

MCR 3UI Trig Identities Worksheet

a) $LS = \tan A + \cot A$ $RS = \sec A \cdot \csc A$
 $= \frac{\sin A}{\cos A} + \frac{\cos A}{\sin A}$ $= \frac{1}{\cos A} \cdot \frac{1}{\sin A}$
 $= \frac{\sin A \cdot \sin A}{\cos A \sin A} + \frac{\cos A \cdot \cos A}{\sin A \cos A}$
 $= \frac{\sin^2 A + \cos^2 A}{\sin A \cos A}$ $\therefore LS = RS$
 $= \frac{1}{\sin A \cos A}$ $\therefore Q.E.D.$

b) $LS = \cot^2 A$ $RS = \cos^2 A + (\cot A \cdot \cos A)^2$
 $= \cos^2 A + \cot^2 A \cos^2 A$
 $= \cos^2 A (1 + \cot^2 A)$
 $= \cos^2 A (\csc^2 A)$
 $= \cos^2 A \left(\frac{1}{\sin^2 A}\right)$
 $= \frac{\cos^2 A}{\sin^2 A}$ $\therefore LS = RS$
 $= \cot^2 A$ $\therefore Q.E.D.$

c) $LS = \frac{1}{\sec^2 \theta}$ $RS = \sin^2 \theta \cos^2 \theta + \cos^4 \theta$
 $= \cos^2 \theta$ $= \cos^2 \theta (\sin^2 \theta + \cos^2 \theta)$
 $= \cos^2 \theta (1)$
 $\therefore LS = RS$
 $\therefore Q.E.D.$

d) $LS = \cot \theta \cdot \sec \theta$ $RS = \csc \theta$
 $= \frac{\cos \theta}{\sin \theta} \cdot \frac{1}{\cos \theta}$ $= \frac{1}{\sin \theta}$
 $= \frac{1}{\sin \theta}$ $\therefore LS = RS$
 $\therefore Q.E.D.$

e) $LS = \sec^2 \theta + \csc^2 \theta$ $RS = \frac{1}{\sin^2 \theta \cos^2 \theta}$
 $= \frac{1}{\cos^2 \theta} + \frac{1}{\sin^2 \theta}$
 $= \frac{1}{\cos^2 \theta} \left(\frac{\sin^2 \theta}{\sin^2 \theta}\right) + \frac{1}{\sin^2 \theta} \left(\frac{\cos^2 \theta}{\cos^2 \theta}\right)$
 $= \frac{\sin^2 \theta + \cos^2 \theta}{\sin^2 \theta \cos^2 \theta}$ $\therefore LS = RS$
 $= \frac{1}{\sin^2 \theta \cos^2 \theta}$ $\therefore Q.E.D.$

f) $LS = \frac{1 + \tan^2 \theta}{1 + \cot^2 \theta}$ $RS = \tan^2 \theta$
 $= \frac{\sec^2 \theta}{\csc^2 \theta}$
 $= \frac{1}{\cos^2 \theta} \div \frac{1}{\sin^2 \theta}$
 $= \frac{1}{\cos^2 \theta} \times \frac{\sin^2 \theta}{1}$
 $= \frac{\sin^2 \theta}{\cos^2 \theta}$ $\therefore LS = RS$
 $= \tan^2 \theta$ $\therefore Q.E.D.$

g) $LS = \frac{\sec^2 \alpha - \cos^2 \alpha}{\tan^2 \alpha}$ $RS = 1 + \cos^2 \alpha$
 $= \frac{\tan^2 \alpha + 1 - \cos^2 \alpha}{\tan^2 \alpha}$
 $= \frac{\tan^2 \alpha + \sin^2 \alpha}{\tan^2 \alpha}$
 $= \frac{\tan^2 \alpha}{\tan^2 \alpha} + \frac{\sin^2 \alpha}{\tan^2 \alpha}$
 $= 1 + \sin^2 \alpha \div \frac{\sin^2 \alpha}{\cos^2 \alpha}$
 $= 1 + \sin^2 \alpha \times \frac{\cos^2 \alpha}{\sin^2 \alpha}$ $\therefore LS = RS$
 $= 1 + \cos^2 \alpha$ $\therefore Q.E.D.$

h) $LS = \sin A \cdot \cos A \cdot \tan A$ $RS = 1 - \cos^2 A$
 $= \sin A \cdot \cos A \cdot \frac{\sin A}{\cos A}$ $= \sin^2 A$
 $= \sin^2 A$
 $\therefore LS = RS$
 $\therefore Q.E.D.$