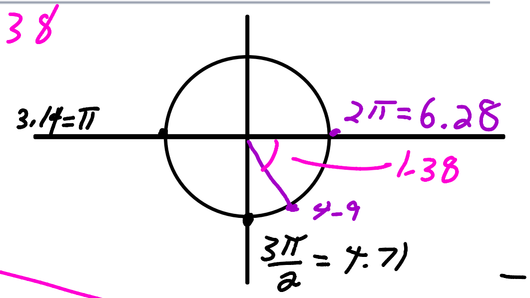
Period 4, Dec 17, 2024

Find the reference angle for the angle 4.9. The angle is measured in radians, not degrees.

Rad

The angle is 1.38.

$6.28 - 4.9 = 1.38$



Find the exact value of each of the remaining trigonometric functions of θ.

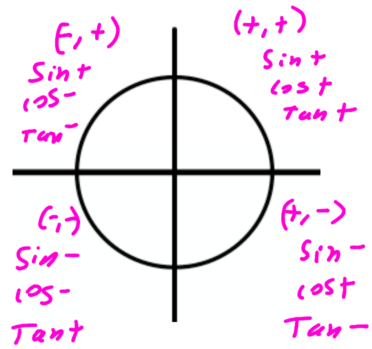
sec $\theta = 17$, **tan** $\theta > 0$

Tan + (Quad I or III)

$\sec\theta = +$

cos + (Quad I and IV)

θ must be in First Quad



$\sin^2\theta + \cos^2\theta = 1 \Rightarrow \sin^2\theta + \left(\frac{1}{17}\right)^2 = 1$

$\sec\theta = 17 = \frac{1}{\cos\theta}$

$\sin^2\theta + \frac{1}{289} = \frac{289}{289} - \frac{1}{289}$

$\cos\theta = \frac{1}{17}$

$\sqrt{\sin^2\theta} = \sqrt{\frac{288}{289}} = \frac{\pm\sqrt{288}}{17} = + \frac{12\sqrt{2}}{17} = \sin\theta$

Quad I

$\sin\theta = \frac{12\sqrt{2}}{17}$

$\csc\theta = \frac{17 \cdot \sqrt{2}}{12\sqrt{2} \cdot \sqrt{2}} = \frac{17\sqrt{2}}{12 \cdot 2} = \frac{17\sqrt{2}}{24}$

$\cos\theta = \frac{1}{17}$

$\sec\theta = 17$

$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{12\sqrt{2}}{17}}{\frac{1}{17}} = \frac{12\sqrt{2}}{\cancel{17}} \cdot \frac{\cancel{17}}{1} = 12\sqrt{2}$

$\cot\theta = \frac{\cos\theta}{\sin\theta} = \frac{1}{12\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{24}$

Find the exact value of each of the remaining trigonometric functions of θ.

tan $\theta = -\frac{1}{4}$, **cos** $\theta > 0$

$\tan\theta = -$ $\quad \cos\theta = +$

Quad 4

$\tan^2\theta + 1 = \sec^2\theta$

$\left(-\frac{1}{4}\right)^2 + 1 = \sec^2\theta$

$\frac{1}{16} + \frac{16}{16} = \frac{17}{16} = \sec^2\theta$

$\sqrt{\frac{17}{16}} = \sqrt{\sec^2\theta}$

$\pm\frac{\sqrt{17}}{4} = \frac{1}{\cos\theta}$ ← Quad IV (Sin −) cos +, Sec +

$\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta + \left(\frac{4}{\sqrt{17}}\right)^2 = 1$

$\sin^2\theta + \frac{16}{17} = \frac{17}{17}$

$\sqrt{\sin^2\theta} = \sqrt{\frac{1}{17}}$

$\sin\theta = \pm\frac{1}{\sqrt{17}} = \pm\frac{\sqrt{17}}{17}$

$\sin\theta = -\frac{\sqrt{17}}{17}$

$\cos\theta = +\frac{4}{\sqrt{17}} = \frac{4\sqrt{17}}{17}$

$\cot\theta = \frac{-4}{1} = -4$

$\sec\theta = \frac{4}{\sqrt{17}} = \frac{4\sqrt{17}}{17}$

$\csc\theta = -\sqrt{17}$

Find the exact value of the following expression. Write the answer as a single fraction. Do not use a calculator.

$$\sin\frac{19\pi}{4}\cos\frac{7\pi}{6}+\cos\frac{19\pi}{4}\sin\frac{7\pi}{6}$$

$$\frac{\sqrt{2}}{2}\cdot\frac{-\sqrt{3}}{2} + -\frac{\sqrt{2}}{2}\cdot -\frac{1}{2} = \frac{-\sqrt{6}}{4} + \frac{\sqrt{2}}{4} = \frac{\sqrt{2}-\sqrt{6}}{4}$$

$\frac{19\pi}{4} = 4\frac{3}{4}\pi$

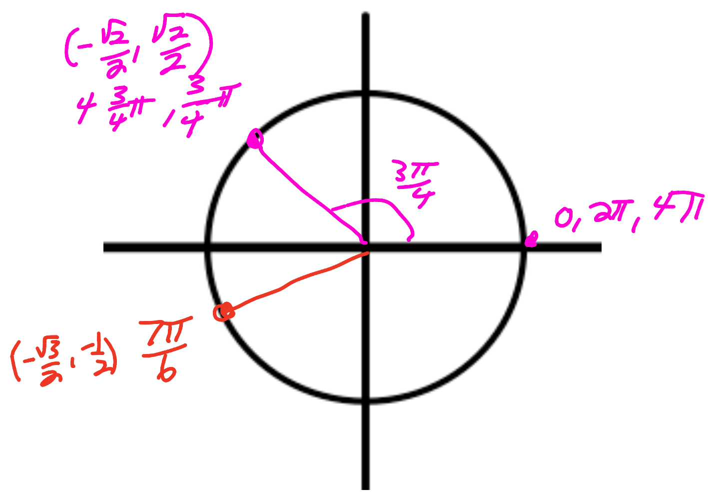
$\sin\frac{19\pi}{4} = \frac{\sqrt{2}}{2}$

$\cos\frac{19\pi}{4} = -\frac{\sqrt{2}}{2}$

$\cos\frac{7\pi}{6} = -\frac{\sqrt{3}}{2}$

$\sin\frac{7\pi}{2} = -\frac{1}{2}$

$(\cos\theta, \sin\theta)$

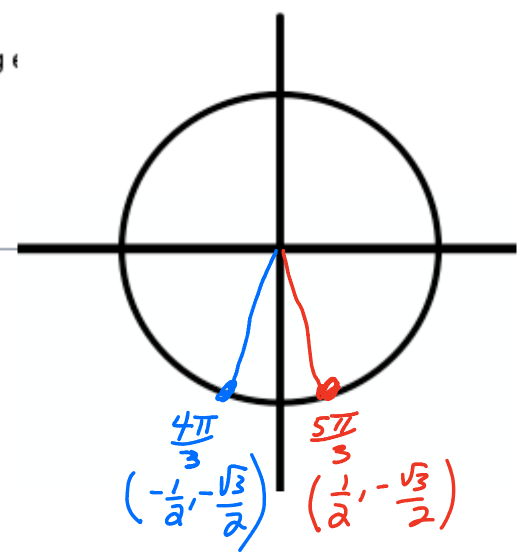


Find two values of θ, $0 \le \theta < 2\pi$, that satisfy the following

$$\sin\theta = -\frac{\sqrt{3}}{2}$$

$\sin\frac{4\pi}{3} = -\frac{\sqrt{3}}{2}$

$\sin\frac{5\pi}{3} = -\frac{\sqrt{3}}{2}$

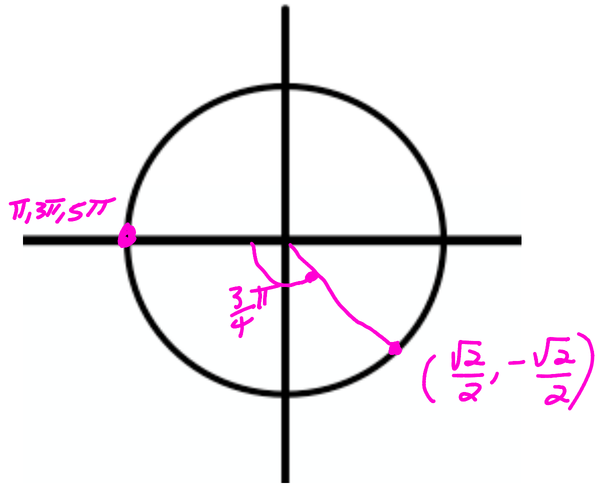


Let g(x) = **cos** x and h(x) = 2x. Find the exact value of the expression. Do not use a calculator.

$$(h \circ g)\left(\frac{23\pi}{4}\right) = h(g(x)) = 2(g(x)) = 2 \cdot \cos x = 2 \cdot \cos\frac{23\pi}{4} = \cancel{2} \cdot \frac{\sqrt{2}}{\cancel{2}} = \sqrt{2}$$

$\cos \frac{23\pi}{4}$

$\cos 5\frac{3}{4}\pi = \frac{\sqrt{2}}{2}$



$y = \pm a \sin(bx \pm c) \pm d$

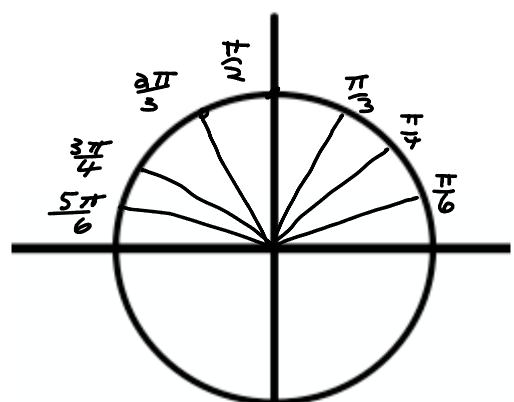
$y = \pm a \cos(bx \pm c) \pm d$

$\frac{\sqrt{3}}{2} = .866$

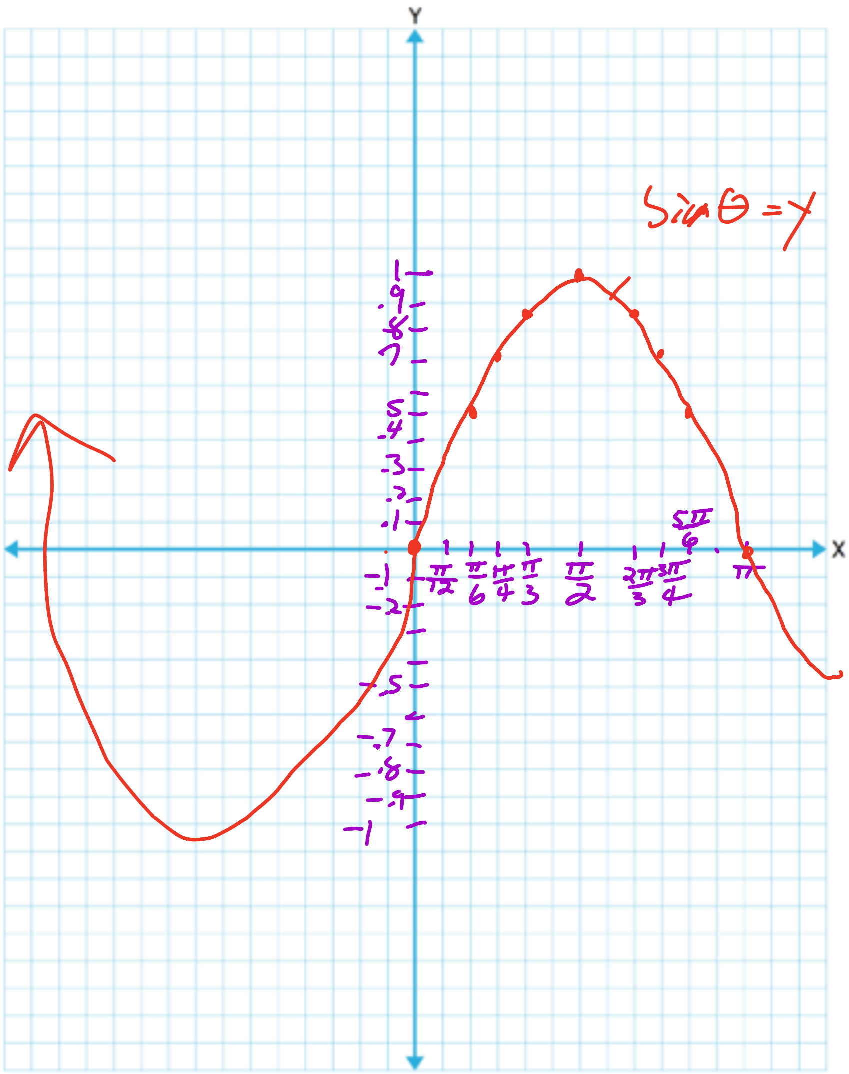
$\frac{\sqrt{2}}{2} = .707$

$\frac{1}{2} = .5$

X	SinX=y
0	0
$\frac{\pi}{6}$	$\frac{1}{2} = .5$
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2} = .707$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2} = .866$
$\frac{\pi}{2}$	$1 = 1$
$\frac{2\pi}{3}$	$\frac{\sqrt{3}}{2} = .866$
$\frac{3\pi}{4}$	$\frac{\sqrt{2}}{2} = .707$
$\frac{5\pi}{6}$	$\frac{1}{2} = .5$
π	$0 = 0$
$\frac{7\pi}{6}$	$-\frac{1}{2} = -.5$



X	Sinx=y
$\frac{5\pi}{4}$	$-\frac{\sqrt{2}}{2} = -.707$
$\frac{4\pi}{3}$	$-\frac{\sqrt{3}}{2} = -.866$
$\frac{3\pi}{2}$	$= -1$
$\frac{5\pi}{3}$	$= -\frac{\sqrt{3}}{2} = -.866$
$\frac{7\pi}{8}$	$= -\frac{\sqrt{2}}{2} = .707$



$\frac{3\pi}{12} = \frac{\pi}{4}$

$\frac{4\pi}{12} = \frac{\pi}{3}$

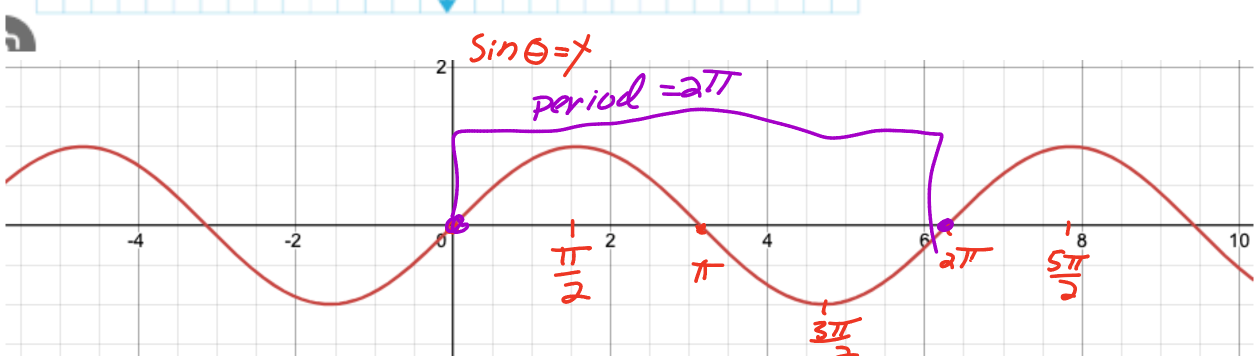
$\frac{6\pi}{12} = \frac{\pi}{2}$

$\frac{8\pi}{12} = \frac{2\pi}{3}$

$\frac{9\pi}{12} = \frac{3\pi}{4}$

$\frac{10\pi}{12} = \frac{5\pi}{6}$

Period



Pattern start at 0

$\frac{\pi}{2}$, up 1

π, 0

$\frac{3\pi}{2}$, Down 1

2π, 0

Pattern
(Start at 0, up 1)
$(\frac{\pi}{2}, 0)$
$(\pi, -1)$
$(\frac{3\pi}{2}, 0)$
$(2\pi, \text{up } 1)$

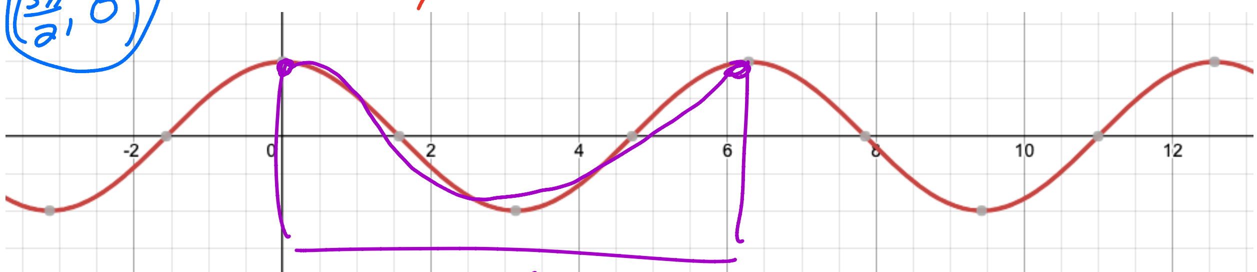
4 steps

0 = Even

Period (How Long To Repeat)

$\frac{2\pi}{4} = \frac{\pi}{2}$ = how big Each Step is

$\cos\theta = y$



Period $= 2\pi$

$x=0$

$\sin\theta$ Starts Even, up 1, Even, Down 1, Even

$\cos\theta$ Starts up 1, Even, down 1, Even, up 1

$y = \pm a \sin(bx \pm c) \pm d$

a = amplitude

d → vertical Shift

$bx \pm c = 0$

Solve For x
To Find Phase
Shift

− Flip over
x-axis
So up becomes
Down. Down
Becomes up

Change To Period
Sin, cos, Sec, csc
Set $bx = 2\pi$
Solve For x
x = New period
$\frac{x}{4}$ = New step
old Step $= \frac{\pi}{2}$

$y = +10\sin(20x)$

amp = 10

$$\frac{20x}{20} = \frac{2\pi}{20}$$

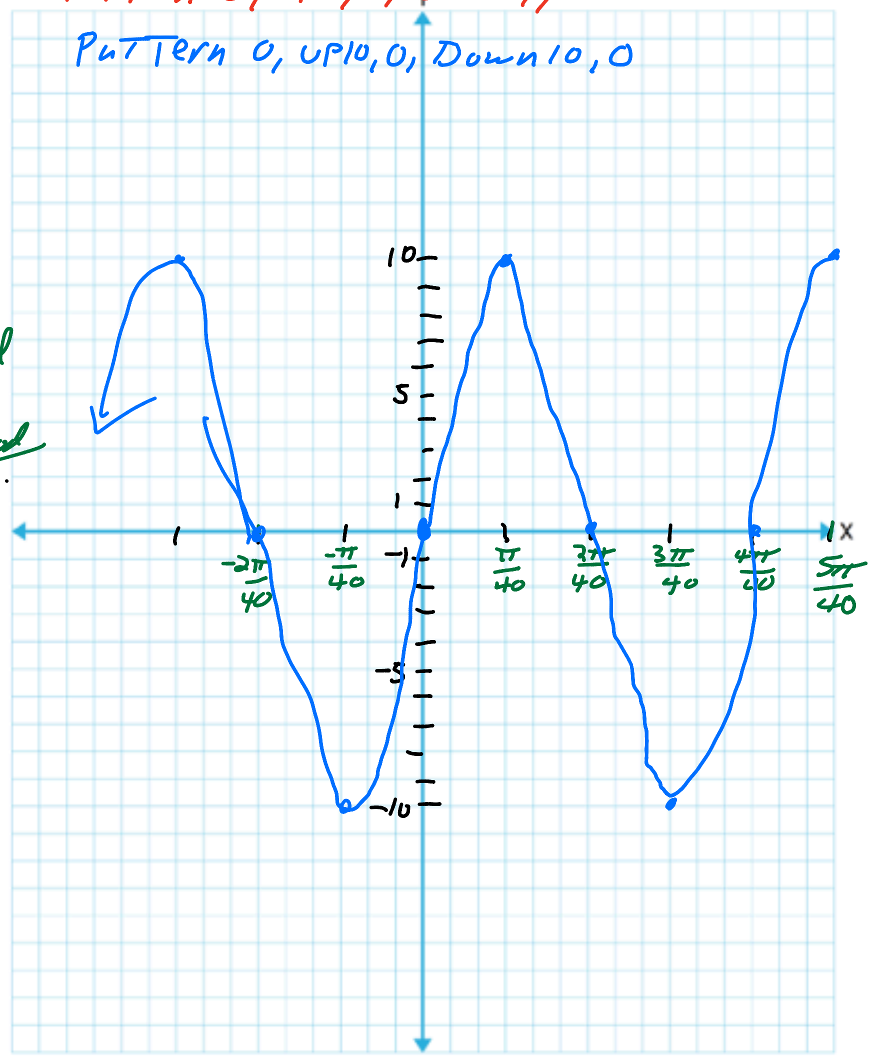
$$x = \frac{\pi}{10} = \text{New period}$$

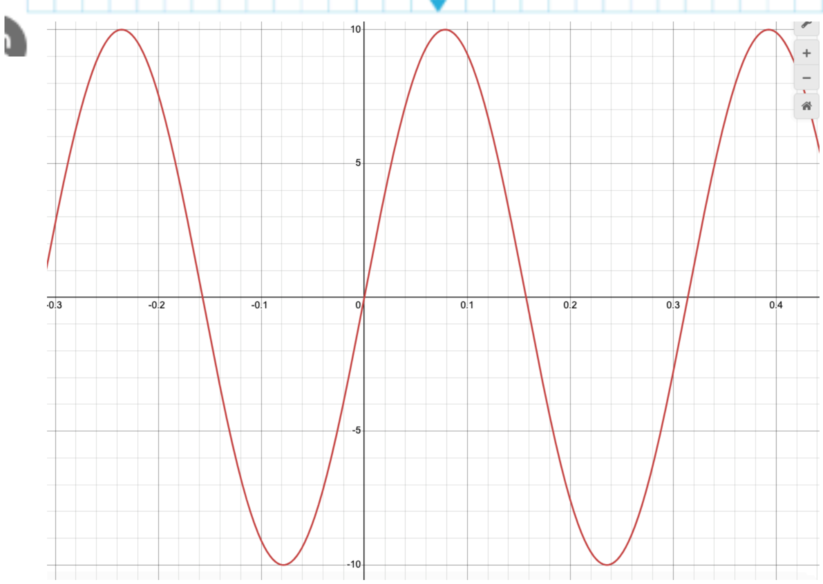
$$\text{New steps} = \frac{\text{New period}}{4}$$

$$= \frac{\frac{\pi}{10}}{\frac{4}{1}} = \frac{\pi}{40}$$

Pattern 0, up 1, 0, Down 1, 0

Pattern 0, up 10, 0, Down 10, 0





$Y = -3\cos(3\pi x + 2) - 4$ ← Drop 4 Down [Range −7, −1]

Flip over x-axis

amp=3

new period $\frac{\cancel{3\pi} x}{\cancel{3\pi}} = \frac{2\pi}{3\pi}$

$x = \frac{2}{3}$ = new period

Steps = $\dfrac{\frac{2}{3}}{\frac{4}{1}} = \frac{2}{12} = \frac{1}{6} = 0.16$

new start

$3\pi x + 2 = 0$

$\quad\;\; -2 \quad -2$

$3\pi x = -2$

$x = \dfrac{-2}{3\pi} = -0.21$

Start = −0.21

Phase shift left

Down 3 from −4

1st step −0.21+0.16= −0.05

Even at y=−4

2nd step −0.05+0.16=0.11

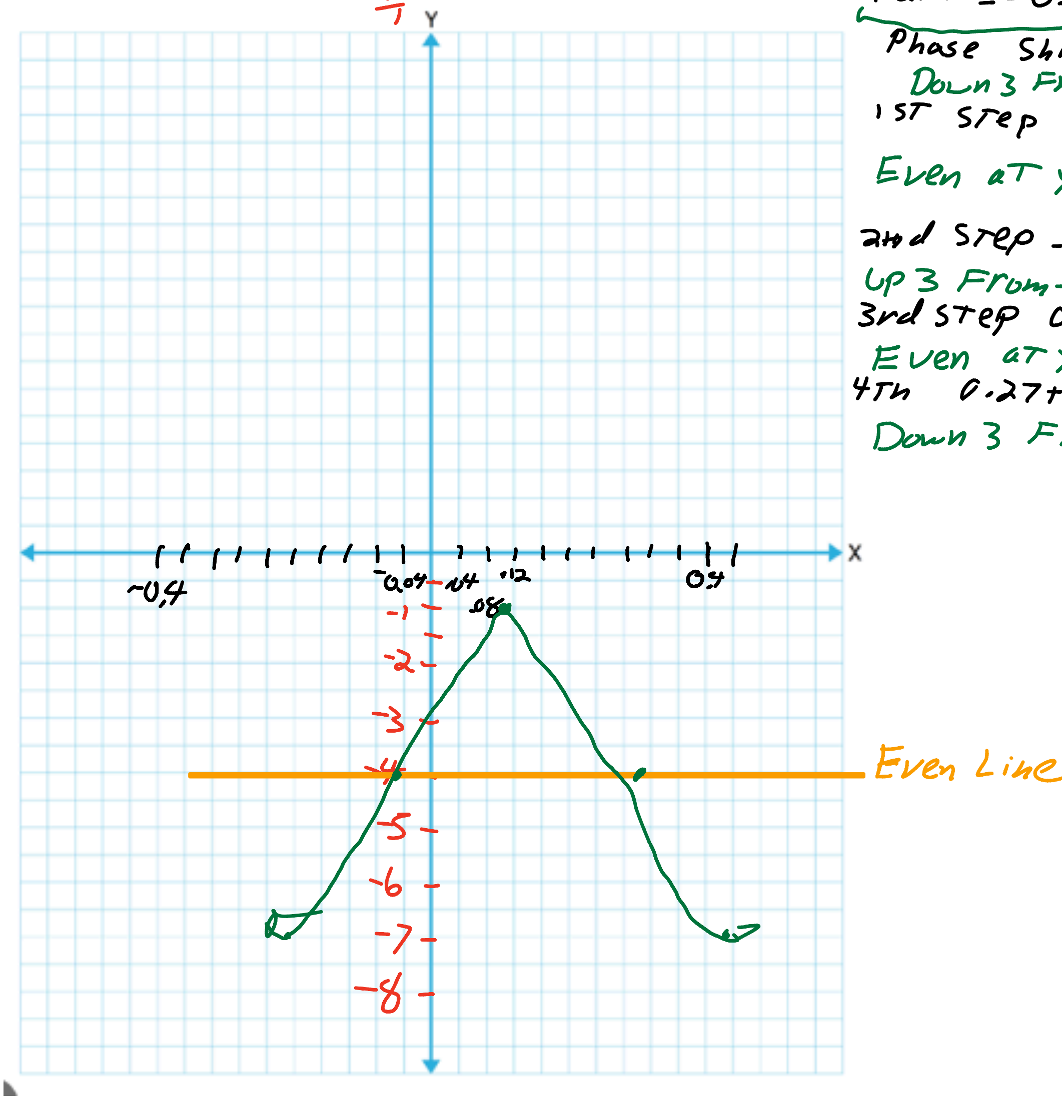
Up 3 from −4

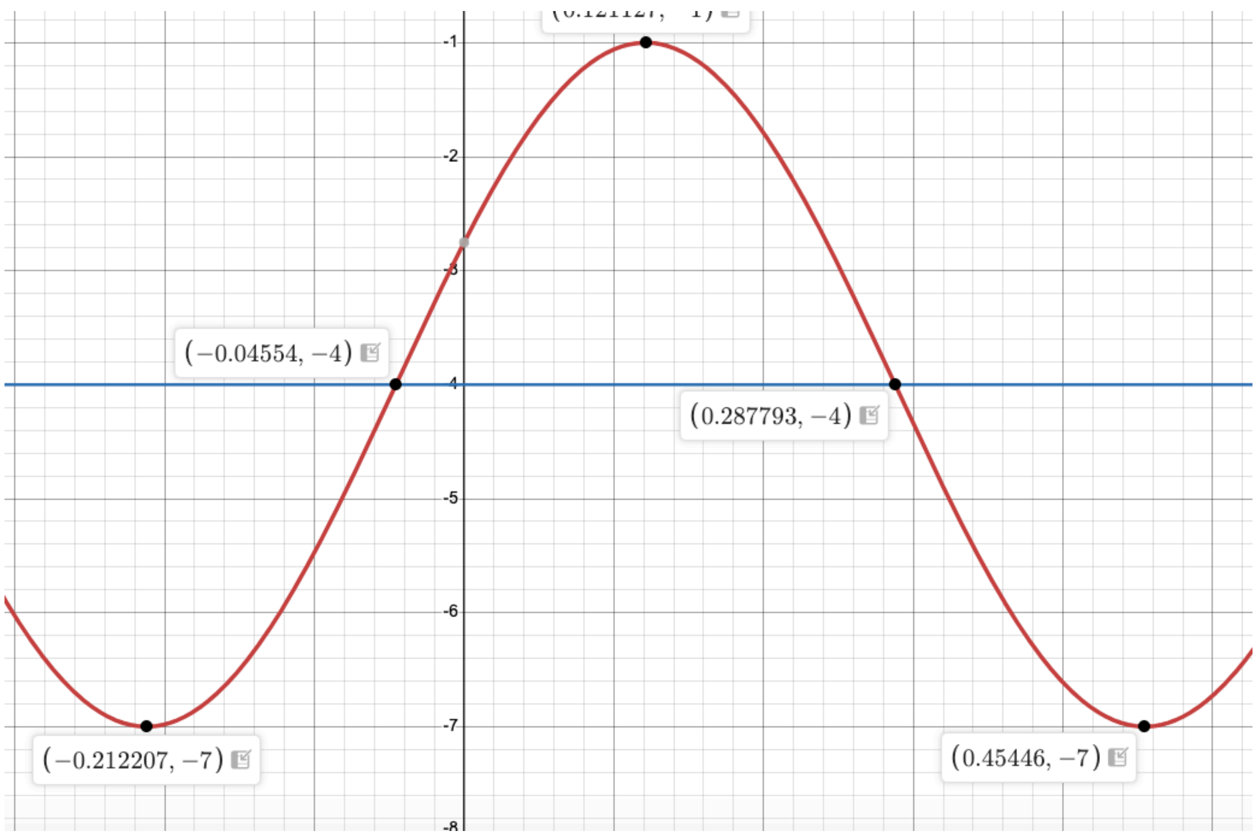
3rd step 0.11+0.16=.27

Even at y=−4

4th 0.27+0.16=.43

Down 3 from −4





Determine the amplitude, period, and phase shift of the function. Graph the function.

$y = -2\,\mathbf{sin}\,(2\pi x - 2\pi)$

Flip over x-axis

amp = 2

Period $2\pi x = 2\pi$

new period $\Rightarrow x = 1$

Phase Shift

$2\pi x - 2\pi = 0$

$+2\pi \quad +2\pi$

$2\pi x = 2\pi$

$x = 1$

Right 1