

# C11 - 2.8 - sin 2θ Notes

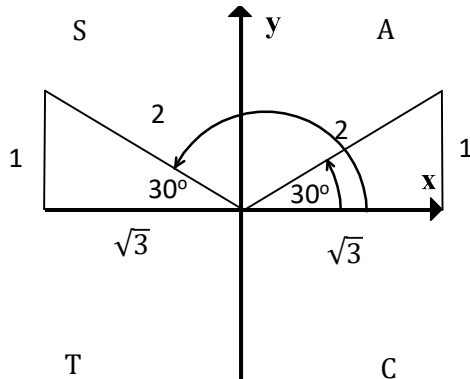
$$\sin 2\theta = \frac{1}{2}$$

Solve for  $\theta$   $0^\circ \leq \theta < 360^\circ$ , and the general solution.

$$\sin m = \frac{1}{2}$$

Let  $m = 2\theta$

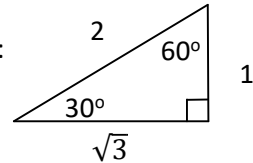
Draw two Δ's where sin m is +ve: ASTC Quadrant I, II



Label the triangles according to SOH CAH TOA

Label the reference angle according to special Δ's.

Draw an arrow from the principal axis:  
To the first and second terminal arm



Solve for the arrows  $m_{stp}$

Check your answer:  $\sin 2\theta = \frac{1}{2}$

$$\sin m = \frac{1}{2}$$

$$\sin(2(15)) = \frac{1}{2} \quad \checkmark \quad \sin(2(75)) = \frac{1}{2} \quad \checkmark$$

$$m_{stp} = 30^\circ$$

$$m_{stp} = 180^\circ - 30^\circ$$

$$= 150^\circ$$

$$m = 30^\circ$$

$$2\theta = 30^\circ$$

$$\frac{2\theta}{2} = \frac{30^\circ}{2}$$

$$\theta = 15^\circ$$

$$m = 150^\circ$$

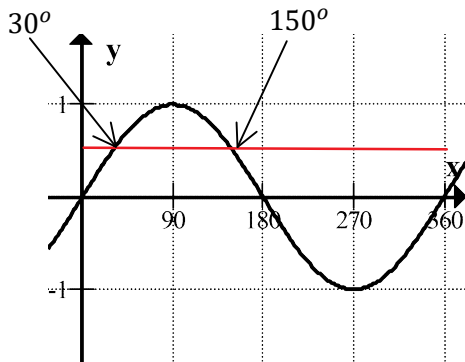
$$2\theta = 150^\circ$$

$$\frac{2\theta}{2} = \frac{150^\circ}{2}$$

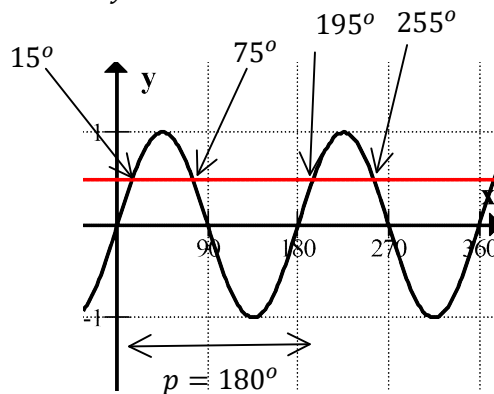
$$\theta = 75^\circ$$

Substitute  $2\theta$  back in for  $m$ .

$$y = \sin \theta$$



$$y = \sin 2\theta$$



$$HC = \frac{1}{2}$$

$$p = \frac{360^\circ}{b}$$

$$p = \frac{360^\circ}{2}$$

$$= 180^\circ$$

$$\theta = \theta_{stp} \pm p$$

$$\theta = 15^\circ + 180^\circ$$

$$\theta = 195^\circ$$

~~$$\theta = \theta_{stp} \pm p$$

$$\theta = 195^\circ + 180^\circ$$

$$\theta = 375^\circ$$~~

$$\theta = \theta_{stp} \pm p$$

$$\theta = 75^\circ + 180^\circ$$

$$\theta = 255^\circ$$

$$0 \leq \theta \leq 360^\circ$$

$$\theta = 15^\circ, 75^\circ, 195^\circ, 225^\circ$$

$$\sin(2(195)) = \frac{1}{2} \quad \checkmark$$

$$\sin(2(225)) = \frac{1}{2} \quad \checkmark$$

General Solution:  $\theta_{gen} = \theta_{stp} \pm pn, n \in I$   
 $\theta_{gen} = 15^\circ \pm 180^\circ n, n \in I$

$\theta_{gen} = \theta_{stp} \pm pn, n \in I$   
 $\theta_{gen} = 75^\circ \pm 180^\circ n, n \in I$