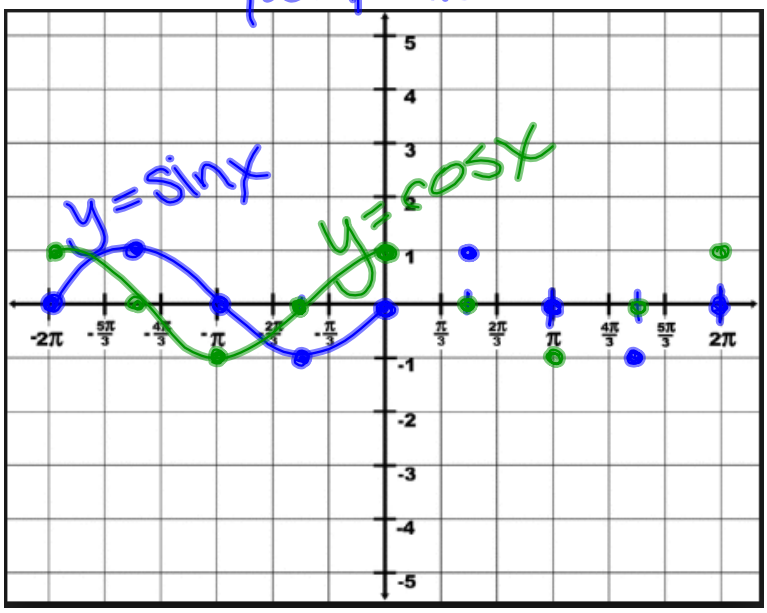
**Warm Up:** Sketch y=sinx and y=cosx on one graph over the interval $[-2\pi, 0]$.



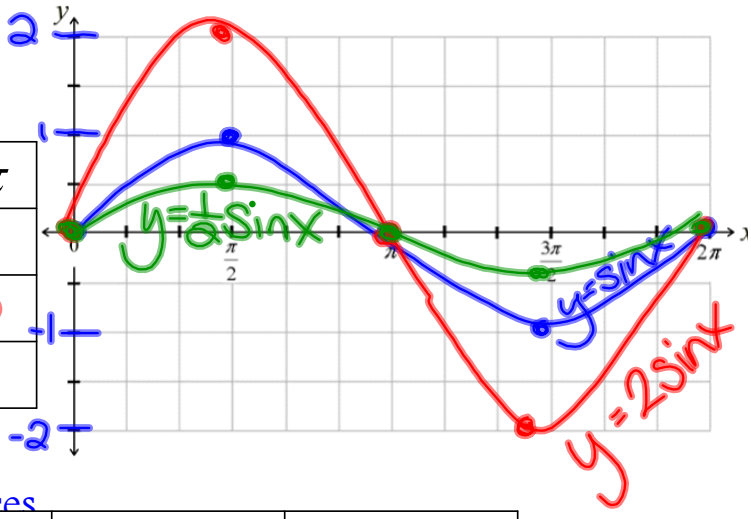
# Drawing Graphs & Writing Equations

a·y

**a·f(x)**

dilation on y-axis

| x | 0 | $\frac{\pi}{2}$ | $\pi$ | $\frac{3\pi}{2}$ | $2\pi$ |
|---|---|---|---|---|---|
| sinx | 0 | 1 | 0 | -1 | 0 |
| 2sinx | 0 | 2 | 0 | -2 | 0 |
| ½sinx | 0 | ½ | 0 | -½ | 0 |




So let's summarize the differences

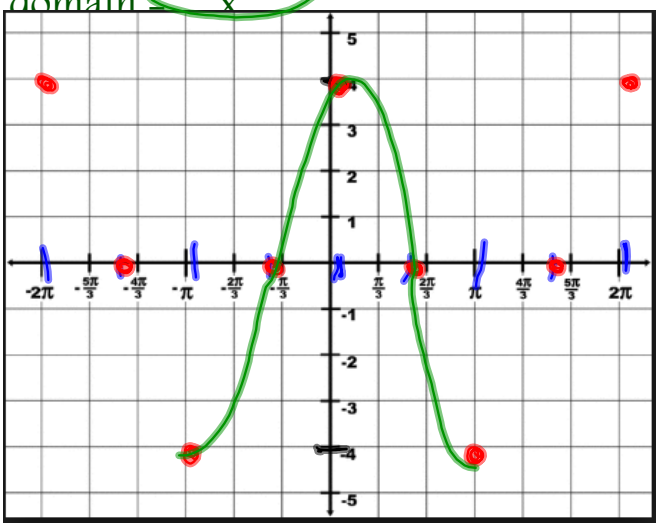
| | y=sinx | y=2sinx | y=½sinx |
|---|---|---|---|
| Max | 1 | 2 | ½ |
| Min | -1 | -2 | -½ |

amplitude- ½ distance between the max & min (always positive)

*distance from middle to max*

Examples:

1) Graph the equation y=4cosx in the domain $-\pi \le x \le \pi$ interval



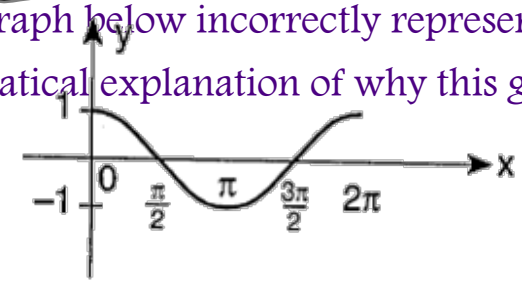

y = 4cosx

start @ max

amplitude = 4

max = 4
min = -4

2. The graph below incorrectly represents the equations y = 2cosx. Write a mathematical explanation of why this graph is incorrect.




y = 1cosx

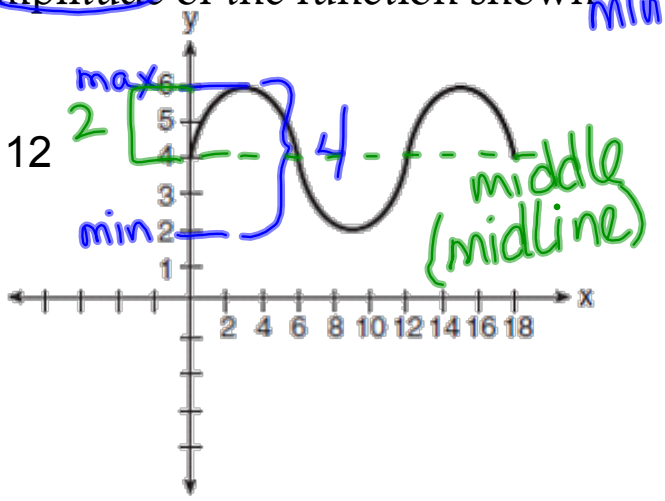
↑ Indicates amplitude = 2, but amplitude = 1

# Warm Up:

What is the amplitude of the function shown in the accompanying graph?

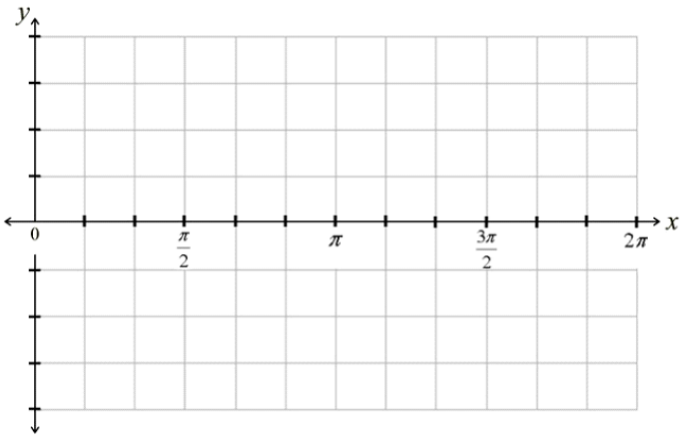
a) 1.5 b) 2 c) 6 d) 12

½ dist between max + min



# f(a·x)

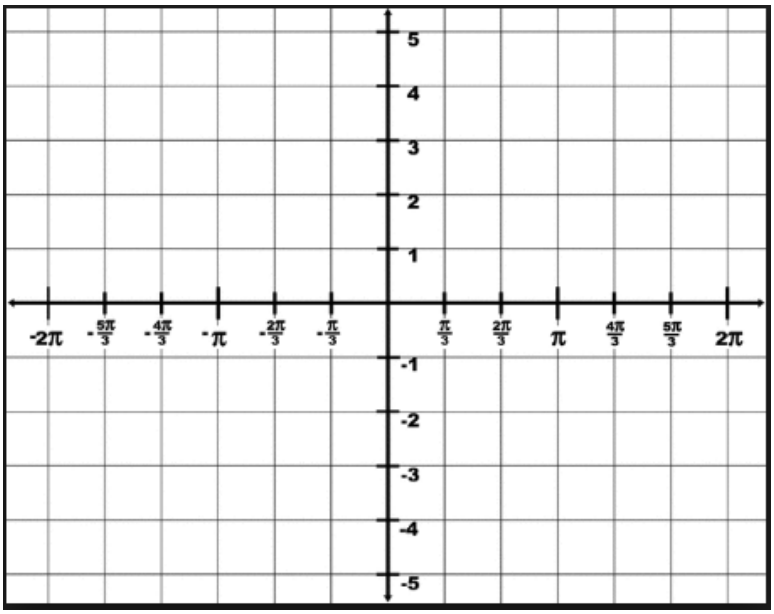
| | ZERO | MAXIMUM | ZERO | MINIMUM | ZERO |
|---|---|---|---|---|---|
| y=sin*x* | | | | | |
| y=sin2*x* | | | | | |
| y=sin½*x* | | | | | |




| | y=sin*x* | y=sin2*x* | y=sin½*x* |
|---|---|---|---|
| PERIOD | | | |
| FREQUENCY | | | |

frequency-

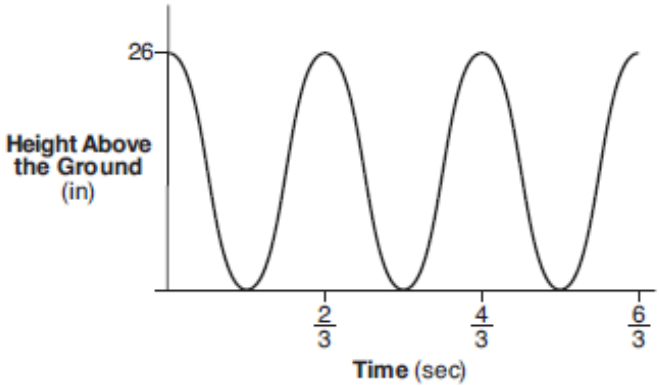
Sketch the graph of y=3sin2x in the interval $-\pi \leq x \leq \pi$.



The voltage used by most households can be modeled by a sine function. The maximum voltage is 120 volts, and there are 60 cycles *every second*. Which equation best represents the value of the voltage as it flows through the electric wires, where $t$ is time in seconds?

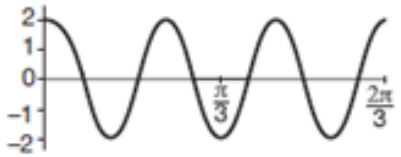
1) $V = 120\sin(t)$
2) $V = 120\sin(60t)$
3) $V = 120\sin(60\pi t)$
4) $V = 120\sin(120\pi t)$

The graph below represents the height above the ground, $h$, in inches, of a point on a triathlete's bike wheel during a training ride in terms of time, $t$, in seconds.



Identify the period of the graph and describe what the period represents in this context.

Which graph represents a cosine function with no horizontal shift, an amplitude of 2, and a period of $\frac{2\pi}{3}$?

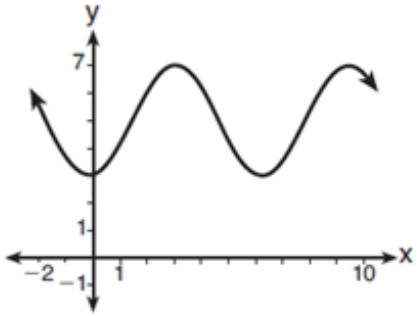
1) 


2)

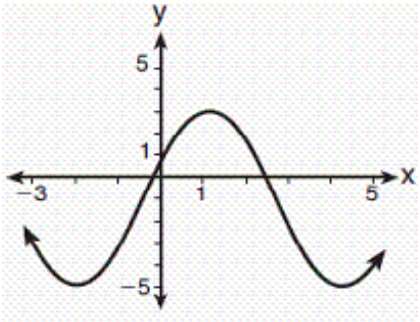

3)


4)


Which sinusoid has the greatest amplitude?

1) 


2) $y = 3\sin(\theta - 3) + 5$

3) 


4) $y = -5\sin(\theta - 1) - 3$

SUMMARY:

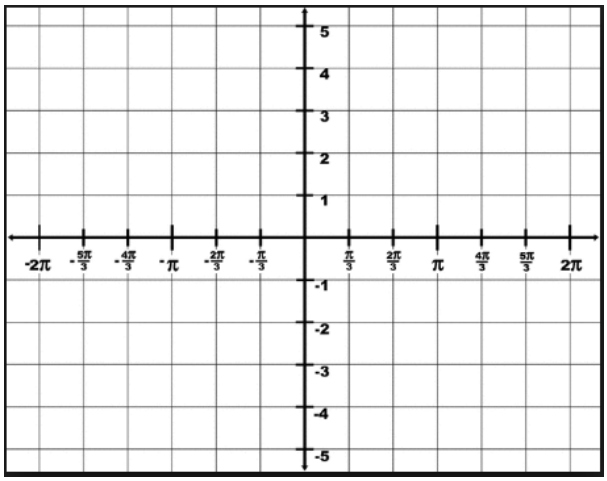
- *Amplitude* = $|a|$
- *Frequency* = $|b|$
- *Period* = $\frac{2\pi}{|b|}$

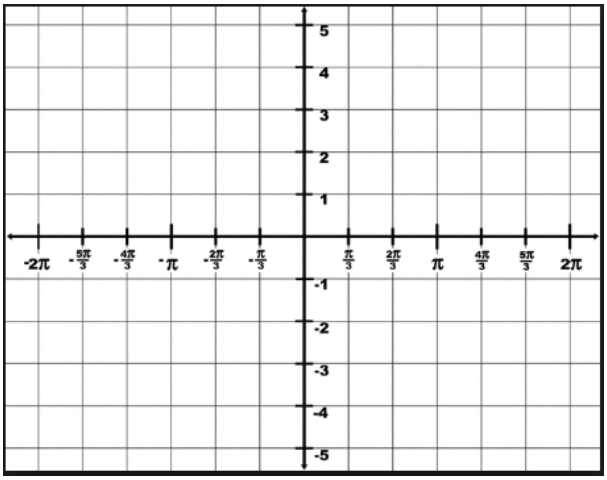
Homework:

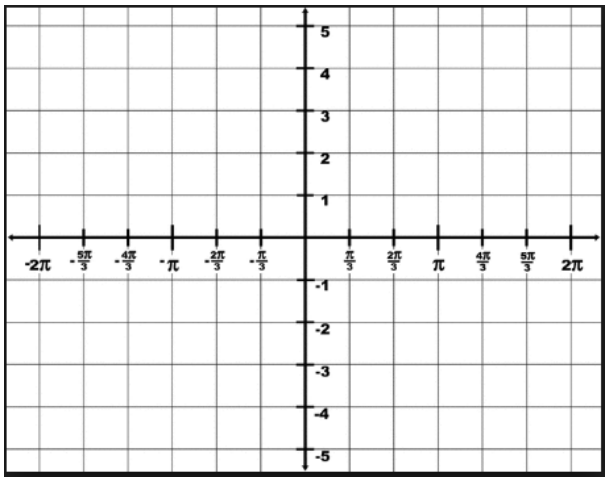
p. 454 #29-35 odd

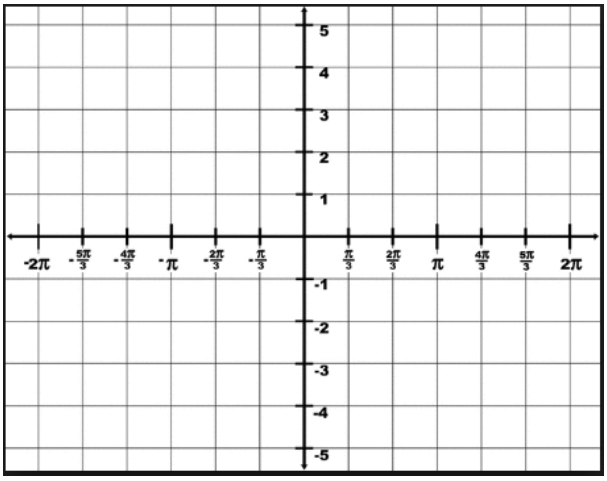
In 27–38. sketch one cycle of each function.

**29.** $y = \sin 2x$ **31.** $y = \cos 3x$ **33.** $y = 4 \sin 3x$ **35.** $y = -\sin 2x$


5
4
3
2
1
-1
-2
-3
-4
-5
$-2\pi$
$-\frac{5\pi}{3}$
$-\frac{4\pi}{3}$
$-\pi$
$-\frac{2\pi}{3}$
$-\frac{\pi}{3}$
$\frac{\pi}{3}$
$\frac{2\pi}{3}$
$\pi$
$\frac{4\pi}{3}$
$\frac{5\pi}{3}$
$2\pi$


5
4
3
2
1
-1
-2
-3
-4
-5
$-2\pi$
$-\frac{5\pi}{3}$
$-\frac{4\pi}{3}$
$-\pi$
$-\frac{2\pi}{3}$
$-\frac{\pi}{3}$
$\frac{\pi}{3}$
$\frac{2\pi}{3}$
$\pi$
$\frac{4\pi}{3}$
$\frac{5\pi}{3}$
$2\pi$


5
4
3
2
1
-2π
-5π/3
-4π/3
-π
-2π/3
-π/3
π/3
2π/3
π
4π/3
5π/3
2π
-1
-2
-3
-4
-5


5
4
3
2
1
-2π
-5π/3
-4π/3
-π
-2π/3
-π/3
π/3
2π/3
π
4π/3
5π/3
2π
-1
-2
-3
-4
-5