These are two of the three

Angle Sum Identities

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

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

These are two of the three

Angle Difference Identities

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

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

Using your trig tables and the sum/difference identities

Find

$$\sin 75^\circ \qquad = \sin(45^\circ + 30^\circ)$$

$$\sin 15^\circ \qquad = \sin(45^\circ - 30^\circ)$$

$$\cos 75^\circ \qquad = \cos(45^\circ + 30^\circ)$$

$$\cos 15^\circ \qquad = \cos(45^\circ - 30^\circ)$$

Using your trig tables and the sum/difference identities

Find

$$\sin 75^\circ = \sin(45)\cos 30 + \cos 45 \sin 30$$

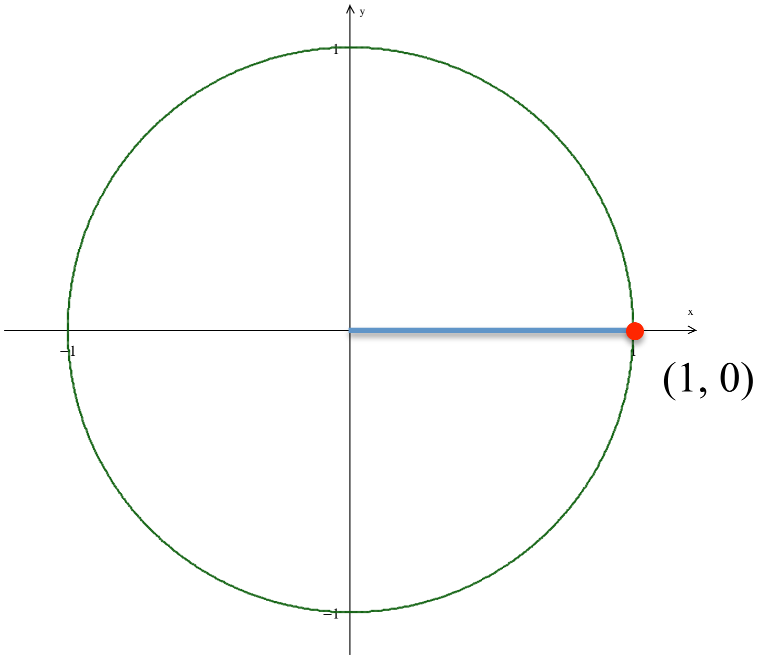
$$\sin 15^\circ = \sin(45)\cos 30 - \cos 45 \sin 30$$

$$\cos 75^\circ = \cos(45)\cos 30 - \sin 45 \sin 30$$

$$\cos 15^\circ = \cos(45)\cos 30 + \sin 45 \sin 30$$

	0°	30°	45°	60°	90°	120°	135°	150°	180°
θ^{rad}	0^{rad}								
$\sin\theta$	$\frac{\sqrt{0}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{0}}{2}$
$\cos\theta$	$\frac{\sqrt{4}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{0}}{2}$	$-\frac{\sqrt{1}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{4}}{2}$

Notice that the angles we just used were the special angles from your trig tables…



Using your trig tables and the sum/difference identities

Find

$$\sin 75^\circ = \sin(45)\cos 30 + \cos 45 \sin 30$$

$$= \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2}\cdot\frac{1}{2} = \frac{\sqrt{6}+\sqrt{2}}{2}$$

$$\sin 15^\circ = \sin(45)\cos 30 - \cos 45 \sin 30$$

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

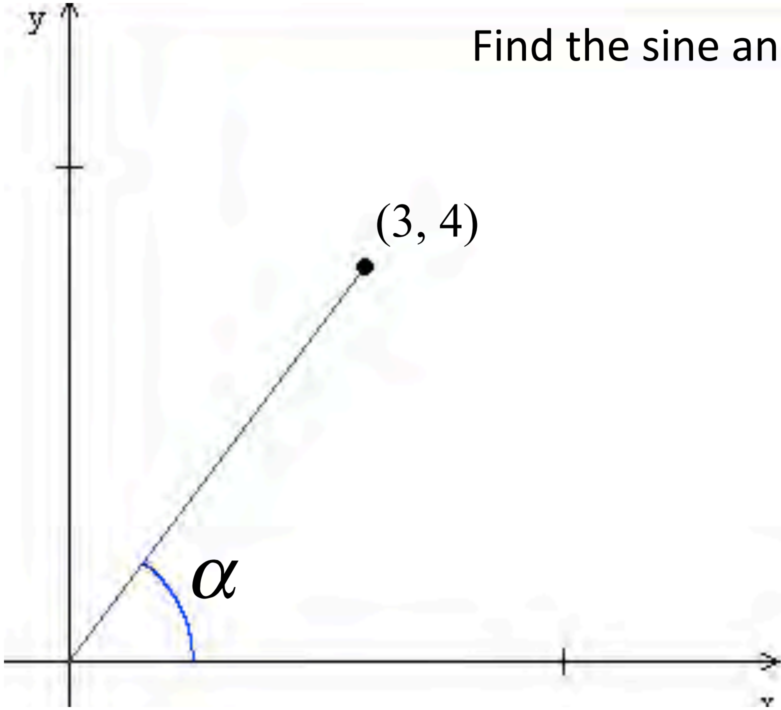
$$\cos 75^\circ = \cos(45)\cos 30 - \sin 45 \sin 30$$

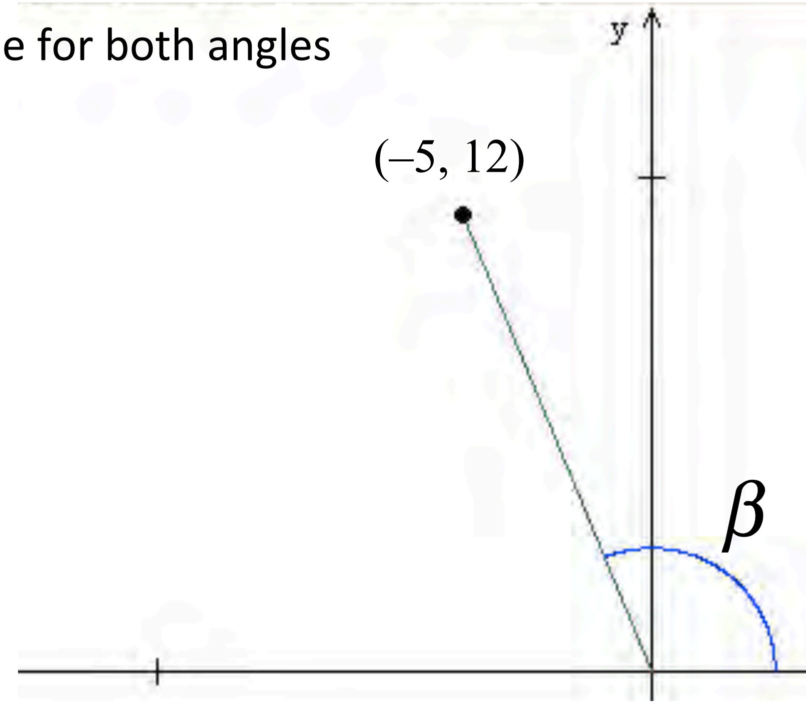
$$= \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2} - \frac{\sqrt{2}}{2}\cdot\frac{1}{2} = \frac{\sqrt{6}-\sqrt{2}}{2}$$

$$\cos 15^\circ = \cos(45)\cos 30 + \sin 45 \sin 30$$

$$= \frac{\sqrt{2}}{2}\cdot\frac{\sqrt{3}}{2} + \frac{\sqrt{2}}{2}\cdot\frac{1}{2} = \frac{\sqrt{6}+\sqrt{2}}{2}$$

Find the sine and cosine for both angles





$$\sin\alpha = \frac{4}{5}$$

$$\sin\beta = \frac{12}{13}$$

$$\cos\alpha = \frac{3}{5}$$

$$\cos\beta = -\frac{5}{13}$$

Use the answers you have and the composite identities to solve the given problems

$$\sin\alpha = \frac{4}{5} \qquad \cos\alpha = \frac{3}{5} \qquad \sin\beta = \frac{12}{13} \qquad \cos\beta = -\frac{5}{13}$$

$$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta = \frac{4}{5}\left(-\frac{5}{13}\right) + \frac{3}{5}\left(\frac{12}{13}\right) = -\frac{20}{65} + \frac{36}{65} = \frac{16}{65}$$

$$\sin(\alpha-\beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta = \frac{4}{5}\left(-\frac{5}{13}\right) - \frac{3}{5}\left(\frac{12}{13}\right) = -\frac{20}{65} - \frac{36}{65} = -\frac{56}{65}$$

$$\cos(\alpha+\beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta = \frac{3}{5}\left(-\frac{5}{13}\right) - \frac{4}{5}\left(\frac{12}{13}\right) = -\frac{15}{65} - \frac{48}{65} = -\frac{63}{65}$$

$$\cos(\alpha-\beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta = \frac{3}{5}\left(-\frac{5}{13}\right) + \frac{4}{5}\left(\frac{12}{13}\right) = -\frac{15}{65} + \frac{48}{65} = -\frac{33}{65}$$

This is called a **Double Angle Identity for Sine**

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

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

Here is one of the **Double Angle Identities for Cosine**

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

The other two can be found on page 807

The **Double Angle Identity for Cosine** can be manipulated like this:

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

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

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

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

$$\frac{\cos(2A) + 1}{2} = \cos^2 A$$

The **Double Angle Identity for Cosine** can be manipulated like this:

$$\frac{\cos(2A)+1}{2}=\cos^2 A$$

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

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

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

The **Half Angle Identities**