

[FlexiPrep: Downloaded from flexiprep.com \[https://www.flexiprep.com/\]](https://www.flexiprep.com/)

For solved question bank visit [doorsteptutor.com \[https://www.doorsteptutor.com/\]](https://www.doorsteptutor.com/) and for free video lectures visit [Examrace YouTube Channel \[https://youtube.com/c/Examrace/\]](https://youtube.com/c/Examrace/)

CBSE Class 10- Mathematics: Chapter – 8 Introduction to Trigonometry Part 1

Get top class preparation for CBSE/Class-10 right from your home: [get questions, notes, tests, video lectures and more \[https://www.doorsteptutor.com/Exams/CBSE/Class-10/\]](https://www.doorsteptutor.com/Exams/CBSE/Class-10/) - for all subjects of CBSE/Class-10.

Introduction to Trigonometry

“The mathematician is fascinated with the marvelous beauty of the forms he constructs, and in their beauty he everlasting truth.”

Question 1:

If $x \cos \theta - y \sin \theta = a$, $x \sin \theta + y \cos \theta = b$, prove that $x^2 + y^2 = a^2 + b^2$.

Answer:

$$x \cos \theta - y \sin \theta = a$$

$$x \sin \theta + y \cos \theta = b$$

Squaring and adding

$$x^2 + y^2 = a^2 + b^2.$$

Question 2:

Prove that $\sec^2 \theta + \cos^2 \theta$ can never be less than 2.

Answer:

$\sec^2 \theta + \cos^2 \theta$ can never be less than 2.

If possible, let it be less than 2.

$$1 + \tan^2 \theta + 1 + \cot^2 \theta < 2.$$

$$\Rightarrow 2 + \tan^2 \theta + \cot^2 \theta$$

$$\Rightarrow (\tan \theta + \cot \theta)^2 < 2$$

Which is not possible.

Question 3:

If $\sin \phi = \frac{1}{2}$, show that $3 \cos \phi - 4 \cos^3 \phi = 0$

Answer:

$$\sin \phi = \frac{1}{2}$$

$$\Rightarrow \phi = 30^\circ$$

Substituting in place of $\phi = 30^\circ$. We get .

Question 4:

If $\sin^2 \phi + 3 \cos^2 \phi = 4$ S.T. , show that $\tan \phi = \frac{1}{\sqrt{3}}$

Answer:

If $7 \sin^2 \phi + 3 \cos^2 \phi = 4$ S.T., $\tan \phi = \frac{1}{\sqrt{3}}$

$$7 \sin^2 \phi + 3 \cos^2 \phi = 4 (\sin^2 \phi + \cos^2 \phi)$$

$$\Rightarrow 3 \sin^2 \phi = \cos^2 \phi$$

$$\Rightarrow \frac{\sin^2 \phi}{\cos^2 \phi} = \frac{1}{3}$$

$$\Rightarrow \tan^2 \phi = \frac{1}{3}$$

$$\tan \phi = \frac{1}{\sqrt{3}}$$

Question 5:

If $\cos \phi + \sin \phi = \sqrt{2} \cos \phi$, prove that $\cos \phi - \sin \phi = \sqrt{2} \sin \phi$

Answer:

$$\cos \phi + \sin \phi = \sqrt{2} \cos \phi$$

$$\Rightarrow (\cos \phi + \sin \phi)^2 = 2 \cos^2 \phi$$

$$\Rightarrow \cos^2 \phi + \sin^2 \phi + 2 \cos \phi \sin \phi = 2 \cos^2 \phi$$

$$\Rightarrow \cos^2 \phi - 2 \cos \phi \sin \phi + \sin^2 \phi = 2 \sin^2 \phi$$

$$\Rightarrow (\cos \phi - \sin \phi)^2 = 2 \sin^2 \phi$$

$$\left[\begin{array}{l} \therefore 2 \sin^2 \phi = 2 - 2 \cos^2 \phi \\ 1 - \cos^2 \phi = \sin^2 \phi \text{ \& } 1 - \sin^2 \phi = \cos^2 \phi \end{array} \right]$$

$$\text{or } \cos \phi - \sin \phi = \sqrt{2} \sin \phi.$$

Question 6:

If $\tan A + \sin A = m$ and $\tan A - \sin A = n$, show that $m^2 - n^2 = \sqrt{mn}$

Answer:

$$\tan A + \sin A = m \quad \tan A - \sin A = n$$

$$m^2 - n^2 = \sqrt{mn}.$$

$$= m^2 - n^2 = (\tan A + \sin A)^2 - (\tan A - \sin A)^2$$

$$= 4 \tan A \sin A$$

$$\text{RHS } 4\sqrt{mn} = 4\sqrt{(\tan A + \sin A)(\tan A - \sin A)}$$

$$= 4\sqrt{\tan^2 A - \sin^2 A}$$

$$= 4\sqrt{\frac{\sin^2 A - \sin^2 A \cos^2 A}{\cos^2 A}}$$

$$= 4\sqrt{\frac{\sin^4 A}{\cos^2 A}}$$

$$= 4\frac{\sin^2 A}{\cos^2 A}$$

$$= 4 \tan A \sin A$$

$$\therefore m^2 - n^2 = 4\sqrt{mn}$$