

NCERT Solutions for Class 11 Maths Chapter 3 Exercise 3.2: Exercise 3.2 of Chapter 3 in Class 11 Maths focuses on understanding the signs of trigonometric functions in different quadrants, along with their domain and range.

This exercise helps students analyze the behavior of trigonometric functions such as sine, cosine, tangent, and others based on the angle's position on the coordinate plane. The solutions provide step-by-step explanations, ensuring students grasp these fundamental concepts effectively. By practicing these problems, students can develop a strong foundation for advanced trigonometry topics.

NCERT Solutions for Class 11 Maths Chapter 3 Exercise 3.2 Overview

Exercise 3.2 focuses on key aspects of trigonometric functions, including their **sign conventions**, **domain**, and **range**. Students learn how the sign of trigonometric functions - such as sine, cosine, tangent, cosecant, secant, and cotangent - varies depending on the angle's position in the four quadrants.

The exercise also emphasizes understanding the **domain** (the set of input angles for which the functions are defined) and the **range** (the set of possible output values for each function). It introduces concepts such as periodicity and the behavior of these functions on a coordinate plane.

Through detailed examples and exercises, students gain a clear understanding of how to analyze and solve problems involving the properties of trigonometric functions, laying the groundwork for more advanced topics in trigonometry.

Class 11 Maths Chapter 3 Exercise 3.2 Questions and Answers PDF

The PDF for NCERT Solutions to Class 11 Maths Chapter 3 Exercise 3.2 provides detailed answers to all questions, focusing on the sign conventions, domain, and range of trigonometric functions. The solutions are presented step-by-step, making it easier for students to understand the concepts and apply them effectively in problem-solving. This resource is designed to enhance conceptual clarity and exam preparation. The PDF link is available below for easy access and download.

Class 11 Maths Chapter 3 Exercise 3.2 Questions and Answers PDF

NCERT Solutions for Class 11 Maths Chapter 3 Trigonometric Functions Exercise 3.2

Below is the NCERT Solutions for Class 11 Maths Chapter 3 Trigonometric Functions Exercise 3.2:

Find the values of the other five trigonometric functions in Exercises 1 to 5.

1. $\cos x = -1/2$, x lies in third quadrant.

Solution:

It is given that

$$\cos x = -1/2$$

$$\sec x = 1/\cos x$$

Substituting the values

$$= \frac{1}{\left(-\frac{1}{2}\right)} = -2$$

Consider

$$\sin^2 x + \cos^2 x = 1$$

We can write it as

$$\sin^2 x = 1 - \cos^2 x$$

Substituting the values

$$\sin^2 x = 1 - (-1/2)^2$$

$$\sin^2 x = 1 - 1/4 = 3/4$$

$$\sin^2 x = \pm \sqrt{3}/2$$

Here x lies in the third quadrant so the value of $\sin x$ will be negative

$$\sin x = -\sqrt{3}/2$$

We can write it as

$$\operatorname{cosec} x = \frac{1}{\sin x} = \frac{1}{\left(-\frac{\sqrt{3}}{2}\right)} = -\frac{2}{\sqrt{3}}$$

So we get

$$\tan x = \frac{\sin x}{\cos x} = \frac{\left(-\frac{\sqrt{3}}{2}\right)}{\left(-\frac{1}{2}\right)} = \sqrt{3}$$

Here

$$\cot x = \frac{1}{\tan x} = \frac{1}{\sqrt{3}}$$

2. $\sin x = 3/5$, x lies in second quadrant.

Solution:

It is given that

$$\sin x = 3/5$$

We can write it as

$$\operatorname{cosec} x = \frac{1}{\sin x} = \frac{1}{\left(\frac{3}{5}\right)} = \frac{5}{3}$$

We know that

$$\sin^2 x + \cos^2 x = 1$$

We can write it as

$$\cos^2 x = 1 - \sin^2 x$$

Substituting the values

$$\cos^2 x = 1 - (3/5)^2$$

$$\cos^2 x = 1 - 9/25$$

$$\cos^2 x = 16/25$$

$$\cos x = \pm 4/5$$

Here x lies in the second quadrant so the value of $\cos x$ will be negative

$$\cos x = -4/5$$

We can write it as

$$\sec x = \frac{1}{\cos x} = \frac{1}{\left(-\frac{4}{5}\right)} = -\frac{5}{4}$$

So we get

$$\tan x = \frac{\sin x}{\cos x} = \frac{\left(\frac{3}{5}\right)}{\left(-\frac{4}{5}\right)} = -\frac{3}{4}$$

Here

$$\cot x = \frac{1}{\tan x} = -\frac{4}{3}$$

3. $\cot x = 3/4$, x lies in third quadrant.

Solution:

It is given that

$$\cot x = 3/4$$

We can write it as

$$\tan x = \frac{1}{\cot x} = \frac{1}{\left(\frac{3}{4}\right)} = \frac{4}{3}$$

We know that

$$1 + \tan^2 x = \sec^2 x$$

We can write it as

$$1 + (4/3)^2 = \sec^2 x$$

Substituting the values

$$1 + 16/9 = \sec^2 x$$

$$\cos^2 x = 25/9$$

$$\sec x = \pm 5/3$$

Here x lies in the third quadrant, so the value of sec x will be negative

$$\sec x = -5/3$$

We can write it as

$$\cos x = \frac{1}{\sec x} = \frac{1}{\left(-\frac{5}{3}\right)} = -\frac{3}{5}$$

So we get

$$\tan x = \frac{\sin x}{\cos x}$$

$$\frac{4}{3} = \frac{\sin x}{\left(-\frac{3}{5}\right)}$$

By further calculation

$$\sin x = \left(\frac{4}{3}\right) \times \left(-\frac{3}{5}\right) = -\frac{4}{5}$$

Here

$$\operatorname{cosec} x = \frac{1}{\sin x} = -\frac{5}{4}$$

4. $\sec x = 13/5$, x lies in fourth quadrant.

Solution:

It is given that

$$\sec x = 13/5$$

We can write it as

$$\cos x = \frac{1}{\sec x} = \frac{1}{\left(\frac{13}{5}\right)} = \frac{5}{13}$$

We know that

$$\sin^2 x + \cos^2 x = 1$$

We can write it as

$$\sin^2 x = 1 - \cos^2 x$$

Substituting the values

$$\sin^2 x = 1 - (5/13)^2$$

$$\sin^2 x = 1 - 25/169 = 144/169$$

$$\sin^2 x = \pm 12/13$$

Here x lies in the fourth quadrant, so the value of $\sin x$ will be negative

$$\sin x = -12/13$$

We can write it as

$$\operatorname{cosec} x = \frac{1}{\sin x} = \frac{1}{\left(-\frac{12}{13}\right)} = -\frac{13}{12}$$

So we get

$$\tan x = \frac{\sin x}{\cos x} = \frac{\left(-\frac{12}{13}\right)}{\left(\frac{5}{13}\right)} = -\frac{12}{5}$$

Here

$$\cot x = \frac{1}{\tan x} = \frac{1}{\left(-\frac{12}{5}\right)} = -\frac{5}{12}$$

5. $\tan x = -5/12$, x lies in second quadrant.

Solution:

It is given that

$$\tan x = -5/12$$

We can write it as

$$\cot x = \frac{1}{\tan x} = \frac{1}{\left(-\frac{5}{12}\right)} = -\frac{12}{5}$$

We know that

$$1 + \tan^2 x = \sec^2 x$$

We can write it as

$$1 + (-5/12)^2 = \sec^2 x$$

Substituting the values

$$1 + 25/144 = \sec^2 x$$

$$\sec^2 x = 169/144$$

$$\sec x = \pm 13/12$$

Here x lies in the second quadrant, so the value of $\sec x$ will be negative

$$\sec x = -13/12$$

We can write it as

$$\cos x = \frac{1}{\sec x} = \frac{1}{\left(-\frac{13}{12}\right)} = -\frac{12}{13}$$

So we get

$$\begin{aligned}\tan x &= \frac{\sin x}{\cos x} \\ -\frac{5}{12} &= \frac{\sin x}{\left(-\frac{12}{13}\right)}\end{aligned}$$

By further calculation

$$\sin x = \left(-\frac{5}{12}\right) \times \left(-\frac{12}{13}\right) = \frac{5}{13}$$

Here

$$\operatorname{cosec} x = \frac{1}{\sin x} = \frac{1}{\left(\frac{5}{13}\right)} = \frac{13}{5}$$

Find the values of the trigonometric functions in Exercises 6 to 10.

6. $\sin 765^\circ$

Solution:

We know that values of $\sin x$ repeat after an interval of 2π or 360°

So we get

$$\sin 765^\circ = \sin(2 \times 360^\circ + 45^\circ)$$

By further calculation

$$= \sin 45^\circ$$

$$= 1/\sqrt{2}$$

7. $\operatorname{cosec}(-1410^\circ)$

Solution:

We know that values of $\operatorname{cosec} x$ repeat after an interval of 2π or 360°

So we get

$$\operatorname{cosec}(-1410^\circ) = \operatorname{cosec}(-1410^\circ + 4 \times 360^\circ)$$

By further calculation

$$= \operatorname{cosec} (-1410^\circ + 1440^\circ)$$

$$= \operatorname{cosec} 30^\circ = 2$$

8. $\tan \frac{19\pi}{3}$

Solution:

We know that values of $\tan x$ repeat after an interval of π or 180°

So we get

$$\tan \frac{19\pi}{3} = \tan 6\frac{1}{3}\pi$$

By further calculation

$$= \tan \left(6\pi + \frac{\pi}{3} \right) = \tan \frac{\pi}{3}$$

We get

$$= \tan 60^\circ$$

$$= \sqrt{3}$$

9. $\sin \left(-\frac{11\pi}{3} \right)$

Solution:

We know that values of $\sin x$ repeat after an interval of 2π or 360°

So we get

$$\sin \left(-\frac{11\pi}{3} \right) = \sin \left(-\frac{11\pi}{3} + 2 \times 2\pi \right)$$

By further calculation

$$= \sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$$

$$10. \cot\left(-\frac{15\pi}{4}\right)$$

Solution:

We know that values of $\tan x$ repeat after an interval of π or 180°

So we get

$$\cot\left(-\frac{15\pi}{4}\right) = \cot\left(-\frac{15\pi}{4} + 4\pi\right)$$

By further calculation

$$= \cot\frac{\pi}{4} = 1$$

Benefits of Solving NCERT Solutions for Class 11 Maths Chapter 3 Exercise 3.2

- **Understanding Sign Conventions:** This exercise helps students learn how the signs of trigonometric functions vary across different quadrants, an essential concept for advanced trigonometry.
- **Grasping Domain and Range:** Students gain a clear understanding of the domain and range of trigonometric functions, which is fundamental for analyzing their behavior.
- **Improved Problem-Solving Skills:** The step-by-step solutions guide students in applying theoretical knowledge to practical problems, enhancing their analytical and reasoning abilities.
- **Exam-Oriented Preparation:** These solutions align with the CBSE syllabus and provide practice with questions likely to appear in exams, boosting confidence and readiness.
- **Foundation for Advanced Topics:** Mastering these concepts prepares students for more complex topics like trigonometric equations, identities, and calculus.