

Sum or Difference of Angles Worksheet 2

Sum Formula

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

$$\sin(45^\circ + 30^\circ) = \sin 45^\circ \cos 30^\circ + \sin 30^\circ \cos 45^\circ$$

$$\left(\frac{\sqrt{2}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$$

$$\frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$$

$$= \frac{\sqrt{6} + \sqrt{2}}{4}$$

1. Find $\sin(75^\circ)$

$$\sin(75^\circ)$$

$$\sin(45^\circ + 30^\circ)$$

2. Find $\sin(30^\circ)$

$$(60^\circ - 30^\circ)$$

$$\sin(A - B) = \sin A \cos B - \cos A \sin B$$

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

$$\left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{3}}{2}\right) - \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)$$

$$\frac{3}{4} - \frac{1}{4} = \frac{2}{4} \text{ or } \left(\frac{1}{2}\right)$$

3. Find $\cos(75^\circ)$

$$(30^\circ + 45^\circ)$$

$$\cos(A + B) = \cos A \cos B - \sin A \sin B$$

$$\cos(30^\circ + 45^\circ) = \cos 30^\circ \cos 45^\circ - \sin 30^\circ \sin 45^\circ$$

$$\left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right) - \left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$$

$$\frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4}$$

$$\frac{\sqrt{6} - \sqrt{2}}{4}$$

4. Find $\cos(15^\circ)$
 $(60^\circ - 45^\circ)$

$$\cos(A - B) = \cos A \cos B + \sin A \sin B$$

$$\cos(60^\circ - 45^\circ) = \cos 60^\circ \cos 45^\circ + \sin 60^\circ \sin 45^\circ$$

$$\left(\frac{1}{2}\right)\left(\frac{\sqrt{2}}{2}\right) + \left(\frac{\sqrt{3}}{2}\right)\left(\frac{\sqrt{2}}{2}\right)$$

$$\frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4}$$

$$\frac{\sqrt{2} + \sqrt{6}}{4}$$

5. Find $\sin(2 \times 30^\circ)$

$$\sin(2A) = 2\sin A \cos A$$

$$\sin(2 \times 30^\circ) = 2 \sin 30^\circ \cos 30^\circ$$

$$2 \left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right)$$

$$\frac{2}{2} = 1 \cdot \frac{\sqrt{3}}{2}$$

$$= \frac{\sqrt{3}}{2}$$

6. Find $\cos(2 \times 45^\circ)$

$$\cos(2A) = \cos^2 A - \sin^2 A = 2\cos^2 A - 1 = 1 - 2\sin^2 A$$

$$\cos(2 \times 45^\circ) = \cos^2 45^\circ - \sin^2 45^\circ$$

$$\left(\frac{\sqrt{2}}{2}\right)^2 - \left(\frac{\sqrt{2}}{2}\right)^2 = 0$$

7. Find $\frac{1}{2} \sin(22^\circ)$

$$\begin{array}{r} \downarrow \\ 22.5 \\ \times 2 \\ \hline 45^\circ \end{array}$$

$$\sin\left(\frac{A}{2}\right) = \pm \sqrt{\frac{1 - \cos A}{2}}$$

$$\sin = + \sqrt{\frac{1 - \cos 45^\circ}{2}}$$

$$\sqrt{\frac{1 - \frac{\sqrt{2}}{2}}{2}}$$

$$\sqrt{\frac{2 - \sqrt{2}}{4}}$$

$$\frac{\sqrt{2 - \sqrt{2}}}{2}$$

8. Find $\frac{1}{2} \cos(22^\circ)$

$$\begin{array}{r} 22.5 \\ \times 2 \\ \hline 45 \end{array}$$

$$\cos\left(\frac{A}{2}\right) = \pm \sqrt{\frac{1 + \cos A}{2}}$$

$$\frac{2}{45} = \sqrt{\frac{1 - \cos 45^\circ}{2}}$$

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

$$= \sqrt{\frac{2 - \sqrt{2}}{4}}$$

$$\frac{\sqrt{2 - \sqrt{2}}}{2}$$