Remember these from last time?

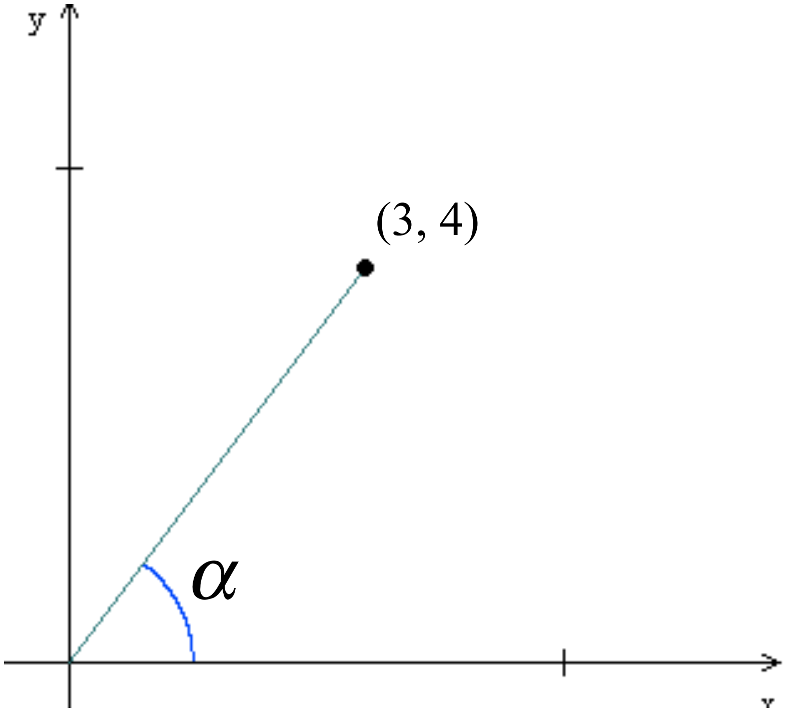
These are called the **Double Angle Identities for Sine & Cosine** (pg 148)

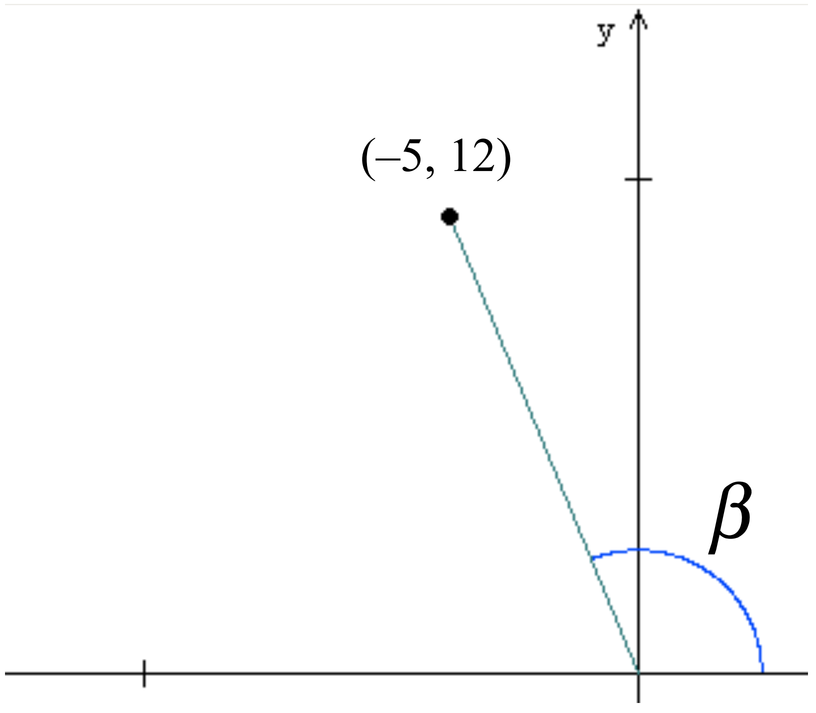
$$\sin(2A) = 2\sin A\cos A$$

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

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

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





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

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

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

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

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

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

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

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

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

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

This is consistent with 2α being a 2nd quadrant angle

This is consistent with 2β being a 3rd quadrant angle

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

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

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

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

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

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

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

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**

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

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

These Identities become essential in Calculus especially without the radical as below

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

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

Pg. 120 #1, 2, 4, 9