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) $\cos ec 31^\circ - \sec 59^\circ$

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

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

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

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

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

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

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

(iv) $\cos ec 31^\circ - \sec 59^\circ$

$= \cos ec\left(90^\circ - 59^\circ\right) - \sec 59^\circ$

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

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. $\tan 48^\circ \tan 23^\circ \tan 42^\circ \tan 67^\circ$

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

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

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

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

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

$= \sin 52^\circ \sin 38^\circ - \sin 38^\circ \sin 52^\circ \; = 0 =$ R.H.S.

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

Ans: Given: $\tan 2A = \cot(A-18°)$

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

$\Rightarrow 90° - 2A = A - 18°$

$\Rightarrow -2A - A = -18° - 90°$

$\Rightarrow -3A = -108°$

$\Rightarrow A = 36°$

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

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

$\Rightarrow \cot(90° - A) = \cot B$

$\Rightarrow 90° - A = B$

$\Rightarrow A + B = 90°$

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

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

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

$\Rightarrow 90° - 4A = A - 20°$

$\Rightarrow -4A - A = -20° - 90°$

$\Rightarrow -5A = -110°$

$\Rightarrow A = 22°$

Q6. If A, B and C are interior angles of a ΔABC, 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 ΔABC.

$\therefore A + B + C = 180°$

$\Rightarrow \frac{A+B+C}{2} = 90°$

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

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

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

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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