# C12 - 6.6 - Double Angle Notes

$4\sin 6x = 8\sin 3x\cos 3x$

$2\sin x = 4\sin\frac{1}{2}x\cos\frac{1}{2}x$

$\frac{1}{2}\sin 4x = 1\sin 2x\cos 2x$

$2sin\pi = 4\sin\left(\frac{\pi}{2}\right)\cos\left(\frac{\pi}{2}\right) = 0$

$$sin2x = 2sinxcosx$$

Double the number in front.
Half the angle. Add a Cos

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$8\sin 3x\cos 3x = 4\sin 6x$

$4\sin\frac{1}{2}x\cos\frac{1}{2}x = 2\sin x$

$4\sin\left(\frac{\pi}{6}\right)\cos\left(\frac{\pi}{6}\right) = 2\sin\left(\frac{\pi}{3}\right) = \frac{2\sqrt{3}}{2} = \sqrt{3}$

$$2sinxcosx = sin2x$$

Half the number in front.
Double the angle. Cos goes away

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$cos4x = \cos^2 2x - \sin^2 2x$

$cos4x = 2\cos^2 2x - 1$

$$cos2x = \cos^2 x - \sin^2 x$$
$$= 2\cos^2 x - 1$$
$$= 1 - 2\sin^2 x$$

Half the angle

$1 - 2\sin^2 2x = cos4x$

Double the angle

$2\cos^2 3x - 2\sin^2 3x =$
$2(\cos^2 3x - \sin^2 3x) = 2cos6x$

GCF

$4\cos^2 5 - 2 =$
$2(2\cos^2 5 - 1) = 2cos10$

$1 - 2\sin^2\pi = cos2\pi = 1$

$1 - 2\sin^2\left(\frac{\pi}{4}\right) = \cos\left(\frac{\pi}{2}\right) = 0$

*Simplify to sinx or cosx*

$1 - cos2x$
$1 - (1 - 2\sin^2 x)$
$1 - 1 + 2\sin^2 x$

$2\sin^2 x$

$1 + cos2x$
$1 + (2\cos^2 x - 1)$
$1 + 2\cos^2 x - 1$

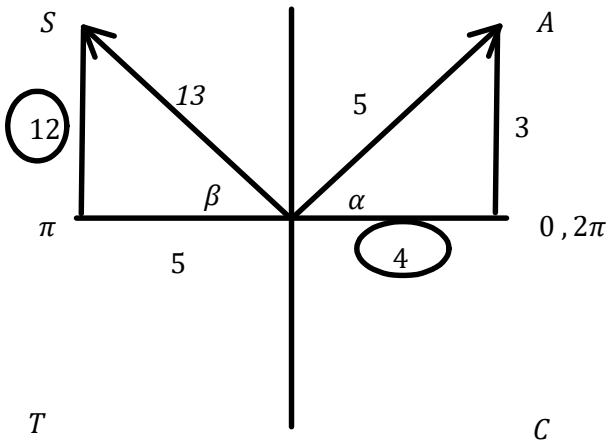
$2\cos^2 x$

# C12 - 6.6 - Proofs Double Angle Notes

| $tanx$ | $\frac{sin2x}{1+cos2x}$ |
|---|---|
| $\frac{sinx}{cosx}$ | $\frac{sin2x}{1+(2\cos^2 x-1)}$<br>$\frac{sin2x}{1+(2\cos^2 x-1)}$<br>$\frac{2sinxcosx}{2\cos^2 x}$<br>$\frac{2sinxcosx}{2\cos^2 x}$<br>$\frac{2sinxcosx}{2\cos^2 x}$<br>$\frac{sinx}{\cos x}$ |

# C12 - 6.6 - CosA= SinB= Sum/Double Angles Notes

*Solve*: $sin\alpha = \frac{3}{5}\ ; QI$ $cos\beta = -\frac{5}{13}\ ; QII$ $\sin(\alpha+\beta) = ?$ $sin2\alpha = ?$ $cos2\beta = ?$




$a^2 + b^2 = c^2$ $a^2 + b^2 = c^2$

$a = 4$ $b = 12$

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

$$sin2\alpha = 2sin\alpha cos\alpha$$
$$= 2\times\frac{3}{5}\times\frac{4}{5}$$
$$= \frac{24}{25}$$

$$cos2\beta = 1 - 2\sin^2\beta$$
$$= 1 - 2\left(\frac{12}{13}\right)^2$$
$$= -\frac{119}{169}$$