



Question 18:

$A = 60^\circ$ and $B = 30^\circ$, $(A + B) = (60^\circ + 30^\circ) = 90^\circ$

$(A - B) = (60^\circ - 30^\circ) = 30^\circ$

$$(i) \text{ LHS} = \sin(A + B) = \sin 90^\circ = 1$$

$$\text{RHS} = \sin A \cos B + \cos A \sin B$$

$$= \sin 60^\circ \cos 30^\circ + \cos 60^\circ \sin 30^\circ$$

$$= \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times \frac{1}{2} = \frac{3}{4} + \frac{1}{4} = \frac{4}{4} = 1$$

$$\text{Hence, } \sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$(ii) \text{ LHS} = \sin(A - B) = \sin 30^\circ = 1/2$$

$$\text{RHS} = \sin A \cos B - \cos A \sin B$$

$$= \sin 60^\circ \cos 30^\circ - \cos 60^\circ \sin 30^\circ$$

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

$$= \frac{3}{4} - \frac{1}{4} = \frac{3-1}{4} = \frac{2}{4} = \frac{1}{2}$$

$$\text{Hence, } \sin(A - B) = \sin A \cos B - \cos A \sin B$$

$$(iii) \text{ LHS} = \cos(A + B) = \cos 90^\circ = 0$$

$$\text{RHS} = \cos A \cos B - \sin A \sin B$$

$$= \cos 60^\circ \cos 30^\circ - \sin 60^\circ \sin 30^\circ$$

$$= \frac{1}{2} \times \frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2} \times \frac{1}{2} = \frac{\sqrt{3}}{4} - \frac{\sqrt{3}}{4} = 0$$

$$\text{Hence, } \cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$(iv) \text{ LHS} = \cos(A - B) = \cos 30^\circ = \frac{\sqrt{3}}{2}$$

$$\text{RHS} = \cos A \cos B + \sin A \sin B$$

$$= \cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ$$

$$= \frac{1}{2} \times \frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2} \times \frac{1}{2} = \frac{\sqrt{3}}{4} + \frac{\sqrt{3}}{4} = \frac{\sqrt{3}}{2}$$

$$(v) \text{ LHS} = \tan(A - B) = \tan 30^\circ = \frac{1}{\sqrt{3}}$$

$$\text{RHS} = \frac{\tan A - \tan B}{1 + \tan A \tan B} = \frac{\tan 60^\circ - \tan 30^\circ}{1 + \tan 60^\circ \tan 30^\circ}$$

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

$$\text{Hence, } \tan(A - B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

***** END *****