

Learning Target(s): I am able to graph the sine, cosine, and tangent functions.
 I am able to identify the important features (amplitude, period, max, min, x-intercepts, and frequency) of the sine, cosine, and tangent functions.

14.1 Notes- Part 1: Graph Sine, Cosine, and Tangent Functions

Axis of Oscillation - The horizontal line in which the graph oscillates between

Amplitude - The distance from the a.o.o. to the max or to the min.

Period - The horizontal length of a cycle, how long it takes for the function to complete a wave.

Frequency - The reciprocal of the period, the number of cycles per unit of time.

Characteristics of $y = \sin x$ and $y = \cos x$

1. The domain of each function is all real numbers.
2. The range of each function is $-1 \leq y \leq 1$
3. The amplitude of each function's graph is half the difference between the max and the min.
4. Each function is periodic.

The amplitude and period of the graphs of $y = a \sin bx$ and $y = a \cos bx$ are:

$$\text{Amplitude} = |a| \qquad \text{Period} = \frac{2\pi}{|b|}$$

Ex. 1

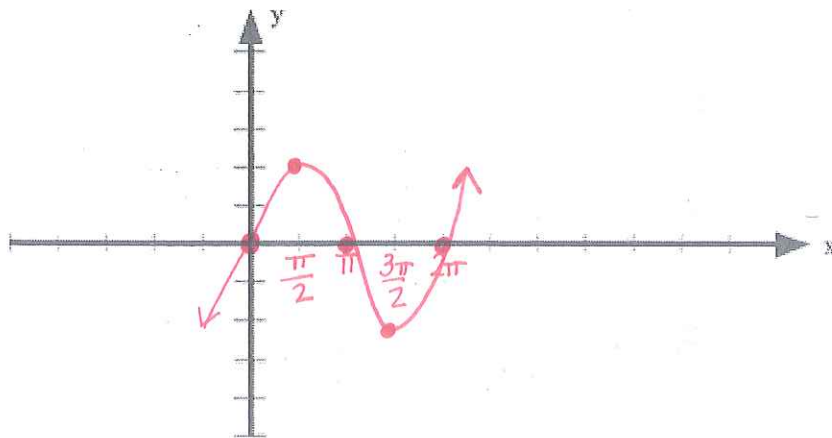
Graph $y = 2 \sin x$

① \sin starts at 0

② $b = 1$ $\frac{2\pi}{1} = 2\pi$
 period is 2π

③ $a = 2$

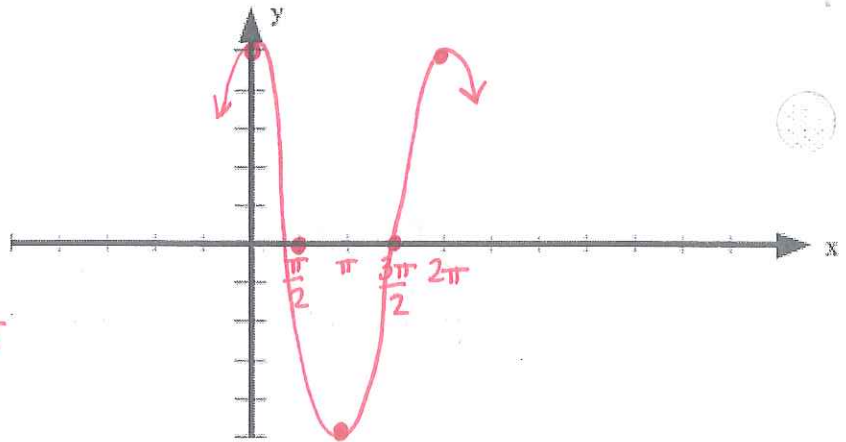
scale: use $\frac{\pi}{2}$



Ex. 2

Graph $y = 5 \cos x$

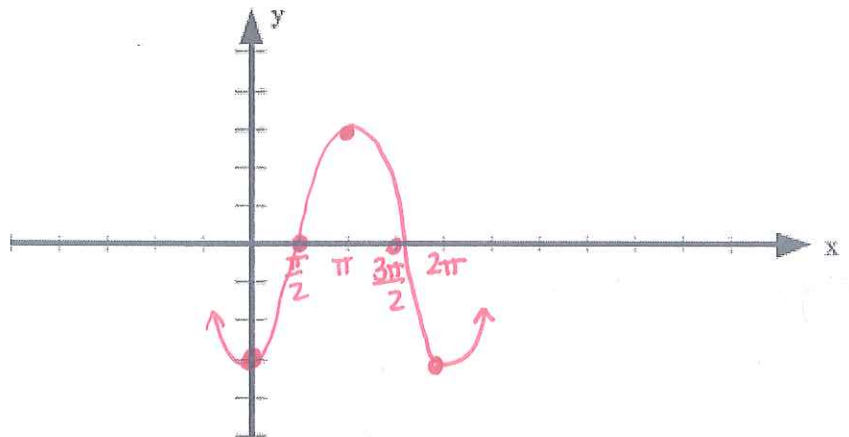
- ① \cos starts at a
 \cos starts at 5
- ② $b=1$ so period is $\frac{2\pi}{1} = 2\pi$
- ③ $a=5$



Ex. 3

Graph $y = -3 \cos x$

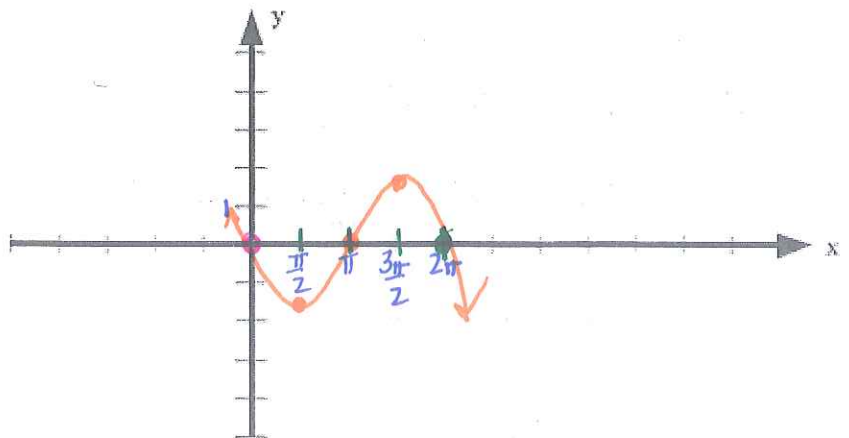
- ↙ reflection
- ① \cos start at a
 - ② $b=1$ period is 2π
 - ③ reflected at 3



Ex. 4

Graph $y = -\frac{3}{2} \sin x$

- ① \sin starts at 0
- ② $b=1$ $\frac{2\pi}{1} = 2\pi$
- ③ $a=3/2$ + reflected



Ex. 5

Graph $y = \sin 2x$

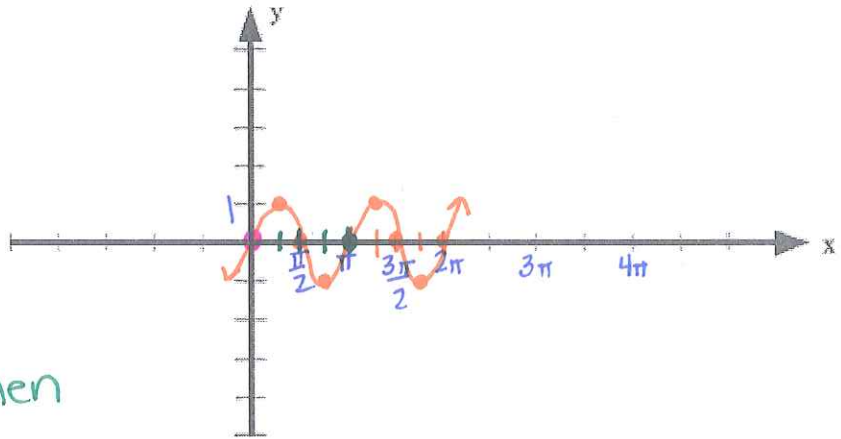
① sin starts at 0

② $b = 2$

period $\frac{2\pi}{|2|} = \pi$

Find period, cut in $\frac{1}{2}$, + then cut each $\frac{1}{2}$ in $\frac{1}{2}$

③ $a = 1$



Ex. 6

Graph $y = \cos \frac{x}{2}$

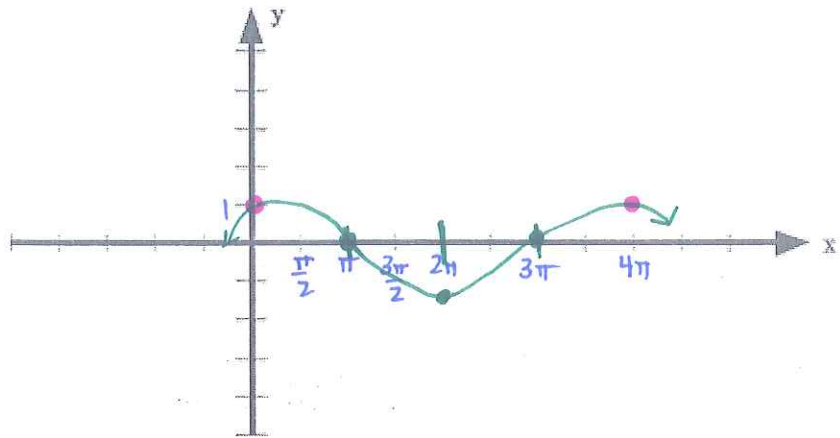
$$y = \cos \frac{1}{2}x$$

① cos starts at a

② $b = \frac{1}{2}$

period $\frac{2\pi}{|1/2|} = 4\pi$

③ $a = 1$



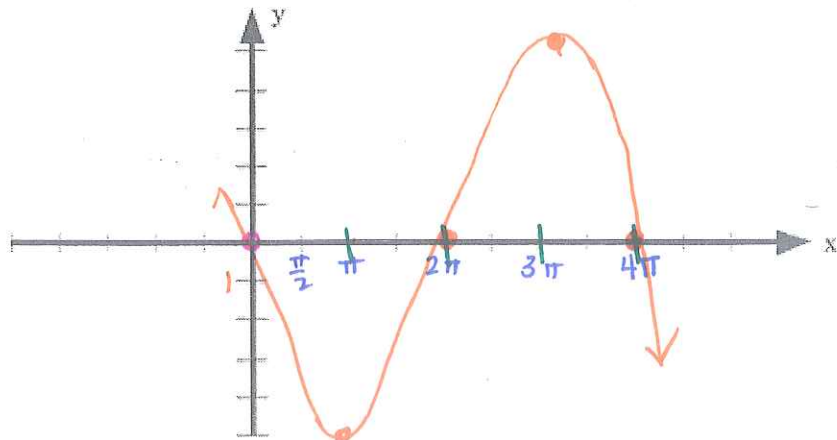
Ex. 7

Graph $y = -5 \sin \frac{x}{2}$

① sin starts at 0

② $b = \frac{1}{2}$ period $\frac{2\pi}{|1/2|} = 4\pi$

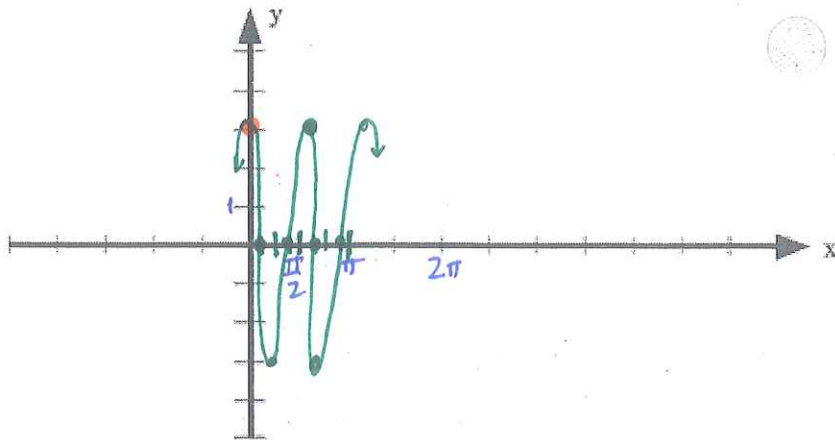
③ $a = 5$ + reflected



Ex. 8

Graph $y = 3 \cos 4x$

- ① cos starts at 3(a)
- ② $b=4$ period $\frac{2\pi}{|4|} = \frac{\pi}{2}$
- ③ $a=3$



Ex. 9

Write a sine function with an amplitude of 3 and a frequency of 1000.

$$a=3$$

$\frac{2\pi}{|b|}$ is reciprocal of period

$$y = 3 \sin 2000\pi x$$

$$\frac{1000}{1} = \frac{|b|}{2\pi}$$

$$b = 2000\pi$$

Ex. 10

Write a cosine function with an amplitude of 4 and a frequency of 1500.

$$y = 4 \cos 3000\pi x$$

$$\frac{1500}{1} = \frac{|b|}{2\pi}$$

$$b = 3000\pi$$

Ex. 11

Write a sine function with an amplitude of 1.5 and frequency of 500.

$$y = 1.5 \sin 1000\pi x$$

$$\frac{500}{1} = \frac{|b|}{2\pi}$$