RD Sharma Solutions Class 10 Maths Chapter 6 Exercise 6.2: Chapter 6, Exercise 6.2 of RD Sharma's Class 10 Maths focuses on trigonometric identities, which are fundamental relationships between trigonometric functions. This exercise provides students with problems to practice key identities.

Students learn to simplify expressions using these identities and verify their correctness. Through various problems, the exercise enhances understanding of how to manipulate trigonometric functions and solve complex equations. Mastering these identities is essential for solving higher-level trigonometry problems in advanced mathematics.

RD Sharma Solutions Class 10 Maths Chapter 6 Exercise 6.2 Overview

Chapter 6 of RD Sharma's Class 10 Maths book, "Trigonometric Identities," focuses on understanding and applying essential trigonometric identities in various mathematical problems. Exercise 6.2 is specifically designed to strengthen students' grasp of these identities by providing a structured set of problems that test their application skills.

The solutions are crucial as they help clarify complex concepts, offer step-by-step problem-solving methods, and reinforce students' understanding through practice. Mastering these solutions is vital for building a strong foundation in trigonometry, as it is fundamental to higher mathematics and essential in various fields like physics, engineering, and architecture.

RD Sharma Solutions Class 10 Maths Chapter 6 Exercise 6.2 Trigonometric Identities

Below is the RD Sharma Solutions Class 10 Maths Chapter 6 Exercise 6.2 Trigonometric Identities -

1. If cos θ = 4/5, find all other trigonometric ratios of angle θ.

Solution:

We have,

$\cos\theta = 4/5$

And we know that,

$\sin\theta = \sqrt{(1 - \cos^2\theta)}$

$\Rightarrow \sin \theta = \sqrt{(1 - (4/5)^2)}$

$= \sqrt{(1 - (16/25))}$

$= \sqrt{[(25 - 16)/25]}$

$= \sqrt{(9/25)}$

$= 3/5$

$\therefore \sin \theta = 3/5$

Since, $\operatorname{cosec} \theta = 1/ \sin \theta$

$= 1/ (3/5)$

$\Rightarrow \operatorname{cosec} \theta = 5/3$

And, $\sec \theta = 1/ \cos \theta$

$= 1/ (4/5)$

$\Rightarrow \operatorname{cosec} \theta = 5/4$

Now,

$\tan \theta = \sin \theta/ \cos \theta$

$= (3/5)/ (4/5)$

$\Rightarrow \tan \theta = 3/4$

And, $\cot \theta = 1/ \tan \theta$

$= 1/ (3/4)$

$\Rightarrow \cot \theta = 4/3$

2. If $\sin \theta = 1/\sqrt{2}$, find all other trigonometric ratios of angle θ.

Solution:

We have,

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

And we know that,

$\cos\theta = \sqrt{(1 - \sin^2\theta)}$

$\Rightarrow \cos\theta = \sqrt{(1 - (1/\sqrt{2})^2)}$

$= \sqrt{(1 - (1/2))}$

$= \sqrt{[(2 - 1)/2]}$

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

$= 1/\sqrt{2}$

$\therefore \cos\theta = 1/\sqrt{2}$

Since, $\text{cosec}\,\theta = 1/ \sin\theta$

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

$\Rightarrow \text{cosec}\,\theta = \sqrt{2}$

And, $\sec\theta = 1/ \cos\theta$

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

$\Rightarrow \sec\theta = \sqrt{2}$

Now,

$\tan\theta = \sin\theta/ \cos\theta$

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

$\Rightarrow \tan\theta = 1$

And, $\cot\theta = 1/ \tan\theta$

$= 1/ (1)$

$\Rightarrow \cot\theta = 1$

If $\tan\theta = \frac{1}{\sqrt{2}}$, find the value of $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \cot^2\theta}$.

3.

Solution:

Given,

tan θ = 1/√2

By using $sec^2 θ - tan^2 θ = 1$,

$$\sec\theta = \sqrt{1+\tan^2\theta} = \sqrt{1+\left(\frac{1}{\sqrt{2}}\right)^2} = \sqrt{1+\frac{1}{2}} = \sqrt{\frac{3}{2}}$$

And,

$$\cot\theta = \frac{1}{\tan\theta} = \frac{1}{\frac{1}{\sqrt{2}}} = \sqrt{2}$$

From identity, we have

$$\operatorname{cosec}\theta = \sqrt{1+\cot^2\theta} = \sqrt{1+2} = \sqrt{3}$$

Substituting the values, we get

$$\frac{\operatorname{cosec}^2\theta - \sec^2\theta}{\operatorname{cosec}^2\theta + \cot^2\theta} = \frac{(\sqrt{3})^2 - \left(\sqrt{\frac{3}{2}}\right)^2}{(\sqrt{3})^2 + (\sqrt{2})^2}$$

$$= \frac{3-\frac{3}{2}}{3+2} = \frac{\frac{3}{2}}{5} = \frac{3}{10}$$

If $\tan\theta = \frac{3}{4}$, find the value of $\frac{1-\cos\theta}{1+\cos\theta}$

4.

Solution:

Given,

tan θ = 3/4

By using $sec^2 θ - tan^2 θ = 1$,

$$\sec\theta = \sqrt{1+\tan^2\theta} \quad = \sqrt{1+\left(\frac{3}{4}\right)^2} \quad = \sqrt{1+\frac{9}{16}} \quad = \sqrt{\frac{16+9}{16}} \quad = \sqrt{\frac{25}{16}}$$

sec θ = 5/4

Since, sec θ = 1/ cos θ

⇒ cos θ = 1/ sec θ

= 1/ (5/4)

= 4/5

$$\frac{\mathrm{cosec}^2\,\theta - \sec^2\theta}{\mathrm{cosec}^2\theta + \cot^2\theta} = \frac{1-\frac{4}{5}}{1+\frac{4}{5}} = \frac{\frac{1}{5}}{\frac{9}{5}} = \frac{1}{9}$$

So,

$$\text{If } \tan\theta = \frac{12}{5}, \text{find the value of } \frac{1+\sin\theta}{1-\sin\theta}$$

5.

Solution:

Given, tan θ = 12/5

Since, cot θ = 1/ tan θ = 1/ (12/5) = 5/12

Now, by using $\mathrm{cosec}^2\theta - \cot^2\theta = 1$

cosec θ = $\sqrt{(1 + \cot^2\theta)}$

= $\sqrt{(1 + (5/12)^2)}$

= √(1 + 25/144)

= √(169/ 25)

⇒ cosec θ = 13/5

Now, we know that

sin θ = 1/ cosec θ

= 1/ (13/5)

⇒ sin θ = 5/13

Putting value of sin θ in the expression we have,

$$= \frac{1+\frac{12}{13}}{1-\frac{12}{13}} \quad = \frac{\frac{13+12}{18}}{\frac{13-12}{18}}$$

= 25/ 1

= 25

If $\cot\theta = \frac{1}{\sqrt{3}}$, find the value of $\frac{1-\cos^2\theta}{2-\sin^2\theta}$

6.

Solution:

Given,

cot θ = 1/√3

Using $\text{cosec}^2\theta - \cot^2\theta = 1$, we can find cosec θ

cosec θ = $\sqrt{(1 + \cot^2\theta)}$

= $\sqrt{(1 + (1/\sqrt{3})^2)}$

= √(1 + (1/3)) = √((3 + 1)/3)

= √(4/3)

⇒ cosec θ = 2/√3

So, sin θ = 1/ cosec θ = 1/ (2/√3)

⇒ sin θ = √3/2

And, we know that

cos θ = √(1 – sin^2 θ)

= √(1 – (√3/2)^2)

= √(1 – (3/4))

= √((4 – 3)/4)

= √(1/4)

⇒ cos θ = 1/2

Now, using cos θ and sin θ in the expression, we have

$$= \frac{1-\left(\frac{1}{2}\right)^2}{2-\left(\frac{\sqrt{3}}{2}\right)^2}$$

$$= \frac{1-\frac{1}{4}}{2-\frac{3}{4}} = \frac{\frac{3}{4}}{\frac{5}{4}}$$

= 3/5

If cosec A $= \sqrt{2}$, find the value of $\frac{2\sin^2 A + 3\cot^2 A}{4(\tan^2 A - \cos^2 A)}$.

7.

Solution:

Given,

cosec A = √2

Using cosec^2 A − cot^2 A = 1, we find cot A

$$\cot A = \sqrt{\text{cosec}^2 A - 1} \quad = \sqrt{(\surd 2)^2 - 1} \quad = \sqrt{2 - 1} \quad = 1$$

So, tan A = 1/ cot A
= 1/ 1 = 1

And, sin A = 1/ cosec A = 1/ √2

$$\cos A = \sqrt{1 - \sin^2 A} \quad = \sqrt{1 - \left(\frac{1}{\sqrt{2}}\right)^2} = \sqrt{\frac{1}{\sqrt{2}}} = \frac{1}{\sqrt{2}}$$

On substituting we get,

$$= \frac{2\left[\frac{1}{\sqrt{2}}\right]^2 + 3[1]^2}{4\left[[1] - \left[\frac{1}{\sqrt{2}}\right]^2\right]}$$

$$= \frac{2 \times \frac{1}{2} + 3}{4\left[1 - \frac{1}{2}\right]} \Rightarrow \frac{1 + 3}{4.\frac{1}{2}}$$

= 4/2

= 2

Benefits of Solving RD Sharma Solutions Class 10 Maths Chapter 6 Exercise 6.2

Solving RD Sharma's solutions for Class 10 Maths, Chapter 6, Exercise 6.2 on Trigonometric Identities provides several benefits for students preparing for their exams. Here's why working through these exercises is advantageous:

Understanding Fundamentals: Trigonometric identities are a foundational topic in math, essential for understanding advanced concepts in trigonometry and calculus. This exercise helps reinforce the basics, building a solid foundation for future math courses.

Enhances Problem-Solving Skills: Trigonometric identities involve complex manipulations and transformations. By practicing these exercises, students develop skills in identifying and applying appropriate identities to simplify expressions, enhancing their analytical and problem-solving abilities.

Increases Speed and Accuracy: Regular practice with RD Sharma's exercises helps improve speed and accuracy, which is crucial for performing well in timed exams. Repeated exposure to similar types of problems trains students to solve them more quickly and accurately.

Prepares for Board Exams: Chapter 6 covers essential identities commonly tested in board exams. Solving these exercises thoroughly ensures students are well-prepared and confident to tackle similar questions in exams.

Builds Confidence: Mastering trigonometric identities can be challenging, but successfully solving these exercises builds students' confidence and encourages a positive attitude toward tackling difficult math topics.