

Date: _____

Today's Learning Goal(s):

By the end of the class, I will be able to:

- a) determine an equation of a sinusoidal function from a graph.

Last day's work: pp. 384-385 #5 – 9[13]

p. 384

6. If each function starts at $x = 0$ and finishes after three complete cycles, determine the period, amplitude, equation of the axis, domain, and range of each without graphing.

$$a) y = 3 \sin x + 2$$

$$k=1 \therefore \text{period} = 360$$

$$\therefore 3 \text{ cycles} = 1080^\circ$$

$$D: \{x \in \mathbb{R} \mid 0^\circ \leq x \leq 1080^\circ\}$$

$$R: \{y \in \mathbb{R} \mid -1 \leq y \leq 5\}$$

$$d) h(x) = \cos(4(x - 12^\circ)) - 9$$

$$k=4 \therefore \text{period} = 90$$

$$\therefore 3 \text{ cycles} = 270$$

$$D: \{x \in \mathbb{R} \mid 0^\circ \leq x \leq 270^\circ\}$$

$$R: \{y \in \mathbb{R} \mid -10 \leq y \leq -8\}$$

$$b) g(x) = -4 \cos(2x) + 7$$

$$k=2 \therefore \text{period} = 180$$

$$\therefore 3 \text{ cycles} = 540$$

$$D: \{x \in \mathbb{R} \mid 0^\circ \leq x \leq 540^\circ\}$$

$$R: \{y \in \mathbb{R} \mid 3 \leq y \leq 11\}$$

$$e) d = 10 \sin(180(t - 17^\circ)) - 30$$

$$k=180 \therefore \text{period} = 2$$

$$\therefore 3 \text{ cycles} = 6$$

$$D: \{x \in \mathbb{R} \mid 0^\circ \leq x \leq 6^\circ\}$$

$$R: \{y \in \mathbb{R} \mid -40 \leq y \leq -20\}$$

$$c) h = -\frac{1}{2} \sin t - 5$$

$$k=1 \therefore \text{period} = 360$$

$$\therefore 3 \text{ cycles} = 1080$$

$$D: \{x \in \mathbb{R} \mid 0^\circ \leq x \leq 1080^\circ\}$$

$$R: \{y \in \mathbb{R} \mid -\frac{11}{2} \leq y \leq -\frac{9}{2}\}$$

$$f) j(x) = 0.5 \sin(2(x - 5^\circ))$$

$$k=2 \therefore \text{period} = 180$$

$$\therefore 3 \text{ cycles} = 540$$

$$D: \{x \in \mathbb{R} \mid 0^\circ \leq x \leq 540^\circ\}$$

$$R: \{y \in \mathbb{R} \mid -0.5 \leq y \leq 0.5\}$$

6.6 Investigating Models of Sinusoidal Functions

The general form of the equation:

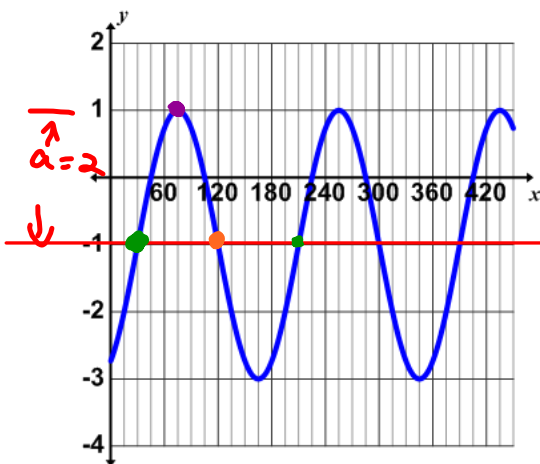
$$y = a \sin(k(x - d)) + c$$

Date: May 23/17

To write the equation, we need to:

- 1) determine the equation of axis \rightarrow "c"
 - 2) decide if the function is *sine* or *cosine*
 - 3) determine the amplitude \rightarrow "a"
 - 4) determine the period
 - 5) determine the value of "k"
 - 6) determine the starting point \rightarrow "d"
- } \rightarrow "k"

Ex. 1 Find **an** equation for the function shown below.



$$y = 2\sin(2(x - 30^\circ)) - 1$$

$$y = 2\cos(2(x - 75^\circ)) - 1$$

$$y = -2\sin(2(x - 120^\circ)) - 1$$

$$y = -1$$

$$\therefore c = -1$$

$$d = 30 \quad \therefore a = 2 \quad k = \frac{360}{\text{period}}$$

$$= \frac{360}{(210 - 30)}$$

$$= \frac{360}{180}$$

$$= 2$$

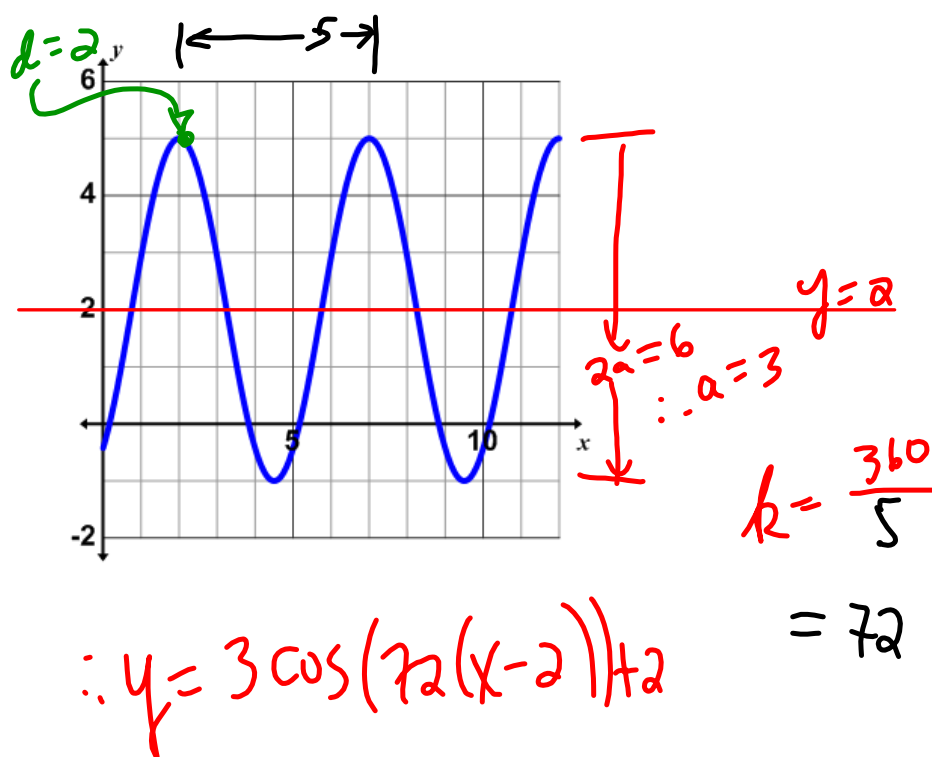
$$y = 2\sin(2(x - 30^\circ)) - 1$$

Ex. 2 Find an equation for the function shown below.

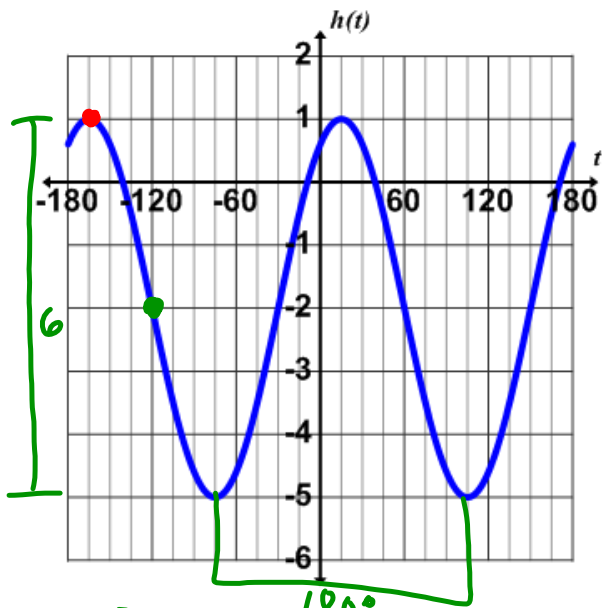
👉 *Why is choosing cosine a better choice?*

$$y = 3\cos(72(x - 2)) + 2$$

$$y = 3\cos(72(x - 7)) + 2$$



Ex. 3 Find a sine equation **AND** a cosine equation for the function shown below.



$$y = 3\sin(2(x + 30^\circ)) - 2$$

$$y = 3\cos(2(x - 15^\circ)) - 2$$

$$y = -3\sin(2(x - 60^\circ)) - 2$$

$$y = 3\cos(2(x + 165^\circ)) - 2$$

$$y = 3\sin(2(x - 150^\circ)) - 2$$

$$y = -3\cos(2(x - 105^\circ)) - 2$$

$$y = -3\sin(2(x + 120^\circ)) - 2$$

$$y = -3\cos(2(x + 75^\circ)) - 2$$



cosine

$$\therefore d = -165^\circ$$

$$\therefore y = 3\cos(2(x + 165^\circ)) - 2$$

$$a = 3 \quad k = \frac{360}{180} = 2 \quad d = -120^\circ \quad c = -2$$

$$\therefore y = -3\sin(2(x + 120^\circ)) - 2$$

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 384-385 #5 – 9[13]

Quiz Tomorrow

Today's Homework Practice includes:

pp. 391-393 #1 – 6, 9, 12 [13,14]