Exercise 20(C)

Solution 1:

Let r be the radius of the circle.

(i)

$$2r = 28\text{cm}$$

$$\text{circumference} = 2\pi r$$
$$= 28\pi\text{cm}$$

(ii)

$$\text{area} = \pi r^2$$
$$= \pi\left(\frac{28}{2}\right)^2$$
$$= 196\pi\text{cm}^2$$

Solution 2:

Let r be the radius of the circular field

(*i*)

$$2\pi r = 308$$

$$\Rightarrow r = \frac{308}{2\pi}$$

$$\Rightarrow r = \frac{308}{2} \times \frac{7}{22}$$

$$\Rightarrow r = 49 \text{ m}$$

(ii)

$$\text{area} = \pi r^2$$

$$= \frac{22}{7} \times (49)^2$$

$$= 7546 \text{ m}^2$$

Solution 3:

Let r be the radius of the circle.

$$2\pi r + 2r = 116$$

$$2r(\pi + 1) = 116$$

$$r = \frac{116}{2(\pi + 1)}$$

$$= 14\text{cm}$$

Solution 4:

Circumference of the first circle

$$S_1 = 2\pi \times 25$$

$$= 50\pi\text{cm}$$

Circumference of the second circle

$$S_2 = 2\pi \times 18$$

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

Let r be the radius of the resulting circle.

$$2\pi r = 50\pi + 36\pi$$

$$2\pi r = 86\pi$$

$$r = \frac{86\pi}{2\pi}$$

$$= 43\text{cm}$$

Solution 5:

Circumference of the first circle

$$S_1 = 2\pi \times 48$$
$$= 96\pi \text{cm}$$

Circumference of the second circle

$$S_2 = 2\pi \times 13$$
$$= 26\pi \text{cm}$$

Let r be the radius of the resulting circle.

$$2\pi r = 96\pi - 26\pi$$
$$2\pi r = 70\pi$$
$$r = \frac{70\pi}{2\pi}$$
$$= 35\text{cm}$$

Hence area of the circle

$$A = \pi r^2$$
$$= \pi \times 35^2$$
$$= 3850\text{cm}^2$$

Solution 6:

Let the area of the resulting circle be r.

$$\pi \times (16)^2 + \pi \times (12)^2 = \pi \times r^2$$
$$256\pi + 144\pi = \pi \times r^2$$
$$400\pi = \pi \times r^2$$
$$r^2 = 400$$
$$r = 20\text{cm}$$

Hence the radius of the resulting circle is 20cm.

Solution 7:

Area of the circle having radius 85m is

$$A = \pi \times (85)^2$$
$$= 7225\pi \text{m}^2$$

Let r be the radius of the circle whose area is 49times of the given circle.

$$\pi r^2 = 49 \times (\pi \times 5^2)$$
$$r^2 = (7 \times 5)^2$$
$$r = 35$$

Hence circumference of the circle

$$S = 2\pi r$$
$$= 2\pi \times 35$$
$$= 220\text{m}$$

Solution 8:

Area of the rectangle is given by

$$A = 55 \times 42$$
$$= 2310\text{cm}^2$$

For the largest circle, the radius of the circle will be half of the sorter side of the rectangle.

Hence r=21cm.

$$\text{Area of the circle} = \pi \times (21)^2$$
$$= 1384.74\text{cm}^2$$

$$\text{Area remaining} = 2310 - 1384.74$$
$$= 925.26$$

Hence

the volume of the circle: area remaining =1384.74:915.26

=3:2

Solution 9:

Area of the square is given by

$$A = 28^2$$
$$= 784\text{cm}^2$$

Since there are four identical circles inside the square.

Hence radius of each circle is one fourth of the side of the square.

$$\text{Area of one circle} = \pi \times 7^2$$
$$= 154\text{cm}^2$$
$$\text{Area of four circle} = 4 \times 154\text{cm}^2$$
$$= 616\text{cm}^2$$
$$\text{Area remaining} = 784 - 616$$
$$= 168\text{cm}^2$$

Area remaining in the cardboard is $= 168\text{cm}^2$

Solution 10:

Let the radius of the two circles be 3r and 8r respectively.

$$\text{area of the circle having radius 3r} = \pi(3r)^2$$
$$= 9\pi r^2$$
$$\text{area of the circle having radius 8r} = \pi(8r)^2$$
$$= 64\pi r^2$$

According to the question

$$64\pi r^2 - 9\pi r^2 = 2695\pi$$
$$55r^2 = 2695$$
$$r^2 = 49$$
$$r = 7\text{cm}$$

Hence radius of the smaller circle is $3 \times 7 = 21\text{cm}$

Area of the smaller circle is given by

$$A = \pi r^2 = \frac{22}{7} \times 21^2 = 1386\text{ cm}^2$$

Solution 11:

Let the diameter of the three circles be 3d, 5d and 6d respectively.

Now

$$\pi \times 3d + \pi \times 5d + \pi \times 6d = 308$$
$$14\pi d = 308$$
$$d = 7$$

$$\text{radius of the smallest circle} = \frac{21}{2} = 10.5$$
$$\text{Area} = \pi \times (10.5)^2$$
$$= 346$$
$$\text{radius of the largest circle} = \frac{42}{2} = 21$$
$$\text{Area} = \pi \times (21)^2$$
$$= 1385.5$$
$$\text{difference} = 1385.5 - 346$$
$$= 1039.5$$

Solution 12:

$$\text{Area of the ring} = \pi(20)^2 - \pi(15)^2$$
$$= 400\pi - 225\pi$$
$$= 175\pi$$
$$= 549.7 cm^2$$

Solution 13:

Let r be the radius of the circular park.

$$2\pi r = 55$$
$$r = \frac{55}{2\pi}$$
$$= 8.75m$$

$$\textit{area of the park} = \pi \times (8.75)^2 = 240.625\ m^2$$

Radius of the outer circular region including the path is given by

$$R = 8.75 + 3.5$$
$$= 12.25\ m$$

Area of that circular region is

$$A = \pi \times (12.25)^2 = 471.625\ m^2$$

Hence area of the path is given by

$$\textit{Area of the path} = 471.625 - 240.625 = 231\ m^2$$

Solution 14:

Let r be the radius of the circular garden A.

Since the circumference of the garden A is 1.760 *Km* = 1760*m*, *we have*,

$$2\pi r = 1760\ m$$

$$\Rightarrow r = \frac{1760 \times 7}{2 \times 22} = 280\ m$$

$$\text{Area of garden A} = \pi r^2 = \frac{22}{7} \times 280^2\ m^2$$

Let R be the radius of the circular garden B.

Since the area of garden B is 25 times the area of garden A, we have,

$$\pi R^2 = 25 \times \pi r^2$$
$$\Rightarrow \pi R^2 = 25 \times \pi \times 280^2$$
$$\Rightarrow R^2 = 1960000$$
$$\Rightarrow R = 1400\ m$$

$$\text{Thus circumference of garden B} = 2\pi R = 2 \times \frac{22}{7} \times 1400 = 8800\ m = 8.8\ Km$$

Solution 15:

Diameter of the wheel = 84 *cm*

Thus, radius of the wheel = 42 *cm*

$$\text{Circumference of the wheel} = 2 \times \frac{22}{7} \times 42 = 264 \text{ cm}$$

In 264 *cm, wheel is covering one revolution.*

Thus, in 3.168 *Km* = 3.168 × 100000 *cm, number of revolutions*

$$\text{covered by the wheel} = \frac{3.168}{264} \times 100000 = 1200$$

Solution 16:

$$\text{the car travells in 10minutes} = \frac{66}{6}$$

$$= 11\text{km}$$

$$= 1100000\text{cm}$$

Circumference of the wheel = distance covered by the wheel in one revolution

Thus, we have,

$$\text{Circumference} = 2 \times \frac{22}{7} \times \frac{80}{2} = 251.43 \text{ cm}$$

Thus, the number of revolutions covered

$$\text{by the wheel in 1100000 cm} = \frac{1100000}{251.43} \approx 4375$$

Solution 17:

$$\text{radius of the wheel} = \frac{42}{2}$$

$$= 21\text{cm}$$

$$\text{circumference of the wheel} = 2\pi \times 21$$

$$= 132\text{cm}$$

$$\text{Distance travelled in one minute} = 132 \times 1200$$

$$= 158400\text{cm}$$

$$= 1.584\text{km}$$

$$\text{hence the speed of the train} = \frac{1.584\text{km}}{\frac{1}{60}\text{hr}}$$

$$= 95.04\text{km/hr}$$

Solution 18:

Time interval is $9.05 - 8.30 = 35$ *minutes*

Area covered in one 60 minutes= $\pi \times 8^2 = 201 cm^2$

Hence area swept in 35 minutes is given by

$$A = \frac{201}{60} \times 35 = 117\frac{1}{3}\ cm^2$$

Solution 19:

Let R and r be the radius of the big and small circles respectively.

Given that the circumference of the bigger circle is 396 cm

Thus, we have,

$2\pi R = 396$ cm

$\Rightarrow R = \frac{396 \times 7}{2 \times 22}$

$\Rightarrow R = 63$ cm

Thus, area of the bigger circle $= \pi R^2$

$= \frac{22}{7} \times 63^2$

$= 12474$ cm^2

Also given that the circumference of the smaller circle is 374 cm

$\Rightarrow 2\pi r = 374$

$\Rightarrow r = \frac{374 \times 7}{2 \times 22}$

$\Rightarrow r = 59.5$ cm

Thus, the area of the smaller circle $= \pi r^2$

$= \frac{22}{7} \times 59.5^2$

$= 11126.5$ cm^2

Thus the area of the shaded portion $= 12474 - 11126.5 = 1347.5$ cm^2

Solution 20:

From the given data, we can calculate the area of the outer circle and then the area of inner circle and hence the width of the shaded portion.

Given that the circumference of the outer circle is 132 cm

Thus, we have, $2\pi R = 132$ cm

$\Rightarrow R = \frac{132 \times 7}{2 \times 22}$

$\Rightarrow R = 21$ cm

Area of the bigger circle $= \pi R^2$

$= \frac{22}{7} \times 21^2$

$= 1386 \text{ cm}^2$

Also given the area of the shaded portion.

Thus the area of the inner circle = Area of the outer circle − Area of the shaded portion

$= 1386 - 770$

$= 616 \text{ cm}^2$

$\Rightarrow \pi r^2 = 616$

$\Rightarrow r^2 = \frac{616 \times 7}{22}$

$\Rightarrow r^2 = 196$

$\Rightarrow r = 14$ cm

Thus, the width of the shaded portion $= 21 - 14 = 7$ cm

Solution 21:

Let the radius of the field is *r* meter.

Therefore circumference of the field will be: $2\pi r$ meter.

Now the cost of fencing the circular field is 52,800 at rate 240 per meter.

Therefore

$2\pi r \cdot 240 = 52800$

$r = \frac{52800 \times 7}{2 \times 240 \times 22}$

$= 35$

Thus the radius of the field is 35 meter.

Now the area of the field will be:

$\pi r^2 = \left(\frac{22}{7}\right) \cdot 35^2$

$= 3850 \text{ m}^2$

Thus the cost of ploughing the field will be:

$3850 \times 12.5 = 48,125$ rupees

Solution 22:

Let r and R be the radius of the two circles.

$$r + R = 10 \quad \ldots(1)$$
$$\pi r^2 + \pi R^2 = 58\pi \quad \ldots(2)$$

Putting the value of r in (2)

$$r^2 + R^2 = 58$$
$$(10 - R)^2 + R^2 = 58$$
$$100 - 20R + R^2 + R^2 = 58$$
$$2R^2 - 20R + 42 = 0$$
$$R^2 - 10R + 21 = 0$$
$$(R-3)(R-7) = 0$$
$$R = 3, 7$$

Hence the radius of the two circles is 3cm and 7cm respectively.

Solution 23:

From the figure:

$$AB = 28\text{cm}$$
$$BC = 21\text{cm}$$
$$AC = \sqrt{AB^2 + BC^2}$$
$$= \sqrt{28^2 + 21^2}$$
$$= 35\text{cm}$$

Hence diameter of the circle is 35cm and hence

$$\text{Area} = \pi \times \left(\frac{35}{2}\right)^2$$
$$= 962.5 \ \text{cm}^2$$

$$\text{Area of the rectangle} = 28 \times 21$$
$$= 588\text{cm}^2$$

Hence area of the shaded portion is given by

$$A = 962 - 588 = 374.5 \ \text{cm}^2$$

Solution 24:

Since the diameter of the circle is the diagonal of the square inscribed in the circle.

Let a be the length of the sides of the square.

Hence

$$\sqrt{2}a = 2\times 7$$
$$a = \sqrt{2}\times 7$$
$$a^2 = 98$$

Hence the area of the square is 98sq.cm.

Solution 25:

Let a be the length of the sides of the equilateral triangle.

$$\frac{\sqrt{3}}{4}a^2 = 484\sqrt{3}$$
$$a^2 = 1936$$
$$a = 44\text{cm}$$
$$4a = 176\text{cm}$$

Hence the length of the wire is 176cm.

Let r be the radius of the circle.

Hence

$$2\pi r = 176$$
$$r = 28$$
$$\pi r^2 = 2464\ \text{cm}^2$$

Hence the area of the circle is $2464\ \text{cm}^2$

Solution 26:

Given the diameter of the front and rear wheels are
63 cm = 0.63 m and 1.54 m respectively.

Radius of the rear wheel $= \frac{1.54}{2} = 0.77$ m

and radius of the front wheel $= \frac{0.63}{2} = 0.315$ m

Distance travelled by tractor in one revolution of rear wheel
= circumference of the rear wheel
$= 2\pi r$
$= 2 \times \frac{22}{7} \times 0.77 = 4.84$ m

The rear wheel rotates at $24\frac{6}{11}$ revolutions per minute

$= \frac{270}{11}$ revolutions per minute

Since in one revolution the distance travelled by the rear wheel = 4.84 m

So, in $\frac{270}{11}$ revolutions, the tractor travels $\frac{270}{11} \times 4.84 = 118.8$ m

Let the number of revolutions made by the front wheel be x.

(i) Now, number of revolutions made by the front wheel in one minute
× circumference of the wheel
= the distance travalled by the tractor in one minute

$\Rightarrow x \times 2 \times \frac{22}{7} \times 0.315 = 118.8$

$\Rightarrow x = \frac{118.8 \times 7}{2 \times 22 \times 0.315} = 60$

(ii) Distance travelled by the tractor in 40 minutes
= Number of revolutions made by the rear wheel in 40 minutes
× circumference of the rear wheel

$= \frac{270}{11} \times 40 \times 4.84 = 4752$ m

Solution 27:

Let the radius of the circles be r_1 and r_2.

So, $r_1 + r_2 = 12 \Rightarrow r_2 = 12 - r_1$

Sum of the areas of the circles $= 74\pi$

$\Rightarrow \pi r_1^2 + \pi r_2^2 = 74\pi$

$\Rightarrow r_1^2 + r_2^2 = 74$

$\Rightarrow r_1^2 + (12 - r_1)^2 = 74$

$\Rightarrow r_1^2 + 144 - 24r_1 + r_1^2 = 74$

$\Rightarrow 2r_1^2 - 24r_1 + 70 = 0$

$\Rightarrow r_1^2 - 12r_1 + 35 = 0$

$\Rightarrow (r_1 - 7)(r_1 - 5) = 0$

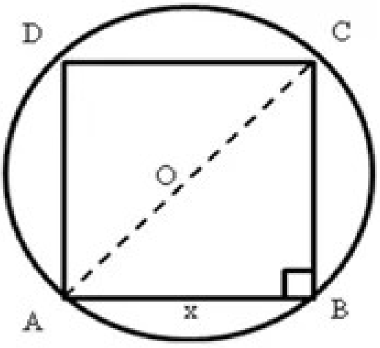
$\Rightarrow r_1 = 7 \quad \text{or} \quad r_1 = 5$

If $r_1 = 7$ cm, then $r_2 = 5$ cm

If $r_1 = 5$ cm, then $r_2 = 7$ cm

So, the diameters of the circles will be 10 cm and 14 cm.

Solution 28:



If AB = x, AC = $x\sqrt{2}$

Diameter of the circle = diagonal of the square

$\Rightarrow 2r = x\sqrt{2}$

$\Rightarrow r = \frac{x\sqrt{2}}{2}$

Area of the circle = πr^2

$= \pi\left(\frac{x\sqrt{2}}{2}\right)^2$

$= \pi\left(\frac{x^2 2}{4}\right)$

$= \frac{\pi x^2}{2}$

Area of the square = x^2

Required ratio = $\frac{\frac{\pi x^2}{2}}{x^2}$

$= \frac{\pi}{2}$

$= \frac{22}{7} \times \frac{1}{2}$

$= \frac{11}{7}$

Hence, the required ratio is 11 : 7.