

If you missed unit circle test, make up by Friday

Anyone can retake it: deadline Tuesday 2/7

Unit Circle Values:

- | | | | |
|--------|--------|--------|---------|
| 1. sin | 4. sec | 7. cot | 10. sec |
| 2. cos | 5. csc | 8. tan | 11. csc |
| 3. cos | 6. tan | 9. sin | 12. sec |

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$$\textcircled{1} \sin \pi \text{ y-value}$$

$$\boxed{0}$$

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$$\textcircled{2} \cos \frac{5\pi}{6} \quad \boxed{\frac{-\sqrt{3}}{2}}$$

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$$\textcircled{3} \cos \frac{\pi}{3} \text{ X-value} \quad \boxed{\frac{1}{2}}$$

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$$\textcircled{4} \sec \frac{\pi}{6} \text{ flip x} \quad \frac{2 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} \quad \boxed{\frac{2\sqrt{3}}{3}}$$

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$$\textcircled{5} \csc \frac{5\pi}{3} \text{ flip y} \quad \frac{-2 \cdot \sqrt{3}}{\sqrt{3} \cdot \sqrt{3}} \quad \boxed{\frac{-2\sqrt{3}}{3}}$$

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⑥ $\tan \frac{2\pi}{3}$ $\frac{y}{x}$ $\frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$ $\boxed{-\sqrt{3}}$

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⑦ $\cot \frac{3\pi}{4}$ $\frac{x}{y}$ $\frac{-\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}}$ $\boxed{-1}$

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⑧ $\tan \frac{5\pi}{4}$ $\frac{-\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}}$ $\boxed{1}$

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⑨ $\sin 0$ y-value $\boxed{0}$

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⑩ $\sec \pi$ flip x $\frac{-1}{\frac{1}{-1}}$ $\boxed{-1}$

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⑪ $\csc \frac{\pi}{4}$ flip y $\frac{2 \cdot \sqrt{2}}{\sqrt{2} \cdot \sqrt{2}}$ $\frac{\cancel{\sqrt{2}}}{\cancel{2}}$ $\boxed{\sqrt{2}}$

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(12) $\sec \frac{\pi}{2}$ flip x $\frac{0}{1}$ flip $\frac{1}{0}$ (undefined)

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4.4 Graphs of Sine and Cosine
 $f(x) = a \sin(bx) + k$

1. Sine goes through (0,0)
2. Sine goes up on the right
3. Sine is odd

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$f(x) = a \cos(bx) + k$

1. Cosine starts high at 1
2. Cosine is even

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Amplitude: The height of the wave
 $f(x) = a \sin(bx) + k$
 (half the distance from the max to min)
 amplitude is never negative

Examples:

a) $f(x) = 3 \cos(2x) + 5$ b) $f(x) = -2 \sin(4x) - 2$
 $a = 3$ $a = 2$

c) $f(x) = \frac{1}{2} \sin(3\pi)$
 $a = \frac{1}{2}$

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Period: One cycle of the wave
 (how long before it repeats)

$\sin x$ or $\cos x$ period 2π

To find the period in a function: $\frac{2\pi}{|b|}$
 b is the # next to x

Examples:

a) $f(x) = -3 \sin(3x) - 4$ b) $f(x) = 2 \cos(\frac{1}{3}\pi x)$

$b = 3$ $\frac{2\pi}{3}$ $b = \frac{1}{3}$ $\frac{2\pi}{\frac{1}{3}}$

Period $\frac{2\pi}{3}$ $\frac{2\pi}{\frac{1}{3}} = 6\pi$

Horizontal Shrink $\frac{2\pi \cdot 3}{\pi} = 6$

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If $|b| > 1$ then it is a horizontal shrink
 a horizontal shrink = period smaller

If $|b| < 1$ then it is a horizontal stretch
 a horizontal stretch = period longer

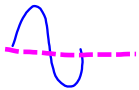
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Midline: The horizontal line that cuts the function in half vertically.

The midline is the vertical shift k

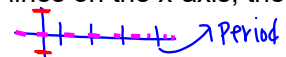
The distance from the midline to the max is the amplitude

The distance from the midline to the min is the amplitude



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Steps to graph:

1. Identify amplitude, period, midline
2. Mark 4 lines on the x-axis, the last one is the period. 
3. Mark amplitude from the midline up and down
4. Determine if the graph is sin or cos

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Recall:

$\sin 0 = 0$

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

$\sin \pi = 0$

$\sin \frac{3\pi}{2} = -1$

$\sin 2\pi = 0$

Then it repeats

$\cos 0 = 1$

$\cos \frac{\pi}{2} = 0$

$\cos \pi = -1$

$\cos \frac{3\pi}{2} = 0$

$\cos 2\pi = 1$

Then it repeats

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Identify the amplitude, period, and midline and then sketch one period of the graph

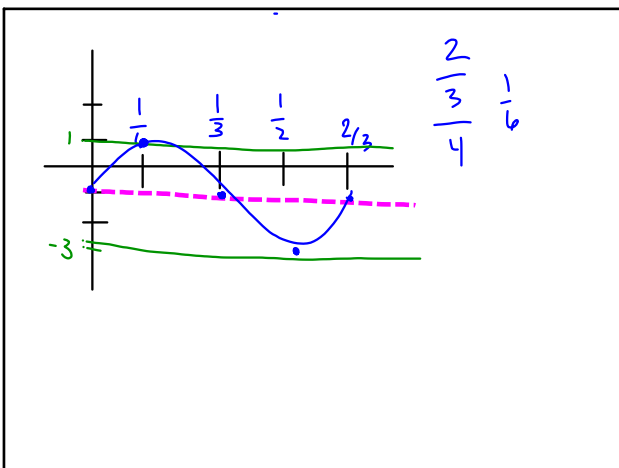
$f(x) = 2\sin(3\pi x) - 1$

amplitude: 2

period: $b = 3\pi \quad \frac{2\pi}{3\pi} \quad \frac{2}{3}$

midline: -1

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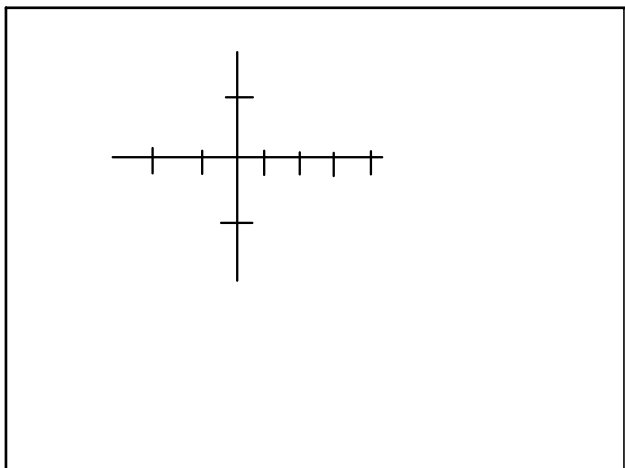
Example 2: $f(x) = -5\cos\left(\frac{1}{2}x\right) + 3$

amplitude: 5

period: $\frac{2\pi}{1/2} \quad 2\pi \cdot \frac{2}{1} \quad 4\pi$

midline: $\frac{1}{2}$

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Example 3:
 Identify the amplitude, period, and midline
 Then write the equation for the function.
 sine or cosine
 amplitude (a)
 period (b) stretch or shrink
 midline (k)

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sine or cosine
 amplitude (a)
 period (b) stretch or shrink
 midline (k)

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