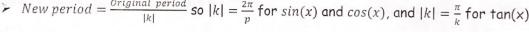
## Finding the Equation of a Trigonometric Function from its Graph



## Steps for determining the equation of a sinusoidal function from its graph

- 1. Find the maximum and minimum values
  - 2. Use the formula  $a=\frac{max-min}{2}$  and  $c=\frac{max+min}{2}$  to determine the amplitude and the vertical displacement (which is also the equation of the axis of the curve). On the graph, draw a dashed line to represent the equation of the axis.
  - 3. Highlight one complete cycle that is closest to the y-axis.
    - > To write your equation in terms of cosine: Use two consecutive maximum values of the function as the starting point and end point for your cycle
    - > To write your equation in terms of sine: Use two values on the axis of the curve of the function as a starting point and end point for your cycle
  - 4. Using your highlighted cycle, find the period of your function and use the period to find the k value
    - New period =  $\frac{Original\ period}{|k|}$  so  $|k| = \frac{2\pi}{\nu}$  for sin(x) and cos(x), and  $|k| = \frac{\pi}{k}$  for tan(x)



- 5. Find the phase shift of your function by determining the horizontal distance of the beginning of your highlighted cycle from the y-axis.
- 6. Incorporate all of the transformations into the equation  $y = a\sin[k(x-d)] + c$  or  $y = a\cos[k(x-d)] + c$

add 7. To convert from sine to cosine: phase shift by  $-\frac{\pi}{2k}$  in the (x-d) bracket (i.e. subtract a quarter of the period from x).

Subtract To convert from cosine to sine phase shift by  $+\frac{\pi}{2k}$  in the (x-d) bracket (i.e. and a quarter of the period to x).