NCERT Solutions for Class 11 Maths Chapter 3 Exercise 3.1: NCERT Solutions for Class 11 Maths Chapter 3 Exercise 3.1 provide a detailed guide to understanding the foundational concepts of Trigonometric Functions.

This exercise focuses on topics such as angles, degree and radian measures, and their interrelation, along with the conversion between degrees and radians. These solutions are created to simplify complex concepts and provide step-by-step explanations, helping students strengthen their problem-solving skills.

NCERT Solutions for Class 11 Maths Chapter 3 Exercise 3.1 Overview

Exercise 3.1 in Chapter 3 of Class 11 Maths focuses on the fundamental concepts of angles and their measurements in different units, such as degrees and radians. It introduces the relationship between degrees and radians and how to convert between these units. Students also learn to express angles as multiples of π in radians and perform basic calculations involving angular measurements.

This exercise is foundational for understanding Trigonometric Functions, as it establishes the basis for working with angles in real-world applications and advanced mathematical problems. The solutions for this exercise provide clear step-by-step explanations, helping students grasp these essential concepts with ease.

Class 11 Maths Chapter 3 Exercise 3.1 Questions and Answers PDF

The PDF for NCERT Solutions to Class 11 Maths Chapter 3 Exercise 3.1 contains detailed answers to all the questions, focusing on key topics like angles, degree and radian measures, and their conversions. These step-by-step solutions simplify complex problems, making it easier for students to understand and practice effectively. The PDF can be accessed through the link provided below for convenient reference and offline study.

Class 11 Maths Chapter 3 Exercise 3.1 Questions and Answers PDF

NCERT Solutions for Class 11 Maths Chapter 3 Trigonometric Functions Exercise 3.1

Below is the NCERT Solutions for Class 11 Maths Chapter 3 Trigonometric Functions Exercise 3.1:

1. Find the radian measures corresponding to the following degree measures:

(i) 25° (ii) – 47° 30′ (iii) 240° (iv) 520°

Solution:

(i) 25°

Here 180° = π radian

It can be written as

$$25° = \frac{\pi}{180} \times 25 \text{ radian}$$

So we get

$$= \frac{5\pi}{36} \text{ radian}$$

(ii) – 47° 30'

Here 1° = 60'

It can be written as

$$-47°\ 30' = -47\frac{1}{2} \text{ degree}$$

So we get

$$= \frac{-95}{2} \text{ degree}$$

Here 180° = π radian

$$\frac{-95}{2} \text{ deg ree} = \frac{\pi}{180} \times \left(\frac{-95}{2}\right) \text{ radian}$$

It can be written as

$$= \left(\frac{-19}{36 \times 2}\right)\pi \text{ radian} = \frac{-19}{72}\pi \text{ radian}$$

We get

$$-47°\ 30' = \frac{-19}{72}\pi \text{ radian}$$

(iii) 240°

Here 180° = π radian

It can be written as

$$240° = \frac{\pi}{180} \times 240 \text{ radian}$$

So we get

$$= \frac{4}{3}\pi \text{ radian}$$

(iv) 520°

Here $180° = \pi$ radian

It can be written as

$$520° = \frac{\pi}{180} \times 520 \text{ radian}$$

So we get

$$= \frac{26\pi}{9} \text{ radian}$$

2. Find the degree measures corresponding to the following radian measures (Use π = 22/7).

(i) 11/16

(ii) -4

(iii) 5π/3

(iv) 7π/6

Solution:

(i) 11/16

Here, π radian = 180°

$$\frac{11}{16} \text{ radain} = \frac{180}{\pi} \times \frac{11}{16} \text{ deg ree}$$

We can write it as

$$= \frac{45 \times 11}{\pi \times 4} \text{deg ree}$$

So we get

$$= \frac{45 \times 11 \times 7}{22 \times 4} \text{ deg ree}$$

$$= \frac{315}{8} \text{ deg ree}$$

$$= 39\frac{3}{8} \text{ deg ree}$$

Take $1^o = 60'$

$$= 39° + \frac{3 \times 60}{8} \text{ min utes}$$

We get

$$= 39° + 22' + \frac{1}{2} \text{ min utes}$$

Consider $1' = 60''$

$= 39^o\ 22'\ 30''$

(ii) -4

Here, π radian = 180°

$$-4 \text{ radian} = \frac{180}{\pi} \times (-4) \text{ deg ree}$$

We can write it as

$$= \frac{180 \times 7(-4)}{22} \text{ deg ree}$$

By further calculation

$$= \frac{-2520}{11} \text{ deg ree} = -229\frac{1}{11} \text{ deg ree}$$

Take $1^o = 60'$

$$= -229° + \frac{1 \times 60}{11} \text{ min utes}$$

So we get

$$= -229° + 5' + \frac{5}{11} \text{ min utes}$$

Again $1' = 60''$

$= -\ 229^o\ 5'\ 27''$

(iii) 5π/3

Here, π radian = 180°

$$\frac{5\pi}{3}\text{radian} = \frac{180}{\pi} \times \frac{5\pi}{3} \text{ degree}$$

We get

= 300º

(iv) 7π/6

Here, π radian = 180°

$$\frac{7\pi}{6}\text{radian} = \frac{180}{\pi} \times \frac{7\pi}{6}$$

We get

= 210º

3. A wheel makes 360 revolutions in one minute. Through how many radians does it turn in one second?

Solution:

It is given that

No. of revolutions made by the wheel in

1 minute = 360

1 second = 360/60 = 6

We know that

The wheel turns an angle of 2π radian in one complete revolution.

In 6 complete revolutions, it will turn an angle of 6 × 2π radian = 12 π radian

Therefore, in one second, the wheel turns at an angle of 12π radian.

4. Find the degree measure of the angle subtended at the centre of a circle of radius 100 cm by an arc of length 22 cm (Use π = 22/7).

Solution:

Consider a circle of radius r unit with l unit as the arc length which subtends an angle θ radian at the centre

$\theta = l/r$

Here r = 100 cm, l = 22 cm

$$\theta = \frac{22}{100} \text{ radian} = \frac{180}{\pi} \times \frac{22}{100} \text{ deg ree}$$

It can be written as

$$= \frac{180 \times 7 \times 22}{22 \times 100} \text{ deg ree}$$

$$= \frac{126}{10} \text{ deg ree}$$

So we get

$$= 12\frac{3}{5} \text{ deg ree}$$

Here $1^o = 60'$

$= 12^o\ 36'$

Therefore, the required angle is $12^o\ 36'$.

5. In a circle of diameter 40 cm, the length of a chord is 20 cm. Find the length of the minor arc of the chord.

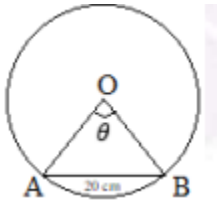
Solution:

The dimensions of the circle are

Diameter = 40 cm

Radius = 40/2 = 20 cm

Consider AB as the chord of the circle, i.e., length = 20 cm



In ΔOAB,

Radius of circle = OA = OB = 20 cm

Similarly AB = 20 cm

Hence, ΔOAB is an equilateral triangle.

θ = 60° = π/3 radian

In a circle of radius *r* unit, if an arc of length *l* unit subtends an angle *θ* radian at the centre,

We get θ = 1/r

$$\frac{\pi}{3}=\frac{\widehat{AB}}{20}\Rightarrow \widehat{AB}=\frac{20\pi}{3}\text{ cm}$$

Therefore, the length of the minor arc of the chord is 20π/3 cm.

6. If in two circles, arcs of the same length subtend angles 60° and 75° at the centre, find the ratio of their radii.

Solution:

Consider r_1 and r_2 as the radii of the two circles.
Let an arc of length l subtend an angle of 60^o at the centre of the circle of radius r_1 and an arc of length l subtend an angle of 75^o at the centre of the circle of radius r_2.
Here $60^o = \pi/3$ radian and $75^o = 5\pi/12$ radian
In a circle of radius r unit, if an arc of length l unit subtends an angle θ radian at the centre
We get
$\theta = l/r$ or $l = r\theta$
We know that
$l=\frac{r_1\pi}{3}$ and $l=\frac{r_2 5\pi}{12}$
By equating both we get
$\frac{r_1\pi}{3}=\frac{r_2 5\pi}{12}$
On further calculation
$r_1=\frac{r_2 5}{4}$
So we get
$\frac{r_1}{r_2}=\frac{5}{4}$
Therefore, the ratio of the radii is 5: 4.

7. Find the angle in the radian through which a pendulum swings if its length is 75 cm and the tip describes an arc of length

(i) 10 cm (ii) 15 cm (iii) 21 cm

Solution:

In a circle of radius r unit, if an arc of length l unit subtends an angle θ radian at the centre, then θ = 1/r

We know that r = 75 cm

(i) l = 10 cm

So we get

θ = 10/75 radian

By further simplification,

θ = 2/15 radian

(ii) l = 15 cm

So, we get

θ = 15/75 radian

By further simplification,

θ = 1/5 radian

(iii) l = 21 cm

So, we get

θ = 21/75 radian

By further simplification,

θ = 7/25 radian

Benefits of Solving NCERT Solutions for Class 11 Maths Chapter 3 Trigonometric Functions Exercise 3.1

- **Concept Clarity**: This exercise helps students understand the basic concepts of angles, degree and radian measures, and their interrelations, laying a strong foundation for advanced trigonometry.
- **Improves Problem-Solving Skills**: By practicing step-by-step solutions, students develop the ability to solve problems systematically and accurately.
- **Exam Preparation**: The solutions align with the CBSE syllabus, making it easier for students to prepare for exams by focusing on relevant questions and concepts.
- **Better Exam Performance**: Regular practice of these exercises helps students become familiar with different question types and improves their speed and accuracy in exams. This contributes to better performance in board exams and competitive exams.