



INDIAN SCHOOL AL WADI AL KABIR

Class X - Mathematics (2026-27)

Worksheet – Introduction to Trigonometry 07 -10-2026

Questions of 2 marks each

- Q.1.** If $\tan \theta + \frac{1}{\tan \theta} = 2$, find the value of $\tan^2 \theta + \frac{1}{\tan^2 \theta}$.
- Q.2.** In the given figure, ABC, ADE and AQP are three right triangles. The value of $\sin A$ is the greatest for ΔAQP . Do you agree? Justify your answer.
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- Q.3.** If $\cos \theta + \sin \theta = 1$, then prove that $\cos \theta - \sin \theta = \pm 1$
- Q.4.** Prove that $\frac{\cot^2 \alpha}{1 + \operatorname{cosec} \alpha} = \operatorname{cosec} \alpha - 1$
- Q.5.** Evaluate: $\sin A \cos B + \cos A \sin B$; if $A = 30^\circ$ and $B = 45^\circ$.

Questions of 3 marks each

- Q.6.** If $\frac{\sec \alpha}{\operatorname{cosec} \beta} = p$ and $\frac{\tan \alpha}{\operatorname{cosec} \beta} = q$, then prove that $(p^2 - q^2) \sec^2 \alpha = p^2$.
- Q.7.** Prove that $(\sin A + \sec A)^2 + (\cos A + \operatorname{cosec} A)^2 = (1 + \sec A \operatorname{cosec} A)^2$
- Q.8.** In ΔPQR , if $PQ : QR : PR = 8 : 15 : 17$, then evaluate,
- (i) $\cos P \cdot \cos R - \sin P \cdot \sin R$ ii) $\frac{\tan P - \tan R}{1 + \tan P \cdot \tan R}$
- Q.9.** Prove: $(\operatorname{cosec} \theta + \cot \theta)^2 = \frac{\sec \theta + 1}{\sec \theta - 1}$
- Q.10.** Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\cos^2 A}{(1 + \sin A)^2}$

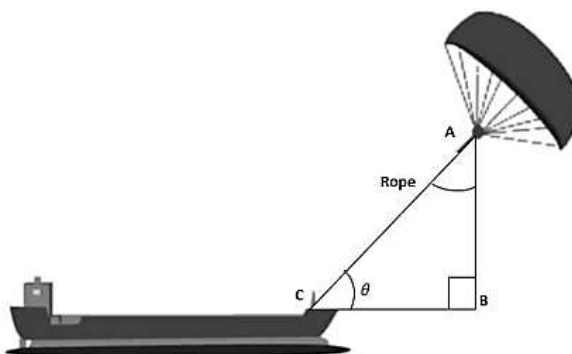
Questions of 5 marks each

Q.11.	Prove that: $\frac{\tan^3 \theta}{1+\tan^2 \theta} + \frac{\cot^3 \theta}{1+\cot^2 \theta} = \sec \theta \cdot \operatorname{cosec} \theta - 2 \sin \theta \cdot \cos \theta$
Q.12.	If $\tan \theta + \sin \theta = m$, $\tan \theta - \sin \theta = n$ then show that $m^2 - n^2 = 4\sqrt{mn}$
Q.13.	If $x = r \sin A \cos C$, $y = r \sin A \sin C$ and $z = r \cos A$, then prove that $x^2 + y^2 + z^2 = r^2$
Q.14.	Prove that $\frac{\sin \theta}{\cot \theta + \operatorname{cosec} \theta} = 2 + \frac{\sin \theta}{\cot \theta - \operatorname{cosec} \theta}$

Case study question (4 marks)

- Q.15.** ‘Skysails’ is that genre of engineering science that uses extensive utilization of wind energy to move a vessel in the sea water. The ‘Skysails’ technology allows the towing kite to gain a height of anything between 100 metres – 300 metres. The sailing kite is made in such a way that it can be raised to its proper elevation and then brought back with the help of a ‘telescopic mast’ that enables the kite to be raised properly and effectively.

Based on the following figure related to sky sailing, answer the questions:



- (i) In the figure, if $AB = 2\sqrt{3}$ m and $BC = 6$ m, then find the measure of θ .
- (ii) If $\cos A = \frac{1}{2}$, then find the value of $9 \cot^2 A - 1$.
- (iii) What should be the length of the rope of the kite sail in order to pull the ship at the angle θ [calculated in (i)] and be at a vertical height of 200 m?
- (iv) Find the value of $\sin C + \cos A$. [measure of angles A and C obtained in (i) and(ii)].

ANSWERS

Q.1	2	Q.2	No, since triangles are similar, value of $\sin A$ is the same.	Q.5	$\frac{\sqrt{3} + 1}{2\sqrt{2}}$	Q.8	(i) 0 (ii) $\frac{161}{240}$
Q.15 (i)	30°	Q.15 (ii)	2	Q.15 (iii)	400 m	Q.15 (iv)	1