

Area Related to Circles

- ① The radii of two circles are 8 cm and 6 cm. Find radius of the circle having area equal to the sum of the areas of two circles.
- ② The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 min. when the car is travelling at speed of 66 km/hr.
- ③ Find area of a quadrant of a circle whose circumference is 22 cm.
- ④ The length of the minute hand of a clock is 14 cm. Find area swept by the minute hand in 5 minutes.
- ⑤ A chord of a circle of radius 15 cm subtends an angle of 60° at the centre. Find areas of the minor and major segments.
- ⑥ An umbrella has 8 ribs which are equally spaced. Assuming umbrella to be a flat circle of radius 45 cm. Find the area between the two consecutive ribs of the umbrella.
- ⑦ Find the area of shaded region in the given fig. If radii of the two concentric circles with centre O are 7 cm and 14 cm respectively and $\angle AOC = 40^\circ$.



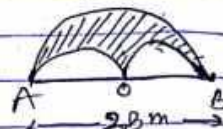
- ⑧ In fig, OACB is a quadrant of a circle with centre O and radius 3.5 cm. If OD = 2 cm find area of:
(i) Quadrant OACB
(ii) Shaded Region.



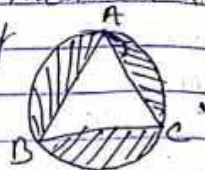
- ⑨ Calculate the area of the designed region in the fig common between two quadrants of the circles of the radius 8 cm each.



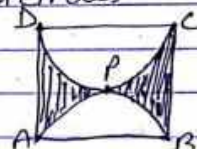
- (10) What is the perimeter of a sector of angle 45° of a circle with radius 7 cm.
- (11) Diameter of semicircular protractor is 14 cm. then find its perimeter.
- (12) Find ~~area~~^{perimeter} of shaded region



- (13) An equilateral triangle has been inscribed in a circle of radius 6 cm. Find area of shaded region ($\pi = 3.14$)



- (14) Find the perimeter of shaded region of a square ABCD of side 14 cm. and APB & CPD are semicircles.



- (15) If perimeter and area of a circle are equal then find ~~area~~ radius.
- (16) All vertices of a rhombus lie on a circle. Find the area of the rhombus, if area of circle is 1256 cm^2 ($\pi = 3.14$)
- (17) To warn ships for underwater rocks, a light-house spreads a red coloured light over a sector of angle 80° to a distance of 16.5 km. Find area of the sea over which the ships are warned. ($\pi = 3.14$)
- (18) Area of a circular play ground is 22176 m^2 . Find cost of fencing at rate of Rs 50/m
- (19) The circumference of a circle exceeds the diameter by 16.8 cm. Find the radius of the circle.
- (20) A wire can be bent in the form of a circle of radius 35 cm. If it is bent in the form of a square then what will be its area?

①

$$r_2 = 6 \text{ cm}$$

A/O

$$\sigma_R^2 = \sigma_{r_1}^2 + \sigma_{r_2}^2$$

$$R^2 = r_1^2 + r_2^2$$

$$R^2 = B^2 + G^2$$

64-P36

$$R^2 \approx 100$$

$$R = \sqrt{100} = 10 \text{ cm Ans}$$

②

Diameter of wheel = 80 cm

Radius $\parallel \parallel = 40\text{cm}$

Circumference " " = $2\pi \cdot 40 \text{ cm}$
 $= 2 \times \frac{22}{7} \times 40 \text{ cm}$

Total distance covered in 10 min

$$= \frac{11.66 \times 1000 \times 100 \times 10}{60} \text{ cm}$$

$$= 11000000 \text{ cm}^2$$

$$\text{No. of Revolutions} = \frac{\text{Total distance}}{\text{Circumference}}$$

11 $\frac{1100000}{2 \times 22 \times 40}$

$$= \frac{110000 \times 7}{2 \times 22 \times 40}$$

$$= \frac{625^2}{2500 \times 7}$$

$$= 625 \times 7$$

~~$\Rightarrow 4375 \text{ Ans}$~~

③

$$C = 22 \text{ cm}$$
$$2\pi r = 22 \text{ cm}$$

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

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

$$\text{A. of Quadrant} = \frac{\theta}{360} \pi r^2$$
$$= \frac{90}{360} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2}$$
$$= \frac{77}{8} \text{ cm}^2$$

Ans

④

$$\text{Length of minute hand (r)} = 14 \text{ cm}$$

$$\text{Angle in 5 min} = \frac{360}{60} \times 5$$
$$= 30^\circ$$

$$\text{Area} = \frac{\theta}{360} \pi r^2$$
$$= \frac{30}{360} \times \frac{22}{7} \times 14 \times 14$$
$$= \frac{154}{3} \text{ cm}^2$$

Ans

⑤

$$r = 15 \text{ cm}$$

$$\theta = 60^\circ$$

$$\text{A. of minor seg.} = \frac{\theta}{360} \pi r^2 - \frac{1}{2} r^2 \sin \theta$$
$$= \frac{60}{360} \times \frac{22}{7} \times (15)^2 - \frac{1}{2} (15)^2 \sin 60^\circ$$
$$= (15)^2 \left[\frac{1}{6} \times \frac{22}{7} - \frac{1}{2} \times \frac{\sqrt{3}}{2} \right]$$
$$= 225 \left[\frac{11}{21} - \frac{\sqrt{3}}{4} \right]$$
$$= 225 \left[\frac{44 - 21\sqrt{3}}{84} \right]$$

$$= \frac{225}{84} [44 + 21 \times 1.73]$$

$$= 20.44 \text{ cm}^2 \quad \text{Ans}$$

$$\text{A. of Major Sector} = \text{A. of circle} - \text{A. of minor seg.}$$

$$= \pi r^2 - 20.44$$

$$= 3.14 \times 15 \times 15 - 20.44$$

$$= 706.5 - 20.44$$

$$= 686.06 \text{ cm}^2$$

Ans

⑥

$$\text{No of Ribs} = 8$$

$$\text{Angle at centre} = \frac{360}{8}$$

$$= 45^\circ$$

$$R = 45 \text{ cm.}$$

$$\text{A. between Ribs} = \frac{\theta}{360} \pi r^2$$

$$= \frac{45}{360} \times \frac{22}{7} \times 45 \times 45$$

$$= \frac{22275}{28} \text{ cm}^2$$

⑦

$$\theta = 40^\circ$$

$$r_1 = 7 \text{ cm}$$

$$r_2 = 14 \text{ cm}$$

$$\text{A of shaded Region} = \frac{\theta}{360} \pi r_2^2 - \frac{\theta}{360} \pi r_1^2$$

$$= \frac{40}{360} \pi [14^2 - 7^2]$$

$$= \frac{1}{9} \times \frac{22}{7} \times (14+7)(14-7)$$

$$= \frac{1}{9} \times \frac{22}{7} \times 7 \times 7$$

$$= \frac{154}{3} \text{ cm}^2$$

⑧

Radius (r) = 3.5 cm

$$\begin{aligned}\text{(i) A. of Quadrant} &= \frac{\theta}{360} \pi r^2 \\ &= \frac{90}{360} \times \frac{22}{7} \times 3.5^2 \\ &= \frac{11.0 \times 3.5}{4} \\ &= \frac{11 \times 35}{40} \\ &= \frac{77}{8} \text{ cm}^2\end{aligned}$$

(ii)

$$\begin{aligned}\text{A. of Shaded Region} &= \text{A. of Quadrant} \\ &\quad - \text{A. of } \Delta \\ &= \frac{77}{8} - \frac{1}{2} \times OB \times OD \\ &= \frac{77}{8} - \frac{1}{2} \times 3.5 \times 2 \\ &= \frac{77}{8} - 3.5 \\ &= \frac{77 - 28.0}{8} \\ &= \frac{49}{8} \text{ cm}^2\end{aligned}$$

⑨

Side of Square = 8 cm.

A. of Square = $8 \times 8 = 64 \text{ cm}^2$

$$\begin{aligned}\text{A. of Quadrants} &= 2 \times \frac{\theta}{360} \pi r^2 \\ &= 2 \times \frac{90}{360} \times \frac{22}{7} \times 8^2 \\ &= \frac{32 \times 22}{7} = \frac{704}{7}\end{aligned}$$

$$\begin{aligned}\text{A. of Shaded Region} &= \text{A. of Quadrants} - \text{A. of Square} \\ &= \frac{704}{7} - 64\end{aligned}$$

$$= \frac{704 - 448}{7}$$

$$= \frac{256}{7} \text{ cm}^2$$

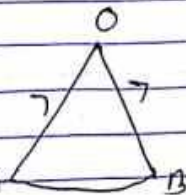
Ans

(10)

$$R = 7 \text{ cm}$$

$$\theta = 45^\circ$$

$$\text{Perimeter} = OA + OB + AB$$



$$= 7 + 7 + \frac{\theta}{360} \times 2\pi R$$

$$= 14 + \frac{45}{360} \times 2 \times \frac{22}{7} \times 7$$

$$= 14 + \frac{11}{2} = 14 + 5.5$$

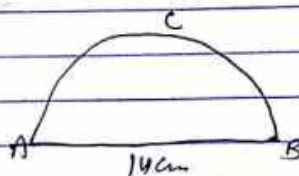
$$= 19.5 \text{ cm} \text{ Ans}$$

(11)

$$\text{diameter (d)} = 14 \text{ cm}$$

$$\text{Radius (r)} = 7 \text{ cm}$$

$$\text{Total Perimeter} = AB + \text{arc } ACB$$



$$= 14 + 1\pi$$

$$= 14 + \frac{22}{7} \times 7$$

$$= 14 + 22 = 36 \text{ cm}$$

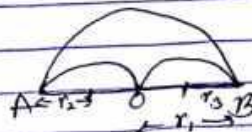
(12)

$$\text{Diameter } AB = 28 \text{ cm}$$

$$\text{Radius } (r_1) = 14 \text{ cm}$$

$$r_2 = \frac{14}{2} = 7 \text{ cm}$$

$$r_3 = \frac{14}{2} = 7 \text{ cm}$$



$$\text{Perimeter} = \pi r_1 + \pi r_2 + \pi r_3$$

$$= \pi [r_1 + r_2 + r_3]$$

$$= \frac{22}{7} [14 + 7 + 1]$$

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

$$= 82 \text{ cm}^2$$

(13)

Radius of circle = 6 cm

Central angle = $\frac{360}{4}$

= 90°



A of Shaded Region = 3 x A of Segment

$$= 3 \left[\frac{\theta}{360} \pi r^2 - \frac{1}{2} r^2 \sin \theta \right]$$

$$= 3 \left[\frac{90}{360} \times \frac{22}{7} \times 6^2 - \frac{1}{2} \times 6^2 \sin 90^\circ \right]$$

$$= 3 \left[\frac{3.14 \times 6 \times 6}{2} - \frac{1}{2} \times 36 \times 1 \right]$$

$$= 3 \left[6.28 \times 6 - 18 \times \frac{1}{2} \right]$$

$$= 3 \left[6.28 \times 6 - 9 \times 1.73 \right]$$

$$= 3 \left[37.68 - 15.57 \right]$$

$$= 3 \left[22.11 \right]$$

$$= 66.33 \text{ cm}^2$$

(14)

Side of Square = 14 cm

Radius of Semicircle = 7 cm

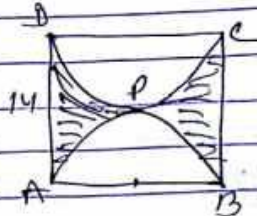
Perimeter of shaded region

$$= AD + BC + r + r$$

$$= 14 + 14 + \frac{22}{7} \times 7 + \frac{22}{7} \times 7$$

$$= 28 + 44$$

$$= 72 \text{ cm Ans}$$



(15)

$\therefore$ Perimeter of circle = A. of circle

$$2\pi r = \pi r^2$$

$$2r = r^2$$

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

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

(16)

$\therefore$ ABCD is Rhombus

A. of Circle = 1256

$$\pi r^2 = 1256$$

$$\frac{22}{7} \times r^2 = 1256$$

$$r^2 = \frac{1256 \times 7}{22}$$

$$3.14 \times r^2 = 1256$$

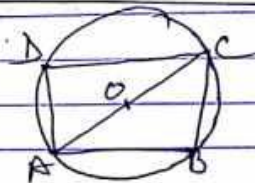
$$r^2 = \frac{1256}{3.14}$$

$$= \frac{4 \times 1256 \times 100}{314} = 400$$

$$r^2 = 400$$

$$r = 20 \text{ cm}$$

$$\therefore d = 2r = 2 \times 20 = 40 \text{ cm}$$



$$\begin{aligned}
 \text{A. of Rhombus} &= \frac{1}{2} \times d_1 \times d_2 \\
 &= \frac{1}{2} \times 40^{20} \times 40 \\
 &= 800 \text{ cm}^2
 \end{aligned}$$

Ans

(17). Angle of sector = 80°
 Distance covered = 16.5 Km
 $\therefore r = 16.5 \text{ Km}$

$$\begin{aligned}
 \text{Area covered} &= \frac{\theta}{360} \pi r^2 \\
 &= \frac{80}{360} \times 3.14 \times 16.5 \times 16.5 \\
 &= \frac{1}{4.5} \times 3.14 \times 16.5 \times 16.5 \\
 &= 189.97 \text{ Km}^2
 \end{aligned}$$

Ans

(18) A. of Circular ground = 22176 m^2

$$\begin{aligned}
 \pi r^2 &= 22176 \\
 \frac{22}{7} \times r^2 &= 22176 \\
 r^2 &= \frac{22176 \times 7}{22} \\
 &= 1008 \times 7 \\
 &= 7056 \\
 r &= \sqrt{7056} \\
 &= 84 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{Circumference} &= 2\pi r = 2 \times \frac{22}{7} \times 84 \\
 &= 2 \times 264 \\
 &= 528 \text{ m}
 \end{aligned}$$

$$\therefore \text{Cost} = 528 \times 50$$

$$= \text{Rs } 26400$$

(19)

Let Radius of circle = r

A/q.

$$2\pi r = 2r + 16.8$$

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

$$2r(\pi - 1) = 16.8$$

$$2r\left(\frac{22}{7} - 1\right) = 16.8$$

$$2r \times \frac{15}{7} = 16.8$$

$$r = \frac{16.8 \times 7}{2 \times 15}$$

$$= \frac{58.8}{15}$$

$$= 3.92 \text{ cm.}$$

Ans

(20)

Let Side of square = x

$\therefore$ Perimeter of square = Circumference of circle

$$4x = 2\pi r$$

$$4x = 2 \times \frac{22}{7} \times 35$$

$$x = \frac{2 \times 22 \times 35}{4 \times 7}$$

$$x = 55 \text{ cm.}$$

$$\begin{aligned}\therefore \text{area of square} &= (\text{side})^2 \\ &= (55)^2 \\ &= 3025 \text{ cm}^2\end{aligned}$$

Ans
