

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

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

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

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

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

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

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

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

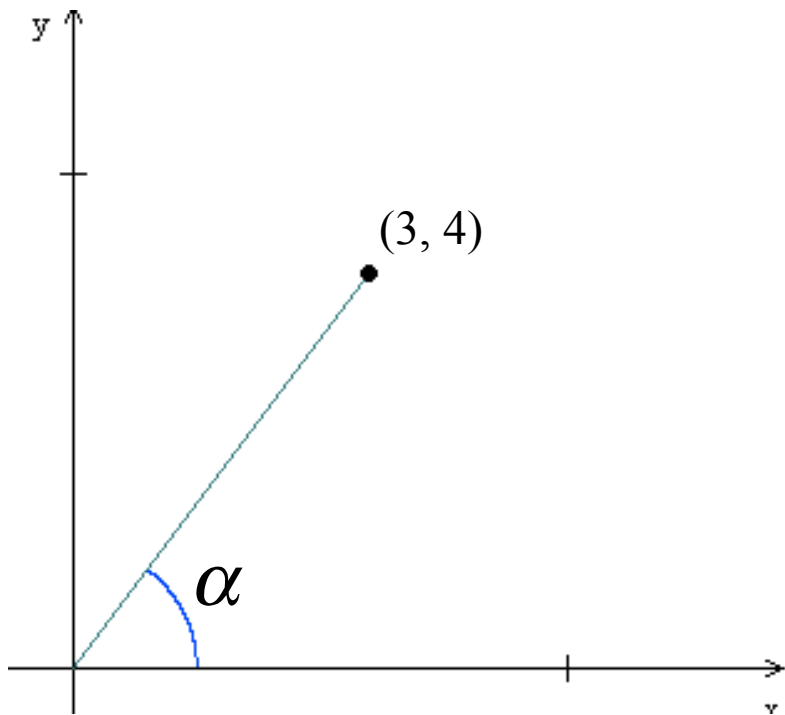
These are called the **Double Angle Identities for Sine & Cosine** (pg 569)

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

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

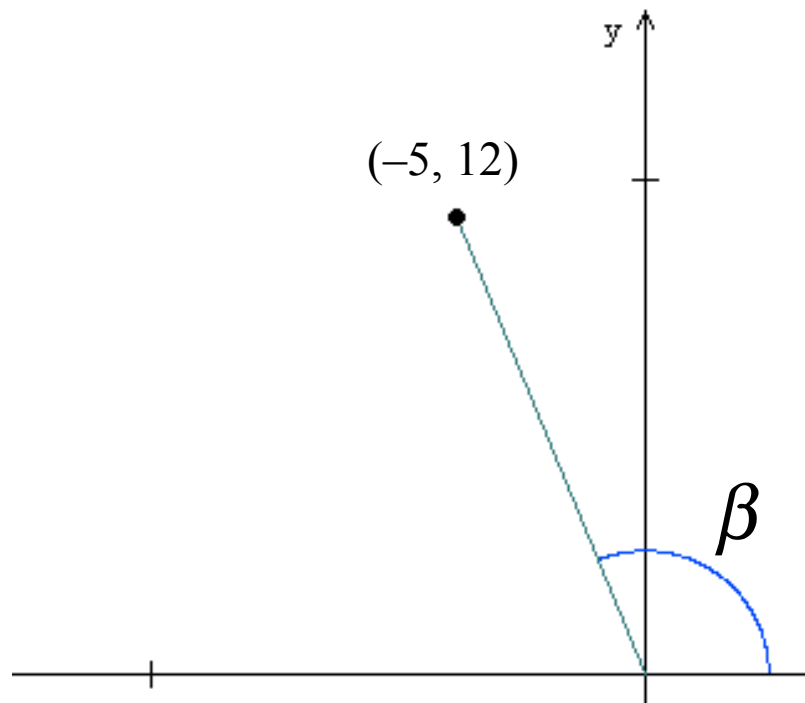
$$\cos(2A) = 2 \cos^2 A - 1$$

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



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

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



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

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

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

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

$$\sin(2\alpha) = 2 \sin \alpha \cos \alpha = 2 \cdot \frac{4}{5} \cdot \frac{3}{5} = \frac{24}{25}$$

$$\sin(2\beta) = 2 \sin \beta \cos \beta = 2 \cdot \frac{12}{13} \cdot \left(-\frac{5}{13}\right) = -\frac{120}{169}$$

$$\cos(2\alpha) = \cos^2 \alpha - \sin^2 \alpha = \left(\frac{3}{5}\right)^2 - \left(\frac{4}{5}\right)^2 = \frac{9}{25} - \frac{16}{25} = -\frac{7}{25}$$

$$\cos(2\beta) = \cos^2 \beta - \sin^2 \beta = \left(-\frac{5}{13}\right)^2 - \left(\frac{12}{13}\right)^2 = \frac{25}{169} - \frac{144}{169} = -\frac{119}{169}$$

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**

More to come in an upcoming screencast