

$$0.3 = \frac{30}{BC}$$

$$\overline{BC} = \frac{30}{0.3}$$

$$\overline{BC} = 100\text{m}$$

In ΔAOC

$$\tan 14^\circ = \frac{\overline{OC}}{\overline{AC}}$$

$$0.2493 = \frac{30}{\overline{AB} + \overline{BC}}$$

$$0.2493 = \frac{30}{x + 100}$$

$$0.2493(x + 100) = 30$$

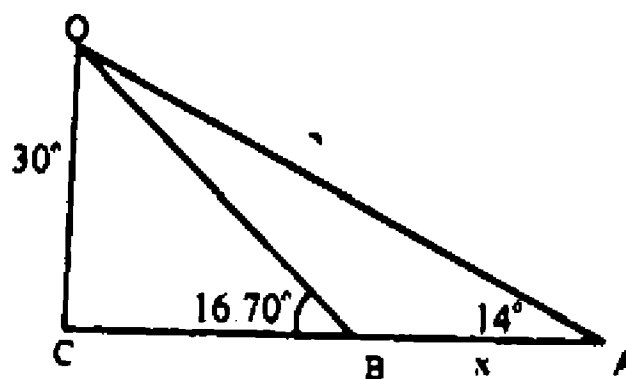
$$0.2493x + 24.93 = 30$$

$$0.2493x = 30 - 24.93$$

$$0.2493x = 5.07$$

$$x = \frac{5.07}{0.2493}$$

$$x = 20.33 \text{ m}$$



SOLVED MISCELLANEOUS EXERCISE - 7

Q1. Multiple Choice Questions

Four possible answers are given for the following questions. Tick (✓) the correct answer.

- (i) The union of two non-collinear rays, which have common end point is called
 - (a) an angle
 - (b) a degree
 - (c) a minute
 - (d) a radian
- (ii) The system of measurement in which the angle is measured in radians is called
 - (a) CGS system
 - (b) sexagesimal system
 - (c) MKS system
 - (d) circular system
- (iii) $20^\circ =$
 - (a) $360'$
 - (b) $630'$
 - (c) $1200'$
 - (d) $3600'$
- (iv) $\frac{3\pi}{4}$ radians =
 - (a) 115°
 - (b) 135°
 - (c) 150°
 - (d) 150°
- (v) If $\tan \theta = \sqrt{3}$, then θ is equal to
 - (a) 90°
 - (b) 45°
 - (c) 60°
 - (d) 30°
- (vi) $\sec 2\theta =$

(a) $1 - \sin^2 \theta$ (b) $1 + \sin^2 \theta$ (c) $1 + \cos^2 \theta$ (d) $\cos \theta$

(vii) $\frac{1}{1 + \sin \theta} + \frac{1}{1 - \sin \theta}$

(a) $2 \sec^2 \theta$ (b) $2 \cos^2 \theta$ (c) $\sec^2 \theta$ (d) $\cos \theta$

(viii) $\frac{1}{2} \operatorname{cosec} 45^\circ$

(a) $\frac{1}{2\sqrt{2}}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\sqrt{2}$ (d) $\frac{\sqrt{3}}{2}$

(ix) $\sec \theta \cot \theta =$

(a) $\sin \theta$ (b) $\frac{1}{\cos \theta}$ (c) $\frac{1}{\sin \theta}$ (d) $\frac{\sin \theta}{\cos \theta}$

(x) $\operatorname{cosec}^2 \theta - \cot^2 \theta =$

(a) -1 (b) 1 (c) 0 (d) $\tan \theta$

Answer

(i)	a	(ii)	d	(iii)	c	(iv)	b	(v)	c
(vi)	b	(vii)	a	(viii)	b	(ix)	c	(x)	b

Q2. Write short answers of the following questions.

(i) Define an angle.

Ans:

an angle is defined as the union of two non-collinear rays with some common end point.

(ii) What is the sexagesimal system of measurement of angles?

Ans:

In sexagesimal system of measurement of angles, we find angles in degree, minutes and seconds.

(iii) How many minutes are in two right angles?

Ans:

In two right angles, we have 10800 minutes.

(iv) Define radian measure of an angle.

Ans:

The angle subtended at the centre of the circle by an arc, whose length is equal to the radius of the circle, is called one radian.

(v) Convert $\frac{\pi}{4}$ radian to degree measure.

Ans:

$$\frac{\pi}{4} = \frac{\pi}{4} \text{ radian} = \frac{\pi}{4} \times \frac{180^\circ}{\pi} = 45^\circ$$

(vi) Convert 15° to radians.

Ans:

$$15^\circ = 15 \times 1^\circ = 15 \times \frac{\pi}{180} = \frac{\pi}{12} \text{ radians.}$$

(vii) What is radian measure of the central angle of an arc 50m long on the circle of radius 25m.

Ans:

$$\theta = ?, l = 50 \text{ m, } r = 25 \text{ m}$$

We know that

$$l = r\theta$$

$$\theta = \frac{l}{r} = \frac{50}{25} = 2 \text{ radian}$$

(viii) Find r when l = 56 cm and $\theta = 45^\circ$

Ans:

$$r = ?, l = 56 \text{ cm, } \theta = 45^\circ = 45 \times 1^\circ = 45 \times \frac{\pi}{180} = \frac{\pi}{4} = 0.7854 \text{ radians}$$

We know that

$$l = r\theta$$

$$\begin{aligned} r &= \frac{l}{\theta} = \frac{56}{0.7854} \\ &= 71.30 \text{ cm} \end{aligned}$$

(ix) Find $\tan \theta$ when $\cos \theta = \frac{9}{41}$ and θ terminal side of the angle θ is in fourth quadrant.

Ans:

$$\cos \theta = \frac{9}{41}$$

$$\Rightarrow x = 9 \text{ and } r = 41$$

By Pythagoras theorem, we have

$$r^2 = x^2 + y^2$$

$$y^2 = r^2 - x^2$$

$$y = \sqrt{r^2 - x^2}$$

$$= \sqrt{(41)^2 - (9)^2}$$

$$= \sqrt{1681 - 81}$$

$$= \sqrt{1600}$$

$$= 40$$

$$\text{Now } \tan \theta = \frac{y}{x} = \frac{40}{9}$$

(i) Prove that $(1 - \sin^2 \theta)(1 + \tan^2 \theta) = 1$:

Ans:

$$\begin{aligned}
 \text{L.H.S.} &= (1 - \sin^2 \theta) (1 + \tan^2 \theta) \\
 &= (1 - \sin^2 \theta) \left(1 + \frac{\sin^2 \theta}{\cos^2 \theta} \right) \\
 &= (\cos^2 \theta) \left(\frac{\cos^2 \theta + \sin^2 \theta}{\cos^2 \theta} \right) \\
 &= (\cos^2 \theta) \left(\frac{1}{\cos^2 \theta} \right) \\
 &= 1 \\
 &= \text{R.H.S}
 \end{aligned}$$

Hence proved

Q3. Fill in the blanks

- (i) radians = _____ degree.
- (ii) The terminal side of angle 235° lies in _____ quadrant.
- (iii) Terminal side of the angle -30° lies in _____ quadrant.
- (iv) Area of a circular sector is _____.
- (v) If $r = 2$ cm and $\theta = 3$ radian, then area of the circular sector is _____.
- (vi) The general form of the angle 480° is _____.
- (vii) If $\sin \theta = \frac{1}{2}$, then $\theta =$ _____.
- (viii) If $\theta = 300^\circ$, then $\sec(-300)^\circ =$ _____.
- (ix) $1 + \cot^2 \theta =$ _____.
- (x) $\sec \theta - \tan \theta =$ _____.

Answer

(i)	180	(ii)	III	(iii)	IV
(iv)	$\frac{1}{2} r^2 \theta$	(v)	6cm^2	(vi)	$2k\pi + 120^\circ$, where $k = 1$
(vii)	$\theta = 30^\circ$ or $\frac{\pi}{6}$ rad	(viii)	2	(ix)	$\text{cosec}^2 \theta$
(x)	$\frac{1 - \sin \theta}{\cos \theta}$				

SUMMARY

- ✓ If we divide the circumference of a circle into 360 equal arcs. Then the angle subtended at the centre of the Circle by one arc is called one degree and is denoted by 1° .
- ✓ The angle subtended at the centre of the circle by an arc, whose length is equal to the radius of the circle, is called one radian.
- ✓ Relationship between radian and degree measure $1^\circ = \frac{\pi}{180}$ radians ≈ 0.0175 radian and
 $1 \text{ radian} = \left(\frac{180}{\pi}\right)^\circ \approx 57.295 \text{ degrees}$
- ✓ Relation between central angle and arc length of a circle: $l = r\theta$
- ✓ Area of a circular sector, $A = \frac{1}{2} r^2\theta$.
- ✓ Two or more than two angles with the same initial and terminal sides are called cotenninal angles.
- ✓ An angle is called a quadrantal angle, if its terminal side lies on the axis or-axis.
- ✓ A general angle is said to be in standard position if its vertex is at the origin and its initial side is directed along the positive direction of the x-a.y.is of a rectangular coordinate system.
- ✓ There are six fundamental trigonometric ratios (functions) known, as sine, cosine, tangent, cotangent, secant and cosecant.
- ✓ Trigonometric Identities:
(a) $\cos^2\theta + \sin^2\theta = 1$ (b) $1 + \tan^2\theta = \sec^2\theta$ (c) $1 + \cot^2\theta = \operatorname{cosec}^2\theta$

