RS Aggarwal Solutions for Class 10 Maths Chapter 7 Exercise 7.2: The Physics Wallah academic team has produced a comprehensive solution for Chapter 7's Trigonometric Identities in the RS Aggarwal class 10 textbook. Use the NCERT solutions to assist you tackle questions from the NCERT in order to get good grades in class 10.

Maths class 10 NCERT solutions were uploaded by a Physics Wallah specialist. The RS Aggarwal class 10 solution for chapter-7 Trigonometric Identities Exercise-7B is uploaded for reference only; do not copy the solutions. Before going through the solution of chapter-7 Trigonometric Identities Exercise-7B, one must have a clear understanding of the chapter-7 Trigonometric Identities. Read the theory of chapter-7 Trigonometric Identities and then try to solve all numerical of exercise-7B.

RS Aggarwal Solutions for Class 10 Maths Chapter 7 Exercise 7.2 Overview

RS Aggarwal Solutions for Class 10 Maths Chapter 7 Exercise 7.2 on Trigonometric Identities provide a comprehensive guide to solving problems related to trigonometric identities. This exercise focuses on applying various identities like reciprocal identities, Pythagorean identities, and co-function identities. The solutions are detailed and step-by-step, helping students understand how to simplify and manipulate trigonometric expressions effectively.

By practicing these problems, students can reinforce their understanding of trigonometric identities, improve their problem-solving skills, and prepare better for exams. The structured approach in the solutions also aids in clarifying concepts and correcting mistakes, making it a valuable resource for mastering this topic.

What are Trigonometric Identities?

The equalities that use trigonometric functions and hold true for all of the variable values in the equation are known as trigonometric identities.

There are several different trigonometric identities that relate to a triangle's angle and side length. Only the right-angle triangle is covered by the trigonometric identities.

The six trigonometric ratios serve as the foundation for all trigonometric identities. They are cotangent, secant, sine, cosine, and tangent. The right triangle's adjacent, opposite, and hypotenuse sides are used to define each of these trigonometric ratios. The six trigonometric ratios are the source of all fundamental trigonometric identities.

RS Aggarwal Solutions for Class 10 Maths Chapter 7 Exercise 7.2

Below we have provided RS Aggarwal Solutions for Class 10 Maths Chapter 7 Exercise 7.2 for the ease of the students –

Question 1

If $a\cos\theta + b\sin\theta = m$ and $a\sin\theta - b\cos\theta = n$ prove that $(m^2 + n^2) = (a^2 + b^2)$.

Solution

$\cos\theta + b\sin\theta = m - - - - (1)$

$\sin\theta - b\cos\theta = n - - - - (2)$

squ ring nd dding both equ tion

$(\ \cos\theta + b\sin\theta)^2 + (\ \sin\theta - b\cos\theta)^2 = m^2 + n^2$

${}^2\cos^2\theta + 2\ b\cos\theta\sin\theta + b^2\sin^2\theta + {}^2\sin^2\theta - 2\ b\sin\theta\cos\theta + b^2\cos^2\theta = m^2 + n^2$

${}^2(\cos^2\theta + \sin^2\theta) + b^2(\cos^2\theta + \sin^2\theta) = m^2 + n^2$

$m^2 + n^2 = {}^2 + b^2 \quad [\cos^2\theta + \sin^2\theta = 1]$

Question 2

If $x = a\sec\theta + b\tan\theta$ and $y = a\tan\theta + b\sec\theta$, prove that $(x^2 - y^2) = (a^2 - b^2)$.

Solution

$x^2 - y^2$

$= (a\sec\theta + b\tan\theta)^2 - (a\tan\theta + b\sec\theta)^2$

$= (a^2\sec^2\theta + b^2\tan^2\theta + 2ab\sec\theta\tan\theta) - (a^2\tan^2\theta + b^2\sec^2\theta + 2ab\tan\theta\sec\theta)$

$= a^2(\sec^2\theta - \tan^2\theta) + b^2(\tan^2\theta - \sec^2\theta)$

$= a^2 - b^2$

Question 3

$\tan 10^\circ \tan 15^\circ \tan 75^\circ \tan 80^\circ = ?$

(a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{3}}$ (c) -1 (d) 1

Solution

$\tan 10^\circ \tan 15^\circ \tan 75^\circ \tan 80^\circ$

$= \tan (90^\circ - 80^\circ) \tan (90^\circ - 75^\circ) \tan 75^\circ \tan 80^\circ$

$= \cot 80^\circ \cot 75^\circ \tan 75^\circ \tan 80^\circ$

$= 1$

Question 4

$\tan 5^\circ \tan 25^\circ \tan 30^\circ \tan 65^\circ \tan 85^\circ = ?$

(a) $\sqrt{3}$ (b) $\frac{1}{\sqrt{5}}$ (c) 1 (d) none of these

Solution

$\tan 5^\circ \tan 25^\circ \tan 30^\circ \tan 65^\circ \tan 85^\circ$

$= \cot (90^\circ - 5^\circ) \cot (90 - 25^\circ) \tan 30^\circ \tan 65^\circ \tan 85^\circ$

$= \cot 85^\circ \cot 65^\circ \tan 30^\circ \tan 65^\circ \tan 85^\circ$

$= \tan 30^\circ = \frac{1}{\sqrt{3}}$

So, the correct choice is (d).

Question 5

$\cos 1^\circ \cos 2^\circ \cos 3^\circ ..... \cos 180^\circ = ?$

(a) -1 (b) 1 (c) 0 (d) $\frac{1}{2}$

Solution

$\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots\ldots \cos 180^\circ$

$= \cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots\ldots\cos 90^\circ \ldots\ldots \cos 180^\circ$

$=\cos 1^\circ \cos 2^\circ \cos 3^\circ \ldots\ldots \times 0 \times \cos 180^\circ$

$= 0$

Hence, the correct choice is (c).

Question 6

$\frac{2\sin^2 63^\circ+1+2\sin^2 27^\circ}{3\cos^2 17^\circ-2+3\cos^2 73^\circ} = ?$

(a) $\frac{3}{2}$ (a) $\frac{2}{3}$ (c) 2 (d) 3

Solution

$\frac{2\sin^2 63^\circ+1+2\sin^2 27^\circ}{3\cos^2 17^\circ-2+3\cos^2 73^\circ}$

Here is the solution.

$\frac{2\sin^2 63^\circ+1+2\sin^2 27^\circ}{3\cos^2 17^\circ-2+3\cos^2 73^\circ}$

$=\frac{2[\sin^2 63^\circ+\sin^2 27^\circ]+1}{3[\cos^2 17^\circ+\cos^2 73^\circ]-2}$

$=\frac{2[\sin^2(90^\circ-27^\circ)+\sin^2 27^\circ]+1}{3[\cos^2(90^\circ-73^\circ)+\cos^2 73^\circ]-2}$

$=\frac{2[\cos^2 27+\sin^2 27^\circ]+1}{3[\sin^2 73^\circ+\cos^2 73^\circ]-2}$ [as, $\sin(90^\circ-\theta)=\cos\theta$; $\cos(90^\circ-\theta)=\sin\theta$]

$=\frac{2\times1+1}{3\times1-2}$ [as, $\sin^2\theta + \cos^2\theta = 1$]

$= 3$

correct option is (d) 3

Question 7

$\sin 47^\circ \cos 43^\circ + \cos 47^\circ \sin 43^\circ = ?$

(a) $\sin 4^\circ$ (b) $\cos 4^\circ$ (c) 1 (d) 0

Solution

We know that, sin (A+B)= sin A cos B + cos A Sin B

Here a = 43° and b = 47°

So, $\sin 47^\circ \cos 43^\circ + \cos 47^\circ \sin 43^\circ = \sin(47^\circ + 43^\circ)$

$= \sin 90^\circ$

$= 1$

Hence, the correct choice is (c).

Question 8

If $m = (\cos\theta - \sin\theta)$ and $n = (\cos\theta + \sin\theta)$ then show that $\sqrt{\frac{m}{n}} + \sqrt{\frac{n}{m}} = \frac{2}{\sqrt{1-\tan^2\theta}}$

Solution

$$\sqrt{\frac{m}{n}} + \sqrt{\frac{n}{m}} = \sqrt{\frac{(\cos\theta-\sin\theta)}{(\cos\theta+\sin\theta)}} + \sqrt{\frac{(\cos\theta+\sin\theta)}{(\cos\theta-\sin\theta)}}$$

$$= \sqrt{\frac{(\cos\theta-\sin\theta)}{(\cos\theta+\sin\theta)}} \times \sqrt{\frac{(\cos\theta-\sin\theta)}{(\cos\theta-\sin\theta)}} + \sqrt{\frac{(\cos\theta+\sin\theta)}{(\cos\theta-\sin\theta)}} \times \sqrt{\frac{(\cos\theta+\sin\theta)}{(\cos\theta+\sin\theta)}}$$

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

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

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

$$= \frac{2}{\sqrt{1-\tan^2\theta}}$$

Question 9

If tanA = ntanB and sinA = msinB, prove that $\cos^2 A = \frac{(m^2-1)}{(n^2-1)}$.

Solution

$\tan A = n \tan B$

$\rightarrow \frac{1}{\tan B} = \frac{n}{\tan A}$

$\rightarrow \cot B = \frac{n}{\tan A}$ -----------(1)

$\sin A = m \sin B$

$\rightarrow \frac{1}{\sin B} = \frac{m}{\sin A}$

$\rightarrow \operatorname{cosec} B = m/\sin A$ -------(2)

Now, $\operatorname{cosec}^2 B - \cot^2 B = 1$

$\rightarrow (m^2/\sin^2 A) - (n^2/\tan^2 A) = 1$

$\rightarrow (m^2/\sin^2 A) - n^2/(\sin^2 A/\cos^2 A) = 1$

$\rightarrow (m^2/\sin^2 A) - (n^2 \cos^2 A/\sin^2 A) = 1$

$\rightarrow (m^2 - n^2 \cos^2 A)/\sin^2 A = 1$

$\rightarrow m^2 - n^2 \cos^2 A = \sin^2 A$

$\rightarrow m^2 - n^2 \cos^2 A = 1 - \cos^2 A$ [$\because$, $\sin^2 A + \cos^2 A = 1$]

$\rightarrow -n^2 \cos^2 A + \cos^2 A = 1 - m^2$

$\rightarrow -\cos^2 A(n^2 - 1) = -(m^2 - 1)$

$\cos^2 A = \frac{(m^2-1)}{(n^2-1)}$. (Proved)

Question 10

If $\sec\theta + \tan\theta = p$, prove that

(i) $\sec\theta = \frac{1}{2}(p + \frac{1}{p})$

(ii) $\tan\theta = \frac{1}{2}(p - \frac{1}{p})$

(iii) $\sin\theta = \frac{p^2-1}{p^2+1}$

Solution

1

$\sec\theta + \tan\theta = p$-------------(1)

we know,

$\sec^2\theta - \tan^2\theta = 1$

$(\sec\theta - \tan\theta)(\sec\theta + \tan\theta) = 1$

put , $\sec\theta + \tan\theta = P$

$(\sec\theta - \tan\theta) \times P = 1$

$(\sec\theta - \tan\theta) = \frac{1}{p}$---------(2)

add equations (1) and (2)

$2\sec\theta = P + \frac{1}{p}$

$\sec\theta = \frac{1}{2}(p + \frac{1}{p})$

Question 11

If $(\cos\theta + \sin\theta) = \sqrt{2}\sin\theta$, prove that $(\sin\theta - \cos\theta) = \sqrt{2}\cos\theta$.

Solution

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

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

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

$\Rightarrow \sin^2\theta - \cos^2\theta - 2\sin\theta\cos\theta = 0$

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

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

$\therefore \sin\theta - \cos\theta = \sqrt{2}\cos\theta$

Question 12

If $(\sin\theta + \cos\theta) = \sqrt{2}\cos\theta$, show that $\cot\theta = (\sqrt{2} + 1)$.

Solution

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

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

$\Rightarrow \frac{\sin\theta}{\sqrt{2}-1} = \cos\theta$

$\Rightarrow \frac{\sin\theta(\sqrt{2}+1)}{2-1} = \cos\theta$

$\Rightarrow \frac{\cos\theta}{\sin\theta} = \sqrt{2} + 1$

$\therefore \cot\theta = \sqrt{2} + 1$

Benefit of RS Aggarwal Solutions for Class 10 Maths Chapter 7 Exercise 7.2

RS Aggarwal Solutions for Class 10 Maths, including Chapter 7 Exercise 7.2 on Trigonometric Identities, offer several benefits for students:

Step-by-Step Solutions: RS Aggarwal Solutions provide detailed, step-by-step solutions to each problem. This approach helps students understand the process of solving trigonometric identities, making it easier to grasp complex concepts.

Concept Clarity: The solutions are designed to reinforce the fundamental concepts of trigonometric identities. By working through these solutions, students can clarify their understanding of key topics such as reciprocal identities, Pythagorean identities, and co-function identities.

Practice Opportunities: Exercise 7.2, along with its solutions, offers a variety of problems that help students practice and apply trigonometric identities. Regular practice is essential for mastering the topic and building problem-solving skills.

Error Analysis: Reviewing solutions helps students identify and learn from common mistakes. This self-correction process enhances their problem-solving accuracy and confidence.

Preparation for Exams: RS Aggarwal Solutions are aligned with the syllabus and exam patterns. Using these solutions can aid in exam preparation by providing a clear understanding of how to approach and solve different types of trigonometric problems.

Time Efficiency: The solutions guide students through efficient problem-solving techniques, helping them save time during exams by avoiding common pitfalls and focusing on effective strategies.

Reinforcement of Learning: By regularly referring to the solutions, students can reinforce their learning and ensure they have a solid grasp of trigonometric identities. This repetition and review contribute to long-term retention of mathematical concepts.

Resource for Doubts: If students encounter difficulties while solving similar problems independently, they can refer to RS Aggarwal Solutions for clarification and a better understanding of tricky parts.