Introduction to Trigonometry

1 Mark:

1. If $3x = \operatorname{cosec} \theta$ and $\frac{3}{x} = \cot \theta$, find the value of $3\left(x^2 - \frac{1}{x^2}\right)$.   CBSE 2010, Delhi (30/1/1)

2. If $6x = \sec \theta$ and $\frac{6}{x} = \tan \theta$, find the value of $9\left(x^2 - \frac{1}{x^2}\right)$.   CBSE 2010, Foreign (30/2/1)

3. If $\sec^2 \theta\,(1 + \sin \theta)(1 - \sin \theta) = k$, then find the value of k.   CBSE 2009, Outside Delhi (30/1)

4. If $\sin \theta = \frac{1}{3}$, then find the value of $(2 \cot^2 \theta + 2)$.   CBSE 2009, Delhi (30/1/1)

5. If $\sec A = \frac{15}{7}$ and $A + B = 90°$, find the value of $\operatorname{cosec} B$.   CBSE 2009, Foreign (30/2/1)

6. What is the maximum value of $\frac{1}{\sec \theta}$?   CBSE Sample Paper III 2008

7. If $\tan A = \frac{3}{4}$ and $A + B = 90°$, then what is the value of $\cot B$?   CBSE Sample Paper III 2008

8. Given $\tan \theta = \frac{1}{\sqrt{5}}$, what is the value of $\frac{\operatorname{cosec}^2 \theta - \sec^2 \theta}{\operatorname{cosec}^2 \theta + \sec^2 \theta}$ CBSE Sample Paper I 2008

9. If $\tan A = \frac{5}{12}$, find the value of $(\sin A + \cos A)\sec A$.   CBSE 2008, Foreign (30/2/1), (30/2/3)

10. If $\cos A = \frac{7}{25}$, find the value of $\tan A + \cot A$.   CBSE 2008, Foreign (30/2/2)

2 Marks :

1. Without using trigonometric tables, find the value of the following expression:
   $\frac{\sec(90° - \theta).\operatorname{cosec} \theta - \tan(90° - \theta)\cot \theta + \cos^2 25° + \cos^2 65°}{3 \tan 27°.\tan 63°}$ CBSE 2010, Delhi (30/1/1)

2. Find the value of $\operatorname{cosec} 30°$, geometrically.   CBSE 2010, Delhi (30/1/1)

3. Without using trigonometric tables, find the value of the following: CBSE 2010, Foreign (30/2/1)
   $\cot \theta . \tan(90° - \theta) - \sec(90° - \theta)\operatorname{cosec} \theta + \sqrt{3}.\tan 12°.\tan 60°.\tan 78°$

4. Find the value of $\sec 45°$ geometrically.   CBSE 2010, Foreign (30/2/1)

5. Simplify : $\frac{\sin^3 \theta + \cos^3 \theta}{\sin \theta + \cos \theta} + \sin \theta \cos \theta$ CBSE 2009, Delhi (30/1/1)

6. If $\cot \theta = \frac{15}{8}$, then evaluate $\frac{(2 + 2 \sin \theta)(1 - \sin \theta)}{(1 + \cos \theta)(2 - 2 \cos \theta)}$.   CBSE 2009, Outside Delhi (30/1)

7. Find the value of $\tan 60°$, geometrically.   CBSE 2009, Outside Delhi (30/1)

8. Without using trigonometric tables, evaluate:
   $\frac{7 \cos 70°}{2 \sin 20°} + \frac{3}{2} \frac{\cos 55° \operatorname{cosec} 35°}{\tan 5° \tan 25° \tan 45° \tan 85° \tan 65°}$ CBSE 2009, Foreign (30/2/1)

9. Express $\sin 67° + \cos 75°$ in terms of trigonometric ratios of angles between $0°$ and $45°$
   CBSE Sample Paper II 2008

10. If A, B, C are interior angles of ΔABC, then show that
    $\cos\left(\frac{B+C}{2}\right) = \sin \frac{A}{2}$ CBSE Sample Paper II 2008

11. Without using trigonometric tables, find the value of $\frac{\cos 70°}{\sin 20°} + \cos 57° \operatorname{cosec} 33° - 2 \cos 60°$
    CBSE Sample Paper I 2008

12. If $\sec 4A = \operatorname{cosec}(A - 20°)$, where $4A$ is an acute angle, find the value of A.
    CBSE 2008, Foreign (30/2/1), (30/2/3)

13. In a ΔABC, right-angled at C, if $\tan A = \frac{1}{\sqrt{3}}$, find the value of

    $\sin A \cos B + \cos A \sin B$ **CBSE 2008, Foreign (30/2/1), (30/2/3)**

14. If $\sec 2A = \operatorname{cosec}(A - 42°)$, where $2A$ is an acute angle, find the value of A.

    CBSE 2008, Foreign (30/2/2)

15. In ΔABC, right angled at A, if $\tan C = \sqrt{3}$, find the value of $\sin B \cos C + \cos B \sin C$.

    CBSE 2008, Foreign (30/2/2)

3 Marks:

1. Prove the following:

   $\frac{\tan A}{1 - \cot A} + \frac{\cot A}{1 - \tan A} = 1 + \tan A + \cot A$ **CBSE 2010, Delhi (30/1/1)**

2. Prove the following:

   $(\operatorname{cosec} A - \sin A)(\sec A - \cos A) = \frac{1}{\tan A + \cot A}$ **CBSE 2010, Delhi (30/1/1)**

3. If $\tan \theta + \sin \theta = m$ & $\tan \theta - \sin \theta = n$, show that $m^2 - n^2 = 4\sqrt{mn}$. **CBSE 2010, Foreign (30/2/1)**

4. Show that:

   $\left(1 + \frac{1}{\tan^2 \theta}\right)\left(1 + \frac{1}{\cot^2 \theta}\right) = \frac{1}{\sin^2 \theta - \sin^4 \theta}$. **CBSE 2010, Foreign (30/2/1)**

5. Find the value of $\sin 30°$ geometrically. **CBSE 2009, Delhi (30/1/1)**

6. Without using trigonometrical tables, evaluate:

   $\frac{\cos 58°}{\sin 32°} + \frac{\sin 22°}{\cos 68°} - \frac{\cos 30° \operatorname{cosec} 52°}{\tan 18° \tan 35° \tan 60° \tan 72° \tan 55°}$ **CBSE 2009, Delhi (30/1/1)**

7. Prove that

   $\sec^2 \theta - \frac{\sin^2 \theta - 2 \sin^4 \theta}{2 \cos^4 \theta - \cos^2 \theta} = 1$ **CBSE 2009, Foreign (30/2/1)**

8. Evaluate:

   $\frac{2}{3} \operatorname{cosec}^2 58° - \frac{2}{3} \cot 58° \tan 32° - \frac{5}{3} \tan 13° \tan 37° \tan 45° \tan 53° \tan 77°$

   CBSE 2009, Outside Delhi (30/1)

9. Prove that: $(1 + \cot A + \tan A)(\sin A - \cos A) = \sin A \tan A - \cot A \cos A$.

   CBSE 2008, Foreign (30/2/1), (30/2/2), (30/2/3)

10. Without using trigonometric tables, evaluate the following:

    $2\left(\frac{\cos 58°}{\sin 32°}\right) - \sqrt{3}\left(\frac{\cos 38° \operatorname{cosec} 52°}{\tan 15° \tan 60° \tan 75°}\right)$ **CBSE 2008, Foreign (30/2/1), (30/2/2), (30/2/3)**

11. Prove that

    $\frac{\sin \theta}{\cot \theta + \operatorname{cosec} \theta} = 2 + \frac{\sin \theta}{\cot \theta - \operatorname{cosec} \theta}$ **CBSE Sample Paper III 2008**

12. Evaluate

    $\frac{\sec 29°}{\operatorname{cosec} 61°} + 2 \cot 8° \cot 17° \cot 45° \cot 73° \cot 82° - 3(\sin^2 38° + \sin^2 52°)$ **CBSE Sample Paper III 2008**

13. Prove that

    $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$ **CBSE Sample Paper II 2008**

14. Prove that: $\frac{1 + \cos A}{\sin A} + \frac{\sin A}{1 + \cos A} = 2 \operatorname{cosec} A$ **CBSE Sample Paper I 2008**

15. Prove that: $\frac{\sin A + \cos A}{\sin A - \cos A} + \frac{\sin A - \cos A}{\sin A + \cos A} = \frac{2}{\sin^2 A - \cos^2 A}$ **CBSE Sample Paper I 2008**