R.S AGGARWAL Class - 9^{th}

Chapter-18 Circumference and Area of circle.

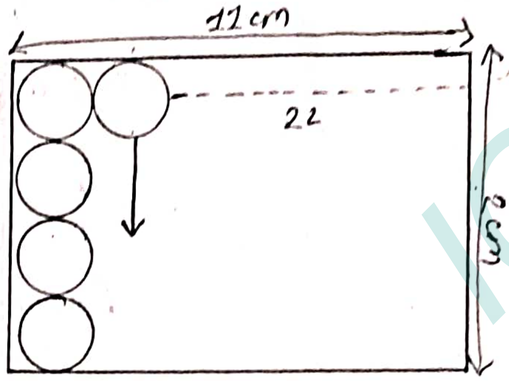
Exercise - 18

1]

Solution| Length of Sheet = 11 cm

width of Sheet = 2 cm

The Sheet in Square of side 0.5 cm



$\therefore$ Number of Square $= \frac{11}{0.5} \times \frac{2}{0.5}$

$= \frac{11 \times 10}{5} \times \frac{2 \times 10}{5}$

$22 \times 4 = 88$

$\therefore$ Number of discs will be equal to number of Square cut out = 88

2]

Solution| radius of circle = 17.5 cm

$\therefore$ circumference $= 2\pi r$

$= 2 \times \frac{22}{7} \times 17.5$

$= 110$ cm

Area $= \pi r^2$

$= \frac{22}{7} \times 17.5 \times 17.5$

$= \frac{22}{7} \times \frac{175}{10} \times \frac{175}{10}$

$= 962.5 \text{ cm}^2$

3]

Solution] radius of circle = 15 cm

Circumference = $2\pi r$

$= 2 \times 3.14 \times 15$

$= 94.2$ cm

Area = πr^2

$= 3.14 \times 15 \times 15$

$= 706.5$ cm^2

4]

Solution] Circumference of circle = 123.2 cm

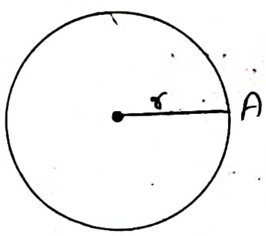
(i) radius of circle = r

$2\pi r = 123.2$

$2 \times \frac{22}{7} \times r = 123.2$

$r = \frac{123.2 \times 7}{2 \times 22}$

$= 19.6$ cm



(ii) Area of circle $= \pi r^2$

$= \frac{22}{7} \times 19.6 \times 19.6$

$= 1207.36\ cm^2$

$= 1207\ cm$

(iii) If the radius is doubled.

Area of circle $= \frac{\pi r^2}{\pi (2r)^2}$

$= \frac{\pi r^2}{4\pi r^2}$

$= \frac{1}{4}$

$\therefore$ Area of resulting circle is four times the area of original circle.

5] Solution] Length of rope $= r\ m$

$\therefore$ radius $= r\ m$

Area of another place $= 9856\ m^2$

$\pi r^2 = 9856$

$\frac{22}{7} \times r^2 = 9856$

$r^2 = \frac{9856 \times 7}{22}$

$r^2 = 448 \times 7$

$r^2 = 3136$

$(r)^2 = (56)^2$

$r = 56\ m$

$\therefore$ Length of rope $= 56\ m$

6]

Solution | Area of circle = r

(i) Radius of circle = r

$$\pi r^2 = 394.24$$

$$\frac{22}{7} \times r^2 = 394.24$$

$$r^2 = \frac{394.24 \times 7}{22}$$

$$r^2 = 125.44$$

$$r^2 = (11.2)^2$$

$$r = 11.2 \text{ cm}$$

(ii) Circumference $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 11.2$$

$$= 70.4 \text{ cm}$$

7]

Solution | Radius of Semi-circular plate = 25cm

∴ Circumference $= \frac{1}{2} \times 2\pi r + 2r$

$$= \frac{2 \times 3.14 \times 25}{2} + 2 \times 25$$

$$= \frac{157.0}{2} + 50$$

$$= 128.5 \text{ cm}$$

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

$$= \frac{1}{2} \times 3.14 \times 25 \times 25$$

$$= 981.25 \text{ cm}^2$$

8]

Solution| Perimeter of Semi-circular plate = 86.4cm.

Radius of plate = r

$\pi r + 2r = 86.4$

$\frac{22}{7} r + 2r = 86.4$

$\frac{36}{7} r = 86.4$

$r = \frac{86.4 \times 7}{36}$

$r = 16.8cm$

Area of plate $= \frac{1}{2} \pi r^2$

$= \frac{1}{2} \times \frac{22}{7} \times 16.8 \times 16.8$

$= \frac{11}{7} \times 16.8 \times 16.8$

$= 443.52 cm^2$

9]

Solution| Radius of circle = r

Circumference = $2\pi r$

(i) $2\pi r - 2r = 180$

$\frac{2 \times 22}{7} r - 2r = 180$

$\frac{44-14}{7} r = 180$

$\frac{30}{7} r = 180$

$r = \frac{180 \times 7}{30}$

$r = 42 cm$

(ii) Circumference $= 2\pi r$

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

$= 264 cm$

(iii) Area of circle $= \pi r^2$

$= \frac{22}{7} \times 42 \times 42$

$= 5544 cm^2$

10]
solution | Area of Square $= 272.25 cm^2$

Side of Square $= a$

$a^2 = 272.25$

$a = \sqrt{272.25}$

$= 16.5 cm$

$\therefore$ Side of Square $= 16.5 cm$

Perimeter $= 4a$

$= 4 \times 16.5$

$= 66 cm$

$\therefore$ Circumference of circular wire $= 66 cm$

Radius of circular wire $= r$

$2\pi r = 66$

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

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

$r = \frac{21}{2} cm$

$\therefore$ Area $= \pi r^2$

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

$= 346.5 cm^2$

11

Solution) Area of equilateral triangle $= 121\sqrt{3}\ cm^2$

Side of triangle $= a$

$$\frac{\sqrt{3}}{4}a^2 = 121\sqrt{3}$$

$$a^2 = \frac{121\sqrt{3}\times 4}{\sqrt{3}}$$

$$a^2 = 484$$

$$a^2 = (22)^2$$

$$\therefore a = 22cm$$

Perimeter of wire $= 3a$

$= 3\times 22$

$= 66\ cm$

Circumference of circular wire $= 66cm$

Radius $= r$

$$2\pi r = 66$$

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

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

$$= \frac{21}{2}\ cm$$

Area of enclose by it $= \pi r^2$

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

$$= 346.5\ cm^2$$

12

Solution

Radii of two circle R and r

$$R+r=140$$
$$2\pi R-2\pi r=88$$
$$2\pi(R-r)=88$$
$$2\times\frac{22}{7}(R-r)=88$$
$$(R-r)=\frac{88\times7}{2\times22}$$
$$=14$$
$$\therefore (R+r)=140$$
$$(R-r)=14$$

Add,

$$2R=154$$
$$R=77$$

Sub

$$2r=126$$
$$r=\frac{126}{2}$$
$$=63$$

$\therefore$ Radii of two circle 77m and 63m.

13

Solution

The Radii of two circle : R and r

$$R+r=84$$
$$\pi R^2+\pi r^2=5544$$
$$\pi(R^2-r^2)=5544$$
$$\frac{22}{7}(R^2-r^2)=5544$$
$$R^2-r^2=\frac{5544\times7}{22}=21$$
$$R+r=84$$
$$R-r=21$$

Add :

$$2R = 105$$
$$R = \frac{105}{2}$$
$$= 52.5 cm$$

Sub .

$$2r = 63$$
$$r = \frac{63}{2}$$
$$= 31.5 cm$$

$\therefore$ Radii of two circle are 52.5 cm & 31.5 cm

14) Solution

The radii of two circle is R & r

$$R + r = 15 cm$$
$$\pi R^2 + \pi r^2 = 117\pi$$
$$\pi(R^2 + r^2) = 117\pi$$
$$R^2 + r^2 = 117$$
$$(R+r)^2 = (15)^2$$
$$R^2 + r^2 + 2Rr = 225$$
$$117 + 2Rr = 225$$
$$2Rr = 225 - 117$$
$$\therefore 2Rr = 108$$
$$(R-r)^2 = R^2 + r^2 - 2Rr$$
$$= 117 - 108$$
$$= 9$$
$$(R-r)^2 = (3)^2$$
$$(R-r) = 3 cm$$

Add $\Rightarrow 2R = 18$

$$R = \frac{18}{2}$$
$$= 9$$

Sub $\Rightarrow 2r = 12$

$$r = \frac{12}{2} = 6$$

Radii of two circle are 9 cm & 6 cm.

15

Solution | Radii of two circle

$R - r = 4cm$

Sum of their areas $= 170\pi$

$\pi R^2 + \pi r^2 = 170\pi$

$R^2 + r^2 = 170$

$R - r = 4$

$(R-r)^2 = (R+r)^2 - 2Rr$

$(4)^2 = 170 - 2Rr$

$16 = 170 - 2Rr$

$2Rr = 170 - 16$

$= 154$

$(R+r^2) = R^2 + r^2 + 2Rr$

$= 170 + 154$

$= 324$

$(R+r)^2 = (18)^2$

$R + r = 18$

Add.

$2R = 22$

$R = \frac{22}{7}$

$R = 11$

Sub

$2r = 14$

$r = \frac{14}{2}$

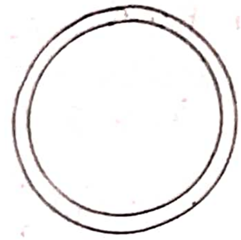
$r = 7$

Radii of circle are 11cm & 7cm.

16

Solution | Outer radius = 19 cm

inner radius = 16 cm



Area of ring = outer area - inner area

$= \pi R^2 - \pi r^2$

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

$= \frac{22}{7} (19^2 - 16^2)$

$= \frac{22}{7} \times (19+16) \times (19-16)$

$= \frac{22}{7} \times 35 \times 3$

$= 330 \text{ cm}^2$

17

Solution | the radii of outer circle and inner circle is R & r

$\pi r^2 = 962.5$

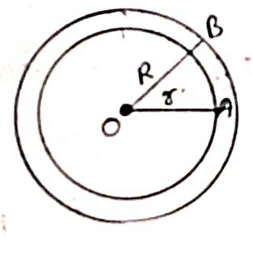
$\frac{22}{7} \times r^2 = 962.5$

$r^2 = \frac{962.5 \times 7}{22}$

$r^2 = 306.25$

$r^2 = (17.5)^2$

$\therefore r = 17.5 \text{ cm}$



$\pi R^2 = 1386$

$\frac{22}{7} \times R^2 = 1386$

$R^2 = \frac{1386 \times 7}{22}$

$R^2 = 441$

$R^2 = (21)^2$

$R = 21 \text{ cm}$

$\therefore$ width of ring $= R - r$

$= 21 - 17.5$

$= 3.5 \text{ cm}$

18

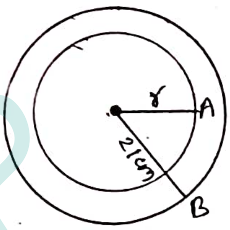
Solution | Radius of outer circle = 21 cm

~~radi~~ radius of inner circle = r

area of enclosed is between two concentric circle = $770\ cm^2$

Area of enclosed area between two concentric circle $= \pi R^2 - \pi r^2$

$$770 = \pi (R^2 - r^2)$$



$$770 = \frac{22}{7}(441 - r^2)$$

$$441 - r^2 = 770 \times \frac{7}{22}$$

$$441 - r^2 = 245$$

$$r^2 = 441 - 245$$

$$r^2 = 196$$

$$r^2 = (14)^2$$

$$r = 14\ cm$$

19

Solution | Area enclosed by two concentric circle = $808.5\ cm^2$

Circumference of outer circle = 242 cm.

The Radii of two circle is R and r.

$$2\pi R = 242$$

$$2 \times \frac{22}{7} \times R = 242$$

$$R = \frac{242 \times 7}{2 \times 22}$$

$$= \frac{77}{2}$$

$$= 38.5\ cm$$

$$\pi(R^2 - r^2) = 808.5$$
$$\frac{22}{7}(R^2 - r^2) = 808.5$$
$$R^2 - r^2 = \frac{808.5 \times 7}{22}$$
$$(38.5)^2 - r^2 = 257.25$$
$$1482.25 - r^2 = 257.25$$
$$r^2 = 1482.25 - 257.25$$
$$r^2 = 1225.00$$
$$r = \sqrt{1225}$$
$$\therefore \quad r = 35$$

(i) Radius of inner circle $= 35\text{cm}$

(ii) width of ring $= R - r$
$= 38.5 - 35.0$
$= 3.5\text{cm}$

20

Solution | Area of AOB + Area of COD $= 308\text{cm}^2$

the radius of circle $= r$.

$$\frac{1}{4}\pi r^2 + \frac{1}{4}\pi r^2 = 308$$
$$308 = \frac{1}{4}\pi r^2 + \frac{1}{4}\pi r^2$$
$$308 = \frac{1}{2}\pi r^2$$
$$308 = \frac{1}{2} \times \frac{22}{7} r^2$$
$$r^2 = \frac{308 \times 2 \times 7}{22}$$
$$r^2 = 196$$
$$r^2 = (14)^2$$
$$r = 14\text{ cm}$$

$\therefore$ Radius $= 14\text{cm}$ & diameter

$AC = 2 \times 14$
$= 28\text{cm}$

$\therefore$ Circumference of circle $= 2\pi r$
$= 2 \times \frac{22}{7} \times 14$
$= 88\text{ cm}.$

21]

Solution] Area $= 2 \times$ quadrant

$= \frac{1}{2} \pi r^2$

$= \frac{1}{2} \times 3.14 \times 8 \times 8$

$= 100.48 \text{ cm}^2$

Perimeter $= \frac{1}{2}$ of circumference $+ 4r$

$= \pi r + 4r$

$= r(\pi + 4)$

$= 8(3.14 + 4)$

$= 8 \times 7.14$

$= 57.12$ cm

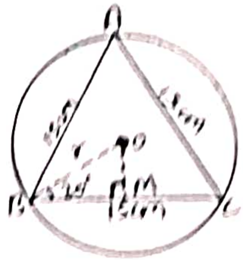
22]

Solution] $\triangle ABC$ is an equilateral & a circle with centre O is drawn to pass from vertices of triangle. Each side of triangle = 15cm

Join OB and draw $OM \perp BC$.

$\therefore$ In right $\triangle OBM$, $\angle OBM = \frac{60^\circ}{2}$

$= 30^\circ$



$\because OM \perp BC$

$BM = \frac{1}{2} BC$

$= \frac{15}{2}$ cm

$\cos\theta = \frac{BM}{OB}$

$OB = \frac{BM}{\cos\theta}$

$= \frac{BM}{\cos 30^\circ}$

$= \frac{7.5}{\frac{\sqrt{3}}{2}}$

$= \frac{7.5 \times 2}{\sqrt{3}}$

$\therefore OB = \frac{15\times\sqrt{3}}{\sqrt{3}\times\sqrt{3}}$

$= \frac{15\sqrt{3}}{3}$

$= 5\sqrt{3}$

Radius $= 5\sqrt{3}$ cm

Area of circle $= \pi r^2$

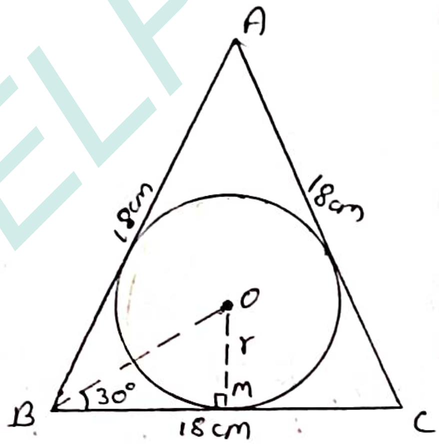
$= 3.14 \times (5\sqrt{3})^2$

$= 3.14 \times 75$

$= 235.5\ cm^2$

23] Solution] A circle is inscribed in equilateral triangle ABC each side is 18cm

Join OB & drawn $OM \perp BC$



$\therefore O\angle M = \frac{60°}{2}$

$= 30°$

$\because OM \perp BC$

$\therefore BM = \frac{1}{2}$

$BC = \frac{18}{2}$

$= 9cm$

In right $\triangle OBM$, $\tan 30° = \frac{OM}{BM}$

$OM = BM \tan 30°$

$OM = \frac{1}{\sqrt{3}} \times 9$

$= \frac{9\times\sqrt{3}}{\sqrt{3}\times\sqrt{3}}$

$= \frac{9\sqrt{3}}{3} = 3\sqrt{3}$ cm

$\therefore$ Area of incircle $= \pi r^2$

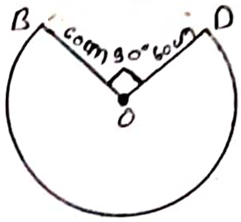
$= 3.14 \times (3\sqrt{3})^2$

$= 3.14 \times 27$

$= 84.78\ cm^2$

24

Solution | Radius of circular Segment = 60 cm



$\angle BOD = 360° - 90°$

$= 270°$

(i) $\therefore$ Area of top of table $= \pi r^2 \times \frac{270°}{360°}$

$= 3.14 \times 60 \times 60 \times \frac{270°}{360°}$

$= 3.14 \times 60 \times 60 \times \frac{3}{4}$

$= 8478 \text{ cm}^2$

(ii) Perimeter $= 2\pi r \times \frac{270°}{360°} + 2r$

$= 2 \times 3.14 \times 60 \times \frac{3}{4} + 2 \times 60$

$= 3.14 \times 90 + 120$

$= 282.6 + 120$

$= 402.6 \text{ cm}$

25

Solution | Each Side of Square = 5 cm

Radius of circumcircle $= \frac{1}{2} \times$ diagonal

$= \frac{1}{2} \times \sqrt{2} \times \text{Side}$

$= \frac{\sqrt{2}}{\sqrt{2}} \times 5$

$= \frac{5\sqrt{2}}{2} \text{ cm}$

Area of circle $= \pi r^2$

$= 3.14 \times \left[\frac{5\sqrt{2}}{2}\right]^2$

$= 3.14 \times \left[\frac{25 \times 2}{4}\right]$

$= 3.14 \times \frac{25}{2}$

$= 39.25 \text{ cm}^2$

Area of Square $= (\text{Side})^2$

$= (5)^2$

$= 25 \text{ cm}^2$

$\therefore$ Area of Shaded region $= 39.25 - 25.00$

$= 14.25 \text{ cm}^2$

26

Solution | In circle side of rectangle are 8 cm & 6 cm.

(i) Radius of circle $= \frac{1}{2} \times$ diagonal of rectangle

$$= \frac{1}{2}\sqrt{l^2+b^2}$$

$$= \frac{1}{2}\sqrt{8^2+6^2}$$

$$= \frac{1}{2}\sqrt{(64+36)}$$

$$= \frac{1}{2} \times \sqrt{100}$$

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

$$= 5\text{ cm}$$

(ii) Area of circle $= \pi r^2$

$$= 3.14 \times (5)^2$$

$$= 3.14 \times 25$$

$$= 78.5\text{ cm}^2$$

Area of rectangle $= l \times b$

$$= 8 \times 6$$

$$= 48\text{ cm}^2$$

$\therefore$ Area of Shaded region $= 78.5 - 48.0$

$$= 30.5\text{ cm}^2$$

27)

Solution) Given, figure

Diameter of Semicircle $ED = 14cm$

$\therefore$ Radius $= \frac{14}{2}$

$= 7cm$

$\therefore AB = BC = CD = AE = 7\ cm$

Length of rectangle $ACDE = 14cm$

breadth of rectangle $= 7cm$

$\therefore$ Area of rectangle $= l \times b$

$= 14 \times 7$

$= 98cm^2$

$\therefore$ Area of each of two quadrant $= \frac{1}{4}\pi r^2$

$= \frac{1}{4}\pi(7)^2$

$\therefore$ Area of two quadrant $= 2 \times \frac{1}{4}\pi 49\ cm^2$

$= \pi \frac{49}{2}\ cm^2$

$\therefore$ Area of Semicircle $= \frac{1}{2}\pi(49)$

$= \frac{49}{2}\pi cm^2$

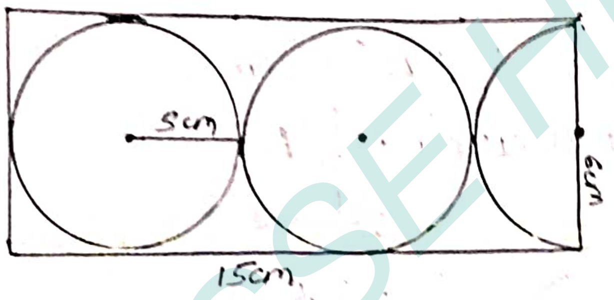
$\therefore$ Area of Shaded region $=$ area of semicircle $+$ area of rectangle $-$ area of two quadrant

$= \frac{49}{2} \times \frac{22}{7} + 98 - \frac{49}{2} \times \frac{22}{7}$

$= 77 + 98 - 77$

$= 98cm^2$

28 Solution



Radius of each circle $= 3cm$

$\therefore$ Diameter $= 2 \times 3$
$= 6cm$

$\therefore$ Length of rectangle $= 6 + 6 + 3$
$= 15cm$

breadth of rectangle $= 6 cm$

area of rectangle $= l \times b$
$= 15 \times 6$
$= 90cm^2$

area of $2\frac{1}{2}$ circle $= \frac{5}{2} \pi r^2$
$= \frac{5}{2} \times 3.14 \times 3 \times 3$
$= 5 \times 1.57 \times 9$
$= 70.65 cm^2$

$\therefore$ Area of unshaded portion $= 90 - 70.65$
$= 19.35 cm^2$

29 Solution

ABC is equilateral triangle which side $= 14cm$

Radius of semicircle $= \frac{14}{2}$
$= 7cm$

$\therefore$ Area of shaded portion $=$ area of semicircle $+$ area of equilateral triangle.

$= \frac{1}{2} \pi r^2 + \frac{\sqrt{3}}{4} a^2$

$= \frac{1}{2} \times \frac{22}{7} \times 7 \times 7 + \frac{1.732}{4} \times 14 \times 14$

$= 77 + 84.868$

$= 161.868 cm^2$

30

Solution: Radius is bigger circle $AO = 7cm$

Radius of Small circle $= \frac{1}{2} AO$

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

$= 3.5cm$

Area of Smaller circle $= \pi r^2$

$= \frac{22}{7} \times (3.5)^2$

$= 22 \times 0.5 \times 3.5$

$= 38.5cm^2$

Area of Semicircle $= \frac{1}{2} \pi r^2$

$= \frac{1}{2} \times \frac{22}{7} \times (7)^2$

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

$= 11 \times 7$

$= 77cm^2$

Area of triangle $\Delta CDB = \frac{1}{2} \times CD \times OB$

[$\because$ Area of $\Delta = \frac{1}{2} \times B \times$ Altitude]

$= \frac{1}{2} \times 14 \times 7$

$= 49cm^2$

[$\because CD = 2 \times AO$

$AO = OB$]

$\therefore$ Area of Shaded portion = Area of Small circle + Area of Semicircle − Area of ΔCDD

$= 38.5 + 77 - 49$

$= 115.5 - 49$

$= 66.5cm^2$

31

Solution Radius of circle = 6cm

$PQ = QR = RS = \frac{12}{3} = 4cm$

$PS = 2r$

$= 2 \times 6$

$= 12 cm$

(i) Area of circle $= \pi r^2$

$= 3.14 \times (6)^2$

$= 3.14 \times 36$

$= 113.04 cm^2$

Area of Semicircle PBQ $= \frac{1}{2} \pi \left[\frac{1}{2} PQ\right]^2$

$= \frac{1}{2} \times 3.14 \times \left[\frac{4}{2}\right]^2$

$= \frac{1}{2} \times 3.14 \times 4$

$= 6.28 cm^2$

Area of Semi-circle PTS $= \frac{1}{2} \pi (6)^2$

$= \frac{1}{2} \times 3.14 \times 36$

$= 56.52 cm^2$

Area of Semi-circle QES $= \frac{1}{2} \pi \left[\frac{1}{2} QS\right]^2$

$= \frac{1}{2} (3.14) \left[\frac{8}{2}\right]^2$

$= \frac{1}{2} \times 3.14 \times 4 \times 4$

$= 25.12 cm^2$

∴ Area of Shaded portion = Area of Semi-circle PBQ + area of Semi-circle PTS − area of semicircle QES

$= 6.28 + 56.52 - 25.12$

$= 62.80 - 25.12$

$= 37.68 cm^2$

(ii) Perimeter of shaded portion = length of [arc PTS + arc PBQ + arc QES

$= \frac{1}{2} \times 2\pi \times \frac{PS}{2} + \frac{1}{2} \times 2\pi \times \left[\frac{PQ}{2}\right] + \frac{1}{2} \times 2\pi \times \left[\frac{QS}{2}\right]$

$= 3.14 \times 6 + 3.14 \times 2 + 3.14 \times 4$

$= 3.14 (6 + 2 + 4)$

$= 3.14 \times 12$

$= 37.68 cm$

32]

Solution] ABCD is trapezium in which $AB \parallel DC$.

$\angle ABC = 90°$, $DC = BC = 4.2 cm$ & $AE = 2 cm$

$\therefore AB = AE + EB = AE + BC$

$= 2 + 4.2$

$= 6.2 cm$

Area of trapezium $= \frac{1}{2} (AB + DC) \times BC$

$= \frac{1}{2} (6.2 + 4.2) \times 4.2$

$= \frac{1}{2} \times 10.4 \times 4.2$

$= 21.84 cm^2$

Radius of quarter circle $= BC$

$= 4.2 cm$

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

$= \frac{1}{2} \times \frac{22}{7} \times 4.2 \times 4.2$

$= 13.86 cm^2$

$\therefore$ Area of shaded portion $= 21.84 - 13.86$

$= 7.98 cm^2$

33

Solution Side of Square = 4 cm

$\therefore$ Area of Square $= (\text{Side})^2$

$= (4)^2$

$= 16 cm^2$

Radius of each quadrant = 1 cm

$\therefore$ Area of 4 quadrants $= 4 \times \frac{1}{4} \pi r^2$

$= 3.14 \times 1^2$

$= 3.14 cm^2$

$\therefore$ Area of central circle $= \pi r^2$

$= 3.14 \times (1)^2$

$= 3.14 cm^2$

$\therefore$ Area of shaded portion = Area of Square − Area of 4 quadrants − area of central circle

$= 16 - (3.14 + 3.14)$

$= 16 - 6.28$

$= 9.72 cm^2$

(ii) Perimeter of shaded portion = length of arcs of 4 quadrant + Circumference of circle + 2 × 4

$= 4 \times \frac{1}{2}(2\pi r) + 2\pi r + 2 \times 4$

$= 2\pi r + 2\pi r + 8$

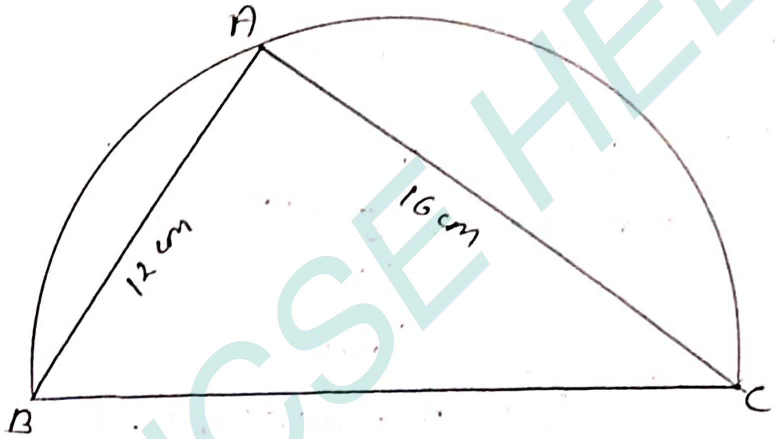
$= 4\pi r + 8$

$= 4 \times 3.14 \times 1 + 8$

$= 12.56 + 8$

$= 20.56 cm$

39
Solution



$\because$ ABC is right triangle whose $\angle A = 90°$

[Angle in Semicircle]

$\therefore BC^2 = AB^2 + AC^2$
$= (12)^2 + (16)^2$
$= 144 + 256$
$BC = 20\,cm$

Radius of Semicircle $= \frac{1}{2} \times BC$
$= \frac{1}{2} \times 20$
$= 10\,cm$

(i) Area of Semicircle $= \frac{1}{2}\pi r^2$
$= \frac{1}{2} \times 3.142 \times (10)^2$
$= \frac{1}{2} \times 3.142 \times 100$
$= 157.1\,cm^2$

Area of triangle $= \frac{1}{2} \times AB \times AC$
$= \frac{1}{2} \times 12 \times 16$
$= 96\,cm^2$

$\therefore$ Area of Shaded portion $= 157.1 - 96.0$
$= 61.1\,cm^2$

(ii) Circumference of Semicircle $= \pi r$
$= 3.142 \times 10$
$= 31.42\,cm$

$\therefore$ Perimeter of Shaded portion $= 31.42 + 12 + 16$
$= 59.42\,cm$

35)

Solution | ABCP is quadrant of radius 14 cm.
AQC is semicircle on AC as diameter.

$\therefore$ Area of Shaded portion = Area of Semicircle + area of ΔABC − area of quadrant

Area of $\Delta ABC = \frac{1}{2} \times 14 \times 14$

$= 98 cm^2$

Area of quadrant $= \frac{1}{4}\pi r^2$

$= \frac{1}{4} \times \frac{22}{7} \times 14 \times 14$

$= 154 cm^2$

Length of AC $= \sqrt{AB^2 + BC^2}$

$= \sqrt{14^2 + 14^2}$

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

Area of semicircle $= \frac{1}{2}\pi r^2$

$= \frac{1}{2} \times \frac{22}{7} \times (7\sqrt{2})$

$= \frac{1}{2} \times \frac{22}{7} \times 49 \times 2$

$= 154 cm^2$

$\therefore$ Area of Shaded portion $= 154 + 98 - 154$

$= 98 cm^2$

36)

Solution | ABCD is Square of Side = 14 cm
Radius of each quadrant = 7 cm

$\therefore$ Area of Square $= (a)^2$

$= (14)^2$

$= 196 cm^2$

Area of 4 quadrants $= 4 \times \frac{1}{2}\pi r^2$

$= \pi r^2$

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

$= 154 cm^2$

$\therefore$ Area of Shaded portion = Area of Square − area of 4 quadrants

$= 196 - 154$

$= 42 cm^2$

37]
Solution] Side of Square ABCD = 7cm

∴ Radius of each circle at the vertices of Square = 3.5cm

area of shaded portion = Area of four circle + area of Square − area of 4 quadrants at vertices

$= 4 \times \pi r^2 + a^2 - 4 \times \frac{1}{4} \pi r^2$

$= 4\pi r^2 - \pi r^2 + a^2$

$= 3\pi r^2 + a^2$

$= 115.5 + 49.0$

$= 164.5 cm^2$

38]
Solution] Inside perimeter = 312m

∴ Inner circumference of each semicircle $= \frac{312 - (90+90)}{2}$

$= \frac{312 - 180}{2}$

$= \frac{132}{2}$

$= 66m$

∴ Inner radius $= \frac{66 \times 7}{22}$

$= 21m$

diameter $= 21 \times 2$

$= 42m$

width of track = 2m

Outer radius $= 21 + 2$

$= 23 m$

Outer diameter $= 23 \times 2$

$= 46m$

∴ Outer area = Area of outer semicircle + area of outer rectangle.

$= 2 \times \frac{1}{2} \pi (R)^2 + 90 \times 46$

$= \left[\frac{22}{7} \times 23 \times 23 + 90 \times 46\right]$

$= 1662.57 + 4140$

$= 5802.57 m^2$

$\therefore$ Inner area = Area of two inner semicircle − Area of inner rectangle.

$$= 2 \times \frac{1}{2} \pi r^2 + 90 \times 42$$

$$= \frac{22}{7} \times 21 \times 21 + 3780$$

$$= 1386 + 3780$$

$$= 5166 m^2$$

Area of path = Outer area − Inner area

$$= 5802.57 - 5166$$

$$= 636.57 m^2$$

39]

Solution] Daiameter of wheel = 1.26m

$\therefore$ Its circumference $= \pi d$

$$= \frac{22}{7} \times 1.26$$

$$= 3.96m$$

$\therefore$ In one revolution, it travels = 3.96m

$\triangle$ in 500 revolution it will travel

$$= 3.96 \times 500$$

$$= 1980 m$$

40

Solution) Circumference of wheel $= 4\frac{2}{7}$

$= \frac{30}{7} m$

$\therefore$ 7 revolutions in 3 seconds

In 1 hour it makes revolutions

$= \frac{7}{3} \times 60 \times 60$

$= 8400$

$\therefore$ Distance in 8400 revolution $= \frac{30}{7} \times 8400$

$= 3600 m$

$\therefore$ Speed $= \frac{36000}{1000}$ Km/h

$= 36$ Km/h

41

Solution) Diameter of toothed wheel $= 50 cm$

$\therefore$ Circumference $= \pi d$

$= \frac{22}{7} \times 50$

$= \frac{1100}{7} cm$

Distance covered in 30 revolution

$= \frac{1100}{7} \times 30$

$= \frac{33000}{7} cm$

$\therefore$ Distance covered by the Small wheel

$= \frac{33000}{7} cm$

Diameter of Smaller wheel = 30 cm

$\therefore$ Circumference $= d\pi$

$= 30 \times \frac{22}{7}$

$= \frac{660}{7}$ cm

$\therefore$ Number of revolution $= \frac{33000}{7} \div \frac{660}{7}$

$= \frac{33000}{7} \times \frac{7}{660}$

$= 50$

42]

Solution]

1000 revolution,

The total distance covered = 88 Km

$\therefore$ Distance covered In 1 revolution

$= \frac{88}{1000}$

$= \frac{88 \times 1000}{1000}$

$= 88 m$

$\therefore$ Circumference of wheel = 88 m

Radius of wheel $= r$

$2\pi r = 88$

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

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

$r = 14 m$