

Trig Graphing – WS 2

Name Triston

Sine and Cosine Graphs with all Transformations

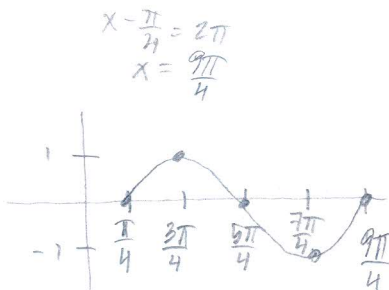
Without graphing, describe in words the relationship between each pair of graphs. Include in your explanation differences you might notice in amplitude, period, reflection, vertical shift, phase shift, etc. (Use vocabulary!)

- 1) $f(x) = \sin x$ and $g(x) = \sin(x - \pi)$ $g(x)$ has a phase shift of π (to the right)
- 2) $f(x) = \cos x$ and $g(x) = \cos(x + \pi)$ $g(x)$ has a phase shift of $-\pi$ (to the left)
- 3) $f(x) = \sin x$ and $g(x) = 4 + \sin x$ $g(x)$ has a vertical shift up 4
- 4) $f(x) = \cos x$ and $g(x) = -6 + \cos 4x$ $g(x)$ has a higher frequency (4 phases in 2π) and has a vertical shift down 6

State the amplitude, period, phase shift and vertical shift of each of the following functions. Then graph one complete period of each, remembering to label the tick divisions on 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. **

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

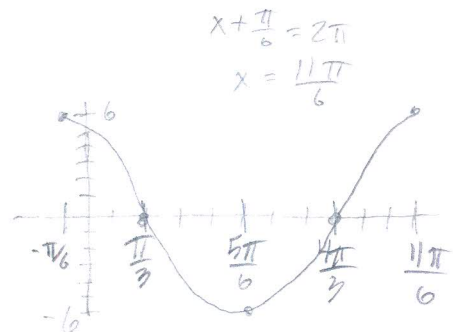
Amp: 1
 period: 2π
 p.s.: $\frac{\pi}{4}$
 v.s.: none
 D: $[\frac{\pi}{4}, \frac{9\pi}{4}]$
 R: $[-1, 1]$



$x - \frac{\pi}{4} = 2\pi$
 $x = \frac{9\pi}{4}$

6) $y = 6 \cos\left(x + \frac{\pi}{6}\right)$

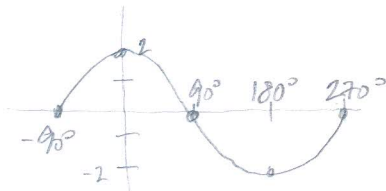
amp: 6
 period: 2π
 p.s.: $-\frac{\pi}{6}$
 v.s.: none
 D: $[-\frac{\pi}{6}, \frac{11\pi}{6}]$
 R: $[-6, 6]$



$x + \frac{\pi}{6} = 2\pi$
 $x = \frac{11\pi}{6}$

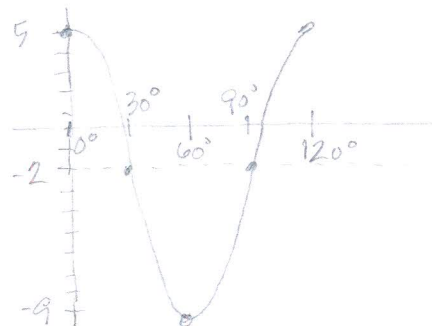
7) $y = 2 \sin(\theta + 90^\circ)$

amp: 2
 period: 360°
 p.s.: -90°
 v.s.: none
 D: $[-90^\circ, 270^\circ]$
 R: $[-2, 2]$



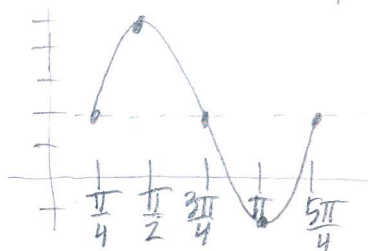
8) $y = 7 \cos 3\theta - 2$

amp: 7
 period: 120°
 p.s.: none
 v.s.: down 2
 D: $[0, 120^\circ]$
 R: $[-9, 5]$



9) $y = 3 \sin\left(2x - \frac{\pi}{2}\right) + 2$

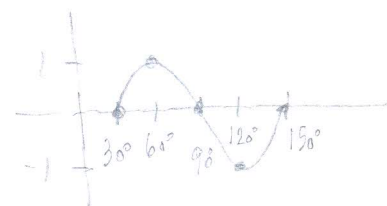
amp: 3
 period: π
 p.s.: $\frac{\pi}{4}$
 v.s.: up 2
 D: $[\frac{\pi}{4}, \frac{5\pi}{4}]$
 R: $[-1, 5]$



$2x - \frac{\pi}{2} = 0$ $2x - \frac{\pi}{2} = 2\pi$
 $2x = \frac{\pi}{2}$ $2x = \frac{5\pi}{2}$
 $x = \frac{\pi}{4}$ $x = \frac{5\pi}{4}$

10) $y = \sin(3\theta - 90^\circ)$

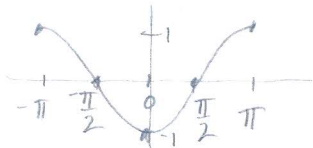
amp: 1
 period: 120°
 p.s.: 30°
 v.s.: none
 D: $[30^\circ, 150^\circ]$
 R: $[-1, 1]$



11) $y = \cos(-x + \pi)$

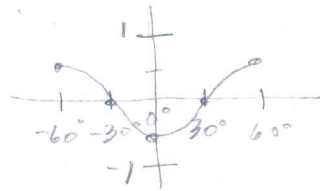
amp: 1
 period: 2π
 p.s.: π
 vs: none
 D: $[-\pi, \pi]$
 R: $[-1, 1]$

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



12) $y = \frac{1}{2} \cos(3\theta + 180^\circ)$

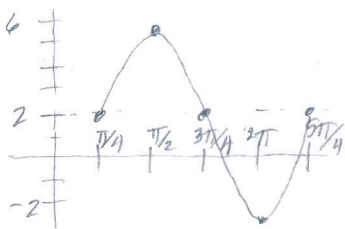
amp: $\frac{1}{2}$
 period: 120°
 ps: -60°
 vs: none
 D: $[-60^\circ, 60^\circ]$
 R: $[-\frac{1}{2}, \frac{1}{2}]$



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

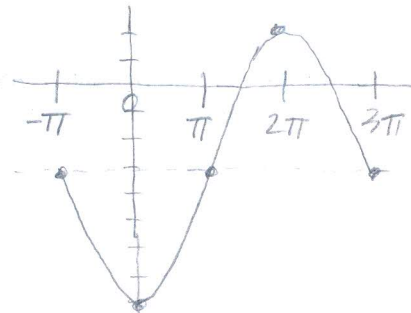
amp: 4
 period: π
 ps: $\frac{\pi}{4}$
 vs: up 2
 D: $[\frac{\pi}{4}, \frac{5\pi}{4}]$
 R: $[-2, 6]$

$2x - \frac{\pi}{2} = 0 \quad 2x - \frac{\pi}{2} = 2\pi$
 $x = \frac{\pi}{4} \quad x = \frac{5\pi}{4}$



14) $y = -5 \sin\left(\frac{x}{2} + \frac{\pi}{2}\right) - 3$

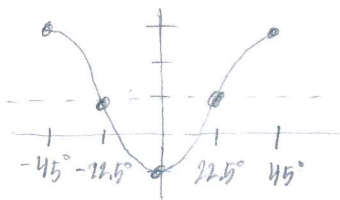
amp: 5
 period: 4π
 ps: $-\pi$
 vs: down 3
 D: $[-\pi, 3\pi]$
 R: $[-8, 2]$



15) $y = 2 \cos(4\theta + 180^\circ) + 1$

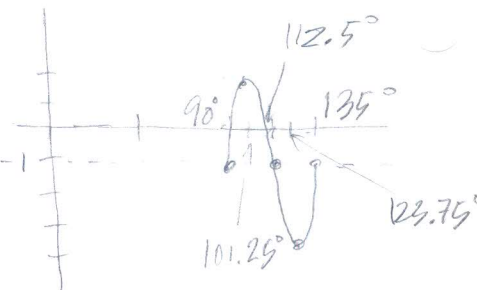
amp: 2
 period: 90°
 ps: -45°
 vs: up 1
 D: $[-45^\circ, 45^\circ]$
 R: $[-1, 3]$

$4\theta + 180 = 0 \quad 4\theta + 180 = 360$
 $\theta = -45^\circ \quad \theta = 45^\circ$



16) $y = 3 \sin(8\theta - 720^\circ) - 1$

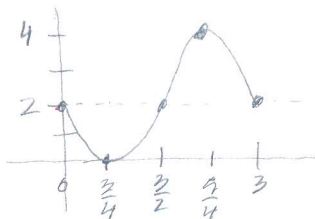
amp: 3
 period: 45°
 ps: 90°
 vs: down 1
 D: $[90^\circ, 135^\circ]$
 R: $[-4, 2]$



17) $y = 2 - 2 \sin \frac{2\pi x}{3}$

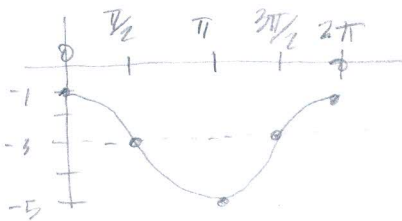
amp: 2
 period: 3
 ps: none
 vs: up 2
 D: $[0, 3]$
 R: $[0, 4]$

$\frac{2\pi x}{3} = 0 \quad \frac{2\pi x}{3} = 2\pi$
 $x = 0 \quad x = 3$



18) $y = 2 \cos x - 3$

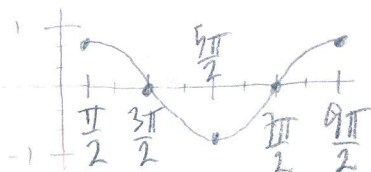
amp: 2
 period: 2π
 ps: 0
 vs: down 3
 D: $[0, 2\pi]$
 R: $[-5, -1]$



19) $y = \frac{2}{3} \cos\left(\frac{x}{2} - \frac{\pi}{4}\right)$

amp: $\frac{2}{3}$
 period: 4π
 ps: $\frac{\pi}{2}$
 vs: none
 D: $[\frac{\pi}{2}, \frac{9\pi}{2}]$
 R: $[-\frac{2}{3}, \frac{2}{3}]$

$\frac{x}{2} - \frac{\pi}{4} = 0 \quad \frac{x}{2} - \frac{\pi}{4} = 2\pi$
 $x = \frac{\pi}{2} \quad x = \frac{9\pi}{2}$



20) $y = -3 \cos(6x + \pi) - 2$

amp: 3
 period: $\frac{\pi}{3}$
 ps: $-\frac{\pi}{6}$
 vs: down 2
 D: $[-\frac{\pi}{6}, \frac{\pi}{6}]$
 R: $[-5, -1]$

