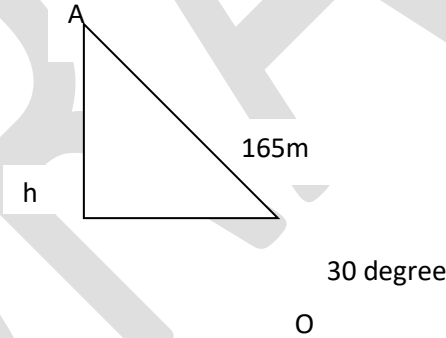


CHAPTER-3
TRIGONOMETRIC FUNCTIONS
03 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	A cow is tied to a pole by a rope. If it moves along a circular path always keeping the rope tight and describe 88m when it has traced out 72 at the centre, find the length of rope.	3
2.	If $\cos \cos (\alpha + \beta) = \frac{4}{5}$ and $\sin \sin (\alpha - \beta) = \frac{5}{13}$, where α lie between 0 and $\frac{\pi}{4}$, then find that value of $\tan \tan 2\alpha$	3
3.	A kite is flying , attached to a thread which is 165m long. The thread makes an angle of 30° with the ground. Find the height of the kite from the ground, assuming that there is no slack in the thread.	3
4.	Find the radius of the circle in which a central angle of 60° intercepts an arc of length 37.4 cm (use $\pi = 22/7$).	3
5.	Prove that: $\cos^2 x + \cos^2 \left(x + \frac{\pi}{3} \right) + \cos^2 \left(x - \frac{\pi}{3} \right) = \frac{3}{2}$	3
6.	Find the value of $\sqrt{3} \operatorname{cosec} 20^\circ - \sec 20^\circ$.	3
7.	Prove that $2 \cos \frac{\pi}{13} \cos \frac{9\pi}{13} + \cos \frac{3\pi}{13} + \cos \frac{5\pi}{13} = 0$.	3
8.	Prove that $\frac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$.	3
9.	Prove that $\sin 2x + 2 \sin 4x + \sin 6x = 4 \cos^2 x \sin 4x$	3

ANSWERS:

Q. NO	ANSWER	MARKS
1.	<p>Solution: Here, arc(l) = 88m $\theta = 72^\circ = 72 \times \frac{\pi}{180} = \frac{2\pi}{5}$ We know, $r = \frac{l}{\theta} = \frac{88}{\frac{2\pi}{5}} = \frac{88 \times 5 \times 7}{2 \times 22} = 70$ so the length of the rope be 70m</p>	
2.	<p>Solution: We know $\sin^2 x + \cos^2 x = 1$ So $\sin(\alpha + \beta) = \sqrt{1 - \frac{16}{25}} = \pm \frac{3}{5} = \frac{3}{5}$ [since α lie between 0 and $\frac{\pi}{4}$] Similarly $\cos(\alpha - \beta) = \frac{12}{13}$ Now $\tan(\alpha + \beta) = \frac{3}{4}$ $\tan(\alpha - \beta) = \frac{5}{12}$ $\therefore \tan 2\alpha = \frac{\tan(\alpha + \beta) + \tan(\alpha - \beta)}{1 - \tan(\alpha + \beta)\tan(\alpha - \beta)}$ $= \frac{\frac{3}{4} + \frac{5}{12}}{1 - \frac{3}{4} \times \frac{5}{12}}$ $= \frac{56}{33}$</p>	
3.	<p>Solution:</p>  <p>Here $\angle BOA = 30^\circ$ $OA = 165\text{m}$ $\angle OBA = 90^\circ$ From the Triangle ,</p> $\sin 30^\circ = \frac{AB}{OA}$ $\Rightarrow \frac{1}{2} = \frac{h}{165}$ $\Rightarrow h = \frac{165}{2} = 82.5$ <p>Hence the height of the kite from the ground = 82.5m</p>	
4.		

Given,

Length of the arc = $l = 37.4$ cm

Central angle = $\theta = 60^\circ = 60\pi/180$ radian = $\pi/3$ radians

We know that,

$$r = l/\theta$$

$$= (37.4) * (\pi / 3)$$

$$= (37.4) / [22 / 7 * 3]$$

$$= 35.7 \text{ cm}$$

Hence, the radius of the circle is 35.7 cm.

5.

$$= \cos^2 x + \cos^2\left(x + \frac{\pi}{3}\right) + \cos^2\left(x - \frac{\pi}{3}\right)$$

$$= \cos^2 x + [\cos(x + \frac{\pi}{3})]^2 + [\cos(x - \frac{\pi}{3})]^2$$

$$= \cos^2 x + (\cos x \cos \frac{\pi}{3} - \sin x \sin \frac{\pi}{3})^2 + (\cos x \cos \frac{\pi}{3} + \sin x \sin \frac{\pi}{3})^2$$

$$= \cos^2 x + [\cos x \left(\frac{1}{2}\right) - \sin x \left(\frac{\sqrt{3}}{2}\right)]^2 + [\cos x \left(\frac{1}{2}\right) + \sin x \left(\frac{\sqrt{3}}{2}\right)]^2$$

$$= \cos^2 x + \frac{1}{4}(\cos x - \sqrt{3} \sin x)^2 + \frac{1}{4}(\cos x + \sqrt{3} \sin x)^2$$

$$= \cos^2 x + \frac{1}{4}(\cos^2 x + 3 \sin^2 x - 2\sqrt{3} \cos x \sin x) + \frac{1}{4}(\cos^2 x + 3 \sin^2 x + 2\sqrt{3} \cos x \sin x)$$

$$= \cos^2 x + \frac{1}{4}(\cos^2 x + 3 \sin^2 x - 2\sqrt{3} \cos x \sin x + \cos^2 x + 3 \sin^2 x + 2\sqrt{3} \cos x \sin x)$$

$$= \cos^2 x + \frac{1}{4}(2 \cos^2 x + 6 \sin^2 x)$$

$$= \cos^2 x + \frac{1}{2} \cos^2 x + \frac{3}{2} \sin^2 x$$

$$= \frac{3}{2} \cos^2 x + \frac{3}{2} \sin^2 x$$

$$= \frac{3}{2}(\cos^2 x + \sin^2 x)$$

$$= \frac{3}{2}(1)$$

$$= \frac{3}{2}$$

= RHS

Hence proved.

6.	$3 \operatorname{cosec} 20^\circ - \sec 20^\circ$ $= \frac{\sqrt{3}}{\sin 20^\circ} - \frac{1}{\cos 20^\circ}$ $= \frac{\sqrt{3} \cos 20^\circ - \sin 20^\circ}{\sin 20^\circ \cos 20^\circ} = 4 \left(\frac{\frac{\sqrt{3}}{2} \cos 20^\circ - \frac{1}{2} \sin 20^\circ}{2 \sin 20^\circ \cos 20^\circ} \right)$ $= 4 \left(\frac{\sin 60^\circ \cos 20^\circ - \cos 60^\circ \sin 20^\circ}{\sin 40^\circ} \right)$ $= 4 \left(\frac{\sin (60^\circ - 20^\circ)}{\sin 40^\circ} \right) = 4$	
7.	$LHS = 2 \cos \frac{\pi}{13} \cos \frac{9\pi}{13} + 2 \cos \frac{4\pi}{13} \cos \left(-\frac{\pi}{13} \right)$ $= 2 \cos \frac{\pi}{13} \left(\cos \frac{9\pi}{13} - \cos \frac{\pi}{13} \right) = 2 \cos \frac{\pi}{13} \left(2 \cos \frac{\pi}{2} \cos \frac{5\pi}{26} \right)$ $= 0$ <p>Since $\cos \frac{\pi}{2} = 0$.</p>	3
8.	$LHS = \frac{\cos 4x + \cos 2x + \cos 3x}{\sin 4x + \sin 2x + \sin 3x} = \frac{2 \cos 3x \cos x + \cos 3x}{2 \sin 3x \sin x + \sin 3x} = \frac{\cos 3x}{\sin 3x}$ $= \cot 3x$	3
9.	$LHS = \sin 2x + \sin 6x + 2 \sin 4x = 2 \sin 4x \cos -2x + 2 \sin 4x$ $= 2 \sin 4x (\cos 2x + 1) = 2 \sin 4x (2 \cos^2 x)$ $= 4 \cos^2 x \sin 4x$	3