



Chapter 5 Trigonometric Functions Ex 5.3 Q 9. i.

$$\begin{aligned}
 \text{LHS} &= \tan 720^\circ - \cos 270^\circ - \sin 150^\circ \cos 120^\circ \\
 &= \tan 4\pi - \cos\left(\frac{3\pi}{2}\right) - \sin\left(\pi\frac{\pi}{6}\right)\cos\left(\frac{\pi}{2} + \frac{\pi}{6}\right) \left(\because \pi = 180^\circ\right) \\
 &= 0 - 0 - \sin\frac{\pi}{6}\left(-\sin\frac{\pi}{6}\right) \quad \left(\because \tan n\pi = 0 \text{ for all } n \in \mathbb{Z} \text{ \& } \cos\frac{3\pi}{2} = 0\right) \\
 &= \sin^2\frac{\pi}{6} \\
 &= \left(\frac{1}{2}\right)^2 \\
 &= \frac{1}{4} \\
 &= \text{RHS} \\
 &\text{Proved}
 \end{aligned}$$

Chapter 5 Trigonometric Functions Ex 5.3 Q 9. ii.

$$\begin{aligned}
 \text{LHS} &= \sin 780^\circ \sin 480^\circ + \cos 120^\circ \sin 150^\circ \\
 &= \sin\left(4\pi + \frac{\pi}{3}\right)\sin\left(3\pi - \frac{\pi}{3}\right) + \cos\left(\frac{\pi}{2} + \frac{\pi}{6}\right)\sin\left(\pi - \frac{\pi}{6}\right) \quad \left(\because \pi = 180^\circ\right) \\
 &= \sin\frac{\pi}{3} \times \sin\frac{\pi}{3} + \left(-\sin\frac{\pi}{6}\right)\sin\frac{\pi}{6} \quad \left(\begin{array}{l} \because \sin\left(4\pi + \frac{\pi}{3}\right) = \sin\frac{\pi}{3} \\ \& \sin\left(3\pi - \frac{\pi}{3}\right) = \sin\frac{\pi}{3} \end{array}\right) \\
 &= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} - \frac{1}{2} \times \frac{1}{2} \\
 &= \frac{3}{4} - \frac{1}{4} \\
 &= \frac{2}{4} \\
 &= \frac{1}{2} \\
 &= \text{RHS} \\
 &\text{Proved}
 \end{aligned}$$

Chapter 5 Trigonometric Functions Ex 5.3 Q 9. iii.

$$\begin{aligned}
 \text{LHS} &= \sin 780^\circ \sin 120^\circ + \cos 240^\circ \sin 390^\circ \\
 &= \sin\left(4\pi + \frac{\pi}{3}\right)\sin\left(\frac{\pi}{2} + \frac{\pi}{6}\right) + \cos\left(\pi + \frac{\pi}{6}\right)\sin\left(2\pi + \frac{\pi}{6}\right) \\
 &= \sin\frac{\pi}{3} \times \cos\frac{\pi}{6} - \cos\frac{\pi}{3} \times \left(+\sin\frac{\pi}{6}\right) \\
 &= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} - \frac{1}{2} \times \frac{1}{2} \\
 &= \frac{3}{4} - \frac{1}{4} \\
 &= \frac{1}{2} \\
 &= \frac{1}{2} \\
 &= \text{RHS} \\
 &\text{Proved}
 \end{aligned}$$

Chapter 5 Trigonometric Functions Ex 5.3 Q 9.iv.

$$\text{LHS} = \sin 600^\circ \cos 390^\circ + \cos 480^\circ \sin 150^\circ$$

$$= \sin \left(3\pi + \frac{\pi}{3} \right) \cos \left(2\pi + \frac{\pi}{6} \right) + \cos \left(3\pi - \frac{\pi}{3} \right) \sin \left(\pi - \frac{\pi}{6} \right)$$

$$= -\sin \frac{\pi}{3} \cos \frac{\pi}{6} - \cos \frac{\pi}{3} - \sin \frac{\pi}{6} \quad \left(\because \sin \left(3\pi + \frac{\pi}{3} \right) = -\sin \frac{\pi}{3} \text{ \& } \cos \left(3\pi - \frac{\pi}{3} \right) = -\cos \frac{\pi}{3} \right)$$

$$= \frac{-\sqrt{3}}{2} \times \frac{-\sqrt{3}}{2} - \frac{1}{2} \times \frac{1}{2}$$

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

$$= \frac{-4}{4}$$

$$= -1$$

$$= \text{RHS}$$

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 9.v.

$$\text{LHS} = \tan 225^\circ \cot 405^\circ + \tan 765^\circ \cot 675^\circ$$

$$= \tan \left(\pi + \frac{\pi}{4} \right) \cot \left(2\pi + \frac{\pi}{4} \right) + \tan \left(4\pi + \frac{\pi}{4} \right) \cot \left(4\pi - \frac{\pi}{4} \right)$$

$$= \tan \frac{\pi}{4} \cot \frac{\pi}{4} + \tan \frac{\pi}{4} \left(-\cot \frac{\pi}{4} \right)$$

$$= 1.1 + 1.(-1)$$

$$= 1 - 1$$

$$= 0$$

$$= \text{RHS}$$

Proved

***** END *****