Date: _____

6.4 Transformations of Trigonometric Functions (day 1)

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

Review of Prerequisite Skills

VERTICAL STRETCHES/COMPRESSION

Recall: $y = af(x)$ is the image of $y = f(x)$ under a transformation which causes a **vertical stretch/compression by a factor of $|a|$**.

The amplitude of each function $y = a \sin \theta$ and $y = a \cos \theta$ is _____.

HORIZONTAL STRETCHES/COMPRESSION

Recall: $y = f(kx)$ is the image of $y = f(x)$ under a transformation which causes a **horizontal stretch/compression by a factor of $\frac{1}{|k|}$**.

The value of k determines the number of degrees in the period of the graph.

To determine the period the trigonometric function, divide the period of the base curve by k.

**Period = $\frac{1}{|k|}$ × _____ = $\frac{}{|k|}$**

HORIZONTAL TRANSLATION

Recall: $y = f(x \pm d)$ is the image of $y = f(x)$ under a transformation which causes a **horizontal translation to the left/right by d units**.

The value of d determines the phase shift.

VERTICAL TRANSLATION

Recall: $y = f(x) \pm c$ is the image of $y = f(x)$ under a transformation which causes a **vertical translation up/down c units**.
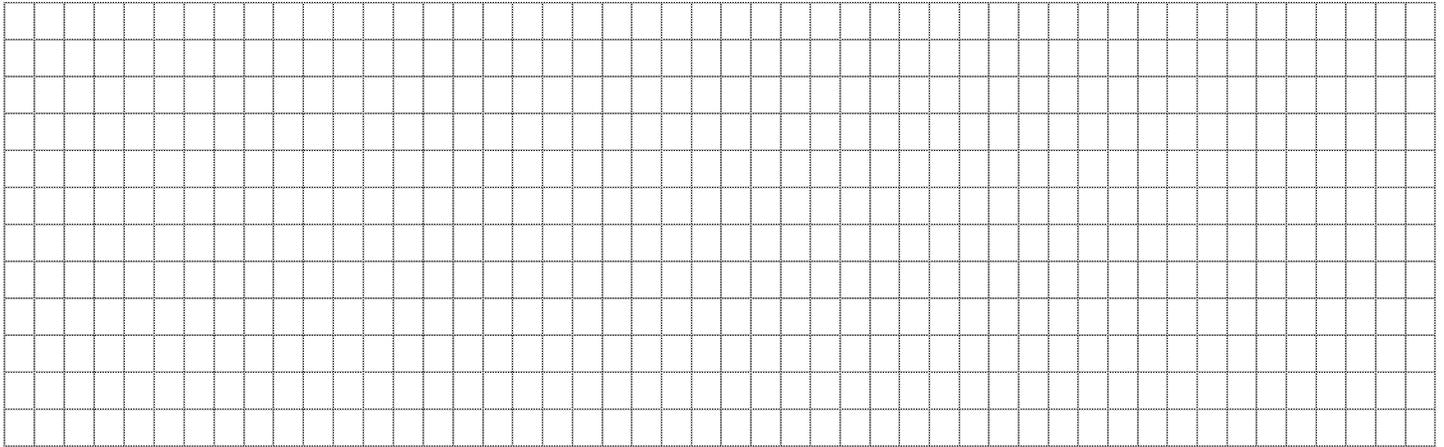
The value of c determines the equation of axis.
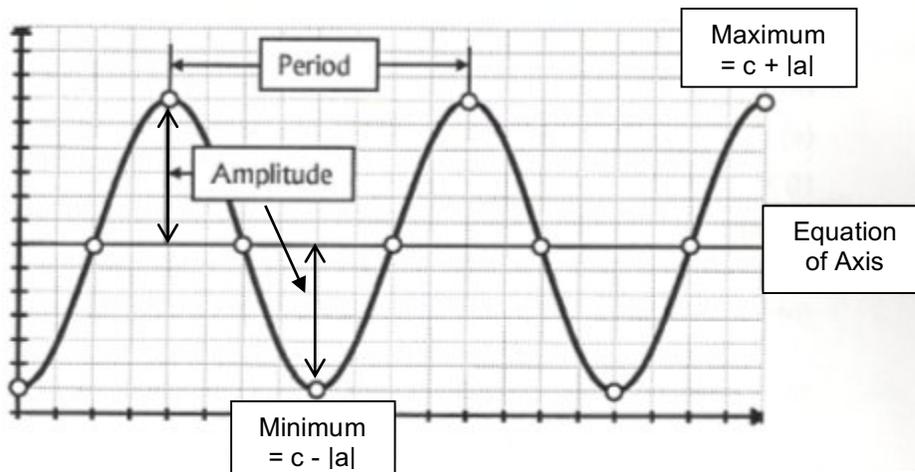
Ex. 1   Complete the table. Use the properties to help you graph <u>two cycles</u> of the transformed function.
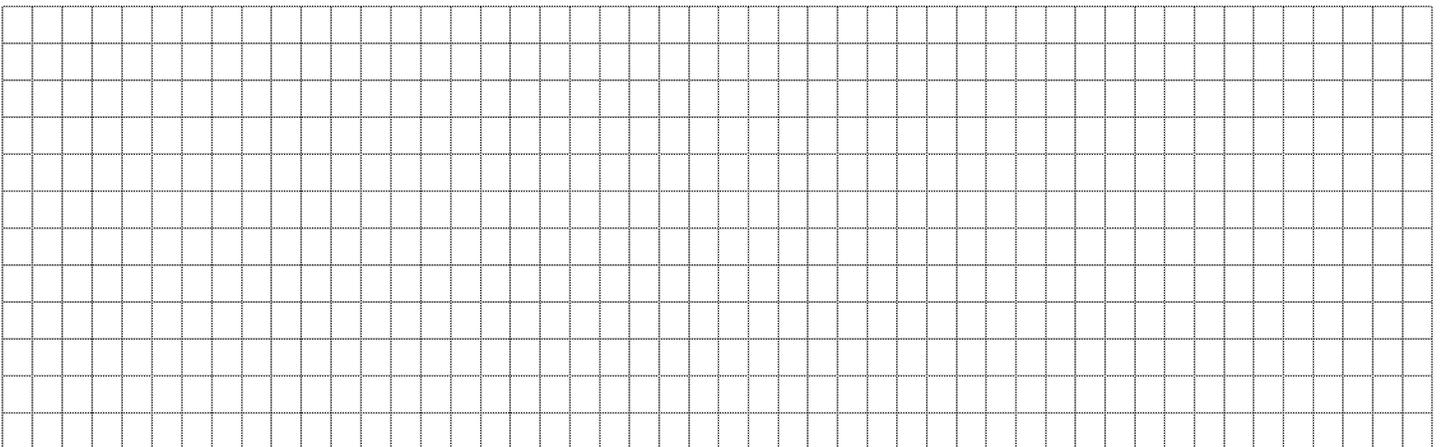
$$y = 3 \sin\left(2\left(x - \frac{\pi}{3}\right)\right) - 1$$

Amplitude	Equation of Axis	Period	Phase Shift	Range

$$y = \cos\left(\frac{1}{2}(x + \pi)\right) - 1$$

Amplitude	Equation of Axis	Period	Phase Shift	Range

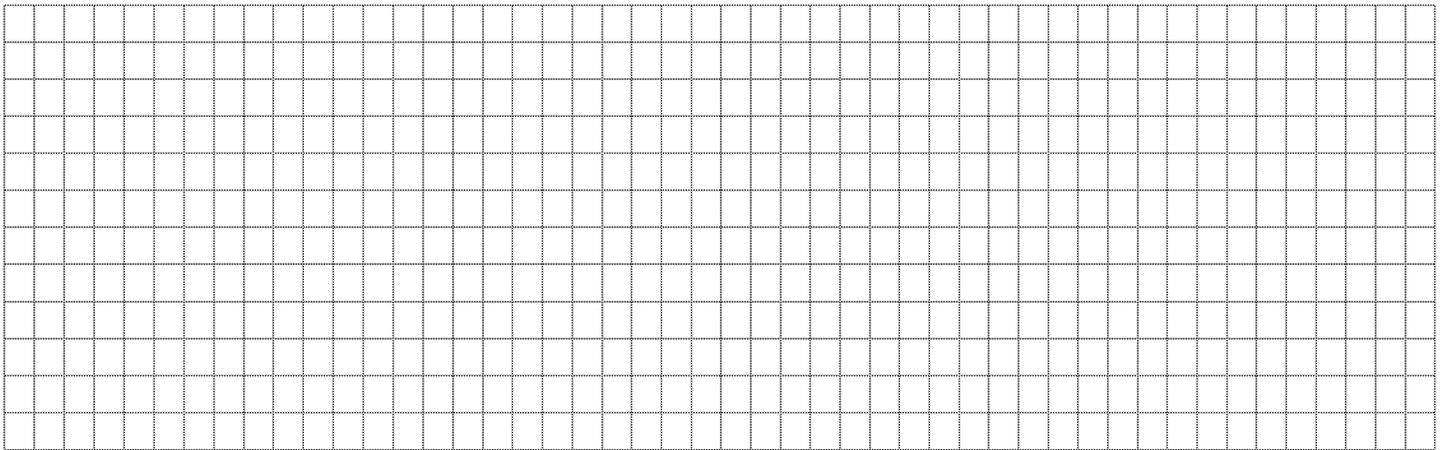**REFLECTION (x-axis)**

Recall: $y = -f(x)$ is the image of $y = f(x)$ under a transformation which causes a **reflection in the x-axis.**

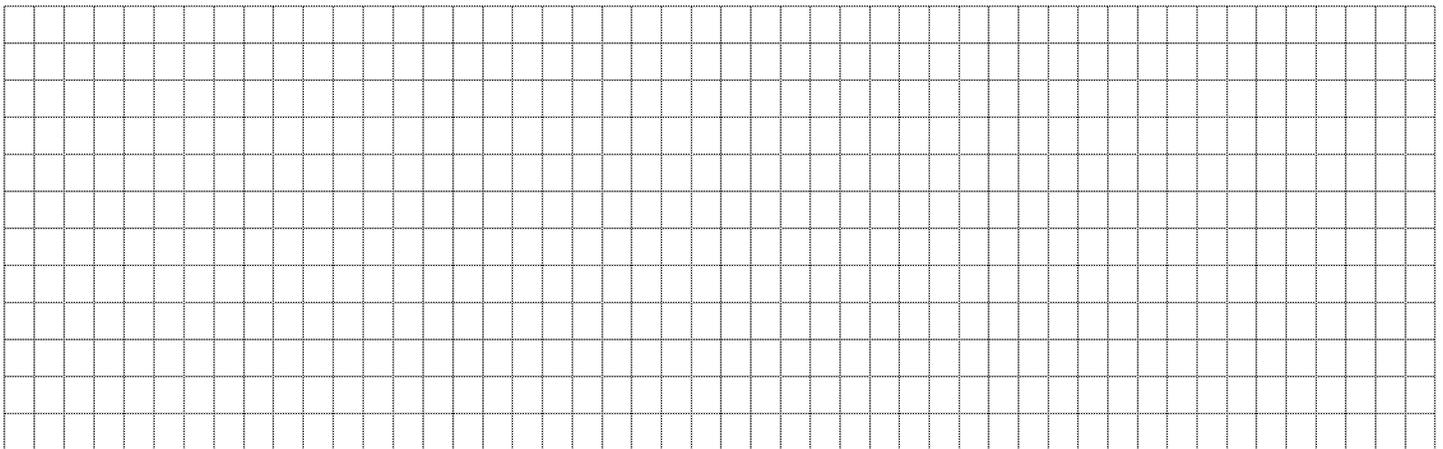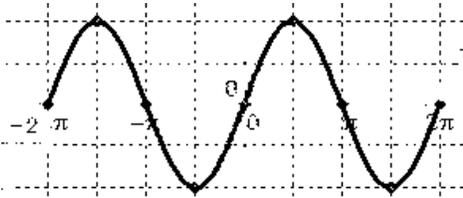$$y = -3\cos\left(x - \frac{\pi}{4}\right) - 1$$

Amplitude	Equation of Axis	Period	Phase Shift	Range

$$y = -\frac{5}{2}\sin(2x + \pi)$$

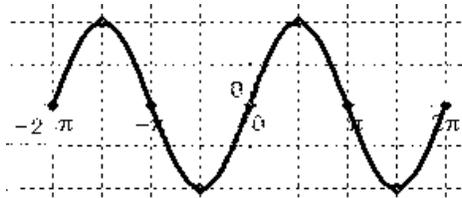| Amplitude	Equation of Axis	Period	Phase Shift	Range

REFLECTION (y-axis)

$y = f(-x)$ is the image of $y = f(x)$ under a transformation which causes a **reflection in the y-axis.**
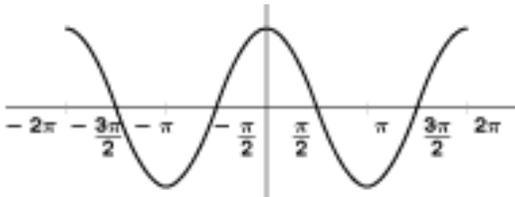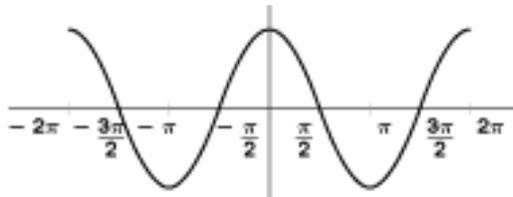
Sketch:
$y = \sin(-x)$

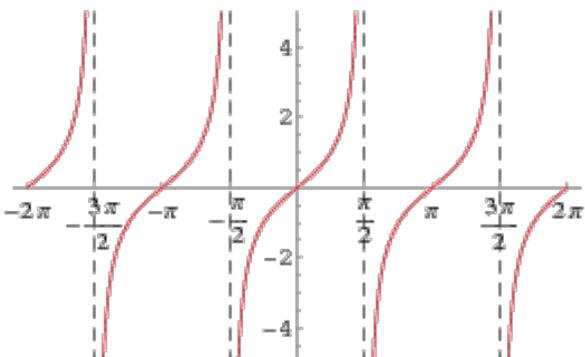$y = -\sin(x)$

What do you notice?

Sketch:
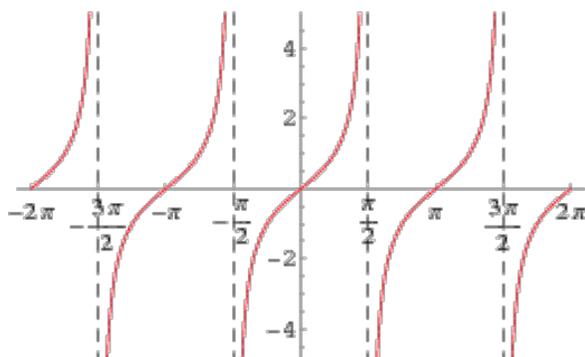$y = \cos(-x)$

$y = -\cos(x)$

What do you notice?

Sketch:
$y = \tan(-x)$

$y = -\tan(x)$

What do you notice?

HOMEWORK: NELSON TEXT p. 344-345 #4-8 (every other one)