

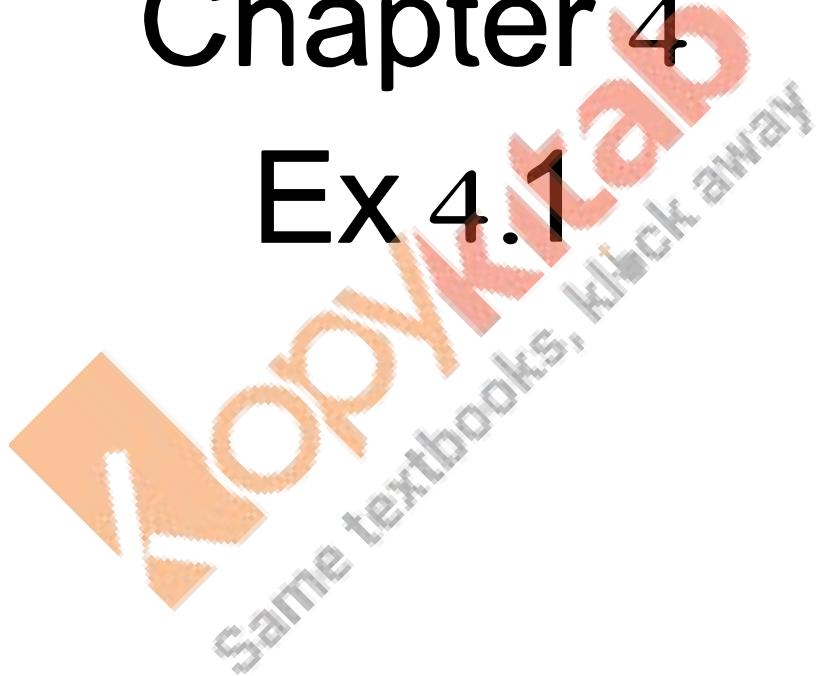
# RD Sharma

# Solutions

## Class 11 Maths

### Chapter 4

#### Ex 4.1



#### Chapter 4 Measurement Of Angles Ex 4.1 Q1

(i)  $\frac{9\pi}{5}$

We have,

$$\pi \text{ radians} = 180^\circ$$

$$1^\circ = \left( \frac{180}{\pi} \right)^0$$

Now,

$$\left( \frac{9\pi}{5} \times \frac{180}{\pi} \right)^0 = 324^\circ$$

(ii)  $\frac{-5\pi}{6}$

We have,

$$\pi \text{ radians} = 180^\circ$$

$$1^\circ = \left( \frac{180}{\pi} \right)^0$$

Now,

$$\left( \frac{-5\pi}{6} \right)^c = \left( \frac{-5\pi}{6} \times \frac{180}{\pi} \right)^0 = -150^\circ$$

(iii)  $\left( \frac{18\pi}{5} \right)^c$

We have,

$$\pi \text{ radians} = 180^\circ$$

$$1^\circ = \left( \frac{180}{\pi} \right)^0$$

Now,

$$\left( \frac{18\pi}{5} \right)^c = \left( \frac{18\pi}{5} \times \frac{180}{\pi} \right)^0 = 648^\circ$$

(iv) We have,

$$\pi \text{ radians} = 180^\circ$$

$$1^\circ = \left( \frac{180}{\pi} \right)^0$$

Now,

$$\begin{aligned} (-3)^c &= \left( -3 \times \frac{180}{\pi} \right)^0 \\ &= \left( \frac{180}{22} \times 7 \times -3 \right)^0 \\ &= \left( -171 \frac{9}{11} \right)^0 \\ &= -171^0 \left( \frac{9}{11} \times 60 \right)^1 \\ &= -171^0 49^1 5^{11} \end{aligned}$$

(v) We have,

$$\pi \text{ radians} = 180^\circ$$

$$1^\circ = \left( \frac{180}{\pi} \right)^0$$

Now,

$$\begin{aligned} (11)^c &= \left( 11 \times \frac{180}{\pi} \right)^0 \\ &= \left( 11 \times 180 \times \frac{7}{22} \right)^0 \\ &= 630^0 \end{aligned}$$

(vi) We have,

$$\pi \text{ radians} = 180^\circ$$

$$1^\circ = \left( \frac{180}{\pi} \right)^0$$

Now,

$$\begin{aligned}
 1^\circ &= \left(1 \times \frac{180}{\pi}\right)^0 \\
 &= 1 \times \frac{180 \times 7}{22} \\
 &= 57^0 16^1 \left(\frac{3}{11} \times 60\right) \\
 &= 57^0 16^1 \left(\frac{4}{11} \times 60\right)^{11} \\
 &= 57^0 16^1 21^{11}
 \end{aligned}$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q2

(i)  $300^\circ$

We have,

$$180^\circ = \pi^c$$

$$\therefore 1^\circ = \left(\frac{\pi}{180}\right)^c$$

Now,

$$300^\circ = 300 \times \frac{\pi}{180} = \frac{5\pi}{3}$$

(ii)  $35^\circ$

We have,

$$180^\circ = \pi^c$$

$$\therefore 1^\circ = \left(\frac{\pi}{180}\right)^c$$

Now,

$$35^\circ = 35 \times \frac{\pi}{180} = \frac{7\pi}{36}$$

(iii)  $-56^\circ$

We have,

$$180^\circ = \pi^c$$

$$\therefore 1^\circ = \left(\frac{\pi}{180}\right)^c$$

Now,

$$-56^\circ = -56 \times \frac{\pi}{180} = \frac{-14\pi}{45}$$

(iv)  $135^\circ$

We have,

$$180^\circ = \pi^c$$

$$\therefore 1^\circ = \left(\frac{\pi}{180}\right)^c$$

Now,

$$135^\circ = 135 \times \frac{\pi}{180} = \frac{3\pi}{4}$$

(v)  $-300^\circ$

We have,

$$180^\circ = \pi^c$$

$$\therefore 1^\circ = \left(\frac{\pi}{180}\right)^c$$

Now,

$$-300^\circ = -300 \times \frac{\pi}{180} = \frac{-5\pi}{3}$$

(vi)  $7^\circ 30^1$

We have,

$$180^\circ = \pi^c$$

$$\therefore 1^\circ = \left(\frac{\pi}{180}\right)^c$$

$$7^\circ 30^1 = \left(7 \times \frac{\pi}{180}\right)^c \times \left(\frac{30}{60}\right)^0$$

$$\begin{aligned}
 &= \left(7\frac{1}{2}\right)^c \times \left(\frac{\pi}{180}\right)^c \\
 &= \left(\frac{15}{2} \times \frac{\pi}{180}\right)^c \\
 &= \frac{\pi}{24}
 \end{aligned}$$

(vii)  $125^\circ 30^1$

We have,

$$180^\circ = \pi^c$$

$$1^\circ = \left(\frac{\pi}{180}\right)^c$$

$$\begin{aligned}
 125^\circ 30^1 &= 125^\circ \left(\frac{30}{60}\right)^0 \\
 &= \left(125\frac{1}{2}\right)^0 \\
 &= \left(\frac{251}{2} \times \frac{\pi}{180}\right)^c = \frac{251\pi}{360}
 \end{aligned}$$

(viii)  $-47^\circ 30^1$

We have,

$$180^\circ = \pi^c$$

$$1^\circ = \left(\frac{\pi}{180}\right)^c$$

$$\begin{aligned}
 -47^\circ 30^1 &= -47^\circ \left(\frac{30}{60}\right)^0 \\
 &= \left(-47\frac{1}{2}\right)^0 \\
 &= \left(\frac{-95}{2}\right)^0 \\
 &= \left(\frac{-95}{2} \times \frac{\pi}{180}\right)^c \\
 &= \frac{-19\pi}{72}
 \end{aligned}$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q3

Let  $\theta_1$  and  $\theta_2$  be two acute angles of a right angled triangle,  
 $\therefore$  difference of acute angles

$$\theta_1 - \theta_2 = \frac{2\pi}{5} \text{ radians}$$

$\therefore$  in a right angled triangle,

$$\theta_1 + \theta_2 = \frac{\pi}{2}$$

$$\theta_1 - \theta_2 = \frac{2\pi}{5} \quad \text{---(i)}$$

$$\theta_1 + \theta_2 = \frac{\pi}{2} \quad \text{---(ii)}$$

On solving

$$2\theta_1 = \frac{2\pi}{5} + \frac{\pi}{2}$$

$$\theta_1 = \frac{9\pi}{20}$$

From equation (ii)

$$\theta_2 = \frac{\pi}{20}$$

So angles in degrees

$$\theta_1 = \frac{9\pi}{20} \times \frac{180}{\pi} = 81^\circ$$

$$\text{and } \theta_2 = \frac{\pi}{20} \times \frac{180}{\pi} = 9^\circ$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q4

Let  $\theta_1$  and  $\theta_2$  and  $\theta_3$  be the angle of triangle.

$$\theta_1 = \frac{2}{3}x \text{ gradians}$$

$$\theta_2 = \frac{3}{2}x \text{ degrees and}$$

$$\theta_3 = \frac{\pi x}{75} \text{ radians}$$

Now,

we have to express all the angles in degrees

$$\begin{aligned}\theta_1 &= \left( \frac{3}{2}x \times \frac{90}{100} \right)^0 \\&= \frac{3}{5}x^0 \quad \left[ 1g = \frac{90}{100} \text{ degree} \right] \\&\theta_2 = \frac{3}{2}x^0 \\&\theta_2 = \frac{\pi x}{75} \times \frac{180}{\pi} = \frac{12x}{5}\end{aligned}$$

By angle sum property,

$$\begin{aligned}\theta_1 + \theta_2 + \theta_3 &= 180^0 \\&\frac{3}{5}x^0 + \frac{3}{2}x^0 + \frac{12x}{5} = 180^0 \\&\Rightarrow \frac{9}{2}x^0 = 180^0 \\&\Rightarrow x = 40^0\end{aligned}$$

$$\therefore \theta_1 = 24^0, \theta_2 = 60^0, \theta_3 = 96^0$$

## Chapter 4 Measurement Of Angles Ex 4.1 Q5

General formula for interior angles of polygon with  $n$  sides

$$= \left( \frac{2n-4}{n} \right) \times 90^0$$

(i) Pentagon has 5 sides

$$\begin{aligned}\therefore \text{magnitude of the interior angle} \\&= \frac{2 \times 5 - 4}{5} \times 90^0 \\&= \frac{6}{5} \times 90 = 180^0\end{aligned}$$

Now,

$$\therefore 1^c = \frac{180}{\pi}$$

And each angle of Pentagon

$$\begin{aligned}&= \frac{2 \times 5 - 4}{5} \times \frac{\pi}{2} \\&= \left( \frac{3\pi}{5} \right)^c\end{aligned}$$

$$\therefore 108^0, \left( \frac{3\pi}{5} \right)^c$$

(ii) Octagon

$$\begin{aligned}n &= 8 \\&\therefore \text{each angle} = \frac{2 \times 8 - 4}{8} \times 90^0 \\&= 135^0\end{aligned}$$

Again,

$$\begin{aligned}&\text{each angle} = \frac{2 \times 8 - 4}{8} \times \frac{\pi}{2} \\&= \left( \frac{3\pi}{4} \right)^c\end{aligned}$$

$$\therefore 135^0, \left( \frac{3\pi}{4} \right)^c$$

(iii) Heptagon

$$\begin{aligned}n &= 7 \\&\therefore \text{each angle} = \frac{2 \times 7 - 4}{7} \times 90^0 \\&= \frac{10}{7} \times 90^0 \\&= \frac{900^0}{7} \\&= 128^034^117^{11}\end{aligned}$$

Again,

$$\begin{aligned}&\text{each angle} = \frac{2 \times 7 - 4}{7} \times \frac{\pi}{2} \\&= \frac{10}{7} \times \frac{\pi}{2} \\&= \left( \frac{5\pi}{7} \right)^c\end{aligned}$$

$$\therefore 128^034^117^{11}, \left( \frac{5\pi}{7} \right)^c$$

(iv) Duodecagon

$$\begin{aligned}n &= 12 \\&\therefore \text{each angle} = \frac{2 \times 12 - 4}{12} \times 90^0 \\&= \frac{20}{12} \times 90^0 \\&= 150^0\end{aligned}$$

Again,

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$$\begin{aligned} \text{each angle} &= \frac{2 \times 12 - 4}{12} \times \frac{\pi}{2} \\ &= \frac{20}{12} \times \frac{\pi}{2} \\ &= \left(\frac{5\pi}{6}\right)^c \end{aligned}$$

$$\therefore 150^0, \left(\frac{5\pi}{6}\right)^c$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q6

Let the angles in degrees be  $a - 3d$ ,  $a - d$ ,  $a + d$ ,  $a + 3d$

Then,

$$\text{sum of the angles} = 360^0$$

$$\Rightarrow 4a = 360^0$$

$$a = 90^0$$

Also,

$$\text{greatest angle} = 120^0$$

$$a + 3d = 120^0$$

$$\Rightarrow 90^0 + 3d = 120^0$$

$$\Rightarrow 3d = 30^0$$

$$\Rightarrow d = 10^0$$

Hence, angles in degrees

$$60^0, 80^0, 100^0, 120^0$$

and in radians, we know that

$$1^0 = \left(\frac{\pi}{180}\right)^c$$

$$\therefore 60 \times \frac{\pi}{180} = \frac{\pi}{3}, 80 \times \frac{\pi}{180} = \frac{4\pi}{9},$$

$$100 \times \frac{\pi}{180} = \frac{5\pi}{9} \text{ and } 120 \times \frac{\pi}{180} = \frac{2\pi}{3}$$

$$\therefore \frac{\pi}{3}, \frac{4\pi}{9}, \frac{5\pi}{9}, \frac{2\pi}{3}$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q7

Let  $A, B \& C$  be the angles of triangle  $ABC$ .

We are given that  $A, B \& C$  are in A.P.

$$\therefore \text{Let } A = a - d, B = a \text{ and } C = a + d$$

According to the question,

$$A + B + C = 180^0$$

$$\therefore a - d + a + a + d = 180^0$$

$$\Rightarrow 3a = 180^0 \Rightarrow a = 60^0$$

Again,

$$\frac{\text{least angle}}{\text{mean angle}} = \frac{1}{120^0}$$

$$\Rightarrow \frac{a - d}{a} = \frac{1}{120}$$

$$\Rightarrow 119a = 120d$$

$$\Rightarrow d = \frac{119a}{120}$$

$$\Rightarrow d = \frac{119}{120} \times 60^0$$

$$= \left(\frac{119}{2}\right)^0$$

$$= \frac{119}{2} \times \frac{\pi}{180} = \frac{119\pi}{360} \text{ radians}$$

Now,

$$1^0 = \frac{\pi}{180} \text{ radians}$$

$$\therefore B = a = 60^0 = \frac{\pi}{3} \text{ radians}$$

$$A = a - d = \frac{\pi}{3} - \frac{119\pi}{360} = \frac{\pi}{360} \text{ radians}$$

$$C = a + d = \frac{\pi}{3} + \frac{119\pi}{360} = \frac{239\pi}{360} \text{ radians.}$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q8

Let  $n$  &  $m$  be the number of sides in two regular polygon respectively.

We know that each angle of  $n$ -sided regular polygon is  $\frac{2n-4}{n}$  right angles.

Now,

According to the question,

$$\left(\frac{2n-4}{n}\right) \times 90^\circ = \frac{3}{2}$$

$$\Rightarrow \frac{(2n-4)m}{(2m-4)n} = \frac{3}{2} \quad \text{---(i)}$$

Also,

$$n = 2m \quad \text{---(ii)} \quad [\text{given}]$$

Put (ii) in (i), we get

$$\begin{aligned} & \frac{(4m-4)m}{(2m-4)2m} = \frac{3}{2} \\ \Rightarrow & 4m-4 = 6m-12 \\ \Rightarrow & 2m = 8 \\ \therefore & m = 4 \end{aligned}$$

From (ii)

$$\begin{aligned} n &= 2m \\ &= 2 \times 4 = 8 \end{aligned}$$

$$\therefore n = 8, m = 4$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q9

According to the question,

$A, B \& C$  are in A.P

$\therefore$  Let  $A = a - d, B = a$  &  $C = a + d$

$$\begin{aligned} \text{So, } A + B + C &= 180^\circ && [\text{By angle sum property}] \\ \Rightarrow a - d + a + a + d &= 180^\circ \\ \Rightarrow 3a &= 180^\circ \Rightarrow a = 60^\circ \quad \text{---(i)} \end{aligned}$$

Also,

greatest angle is 5 times the least

$$\begin{aligned} \therefore a + d &= 5(a - d) \\ \Rightarrow 4a &= 6d \\ \Rightarrow d &= \frac{2}{3}a \\ \Rightarrow d &= \frac{2}{3} \times 60^\circ = 40^\circ \quad \text{---(ii)} \end{aligned}$$

$$\begin{aligned} \therefore A &= a - d = 20^\circ \\ B &= a = 60^\circ \\ C &= a + d = 100^\circ \end{aligned}$$

$$\begin{aligned} \therefore 1^\circ &= \left(\frac{\pi}{180^\circ}\right) \text{ radians} \\ \therefore A &= 20 \times \frac{\pi}{180} = \frac{\pi}{9} \\ B &= 60 \times \frac{\pi}{180} = \frac{\pi}{3} \\ C &= 100 \times \frac{\pi}{180} = \frac{5\pi}{9} \end{aligned}$$

Thus,

$$A = \frac{\pi}{9}, B = \frac{\pi}{3}, C = \frac{5\pi}{9}$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q10

Let  $n$  and  $m$  be the number of sides in two regular polygon respectively.

We know that each angle of  $n$ -sided regular polygon is

$$\left(\frac{2n-4}{n}\right) \text{ right angles.}$$

Now,

According to the question

$$\frac{n}{5} = \frac{5}{m} \Rightarrow \frac{5m}{5} = n \quad \text{---(i)}$$

Also,

$$\begin{aligned} & \left(\frac{2n-4}{n}\right)90^\circ - \left(\frac{2m-4}{m}\right)90^\circ = 90^\circ \\ \Rightarrow & \frac{(2n-4)m - (2m-4)n}{mn} = \left(\frac{1}{10}\right)^0 \quad \text{---(ii)} \end{aligned}$$

From (i) and (ii), we get

$$\begin{aligned} & \frac{\left(2 \times \frac{5}{4}m - 4\right)m - (2m-4)\frac{5}{4}m}{\frac{5}{4}m^2} = \frac{1}{10} \\ \Rightarrow & \frac{(10m-16) - (10m-20)}{5m} = \frac{1}{10} \\ \Rightarrow & \frac{4}{m} = \frac{1}{2} \Rightarrow m = 8 \end{aligned}$$

From (i)

$$n = \frac{5}{4}m = 10$$

Thus,

$$n = 10, m = 8$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q11

Let  $AB$  be the rail road

$$\angle AOB = 25^\circ = 25 \times \frac{\pi}{180} = \left(\frac{5\pi}{36}\right)^c \quad \left[ \because 1^\circ = \left(\frac{\pi}{180}\right)^c \right]$$

We know that

$$\begin{aligned} \theta &= \frac{\text{arc}}{\text{radius}} \\ \Rightarrow \angle AOB &= \frac{AB}{OA} \\ \Rightarrow \frac{5\pi}{36} &= \frac{AB}{r} \\ \Rightarrow r &= \frac{40 \times 36}{5\pi} \\ \Rightarrow r &= \frac{288}{\pi} \text{ meter} \\ \Rightarrow r &= 91.64 \text{ meter} \end{aligned}$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q12

$$\text{Let, } \angle AOB = \theta = 1'$$

$$\begin{aligned} AB &= \text{arc } AB = l \\ OA = OB &= r = 5280 \text{ m} \\ \therefore 1^\circ &= 60' \end{aligned}$$

$$\Rightarrow 1' = \left(\frac{1}{60}\right)^0 = \left(\frac{1}{60} \times \frac{\pi}{180}\right)^c \quad \left[ \because 1^\circ = \left(\frac{\pi}{180}\right)^c \right]$$

Now,

We know that

$$\begin{aligned} \theta &= \frac{\text{arc}}{\text{radius}} \\ \Rightarrow \left(\frac{\pi}{180 \times 60}\right)^c &= \frac{l}{5280} \\ \Rightarrow l &= \frac{5280\pi}{180 \times 60} = 1.5365 \text{ m} \quad \left[ \because \pi = \frac{22}{7} \right] \end{aligned}$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q13

Since A wheel makes  $360^\circ$  revolution in 1 minutes

$\therefore$  Wheel will make  $\frac{360}{60}$  revolution in 1 seconds

That is, 6 revolution in 1 second

Now,

In one revolution the wheel makes  $360^\circ$  angle

$\therefore$  In 6 revolution the wheel will make  $360^\circ \times 6$  angles

$$= 2160^\circ$$

$$\therefore 1^\circ = \left(\frac{\pi}{180}\right)^c$$

$$\therefore 2160^\circ = \left[\frac{2160}{180} \times \pi\right]^c$$

$$\left( \frac{180}{\pi} \right) = 12\pi$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q14

(i) We have,

$$OA = \text{length of pendulum} = 75 \text{ cm} \\ = 0.75 \text{ m}$$

$$AB = \text{arc } AB = 10 \text{ cm} \\ = 0.1 \text{ m}$$

Also,

$$\theta = \frac{\text{arc}}{\text{radius}} \quad \dots \text{(i)}$$

$$\Rightarrow \theta = \frac{0.1}{0.75} = \left( \frac{2}{15} \right)^c \\ \theta = \frac{2}{15} \text{ radian}$$

(ii)

$$OA = 75 \text{ cm} = 0.75 \text{ m} \\ AB = 15 \text{ cm} = 0.15 \text{ m}$$

From (A)

$$\theta = \frac{0.15}{0.75} = \frac{1}{5} \text{ radian} \\ \theta = \frac{1}{5} \text{ radian}$$

(iii)

$$OA = 75 \text{ cm} = 0.75 \text{ m} \\ AB = 21 \text{ cm} = 0.21 \text{ m}$$

From (A)

$$\theta = \frac{0.21}{0.75} = \frac{7}{25} \\ \therefore \theta = \frac{7}{25} \text{ radian}$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q15

We have,

$$OA = OB = \text{radius of circle} = 30 \text{ cm} = 0.3 \text{ m} \\ AB = \text{chord } AB = 30 \text{ cm} = 0.3 \text{ m} \\ \text{Arc } AB = \overline{AB} = l \text{ (say)}$$

Now,

$\triangle AOB$  is equilateral triangle as  $OA = OB = AB = 30 \text{ cm}$

$$\therefore \angle AOB = 60^0 = \frac{\pi}{3} \text{ radian.}$$

$$\therefore \theta = \frac{\text{arc}}{\text{radius}}$$

$$\Rightarrow \frac{\pi}{3} = \frac{l}{0.3}$$

$$\Rightarrow l = \frac{0.3}{3} \pi = 0.1\pi \text{ m}$$

$$\therefore l = \text{arc } AB = 10\pi \text{ cm.}$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q16

We have,

In circular track,

$$OA = OB = r = 150 \text{ m}$$

$\angle AOB = \theta = \text{angle the train turns in 10 seconds}$

Speed of train = 66 km/hr

$$= \frac{66 \times 1000}{60 \times 60} \text{ m/sec} \\ = \frac{110}{6} \text{ m/sec}$$

$$\therefore \text{Train will travel in 10 sec} = \frac{110}{6} \times 10 = \frac{1100}{6} \text{ m}$$

$$\therefore \text{arc } AB = \frac{1100}{6} \text{ m}$$

Thus,

$$\theta = \frac{\text{arc}}{\text{radius}} = \frac{1100}{6 \times 1500} = \frac{11}{90} \text{ radian}$$

$\therefore$  The train will turn by  $\left(\frac{11}{90}\right)^c$  angle in 10 sec.

### Chapter 4 Measurement Of Angles Ex 4.1 Q17

Let,  $r$  be the distance, at which coin is placed. So that it completely conceals the full moon.

Let,  $E$  be the eye of the observer.

Now,

$$\begin{aligned} \theta &= 31' = \left(\frac{31}{60}\right)^0 & [\because 60' = 1^0] \\ &= \frac{31}{60} \times \left(\frac{\pi}{180}\right)^c & [\because 1^0 = \left(\frac{\pi}{180}\right)^c] \end{aligned}$$

Also,

$$\widehat{AB} = \text{arc } AB = 2 \text{ cm} = 0.02 \text{ m.}$$

Now,

$$\begin{aligned} \text{by } \theta &= \frac{\text{arc}}{\text{radius}} \\ \frac{31\pi}{60 \times 180} &= \frac{0.02}{r} \\ \Rightarrow r &= \frac{0.02 \times 60 \times 180}{31\pi} \\ &= 2.217 \text{ m} & [\because \pi = \frac{22}{7}] \end{aligned}$$

Thus,

The coin should be placed at a distance of 2.217 m from the eye.

### Chapter 4 Measurement Of Angles Ex 4.1 Q18

Let,  $E$  be the eye of the observer and  $S$  be the sun.

Now,

$$\begin{aligned} \angle AOB &= \theta = 32' \\ &= \left(\frac{32}{60}\right)^0 \\ &= \left(\frac{32}{60} \times \frac{\pi}{180}\right)^c \\ \therefore \theta &= \frac{\text{arc}}{\text{radius}} \\ \Rightarrow \frac{32}{60} \times \frac{\pi}{180} &= \frac{AB}{91 \times 10^6} \text{ km} \\ \Rightarrow AB &= \frac{91 \times 10^6 \times 32 \times \pi}{60 \times 180} \\ &= 8.474074 \times 10^5 \text{ km} \\ &= 847407.4 \text{ km} \end{aligned}$$

$\therefore$  Distance of sun is 847407.4 km.

### Chapter 4 Measurement Of Angles Ex 4.1 Q19

Let,  $C_1$  &  $C_2$  are two circles with same Arc length  $l$ .

That is  $AB = CD = l$

Let,  $\theta_1$  and  $\theta_2$  are two angles subtended by arc  $AB$  and  $CD$  on respective circles.

$$\begin{aligned} \text{Let, } OA &= OB = r & [\text{radius of } C_1] \\ \text{and } OC &= OD = R & [\text{radius of } C_2] \end{aligned}$$

Also,

$$\begin{aligned} \theta_1 &= 65^0 = \left(\frac{65\pi}{180}\right)^c \\ \text{and } \theta_2 &= 110^0 = \left(\frac{110\pi}{180}\right)^c \end{aligned}$$

We know

$$\begin{aligned} \theta &= \frac{\text{arc}}{\text{radius}} \\ \therefore \text{For } C_1 & \theta_1 = \frac{AB}{r} \\ & \Rightarrow \theta_1 = \frac{l}{r} \\ & \Rightarrow r = \frac{l}{\theta_1} \quad \text{---(i)} \end{aligned}$$

$\theta_1$

For  $C_2$

$$\theta_2 = \frac{CD}{R}$$

$$\Rightarrow \theta_2 = \frac{l}{R}$$

$$\Rightarrow R = \frac{l}{\theta_2} \quad \text{---(i)}$$

From (i) and (ii)

$$\frac{r}{R} = \frac{\frac{l}{\theta_1}}{\frac{l}{\theta_2}} = \frac{\theta_2}{\theta_1} = \frac{\frac{110\pi}{180}}{\frac{65\pi}{180}} = \frac{22}{13}$$

$$\therefore r : R = 22 : 13$$

### Chapter 4 Measurement Of Angles Ex 4.1 Q20

Let,  $AB = \text{arc } AB = 22 \text{ cm}$

$$OA = OB = r = 100 \text{ cm}$$

Let  $\theta$  be the angle subtended by arc  $AB$  at centre O.

$\therefore$  by  $\theta = \frac{\text{arc}}{\text{radius}}$

$$\Rightarrow \theta = \frac{22}{100} \text{ radian}$$

$$\begin{aligned} \therefore \theta &= \left( \frac{22}{100} \times \frac{180}{\pi} \right)^0 & \left[ \because 1 \text{ radian} = \left( \frac{180}{\pi} \right)^0 \right] \\ &= 12.6^0 \\ &= 12^0 36^1 & \left[ \because 1^0 = 60^1 \right] \end{aligned}$$

$$\therefore \theta = 12^0 36^1$$

