

Graphing Trig Functions

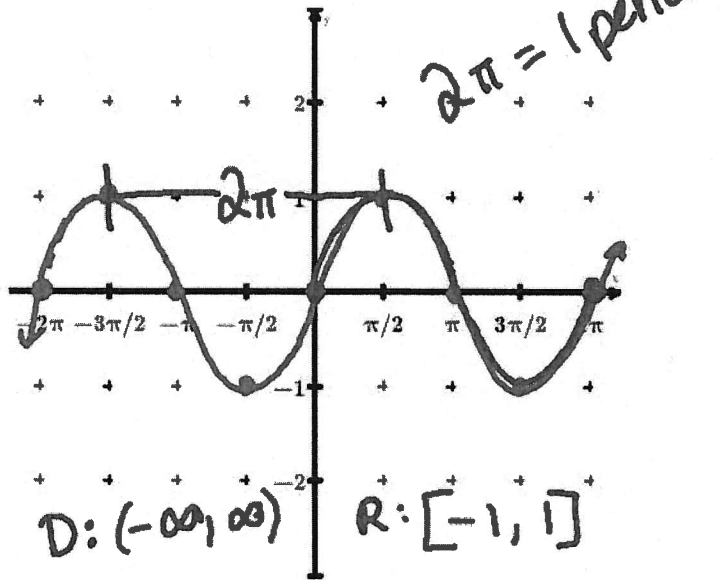
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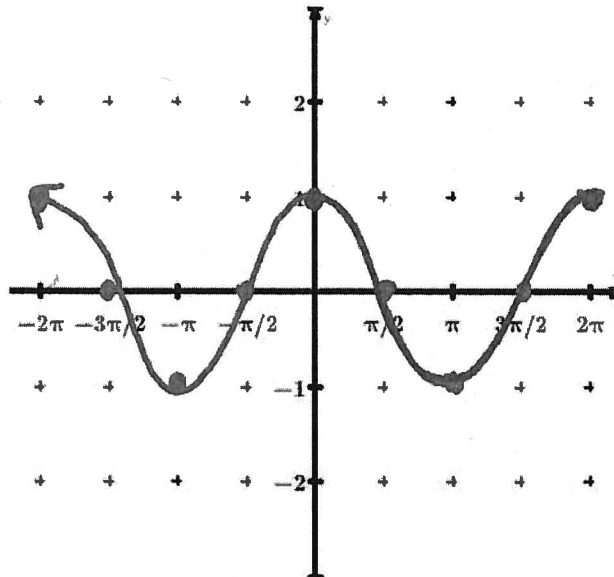
Warm Up → Graph the following functions by plotting the points given on the table.

x	y = sin(x)
-2π	0
$-\frac{3\pi}{2}$	1
$-\pi$	0
$-\frac{\pi}{2}$	-1
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0



$y = \cos(x)$

x	y = cos(x)
-2π	1
$-\frac{3\pi}{2}$	0
$-\pi$	-1
$-\frac{\pi}{2}$	0
0	1
$\frac{\pi}{2}$	0
π	-1
$\frac{3\pi}{2}$	0
2π	1



Graphing Sine and Cosine

$$y = a \sin(bx - c) + d$$

$$y = a \cos(bx - c) + d$$

Amplitude = $|a|$ (how tall the graph is)

Period = $\frac{2\pi}{b}$ (how often the graph repeats)

Unit = $\frac{\text{Period}}{4}$ (what we count by on the x-axis)

Phase Shift is the value of x from $bx - c = 0$ (horizontal shift, side to side)
 Vertical Shift = d (up and down)

Reflection over x-axis if a is negative

Sine Wave: O-H-O-L-O

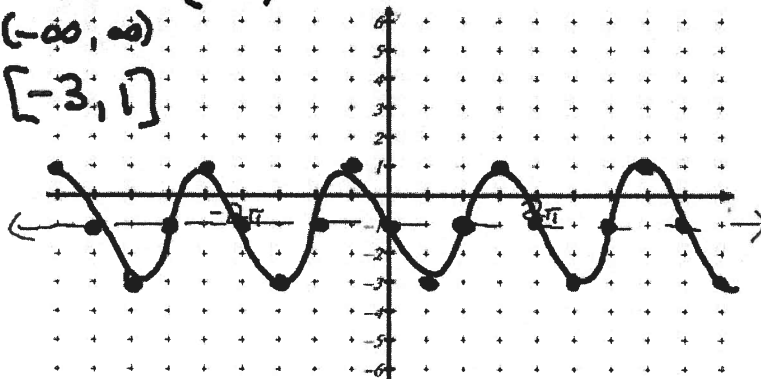
Cosine Wave: H-O-L-O

Example One → Graph the following trig functions

a) $y = 2\sin(x - \pi) - 1$

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

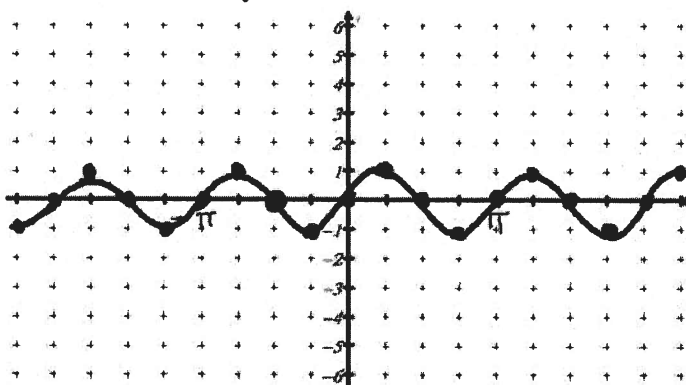
R: $[-3, 1]$



Amplitude: 2
 Period: 2π
 Unit: $\pi/2$
 Phase Shift: $+\pi$
 Vertical Shift: -1

$x - \pi = 0$
 $x = \pi$

b) $y = -\sin(2x + \pi)$

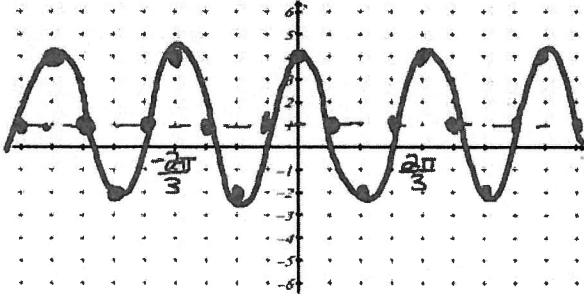


Amplitude: 1
 Period: π
 Unit: $\pi/4$
 Phase Shift: $-\pi/2$
 Vertical Shift: 0

Starting pt.

High-zero-low-zero

c) $f(x) = 3\cos(3x + 4\pi) + 1$



Amplitude: 3

Period: $2\pi/3$

Unit: $\pi/6$

Phase Shift: $-4\pi/3$

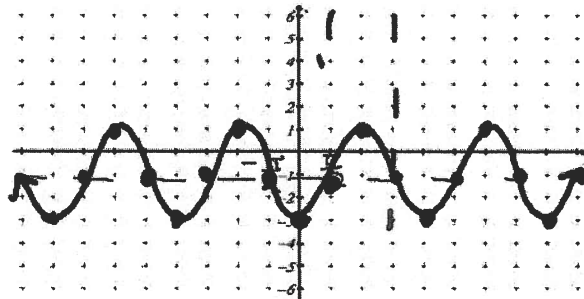
Vertical Shift: +1 (Start high) +3

$3x + 4\pi = 0$

$3x = -4\pi$

$x = -4\pi/3$

d) $y = -2\cos x - 1$



Amplitude: 2

Period: 2π

Unit: $\pi/2$

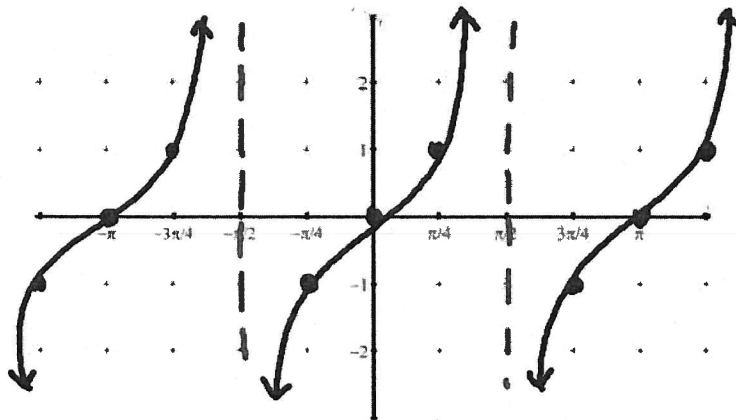
Phase Shift: 0

Vertical Shift: -1

$R: [-3, 1]$

Graphing Tangent

x	y = tan(x)
$-\pi$	0
$-\frac{3\pi}{4}$	1
$-\frac{\pi}{2}$	und.
$-\frac{\pi}{4}$	-1
0	0
$\frac{\pi}{4}$	1
$\frac{\pi}{2}$	und.
$\frac{3\pi}{4}$	-1
π	0



period = π

D: $x \neq \frac{\pi}{2} + \pi k$ | R: $(-\infty, \infty)$

Tangent

$$y = a \tan(bx - c) + d$$

Amplitude = $|a|$

(how tall the graph is)

Period = $\frac{\pi}{b}$

(how often the graph repeats)

Unit = $\frac{\text{Period}}{4}$

(what we count by on the x-axis)

Phase Shift is the value of x from $bx - c = 0$

(horizontal shift, side to side)

Vertical Shift = d

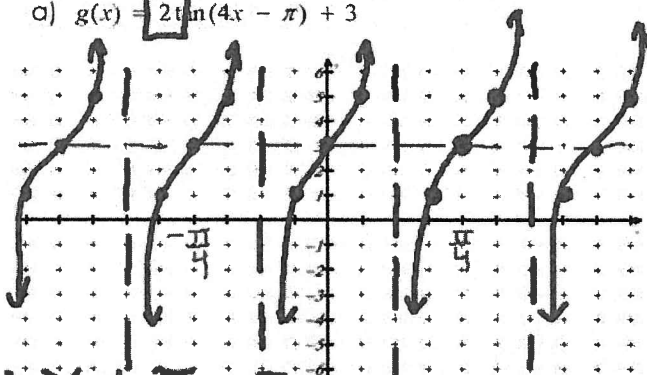
(up and down)

Reflection over x -axis if a is negative

Tangent Curve: O-H-U-L-O

EXAMPLE TWO → Graph the following functions

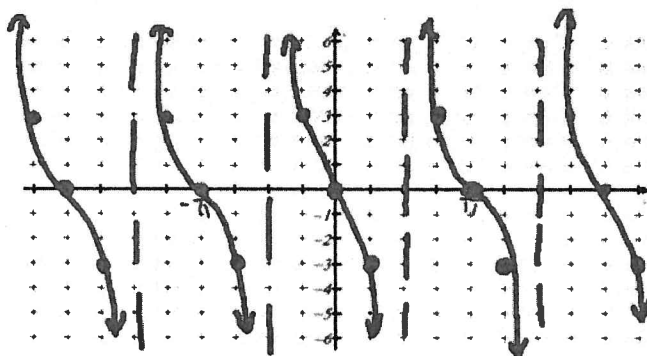
a) $g(x) = 2 \tan(4x - \pi) + 3$



Amplitude: 2
 Period: $\frac{\pi}{4}$
 Unit: $\frac{\pi}{16}$
 Phase Shift: $+\frac{\pi}{4}$
 Vertical Shift: +3

D: $x \neq \frac{\pi}{8} + \frac{\pi}{4}k$

b) $y = -3 \tan(x - \pi)$



Amplitude: 3
 Period: π
 Unit: $\frac{\pi}{4}$
 Phase Shift: π
 Vertical Shift: 0

D: $x \neq \pi + \pi k$

$$\text{Period} = \frac{2\pi}{b} = 2\pi$$

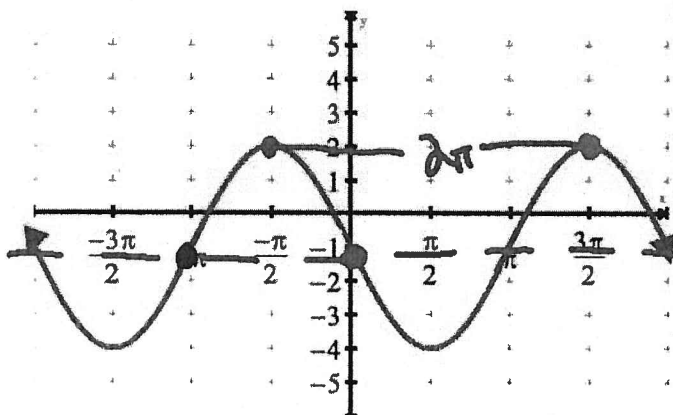
$$b = 1$$

$$|x - c| = 0$$

$$|\pi - c| = 0$$

$$\pi = c$$

EXAMPLE THREE → Which equations are graphed below?



$$y = a \sin(bx - c) + d$$

$$y = 3 \sin(x + \pi) - 1$$

$$\text{or } y = -3 \sin(x) - 1$$

$$\text{or } y = 3 \cos(x - \frac{3\pi}{2}) - 1$$

$$x = -\pi$$

$$(x + \pi) = 0$$

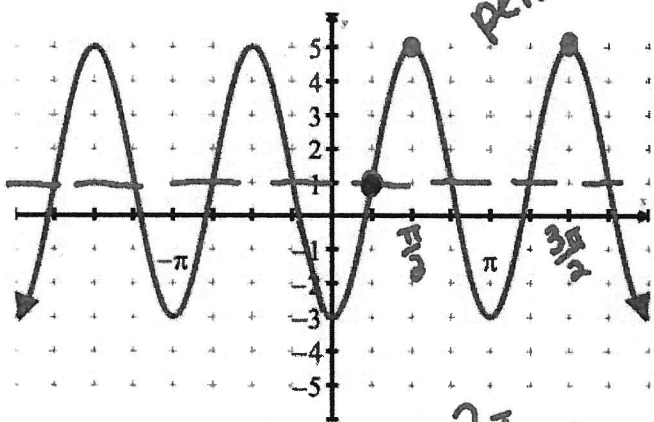
$$\frac{2\pi}{b} = 2\pi$$

$$\text{Period} = \pi$$

$$|x - c| = 0$$

$$\frac{3\pi}{2} - c = 0$$

$$c = \frac{3\pi}{2}$$



$$y = 4 \sin(2x - \frac{\pi}{2}) + 1$$

$$2x = \frac{\pi}{4} \cdot 2$$

$$2x = \frac{\pi}{2}$$

$$2x - \frac{\pi}{2} = 0$$

$$\frac{2\pi}{b} = \pi$$

$$2x - c = 0$$

$$2(\frac{\pi}{4}) - c = 0$$

$$\frac{\pi}{2} - c = 0$$

$$\frac{\pi}{2} = c$$

Homework → Worksheet