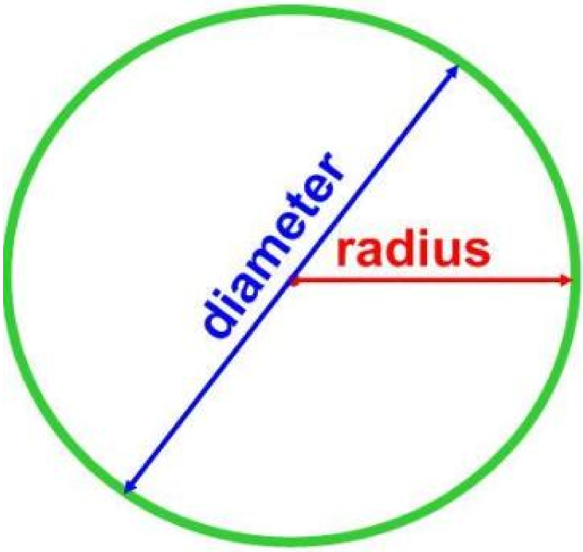
Areas Of Circle, Sector & Segment

Exercise 18



Area of a circle
= π x **radius**^{2}

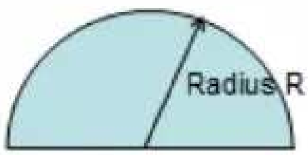
Circumference of a circle = π x **diameter**

remember that the
diameter = 2 x radius

AREA OF A SEMICIRCLE

- A semicircle is just **half of a circle**. To find the area of a semicircle we just take **half of the area of a circle**.
- So, the formula for the area of a semicircle is:

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



AREA OF A SECTOR

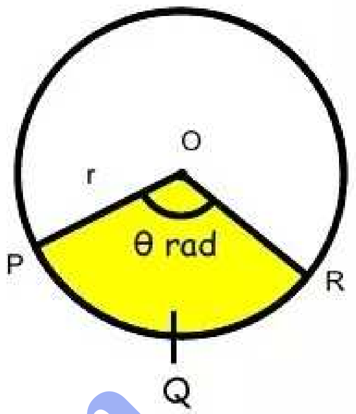
The area of a sector, A is proportional to the angle subtended at the centre of the circle.

$$\frac{\text{Area of sector OPQR}}{\text{Area of circle}} = \frac{\theta}{2\pi}$$

$$\frac{A}{\pi r^2} = \frac{\theta}{2\pi}$$

$$A = \frac{\theta}{2\pi} \times \pi r^2$$

$$A = \frac{1}{2} r^2 \theta$$



Measurement of area of sector of a circle in Radian

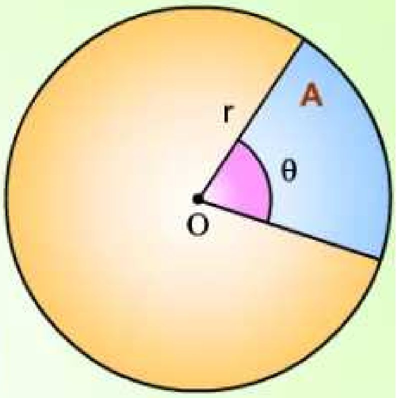
In general, if the angle of a sector, θ, is measured in degree,

then the **area of the sector**, $A = \frac{\theta}{360} \times \pi r^2$

If θ is measured in **radians**,

then the area of the sector, $A = \frac{\theta}{2\pi} \times \pi r^2$ $\quad$ $2\pi \text{ rad} = 360^\circ$

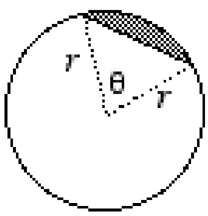
$\therefore$ $A = \frac{1}{2} r^2 \theta$



Segment of a Circle
(shaded)

$$\text{Area} = \frac{1}{2} r^2 (\theta - \sin\theta) \quad \text{(radians)}$$

$$= \frac{1}{2} r^2 \left(\frac{\pi}{180} \theta - \sin\theta \right) \quad \text{(degrees)}$$



Question 1:

Radius = $\frac{Diameter}{2} = \frac{35}{2} cm$

Circumference of circle = 2πr = $\left(2 \times \frac{22}{7} \times \frac{35}{2}\right) cm$ = 110 cm

∴ Area of circle = πr^2 = $\left(\frac{22}{7} \times \frac{35}{2} \times \frac{35}{2}\right)$ cm^2

= 962.5 cm^2

Question 2:

Circumference of circle = 2πr = 39.6 cm

$$\Rightarrow 2 \times \frac{22}{7} \times r = 39.6$$

$$r = \left(39.6 \times \frac{7}{44}\right) cm = 6.3$$

$$r = 6.3 \text{ cm}$$

$$\text{Area of circle} = \pi r^2 = \left(\frac{22}{7} \times 6.3 \times 6.3\right) cm^2$$

$$= 124.74 \text{ cm}^2$$

Question 3:

Area of circle = πr^2 = 301.84

$$\Rightarrow r^2 = 301.84 \times \frac{7}{22} = 96.04$$

$$r = \sqrt{96.04} \text{ cm} = 9.8 \text{ cm}$$

Circumference of circle = 2πr = $\left(2 \times \frac{22}{7} \times 9.8\right)$ = 61.6 cm

Question 4:

Let radius of circle be r

Then, diameter = 2 r

circumference – Diameter = 16.8

$$\Rightarrow 2\pi r - 2r = 16.8$$

$$\Rightarrow \frac{44}{7} r - 2r = 16.8$$

$$\Rightarrow \frac{30r}{7} = 16.8 \Rightarrow r = \frac{16.8 \times 7}{30} = 3.92 \text{ cm}$$

Circumference of circle = 2πr = $\left(2 \times \frac{22}{7} \times 3.92\right)$ cm = 24.64 cm

Question 5:

Let the radius of circle be r cm

Then, circumference – radius = 37 cm

$$2\pi r - r = 37$$

$$\frac{44r}{7} - r = 37$$

$$\frac{37r}{7} = 37 \Rightarrow r = \frac{37 \times 7}{37} = 7 \text{ cm}$$

$$\text{Area of circle} = \pi r^2 = \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$$

Question 6:

Area of square = $(\text{side})^2$ = 484 cm^2

⇒ side = $\sqrt{484cm}$ = 22 cm

Perimeter of square = 4 × side = 4 × 22 = 88 cm

Circumference of circle = Perimeter of square

$$2\pi r = 88\text{cm} \Rightarrow r = \frac{88 \times 7}{2 \times 22} = 14 \text{ cm}$$

$$\text{Area of circle} = \pi r^2 = \left(\frac{22}{7} \times 14 \times 14\right)\text{cm}^2 = 616\text{cm}^2$$

Question 7:

Area of equilateral = $\frac{\sqrt{3}}{4}a^2$ = 121√3

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

$$a^2 = 484 \Rightarrow a = \sqrt{484}$$

$$a = 22 \text{ cm}$$

Perimeter of equilateral triangle = 3a = (3 × 22) cm

= 66 cm

Circumference of circle = Perimeter of circle

2πr = 66

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

⇒ r = 10.5 cm

Area of circle = πr^2 = $\left(\frac{22}{7} \times 10.5 \times 10.5\right)$ cm^2

= 346.5 cm^2

Question 8:

Let the radius of park be r meter

$$\text{Thus, } \pi r + 2r = 90 \Rightarrow \frac{22r}{7} + 2r = 90$$

$$\Rightarrow \frac{36r}{7} = 90 \Rightarrow r = \frac{90 \times 7}{36}$$

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

$$\text{Area of semicircle} = \frac{1}{2}\pi r^2 = \left(\frac{1}{2} \times \frac{22}{7} \times 17.5 \times 17.5\right) m^2$$

$$= 481.25 \ m^2$$

Question 9:

Let the radii of circles be x cm and (7 – x) cm

Then,

$$2\pi x - [2\pi(7 - x)] = 8$$
$$2\pi x - [14\pi - 2\pi x] = 8$$
$$2\pi x - 14\pi + 2\pi x = 8$$
$$4\pi x - 14\pi = 8$$
$$2\pi x = 4 + 7\pi$$
$$2\pi x = 4 + 22$$
$$2\pi x = 26$$

Substitute the value of $2\pi x$ in $2\pi(7 - x)$

$$= 14\pi - 2\pi x = 14 \times \frac{22}{7} - 26$$
$$= 44 - 26 = 18 \text{ cm}$$

Circumference of the circles are 26 cm and 18 cm

Question 10:

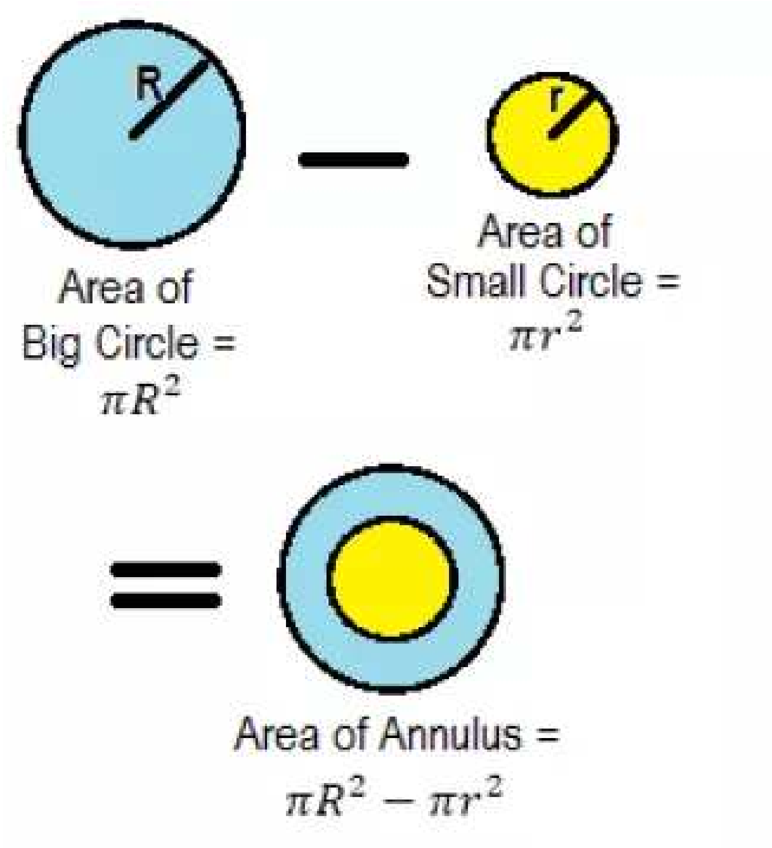
Area of first circle = πr^2 = 962.5 cm^2

$$r^2 = \left(962.5 \times \frac{7}{22}\right) cm$$
$$r^2 = 306.25$$
$$r = 17.5 \text{ cm}$$

Area of second circle = πR^2 = 1386 cm^2

$$R^2 = \left(1386 \times \frac{7}{22}\right) cm$$
$$R^2 = 441$$
$$\Rightarrow R = 21 \text{ cm}$$

Width of ring R – r = (21 – 17.5) cm = 3.5 cm



Question 11:

Area of outer circle = πr_1^2 = $\left(\frac{22}{7} \times 23 \times 23\right)$ cm^2
= 1662.5

Area of inner circle = πr_2^2 = $\left(\frac{22}{7} \times 12 \times 12\right)$ cm^2
= 452.2 cm^2

Area of ring = Outer area – inner area
= (1662.5 – 452.5) cm^2 = 1210 cm^2

Question 12:

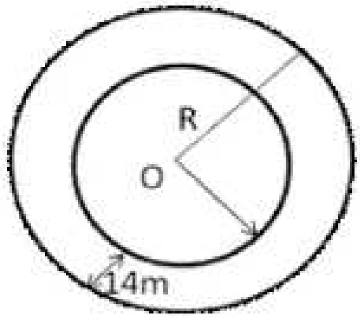
Inner radius of the circular park = 17 m
Width of the path = 8 m
Outer radius of the circular park = (17 + 8)m = 25 m
Area of path = $\pi[(25)^2-(17)^2]$ = cm^2

$$= \pi(25+17)(25-17)\text{m}^2$$
$$= \left[\frac{22}{7} \times 42 \times 8\right]\text{m}^2$$

Area = 1056 m^2

Question 13:

Let the inner and outer radii of the circular tacks be r meter and R meter respectively. Then
Inner circumference = 440 meter



$\Rightarrow 2\pi r = 440$

$2 \times \frac{22}{7} \times r = 440$

$\Rightarrow r = 70$ m

Since the track is 14 m wide every where.
Therefore,
Outer radius R = r + 14m = (70 + 14) m = 84 m
Outer circumference = 2πR
= $\left(2 \times \frac{22}{7} \times 84\right) m$ = 528 m
Rate of fencing = Rs. 5 per meter
Total cost of fencing = Rs. (528 × 5) = Rs. 2640
Area of circular ring = $\pi R^2 - \pi r^2$

$$= \pi\left(84^2 - 70^2\right) = \frac{22}{7} \times 2156 = 6776\ m^2$$

Cost of levelling = Rs 0.25 per m2
Cost of levelling the track = Rs(6776 × 0.25) = Rs. 1694

Question 14:
Let r m and R m be the radii of inner circle and outer boundaries respectively.
Then, 2r = 352 and 2R = 396

$$r = \frac{352}{2\pi},\ R = \frac{396}{2\pi}$$

Width of the track = (R − r) m

$$= \left(\frac{396}{2\pi} - \frac{352}{2\pi}\right) m = \left(\frac{44}{2\pi}\right) m$$
$$= \left(\frac{44}{2} \times \frac{7}{22}\right) m = 7\ m$$

Area the track = $\pi(R^2 - r^2) = \pi(R+r)(R-r)$

$$= \left[\pi\left(\frac{352}{2\pi} + \frac{396}{2\pi}\right) \times 7\right] m^2$$

$$= \left[\left(\pi \times \frac{748}{2\pi}\right) \times 7\right] m^2 = (374 \times 7) m^2$$

$$= 2618\ m^2$$

Question 15:

Area of rectangle = (120 × 90)

= 10800 m^2

Area of circular lawn = [Area of rectangle – Area of park excluding circular lawn]

= [10800 – 2950] m^2 = 7850 m^2

Area of circular lawn = 7850 m^2

⇒ $\pi r^2 = 7850\ m^2$

$$3.14 \times r^2 = 7850\ m^2$$

$$r^2 = \left(\frac{7850}{3.14}\right) m^2$$

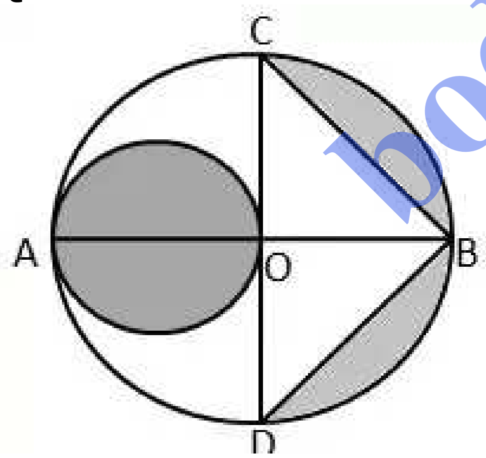
$$= 2500\ m^2$$

$$r = \sqrt{2500}\ m$$

or $r = 50\ m$

Hence, radius of the circular lawn = 50 m

Question 16:



Area of the shaded region = (area of circle with OA as diameter) + (area of semicircle ΔDBC) – (area of ΔBCD)

Area of circle with OA as diameter = πr^2

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

$$= 38.5\ m^2$$

OB = 7 cm, CD = AB = 14 cm

Area of semicircle ΔDBC = $\frac{1}{2}\pi r^2 - \left(\frac{1}{2}\times\frac{22}{7}\times 7\times 7\right)cm^2$

= 72

$$\text{Area of } \Delta BCD = \frac{1}{2}\times DC\times OB$$

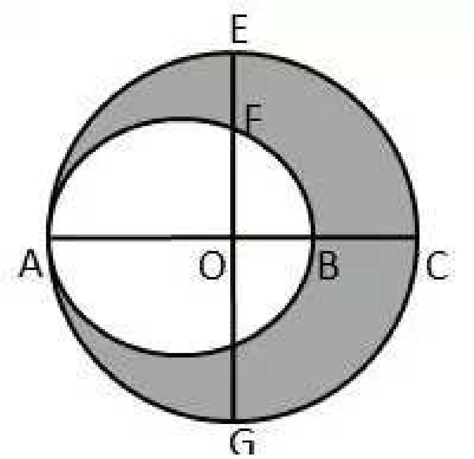
$$= \frac{1}{2}\times 14\times 7$$

$$= 49 cm^2$$

$$\text{Area of shaded region} = (38.5 + 77 - 49)$$

$$= 66.5 cm^2$$

Question 17:



Diameter of bigger circle = AC = 54 cm

Radius of bigger circle = $\frac{AC}{2}$

= $\left(\frac{54}{2}\right)$ cm = 27 cm

Diameter AB of smaller circle = AC – BC = 54-10 = 44 cm

Radius of smaller circle = $\frac{44}{2}$ cm = 22 cm

Area of bigger circle = πR^2 = $\left(\frac{22}{7}\times 27\times 27\right)$ cm^2

= 2291. 14 cm^2

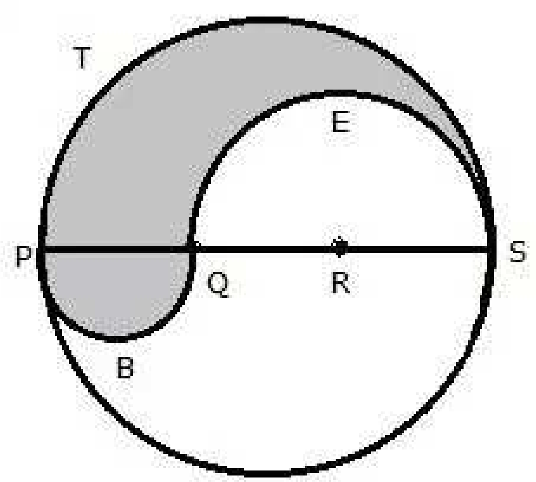
Area of smaller circle = πr^2 = $\left(\frac{22}{7}\times 22\times 22\right)$ cm^2

= 1521. 11 cm^2

Area of shaded region = area of bigger circle – area of smaller circle

= (2291. 14 – 1521. 11) cm^2 = 770 cm^2

Question 18:



PS = 12 cm
PQ = QR = RS = 4 cm, QS = 8 cm
Perimeter = arc PTS + arc PBQ + arc QES

$= (\pi \times 6 + \pi \times 2 + \pi \times 4)\,cm$

$= 12\pi\ cm$

$= 12\pi = 12 \times 3.14\ cm$

$= 37.68\ cm$

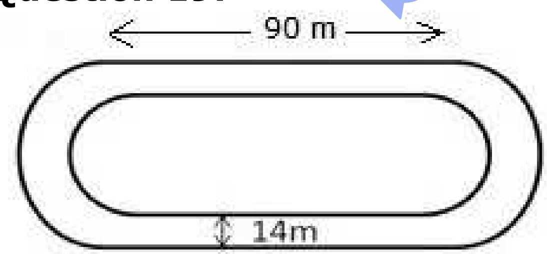
Area of shaded region = (area of the semicircle PBQ) + (area of semicircle PTS)-(Area of semicircle QES)

$= \left[\frac{1}{2}\pi \times (2)^2 + \frac{1}{2} \times \pi \times (6)^2 - \frac{1}{2} \times \pi \times (4)^2\right] cm^2$

$= [2\pi + 18\pi - 8\pi] = 12\pi\ cm^2 = (12 \times 3.14)\,cm^2$

$= 37.68\ cm^2$

Question 19:



Length of the inner curved portion
= (400 − 2 × 90) m
= 220 m
Let the radius of each inner curved part be r

$$\text{Then, } \frac{22}{7} \times r = 110 \text{ m}$$

$$r = \left(110 \times \frac{7}{22}\right) \text{m} = 35 \text{ m}$$

Inner radius = 35 m, outer radius = (35 + 14) = 49 m
Area of the track = (area of 2 rectangles each 90 m × 14 m) + (area of circular ring with R = 49 m, r = 35 m

$$= \left[2 \times 90 \times 14 + \frac{22}{7}\left\{(49)^2 - (35)^2\right\}\right] m^2$$

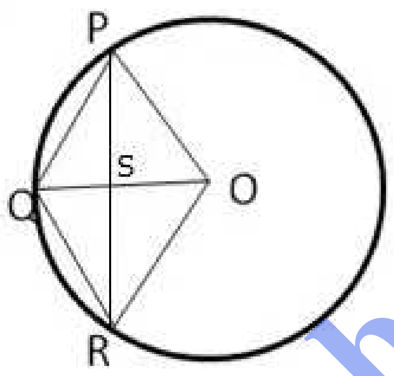
$$= \left[2520 + \frac{22}{7}(49+35)(49-35)\right] m^2$$

$$= [2520 + 3696] m^2 = 6216 \text{ m}^2$$

Length of outer boundary of the track

$$= \left[2 \times 90 + 2 \times \frac{22}{7} \times 49\right] m = 488 \text{ m}$$

Question 20:



OP = OR = OQ = r
Let OQ and PR intersect at S
We know the diagonals of a rhombus bisect each other at right angle.

Therefore we have

$$OS = \frac{1}{2}r \text{ and } \angle OSR = 90^\circ$$

$$\therefore SR = \sqrt{OR^2 - OS^2}$$

$$= \sqrt{r^2 - \frac{r^2}{4}} = \frac{\sqrt{3}r}{2}$$

$$\therefore PR = 2 \times SR = \sqrt{3}r$$

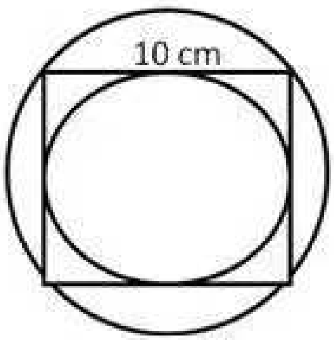
$$\text{Area of rhombus} = \frac{1}{2} \times OQ \times PR$$

$$= \frac{1}{2} \times r \times \sqrt{3}r = \frac{\sqrt{3}r^2}{2}$$

$$\therefore \frac{\sqrt{3}r^2}{2} = 32\sqrt{3} \Rightarrow r^2 = \frac{32\sqrt{3}}{\sqrt{3}} \times 2 = 64cm$$

$$r = 8 \text{ cm}$$

Question 21:
Diameter of the inscribed circle = Side of the square = 10 cm
Radius of the inscribed circle = 5 cm

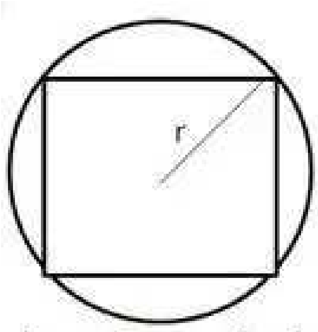


Diameter of the circumscribed circle
= Diagonal of the square
= $(\sqrt{2} \times 10)$ cm
Radius of circumscribed circle = $5\sqrt{2}$ cm

(i) Area of inscribed circle = $\left(\frac{22}{7} \times 5 \times 5\right)$ = 78.57 cm^2

(ii) Area of the circumscribed circle $= \left(\frac{22}{7} \times 5\sqrt{2} \times 5\sqrt{2}\right) = 157.14 cm^2$

Question 22:
Let the radius of circle be r cm



Then diagonal of square = diameter of circle = 2r cm

Area of the circle = πr^2 cm^2

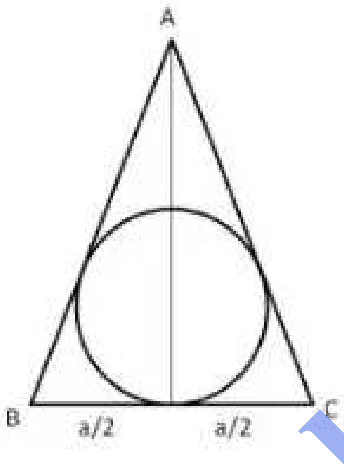
$$\text{Area of square} = \frac{1}{2} \times (\text{diagonal})^2$$

$$= \frac{1}{2} \times 4r^2 = 2r^2 \text{ cm}$$

$$\text{Ratio} = \frac{\text{Area of circle}}{\text{Area of square}} = \frac{\pi r^2}{2r^2} = \frac{\pi}{2} = (\pi : 2)$$

Question 23:

Let the radius of circle be r cm



Then, $\pi r^2 = 154$

$\Rightarrow \quad r^2 = \left(154 \times \frac{7}{22}\right)$

$\Rightarrow \quad r = 7 \text{ cm}$

Let each side of the triangle be a cm

And height be h cm

Then, $r = \frac{h}{3}$

$\Rightarrow \quad h = 3r = 21$ cm

$h = \sqrt{a^2 - \frac{a^2}{4}} = \frac{\sqrt{3a^2}}{2} = \frac{\sqrt{3}a}{2} = 21$

$a = \frac{42}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 14\sqrt{3}$ cm

Perimeter $= 3a = \left(3 \times 14 \times \sqrt{3}\right) = (42 \times 1.73)$ cm

$= 72.66$ cm

Question 24:
Radius of the wheel = 42 cm

Circumference of wheel = 2πr = $\left(2 \times \frac{22}{7} \times 42\right)$ = 264 cm
Distance travelled = 19.8 km = 1980000 cm

Number of revolutions = $\frac{1980000}{264}$ = 7500

Question 25:
Radius of wheel = 2.1 m

Circumference of wheel = 2πr = $\left(2 \times \frac{22}{7} \times 2.1\right)$ = 13.2 m
Distance covered in one revolution = 13.2 m
Distance covered in 75 revolutions = (13.2 × 75) m = 990 m
= $\frac{990}{1000}$ km

Distance a covered in 1 minute = $\frac{99}{100}$ km

Distance covered in 1 hour = $\frac{99}{100} \times 60$ km = 59.4 km

Question 26:
Distance covered by the wheel in 1 revolution

$$= \left(\frac{4.95 \times 1000 \times 100}{2500}\right) \text{cm} = 198 \text{ cm}$$

The circumference of the wheel = 198 cm
Let the diameter of the wheel be d cm

Then, $\pi d = 198 \Rightarrow \frac{22}{7} \times d = 198$

$\Rightarrow \quad d = \frac{198 \times 7}{22} = 63$ cm

Hence diameter of the wheel is 63 cm

Question 27:

Radius of the wheel = r = $\frac{60}{2}$ = 30 cm

Circumference of the wheel = 2πr = $\left(2 \times \frac{22}{7} \times 30\right) = \frac{1320}{7}$ cm
Distance covered in 140 revolution

$= \left(\frac{1320}{7} \times 140\right) cm = (1320 \times 20) cm$

$= 26400 cm = \frac{26400}{100} m = 264 m = \frac{264}{1000} km$

Distance covered in one hour = $\frac{264}{1000} \times 60$ = 15.84 km

Question 28:
Distance covered by a wheel in 1minute

$= \left(\frac{72.6 \times 1000 \times 100}{60}\right) cm = 121000 \ cm$

Circumference of a wheel = 2πr = $\left(2 \times \frac{22}{7} \times 70\right)$ = 440 cm
Number of revolution in 1 min = $\frac{121000}{440}$ = 275

Question 29:
Area of quadrant = $\frac{1}{4}$ πr^2
Circumference of circle = 2πr = 22

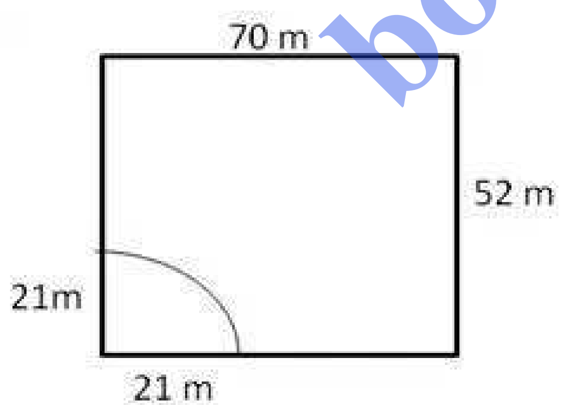
$2 \times \frac{22}{7} \times r = 22$

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

Area of quadrant $= \frac{1}{4}\pi r^2 = \left(\frac{1}{4} \times \frac{22}{7} \times 3.5 \times 3.5\right) cm^2$

$= 9.625 \ cm^2$

Question 30:



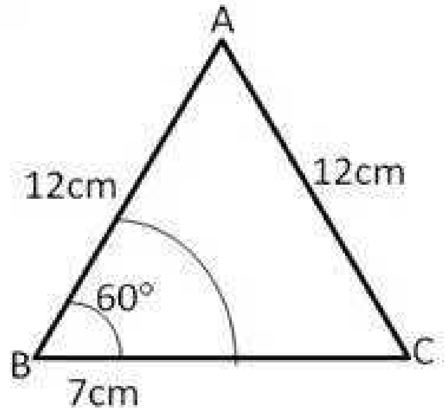
Area which the horse can graze = Area of the quadrant of radius 21 m

$= \left(\frac{1}{4} \times \frac{22}{7} \times 21 \times 21\right) m^2$

$= 346.5 m^2$

Area ungrazed = [(70×52) – 346.5] m^2
= 3293.5 m^2

Question 31:
Each angle of equilateral triangle is 60°



Area which cannot be grazed = (area of equilateral ΔABC)
− (area of the sector with r = 7m, θ = 60°)

$$= \left[\frac{\sqrt{3}}{4}\times(12)^2 - \frac{22}{7}\times(7)^2\times\frac{60}{360}\right] m^2$$

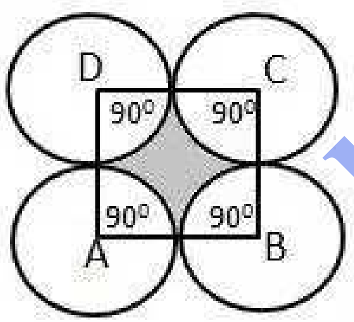
$$= \left[(\sqrt{3}\times 12\times 3) - \frac{(22\times 7)}{6}\right]$$

$$= 62.35 - 25.66\ m^2$$

$$= 36.68\ m^2$$

Area that the horse cannot graze is 36.68 m^2

Question 32:



Each side of the square is 14 cm
Then, area of square = (14 × 14) cm^2
= 196 cm^2
Thus, radius of each circle 7 cm
Required area = area of square ABCD – 4 (area of sector with r = 7 cm, θ= 90°)

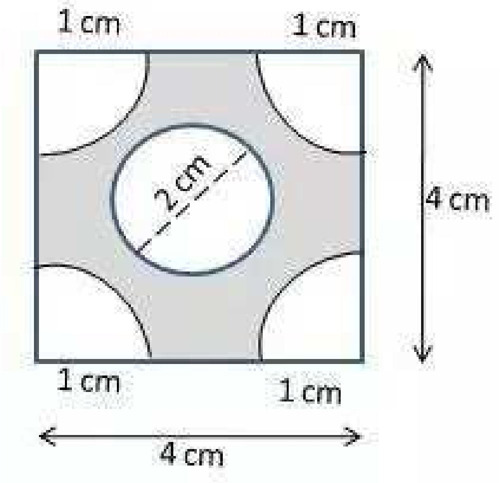
$$= \left[196 - 4 \times \frac{22}{7} \times 7 \times 7 \times \frac{90}{360}\right] cm^2$$

$$= [196 - 154] cm^2$$

$$= 42\ cm^2$$

Area of the shaded region = 42 cm^2

Question 33:



Area of square = (4 × 4) cm^2
= 16 cm^2
Area of four quadrant corners

$$= 4\left[\frac{1}{4}\pi r^2\right]$$

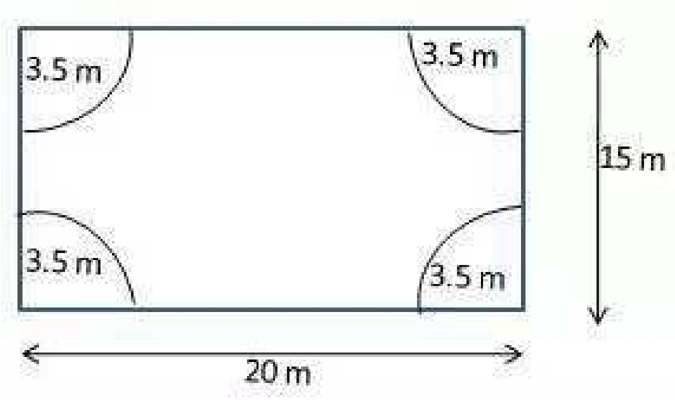
$$= \pi r^2$$

$$= (\pi \times 1 \times 1) cm^2$$

$$= 3.14\ cm^2$$

Radius of inner circle = 2/2 = 1 cm
Area of circle at the center = πr^2 = (3.14 × 1 × 1) cm^2
= 3.14 cm^2
Area of shaded region = [area of square – area of four corner quadrants – area of circle at the centre]
= [16 – 3.14 – 3.14] cm^2 = 9.72 cm^2

Question 34:



Area of rectangle = $(20 \times 15)\ m^2 = 300\ m^2$
Area of 4 corners as quadrants of circle

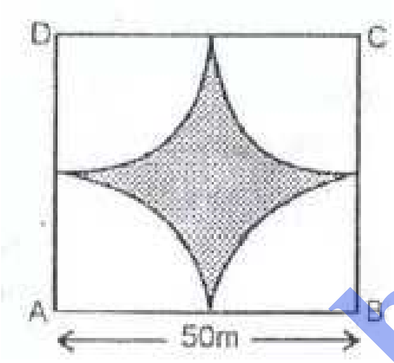
$= 4 \times \left(\frac{1}{4}\pi r^2\right)$

$= \left[\frac{22}{7} \times 3.5 \times 3.5\right] m^2$

$= 38.5\ m^2$

Area of remaining part = (area of rectangle – area of four quadrants of circles)
$= (300 - 38.5)\ m^2 = 261.5\ m^2$

Question 35:



Ungrazed area

= shaded area

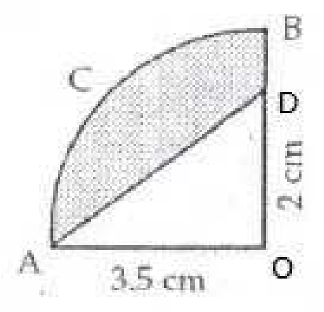
$= \left[(50 \times 50) - \frac{4 \times \pi \times (25)^2 \times 90}{360}\right] m^2$

$= [2500 - 3.14 \times 25 \times 25] m^2$

$= [2500 - 1962.5] m^2$

$= 537.5\ m^2$

Question 36:



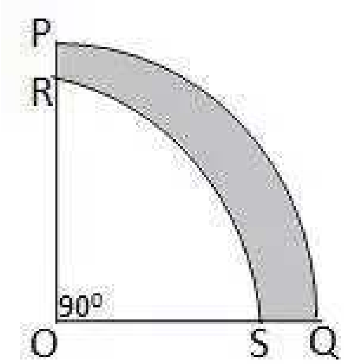
Shaded area = (area of quadrant) – (area of DAOD)

$$= \left[\frac{1}{4}\pi r^2 - \frac{1}{2} \times h \times b\right]$$

$$= \left[\frac{1}{4} \times \frac{22}{7} \times 3.5 \times 3.5 - \frac{1}{2} \times 2 \times 3.5\right] cm^2$$

$$= (9.625 - 3.5) cm^2 = 6.125 cm^2$$

Question 37:



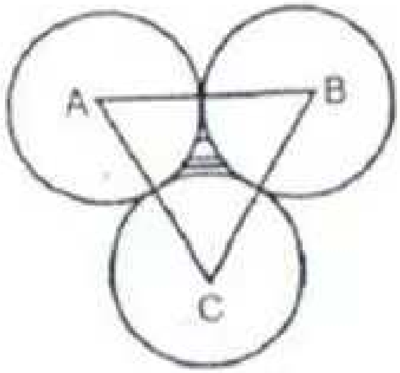
Area of flower bed = (area of quadrant OPQ) – (area of the quadrant ORS)

$$= \left[\frac{1}{4}\pi r_1^2 - \frac{1}{4}\pi r_2^2\right]$$

$$= \left[\frac{1}{4} \times \frac{22}{7} \times 21 \times 21 - \frac{1}{4} \times \frac{22}{7} \times 14 \times 14\right] m^2$$

$$= [346.5 - 154] m^2 = 192.5\ m^2$$

Question 38:



Let A, B, C be the centres of these circles. Joint AB, BC, CA
Required area=(area of ΔABC with each side a = 12 cm) – 3(area of sector with r = 6, θ = 60°)

$$= \left[\frac{\sqrt{3}}{4}\times(12)^2 - 3\times\left(3.14\times(6)^2\times\frac{60}{360}\right)\right]$$

$$= \left[\frac{\sqrt{3}}{4}\times 12\times 12 - 3\times 3.14\times 6\right]\text{cm}$$

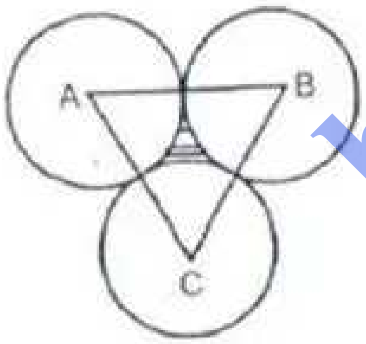
$$= (36\times 1.73 - 56.52)\text{cm}^2$$

$$= (62.28 - 56.52)\text{cm}^2$$

$$= 5.76\ \text{cm}^2$$

The area enclosed = 5.76 cm^2

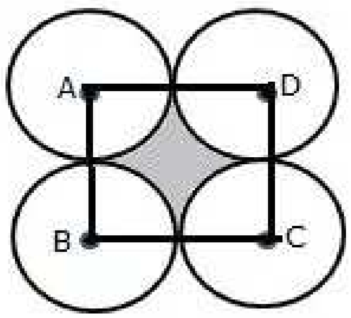
Question 39:



Let A, B, C be the centers of these circles. Join AB, BC, CA
Required area= (area of ΔABC with each side 2) – 3[area of sector with r = a cm, θ = 60°]

$$= \left[\frac{\sqrt{3}}{4} \times (2a)^2 - \frac{3\pi a^2 \times 60}{360}\right]$$
$$= \left(1.73 a^2 - 1.57\ a^2\right)$$
$$= 0.16\ a^2$$
$$= \frac{16}{100} a^2$$
$$= \left(\frac{4}{25} a^2\right) \text{sq. unit}$$

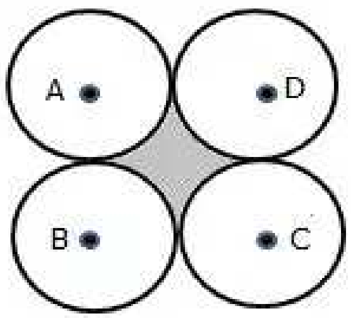
Question 40:



Let A, B, C, D be the centres of these circles
Join AB, BC, CD and DA
Side of square = 10 cm
Area of square ABCD
= (10×10) cm^2
= 100 cm^2

Area of each sector = $\left(\pi r^2 \times \frac{\theta}{360}\right) = 3.14 \times 5 \times 5 \times \frac{90}{360}$
= 19.625 cm^2
Required area = [area of sq. ABCD – 4(area of each sector)]
= $(100 - 4 \times 19.625)$ cm^2
= $(100 - 78.5) = 21.5$ cm^2

Question 41:



Required area = [area of square – areas of quadrants of circles]
Let the side = 2a unit and radius = a units

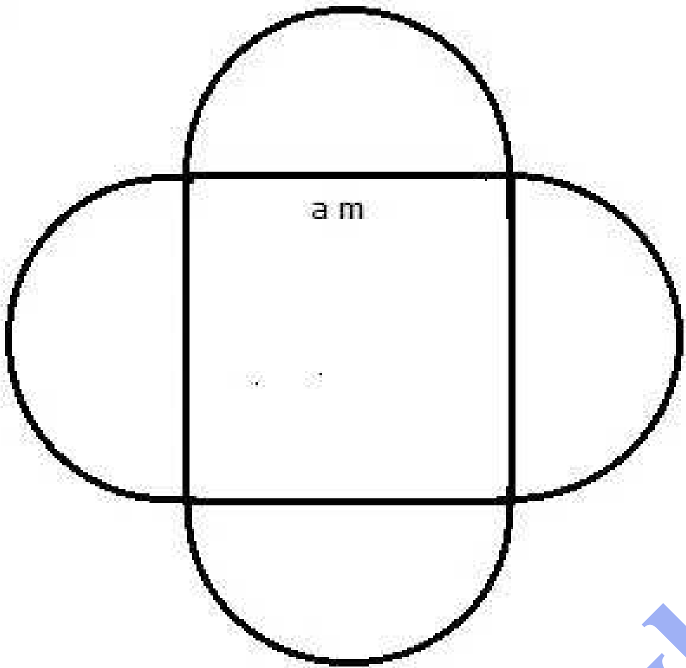
Area of square = (side × side) = (2a × 2a) sq. units = $4a^2$ sq.units

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

Area of 4 quadrants = $4 \times \frac{1}{4}\pi r^2 = \pi r^2 = \frac{22}{7} \times a \times a = \frac{22}{7}a^2$ sq.unit

Required area = $\left(4a^2 - \frac{22}{7}a^2\right)$ sq.unit = $\frac{6a^2}{7}$

Question 42:



Let the side of square = a m

Area of square = (a × a) cm = $a^2 m^2$

$\therefore a^2 = 1600$

$a = \sqrt{1600}$ m

$a = 40$ m

Side of square = 40 m

Therefore, radius of semi circle = 20 m

Area of semi circle = $\frac{1}{2}\pi r^2 = \left(\frac{1}{2} \times 3.14 \times 20 \times 20\right) m^2$

= 628 m^2

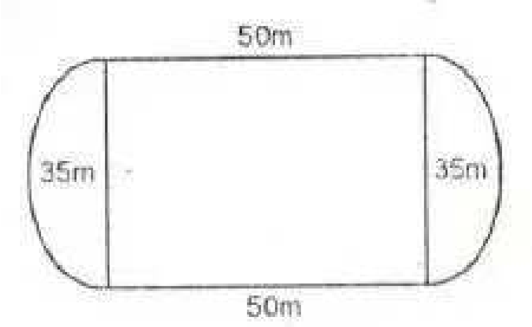
Area of four semi circles = (4 × 628) m^2 = 2512 m^2

Cost of turfing the plot of of area 1 m^2 = Rs. 1.25

Cost of turfing the plot of area 2512 m^2 = Rs. (1.25 × 2512)

= Rs. 3140

Question 43:



Area of rectangular lawn in the middle
= (50 × 35) = 1750 m^2
Radius of semi circles = $\frac{35}{2}$ = 17.5 m

Area of two semicircles = 2(area of semi circle)

$$= \left[2\left(\frac{1}{2}\pi r^2\right)\right] m^2$$

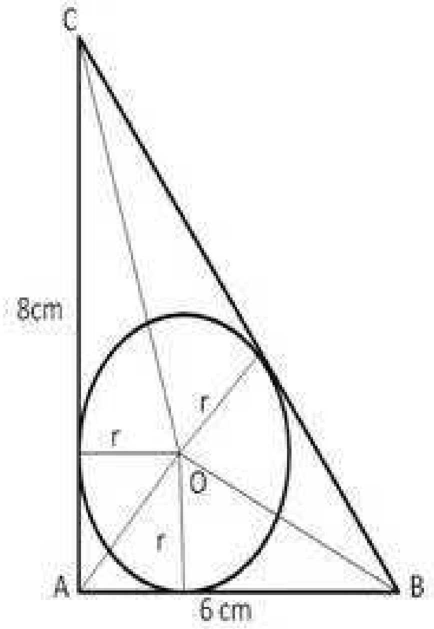
$$= \left(2 \times \frac{1}{2} \times \frac{22}{7} \times 17.5 \times 17.5\right) m^2$$

$$= 962.5 \text{ m}^2$$

Area of lawn = (area of rectangle + area of semi circle)
= (1750 + 962.5) m^2 = 2712.5 m^2

Question 44:
Area of plot which cow can graze when r = 16 m is πr^2
= $\left(\frac{22}{7} \times 10.5 \times 10.5\right)$
= 804.5 m^2
Area of plot which cow can graze when radius is increased to 23 m
= $\left(\frac{22}{7} \times 10.5 \times 10.5\right)$
= 1662.57 m^2
Additional ground = Area covered by increased rope – old area
= (1662.57 – 804.5)m^2 = 858 m^2

Question 45:



Given: ABC is right angled at A with AB = 6 cm and AC = 8 cm

$BC = \sqrt{AB^2 + AC^2} = \sqrt{(6)^2 + (8)^2}$ cm

$= \sqrt{36 + 64}$ cm

$BC = \sqrt{100}$ cm $= 10$ cm

Let us join OA, OB and OC

ar(ΔAOC) + ar(ΔOAB) + ar(ΔBOC) = ar(ΔABC)

$\Rightarrow \left(\frac{1}{2} \times 8 \times r\right) + \left(\frac{1}{2} \times 6 \times r\right) + \left(\frac{1}{2} \times 10 \times r\right)$

$= \frac{1}{2} \times 6 \times 8$

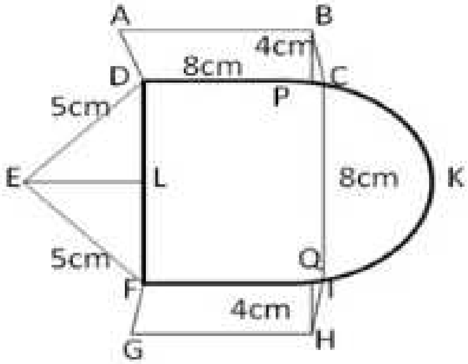
$4r + 3r + 5r = 24$

$12r = 24$

$\Rightarrow r = \frac{24}{12} = 2$

Radius = 2 cm

Question 46:



Given BP ⊥ CD, HQ ⊥ FI and EL ⊥ DF,

DC=8 cm, BP = HQ = 4 cm and DE = EF = 5 cm

Area of parallelogram ABCD = BP × DC

$= 4 \times 8 = 32 \text{ cm}^2$

Area of parallelogram FGHI = FI × HQ

$= 8 \times 4 = 32 \text{ cm}^2$

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

$= \frac{1}{2} \times 3.14 \times (4)^2 = 25.12 \text{ cm}^2$

Area of isosceles ΔDEF $= \frac{1}{4} b\sqrt{4a^2 - b^2}$

$= \frac{1}{4}(8)\sqrt{4(5)^2 - (8)^2} = 2\sqrt{100 - 64}$

$= 2\sqrt{36} = 12 \text{ cm}^2$

Area of square CDFI $= (\text{side})^2 = (8)^2 = 64 \text{ cm}^2$

Area of whole figure = area of ||^{gm} ABCD + area of ||^{gm} FGHI

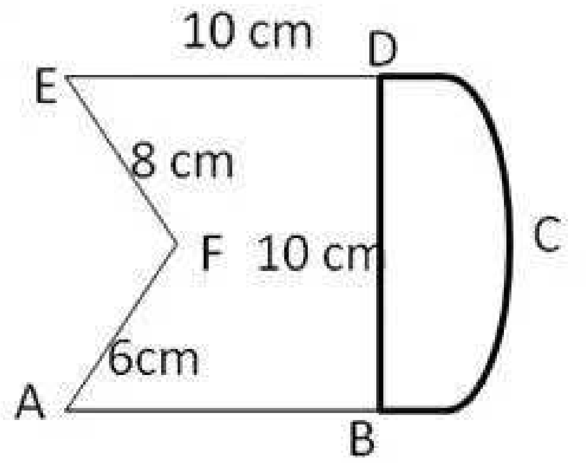
+ area of semi-circle CKI + area of ΔDEF

+ area of square CDFI

$= (32+32+25.12+12+64) \text{ cm}^2$

$= 165.12 \text{ cm}^2$

Question 47:

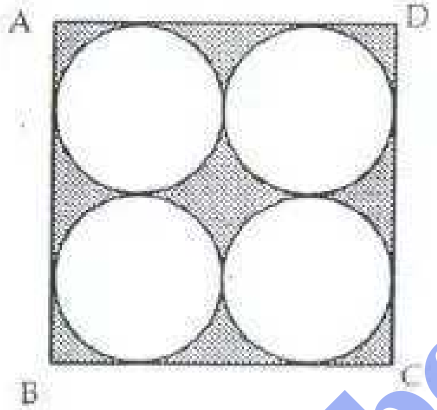


Area of region ABCDEFA = area of square ABDE + area of semi circle BCD – area of ΔAFE

$$= \left[10 \times 10 + \frac{1}{2} \times 3.14 \times 5 \times 5 - \frac{1}{2} \times 6 \times 8\right] cm^2$$

$$= [100 + 39.25 - 24] cm^2 = 115.25\ cm^2$$

Question 48:



Side of the square ABCD = 14 cm
Area of square ABCD = 14 × 14 = 196 cm^2
Radius of each circle = $\frac{14}{4}$ = 3.5 cm
Area of the circles = 4 × area of one circle

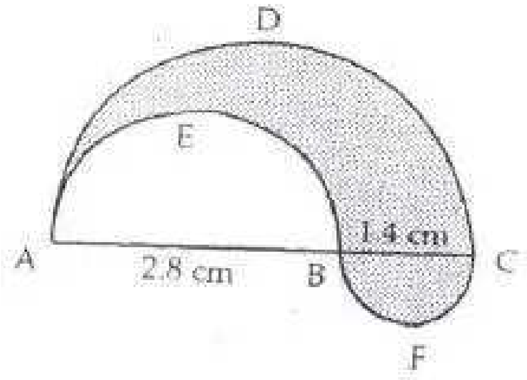
$$= 4 \times \pi (3.5)^2$$

$$= 4 \times \frac{22}{7} \times 3.5 \times 3.5$$

$$= 154\ cm^2$$

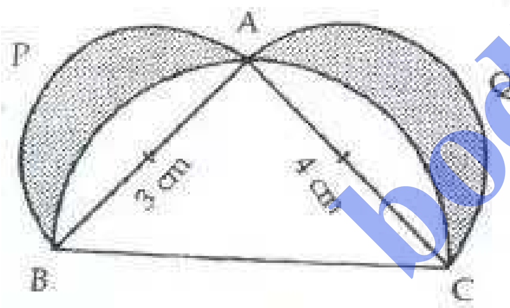
Area of shaded region = Area of square – area of 4 circles
= 196 – 154 = 42 cm^2

Question 49:



Diameter AC = 2.8 + 1.4
= 4.2 cm
Radius $r_1 = \frac{4.2}{2} = 2.1$ cm
Length of semi-circle ADC = $\pi r_1 = \pi \times 2.1 = 2.1\pi$ cm
Diameter AB = 2.8 cm
Radius $r_2 = 1.4$ cm
Length of semi- circle AEB = $\pi r_2 = \pi \times 1.4 = 1.4\pi$ cm
Diameter BC = 1.4 cm
Radius $r_3 = \frac{1.4}{2} = 0.7$ cm
Length of semi – circle BFC = $\pi \times 0.7 = 0.7\pi$ cm
Perimeter of shaded region = 2.1 + 1.4 + 0.7 = 4.2π cm
= $4.2 \times \frac{22}{7} = 13.2$ cm

Question 50:



Area of shaded region = Area of ΔABC + Area of semi-circle APB + Area of semi circle AQC – Area of semicircle BAC

Now, Area of a $\Delta ABC = \frac{1}{2} \times 3 \times 4 = 6\,cm^2$ --(1)

Area of semi – circle APB $= \frac{1}{2}\pi r^2 = \frac{1}{2}\pi \times \left(\frac{3}{2}\right)^2 = \frac{9}{8}\pi$--(2)

Area of semi – circle AQC $= \frac{1}{2}\pi r_2^2$

$$= \frac{1}{2}\pi\left(\frac{4}{2}\right)^2 = 2\pi\,cm^2 \text{ ----(3)}$$

Further in ΔABC, ∠A = 90°

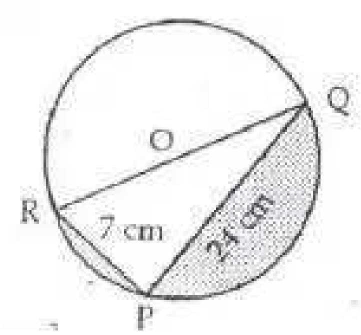
$\therefore BC^2 = AB^2 + AC^2 = 9 + 16 = 25$
$\therefore BC = 5$

$\text{Area of semi-circle BAC} = \frac{1}{2}\pi\left(\frac{5}{2}\right)^2 = \frac{25}{8}\pi \text{ --(4)}$

Adding (1), (2), (3) and subtracting (4)

$$\therefore \text{Area of shaded region} = 6 + \frac{9}{8}\pi + 2\pi - \frac{25}{8}\pi$$
$$= 6 + \frac{25}{8}\pi - \frac{25}{8}\pi = 6 \text{ cm}^2$$

Question 51:



In ΔPQR, ∠P = 90°, PQ = 24 cm, PR = 7 cm

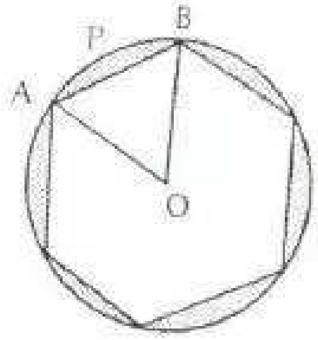
$\therefore QR^2 = RP^2 + PQ^2 = 7^2 + 24^2$
$= 49 + 576 = 625$
$\therefore QR = 25 \text{cm}$

Area of semicircle

$= \frac{1}{2} \times \pi \times \left(\frac{25}{2}\right)^2$
$= \frac{1}{2} \times 3.14 \times \frac{25 \times 25}{4} \text{cm}^2$
$= \frac{625 \times 3.14}{8} = 245.31 \text{ cm}^2$

Area of ΔPQR = $\frac{1}{2}$ × 7 × 24 cm^2 = 84 cm^2
Shaded area = 245.31 − 84 = 161.31 cm^2

Question 52:



ABCDEF is a hexagon.
∠AOB = 60°, Radius = 35 cm
Area of sector AOB

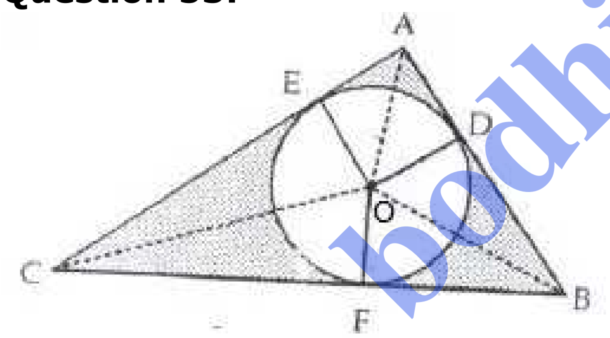
$= \pi r^2 \times \frac{60°}{360°} = \frac{\pi \times 35 \times 35}{6}\ cm^2$

$= \frac{3.14 \times 35 \times 35}{6}\ cm^2$

$= 641.083\ cm^2$

Area of ΔAOB = $\frac{\sqrt{3}}{4} \times r^2 = \frac{\sqrt{3}}{4} \times 35 \times 35\ cm^2$
= 530.425 cm^2
Area of segment APB = (641.083 – 530.425) cm^2 = 110.658 cm^2
Area of design (shaded area) = 6 × 110.658 cm^2 = 663.948 cm^2
= 663.95 cm^2

Question 53:



In ΔABC, ∠A = 90°, AB = 6cm, BC = 10 cm

$BC^2 = AC^2 + AB^2$

$\therefore\ AC^2 = BC^2 - AB^2 = 10^2 - 6^2 = 100 - 36 = 64$

$\therefore\ AC = 8\ cm$

Area of ΔABC = $\frac{1}{2} \times AC \times AB = \frac{1}{2} \times 8 \times 6 cm^3 = 24\ cm^2$

Let r be the radius of circle of centre O

$$\text{Area of } \Delta OCB = \frac{1}{2} \times 10 \times r \text{ cm}^2 = 5r \text{ cm}^2$$

$$\text{Area of } \Delta OAB = \frac{1}{2} \times 6 \times r \text{ cm}^2 = 3r \text{ cm}^2$$

$$\text{Area of } \Delta OCA = \frac{1}{2} \times 8 \times r \text{ cm}^2 = 4r \text{ cm}^2$$

$$\text{Area of } (\Delta OCB + \Delta OAB + \Delta OCA) = \text{Area of } \Delta ABC$$

$$\therefore 5r + 3r + 4r = 24$$

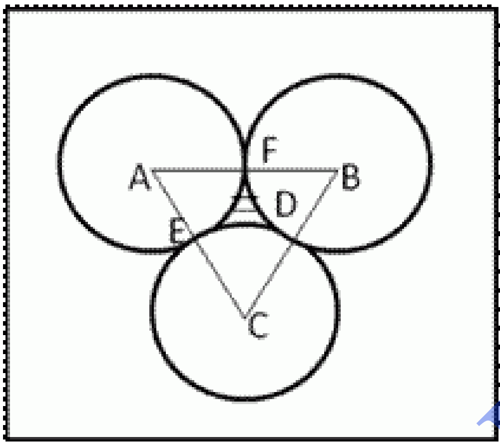
$$\text{or } 12r = 24 \quad \therefore r = 2 \text{ cm}$$

$$\therefore \text{Area of incircle} = \pi r^2 = 3.14 \times 2 \times 2 \text{ cm}^2 = 12.56 \text{ cm}^2$$

$$\Rightarrow \text{Shaded area} = \text{Area of } \Delta ABC - \text{Area of incircle} = (24 - 12.56)\text{cm}^2 = 11.44 \text{ cm}^2$$

Question 54:

Area of equilateral triangle ABC = $49\sqrt{3}$ cm^2



Let a be its side

$$\therefore \frac{\sqrt{3}}{4}a^2 = 49\sqrt{3}$$

$$\text{or } a^2 = 49 \times 4$$

$$\therefore a = 7 \times 2$$

$$\Rightarrow a = 14 \text{ cm}$$

Area of sector BDF = $\pi r^2 \times \frac{\theta}{360^\circ}$

$$= \frac{22}{7} \times 7 \times 7 \times \frac{60}{360} \text{cm}$$

$$= \frac{11 \times 7}{3} \text{cm}^2 = \frac{77}{3} \text{ cm}^2$$

Area of sector BDF = Area of sector CDE = Area of sector AEF

Sum of area of all the sectors

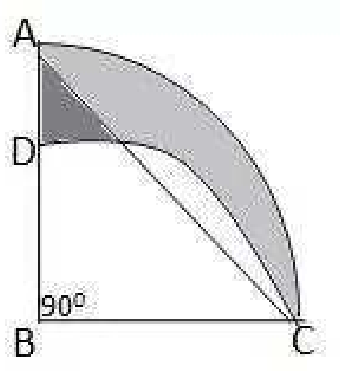
$= \frac{77}{3} \times 3\ cm^2 = 77\ cm^2$

Shaded area = Area of ΔABC – sum of area of all sectors

$= 49\sqrt{3} - 77 = (84.77 - 77.00)\ cm^2$

$= 77.7\ cm^2$

Question 55:



In ΔABC, ∠B = 90°, AB = 48 cm, BC = 14 cm

$\therefore\ AC^2 = AB^2 + AC^2 = 48^2 + 14^2$

$= 2304 + 196 = 2500$

$\therefore\ AC = 50\ cm$

$\text{Area of } \Delta ABC = \frac{1}{2} \times 48 \times 14\ cm^2 = 336\ cm^2$

Area of semi-circle APC

$= \frac{1}{2}\pi r^2 = \frac{1}{2} \times \frac{22}{7} \times 25 \times 25\ cm^2$

$= \frac{11 \times 625}{7}\ cm^2 = \frac{6875}{7}\ cm^2$

$= 982.14\ cm^2$

Area of quadrant BDC with radius 14 cm

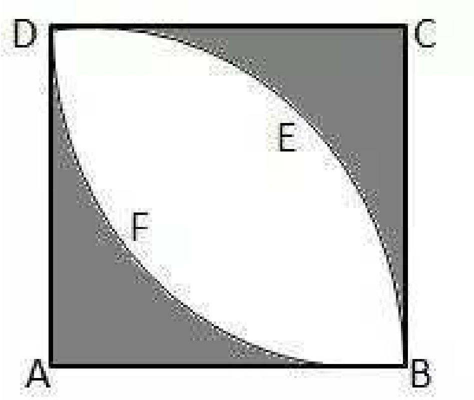
$= \frac{1}{4} \times \frac{22}{7} \times 14 \times 14\ cm^2 = 154\ cm^2$

Shaded area = Area of ΔABC + Area of semi-circle APC – Area of quadrant BDC

$= (\ 336+982.14-154\ )\ cm^2$

$= (\ 1318.14-154\ )\ cm^2 = 1164.14\ cm^2$

Question 56:



Radius of quadrant ABED = 16 cm

Its area = $\frac{1}{4} \times \frac{22}{7} \times 16 \times 16$ cm^2

Area of ΔABD = $\left(\frac{1}{2} \times 16 \times 16\right)$ cm^2

= 128 cm^2

Area of segment DEB

$= \frac{11 \times 128}{7} - 128$

$= 128\left(\frac{11-7}{7}\right)$cm^2 $= \frac{128 \times 4}{7}$cm^2 $= \frac{512}{7}$ cm^2

Area of segment DFB = $\frac{512}{7}$ cm^2

Total area of segments = 2 × $\frac{512}{7}$ cm^2 = $\frac{1024}{7}$ cm^2

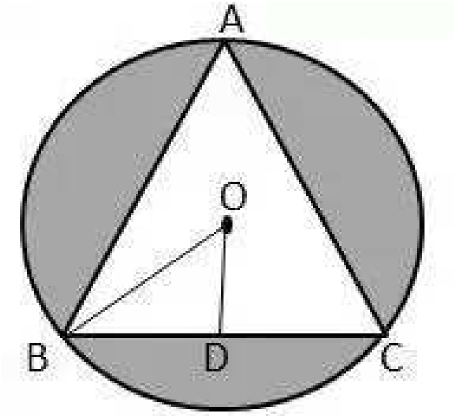
Shaded area = Area of square ABCD – Total area of segments

$= \left(16 \times 16 - \frac{1024}{7}\right)$cm^2

$= \left(256 - \frac{1024}{7}\right)$cm^2 $= \frac{1792 - 1024}{7}$cm^2

$= \frac{768}{7}$cm^2 = 109.7 cm^2

Question 57:



Radius of circular table cover = 70 cm

Area of the circular cover = $\pi r^2 = \frac{22}{7} \times 70 \times 70 \text{ cm}^2 = 15400 \text{ cm}^2$

In Δ BOD, $\angle D = 90^0$, $\angle OBD = 30^0$

$\therefore \frac{BD}{OB} = \cos 30^o = \frac{\sqrt{3}}{2}$

$\Rightarrow BD = OB \cos 30^o$

$= 70 \times \frac{\sqrt{3}}{2} \text{cm}$

$= 35\sqrt{3}$ cm

$\Rightarrow BC = 2BD = 2 \times 35\sqrt{3} = 70\sqrt{3}$

Area of ABC $= \frac{\sqrt{3}}{4} \times a^2 = \frac{\sqrt{3}}{4} \times 70\sqrt{3} \times 70\sqrt{3}$

$[\because \Delta ABC \text{ is equilateral}]$

$= \frac{4900 \times 3 \times \sqrt{3}}{4} \text{cm}^2 = 1225 \times 3 \times \sqrt{3}$

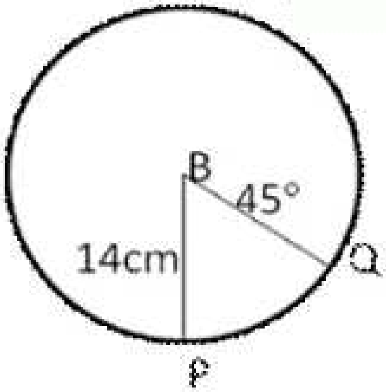
$= 3675\sqrt{3} \text{ cm}^2 = 6365.1 \text{ cm}^2$

Shaded area = Area of circle – Area of ΔABC
= (15400 – 6365.1)

Question 58:

Area of the sector of circle = $\frac{\pi r^2 \theta}{360^o}$

r = 14 cm and θ = 45°



$$\therefore \text{Area of sector} = \left(\frac{\pi \times 14 \times 14 \times 45}{360}\right) cm^2$$
$$= (24.5\pi) cm^2$$
$$= \left(24.5 \times \frac{22}{7}\right) cm^2 = 77\ cm^2$$

Question 59:

Length of the arc $= \frac{2\pi r\theta}{360}$, $r = 21 cm$, $\theta = 150°$

$$= \left(\frac{2\pi \times 21 \times 150}{360}\right) cm = (17.5\pi) cm$$

Length of arc = (17.5 × $\frac{22}{7}$) cm = 55 cm

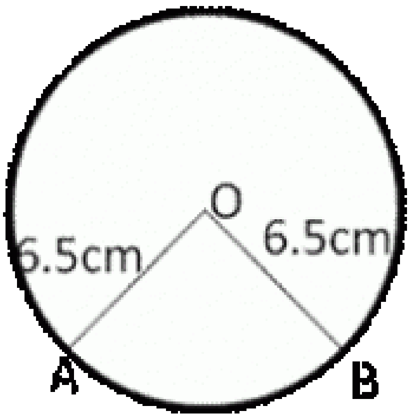
Area of the sector = $\frac{\pi r^2 \theta}{360} = \left(\frac{\pi \times 21 \times 21 \times 150}{360}\right) cm^2$

= ($\frac{22}{7}$ × 183.75) cm^2 = 577.5 cm^2

Question 60:
Length of arc of circle = 44 cm
Radius of circle = 17.5 cm

Area of sector = $\frac{1}{2} lr = \left(\frac{1}{2} \times 44 \times 17.5\right) cm^2$
= (22 × 17.5) cm^2 = 385 cm^2

Question 61:
Let sector of circle is OAB
Perimeter of a sector of circle =31 cm
OA + OB + length of arc AB = 31 cm



6.5 + 6.5 + arc AB = 31 cm
arc AB = 31 − 13
= 18 cm

$$\text{Area of circle} = \frac{1}{2} lr$$
$$= \frac{1}{2} \times 18 \times 6.5 = 58.5 \text{ cm}^2$$

Question 62:

Area of the sector of circle = $\frac{\pi r^2 \theta}{360} = 69.3$
Radius = 10.5 cm

$$\Rightarrow \frac{\pi \times (10.5)^2 \times \theta}{360} = 69.3$$
$$\Rightarrow \quad \theta = \frac{69.3 \times 360 \times 7}{10.5 \times 10.5 \times 22} = 72^\circ$$

Question 63:
Length of the pendulum = radius of sector = r cm

$$\text{Arc length} = 8.8 \Rightarrow 2 \times \frac{22}{7} \times r \times \frac{30}{360} = 8.8$$
$$\Rightarrow r = \frac{8.8 \times 7 \times 360}{2 \times 22 \times 30} = 16.8 \text{ cm}$$

Question 64:

Length of arc = $\frac{2\pi r\theta}{360} = 16.5$ cm

$$2 \times \frac{22}{7} \times r \times \frac{54^\circ}{360^\circ} = 16.5$$
$$r = \frac{16.5 \times 7 \times 360}{2 \times 22 \times 54} = 17.5\text{cm}$$

Circumference of circle = 2πr

$$\left(2 \times \frac{22}{7} \times 17.5\right) = 110 \text{ cm}$$

Area of circle =

$$\pi r^2 = \left(\frac{22}{7} \times 17.5 \times 17.5\right) \text{cm}^2$$

= 962.5 cm^2

Question 65:
Circumference of circle = 2πr

$$2\pi r = 88 \Rightarrow r = \frac{88 \times 7}{2 \times 22} = 14 \text{ cm}$$

$$\text{Area of sector} = \frac{\pi r^2 \theta}{360}$$

$$= \left(\frac{22}{7} \times 14 \times 14 \times \frac{72}{360}\right) \text{cm}^2 = 123.2 \text{cm}^2$$

Question 66:
Angle described by the minute hand in 60 minutes θ = 360°
Angle described by minute hand in 20 minutes

$$= \left(\frac{360}{60} \times 20\right) = 120°$$

Required area swept by the minute hand in 20 minutes
= Area of the sector(with r = 15 cm and θ = 120°)

$$= \left(\frac{\pi r^2 \theta}{360°}\right) \text{cm}^2 = \left(3.14 \times 15 \times 15 \times \frac{120°}{360°}\right)$$

$$= 235.5 \text{cm}^2$$

Question 67:
θ = 56° and let radius is r cm

Area of sector = $\frac{\pi r^2 \theta}{360°} = 17.6 \text{ cm}^2$

$$\Rightarrow \frac{22}{7} \times r^2 \times \frac{56^\circ}{360^\circ} = 17.6$$

$$r^2 = \left(\frac{17.6 \times 360 \times 7}{22 \times 56}\right) cm^2$$

$$r^2 = 36\ cm^2 \Rightarrow r = \sqrt{36}\ cm = 6\ cm$$

Hence radius = 6cm

Question 68:

$$\frac{\text{Area of sector with } \theta = 150^\circ}{\text{Area of the circle}} = \frac{\pi \times (6)^2 \times \frac{150}{360}}{\pi \times (6)^2}$$

$$= \frac{150}{360} = \frac{5}{12}$$

$$\text{Required ratio} = \left(36\pi \times \frac{90}{360}\right) : \left(36\pi \times \frac{120}{360}\right) : \left(36\pi \times \frac{150}{360}\right)$$

$$= \frac{1}{4} : \frac{1}{3} : \frac{5}{12} = 3 : 4 : 5$$

Question 69:

In 2 days, the short hand will complete 4 rounds

∴ Distance travelled by its tip in 2 days

=4(circumference of the circle with r = 4 cm)

= (4 × 2 × 4) cm = 32 cm

In 2 days, the long hand will complete 48 rounds

∴ length moved by its tip

= 48(circumference of the circle with r = 6cm)

= (48 × 2 × 6) cm = 576 cm

∴ Sum of the lengths moved

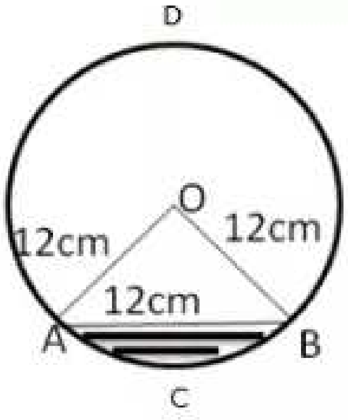
= (32 + 576) = 608 cm

= (608 × 3.14) cm = 1909.12 cm

Question 70:

ΔOAB is equilateral.

So, ∠AOB = 60°

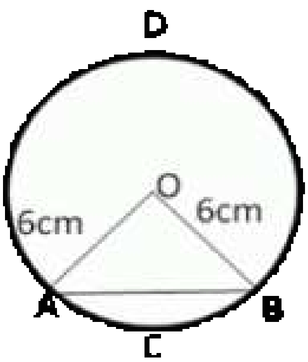


$$\text{arc}ACB = \left(2\pi \times 12 \times \frac{60}{360}\right) cm$$
$$= 4\pi \ cm$$
$$= (4 \times 3.14) cm$$
$$= 12.56 \ cm$$

Length of arc BDA = (2π × 12 − arc ACB) cm
= (24π − 4π) cm = (20π) cm
= (20 × 3.14) cm = 62.8 cm
Area of the minor segment ACBA

$$= \left[\pi \times (12)^2 \times \frac{60}{360} - \frac{\sqrt{3}}{4} \times (12)^2\right] cm^2$$
$$= \left(3.14 \times 12 \times 12 \times \frac{60}{360} - \frac{1.73}{4} \times 12 \times 12\right) cm^2$$
$$= (75.36 - 62.28) cm^2 = 13.08 \ cm^2$$

Question 71:
Let AB be the chord of circle of centre O and radius = 6 cm such that ∠AOB = 90°



Area of sector = OACBO

$= \frac{\pi r^2 \theta}{360} cm^2$

$= \left(\frac{22}{7} \times 6 \times 6 \times \frac{90}{360}\right) cm^2$

$= 28.29 cm^2$

Area of ΔAOB = $\frac{1}{2} r^2 \sin\theta = \left(\frac{1}{2} \times 6 \times 6 \times \sin 90^\circ\right) = 18\ cm^2$

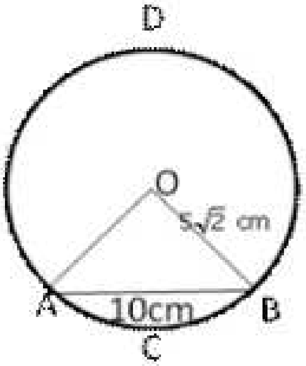
Area of minor segment ACBA
= (area of sector OACBO) – (area of ΔOAB)
= (28.29 – 18) cm^2 = 10.29 cm^2
Area of major segment BDAB

= (area of circle) – (area of minor segment)

$= \left[\left(\frac{22}{7} \times 6 \times 6\right) - 10.29\right] cm^2$

$= (113.14 - 10.29) cm^2 = 102.85\ cm^2$

Question 72:
Let OA = 5√2 cm , OB = 5√2 cm
And AB = 10 cm



Then, $OA^2 + OB^2 = AB^2$

$\Rightarrow \angle AOB = 90^\circ$

Area of the sector OACBO

$= \frac{\pi r^2 \theta}{360} cm^2$

$= \left(3.14 \times (5\sqrt{2}) \times (5\sqrt{2}) \times \frac{90}{360}\right) cm^2$

$= 39.25\ cm^2$

Area of ΔAOB = $\frac{1}{2} r^2 \sin\theta = \left(\frac{1}{2} \times 5\sqrt{2} \times 5\sqrt{2} \times \sin 90^\circ\right)$

$= 25\ cm^2$

Area of minor segment = (area of sector OACBO) – (area of ΔOAB)

$= (39.25 - 25)\ cm^2 = 14.25\ cm^2$

Area of the major segment BDAB

= area of circle – area of minor segment

$= \left(\frac{22}{7} \times 5\sqrt{2} \times 5\sqrt{2} - 14.25\right) cm^2$

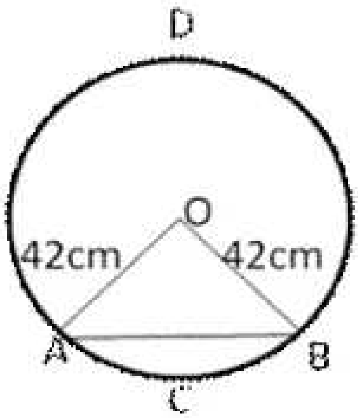
$= \left(\frac{1100}{7} - 14.25\right) cm^2 = (157 - 14.25)\ cm^2$

$= 142.75\ cm^2$

Question 73:

Area of sector OACBO

$= \frac{\pi r^2 \theta}{360} cm^2 = \left(\frac{22}{7} \times 42 \times 42 \times \frac{120}{360}\right) cm^2 = 1848\ cm^2$



Area of $\Delta OAB = \frac{1}{2} r^2 \sin\theta$

$= \left(\frac{1}{2} \times 42 \times 42 \times \sin 120°\right)$

$= \left(21 \times 42 \times \frac{\sqrt{3}}{2}\right) cm^2$

$= (21 \times 21 \times 1.73)\ cm^2 = 762.93\ cm^2$

Area of minor segment ACBA

= (area of sector OACBO) – (area of the ΔOAB)

$= (1848 - 762.93)\ cm^2 = 1085.07\ cm^2$

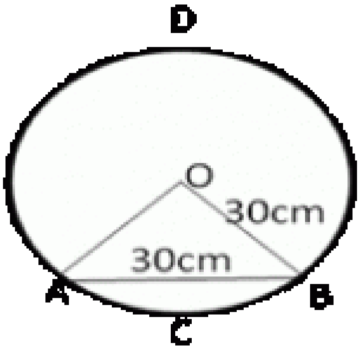
Area of major segment BADB

= (area of the circle) – (area of minor segment)

$= \frac{22}{7} \times 42 \times 42 - 1085.07$

$= (5544 - 1085.07)\ cm^2 = 4458.93\ cm^2$

Question 74:
Let AB be the chord of circle of centre O and radius = 30 cm such that AOB = 60°



Area of the sector OACBO

$$= \frac{\pi r^2 \theta}{360} cm^2$$
$$= \left(3.14 \times 30 \times 30 \times \frac{60}{360}\right) cm^2$$
$$= 471 cm^2$$

Area of ΔOAB = $\frac{1}{2} r^2 \sin\theta = \left(\frac{1}{2} \times 30 \times 30 \times \sin 60^\circ\right) cm^2$

$$= \left(\frac{1}{2} \times 30 \times 30 \times \frac{\sqrt{3}}{2}\right) cm^2 = (225\sqrt{3}) cm^2$$
$$= (225 \times 1.73) cm^2 = 389.25 \ cm^2$$

Area of the minor segment ACBA
= (area of the sector OACBO) – (area of the ΔOAB)
=(471 – 389.25) cm^2 = 81.75 cm^2
Area of the major segment BADB
= (area of circle) – (area of the minor segment)
= [(3.14 × 30 × 30) – 81.75)] cm^2 = 2744.25 cm^2

Question 75:
Let the major arc be x cm long
Then, length of the minor arc = $\frac{1}{5}$ x cm

Circumference = $\left(x + \frac{1}{5}x\right) cm = \frac{6x}{5} cm$

$$\frac{6x}{5} = 2 \times \frac{22}{7} \times \frac{21}{2} \Rightarrow x = 55 \text{ cm}$$

Required area $= \left(\frac{1}{2} \times 55 \times \frac{21}{2}\right) cm^2$

$$\left[\text{Area} = \frac{1}{2} rl\right]$$

$= 288.75 \text{ cm}^2$

Question 76:

Radius of the front wheel = 40 cm = $\frac{2}{5}$ m

Circumference of the front wheel = $\left(2\pi \times \frac{2}{5}\right) m = \frac{4\pi}{5} m$

Distance moved by it in 800 revolution

$= \left(\frac{4\pi}{5} \times 800\right) m = (640\pi) m$

Circumference of rear wheel = (2п × 1)m = (2п) m

Required number of revolutions = $\left(\frac{640\pi}{2\pi}\right) = 320$