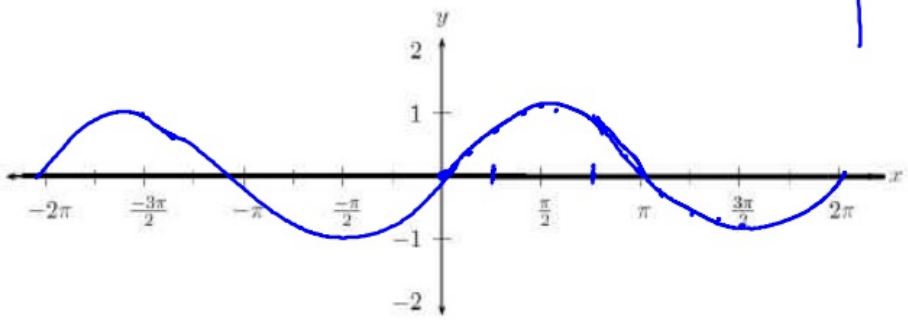
θ	$\sin\theta$
0	0
$\frac{\pi}{6}$	$\frac{1}{2}$
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2} = .707$
$\frac{\pi}{3}$	$\frac{\sqrt{3}}{2} \approx .8660$
$\frac{\pi}{2}$	1
$\frac{2\pi}{3}$	$\frac{\sqrt{3}}{2} \approx .866$
$\frac{3\pi}{4}$	$\frac{\sqrt{2}}{2} \approx .707$
$\frac{5\pi}{6}$	$\frac{1}{2}$
π	0

θ	$\sin\theta$
$\frac{7\pi}{6}$	$-\frac{1}{2}$
$\frac{5\pi}{4}$	$-\frac{\sqrt{2}}{2} \approx -.707$
$\frac{4\pi}{3}$	$-\frac{\sqrt{3}}{2} \approx -.866$
$\frac{3\pi}{2}$	-1

What you'll Learn About

- The basic waves revisited/Sinusoids and Transformations
- Modeling

The graph of y = sin x

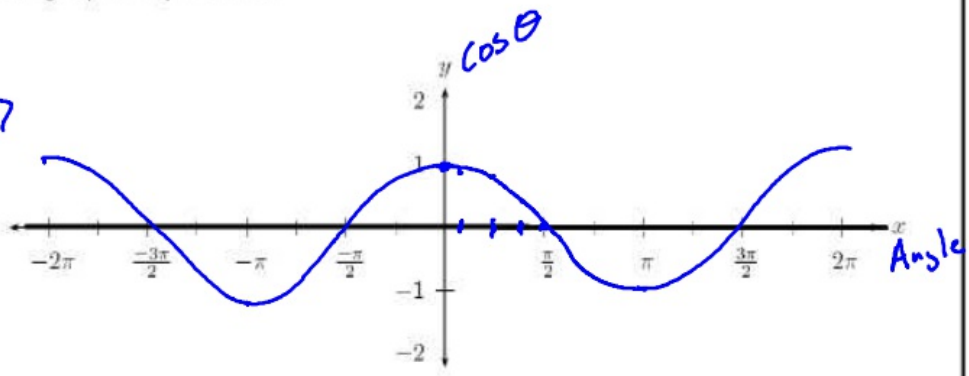


Domain $(-\infty, \infty)$

Range $[-1, 1]$

θ	$\cos\theta$
0	1
$\frac{\pi}{6}$	$\frac{\sqrt{3}}{2} \approx .866$
$\frac{\pi}{4}$	$\frac{\sqrt{2}}{2} \approx .707$
$\frac{\pi}{3}$	$\frac{1}{2}$
$\frac{\pi}{2}$	0
$\frac{2\pi}{3}$	$-\frac{1}{2}$
$\frac{3\pi}{4}$	$-\frac{\sqrt{2}}{2} \approx -.707$
$\frac{5\pi}{6}$	$-\frac{\sqrt{3}}{2} \approx -.866$
π	-1

The graph of y = cos x



$y = A \sin B(x-c)+D$

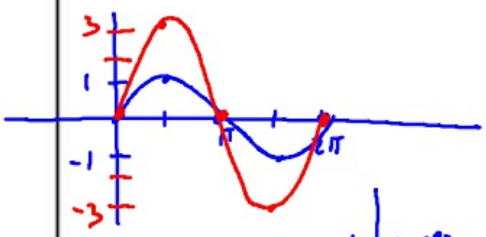
$y = A \cos B(x-c)+D$

Amplitude = $|A|$

Find the amplitude of the function and use the language of transformations to describe how the graph of the function is related to the graph of y = sinx

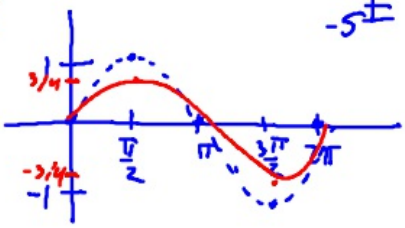
A) y = 3sinx

Amp = 3



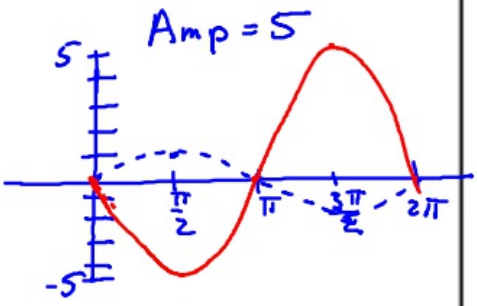
B) $y = \frac{3}{4}\sin x$

Amp = $\frac{3}{4}$



C) y = −5sinx → Reflection over x-axis

Amp = 5



Period of Function: How long the Function takes to repeat itself

$Per = \frac{2\pi}{B}$

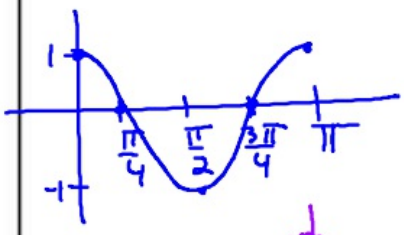
Find the period of the function and use the language of transformations to describe how the graph of the function is related to the graph of y = cosx

A) y = cos(2x)

B = 2

$Per \frac{2\pi}{B}$

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



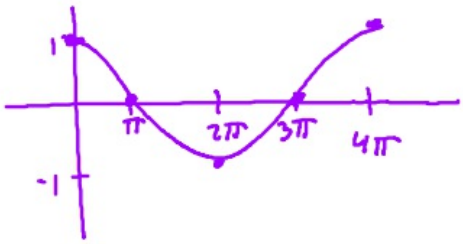
B) $y = \cos\frac{x}{2}$

$B = \frac{1}{2}$

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

$Per \frac{2\pi}{B}$

$\frac{2\pi}{\frac{1}{2}} = 4\pi$



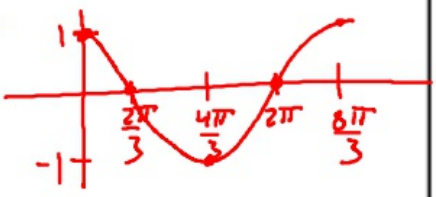
C) $y = \cos\left(\frac{3x}{4}\right)$

$B = \frac{3}{4}$

$\frac{2\pi}{1} \div \frac{3}{4}$

$\frac{2\pi}{1} \cdot \frac{4}{3}$

$Per \frac{2\pi}{B} = \frac{2\pi}{\frac{3}{4}} = \frac{8\pi}{3}$

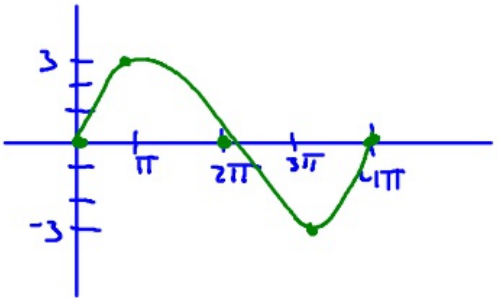


Graph 1 period of the function without using your calculator.

A) $y = 3\sin\frac{x}{2}$ $\quad B = \frac{1}{2}$

Amp = 3

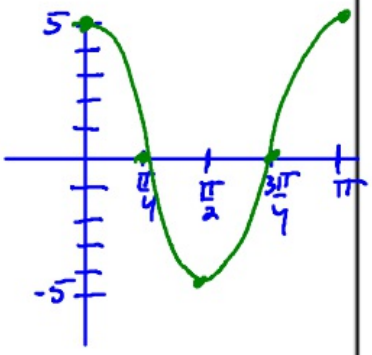
Per $\frac{2\pi}{B} = \frac{2\pi}{\frac{1}{2}} = 4\pi$



$y = 5\cos 2x$

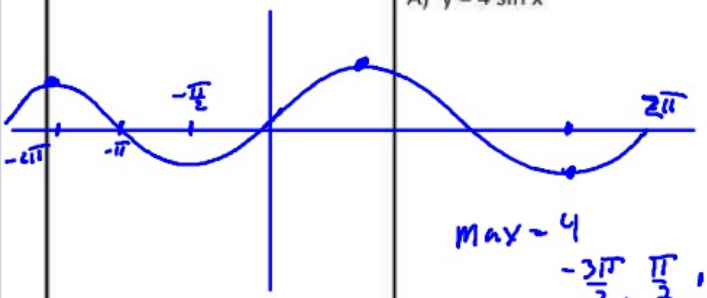
Amp = 5

Per $\frac{2\pi}{B} = \frac{2\pi}{2} = \pi$



Identify the maximum and minimum values and the zeros of the function in the interval $[-2\pi, 2\pi]$. Use your understanding of transformations, not your calculator.

A) y = 4 sin x



max = 4

$-\frac{3\pi}{2}, \frac{\pi}{2}, -6\pi$

min = -4

$\frac{3\pi}{2}, -\frac{\pi}{2}$

Zeros: $\pi, -\pi$

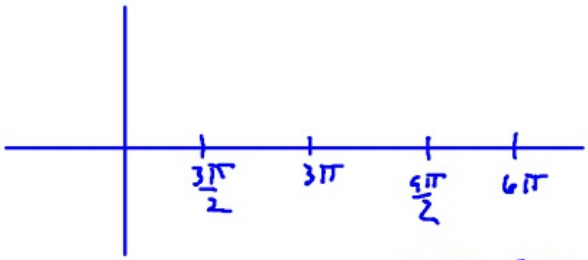
0

$2\pi, -2\pi$

B) $y = -2\cos\frac{x}{3}$

Amp = 2

Per $\frac{2\pi}{B} = \frac{2\pi}{\frac{1}{3}} = 6\pi$



Zeros: $\frac{3\pi}{2}, \frac{9\pi}{2}$

$-\frac{3\pi}{2}, \frac{9\pi}{2}$