

CLASS –XI
ASSIGNMENT- 3

SUBJECT – MATHEMATICS
TOPIC – TRIGONOMETRY

- Q1. The difference between two acute angles of a right triangle is $\frac{\pi}{9}$. Find the angles in degree.
- Q2. A horse is tied to a post by a rope. If the horse moves along a circular path always keeping the rope tight and describe 88 metres when it was traced out 72° at the centre, find the length of the rope.
- Q3. The angles of a triangle are A.P. such that the greatest is 5 times the least. Find the angles in radians.
- Q4. Prove that (i) $(1 + \tan \alpha \tan \beta)^2 + (\tan \alpha - \tan \beta)^2 = \sec^2 \alpha \sec^2 \beta$
- (ii) $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = \sec A \operatorname{cosec} A + 1$
- Q5. If $\sin \theta = \frac{12}{13}$ and θ lies in 2nd quad, then find the value of $8 \tan \theta - \sqrt{5} \sec \theta$
- Q6. Prove that :-
- (i)
$$\frac{\cos(2\pi + \theta) \operatorname{cosec}(2\pi + \theta) \tan\left(\frac{\pi}{2} + \theta\right)}{\sec\left(\frac{\pi}{2} + \theta\right) \cos \theta \cot(\pi + \theta)} = 1$$
- (ii)
$$\frac{\tan(90^\circ - \theta) \sec(180^\circ - \theta) \sin(-\theta)}{\sin(180^\circ + \theta) \cot(360^\circ - \theta) \operatorname{cosec}(90^\circ - \theta)} = 1$$
- (iii)
$$\frac{\tan 69^\circ + \tan 66^\circ}{1 - \tan 69^\circ \tan 66^\circ} = -1$$
- (iv)
$$\frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \tan 56^\circ$$
- Q7. If $\tan \alpha = \frac{m}{m+1}$, $\tan \beta = \frac{1}{2m+1}$ then prove that $\alpha + \beta = \frac{\pi}{4}$
- Q8. Prove that (i) $\tan 3A \tan 2A \tan A = \tan 3A - \tan 2A - \tan A$
- (ii) $(1 + \tan A)(1 + \tan B) = 2$ when $A + B = \frac{\pi}{4}$
- Q9. Draw the graph of
- (i) $y = 3 \sin x$ (ii) $y = \operatorname{cosec} x$ (iii) $y = \sec x$
- (iv) $y = \sin x + \cos x$
- Q10. Solve the following trigonometric equations :-
- (i) $\tan\left(\frac{2}{3}\theta\right) = \sqrt{3}$
- (ii) $7\cos^2\theta + 3\sin^2\theta = 4$
- Q11. If $\tan A = x \tan B$ then prove that $\frac{\sin(A - B)}{\sin(A + B)} = \frac{x - 1}{x + 1}$
- Q12. If $\sin A = \frac{3}{5}$, $0 < A < \frac{\pi}{2}$, $\cos B = \frac{-12}{13}$, $\pi < B < 3\frac{\pi}{2}$, find $\sin(A+B)$

Q13. Prove that (i) $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$

(ii) $\cos 5A = 16\cos^5 A - 20\cos^3 A + 5\cos A$

Q14. Find the value of (i) $\cos 15^\circ$ (ii) $\sin 75^\circ$ (iii) $\tan 75^\circ$

Q15. Find the general solution of the following trigonometric equations ;-

(i) $\cot^2 \theta + \frac{3}{\sin \theta} + 3 = 0$

(ii) $\tan \theta + \tan 2\theta + \tan \theta \tan 2\theta = 1$

(iii) $\tan \theta + \tan 2\theta + \sqrt{3} \tan \theta \tan 2\theta = \sqrt{3}$

(iv) $\sec^2 2x = 1 - \tan 2x$

(v) $\tan \theta + \tan \left(\theta + \frac{\pi}{3} \right) + \tan \left(\theta + \frac{2\pi}{3} \right) = 3$

Q16. In any triangle ABC, if $a=16$, $b=12$, $c=25$ find

(i) $\cos A$, $\cos B$, $\cos C$

(ii) $\sin A$, $\sin B$, $\sin C$

Q17. For any triangle ABC prove that

(i) $\frac{\sin(B-C)}{\sin(B+C)} = \frac{b^2 - c^2}{a^2}$

(ii) $\frac{b^2 - c^2}{a^2} \sin 2A + \frac{c^2 - a^2}{b^2} \sin 2B + \frac{a^2 - b^2}{c^2} \sin 2C = 0$

(iii) $a(\cos C - \cos B) = 2(b - c) \cos^2(A/2)$