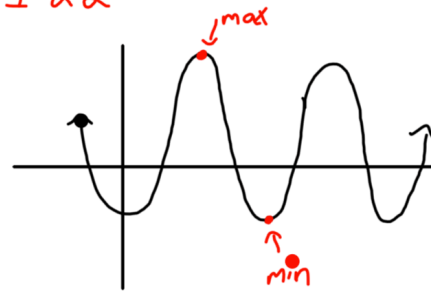**Section 1: How to Determine the Equation of a Sine or Cosine Function Given its Graph**

1) Find the max and min of the function

1 & 2

max

$a = \frac{max - min}{2}$

2) Find the amplitude of the function (a-value): $a = \frac{max - min}{2}$

min

3) Find the vertical shift (c-value): $c = max - amplitude$

3

vertical shift

(this finds the 'middle' of the function)
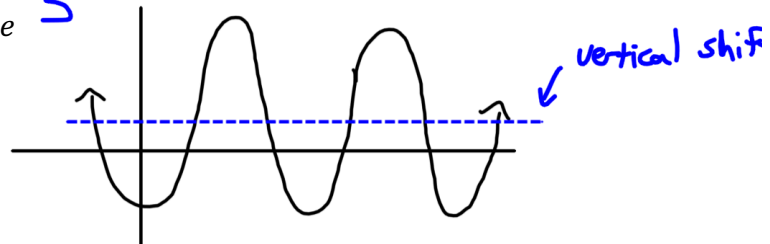
4) Find the period (in degrees) of the function using a starting point and ending point of a full cycle

4 & 5

1 cycle

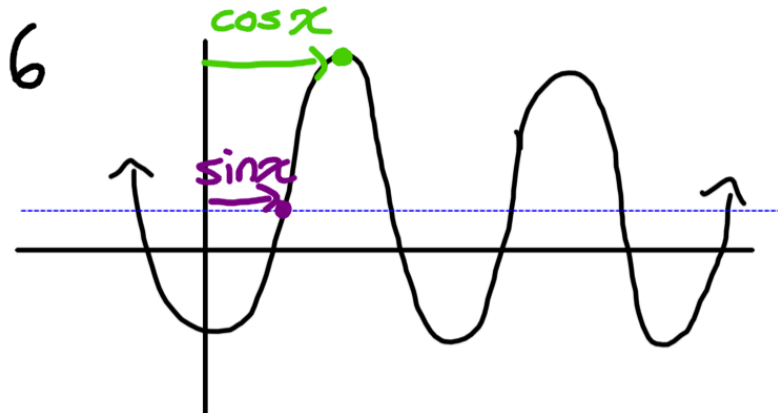**5)** Calculate the k-value. $k = \frac{360}{period}$ → $period = \frac{360}{|k|}$
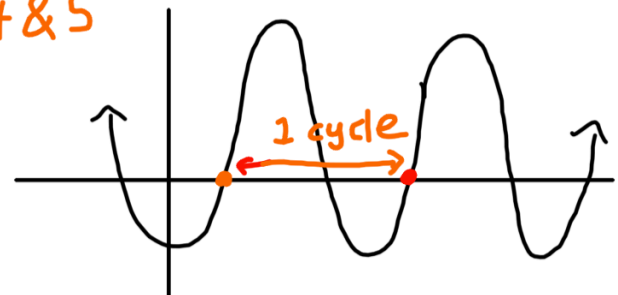
6) Determine the phase shift (d-value)

   - for $\sin x$: trace along the center line and find the distance between the y-axis and the bottom left of the closest rising midline.
   - for $\cos x$: the distance between the y-axis and the closest maximum point

6

cos x

sinx

Section 2: Determining the Equation of a Sinusoidal Function Given its Graph

Example 1: For each of the following graphs, determine the equation of a sine and cosine function that represents each graph:

a)

b)

c)
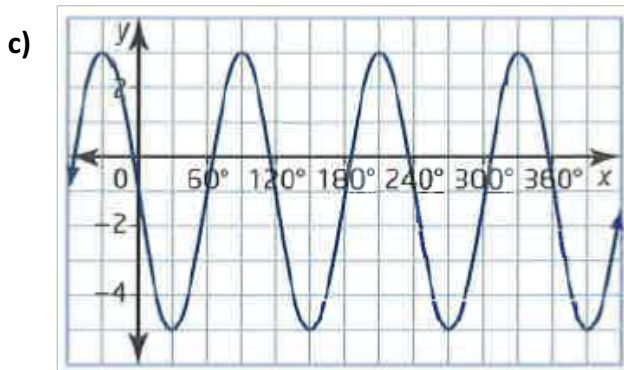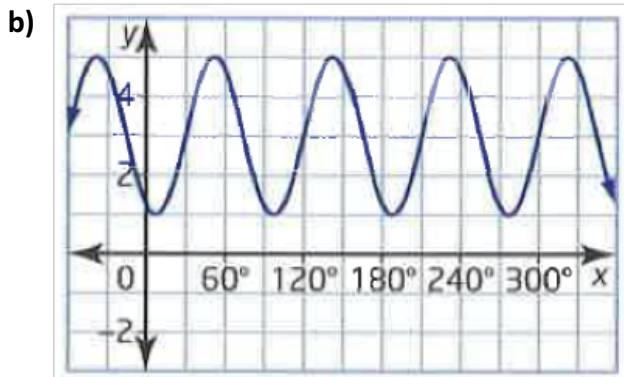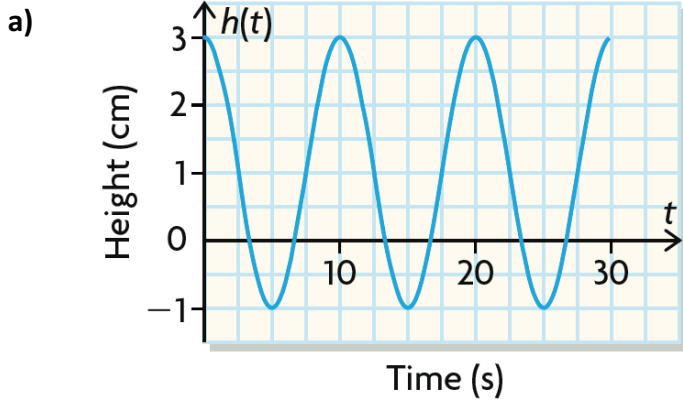
Example 2: A sinusoidal function has an amplitude of 3 units, a period of 180 degrees and a max point at (0, 5). Represent the function with an equation in two different ways.
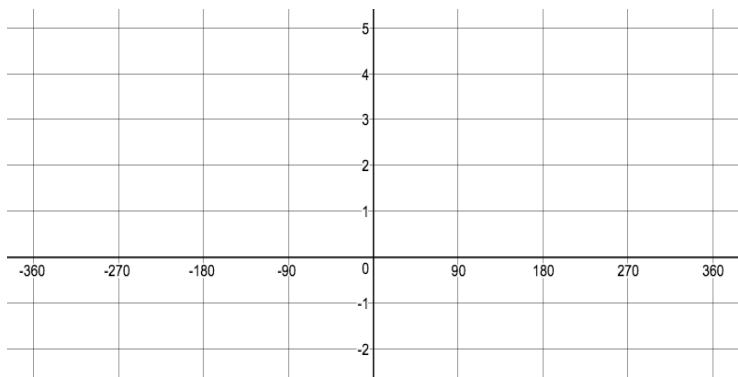
Example 3: A sinusoidal function has an amplitude of 5 units, a period of 120 degrees and a maximum at (0, 3). Represent the function with an equation in two different ways.