

Trigonometry Worksheet: Double Angle Formula (1)

1. If $\sin(\alpha) = \frac{3}{5}$ and α is an acute angle, use the double angle formulas to find exact values of $\sin(2\alpha)$, $\cos(2\alpha)$, $\tan(2\alpha)$, and the quadrant of angle 2α .

$$\text{Given } \sin \alpha = \frac{3}{5} \Rightarrow \cos \alpha = \sqrt{1 - \sin^2 \alpha}$$
$$\cos \alpha = \sqrt{1 - \frac{9}{25}} = \frac{4}{5}$$

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

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

$$\text{C) } \tan(2\alpha) = \frac{\sin 2\alpha}{\cos 2\alpha} = \frac{\frac{24}{25}}{\frac{7}{25}} = \frac{24}{7}$$

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$\sin(2\alpha)$, $\cos(2\alpha)$ and $\tan(2\alpha)$ are all positive, hence 2α is in quadrant (I).