Chapter 21 Mensuration II (Area of Circle) Exercise – 21.1

Question: 1

Find the circumference of a circle whose radius is

(i) 14 cm (ii) 10 m (iii) 4 km

Solution:

(i) We know that the circumference of a circle of radius r is given by C = $2\pi r$

Here, r = 14 cm

$\Rightarrow C = 2 \times \frac{22}{7} \times 14 = 88\ cm$

(ii) We know that the circumference of a circle of radius r is given by C = $2\pi r$

Here, r = 10 m

$\Rightarrow C = 2 \times \frac{22}{7} \times 10 = 62.86\ m$

(iii) We know that the circumference of a circle of radius r is given by C = $2\pi r$

Here, r = 4 km

$\Rightarrow C = 2 \times \frac{22}{7} \times 4 = 25.142\ km$

Question: 2

Find the circumference of a circle whose diameter is

(i) 7 cm (ii) 4.2 cm (iii) 11.2 km

Solution:

(i) We know that the circumference of a circle of radius r is given by C = $2\pi r$

Here, d = 7 cm

Then, r = $\frac{7}{2} = 3.5\ cm$

$\Rightarrow C = 2 \times \frac{22}{7} \times 3.5 = 22\ cm$

(ii) We know that the circumference of a circle of radius r is given by C = $2\pi r$

Here, d = 4.2 cm

Then, r = $\frac{4.2}{2} = 2.1\ cm$

$\Rightarrow C = 2 \times \frac{22}{7} \times 2.1 = 13.2\ cm$

(iii) We know that the circumference of a circle of radius r is given by C = $2\pi r$

Here, d = 11.2 km

Then, r = $\frac{11.2}{2} = 5.6\ km$

$\Rightarrow C = 2 \times \frac{22}{7} \times 5.6 = 35.2\ km$

Question: 3

Find the radius of a circle whose circumference is

(i) 52.8 cm (ii) 42 cm (iii) 6.6 km

Solution:

(i)

Let the radius of the circle be r cm.

Circumference of the circle (C) = 52.8 cm

$\Rightarrow 2 \times \frac{22}{7} \times r = 52.8$

$\Rightarrow r = \frac{52.8 \times 7}{2 \times 22} = 8.4\ cm$

(ii)

Let the radius of the circle be r cm.

Circumference of the circle (C) = 42 cm

$\Rightarrow 2 \times \frac{22}{7} \times r = 42$

$\Rightarrow r = \frac{42 \times 7}{2 \times 22} = 6.68\ cm$

(iii)

Let the radius of the circle be r cm.

Circumference of the circle (C) = 6.6 km

$\Rightarrow 2 \times \frac{22}{7} \times r = 6.6$

$\Rightarrow r = \frac{6.6 \times 7}{2 \times 22} = 1.05\ km$

Question: 4

Find the diameter of a circle whose circumference is

(i) 12.56 cm (ii) 88 m (iii) 11.0 km

Solution:

(i)

Let the radius of the circle be r cm.

Circumference of the circle (C) = 12.56 cm

$\Rightarrow 2 \times \frac{22}{7} \times r = 12.56$

$\Rightarrow r = \frac{12.56 \times 7}{2 \times 22} = 1.99\ cm$

Now, Diameter = $2 \times r = 2 \times 1.99$ = 3.99 cm.

(ii)

Let the radius of the circle be r m.

Circumference of the circle (C) = 88 m

$\Rightarrow 2 \times \frac{22}{7} \times r = 88$

$\Rightarrow r = \frac{88 \times 7}{2 \times 22} = 14\ m$

Now, Diameter = $2 \times r = 2 \times 14$ = 28 m.

(iii)

Let the radius of the circle be r km.

Circumference of the circle (C) = 11.0 km

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

$\Rightarrow r = \frac{11 \times 7}{2 \times 22} = 1.75\ km$

Now, Diameter = $2 \times r = 2 \times 1.75$ = 3.5 km.

Question: 5

The ratio of the radii of two circles is 3 : 2. What is the ratio of their circumferences?

Solution:

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

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

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

$C_1 = 2\pi \times 3r = 6\pi r$, and $C_2 = 2\pi \times 2r = 4\pi r$

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

$C_1 : C_2$ = 3 : 2.

Question: 6

A wire in the form of a rectangle 18.7 cm long and 14.3 cm wide is reshaped and bent into the form of a circle. Find the radius of the circle so formed.

Solution:

Length of the wire = Perimeter of the rectangle

= 2 (l + b) = 2 x (18.7 + 14.3)

= 66 cm

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

Circumference = 66 cm

$\Rightarrow 2\pi r = 66\ cm$

$\Rightarrow 2 \times \frac{22}{7} \times r = 66\ cm$

$\Rightarrow r = \frac{66 \times 7}{2 \times 22} = 10.5\ cm$

Question: 7

A piece of wire is bent in the shape of an equilateral triangle of each side 6.6 cm. It is re-bent to form a circular ring. What is the diameter of the ring?

Solution:

We have:

Length of the wire = The perimeter of the equilateral triangle

= 3 x side = 3 x 6.6 = 19.8 cm.

Let the wire be bent to form a circular ring of radius 'r' cm. Then,

Circumference = 19.8 cm

$\Rightarrow 2\pi r = 19.8\ cm$

$\Rightarrow 2 \times \frac{22}{7} \times r = 19.8\ cm$

$\Rightarrow r = \frac{19.8 \times 7}{2 \times 22} = 3.15\ cm$

So, the diameter of the ring = 2 x 3.15 = 6.30 cm.

Question: 8

The diameter of a wheel of a car is 63 cm. Find the distance travelled by the car during the period, the wheel makes 1000 revolutions.

Solution:

It may be noted that in one revolution, the cycle covers a distance equal to the circumference of the wheel.

Now, the diameter of the wheel = 63 cm

∴ Circumference of the wheel = πd = 227 x 63 = 198 cm.

Thus, the cycle covers 198 cm in one revolution.

∴ The distance covered by the cycle in 1000 revolutions = (198 x 1000) = 198000 cm = 1980 m.

Question: 9

The diameter of a wheel of a car is 98 cm. How many revolutions will it make to travel 6160 metres.

Solution:

Diameter of the wheel of the car = 98 cm

$\therefore$ Circumference of the wheel of the car = πd = 227 x 98 = 308 cm.

Note that, in one revolution of the wheel, the car travels a distance equal to the circumference of the wheel.

$\therefore$ The distance travelled by the car in one revolution of the wheel = 308 cm.

Total distance travelled by the car = 6160 m = 616000 cm.

$\therefore$ Number of revolutions = $\frac{616000}{308}$ = 2000.

Question: 10

The moon is about 384400 km from the earth and its path around the earth is nearly circular. Find the circumference of the path described by the moon in lunar month.

Solution:

We have:

The radius of the path described by the moon around the earth = 384400 km

$\therefore$ The circumference of the path described by the moon,

C = $2\pi r = 2 \times \frac{22}{7} \times 384400$ = 2416228.57 km.

Question: 11

How long will John take to make a round of a circular field of radius 21 m cycling at the speed of 8 km/hr?

Solution:

We have:

The radius of the circular field = 21 m

$\therefore$ Circumference of the circular field = $2\pi r = 2 \times \frac{22}{7} \times 21$ = 132 m.

If John cycles at the speed of 8 km/hr (In 1 hour John covers 8 km = 8000 m), then,

John covers 8000 m in 1 hour.

$\therefore$ Time required to cover 132 m = $\frac{132}{8000}$ = 0.0165 hours

1 hour = 3600 seconds

$\therefore$ 0.0615 hours = 0.0615 x 3600 = 59.4 seconds.

Question: 12

The hour and minute hands of a clock are 4 cm and 6 cm long respectively. Find the sum of the distances travelled by their tips in 2 days.

Solution:

The radius of the path inscribed by the hour hand = Length of the hour hand = 4 cm

The radius of the path inscribed by the minute hand = Length of the minute hand = 6 cm

The circumference of the path inscribed by the hour hand = $2\pi r = 2 \times \frac{22}{7} \times 4 = \frac{176}{7}$ cm.

The hour hand makes 2 revolutions in one day.

∴ The distance covered by the hour hand in 2 days = $\frac{176}{7} \times 2 \times 2$ = 100.57 cm.

The distance covered by the minute hand in 1 revolution = $2\pi r = 2 \times \frac{22}{7} \times 6 = \frac{264}{7}$ cm.

The minute hand makes 1 revolution in one hour.

∴ In 1 day, it makes 24 revolutions.

In 2 days, it makes 2 x 24 revolutions.

∴ The distance covered by the minute hand in 2 days = $2 \times 24 \times \frac{264}{7} = \frac{12672}{7}$ = 1810.28 cm

The sum of the distances travelled by the hour and minute hands in 2 days = 1810.28 + 100.57 = 1910.85 cm.

Question: 13

A rhombus has the same perimeter as the circumference of a circle. If the side of the rhombus is 2.2 m. Find the radius of the circle.

Solution:

We have:

The side of a rhombus = 2.2 m

Let C be the circumference of a circle having a radius r cm.

Then,

The perimeter of the rhombus = 4 x side = 4 x 2.2 = 8.8 m.

We know:

Perimeter of the rhombus = Circumference of the circle

$\Rightarrow 8.8\ m = 2\pi r \Rightarrow r = \frac{8.8}{2\pi} \Rightarrow r = \frac{8.8 \times 7}{2 \times 22} = 1.4\ m$

The radius of the circle is 1.4 m.

Question: 14

A wire is looped in the form of a circle of radius 28 cm. It is re-bent into a square form. Determine the length of the side of the square.

Solution:

We have:

The radius of the circle = 28 cm

∴ Circumference of the circle = $2\pi r = 2 \times \frac{22}{7} \times 28$ = 176 cm.

Let 'a' cm be the side of the square. Then,

The circumference of the circle = The perimeter of the square

= 176 = 4 x a = a = $\frac{176}{4}$ = 44 cm.

The side of the square is 44 cm.

Question: 15

A bicycle wheel makes 5000 revolutions in moving 11 km. Find the diameter of the wheel.

Solution:

We have:

Total distance covered in 5000 revolutions = 11 km = 11000 m

$\therefore$ Distance covered in 1 revolution = $\frac{11000}{5000} = \frac{11}{5}\ m.$

Distance covered in 1 revolution = Circumference of the wheel

= $\frac{11}{5}$ = πd = d = $\frac{11}{5\times\pi} = \frac{11\times7}{5\times22}$

= d = 0.7 m.

Thus, the diameter of the wheel is 0.7 m = 70 cm.

Question: 16

A boy is cycling such that the wheels of the cycle are making 140 revolutions per minute. If the diameter of the wheel is 60 cm, calculate the speed per hour with which the boy is cycling.

Solution:

We have:

The diameter of the wheel = 60 cm

Distance covered by the wheel in 1 revolution = Circumference of the wheel

$\therefore$ Distance covered by the wheel in 1 revolution = $\pi d = \frac{22}{7} \times 60\ cm$

$\therefore$ Distance covered in 140 revolutions = $\frac{22}{7} \times 60 \times 140 = \frac{184800}{7}$ = 26400 cm.

Thus, the wheel covers 26400 cm in 1 minute. Then,

Speed = $\frac{26400}{100} \times 60\ m/hr$ = 264 x 60 m/hr

= Speed = $264 \times \frac{60}{1000}\ km/hr$ = 15.84 km/hr.

The speed with which the boy is cycling is 15.84 km/hr.

Question: 17

The diameter of the driving wheel of a bus is 140 cm. How many revolutions per minute must the wheel make in order to keep a speed of 66 km per hour?

Solution:

We have: Diameter of the wheel = 140 cm

Desired speed of the bus = 66 km/hr

$\therefore$ Distance covered by the wheel in 1 revolution = Circumference of the wheel = $\pi d = \frac{22}{7} \times 140\ cm$ = 440 cm.

Now, the desired speed of the bus = 66 km/hr = $66 \times 1000 \times \frac{100}{60}$ = 1,10,000 cm/min.

$\therefore$ Number of revolutions per minute = $\frac{110000}{440} = 250.$

Thus, the bus must make 250 revolutions per minute to keep the speed at 66 km/hr.

Question: 18

A water sprinkler in a lawn sprays water as far as 7 m in all directions. Find the length of the outer edge of wet grass.

Solution:

The wet grass forms a circular region of radius 7 m.

$\therefore$ The length of the outer edge of the wet grass is $2\pi r = 2 \times \frac{22}{7} \times 7$ = 44 m.

Question: 19

A well of diameter 150 cm has a stone parapet around it. If the length of the outer edge of the parapet is 660 cm. then find the width of the parapet.

Solution:

We have:

Diameter of the well = 150 cm

Length of the outer edge of the parapet = 660 cm

Width of the parapet = ?

Radius of well = $\frac{150}{2}$ = 75 cm.

Let the width of the stone parapet be x cm. Clearly, the outer edge of the parapet forms a circular region of radius (x + 75 cm).

Therefore, 660 cm = $2 \times \frac{22}{7} \times (x + 75)$

= x + 75 = $\frac{660 \times 7}{22 \times 2}$

= x + 75 = 105

= x = 105 – 75

= x = 30 cm.

Thus, the width of the parapet is 30 cm.

Question: 20

An ox in a kolhu (an oil processing apparatus) is tethered to a rope 3 m long. How much distance does it cover in 14 rounds?

Solution:

We have,

Radius of the circular path traced by the ox in a kolhu = 3 m

Distance covered by the ox in 1 round = Circumference of the circular path = $2\pi r = 2 \times \frac{22}{7} \times 3\ m$

$\therefore$ Distance covered in 14 rounds = $2 \times \frac{22}{7} \times 3 \times 14$ = 22 x 12 = 264 m.