OPEN STUDENT FOUNDATION
STD 10 : MATHS
IMPORTANT QUESTION DAY 9

CHAPTER : 11 **Date : 26/02/24**

Section A

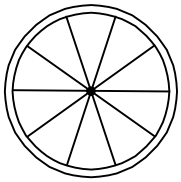
- **Write the answer of the following questions. [Each carries 3 Marks]** **[24]**

1. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes. use $\pi = \frac{22}{7}$

2. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the corresponding : (i) minor segment(ii) major sector, (Use $\pi = 3.14$)

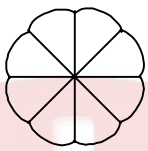
3. A chord of a circle of radius 15 cm subtends an angle of 60° at the centre. Find the areas of the corresponding minor and major segments of the circle. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$)

4. A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters which divide the circle into 10 equal sectors as shown in Figure. find : the total length of the silver wire required.



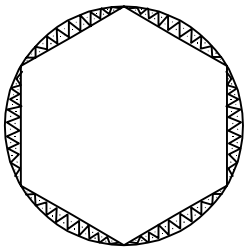
5. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find area of the segment formed by the corresponding chord use $\pi = \frac{22}{7}$

6. An umbrella has 8 ribs which are equally spaced (see Figure). Assuming umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella. use $\pi = \frac{22}{7}$



7. A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of 115°. Find the total area cleaned at each sweep of the blades. use $\pi = \frac{22}{7}$

8. A round table cover has six equal designs as shown in Figure. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of ₹ 0.35 per cm^2. (Use $\sqrt{3} = 1.7$)



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Section A

● **Write the answer of the following questions.** [Each carries 3 Marks] **[24]**

1. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

use $\pi = \frac{22}{7}$

➤ Angle subtended by the minute hand in 60 minute = 360°

➤ Angle subtended by the minute hand in 5 minute = $\frac{5}{60°} \times 360° = 30°$

➤ The region swept by the minute hand is minor sector with radius = 14 cm

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

$= \frac{22 \times 14 \times 14 \times 30}{7 \times 360} = \frac{154}{3}\ cm^2$

2. A chord of a circle of radius 10 cm subtends a right angle at the centre. Find the area of the corresponding : (i) minor segment(ii) major sector, (Use $\pi = 3.14$)

➤ $r = 10$ cm

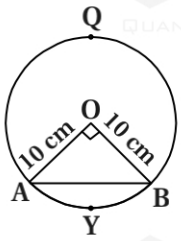
Area of minor sector OAYB $= \frac{\theta}{360} \times \pi r^2$

$= \frac{90}{360} \times \frac{314}{100} \times 10 \times 10$

$= \frac{1}{4} \times 314$

$= \frac{157}{2}$

$= 78.5\ cm^2$



➤ **(i) Area of minor segment**

Area of minor segment AYB = Area of minor sector OAYB – Area of ΔAOB

$= 78.5\ cm^2 - (\frac{1}{2} \times 10 \times 10\ cm^2)$

$= (78.5 - 50)\ cm^2$

$= 28.5\ cm^2$

➤ **(ii) Area of major sector**

Area of major sector OAQB = Area of circle – Area of minor sector OAYB.

$= \pi r^2 - (78.5\ \text{cm}^2)$

$= \frac{314}{100} \times 10 \times 10 - (78.5)\ \text{cm}^2$

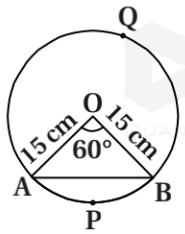
$= (314 - 78.5)\ \text{cm}^2$

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

Note : If a radius substends at an angle other than 90° at the centre, use No. [6] method from things to remember.

3. A chord of a circle of radius 15 cm subtends an angle of 60° at the centre. Find the areas of the corresponding minor and major segments of the circle. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73$)

➤



(i) Area of minor sector OAPB

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

$= \frac{60}{360} \times \frac{314}{100} \times 15 \times 15\ \text{cm}^2$

$= \frac{471}{4}\ \text{cm}^2$

$= 117.75\ \text{cm}^2$

(ii) Area of minor segment APB

In ΔOAB, $\angle O = 60°$ and $OA = OB = 15$ cm

$\therefore$ ΔOAB is the equilateral triangle.

Area of equilateral Δ OAB $= \frac{\sqrt{3}}{4} \times (\text{side})^2$

Area of $\Delta OAB = \frac{\sqrt{3}}{4} \times (15)^2$

$= \frac{\sqrt{3}}{4} \times 225\ \text{cm}^2$

$= \frac{225 \times \sqrt{3}}{4}\ \text{cm}^2$

$= \frac{225 \times 1.73}{4}\ \text{cm}^2$

$= 97.3125\ \text{cm}^2$

Area of minor segment APB = Area of minor sector OAPB – Area of ΔAOB

$= 117.75\ \text{cm}^2 - 97.3125\ \text{cm}^2$

$= 20.4375\ \text{cm}^2$

(iii) Area of major segment AQB

Area of major segment AQB = Area of circle − Area of minor segment APB

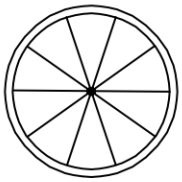
$= \pi r^2 - (20.4375\ cm^2)$

$= \left(\frac{314}{100} \times (15)^2\right) - (20.4375)\ cm^2$

$= (706.5 - 20.4375)$

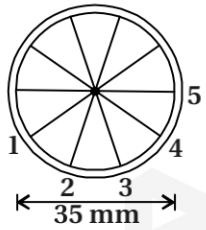
$= 686.0625\ cm^2$

4. A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire is also used in making 5 diameters which divide the circle into 10 equal sectors as shown in Figure. find : the total length of the silver wire required.



➤ Diameter of a circle = 35 mm.

$\therefore$ Radius = $\frac{\text{diameter}}{2} = \frac{35}{2}$ mm



Total length of wire

= Circumference of circle + 5 × diameter

$= 2\pi r + 5 \times 35$

$= \left(2 \times \frac{22}{7} \times \frac{35}{2}\right) + 175$

$= 110 + 175$

$= 285$ mm

5. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find area of the segment formed by the corresponding chord use $\pi = \frac{22}{7}$

➤ **Area of minor segment APB**

In ΔOAB $m\angle O = 60°$

OA = OB (same radius)

$\therefore \angle B = \angle A$

$\therefore \angle OBA = \angle OAB = \frac{1}{2}(180° - 60°)$

$= \frac{1}{2}(120°)$

$\therefore \angle OBA = \angle OAB = 60°$

$\therefore \Delta OAB$ is the equilateral triangle.

Area of equilateral Δ OAB $= \frac{\sqrt{3}}{4} \times r^2$

$= \frac{\sqrt{3}}{4} \times (21)^2 \text{ cm}^2$

$= \frac{\sqrt{3}}{4} \times 441 \text{ cm}^2$

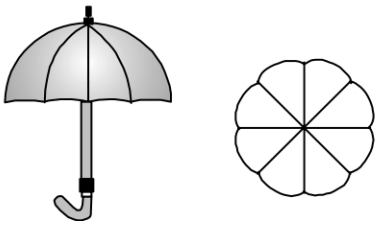
$= \frac{441\sqrt{3}}{4} \text{ cm}^2$

Area of minor segment APB = Area of minor sector OAPB – Area of ΔOAB

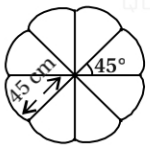
$= 231 \text{ cm}^2 - \frac{441\sqrt{3}}{4} \text{ cm}^2$

$= \left(231 - \frac{441\sqrt{3}}{4}\right) \text{cm}^2.$

6. An umbrella has 8 ribs which are equally spaced (see Figure). Assuming umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella. use $\pi = \frac{22}{7}$



➤ The area between two consecutive ribs of the umbrella is given by the area of a minor sector for which radius $r = 45$ cm and $\theta = \frac{360}{8} = 45$.



➤ Area of between two consecutive ribs = Area of minor sector whose radius is 45 cm.

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

$= \frac{45}{360} \times \frac{22}{7} \times 45 \times 45 \text{ cm}^2$

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

7. A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of 115°. Find the total area cleaned at each sweep of the blades. use $\pi = \frac{22}{7}$

➤ We have radius $r = 25$ cm

Angle of sector $\theta = 115°$

Total area cleaned at each sweep of two blades

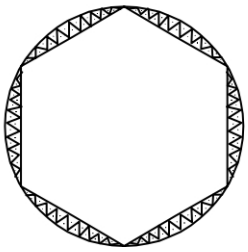
$= \left(\frac{\theta}{360} \times \pi r^2\right) \times 2$

$= \left(\frac{115}{360} \times \frac{22}{7} \times 25 \times 25\right) \times 2 \text{ cm}^2$

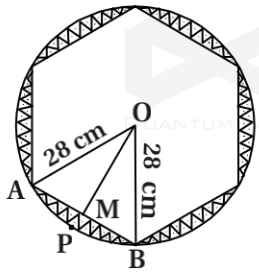
$= \frac{23 \times 11 \times 25 \times 25}{18 \times 7} \text{ cm}^2$

$= \frac{158125}{126} \text{ cm}^2$

8. A round table cover has six equal designs as shown in Figure. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of ₹ 0.35 per cm^2. (Use $\sqrt{3} = 1.7$)



➤



Suppose AB is a chord. $\angle AOB = \frac{360°}{6} = 60°$

Area of minor sector OAPB :

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

$= \frac{60}{360} \times \frac{22}{7} \times (28)^2 \text{ cm}^2$

$= \frac{1232}{3} \text{ cm}^2$

$= 410.67 \text{ cm}^2$

➤ Draw OM ⊥ AB.

∴ ΔOMA and ΔOMB become right angled triangle.

In ΔAOB, OA = OB (equal radius of one circle)

∴ OM = OM (Common side)

∴ $\angle OMA \cong \angle OMB$ (∵ 90°)

∴ Δ OMA ≅ Δ OMB (RHS)

∴ $AM = BM = \frac{1}{2} AB$

and $\angle AOM = \angle BOM$

∴ $\angle AOM = \angle BOM = \frac{1}{2} \angle AOB$

$= \frac{1}{2} \times 60°$

$\therefore \angle AOM = \angle BOM = 30°$

➤ In ΔOMA

$\cos 30° = \frac{OM}{OA}$

$\therefore \frac{\sqrt{3}}{2} = \frac{OM}{28}$

$\therefore OM = \frac{\sqrt{3} \times 28}{2}$

$\therefore OM = 14\sqrt{3}$ cm

In ΔOMA,

$\sin 30° = \frac{AM}{OA}$

$\therefore \frac{1}{2} = \frac{AM}{28}$

$\therefore AM = \frac{28}{2}$

$\therefore AM = 14$

$\therefore 2AM = 28$

$\therefore AB = 28$ cm

➤ **Area of Δ AOB**

Area of $\Delta AOB = \frac{1}{2} \times AB \times OM$

$= \frac{1}{2} \times 28 \times 14\sqrt{3}$ cm^2

$= 196\sqrt{3}$ cm^2

$= 196 \times 1.7$ cm^2

$= 333.2$ cm^2

➤ **Area of minor segment APB =** Area of minor segment APB

= Area of minor sector OAPB – Area of ΔAOB

= 410.67 – 333.2

$\therefore$ Area of minor segment = 77.47 cm^2

1 Area of minor segment = 77.47 cm^2

$\therefore$ 6 Area of minor segment = (?)

$= 77.47 \times 6 = 464.82$ cm^2

➤ **Cost :**

1 cm^2 = ₹ 0.35 (cost)

$\therefore$ 464.82 cm^2 = (?)

$= 0.35 \times 464.82 =$ ₹ 162.68