Chapter 5 Trigonometric Functions Ex 5.3 Q 9. i.

LHS = $\tan 720^\circ - \cos 270^\circ - \sin 150^\circ \cos 120^\circ$

$= \tan 4\pi - \cos\left(\frac{3\pi}{2}\right) - \sin\left(\pi - \frac{\pi}{6}\right)\cos\left(\frac{\pi}{2} + \frac{\pi}{6}\right) \left(\because \pi = 180^\circ\right)$

$= 0 - 0 - \sin\frac{\pi}{6}\left(-\sin\frac{\pi}{6}\right) \qquad \left(\because \tan n\pi = 0 \text{ for all } n \in Z \ \& \ \cos\frac{3\pi}{2} = 0\right)$

$= \sin^2\frac{\pi}{6}$

$= \left(\frac{1}{2}\right)^2$

$= \frac{1}{4}$

= RHS

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 9. ii.

LHS = $\sin 780^\circ \sin 480^\circ + \cos 120^\circ \sin 150^\circ$

$= \sin\left(4\pi + \frac{\pi}{3}\right)\sin\left(3\pi - \frac{\pi}{3}\right) + \cos\left(\frac{\pi}{2} + \frac{\pi}{6}\right)\sin\left(\pi - \frac{\pi}{6}\right) \qquad \left(\because \pi = 180^\circ\right)$

$= \sin\frac{\pi}{3} \times \sin\frac{\pi}{3} + \left(-\sin\frac{\pi}{6}\right)\sin\frac{\pi}{6} \qquad \left(\because \sin\left(4\pi + \frac{\pi}{3}\right) = \sin\frac{\pi}{3} \ \& \ \sin\left(3\pi - \frac{\pi}{3}\right) = \sin\frac{\pi}{3}\right)$

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

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

$= \frac{2}{4}$

$= \frac{1}{2}$

= RHS

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 9. iii.

LHS = $\sin 780^\circ \sin 120^\circ + \cos 240^\circ \sin 390^\circ$

$= \sin\left(4\pi + \frac{\pi}{3}\right)\sin\left(\frac{\pi}{2} + \frac{\pi}{6}\right) + \cos\left(\pi + \frac{\pi}{6}\right)\sin\left(2\pi + \frac{\pi}{6}\right)$

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

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

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

$= \frac{1}{2}$

$= \frac{1}{2}$

= RHS

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 9.iv.

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

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

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

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

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

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

$= -1$

= RHS

Proved

Chapter 5 Trigonometric Functions Ex 5.3 Q 9.v.

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

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

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

$= 1.1 + 1.(-1)$

$= 1 - 1$

$= 0$

= RHS

Proved

********** END **********