



### Trigonometric Ratios of Compound Angles Ex 7.1 Q11

$$\text{LHS: } \frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ}$$

Dividing numerator and denominator by  $\cos 11^\circ$ , we get

$$\begin{aligned} & \frac{\frac{\cos 11^\circ}{\cos 11^\circ} + \frac{\sin 11^\circ}{\cos 11^\circ}}{\frac{\cos 11^\circ}{\cos 11^\circ} - \frac{\sin 11^\circ}{\cos 11^\circ}} \\ &= \frac{1 + \tan 11^\circ}{1 - \tan 11^\circ} \quad \left[ \because \tan \theta = \frac{\sin \theta}{\cos \theta} \right] \\ &= \frac{\tan 45^\circ + \tan 11^\circ}{1 - \tan 45^\circ \times \tan 11^\circ} \quad [\tan 45^\circ = 1] \\ &= \tan(45^\circ + 11^\circ) \quad \left[ \because \tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} \right] \\ &= \tan 56^\circ \end{aligned}$$

$$\therefore \frac{\cos 11^\circ + \sin 11^\circ}{\cos 11^\circ - \sin 11^\circ} = \tan 56^\circ$$

Hence proved.

$$\text{LHS: } \frac{\cos 9^\circ + \sin 9^\circ}{\cos 9^\circ - \sin 9^\circ}$$

$$\begin{aligned} & \frac{\frac{\cos 9^\circ}{\cos 9^\circ} + \frac{\sin 9^\circ}{\cos 9^\circ}}{\frac{\cos 9^\circ}{\cos 9^\circ} - \frac{\sin 9^\circ}{\cos 9^\circ}} \quad \left[ \text{Dividing numerator and denominator by } \cos 9^\circ \right] \\ &= \frac{1 + \tan 9^\circ}{1 - \tan 9^\circ} \quad \left[ \because \tan \theta = \frac{\sin \theta}{\cos \theta} \right] \\ &= \frac{\tan 45^\circ + \tan 9^\circ}{1 - \tan 45^\circ \times \tan 9^\circ} \quad [\tan 45^\circ = 1] \\ &= \tan(45^\circ + 9^\circ) \quad \left[ \because \tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} \right] \\ &= \tan 54^\circ \\ &= \text{RHS} \end{aligned}$$

$$\therefore \text{LHS} = \text{RHS}$$

Hence proved.

$$\text{LHS: } \frac{\cos 8^\circ - \sin 8^\circ}{\cos 8^\circ + \sin 8^\circ}$$

$$\frac{\frac{\cos 8^\circ}{\cos 8^\circ} - \frac{\sin 8^\circ}{\cos 8^\circ}}{\frac{\cos 8^\circ}{\cos 8^\circ} + \frac{\sin 8^\circ}{\cos 8^\circ}}$$

$$= \frac{1 - \tan 8^\circ}{1 + \tan 8^\circ}$$

$$= \frac{\tan 45^\circ - \tan 8^\circ}{1 + \tan 45^\circ \times \tan 8^\circ}$$

$$= \tan(45^\circ - 8^\circ)$$

$$= \tan 37^\circ$$

$$= \text{RHS}$$

[Dividing numerator and denominator by  $\cos 8^\circ$ ]

$$\left[ \because \tan \theta = \frac{\sin \theta}{\cos \theta} \right]$$

$$[\tan 45^\circ = 1]$$

$$\left[ \because \tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B} \right]$$

$$\therefore \text{LHS} = \text{RHS}$$

Hence proved.

#### Trigonometric Ratios of Compound Angles Ex 7.1 Q12

$$\begin{aligned} \text{LHS: } & \sin(60^\circ - \theta) \cos(30^\circ + \theta) + \cos(60^\circ - \theta) \times \sin(30^\circ + \theta) \\ &= \sin[(60^\circ - \theta) + (30^\circ + \theta)] \quad [\sin(A + B) = \sin A \cos B + \cos A \sin B] \\ &= \sin[60^\circ - \theta + 30^\circ + \theta] \\ &= \sin(90^\circ) \\ &= 1 \\ &= \text{RHS} \end{aligned}$$

$$\therefore \text{LHS} = \text{RHS}$$

Hence proved.

#### Trigonometric Ratios of Compound Angles Ex 7.1 Q13

$$\begin{aligned} \text{LHS: } & \frac{\tan 69^\circ + \tan 66^\circ}{1 - \tan 69^\circ \tan 66^\circ} \\ &= \tan(69^\circ + 66^\circ) \quad \left[ \because \tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B} \right] \\ &= \tan(135^\circ) \\ &= \tan(90^\circ + 45^\circ) \\ &= -\cot 45^\circ \quad [\because \tan \theta \text{ is negative in second quadrant}] \\ &= -1 \\ &= \text{RHS} \end{aligned}$$

$$\therefore \text{LHS} = \text{RHS}$$

Hence proved.

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