



NCERT Solutions For Class 10 Chapter 8 Introduction to Trigonometry Exercise 8.3

Q1. Evaluate:

(i) $\frac{\sin 18^\circ}{\cos 72^\circ}$

(ii) $\frac{\tan 26^\circ}{\cot 64^\circ}$

(iii) $\cos 48^\circ - \sin 42^\circ$

(iv) $\operatorname{cosec} 31^\circ - \sec 59^\circ$

Ans: (i) $\frac{\sin 18^\circ}{\cos 72^\circ} = \frac{\sin(90^\circ - 72^\circ)}{\cos 72^\circ}$

$= \frac{\cos 72^\circ}{\cos 72^\circ} = 1$

(ii) $\frac{\tan 26^\circ}{\cot 64^\circ} = \frac{\tan(90^\circ - 64^\circ)}{\cot 64^\circ}$

$= \frac{\cot 64^\circ}{\cot 64^\circ} = 1$

(iii) $\cos 48^\circ - \sin 42^\circ$

$= \cos(90^\circ - 42^\circ) - \sin 42^\circ$

$= \sin 42^\circ - \sin 42^\circ = 0$

(iv) $\operatorname{cosec} 31^\circ - \sec 59^\circ$

$= \operatorname{cosec}(90^\circ - 59^\circ) - \sec 59^\circ$

$= \sec 59^\circ - \sec 59^\circ = 0$

Q2. Show that:

(i) $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ = 1$

(ii) $\cos 38^\circ \cos 52^\circ - \sin 38^\circ \sin 52^\circ = 0$

Ans: (i) L.H.S. $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ$

$= (\tan(90^\circ - 42^\circ)) \cdot (\tan(90^\circ - 67^\circ)) \cdot \tan 42^\circ \cdot \tan 67^\circ$

$$= \tan(90^\circ - 42^\circ) \tan(90^\circ - 67^\circ) \tan 42^\circ \tan 67^\circ$$

$$= \cot 42^\circ \cot 67^\circ \tan 42^\circ \tan 67^\circ$$

$$= \frac{1}{\tan 42^\circ} \cdot \frac{1}{\tan 67^\circ} \cdot \tan 42^\circ \cdot \tan 67^\circ = 1 = \text{R.H.S.}$$

$$\text{(ii) R.H.S. } \cos 38^\circ \cos 52^\circ - \sin 38^\circ \sin 52^\circ$$

$$= \cos(90^\circ - 52^\circ) \cdot \cos(90^\circ - 38^\circ) - \sin 38^\circ \cdot \sin 52^\circ$$

$$= \sin 52^\circ \sin 38^\circ - \sin 38^\circ \sin 52^\circ = 0 = \text{R.H.S.}$$

Q3. If $\tan 2A = \cot(A - 18^\circ)$, where $2A$ is an acute angle, find the value of A .

Ans: Given: $\tan 2A = \cot(A - 18^\circ)$

$$\Rightarrow \cot(90^\circ - 2A) = \cot(A - 18^\circ)$$

$$\Rightarrow 90^\circ - 2A = A - 18^\circ$$

$$\Rightarrow -2A - A = -18^\circ - 90^\circ$$

$$\Rightarrow -3A = -108^\circ$$

$$\Rightarrow A = 36^\circ$$

Q4. If $\tan A = \cot B$, prove that $A + B = 90^\circ$.

Ans: Given: $\tan A = \cot B$

$$\Rightarrow \cot(90^\circ - A) = \cot B$$

$$\Rightarrow 90^\circ - A = B$$

$$\Rightarrow A + B = 90^\circ$$

Q5. If $\sec 4A = \operatorname{cosec}(A - 20^\circ)$, where $4A$ is an acute angle, find the value of A .

Ans: Given: $\sec 4A = \operatorname{cosec}(A - 20^\circ)$

$$\Rightarrow \operatorname{cosec}(90^\circ - 4A) = \operatorname{cosec}(A - 20^\circ)$$

$$\Rightarrow 90^\circ - 4A = A - 20^\circ$$

$$\Rightarrow -4A - A = -20^\circ - 90^\circ$$

$$\Rightarrow -5A = -110^\circ$$

$$\Rightarrow A = 22^\circ$$

Q6. If A , B and C are interior angles of a $\triangle ABC$, then show that $\sin\left(\frac{B + C}{2}\right) = \cos\frac{A}{2}$.

Ans: Given: A , B and C are interior angles of a $\triangle ABC$.

$$\therefore A + B + C = 180^\circ$$

$$\Rightarrow \frac{A + B + C}{2} = 90^\circ$$

$$\Rightarrow \frac{B+C}{2} = 90^\circ - \frac{A}{2}$$

$$\Rightarrow \sin\left(\frac{B+C}{2}\right) = \sin\left(90^\circ - \frac{A}{2}\right)$$

$$\Rightarrow \sin\left(\frac{B+C}{2}\right) = \cos\frac{A}{2}$$

Q7. Express $\sin 67^\circ + \cos 75^\circ$ in terms of trigonometric ratios of angles between 0° and 45° .

Ans: $\sin 67^\circ + \cos 75^\circ$

$$= \sin(90^\circ - 23^\circ) + \cos(90^\circ - 15^\circ)$$

$$= \cos 23^\circ + \sin 15^\circ$$

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