

### Trig Graphs: Phase Shift

Let's use our graphing calculator to investigate phase shift. Graph the following pairs of equations on the same axis

a)  $y = \sin \theta$   
 $y = \sin (\theta - \pi/2)$

translated right  
 $\pi/2$

b)  $y = \cos \theta$   
 $y = \cos (\theta + \pi/3)$

more left  $\pi/3$

properties of trigfns.gsp

In the equation  $y = \sin (\theta + c)$  explain how varying "c" effects the original graph of  $y = \sin \theta$ .

$-c \rightarrow$  moves right  
 $+c \rightarrow$  left.

$$y = \underline{a} \sin (\underline{x+c}) + \underline{d}$$

### Trig Graphs: Period

Let's use our graphing calculator to investigate phase shift. Graph the following pairs of equations on the same axis

a)  $y = \sin \theta$   
 $y = \sin 2(\theta)$

horizontally  
 compressed by  
 a factor of  $\frac{1}{2}$

b)  $y = \cos \theta$   
 $y = \cos 3(\theta)$

compressed by  
 a factor of  $\frac{1}{3}$

properties of trigfns.gsp

In the equation  $y = \sin b(\theta)$  explain how varying "b" effects the original graph of  $y = \sin \theta$ .

$b > 1$  compress horizontally  
 $0 < b < 1$  expand  
 $\sin 2\theta$   
 ↓  
 # of cycles between  $0^\circ$  and  $360^\circ$

**Period:** Length of one full cycle of a graph measured along the x-axis

$$* \text{ Period} = \frac{2\pi}{b} \text{ or } \frac{360^\circ}{b} *$$

$$y = \sin(2\theta)$$

$$\text{Period} = \frac{2\pi}{2} \text{ or } \frac{360^\circ}{2}$$

$$= \pi \quad \frac{180^\circ}{1}$$

$$b = \frac{2\pi}{\text{period}} \text{ or } \frac{360^\circ}{\text{period}}$$

For each of the following equations state the period and phase shift

a)  $y = \sin 4(\theta - \pi/5)$

period =  $\frac{2\pi}{4} = \frac{\pi}{2}$

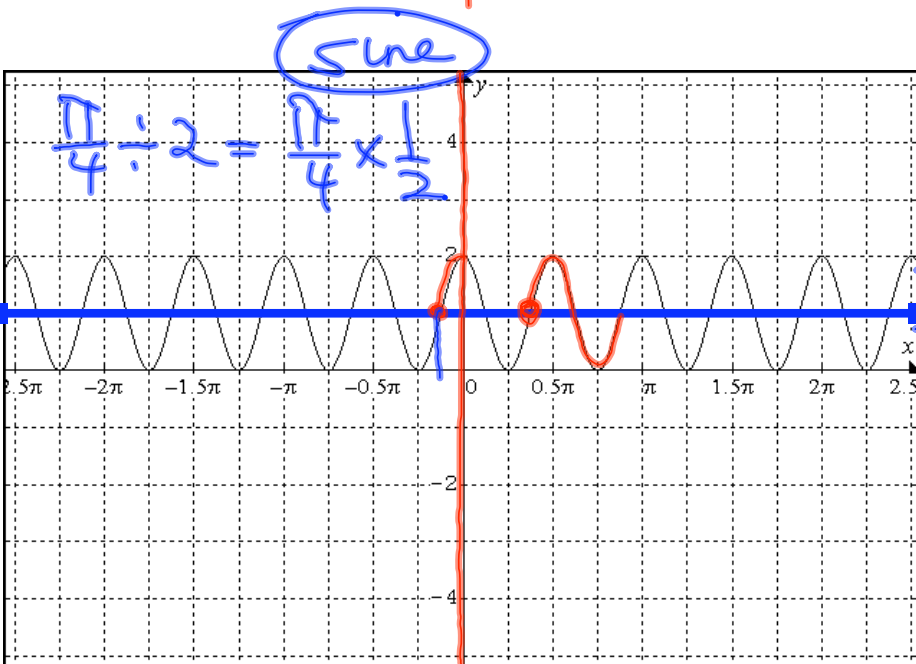
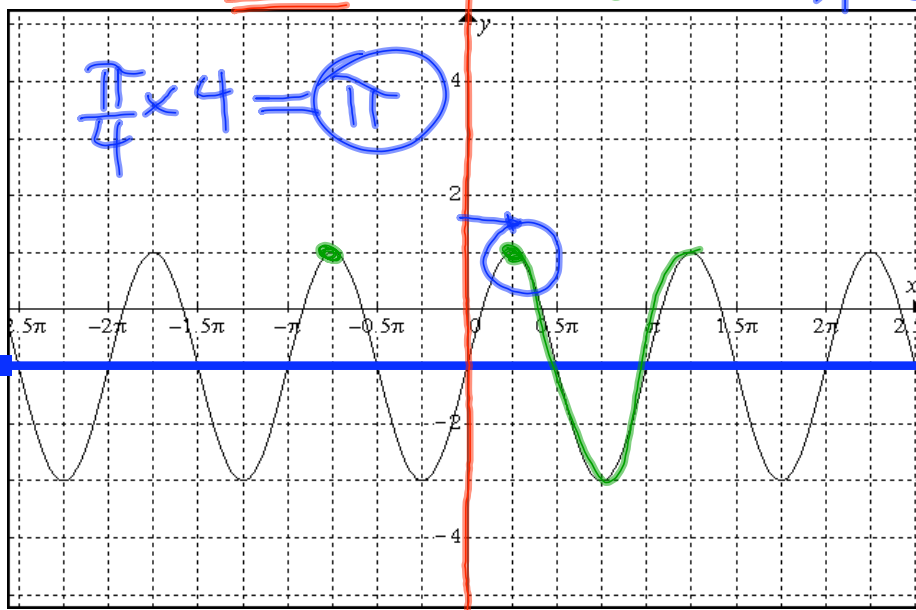
P.S.  $\pi/5$  right

b)  $y = \cos 3(\theta + \pi/6)$

Period:  $\frac{2\pi}{3}$

P.S. left  $\pi/6$

For each graph, state the amplitude, period, possible phase shift and vertical displacement.



$$y = a \sin b(x+c) + d$$

↓                      ↓                      ↓                      ↓

Amplitude          Period                  P.S.                  V.D.

Amp                      P                      P.S.                      V.D.

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