = 5,000.

Total distance travelled = 11 km.

$$\text{Number of Revolutions} = \frac{\text{Total distance travelled}}{\text{Distance travelled in one revolution}}$$

$$5000 = \frac{11 \text{ km}}{\text{Distance travelled in one revolution.}}$$

Distance travelled in one revolution = c

$$c = \frac{11,000}{5,000} = \frac{11}{5} \text{ m} \quad [∵ 1 \text{ km} = 1000 \text{ m}]$$

We know that

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

$$\frac{11}{5} \text{ m} = 2\pi r = \pi d$$

$$2 \times \text{Radius} = \frac{11}{5} \times \frac{7}{22}$$

$$\text{Diameter} = \frac{7}{10}$$

$$\text{Distance} = \frac{70}{10} \text{ m}$$

$$\text{Distance} = 70 \text{ cm} \quad [∵ 1 \text{ m} = 100 \text{ cm}]$$

Solution-16:-

We have,

Diameter of the wheel = 60 cm.

Circumference of the wheel = πd

$$= \frac{22}{7} \times 60 \text{ cm} = \frac{1320}{7} \text{ cm}$$

Wheels of cycle are making 140 revolutions per minute.

Travelling distance by cycle in one

$$\text{minute} = \frac{1320}{7} \text{ cm} \times 140 \text{ revolutions}$$

Distance travelled by the cycle in one hour

$$\text{Speed per hour} = \frac{1320}{7} \times \frac{20}{1} \times 60$$

$$= 132 \times 12 \times 1000$$

$$= 1584000 \text{ cm.}$$

$$= 15.84 \text{ km/hr}$$

∴ Speed per hour = 15.84 km/hr.

Solution-17:-

We have,

Diameter of the driving wheel of a bus is 140cm.

$$\text{Circumference of a bus} = \frac{22}{7} \times 140$$

$$= 22 \times 20$$

$$= 440 \text{ cm.}$$

Given, Speed Per hour = 66 km/hr

Speed Per hour = No. of revolutions \times Circumference of wheel.

$$\frac{66 \times 1000 \times 100}{60 \times 440} = \text{No. of revolutions per minute.}$$

$$\Rightarrow \text{Revolutions per minute} = \frac{1500}{6} = 250.$$

Solution-18:-

A water sprinkler in lawn

sprays radius = 7m.

Length of the outer edge of wet grass = $2\pi r$

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

$$= 44 \text{ m.}$$

$$\text{Length} = 44 \text{ m.}$$

Solution-19:-

Given,

Diameter of a well = 150cm

Radius of the well = $\frac{150}{2}$ cm

$$= 75 \text{ cm.}$$

Length of the outer edge of the parapet = 660cm

$$\Rightarrow \text{Circumference (C)} = 660 \text{ cm}$$

$$\Rightarrow C = 660 \text{ cm}$$

$$\Rightarrow 2\pi r = 660 \text{ cm}$$

$$\Rightarrow r = \frac{660}{2 \times 2} \times 7 \text{ cm}$$

$$\Rightarrow r = 105 \text{ cm.}$$

$$\Rightarrow \text{radius} = 105 \text{ cm.}$$

\therefore width of the parapet = radius of parapet edge - radius of well

$$= 105 \text{ cm} - 75 \text{ cm}$$

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

\therefore width of the parapet = 30cm.

Solution-20:-

Given, rope radius = 3m.

$$\begin{aligned}\text{Circumference of rope} &= 2\pi r \\ &= 2 \times \frac{22}{7} \times 3 \text{ m} \\ &= \frac{132}{7} \text{ m.}\end{aligned}$$

$$\text{distance covered in one round} = \frac{132}{7} \text{ m.}$$

$$\begin{aligned}\text{distance covered in 14 rounds} &= \frac{14 \times 132}{7} \text{ m} \\ &= 264 \text{ m}\end{aligned}$$

\therefore distance covered by ox in 14 rounds = 264m.

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chapter-21 Mensuration-II

Exercise-21.2

Solution-05:-

It is given that,

$$\text{circumference of a circle} = 3.14 \text{ m.}$$

$$\Rightarrow 2\pi r = 3.14$$

$$\Rightarrow \text{radius} = \frac{3.14}{2 \times \pi}$$

$$\Rightarrow \text{radius} = \frac{1}{2} \text{ m}$$

$$\Rightarrow \text{radius} = 0.5 \text{ m.}$$

We know that,

$$\begin{aligned} \text{Area of a circle} &= \pi r^2 \\ &= \frac{22}{7} \times 0.5 \times 0.5 \\ &= 0.785 \text{ m}^2 \end{aligned}$$

Solution-06:-

Given that,

$$\text{Area of a circle} = 50.24 \text{ m}^2$$

$$\Rightarrow \pi r^2 = 50.24 \text{ m}^2$$

$$\Rightarrow r = \sqrt{\frac{50.24}{\pi}} \text{ m}$$

$$\Rightarrow \text{Radius} = \sqrt{16} \text{ m} = 4 \text{ m.}$$

$$\begin{aligned} \text{Circumference of a circle} &= 2\pi r \\ &= 2 \times 3.14 \times 4 \\ &= 25.12 \text{ m} \end{aligned}$$

Solution-07:-

We have.

$$\text{Radius of a Long strip} = 28 \text{ m.}$$

We know that,

$$\begin{aligned} \text{Area of a circle} &= \pi r^2 \\ &= \frac{22}{7} \times 28 \times 28 \\ &= 22 \times 4 \times 28 \\ &= 2464 \text{ m}^2 \end{aligned}$$

Solution-09:-

We have,

Circumference of a circular park = 352 m

$$\Rightarrow 2\pi r = 352 \text{ m}$$

$$\Rightarrow r = \frac{352}{2\pi} \text{ m}$$

$$\Rightarrow r = \frac{352}{2 \times \frac{22}{7}} \times 1 \text{ m.}$$

$$\Rightarrow r = 56 \text{ m.}$$

Radius of park = 56 m.

Road wide = 7 m.

Radius of surrounded road with circular

park = 56 m + 7 m.

$$= 63 \text{ m.}$$

$$\text{Area of Road} = \pi \times (63)^2 - \pi (56)^2$$

$$= \frac{22}{7} \times 63 \times 63 - \frac{22}{7} \times 56 \times 56$$

$$= 22 [9 \times 63 - 8 \times 56]$$

$$= 22 [567 - 448]$$

$$= 22 [119]$$

$$= 2618$$

$$\text{Area of road} = 2618 \text{ m}^2$$

Solution-10:-

Radius of circular region = r

Radius of circular region including path = (r+h) m

Area of a circular path of

uniform width h = [Area of larger circle with radius (r+h)] - [Area of smaller circle with radius r]

$$= \pi (r+h)^2 - \pi r^2$$

$$= \pi [r^2 + h^2 + 2r \cdot h - r^2]$$

$$= \pi [h^2 + 2rh]$$

$$= \pi h [2r+h].$$

$$\therefore \text{required Area} = \pi h [2r+h].$$

Solution-11:-

we have,

perimeter of a circle = $4\pi r$ cm.

we know that,

$$\text{Perimeter of a circle} \Rightarrow 2\pi R = 4\pi r$$

$$\Rightarrow R = \frac{4\pi r}{2\pi}$$

$$\Rightarrow R = 2r.$$

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

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

$$= 4\pi r^2 \text{ cm}^2$$

$$\therefore \text{Area} = 4\pi r^2 \text{ cm}^2.$$

Solution-12:-

Let square be of side 's' and circle be of radius

length of wire = perimeter of square.
= perimeter of circle

$$\Rightarrow 5024 = 4s \quad \& \quad s = \frac{5024}{4}$$

$$\Rightarrow s = \frac{5024 \times 7}{2 \times 22} = 799.27 \quad \& \quad s = 1256.$$

$$\text{Area of square } A_1 = s^2 = (1256)^2$$

$$\begin{aligned} \text{Area of circle } A_2 &= \pi r^2 = \frac{22}{7} \times \frac{5024 \times 7}{22} \times \frac{5024 \times 7}{22} \\ &= \frac{(5024)^2 \times 7}{22} \end{aligned}$$

$$\frac{A_1}{A_2} = \frac{(1256)^2}{(5024)^2 \times \frac{7}{22}} = \frac{1}{16 \times 7}$$



Solution-13:-

Radius of a circle = 14 cm

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

$$= \frac{22}{7} \times 14 \times 14$$

$$= 22 \times 2 \times 14$$

$$= 22 \times 28$$

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

$$\text{Double Area of a circle} = 2 (616) \text{ cm}^2$$

$$= 1232 \text{ cm}^2$$

$$\therefore \text{Radius of a circle} = \sqrt{\frac{A}{\pi}}$$

$$= \sqrt{\frac{1232}{\pi}}$$

$$= \sqrt{\frac{1232 \times 7}{22}}$$

$$= \sqrt{56 \times 7}$$

$$= 14\sqrt{2} \text{ cm}$$

$$\therefore \text{Radius} = 14\sqrt{2} \text{ cm.}$$

Solution-14:-

Given,

Radius of first circular field = 20m

$$\begin{aligned} 1 \rightarrow \text{Area of a circular field} &= \frac{22}{7} \times 20 \times 20 \\ &= \frac{22}{7} \times 400 \text{ m}^2 \\ &= \frac{8800}{7} \text{ m}^2 \end{aligned}$$

Radius of second circular field = 48m

$$\begin{aligned} \text{Area of second circular field} &= \frac{22}{7} \times 48 \times 48 \\ &= \frac{50688}{7} \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of third circular field} &= \text{Area ①} + \text{Area ②} \\ &= \frac{8800}{7} + \frac{50688}{7} \\ &= \frac{51488}{7} \end{aligned}$$

$$\begin{aligned} \text{Radius of third circular field} &= \sqrt{\frac{A}{\pi}} \\ &= \sqrt{\frac{51488}{7} \times \frac{7}{22}} \\ &= \sqrt{(52)^2} \end{aligned}$$

\therefore Radius of third circular field = 52m.

Solution-15:-

Radius of first circular field = 5m.

Radius of second circular field = 13m.

$$\begin{aligned} \text{Area of a circular field} &= \pi r^2 \\ &= \frac{22}{7} \times 5 \times 5 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of 2}^{\text{nd}} \text{ circular field} &= \pi r^2 \\ &= \frac{22}{7} \times 13 \times 13 \text{ m}^2. \end{aligned}$$

$$\begin{aligned} \text{Area of 3}^{\text{rd}} \text{ circular field} &= \text{Area ②} - \text{Area ①} \\ &= \frac{22}{7} [13 \times 13 - 5 \times 5] \\ &= \frac{22}{7} [169 - 25] \\ &= \frac{22}{7} \times 144 \\ &= 3.14 \times 144. \end{aligned}$$

$$\begin{aligned} \text{Radius of a circle} &= \sqrt{\frac{A}{\pi}} \\ &= \sqrt{\frac{3.14 \times 144}{3.14}} = \sqrt{144} \\ &= 12 \text{ m} \end{aligned}$$

\therefore Radius of third circle = 12m.

Solution-16:-

We have,

Radius of first circle = R .

Diameter of ① circle = $2R$

Diameter of ② circle = $\frac{2}{3}D$

Diameter of ③ circle = $\frac{1}{3}D$

Area of ① circle = $\frac{\pi D^2}{4}$

Area of ② circle = $\frac{\pi (\frac{2}{3}D)^2}{4}$

Area of ③ circle = $\frac{\pi (\frac{1}{3}D)^2}{4}$

\therefore Area of shaded Region = Area ① - Area ② - Area ③

$$= \frac{\pi D^2}{4} - \frac{\pi D^2}{9} - \frac{\pi D^2}{36}$$

$$= \frac{9\pi D^2 - 4\pi D^2 - \pi D^2}{36}$$

$$= \frac{4\pi D^2}{36}$$

$$= \frac{\pi D^2}{9} \text{ cm}^2$$

$$\therefore \text{Area of shaded Region} = \frac{\pi \times 18 \times 18}{9} = 36\pi \text{ cm}^2$$

Solution-17:-

Radius of the quarter circular plot = 2 m .

$$\begin{aligned} \text{Area of quarter circular plot} &= \frac{\pi}{4} (2)^2 \\ &= \pi \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of the flower bed} &= \pi r^2 \\ &= \pi (2)^2 \quad [\because \text{radius of flower bed} = 2\text{m}] \\ &= 4\pi \end{aligned}$$

Area of the remaining field = Area of the Rectangular field - 4 x Area of quarter circular plot - Area of flower bed

$$\begin{aligned} \text{Area of rectangular field} &= 8 \times 6 \text{ m}^2 \\ &= 48 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of the Remaining field} &= 48 \text{ m}^2 - 4\pi \text{ m}^2 - 4\pi \text{ m}^2 \\ &= 48 \text{ m}^2 - 25.1327 \\ &= 22.86 \text{ m}^2 \end{aligned}$$

$$\therefore \text{Area of the Remaining field} = 22.86 \text{ m}^2.$$

Solution-18:-

Radius of a circle = 5cm.

Given that side of the square = 10cm

Required Area = Area of square ABCD - Area of
4 quadrants

$$= 10 \times 10 - 4 \left(\frac{1}{4} \times \frac{22}{7} \times 5^2 \right) \text{cm}^2$$

$$= 100 \text{cm}^2 - \frac{22 \times 25}{7} \text{cm}^2$$

$$= 21.43 \text{cm}^2$$

Solution-19:-

Area of ① circle = πr^2

Area of ② circle = $100\pi r^2$

Radius of ① circle = r

$$\text{Radius of ② circle} = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{100\pi r^2}{\pi}} = \sqrt{100r^2} \\ = 10r.$$

Circumference of ① circle = $2\pi r$

Circumference of ② circle = $2\pi(10r) = 20\pi r$

$$\frac{C_2}{C_1} = \frac{20\pi r}{2\pi r} = \frac{10}{1} \quad \therefore C_2 : C_1 = 10 : 1$$

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