

# Sine and Cosine with Dilations

Graphs of Sine and Cosine Functions

Name Key

Determine the amplitude, period, domain and range of each function.

1.  $y = \sin(4x)$  Pd =  $\frac{2\pi}{4} = \frac{\pi}{2}$

Amplitude = 1

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

Domain:  $[0, \frac{\pi}{2}]$

Range:  $[-1, 1]$

2.  $y = 4 \cos(5x)$  Pd =  $\frac{2\pi}{5}$

Amplitude = 4

Period =  $\frac{2\pi}{5}$

Domain:  $[0, \frac{2\pi}{5}]$

Range:  $[-4, 4]$

3.  $y = -3 \sin \theta$  Pd =  $\frac{360}{1} = 360$

Amplitude = 3

Period =  $360^\circ$

Domain:  $[0^\circ, 360^\circ]$

Range:  $[-3, 3]$

4.  $y = 4 \cos(\frac{1}{2}\theta)$  Pd =  $\frac{360}{1/2} = 720$

Amplitude = 4

Period =  $720^\circ$

Domain:  $[0, 720^\circ]$

Range:  $[-4, 4]$

5.  $y = -2 \sin \frac{x}{3}$

Amplitude = 2

Period =  $6\pi$

Domain:  $[0, 6\pi]$

Range:  $[-2, 2]$

6.  $y = 2 \cos(-4\theta)$  Pd =  $\frac{360}{4} = 90$

$y = 2 \cos(4\theta)$

Amplitude = 2

Period =  $90^\circ$

Domain:  $[0^\circ, 90^\circ]$

Range:  $[-2, 2]$

7.  $y = 3 \sin(\frac{2}{3}x)$  Pd =  $\frac{2\pi}{2/3} = 3\pi$

Amplitude = 3

Period =  $3\pi$

Domain:  $[0, 3\pi]$

Range:  $[-3, 3]$

8.  $y = \frac{2}{3} \cos \frac{x}{5}$

Amplitude =  $\frac{2}{3}$

Period =  $10\pi$

Domain:  $[0, 10\pi]$

Range:  $[-\frac{2}{3}, \frac{2}{3}]$

9.  $y = -3 \sin(-6\theta)$

$y = 3 \sin(6\theta)$

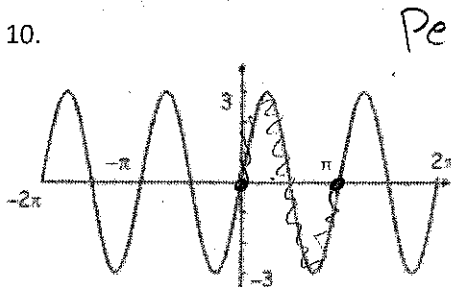
Amplitude = 3

Period =  $60^\circ$

Domain:  $[0^\circ, 60^\circ]$

Range:  $[-3, 3]$

Give the amplitude and period of each function graphed below. Then write an equation of each graph.



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

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

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

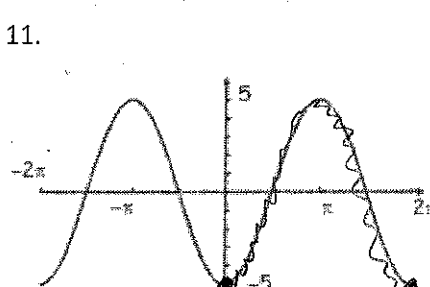
$b = 2$

Amplitude = 3

Period =  $\pi$

Equation:  $y = 3 \sin(2x)$

$y = a \sin bx$   
↓  
pos



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

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

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

$b = 1$

Amplitude = 5

Period =  $2\pi$

Equation:  $y = -5 \cos x$

$y = a \cos bx$   
↓  
neg because it reflects over x-axis

Rewrite the following sine and cosine functions so that the argument is not negative.

S  
+  
-  
C  
-  
+

12.  $y = 3 \sin(-2x)$

$y = -3 \sin(2x)$

13.  $y = -2 \cos(-4\theta)$

$y = -2 \cos(4\theta)$

14.  $y = -\frac{1}{2} \sin\left(-\frac{x}{2}\right)$

$y = \frac{1}{2} \sin\left(\frac{x}{2}\right)$

15.  $y = 3 \cos(-2x)$

$y = 3 \cos(2x)$

16.  $y = -2 \sin(-4\theta)$

$y = 2 \sin(4\theta)$

17.  $y = \cos\left(-\frac{2}{3}\theta\right)$

$y = \cos\left(\frac{2}{3}\theta\right)$

State the amplitude and period for each of the following functions. Then graph one complete period of each, remembering to label the tick divisions and both your horizontal axis and vertical axis. Also state the domain and range of one period using interval notation.

\*\*\* Remember:  $\theta \rightarrow$  degrees and  $x \rightarrow$  radians.

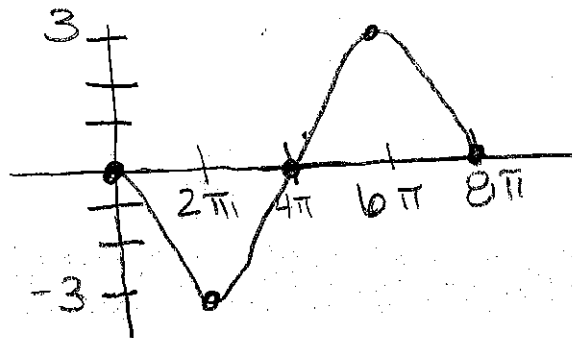
18.  $y = -3 \sin\left(\frac{x}{4}\right)$

$A = |-3| = 3$

$Pd = \frac{2\pi}{1/4} = 2\pi \cdot 4 = 8\pi$

$D: [0, 8\pi]$

$R: [-3, 3]$



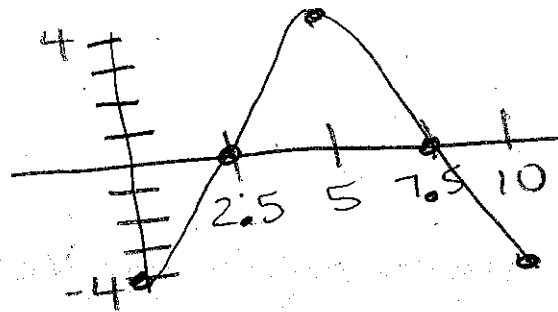
19.  $y = -4 \cos\left(\frac{\pi x}{5}\right)$

$A = |-4| = 4$

$Pd = \frac{2\pi}{\pi/5} = 2\pi \cdot \frac{5}{\pi} = 10$

$D: [0, 10]$

$R: [-4, 4]$



20.  $y = \frac{3}{2} \sin\left(\frac{2\theta}{3}\right)$

$A = \left|\frac{3}{2}\right|$

$Pd = \frac{360}{2/3} = 360 \cdot \frac{3}{2} = 540^\circ$

$D: [0^\circ, 540^\circ]$

$R: \left[-\frac{3}{2}, \frac{3}{2}\right]$

