

7-2 Graphing Sine and Cosine Functions DAY 1

Objective(s):

- Determine the amplitude and period of various Sine and Cosine functions.
- Graph Sine and Cosine Functions by hand.

Warm-up:

1. Draw 2 conclusions about the sine and cosine explorations you completed yesterday.

Answers will vary

2. Write an equation of sine that has been vertically compressed and reflected over the x axis.

$$y = -\frac{1}{2} \sin x$$

Vocabulary:

Periodic Functions: A function that has a repeating pattern that continues indefinitely

Cycle: The shortest repeating portion of the graph

Period: The horizontal length of each cycle (period = $\frac{2\pi}{b}$)

Amplitude: The distance from the midline to the maximum value and the distance from the midline to the minimum value of the function (amplitude = a)

*** TOOLKIT ***

Ex 1: Determine the amplitude and period of each of the trigonometric functions below:

A.) $y = \sin 4x$

$$\text{Amp} = 1$$

$$\text{Per} = \frac{2\pi}{4} = \frac{\pi}{2}$$

B.) $y = \cos 5x$

$$\text{Amp} = 1$$

$$\text{Per} = \frac{2\pi}{5}$$

C.) $y = 2 \sin x$

$$\text{Amp} = 2$$

$$\text{Per} = 2\pi$$

D.) $y = -4 \sin 3x$

$$\text{Amp} = 4$$

$$\text{Per} = \frac{2\pi}{3}$$

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

$$\text{Amp} = 2$$

$$\text{Per} = \frac{2\pi}{4} = \frac{\pi}{2}$$

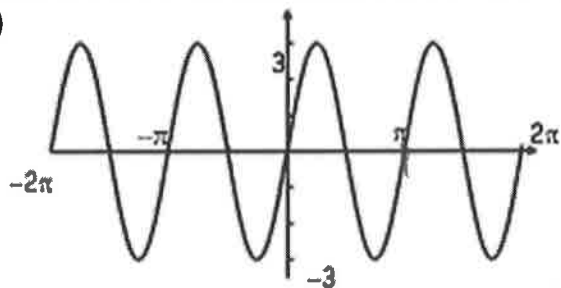
F.) $y = 3 \sin \frac{2}{3}x$

$$\text{Amp} = 3$$

$$\text{Per} = \frac{2\pi}{\frac{2}{3}} = 2\pi \cdot \frac{3}{2} = 3\pi$$

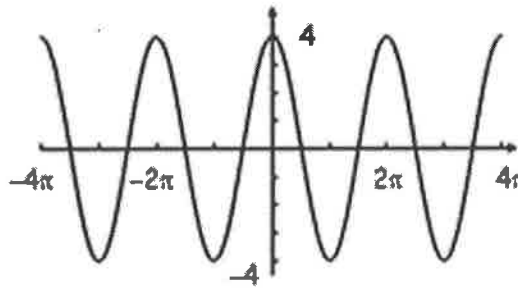
Ex 2: Give the amplitude and period of each function graphed below.

A.)



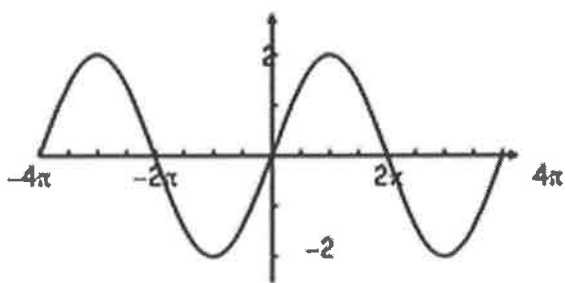
Amp = 3 per = π

B.)



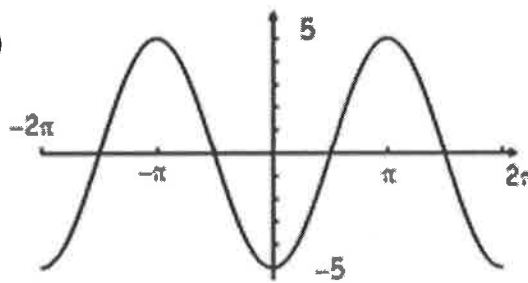
Amp = 4 per = 2π

C.)



Amp = 2
per = 4π

D.)



Amp = 5
per = 2π

Ex 3: Determine how many cycles would be in 2π radians.

A.) $y = -5 \sin x$

per = 2π

Cycles = $\frac{2\pi}{\text{per}} = \frac{2\pi}{2\pi} = 1$

B.) $y = \cos 8x$

per = $\frac{2\pi}{8} = \frac{1}{4}\pi$

Cycles = $\frac{2\pi}{\frac{1}{4}\pi} = 2\pi \cdot \frac{4}{\pi} = 8$

C.) $y = \frac{3}{4} \sin 4x$

Cycles = 4

D.) $y = 5 \sin 2\pi x$

Cycles = 2π

E.) $y = -7 \cos \frac{3}{2}x$

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

F.) $y = 13 \cos x$

Cycles = 1

Ex 4: Graph each of the function by identifying its key features.

A.) $y = 2 \sin x$

Transformations: vertical stretch

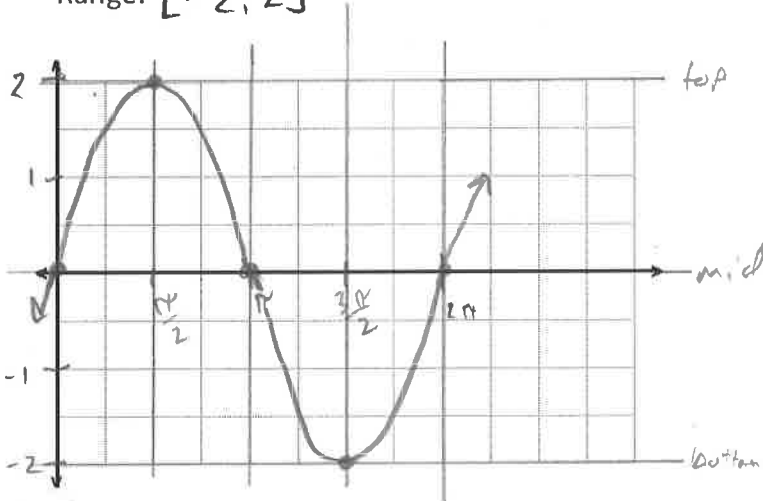
Amplitude: 2

Period: 2π

Midline: $y=0$

Domain: $(-\infty, \infty)$

Range: $[-2, 2]$



B.) $y = \cos 2x$

Transformations: horizontal compression

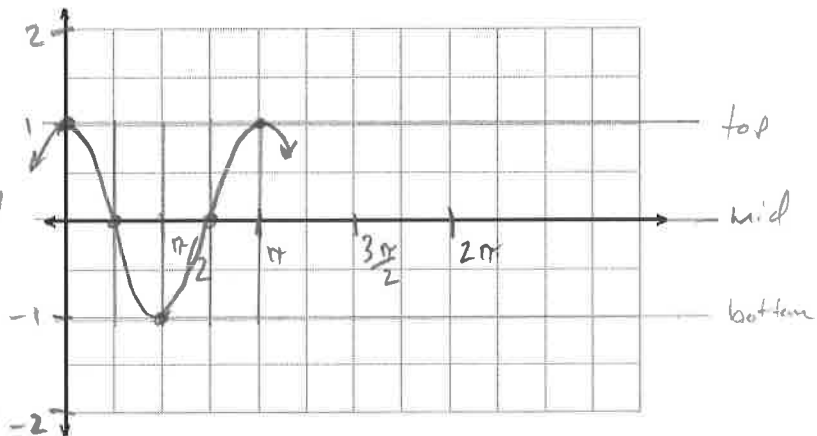
Amplitude: 1

Period: $\pi \leftarrow \frac{2\pi}{2}$

Midline: $y=0$

Domain: $(-\infty, \infty)$

Range: $[-1, 1]$



C.) $y = 4 \sin 8x$

Transformations: vertical stretch
horizontal compression

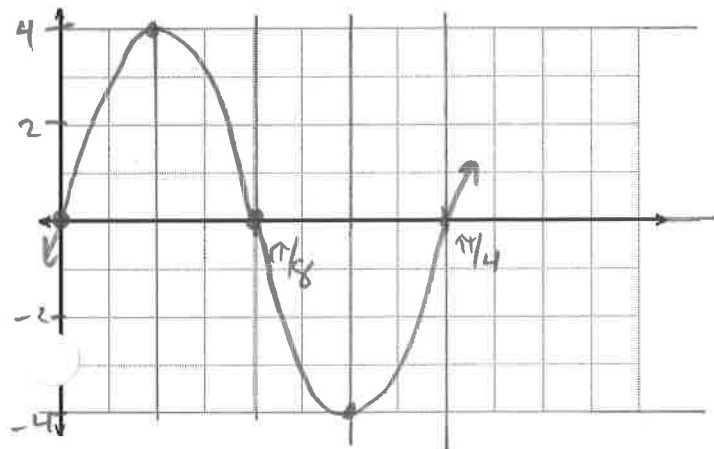
Amplitude: 4

Period: $\pi/4 \leftarrow \frac{2\pi}{8}$

Midline: $y=0$

Domain: $(-\infty, \infty)$

Range: $[-4, 4]$



D.) $y = 3 \cos 2\pi x$

Transformations: vertical stretch
horizontal compression

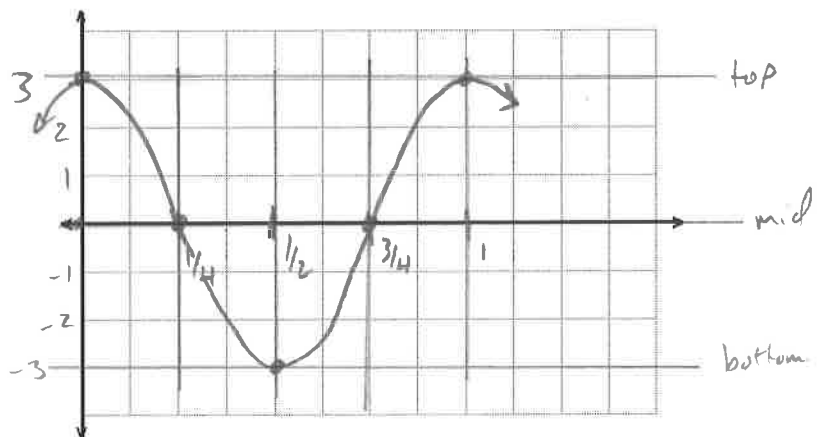
Amplitude: 3

Period: $1 \leftarrow \frac{2\pi}{2\pi}$

Midline: $y=0$

Domain: $(-\infty, \infty)$

Range: $[-3, 3]$



E.) $y = -2 \sin 2x$

transformations: reflection, vert. stretch, horiz. compression

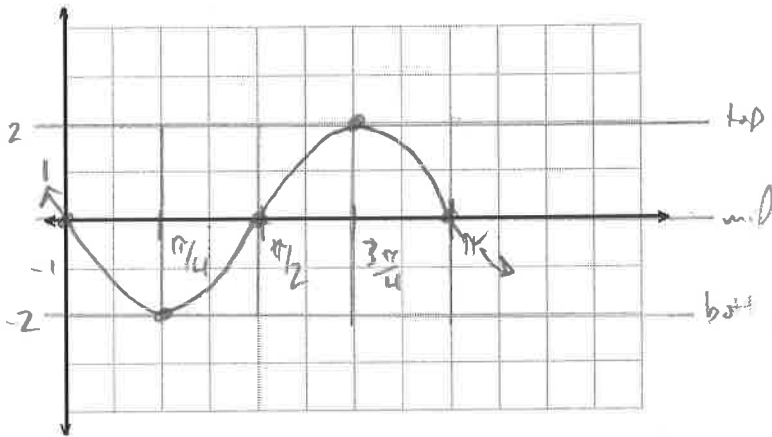
Amplitude: 2

Period: $\pi \leftarrow \frac{2\pi}{2}$

Midline: $y=0$

Domain: $(-\infty, \infty)$

Range: $[-2, 2]$



F.) $y = 4 \cos \frac{2}{3}x$

Transformations: vertical stretch, horizontal stretch

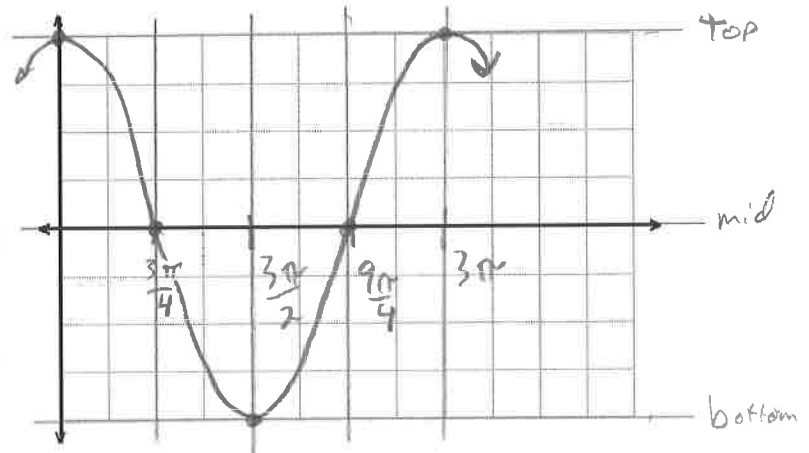
Amplitude: 4

Period: $3\pi \leftarrow \frac{2\pi}{2/3} = 2\pi \cdot \frac{3}{2} = 3\pi$

Midline: $y=0$

Domain: $(-\infty, \infty)$

Range: $[-4, 4]$



G.) $y = \frac{1}{3} \sin \frac{1}{4}x$

Transformations: vertical compression, horizontal stretch

Amplitude: $1/3$

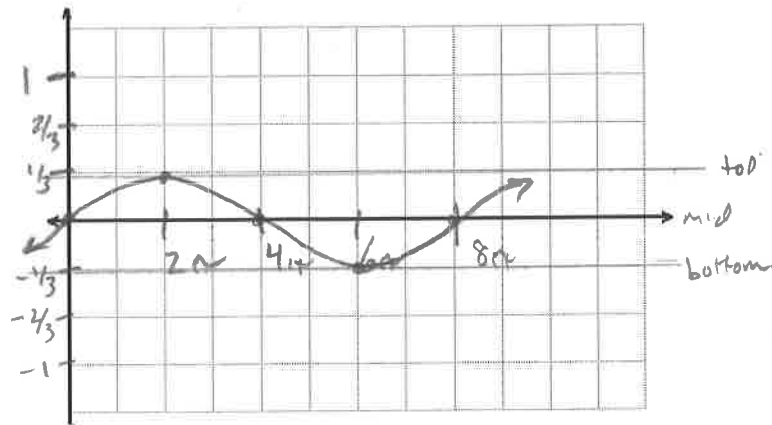
Period: 8π

Midline: $y=0$

Domain: $(-\infty, \infty)$

Range: $[-1/3, 1/3]$

$\frac{2\pi}{1/4} = 2\pi \cdot \frac{4}{1} = 8\pi$



H.) $y = -\frac{1}{2} \cos 2x$

Transformations: reflection, vertical compression, horizontal compression

Amplitude: $1/2$

Period: π

Midline: $y=0$

Domain: $(-\infty, \infty)$

Range: $[-1/2, 1/2]$

