

## 5.6 Phase Shift: Sinusoidal Curve Fitting

We have:  $y = A \sin (wx)$  ,  $w > 0$  ; Amplitude =  $|A|$ ; Period =  $2\pi/w$   
one cycle would then be:  $[0, 2\pi/w]$

Now.....

$$y = A \sin (wx - \Phi) = A \sin [w(x - \Phi/w)]$$

$$\text{Amplitude} = |A|$$

$$\text{Period begins at } wx - \Phi = 0 \Rightarrow x = \Phi/w$$

$$\text{Period ends at } wx - \Phi = 2\pi \Rightarrow x = 2\pi/w + \Phi/w$$

---

For graphs  $y = A \sin (wx - \Phi)$  or  $y = A \cos (wx - \Phi)$

Amplitude =  $|A|$  ; Period =  $T = 2\pi/w$  ; Phase shift =  $\Phi/w$

---

Ex. 1 Find amplitude, period & phase shift of  $y = 3 \sin (2x - \pi)$  and graph

There is an example of cos on pg. 439

Steps for graphing sinusoidal functions of form  $y = A \sin (wx + \Phi)$  or  $y = A \cos (wx + \Phi)$ .

1. determine amplitude  $|A|$  & period  $T = 2\pi/w$
2. determine starting pt. of one cycle:  $\Phi/w$
3. determine ending pt. of one cycle:  $\Phi/w + 2\pi/w$
4. divide interval  $[\Phi/w, \Phi/w + 2\pi/w]$  into 4 subintervals each with length period/4
5. use endpoints of the subintervals to find the 5 key pts.
6. fill in one cycle on graph
7. extend graph in both directions

Ex. 2 Find amplitude, period & phase shift of  $y = 2 \cos (4x + 3\pi)$  and graph

Ex. 3 #13 on pg. 446 Write an equation of Sine function  $y = A \sin(\omega x - \phi)$

Amplitude = 2

Period =  $\pi$

Phase shift =  $1/2$