Sin/Cos Transformations Homework

For each function, state the amplitude, period, intervals, horizontal shift and vertical shift, and mimdline. Then graph one period.

1. $y = 6\sin 2\theta - 4$

amplitude $= 6$

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

intervals : $\frac{\pi}{4}$

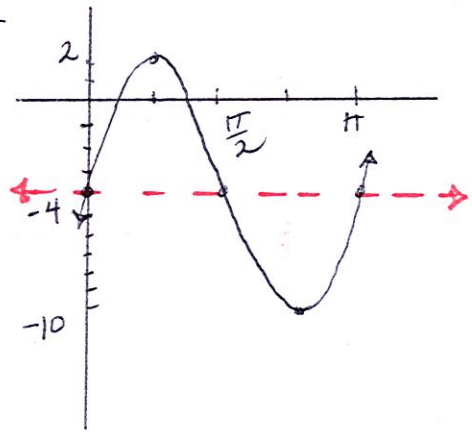
phase shift : none

midline : $y = -4$

MAX : $-4 + 6 = 2$

MIN : $-4 - 6 = -10$

θ	$\sin\theta$
0	-4
$\pi/4$	2
$\pi/2$	-4
$3\pi/4$	-10
π	-4



2. $y = 4\cos\left(4\theta - \frac{\pi}{2}\right) + 3$

amplitude $= 4$

midline $= 3$

MAX $= 3 + 4 = 7$

MIN $= 3 - 4 = -1$

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

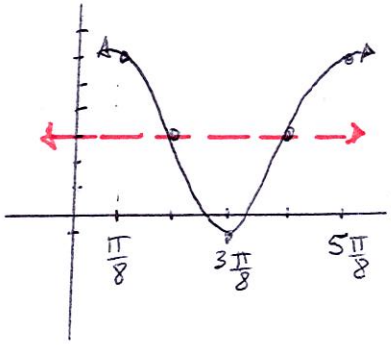
intervals : $\frac{\pi}{8}$

phase shift : $4\theta - \frac{\pi}{2} = 0$

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

$\theta = \frac{\pi}{8}$

θ	$\cos\theta$
$\frac{\pi}{8}$	7
$\pi/4$	4
$3\pi/8$	-1
$\pi/2$	4
$5\pi/8$	7



3. $y = 5\sin\left(\theta + \frac{\pi}{4}\right)$

amp $= 5$

MID $= 0$

MAX $= 5$

MIN $= -5$

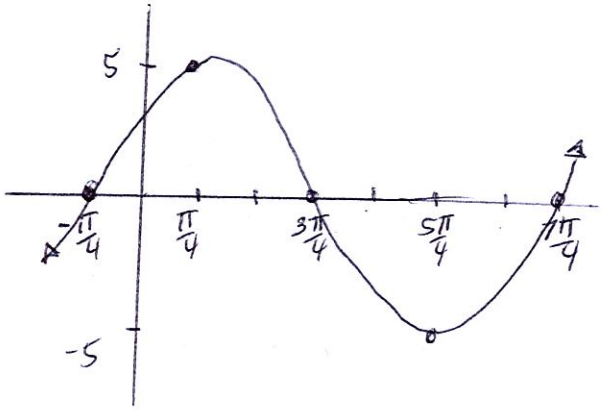
period $= 2\pi$

intervals : $\frac{2\pi}{4} = \frac{\pi}{2}$

phase shift : $\theta + \frac{\pi}{4} = 0$

$\theta = -\frac{\pi}{4}$

	θ	$\sin\theta$
	$-\pi/4$	0
$+\pi/2$	$\pi/4$	5
$+\pi/2$	$3\pi/4$	0
$+\pi/2$	$5\pi/4$	-5
$+\pi/2$	$7\pi/4$	0



4. $y = -6\cos(2\theta - \pi)$ Reflection!

amplitude $= 6$

midline $= 0$

MAX $= 6$

MIN $= -6$

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

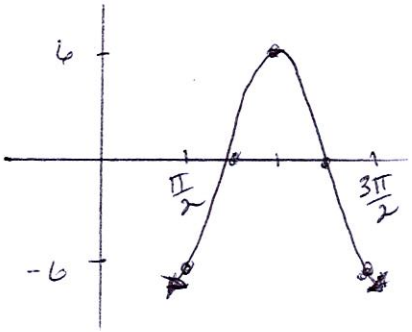
intervals : $\frac{\pi}{4}$

phase shift : $2\theta - \pi = 0$

$2\theta = \pi$

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

	θ	$\cos\theta$
	$\frac{\pi}{2}$	-6
$+\frac{\pi}{4}$	$\frac{3\pi}{4}$	0
$+\frac{\pi}{4}$	π	6
$+\frac{\pi}{4}$	$\frac{5\pi}{4}$	0
$+\frac{\pi}{4}$	$\frac{3\pi}{2}$	-6



Sin/Cos Transformations Homework

For each function, state the amplitude, period, intervals, horizontal shift and vertical shift, and mimdline. Then graph one period.

1. $y = 6\sin 2\theta - 4$

amplitude $= 6$

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

intervals : $\frac{\pi}{4}$

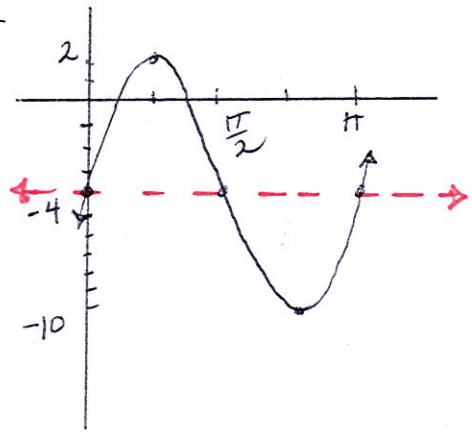
phase shift : none

midline : $y = -4$

MAX : $-4 + 6 = 2$

MIN : $-4 - 6 = -10$

θ	$\sin\theta$
0	-4
$\pi/4$	2
$\pi/2$	-4
$3\pi/4$	-10
π	-4



2. $y = 4\cos\left(4\theta - \frac{\pi}{2}\right) + 3$

amplitude $= 4$

midline $= 3$

MAX $= 3 + 4 = 7$

MIN $= 3 - 4 = -1$

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

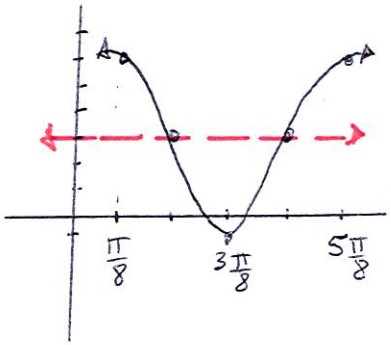
intervals : $\frac{\pi}{8}$

phase shift : $4\theta - \frac{\pi}{2} = 0$

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

$\theta = \frac{\pi}{8}$

θ	$\cos\theta$
$\frac{\pi}{8}$	7
$\pi/4$	4
$3\pi/8$	-1
$\pi/2$	4
$\frac{5\pi}{8}$	7



3. $y = 5\sin\left(\theta + \frac{\pi}{4}\right)$

amp $= 5$

MID $= 0$

MAX $= 5$

MIN $= -5$

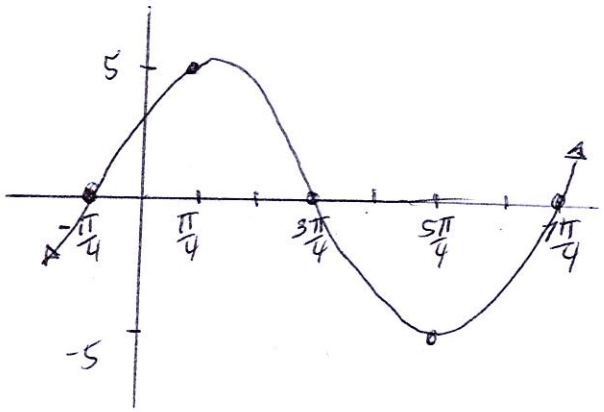
period $= 2\pi$

intervals : $\frac{2\pi}{4} = \frac{\pi}{2}$

phase shift : $\theta + \frac{\pi}{4} = 0$

$\theta = -\frac{\pi}{4}$

	θ	$\sin\theta$
	$-\pi/4$	0
$+\pi/2$	$\pi/4$	5
$+\pi/2$	$3\pi/4$	0
$+\pi/2$	$5\pi/4$	-5
$+\pi/2$	$7\pi/4$	0



4. $y = -6\cos(2\theta - \pi)$ Reflection!

amplitude $= 6$

midline $= 0$

MAX $= 6$

MIN $= -6$

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

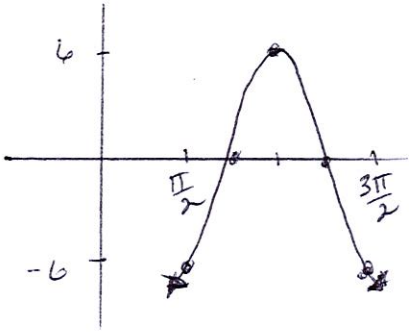
intervals : $\frac{\pi}{4}$

phase shift : $2\theta - \pi = 0$

$2\theta = \pi$

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

	θ	$\cos\theta$
	$\frac{\pi}{2}$	-6
$+\frac{\pi}{4}$	$\frac{3\pi}{4}$	0
$+\frac{\pi}{4}$	π	6
$+\frac{\pi}{4}$	$\frac{5\pi}{4}$	0
$+\frac{\pi}{4}$	$\frac{3\pi}{2}$	-6



5. $y=-2\sin\left(3\theta-\frac{\pi}{4}\right)$

amplitude $=2$

midline $=0$

MAX $=2$

MIN $=-2$

Reflection

period $=2\pi/3$

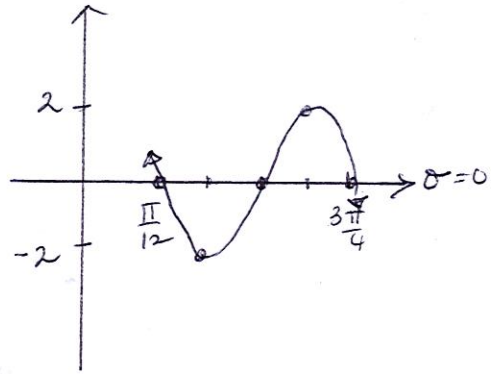
intervals: $\frac{2\pi}{3\cdot 4}=\frac{2\pi}{12}=\frac{\pi}{6}$

phase shift: $3\theta-\frac{\pi}{4}=0$

$3\theta=\frac{\pi}{4}$

$\theta=\frac{\pi}{4\cdot 3}=\frac{\pi}{12}$

	θ	$\sin\theta$
	$\frac{\pi}{12}$	0
$+\frac{\pi}{6}$	$\frac{\pi}{4}$	-2
$+\frac{\pi}{6}$	$5\pi/12$	0
$+\frac{\pi}{6}$	$7\pi/12$	2
	$3\pi/4$	0



6. $y=\cos\left(\frac{2}{3}\theta+\frac{\pi}{2}\right)-5$

amplitude $=1$

midline $=-5$

MAX $=-5+1=-4$

MIN: $-5-1=-6$

period: $\frac{2\pi}{\frac{2}{3}}=2\pi\times\frac{3}{2}=3\pi$

intervals: $\frac{3\pi}{4}$

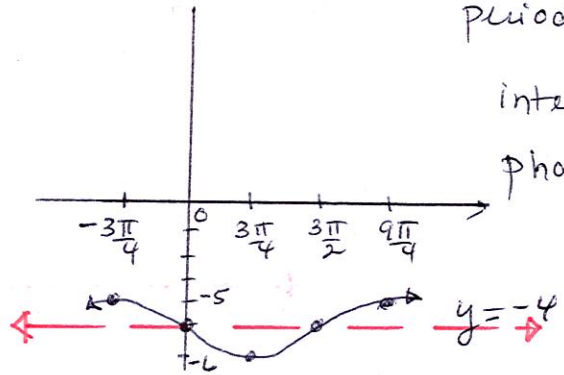
phase shift:

$\frac{2}{3}\theta+\frac{\pi}{2}=0$

$\frac{2}{3}\theta=-\frac{\pi}{2}$

$\theta=-\frac{\pi}{2}\cdot\frac{3}{2}$

$\theta=-\frac{3\pi}{4}$



	θ	$\cos\theta$
	$-\frac{3\pi}{4}$	-4
$+\frac{3\pi}{4}$	0	-5
	$\frac{3\pi}{4}$	-6
	$\frac{3\pi}{2}$	-5
	$\frac{9\pi}{4}$	-4

7. $y=3\sin\left(\frac{1}{4}\theta-\frac{2\pi}{3}\right)+1$

amplitude $=3$

midline $=1$

MAX $=1+3=4$

MIN $=1-3=-2$

period $=\frac{2\pi}{\frac{1}{4}}=2\pi\times\frac{4}{1}=8\pi$

intervals: $\frac{8\pi}{4}=2\pi$

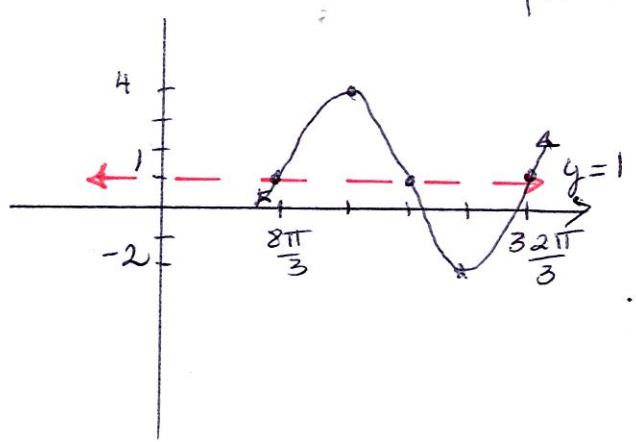
phase shift: $\frac{1}{4}\theta-\frac{2\pi}{3}=0$

$\frac{1}{4}\theta=\frac{2\pi}{3}$

$\theta=\frac{2\pi}{3}\times\frac{4}{1}$

$\theta=\frac{8\pi}{3}$

	θ	$\sin\theta$
	$\frac{8\pi}{3}$	1
$+2\pi$	$\frac{14\pi}{3}$	4
$+2\pi$	$\frac{20\pi}{3}$	1
$+2\pi$	$\frac{26\pi}{3}$	-2
$+2\pi$	$\frac{32\pi}{3}$	1



8. $y=-3\cos\left(2\theta+\frac{\pi}{6}\right)$

amp $=3$

Reflection

mid $=0$

MAX $=3$, MIN $=-3$

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

intervals: $\pi/4$

phase shift: $2\theta+\frac{\pi}{6}=0$

$2\theta=-\frac{\pi}{6}$

$\theta=-\pi/12$

	θ	$\cos\theta$
	$-\pi/12$	-3
$+\frac{\pi}{4}$	$+\pi/6$	0
$+\frac{\pi}{4}$	$5\pi/12$	3
$+\frac{\pi}{4}$	$2\pi/3$	0
$+\frac{\pi}{4}$	$11\pi/12$	-3