

Section 6.2 →
Sum, Difference And Double
Angle Identities.

RECALL:

$$\left. \begin{array}{l} \sin 30^\circ = \frac{1}{2} \\ \cos 30^\circ = \frac{\sqrt{3}}{2} \\ \tan 30^\circ = \frac{1}{\sqrt{3}} \end{array} \right\} \left. \begin{array}{l} \sin 60^\circ = \frac{\sqrt{3}}{2} \\ \cos 60^\circ = \frac{1}{2} \\ \tan 60^\circ = \sqrt{3} \end{array} \right\} \left. \begin{array}{l} \sin 45^\circ = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \\ \cos 45^\circ = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \\ \tan 45^\circ = 1 \end{array} \right.$$

* $30^\circ = \frac{\pi}{6}$ $60^\circ = \frac{\pi}{3}$ $45^\circ = \frac{\pi}{4}$

QUADRANTALS

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Exact Value of:

1. $\sin 135^\circ = \frac{\sqrt{2}}{2}$

2. $\cos \frac{5\pi}{6} = -\frac{\sqrt{3}}{2}$

3. $\sin 45^\circ + \cos 45^\circ$

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

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

= $\sqrt{2}$

~~$\frac{3\sqrt{3}}{3}$~~
 $\frac{3}{\sqrt{3}} \left(\frac{\sqrt{3}}{\sqrt{3}} \right) =$
 $\frac{3\sqrt{3}}{3}$

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$$\left(\frac{a}{\sqrt{a}} \right) \frac{\sqrt{a}}{\sqrt{a}} \rightarrow \sqrt{a}$$

$$= \frac{a\sqrt{a}}{a}$$

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$$\textcircled{4} \quad \sin 75^\circ \neq \underbrace{\sin 30 + \sin 45}$$

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

$$= \sin 30 \cos 45 + \sin 45 \cdot \cos 30$$

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

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

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

BAD MISTAKE if you write $\frac{\sqrt{8}}{4}$

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$$\textcircled{5} \quad \cos 105^\circ$$

$$= \cos (60 + 45)$$

$$= \cos 60 \cos 45 - \sin 60 \sin 45$$

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

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

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$$\textcircled{6} \quad \cos^2\left(\frac{\pi}{3}\right) - \sin^2\left(\frac{\pi}{3}\right)$$

$$\begin{aligned} * \cos^2 A - \sin^2 A \\ = \cos \underline{\underline{2A}} \end{aligned}$$

$$= \cos\left[2\left(\frac{\pi}{3}\right)\right]$$

$$= \cos \frac{2\pi}{3}$$

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

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⑦ Simplify (no Calc)

$$\overset{A}{\sin 21} \overset{B}{\cos 32} + \overset{A}{\sin 32} \overset{B}{\cos 21}$$

$\left(\begin{array}{l} * \sin(A+B) \\ = \sin(21+32) \\ = \sin 53^\circ \end{array} \right.$

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⑧ $\overset{A}{\cos 22^\circ} \overset{B}{\cos 18^\circ} - \overset{A}{\sin 22^\circ} \overset{B}{\sin 18^\circ}$

$\left(\begin{array}{l} * \cos(A+B) \\ = \cos(22+18) \\ = \cos 40^\circ \end{array} \right.$

⑨
$$\frac{2 \tan \frac{\pi}{8}}{1 - \tan^2 \frac{\pi}{8}} = 1$$

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$$\begin{aligned} & \textcircled{10} \quad \cos \frac{\pi}{12} \\ & = \cos \left(\frac{\pi}{4} - \frac{\pi}{6} \right) \\ & = \cos \frac{\pi}{4} \cdot \cos \frac{\pi}{6} + \sin \frac{\pi}{4} \cdot \sin \frac{\pi}{6} \\ & = \left(\frac{\sqrt{2}}{2} \right) \left(\frac{\sqrt{3}}{2} \right) + \left(\frac{\sqrt{2}}{2} \right) \left(\frac{1}{2} \right) \\ & = \frac{\sqrt{6} + \sqrt{2}}{4} \quad \pi \end{aligned}$$

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1, 4, 5, 8

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