

5.5 - Writing Trigonometric Equations

Several different equations can represent the SAME GRAPH.

This is because these functions are periodic → a phase shift of a sine function could look like a cosine function or vice versa.

Ex 1: Write the equation for the sine function that has the following properties

amplitude of 5
 period of 240°
 phase shift of 45° to the right
 vertical shift up 3 units

$$k = ?$$

$$\text{period} = \frac{360}{k}$$

$$240 = \frac{360}{k}$$

$$k = \frac{360}{240}$$

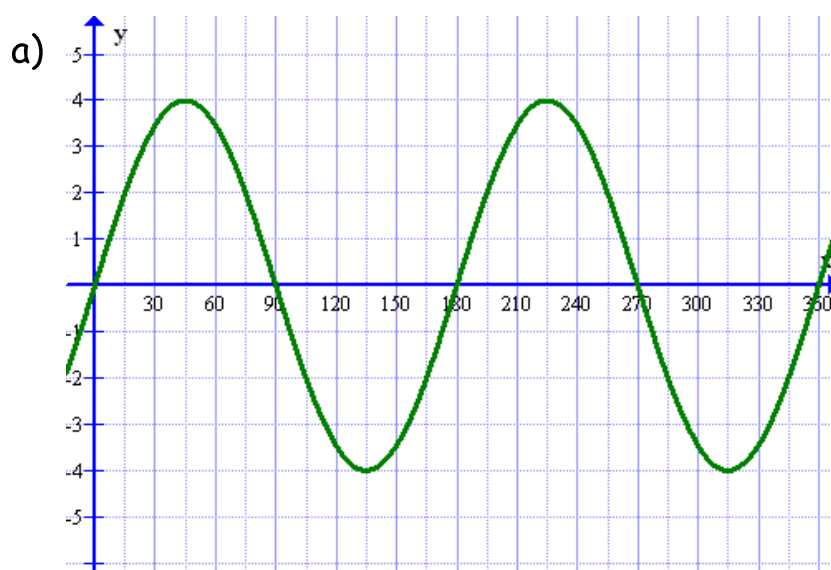
$$= \frac{3}{2}$$

$$y = a \sin[k(x-d)] + c$$

$$y = 5 \sin[k(x-45^\circ)] + 3$$

$$\therefore y = 5 \sin\left[\frac{3}{2}(x-45^\circ)\right] + 3$$

Ex 2: Write an equation for both sine and cosine function that has the following properties



amplitude: 4

period: 180°

need k: $\frac{360}{180} = 2$
 $k = 2$

phase shift:

for sin fn: 0°

for cos fn: 45° right

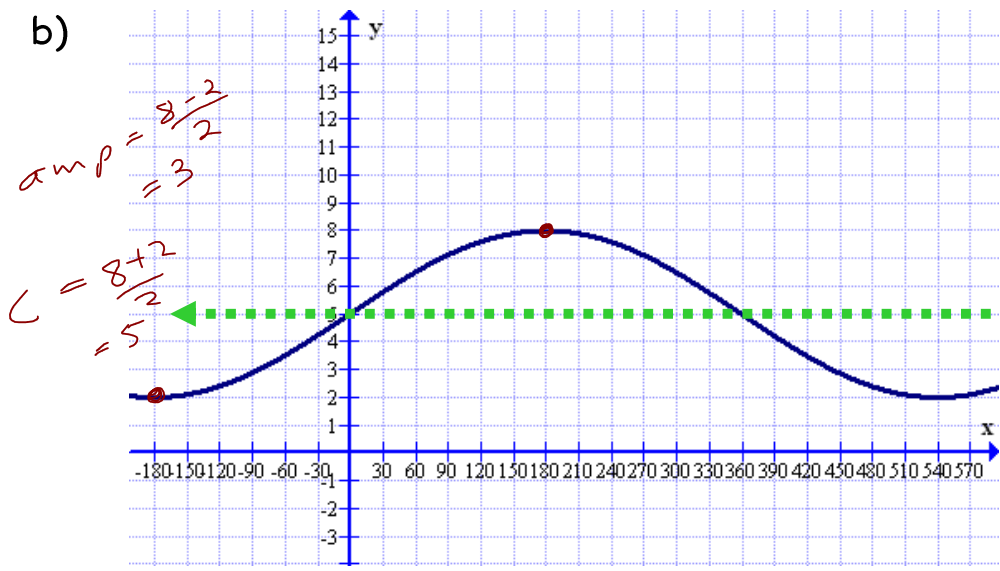
vertical shift none

Equation(sin fn):

$$y = 4\sin(2x)$$

Equation(cos fn):

$$y = 4\cos[2(x - 45^\circ)]$$



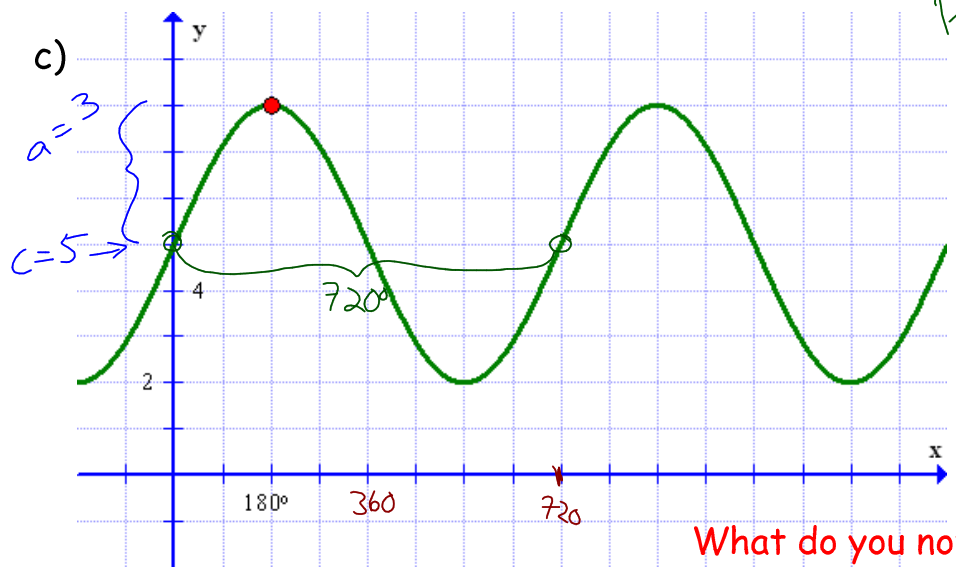
period = 720°
 $k: \frac{360}{720}$
 $\therefore k = \frac{1}{2}$

phase shift:
 for sin fn:
 none

for cos fn:
 180° right

Equation(sin fn):
 $y = 3\sin\left(\frac{1}{2}x\right) + 5$

Equation(cos fn):
 $y = 3\cos\left[\frac{1}{2}(x-180^\circ)\right] + 5$



Period = 720°
 $k: \frac{360}{720} \Rightarrow k = \frac{1}{2}$

phase shift:
 for sin fn:
 none

for cos fn:
 180° right

What do you notice? SAME AS b)

Equation(sin fn):
 $y = 3\sin\left(\frac{1}{2}x\right) + 5$

Equation(cos fn):
 $y = 3\cos\left[\frac{1}{2}(x-180^\circ)\right] + 5$

