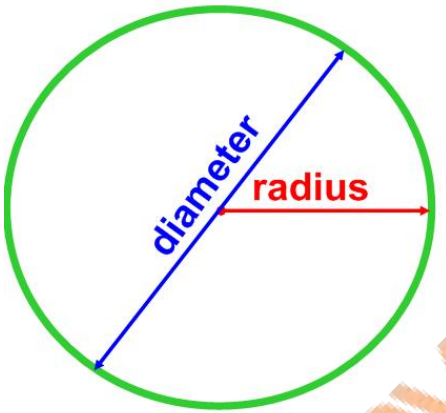
Mensuration
Exercise 20E



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

Circumference of a circle $= \pi \times$ diameter

remember that the
diameter = 2 x radius

Q1

Answer :

Here, r = 15 cm

∴ Circumference = $2\pi r$

= (2 × 3.14 × 15) cm

= 94.2 cm

Hence, the circumference of the given circle is 94.2 cm

Q2

Answer :

(i) Here, r = 28 cm

∴ Circumference = 2π r

$= \left(2 \times \frac{22}{7} \times 28\right)$cm

= 176 cm

Hence, the circumference of the given circle is 176 cm.

(ii) Here, r = 1.4 m

∴ Circumference = 2π r

$= \left(2 \times \frac{22}{7} \times 1.4\right)$ m

$= (2 \times 22 \times 0.2)$ m = 8.8 m

Hence, the circumference of the given circle is 8.8 m.

Q3

Answer :

(i) Here, d = 35 cm

Circumference = 2π r

$= (\pi d)$ [since $2r = d$]

$= \left(\frac{22}{7} \times 35\right)$ cm = (22 × 5) = 110 cm

Hence, the circumference of the given circle is 110 cm.

(ii) Here, d = 4.9 m

Circumference =2π r

$= (\pi d)$ [since $2r = d$]

$= \left(\frac{22}{7} \times 4.9\right)$ m = (22 × 0.7) = 15.4 m

Hence, the circumference of the given circle is 15.4 m.

Q4

Answer :

Circumference of the given circle = 57.2 cm

∴ C = 57.2 cm

Let the radius of the given circle be r cm.

$C = 2\pi r$

$\Rightarrow r = \frac{C}{2\pi}$ cm

$\Rightarrow r = \left(\frac{57.2}{2} \times \frac{7}{22}\right)$ cm = 9.1 cm

Thus, radius of the given circle is 9.1 cm.

Q5

Answer :

Circumference of the given circle = 63.8 m

∴ C = 63.8 m

Let the radius of the given circle be r cm.

$C = 2\pi r$

$\Rightarrow r = \frac{C}{2\pi}$

$\Rightarrow r = \left(\frac{63.8}{2} \times \frac{7}{22}\right)$m =10.15 m

∴ Diameter of the given circle = $2r$ = (2 × 10.15) m = 20.3 m

Q6

Answer :

Let the radius of the given circle be *r* cm.
Then, its circumference = $2\pi r$

Given:
(Circumference) - (Diameter) = 30 cm
$\therefore (2\pi r - 2r) = 30$
$\Rightarrow 2r(\pi - 1) = 30$
$\Rightarrow 2r\left(\frac{22}{7} - 1\right) = 30$
$\Rightarrow 2r \times \frac{15}{7} = 30$
$\Rightarrow r = \left(30 \times \frac{7}{30}\right) = 7$
$\therefore$ Radius of the given circle = 7 cm

Q7

Answer :

Let the radii of the given circles be $5x$ and $3x$, respectively.
Let their circumferences be C_1 and C_2, respectively.

$C_1 = 2 \times \pi \times 5x = 10\pi x$

$C_2 = 2 \times \pi \times 3x = 6\pi x$
$\therefore \frac{C_1}{C_2} = \frac{10\pi x}{6\pi x} = \frac{5}{3}$
$\Rightarrow C_1:C_2 = 5:3$
Hence, the ratio of the circumference of the given circle is 5:3.

Q8

Answer :

Radius of the circular field, *r* = 21 m.
Distance covered by the cyclist = Circumference of the circular field

$= 2\pi r$
$= \left(2 \times \frac{22}{7} \times 21\right)$ m = 132 m

Speed of the cyclist = 8 km per hour = $\frac{8000\ \text{m}}{(60\times60)\ \text{s}} = \left(\frac{8000}{3600}\right)\text{m/s} = \left(\frac{20}{9}\right)\text{m/s}$

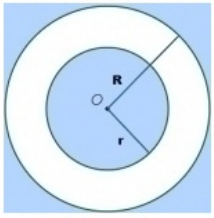
Time taken by the cyclist to cover the field = $\frac{\text{Distance covered by the cyclist}}{\text{Speed of the cyclist}}$

$= \left[\frac{132}{\left(\frac{20}{9}\right)}\right]\text{s}$
$= \left(\frac{132\times9}{20}\right)\text{s}$
= 59.4 s

Q9

Answer :

Let the inner and outer radii of the track be *r* metres and *R* metres, respectively.



Then, $2\pi r$ = 528

$2\pi R$ = 616

$\Rightarrow 2 \times \frac{22}{7} \times r = 528$

$2 \times \frac{22}{7} \times R = 616$

$\Rightarrow r = \left(528 \times \frac{7}{44}\right) = 84$

$R = \left(616 \times \frac{7}{44}\right) = 98$

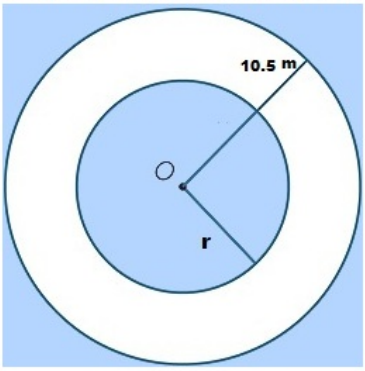
$\Rightarrow (R - r) = (98 - 84)$ m = 14 m

Hence, the width of the track is 14 m.

Q10

Answer :

Let the inner and outer radii of the track be *r* metres and (*r* + 10.5) metres, respectively.



Inner circumference = 330 m

$\therefore 2\pi r = 330 \Rightarrow 2 \times \frac{22}{7} \times r = 330$

$\Rightarrow r = \left(330 \times \frac{7}{44}\right) = 52.5\ \text{m}$

Inner radius of the track = 52.5 m

∴ Outer radii of the track = (52.5 + 10.5) m = 63 m

∴ Circumference of the outer circle = $\left(2 \times \frac{22}{7} \times 63\right)\ \text{m} = 396\ \text{m}$

Rate of fencing = Rs. 20 per metre

∴ Total cost of fencing the outer circle = Rs. (396 × 20) = Rs. 7920

Q11

Answer :

We know that the concentric circles are circles that form within each other, around a common centre point.

Radius of the inner circle, *r* = 98 cm

∴ Circumference of the inner circle = $2\pi r$

$= \left(2 \times \frac{22}{7} \times 98\right)$ cm = 616 cm

Radius of the outer circle, *R* = 1 m 26 cm = 126 cm [since 1 m = 100 cm]

∴ Circumference of the outer circle = $2\pi R$

$= \left(2 \times \frac{22}{7} \times 126\right)$ cm = 792 cm

∴ Difference in the lengths of the circumference of the circles = (792 - 616) cm = 176 cm

Hence, the circumference of the second circle is 176 cm larger than that of the first circle.

Q12

Answer :

Length of the wire = Perimeter of the equilateral triangle
= 3 × Side of the equilateral triangle = (3 × 8.8) cm = 26.4 cm
Let the wire be bent into the form of a circle of radius *r* cm.
Circumference of the circle = 26.4 cm
$\Rightarrow 2\pi r = 26.4$
$\Rightarrow 2 \times \frac{22}{7} \times r = 26.4$
$\Rightarrow r = \left(\frac{26.4 \times 7}{2 \times 22}\right)$ cm = 4.2 cm

∴ Diameter = 2*r* = (2 × 4.2) cm = 8.4 cm
Hence, the diameter of the ring is 8.4 cm.

Q13

Answer :

Circumference of the circle = Perimeter of the rhombus
= 4 × Side of the rhombus = (4 × 33) cm = 132 cm

∴ Circumference of the circle = 132 cm
$\Rightarrow 2\pi r = 132$
$\Rightarrow 2 \times \frac{22}{7} \times r = 132$
$\Rightarrow r = \left(\frac{132 \times 7}{2 \times 22}\right)$cm = 21 cm
Hence, the radius of the circle is 21 cm.

Q14

Answer :

Length of the wire = Perimeter of the rectangle
= 2(*l* + *b*) = 2 × (18.7 + 14.3) cm = 66 cm

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

Circumference of the circle = 66 cm

$\Rightarrow 2\pi r = 66$
$\Rightarrow \left(2 \times \frac{22}{7} \times r\right) = 66$
$\Rightarrow r = \left(\frac{66 \times 7}{2 \times 22}\right)$ cm = 10.5 cm

Hence, the radius of the circle formed is 10.5 cm.

Q15

Answer :

It is given that the radius of the circle is 35 cm.
Length of the wire = Circumference of the circle
$\Rightarrow$ Circumference of the circle $= 2\pi r = \left(2 \times \frac{22}{7} \times 35\right)$ cm = 220 cm
Let the wire be bent into the form of a square of side *a* cm.
Perimeter of the square = 220 cm
$\Rightarrow 4a = 220$
$\Rightarrow a = \left(\frac{220}{4}\right)$cm = 55 cm
Hence, each side of the square will be 55 cm.

Q16

Answer :

Length of the hour hand (r)= 4.2 cm.

Distance covered by the hour hand in 12 hours = $2\pi r = \left(2 \times \frac{22}{7} \times 4.2\right)$ cm = 26.4 cm

∴ Distance covered by the hour hand in 24 hours = (2 × 26.4) = 52.8 cm

Length of the minute hand (R)= 7 cm

Distance covered by the minute hand in 1 hour = $2\pi R = \left(2 \times \frac{22}{7} \times 7\right)$ cm = 44 cm

∴ Distance covered by the minute hand in 24 hours = (44 × 24) cm = 1056 cm

∴ Sum of the distances covered by the tips of both the hands in 1 day = (52.8 + 1056) cm
= 1108.8 cm

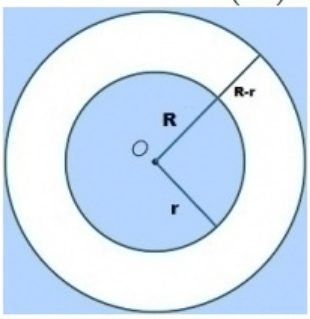
Q17

Answer :

Given:

Diameter of the well (d) = 140 cm.

Radius of the well (r) = $\left(\frac{140}{2}\right)$cm = 70 cm



Let the radius of the outer circle (including the stone parapet) be R cm.

Length of the outer edge of the parapet = 616 cm

$\Rightarrow 2\pi R = 616$

$\Rightarrow \left(2 \times \frac{22}{7} \times R\right) = 616$

$\Rightarrow R = \left(\frac{616 \times 7}{2 \times 22}\right)$ cm = 98 cm

Now, width of the parapet = {Radius of the outer circle (including the stone parapet) - Radius of the well}
= {98 -70} cm = 28 cm

Hence, the width of the parapet is 28 cm.

Q18

Answer :

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

Now, diameter of the wheel = 98 cm

∴ Circumference of the wheel = $\pi d = \left(\frac{22}{7} \times 98\right)$ cm = 308 cm

Thus, the bus travels 308 cm in one rotation.

∴ Distance covered by the bus in 2000 rotations = (308 × 2000) cm
= 616000 cm
= 6160 m [since 1 m = 100 cm]

Q19

Answer :

It may be noted that in one revolution, the cycle covers a distance equal to the circumference of the wheel.
Diameter of the wheel = 70 cm
∴ Circumference of the wheel = $\pi d = \left(\frac{22}{7} \times 70\right)$ cm = 220 cm
Thus, the cycle covers 220 cm in one revolution.

∴ Distance covered by the cycle in 250 revolutions = (220 × 250) cm
= 55000 cm
= 550 m [since 1 m = 100 cm]

Hence, the cycle will cover 550 m in 250 revolutions.

Q20

Answer :

Diameter of the wheel = 77 cm
⇒ Radius of the wheel = $\left(\frac{77}{2}\right)$ cm
Circumference of the wheel = $2\pi r$
$= \left(2 \times \frac{22}{7} \times \frac{77}{2}\right)$cm = (22 × 11) cm = 242 cm
$= \left(\frac{242}{100}\right)$m = $\left(\frac{121}{50}\right)$m
Distance covered by the wheel in 1 revolution = $\left(\frac{121}{50}\right)$ m
Now, $\left(\frac{121}{50}\right)$ m is covered by the car in 1 revolution.
(121 × 1000) m will be covered by the car in $\left(1 \times \frac{50}{121} \times 121 \times 1000\right)$ revolutions, i.e. 50000 revolutions.
∴ Required number of revolutions = 50000

Q21

Answer :

It may be noted that in one revolution, the bicycle covers a distance equal to the circumference of the wheel.
Total distance covered by the bicycle in 5000 revolutions = 11 km

⇒ 5000 × Circumference of the wheel = 11000 m [since 1 km = 1000 m]

Circumference of the wheel = $\left(\frac{11000}{5000}\right)$ m =2.2 m = 220 cm [since 1 m = 100 cm]

Circumference of the wheel = $\pi \times$ Diameter of the wheel
⇒ 220 cm = $\frac{22}{7} \times$ Diameter of the wheel
⇒ Diameter of the wheel = $\left(\frac{220 \times 7}{22}\right)$ cm = 70 cm
Hence, the circumference of the wheel is 220 cm and its diameter is 70 cm.