

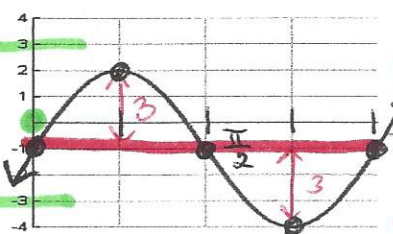
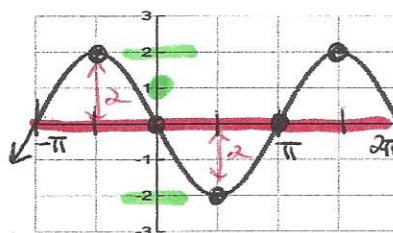
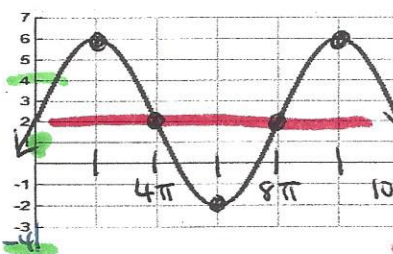
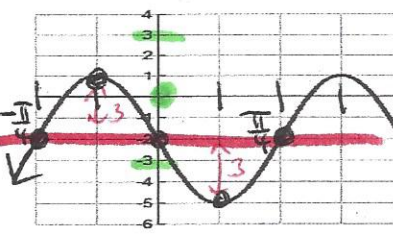
# Angles, UC, Trig Graphs/Equations – Writing Sine/Cosine Equations

**Sine Function** →  $y = a \sin(bx \pm c) \pm d$       **Cosine Function** →  $y = a \cos(bx \pm c) \pm d$

where use the following "formulas" to find each parameter (the value of each letter):

$a = \text{amplitude}$      $b = \frac{2\pi}{\text{period}}$      $c = -b \cdot \text{phshift}$      $d = \begin{cases} \text{up} = +d \\ \text{down} = -d \end{cases}$

**Examples:** Write the equation for the appropriate function.

Given Info	Function	Work to Find a, b, c, and d	Equation for Function
a.) amplitude = 4, period = $\frac{\pi}{3}$ , left by $\frac{\pi}{2}$ up by 5	sine	$a = 4$ $b = \frac{2\pi}{\frac{\pi}{3}} = 6$ $c = -6 \cdot -\frac{\pi}{2} = 3\pi$ $d = 5$	$y = 4 \sin(6x + 3\pi) + 5$
b.) amplitude = 1, period = $4\pi$ , right by $2\pi$ , down by 3	cosine	$a = 1$ $b = \frac{2\pi}{4\pi} = \frac{1}{2}$ $c = -\frac{1}{2} \cdot 2\pi = -\pi$ $d = -3$	$y = \cos(\frac{1}{2}x - \pi) - 3$
c.)  amp = 3 period = $\pi$ pshft = none vshift = down 1 $y = \sin x$		$a = 3$ $b = \frac{2\pi}{\pi} = 2$ $c = 0$ $d = -1$	$y = 3 \sin(2x) - 1$
d.)  amp = 2 period = $2\pi$ pshft = left $\frac{\pi}{2}$ vshift = none $y = \cos x$		$a = 2$ $b = \frac{2\pi}{2\pi} = 1$ $c = -1 \cdot -\frac{\pi}{2} = \frac{\pi}{2}$ $d = 0$	$y = 2 \cos(x + \frac{\pi}{2})$
e.)  amp = 4 period = $8\pi$ pshft = right $\frac{\pi}{2}$ vshift = up 2 $y = \cos x$		$a = 4$ $b = \frac{2\pi}{8\pi} = \frac{1}{4}$ $c = -\frac{1}{4} \cdot 2\pi = -\frac{\pi}{2}$ $d = 2$	$y = 4 \cos(\frac{1}{4}x - \frac{\pi}{2}) + 2$
f.)  amp = 3 period = $\frac{\pi}{2}$ pshft = left $\frac{\pi}{4}$ vshift = down 2 $y = \sin x$		$a = 3$ $b = \frac{2\pi}{\frac{\pi}{2}} = 4$ $c = -4 \cdot -\frac{\pi}{4} = \pi$ $d = -2$	$y = 3 \sin(4x + \pi) - 2$