

CLASS 10

MATHS

EXTRA QUESTIONS

Extra Questions (HOTS) Class 10 Maths Chapter 8 – Introduction to Trigonometry

Looking for Trigonometry extra questions for Class 10? These HOTS-level questions go beyond the standard NCERT exercise for Chapter 8, Introduction to Trigonometry.

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Class 10 Mathematics Chapter 8 – Solutions and Notes

Looking for **Trigonometry extra questions for Class 10**? These HOTS-level questions go beyond the standard NCERT exercise for Chapter 8, Introduction to Trigonometry.

These go beyond the textbook exercise — general/abstract proofs and reverse-engineering problems using fresh numbers, at HOTS level for board exam extension questions. These Class 10 Mathematics Chapter 8 important questions are handy for last-minute exam practice.

Q1 (General proof). Prove that $(\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2 = 2$, for any angle θ .

Solution: Expanding both squares: $(\sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta) + (\sin^2\theta - 2\sin\theta\cos\theta + \cos^2\theta) = 2\sin^2\theta + 2\cos^2\theta = 2(\sin^2\theta + \cos^2\theta) = 2$. Proved for all θ , not just a specific value.

Q2 (General proof, harder). Prove that $\sec A (1 - \sin A)(\sec A + \tan A) = 1$.

Solution: $(1 - \sin A)(\sec A + \tan A) = \sec A + \tan A - \sin A \cdot \sec A - \sin A \cdot \tan A$. Since $\sin A \cdot \sec A = \tan A$, this becomes $\sec A - \sin A \cdot \tan A = \sec A - \sin^2 A / \cos A = (1 - \sin^2 A) / \cos A = \cos^2 A / \cos A = \cos A$. So the full expression = $\sec A \cdot \cos A = 1$.

Q3 (General proof, 3D-style). If $x = r \sin A \cos B$, $y = r \sin A \sin B$, $z = r \cos A$, prove $x^2 + y^2 + z^2 = r^2$.

Solution: $x^2 + y^2 = r^2 \sin^2 A (\cos^2 B + \sin^2 B) = r^2 \sin^2 A$. Adding z^2 : $r^2 \sin^2 A + r^2 \cos^2 A = r^2$.

Q4 (Reverse-engineering). If $\tan\theta + \cot\theta = 2$, find $\tan^2\theta + \cot^2\theta$ without assuming $\theta = 45^\circ$.

Solution: Square both sides: $(\tan\theta + \cot\theta)^2 = \tan^2\theta + 2 + \cot^2\theta = 4$. So $\tan^2\theta + \cot^2\theta = 4 - 2 = 2$.

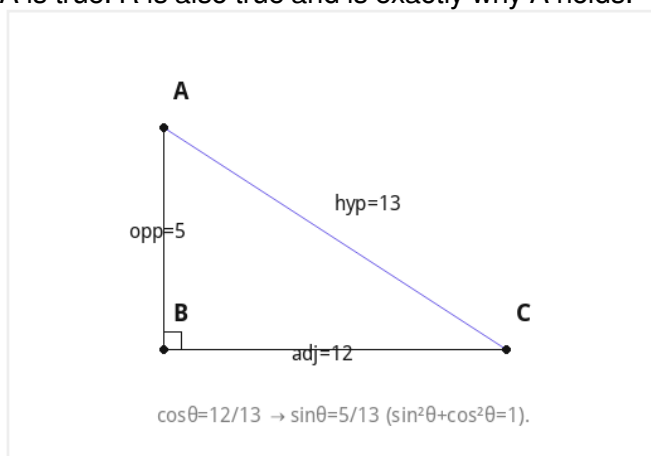
Q5 (Fresh-numbers quadratic-in-trig). Find x ($0^\circ \leq x \leq 90^\circ$) if $2\sin^2 x + 3\cos x = 3$.

Solution: Substitute $\sin^2 x = 1 - \cos^2 x$: $2 - 2\cos^2 x + 3\cos x = 3 \Rightarrow 2\cos^2 x - 3\cos x + 1 = 0$. Solving the quadratic: $\cos x = (3 \pm 1)/4 = 1$ or $1/2$. $\cos x = 1/2$ gives the meaningful acute-angle solution, **$x = 60^\circ$** .

Q6 (Assertion-Reason). Assertion (A): If $\cos\theta = 12/13$, then $\sin\theta = 5/13$.

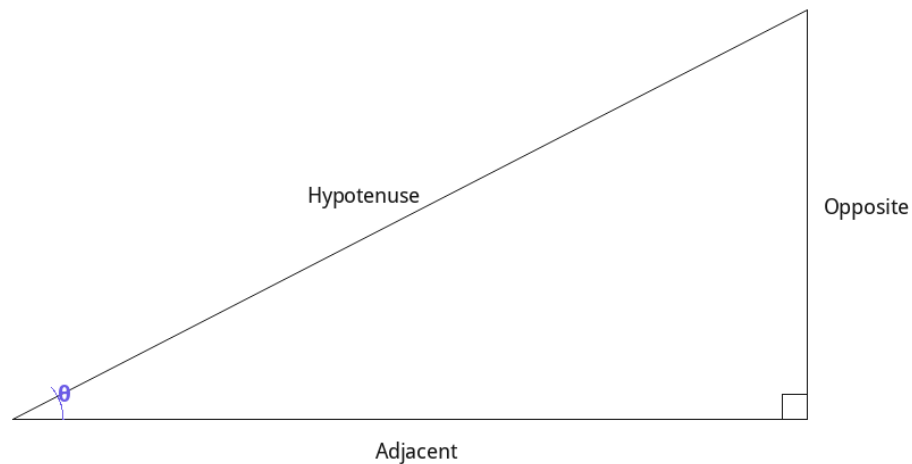
Reason (R): For any angle, $\sin^2\theta + \cos^2\theta = 1$.

Solution: $\sin\theta = \sqrt{1 - 144/169} = \sqrt{25/169} = 5/13$, so A is true. R is also true and is exactly why A holds.



Both A and R are true, and R correctly explains A.

Q7 (Exam strategy tip). A common mistake in HOTS trigonometry questions is applying an identity meant for acute angles to a general angle without checking the domain, or forgetting to rationalise a surd in the final answer. Before submitting a proof, re-check that every identity used (like $\sin^2\theta + \cos^2\theta = 1$ or $1 + \tan^2\theta = \sec^2\theta$) was valid for the specific range given in the question, and that the final simplified form matches what was asked — a numeric value, a proof, or a simplified expression.



$\sin\theta = \text{Opposite/Hypotenuse}$, $\cos\theta = \text{Adjacent/Hypotenuse}$, $\tan\theta = \text{Opposite/Adjacent}$.

Reference figure — trigonometric ratios of a right triangle

Class 10 Mathematics Chapter 8 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the [Class 10 Mathematics Chapter 8 Solutions](#) and [Class 10 Mathematics Chapter 8 Revision Notes](#).

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