

$$1. \sin 75^\circ \cos 15^\circ + \cos 75^\circ \sin 15^\circ = \sin(75^\circ + 15^\circ)$$

$$\begin{array}{c} (0,1) \\ \text{c} \\ \text{s} \\ | \\ + \\ | \end{array} = \sin 90^\circ = 1$$

chg sign

$$3. \cos \frac{5\pi}{12} \cos \frac{\pi}{12} - \sin \frac{5\pi}{12} \sin \frac{\pi}{12} = \cos \left(\frac{5\pi}{12} \oplus \frac{\pi}{12} \right)$$

$$\begin{array}{c} (0,1) \\ \text{c} \\ | \\ + \\ | \end{array} = \cos \frac{6\pi}{12} = \cos \frac{\pi}{2} = 0$$

$$5. \sin 3x \cos 2x - \cos 3x \sin 2x = \sin(3x - 2x) = \sin x$$

$$7. \sin(x \oplus \pi) = -\sin x$$

$$\sin x \cos \pi \oplus \cos x \sin \pi =$$

$$\sin x (-1) + \cos x (0) = -\sin x$$

$$\begin{array}{c} | \\ + \\ | \\ (-1,0) \\ \text{c} \\ \text{s} \end{array}$$

$$9. \cos(x \oplus \frac{\pi}{2}) = -\sin x$$

$$\cos x \cos \frac{\pi}{2} \ominus \sin x \sin \frac{\pi}{2}$$

$$\cos x (0) \ominus \sin x (1) = -\sin x$$

$$\begin{array}{c} (0,1) \\ \text{c} \\ \text{s} \\ | \\ + \\ | \end{array}$$

$$13. \cos 75^\circ = \cos(45^\circ \oplus 30^\circ)$$

$$= \cos 45^\circ \cos 30^\circ \ominus \sin 45^\circ \sin 30^\circ$$

$$= \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{3}}{2} \ominus \frac{\sqrt{2}}{2} \cdot \frac{1}{2} = \frac{\sqrt{6} - \sqrt{2}}{4}$$

$$15. \cos 105^\circ = \cos(60^\circ \oplus 45^\circ)$$

$$= \cos 60^\circ \cos 45^\circ \ominus \sin 60^\circ \sin 45^\circ$$

$$= \frac{1}{2} \cdot \frac{\sqrt{2}}{2} \ominus \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} = \frac{\sqrt{2} - \sqrt{6}}{4}$$

$$17 \quad \sin(-15^\circ) = \sin(30^\circ \ominus 45^\circ)$$

$$\sin 30^\circ \cos 45^\circ \ominus \cos 30^\circ \sin 45^\circ$$

$$\frac{1}{2} \cdot \frac{\sqrt{2}}{2} \ominus \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} = \frac{\sqrt{2} - \sqrt{6}}{4}$$

$$19 \quad \sin \frac{7\pi}{12} = \sin\left(\frac{4\pi}{12} + \frac{3\pi}{12}\right) = \sin\left(\frac{\pi}{3} \oplus \frac{\pi}{4}\right)$$

$$\sin \frac{\pi}{3} \cos \frac{\pi}{4} \oplus \cos \frac{\pi}{3} \sin \frac{\pi}{4} = \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} + \frac{1}{2} \cdot \frac{\sqrt{2}}{2} = \frac{\sqrt{6} + \sqrt{2}}{4}$$

$$21 \quad \sin(30^\circ + \theta) + \sin(30^\circ - \theta)$$

$$\sin 30^\circ \cos \theta + \cos 30^\circ \sin \theta + \sin 30^\circ \cos \theta - \cos 30^\circ \sin \theta$$

$$\frac{1}{2} \cos \theta + \frac{1}{2} \cos \theta = \cos \theta$$

$$23 \quad \cos\left(\frac{\pi}{3} \oplus x\right) + \cos\left(\frac{\pi}{3} \ominus x\right)$$

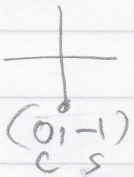
$$\cos \frac{\pi}{3} \cos x \ominus \sin \frac{\pi}{3} \sin x + \cos \frac{\pi}{3} \cos x \oplus \sin \frac{\pi}{3} \sin x$$

$$\frac{1}{2} \cos x + \frac{1}{2} \cos x = \cos x$$

$$25 \quad \cos\left(\frac{3\pi}{2} + x\right) + \cos\left(\frac{3\pi}{2} - x\right)$$

$$\cos \frac{3\pi}{2} \cos x \ominus \sin \frac{3\pi}{2} \sin x + \cos \frac{3\pi}{2} \cos x \oplus \sin \frac{3\pi}{2} \sin x$$

$$0 \cos x + 0 \cos x = 0$$



$$27 \quad \begin{array}{l} \text{24} \end{array} \begin{array}{|l} \hline \text{25} \\ \hline \end{array} \begin{array}{|l} \hline \text{5} \\ \hline \end{array} \begin{array}{|l} \hline \text{3} \\ \hline \end{array}$$

$$\sin \alpha = \frac{3}{5} \quad \sin \beta = \frac{24}{25}$$

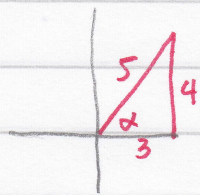
$$\cos \alpha = \frac{4}{5} \quad \cos \beta = \frac{-7}{25}$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

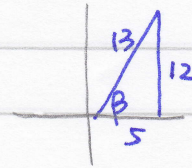
$$= \frac{3}{5} \left(\frac{-7}{25}\right) + \frac{4}{5} \left(\frac{24}{25}\right)$$

$$= \frac{-21 + 96}{125} = \frac{75}{125} = \frac{3}{5}$$

29.



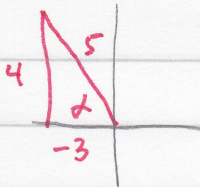
$$\begin{aligned}\sin \alpha &= \frac{4}{5} \\ \cos \alpha &= \frac{3}{5}\end{aligned}$$



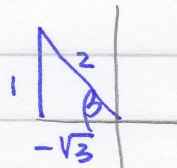
$$\begin{aligned}\sin \beta &= \frac{12}{13} \\ \cos \beta &= \frac{5}{13}\end{aligned}$$

$$\begin{aligned}\cos(\alpha \ominus \beta) &= \cos \alpha \cos \beta \oplus \sin \alpha \sin \beta \\ &= \frac{3}{5} \cdot \frac{5}{13} \oplus \frac{4}{5} \cdot \frac{12}{13} \\ &= \frac{15 + 48}{65} = \frac{63}{65}\end{aligned}$$

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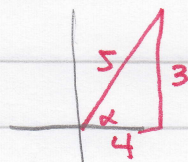
$$\begin{aligned}\sin \alpha &= \frac{4}{5} \\ \cos \alpha &= -\frac{3}{5}\end{aligned}$$



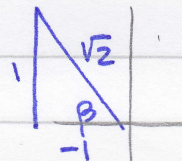
$$\begin{aligned}\sin \beta &= \frac{1}{2} \\ \cos \beta &= -\frac{\sqrt{3}}{2}\end{aligned}$$

$$\begin{aligned}\sin(\alpha \oplus \beta) &= \sin \alpha \cos \beta \ominus \cos \alpha \sin \beta \\ &= \frac{4}{5} \cdot -\frac{\sqrt{3}}{2} \ominus -\frac{3}{5} \cdot \frac{1}{2} \\ &= \frac{-4\sqrt{3} + 3}{10}\end{aligned}$$

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$$\begin{aligned}\sin \alpha &= \frac{3}{5} \\ \cos \alpha &= \frac{4}{5}\end{aligned}$$



$$\begin{aligned}\sin \beta &= \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \\ \cos \beta &= \frac{-1}{\sqrt{2}} = -\frac{\sqrt{2}}{2}\end{aligned}$$

$$\begin{aligned}\cos(\alpha \oplus \beta) &= \cos \alpha \cos \beta \ominus \sin \alpha \sin \beta \\ &= \frac{4}{5} \left(-\frac{\sqrt{2}}{2}\right) \ominus \frac{3}{5} \left(\frac{\sqrt{2}}{2}\right) \\ &= \frac{-4\sqrt{2} - 3\sqrt{2}}{10} = \frac{-7\sqrt{2}}{10}\end{aligned}$$