Unit 5 Day 10

Writing Equations given Graphs of Trig Functions

Practice Graphs of Trig Functions

Warm-up Day 10 Notes p. 27 - 28

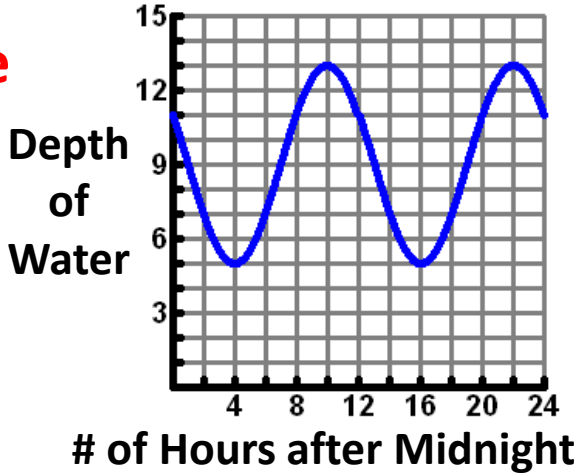
1. Find the amplitude, period and midline. Then, graph each Trig Function with 1 cycle in the negative direction and 1 cycle in the positive direction.

   a. $y = -4 \sin(3x)$

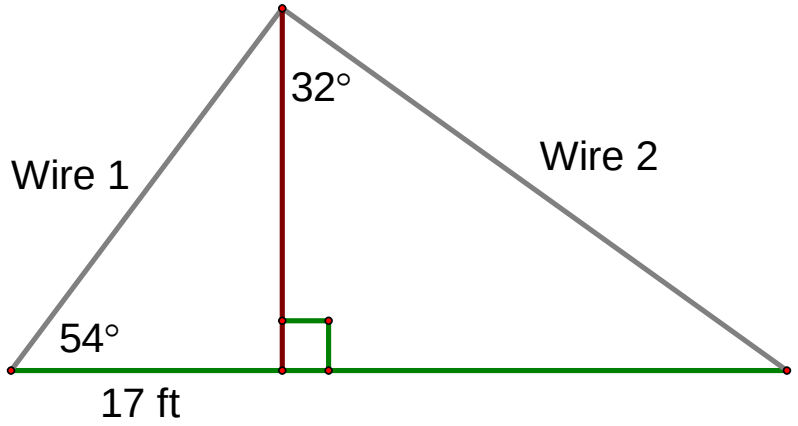
   b. $y = \cos(2x) + 1$

2. The graph shown displays the level of water at a boat dock, which varies due to the tides. Determine the amplitude, midline, and period of the graph.

HINT: Use the formulas in yesterday's notes! ☺



4. In the figure shown, a pole has two wires attached to it, one on each side, forming two right triangles. How far from the base of the pole does Wire 2 attach to the ground?



Warm-up Answers

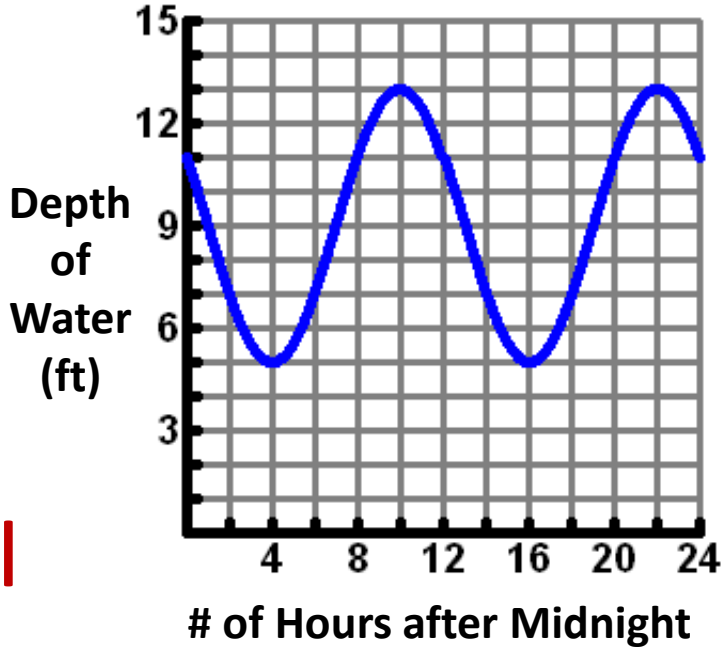
1. Find the amplitude, period and midline. Then, graph each Trig Function with 1 cycle in the negative direction and 1 cycle in the positive direction.

   a. $y = -4 \sin(3x)$ **Amp = 4 (NOT -4), period = 120°, midline: y = 0**

   b. $y = \cos(2x) + 1$ **Amp = 1, period = 180°, midline: y = 1**

Warm-up Answers

3. The graph shown displays the level of water at a boat dock, which varies due to the tides. Determine the amplitude, midline, and period of the graph.



Amplitude = 4 feet

$$= \left|\frac{\text{max} - \text{min}}{2}\right| = \left|\frac{13 - 5}{2}\right|$$

midline: y = 9

$$y = \frac{\text{max} + \text{min}}{2} = \frac{13 + 5}{2}$$ OR $y = \text{min} + \text{amp}$

$y = 5 + 4$

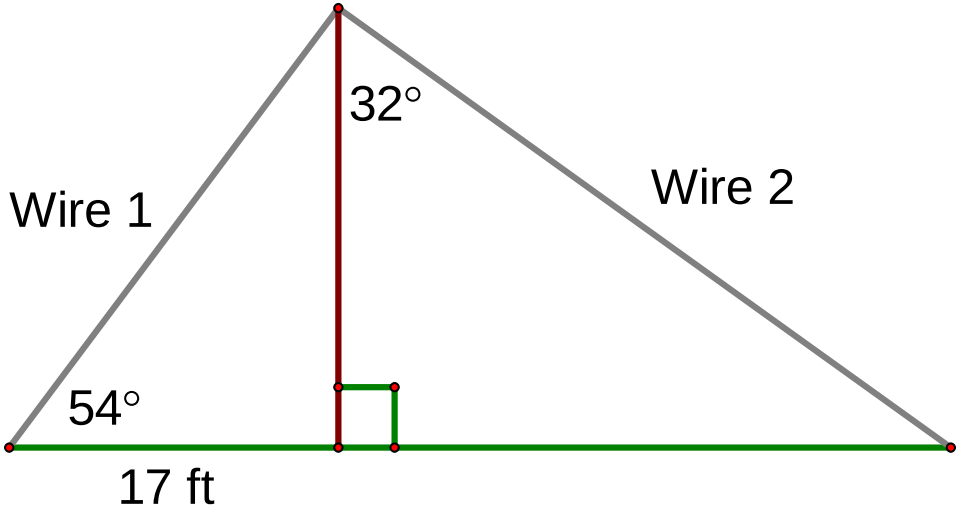
period = 12 hours

(do end x-value – start x-value of 1 cycle)

Warm-up Answers

Problems like Released Exam Items!

4. In the figure shown, a pole has two wires attached to it, one on each side, forming two right triangles. How far from the base of the pole does Wire 2 attach to the ground?



tan(54) = x/17
where x = pole height
Cross multiply to find x = 23.398 ft

tan(32) = y/23.398
where y = how far base of pole attaches from ground
Cross multiply to find y = 14.6 ft

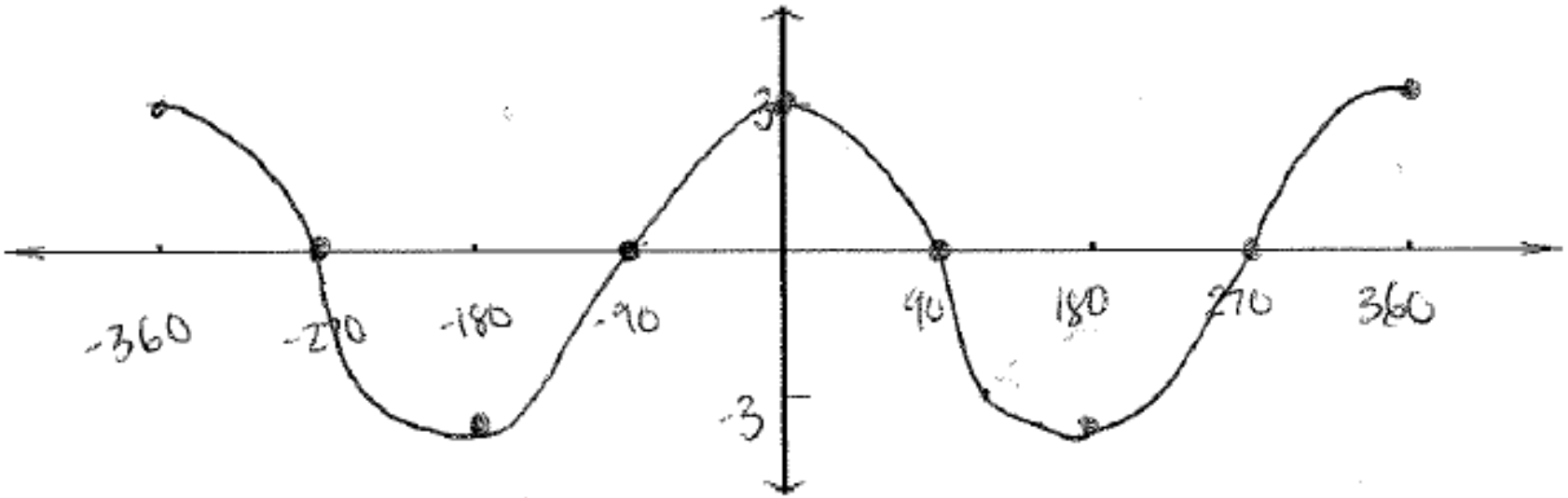
Homework Answers

Packet p. 21 Part I:

1. A
2. B
3. C
4. E
5. F
6. D

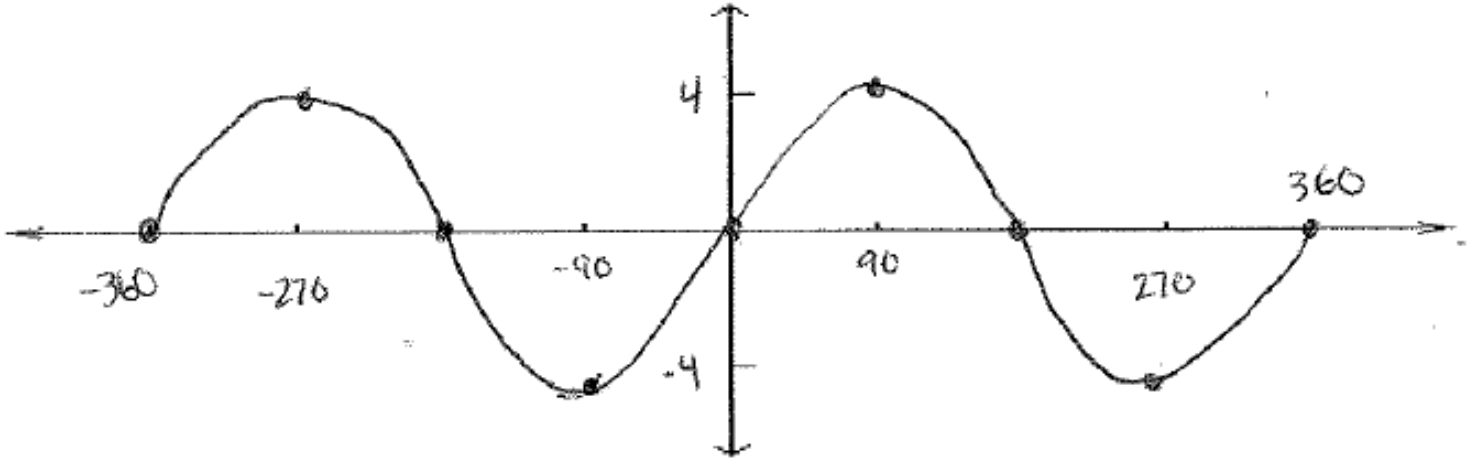
Packet p. 22

1. $y = 3\cos(x)$ period: 360° Amplitude: 3 Midline: $y = 0$

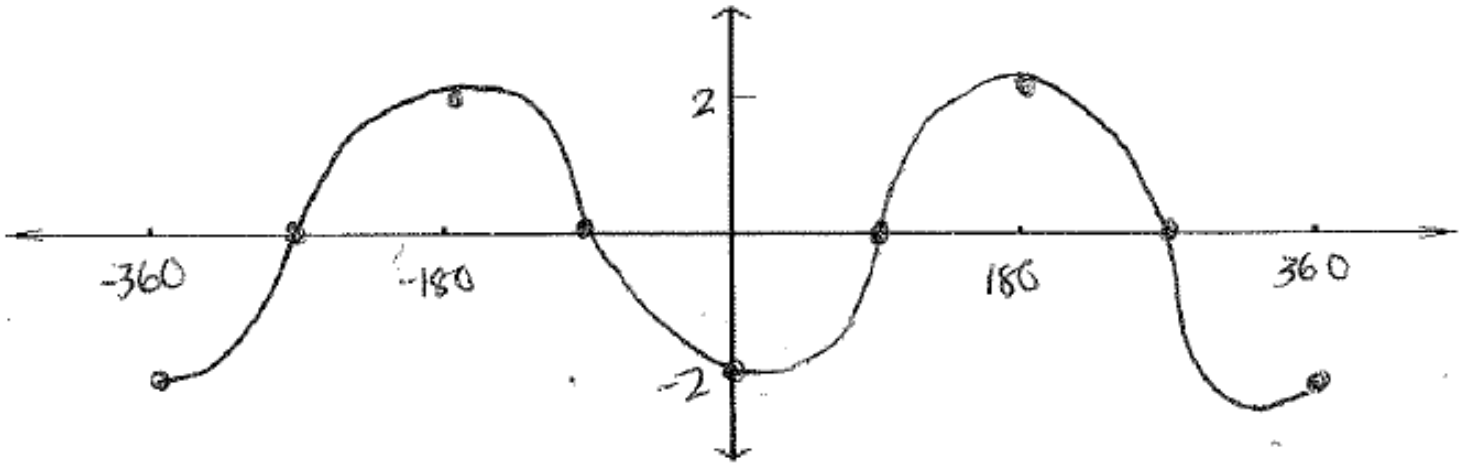


Homework Answers

2. $y = 4\sin(x)$ period 360° Amplitude: 4 Midline: $y = 0$



3. $y = -2\cos(x)$ period 360° Amplitude: 2 Midline: $y = 0$



Tonight's Homework

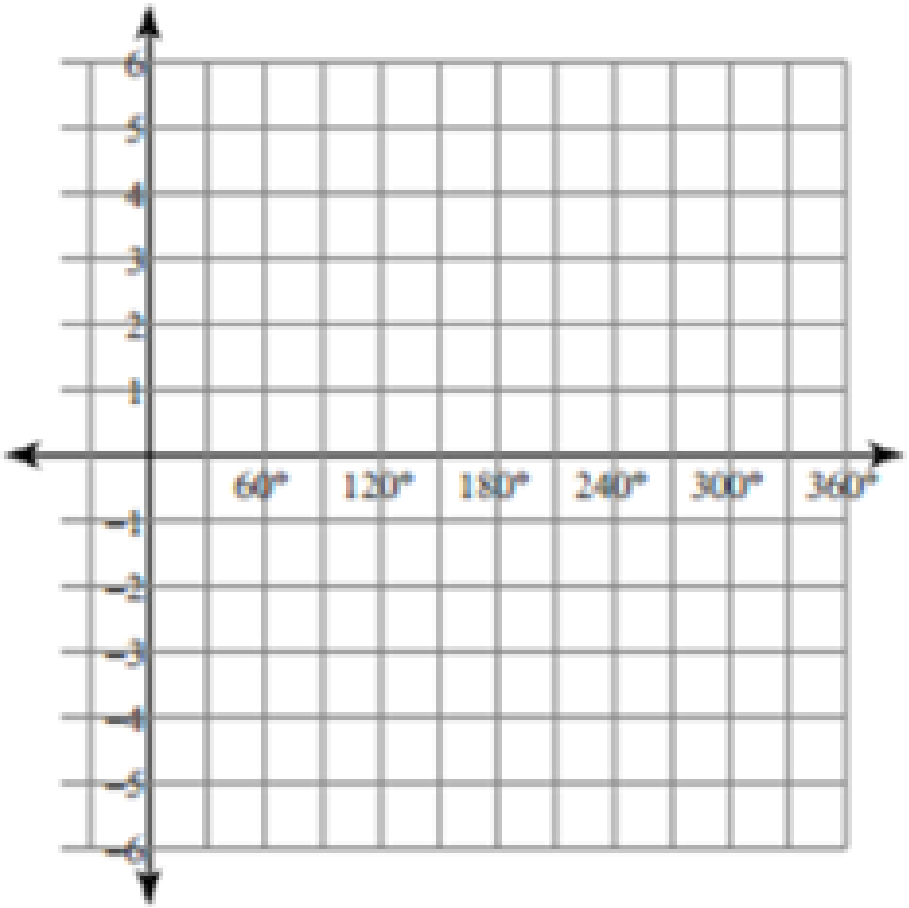
- Packet p. 21 Part II
- Packet p. 23, 24

**WARNING HW Pages are NOT in order for this half of the unit! Go by the assignments on the outline!

Let's talk about HW p. 21

For ones like Part II #1:

1) $y = \sin 3\underline{\theta}$ <- Enter into calc as y = sin(3**x**)



Remember Θ is just a variable like x! ☺

Day 10 Notes Part 1:
Interpreting Graphs of Trig Functions

Interpreting Graphs of Trig Functions

I. Amplitude and Midline

a. The **amplitude** can be found by using the following formula:

$$\text{amp} = |a| = \left|\frac{\text{max} - \text{min}}{2}\right|$$

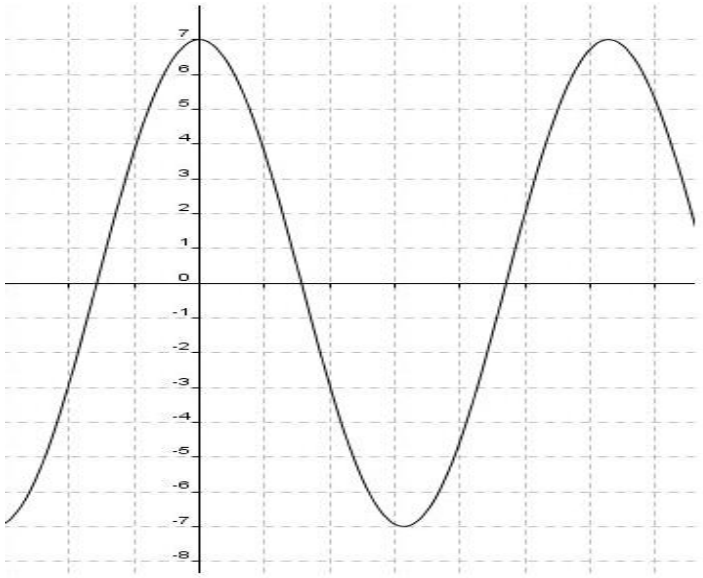
b. The **midline** can be found using the following formula:

$$\text{Midline is } y = \frac{(\text{Max} + \text{Min})}{2} \quad \text{OR} \quad y = \text{Min} + \text{Amp}$$

Together

c. Find the amplitude and midline for each of the following graphs:

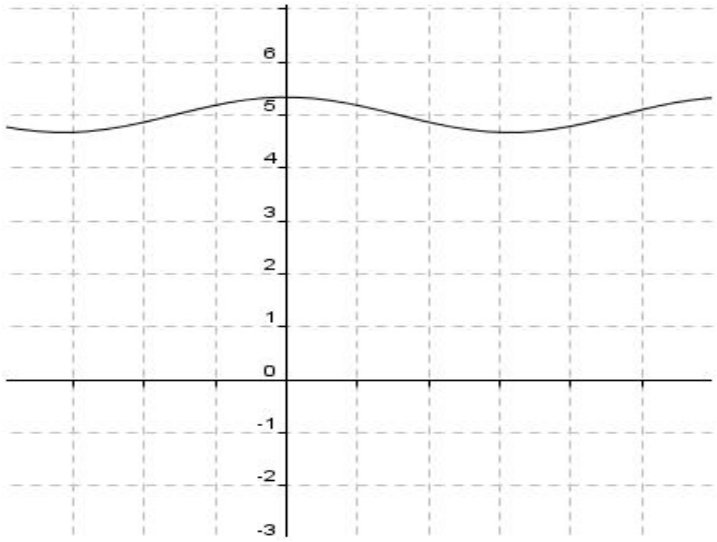
1.



Midline: y = 0

Amplitude: 7

2.

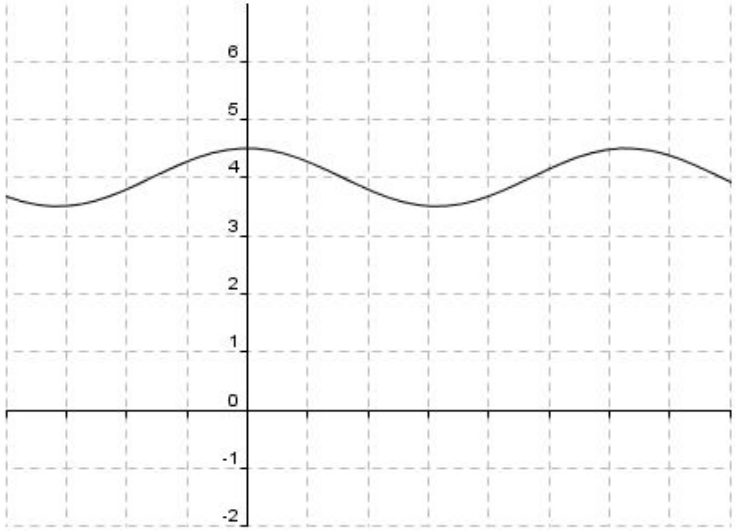


Midline: y = 5

Amplitude: ¼

You Try!

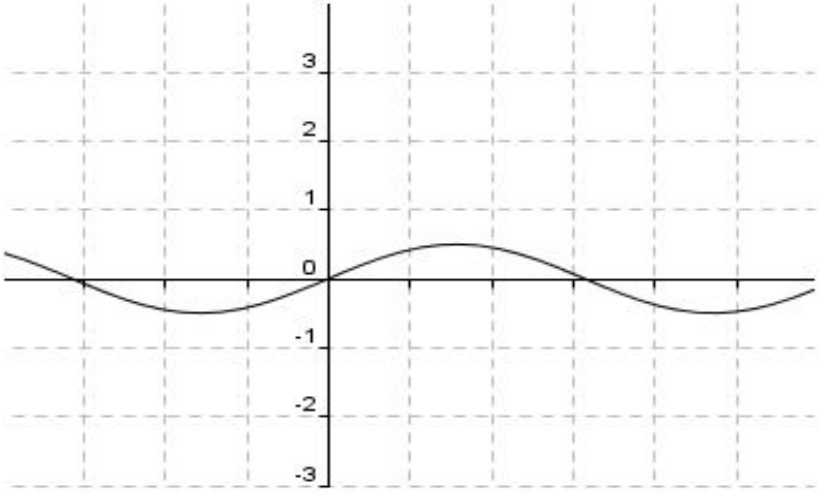
3.



Midline: y = 4

Amplitude: ½

4.

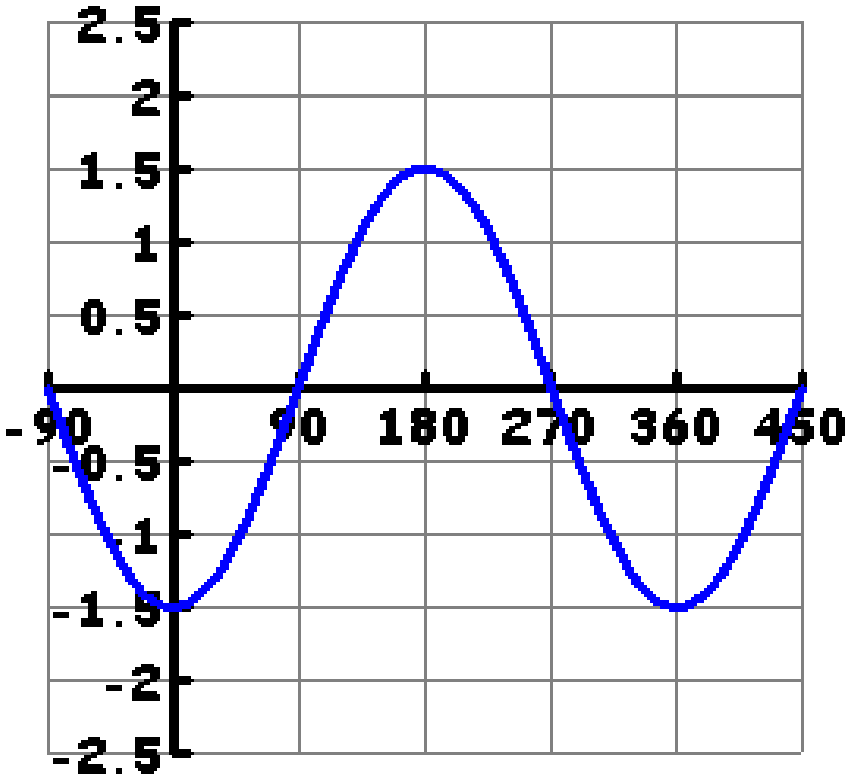


Midline: y = 0

Amplitude: ½

Practice

1. Identify the amplitude, period, and midline of the following trig function. Hint: it may help to trace out one cycle.



State the amplitude, period, and midline of each of the following:

2. $y = (1/2)\sin(x)$

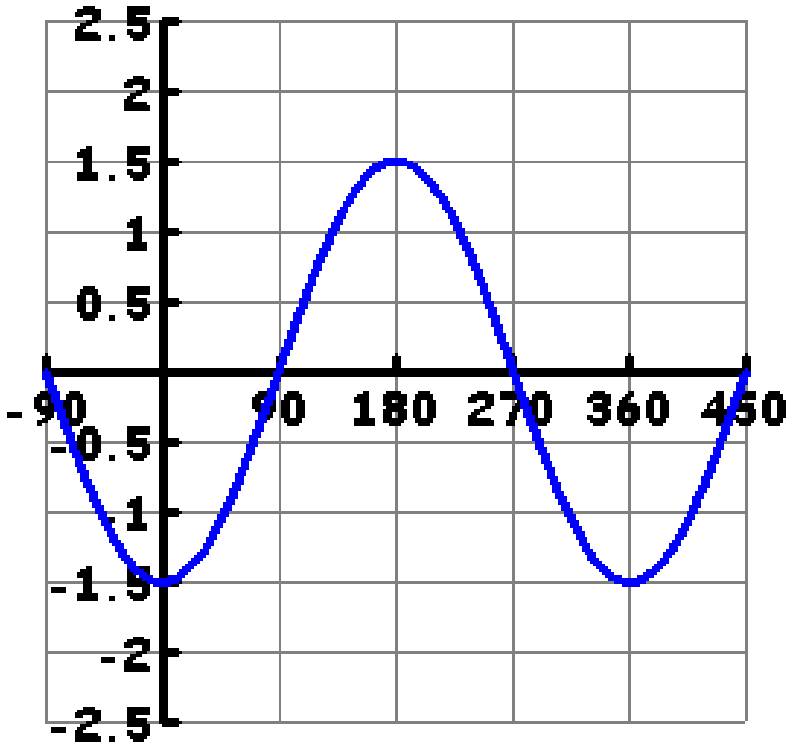
3. $y = -5\cos(3x)$

4. $y = \sin(x + 5) - 6$

5. $y = 2\cos(x) + 3$

Practice Answers

1. Identify the amplitude, period, and midline of the following trig function. Hint: it may help to trace out one cycle.



Amp = 1.5, per = 360°, midline: y = 0

State the amplitude, period, and midline of each of the following:

2. y = (1/2)sin (x)
   Amp = 1/2, per = 360°, midline: y = 0
3. y = -5cos (3x)
   Amp = 5, per = 120°, midline: y = 0
4. y = sin(x +5) - 6
   Amp = 1, per = 360°, midline: y = -6
5. y = 2cos (x) + 3
   Amp = 2, per = 360°, midline: y = 3

Day 10 Notes Part 2:
Writing Equations of Trig Functions

Notes: Writing an equation given a trig graph

To write an equation of a trigonometric function when given a graph, first determine **amplitude**, **period**, and **midline** of the graph.

**HINT: tracing one cycle of the graph can help determine these values AND decide if sine or cosine is better.

Then use those values and the formulas to calculate a, b, and d of the standard equation $y = a \sin(bx) + d$ or $y = a \cos(bx) + d$.

The standard equations are

$y = a \sin(bx) + d$ **and** **$y = a \cos(bx) + d$**

Formulas we must know

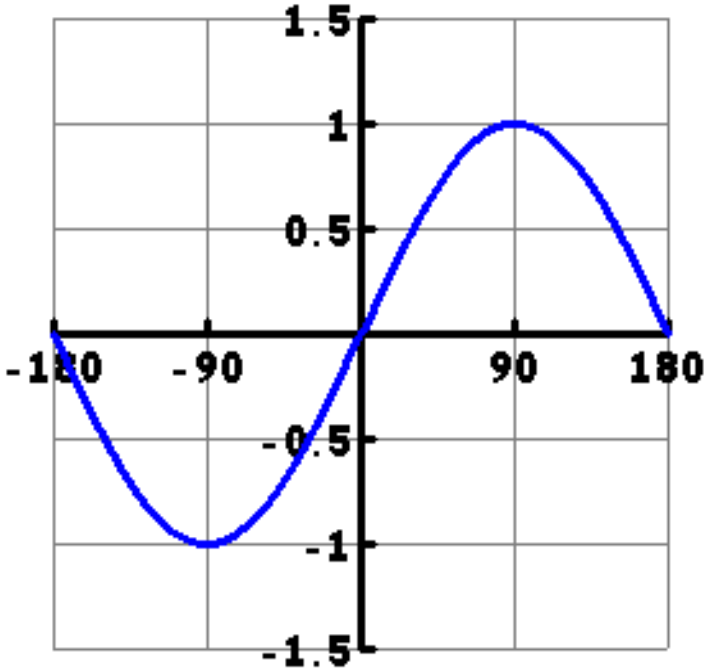
Amplitude = $|a| = \left|\frac{\text{max} - \text{min}}{2}\right|$

Period = $\frac{360°}{|b|} = \text{end} - \text{start}$

Midline is $y = \frac{(\text{Max} + \text{Min})}{2} = d$ OR $y = \text{Min} + \text{Amp} = d$

Write the equation for the following trigonometric functions.

1) A radio transmitter sends a radio wave from the top of a 50-foot tower. The wave is represented by the accompanying graph.



Starting at the y-axis, we have Hill then Valley → we should use sine

Amp: |max-min|/2 = |1 - -1|/2 = 2/2

a = 1

Period → 1st) draw the rest of 1 cycle

then end – start = 360 - 0 = 360

per = 360/b

360 = 360/b → b = 1

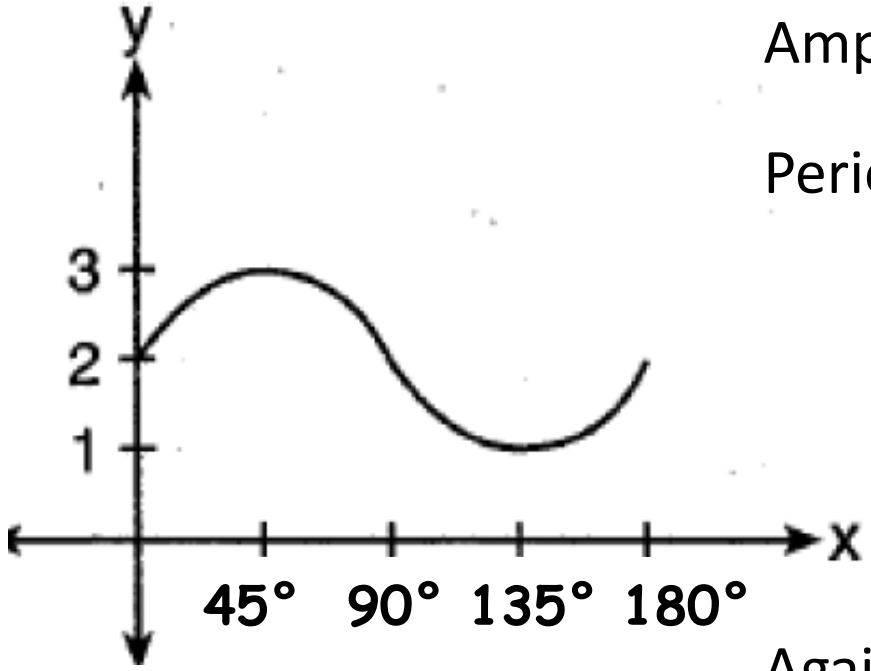
Midline: y = 0 → d = 0

Again, it's Hill then valley → do sine

y = sin(x)

Write the equation for the following trigonometric functions.

2) The accompanying graph represents a portion of a sound wave.



Starting at y-axis, we have Hill then Valley → do sine

Amp: |max-min|/2= |3-1|/2= 1 = a

Period → trace out 1 cycle

180 - 0 = 180

per = 360/b

180 = 360/b → b = 2

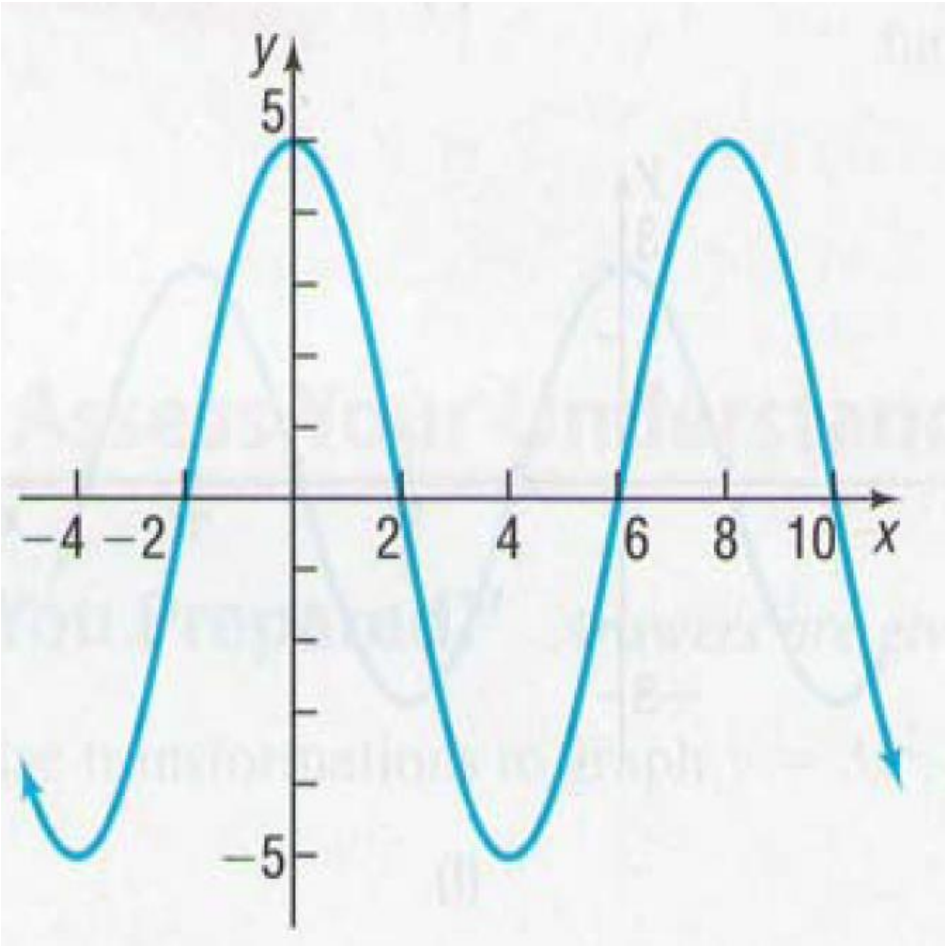
Midline: y = 2, d = 2

Again, it's Hill then valley → do sine

y = sin(2˚x) + 2

Write the equation for the following trigonometric functions.

3)



Starting at y-axis, we have one big Valley→ do cosine

Amp: |5-(-5)|/2 = 5 → a = 5

Period → trace out 1 cycle

8-0 = 8

per = 360/b

8 = 360/b → b = 45

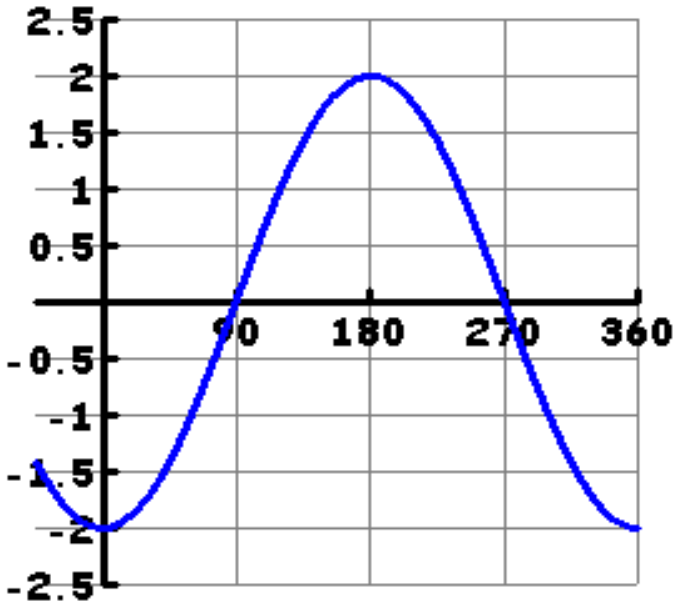
Midline: y = 0, d = 0

Again, One big Valley → do cosine

y = 5cos(45˚x)

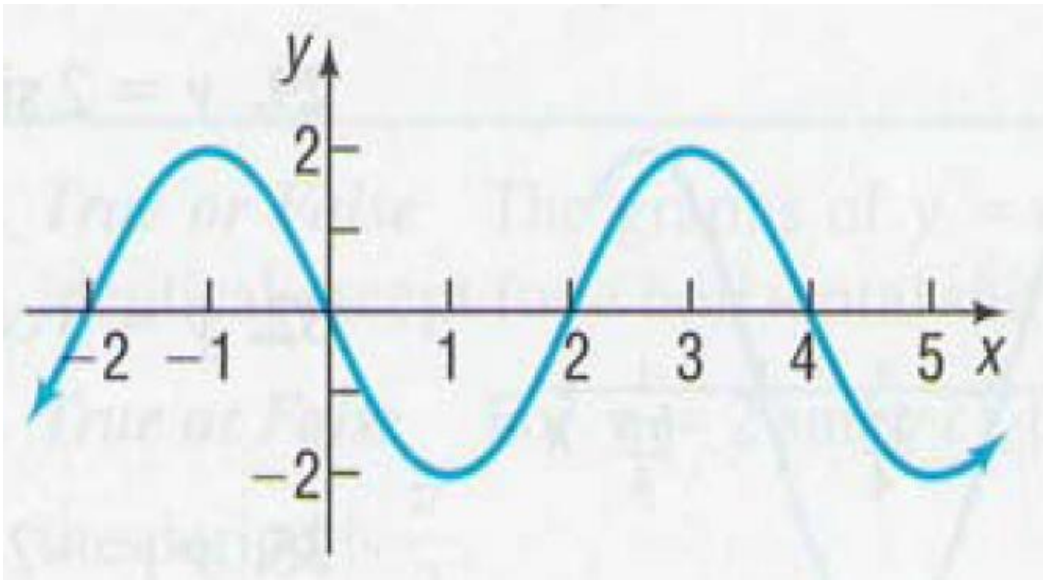
You Try! **Write the equation for the following trigonometric functions.**

4)



$y = -2\cos(x)$

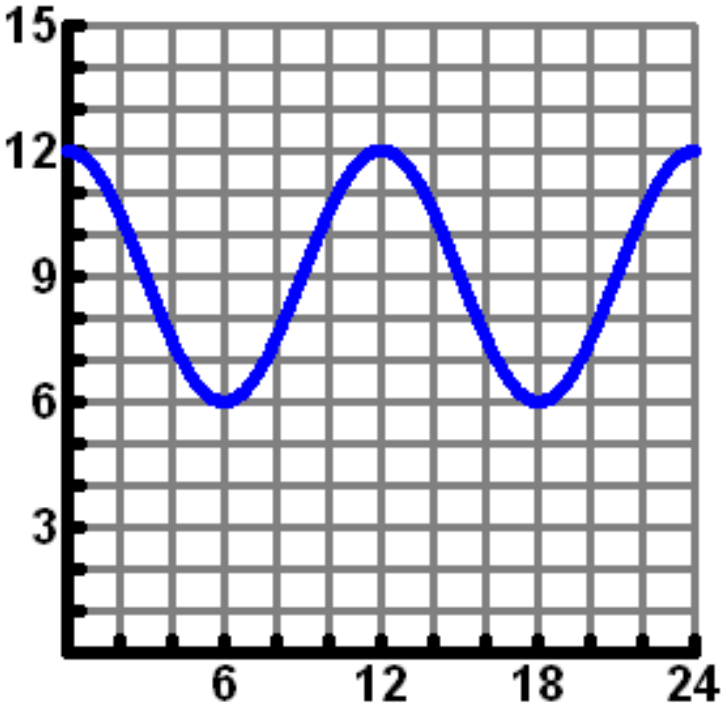
5)



$y = -2\sin(90^\circ x)$

You Try! Write the equation for the following trigonometric functions.

6)



The figure at the left shows that the depth of water at a boat dock varies with the tides. The depth is 6 feet at low tide and 12 feet at high tide. On a certain day, low tide occurs at 6 AM and high tide occurs at 12 Noon.

$$y = 3\cos(30^\circ x) + 9$$

Graphing Practice

Next page in the Notes # 1-4

(Questions on next slide)

Graphing Practice

Graph the following functions over two periods, one in the positive direction and one in the negative directions. Label the axes appropriately.

1. $y = -2 \sin(3x)$ Amp: ____ Midline: ____ Per: ____

2. $y = \cos(2x) - 1$ Amp: ____ Midline: ____ Per: ____

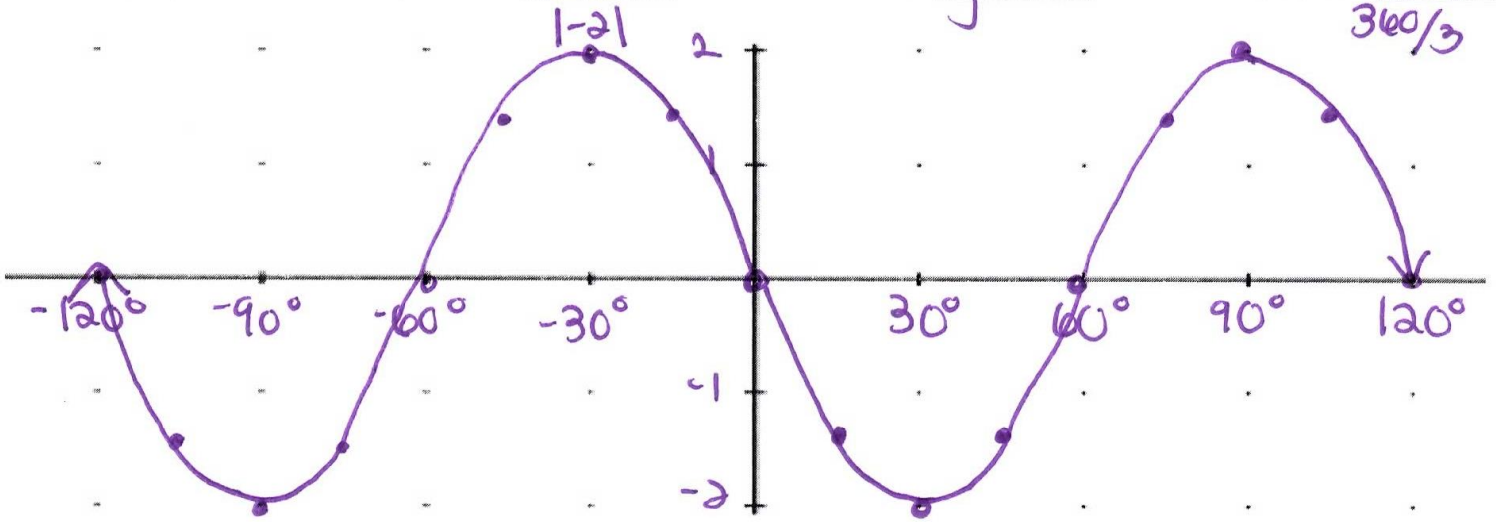
3. $y = 3 \sin(1/2x)$ Amp: ____ Midline: ____ Per: ____

4. $y = -2 \cos(4x) + 1$ Amp: ____ Midline: ____ Per: ____

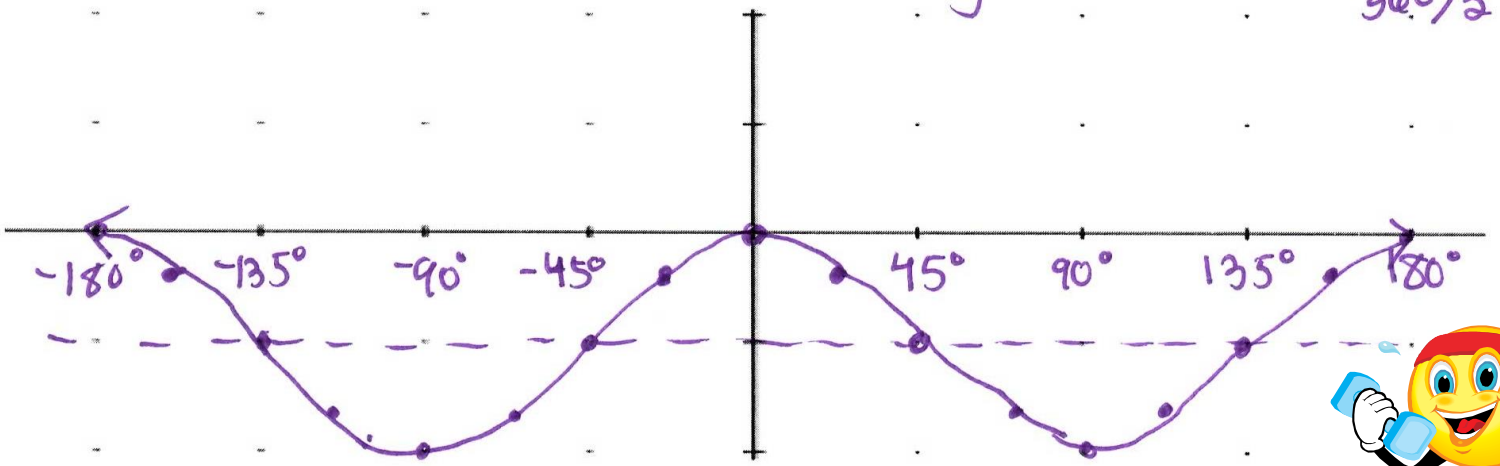
Graphing Practice Answers

Graphing Practice: Graph the following functions over two periods, one in the positive direction and one in the negative directions. Label the axes appropriately.

1. $y = -2 \sin(3x)$ Amplitude: 2 (|-2|) Midline: $y = 0$ Period: 120° (360/3)



2. $y = \cos(2x) - 1$ Amplitude: 1 Midline: $y = -1$ Period: 180° (360/2)

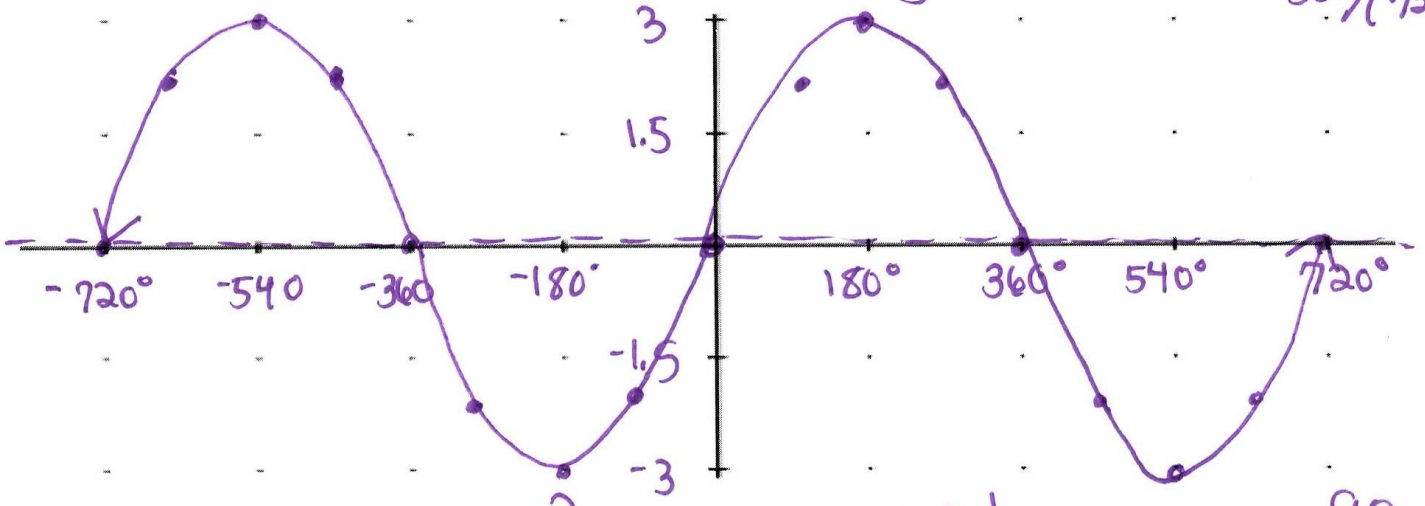


Graphing Practice Answers

Graphing Practice: Graph the following functions over two periods, one in the positive direction and one in the negative directions. Label the axes appropriately.

3. $y = 3 \sin (1/2x)$ Amplitude: 3 Midline: $y = 0$ Period: 720°

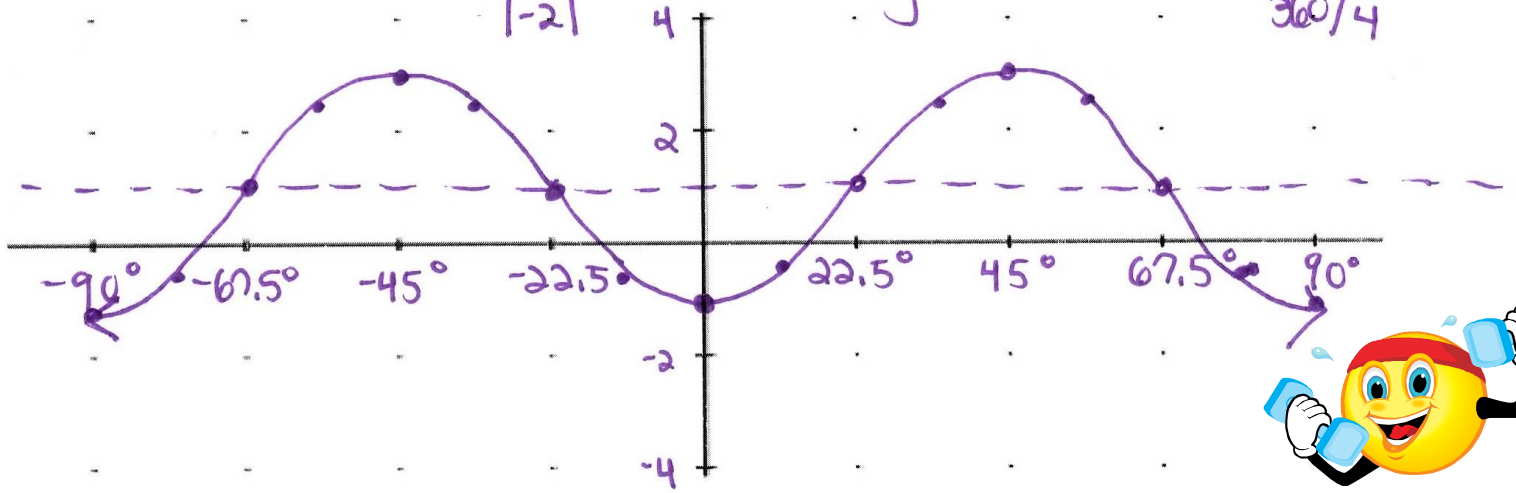
360/(1/2)



4. $y = -2 \cos (4x) + 1$ Amplitude: 2 Midline: $y = 1$ Period: 90

|-2|

360/4



Kahoot for Practice

- https://play.kahoot.it/#/k/39a98280-e035-4016-a337-32a5abe29af7

Practice

EXTRA – not in notes

An architect commissions a contractor to produce a triangular window. The architect describes the window as triangle ABC where m<A = 50, BC = 10 inches, and AB = 12 inches.

Find the missing measures of the window.
Round sides to the tenths place and angles to the nearest degree.

m<C = 67, m<B = 63, b = 11.6

OR

m<C = 113, m<B = 17, b = 3.8