Level Based Questions

Level 1

1. What is area of the quadrant of a circle with radius 7cm?

Ans. $38.5cm^2$.

2. If radius of a circle is 14cm. What is the circumference of the circle?

Ans. 88cm.

3. What is the angle described by the minute hand in 25minutes?

Ans. 150^0.

4. A chord of a circle of radius 10 cm. subtends a right angle at the centre. Find the area of the minor sector.

Ans. $78.5\ cm^2$.

Level 2

1. Find the radius of a circle whose area is $301.84\ cm^2$.

Sol. Area of a circle = Πr^2

$\Pi r^2 = 301.84$

$r^2 = 301.84x7/22$

r = 61.6 cm.

2. The minute hand of a clock is 10 cm. long. Find the area of the face of a clock described by the minute hand between 9 am to 9:35 am.

Sol. Angle described by minute hand in 1 minute = 6^0

Angle described by minute hand in 35 minute = 210^0

Area swept = Area of sector with angle 210^0

$$= \frac{210}{360} x\Pi(10)^2$$

$= 183.3\ cm^2$

3. Find the area of a quadrant of a circle whose circumference is 22cm.

Sol. Let r be the radius of the circle then,Circumference = 22cm

$\Rightarrow$ $2\pi r = 22cm$
$\Rightarrow$ $2 x 22/7 x r = 22$
$\Rightarrow$ $r = 22 x 7/22 x 1/2$ cm
$\Rightarrow$ $r = 7/2$ cm

Area of a quadrant $= 1/4 \pi r^2$

$= \{ 1/4 \times 22/7 (7/2)^2 \} cm^2$

Area of a quadrant $= \{ 1/4 \times 22/7 \times 7/2 \times 7/2 \}$

$= 77/8\ cm^2 = 9.62 cm^2$

4. The circumference of circle exceeds the diameter by 16.8 cm . Find the radius of the circle?

Sol. Let the radius of the circle by r cm , then ,

Diameter = 2r and circumference = $2\pi r$

It is given that the circumference exceeds the diameter by 16.8 cm.

$\therefore$ Circumference = Diameter + 16.8

$2\pi r = 2r + 16.8$

$2 \times 22/7 \times r = 2r + 16.8$

$44 \times r = (2r + 16.8) \times 7$

$44r = 14 r + 117.6$

$44r – 14r = 117.6$

$30r = 117.6$

$r = 117.6/ 30 = 3.92$cm.

Level 3

1. A bicycle wheel make 500 revolution in moving 11 km. Find the diameter of the wheel.

Sol. Let the radius of the wheel be r cm.

Distance covered by the wheel in one revolution = Distance moved/ Number of revolutions

= 11/5000 km

= 11/ 500 x 1000 x 100 cm

= 220 cm

$\therefore$ circumference of the wheel 220 cm

$\Rightarrow$ $2\pi r$ = 220 cm
$\Rightarrow$ 2 x 22/7 x r = 220
$\Rightarrow$ r = 220 x 7/22 x 1/2
$\Rightarrow$ r = 220 x 7/22 x ½

r = 5 x 7 = 35cm

Diameter = 2r = 2x35 = 70 cm.

2. Find the area of sector of a circle whose radius is 14cm and angle of sector is 45^0.

Sol. We know that the area A of a sector of angle θ in a circle of radius r is given by

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

Here r = 14 cm and θ = 45

$\therefore$ A = $\{\frac{45}{360} x \frac{22}{7} x (14)^2\}$ cm2

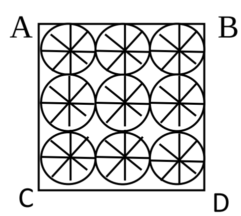
= $\{ \frac{1}{8} x \frac{22}{7} x\ 14\ x\ 14 \}$ cm^2

= 77 cm^2

3. On a square handkerchief , nine circular designs , each of radius 7 cm are made . Find the area of the remaining portion of the handkerchief

Sol. Side of square ABCD = AB

= 3 x diameter of circular design



= 3 x (2 x 7) cm

= 42 cm

$\therefore$ Area of square ABCD

= side x side

= (42 x 42) cm^2

= 1764 cm^2

Area of one circular design = πr^2

= ($\frac{22}{7}$ x 7 x 7) cm^2

= 154 cm^2

$\therefore$ Area of 9 such design = (9 x 154)

= 1386 cm^2

$\therefore$ Area of the remaining position of the handkerchief .

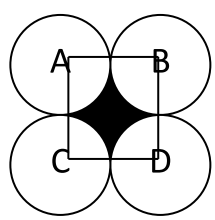
= Area of the square ABCD – Area of 9 circular designs

= (1764 – 1386) cm^2

= 378 cm^2

4. Four equal circles are described about the four corners of a square so that each touches two of the others as shown in figure. Find the area of the shaded region, each side of the square measuring 14 cm

Sol.



Let ABCD be the given square each side of which is 14 cm long . Clearly , the radius of circle is 7cm. We have ,

Area of the square of side 14 cm long = 14 x 14

= 196 cm^2

Area of each quadrant of a circle of radius 7 cm

= ¼ (π r^2)

$= \{ \frac{1}{4} x \frac{22}{7} x \ (7)^2\}$ cm^2

= 38.5 cm^2

$\therefore$ Area of 4 quadrant = 4 x 38.5

= 154 cm^2

Hence , area of shaded region = Area of square ABCD – Area of 4 quadrants .

Area of the shaded region

= (196 – 154) cm^2

= 42 cm^2

Level 4

1. An elastic belt is placed round the rim of pulley of radius 5 cm. One point on the belt is pulled directly away from the centre O of the pulley until it is at P, 10 cm from O. Find the length of the belt that is in contact with the rim of the pulley. Also find the shaded area.

Sol. Let <AOP = <BOP = θ

cosθ = OA/OP = 5/10 = 1/2

θ = 60^0

$\Rightarrow$<AOB = 2θ = 120^0

$\therefore$ Arc AB = 120x2xπx5/360 cm

= 10π/3 cm

Hence, length of the belt that is in contact with the rim of the pulley = Circumference of the rim – Length of the arc AB

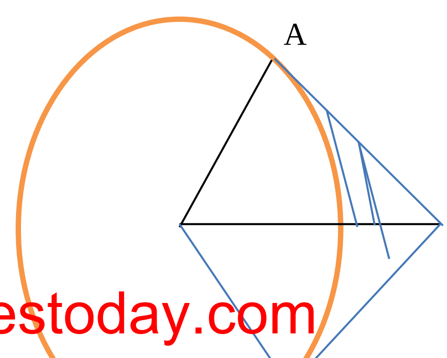
=2πx5 cm -10π/3 cm

= 20π/3 cm

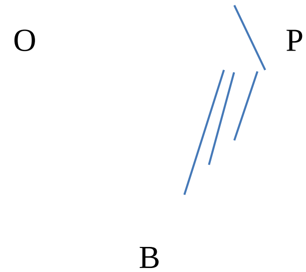
Now Area of the sector OAQB = $\frac{120}{360}$ xπx5^2 cm^2

= 25π/3cm^2

Area of quadrilateral OAPB =2(Area of triangle OAP)



$= 2x(\frac{1}{2}xOAxAP)$



$= 25\sqrt{3}\ cm^2$

Shaded area = Area of quadrilateral OAPB – Area of sector OAQB

$= (25\sqrt{3} - 25\pi/3)\ cm^2$

$= \frac{25}{3}(3\sqrt{3} - \pi)\ cm^2$

2. The cost of fencing a circular field at the rate of Rs. 24 per metre is Rs. 5280. The field is ploughed to be at the rate of Rs. 0.50 per metre square. Find the cost of ploughing the field.

Sol. Rate of fencing = Rs. 24 per m and, total cost of fencing = 5280

So, Length of fence = total cost/rate = 5280/24 m = 220 m

Circumference of the field = 220 m

$2\pi r = 220$

2x22/7xr = 220

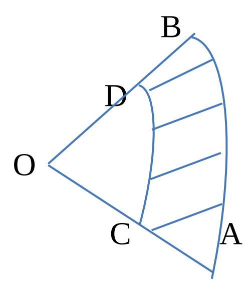
r = 220x7/22x2 = 35 m

Area of the field = πr^2

= 22/7x35x35 = 22x5x35 m^2

Cost of ploughing the field at the rate of Rs. 0.50 per m^2 = Rs.(22x5x35x0.50) = Rs. 1925

3. AB and CD are respectively arcs of two concentric circles of radii 21 cm and 7 cm at centre O. If <AOB = 30^0, find the area of shaded region.



Sol. Shaded area = Area of sector OAB – Area of sector OCD

= (30/360x22/7x21x21 – 30/360x22/7x7x7) cm^2

= 30/360x22/7x(21x21-7x7) cm^2

= 11/42x(21+7)x(21-7) cm^2

= 11/42x28x14 cm^2

= 102.67 cm^2

4. A horse is placed for grazing inside a rectangular field 70 m by 52 m and is tethered to one corner by a rope 20 m long. On how much area can it graze?

Sol. Shaded portion indicates the area which the horse can graze. Clearly shaded area is the area of a quadrant of circle of radius 21 m.

Required area = $1/4 x \pi r^2$

$= 1/4 x 22/7 x (21)^2 \text{ cm}^2$

$= 693/2 = 346.5 \text{ cm}^2$