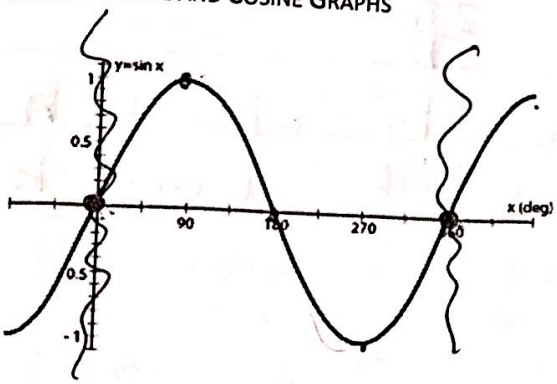
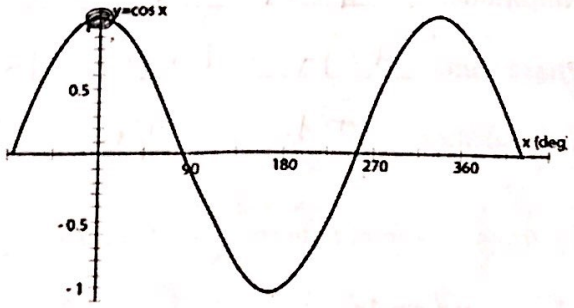
DAY 4 – GRAPHING AND EVALUATING

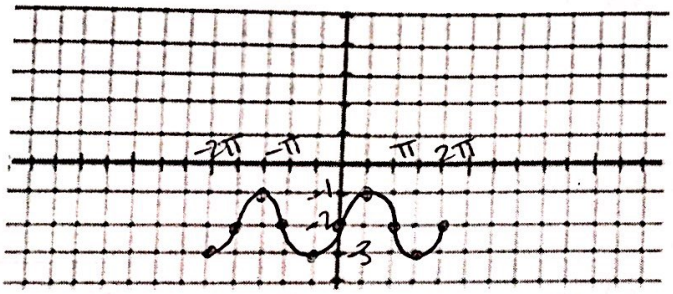
REVIEWING SINE AND COSINE GRAPHS



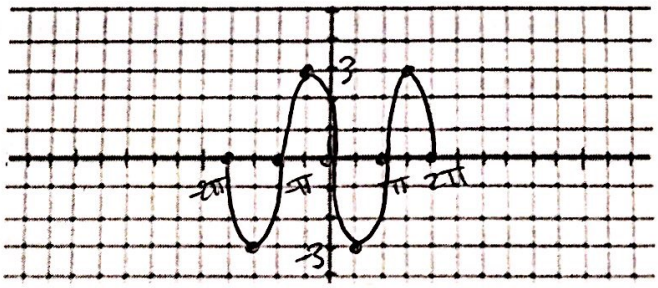


Use your knowledge of ***basic transformations*** to graph the following (LABEL THE AXES appropriately):

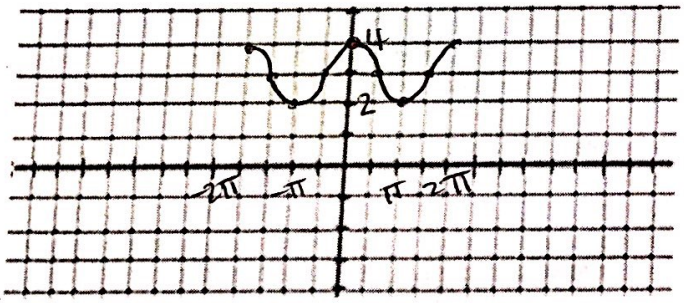
1) $y = \sin x - 2$



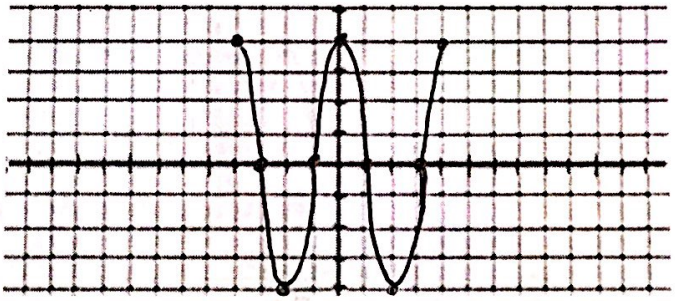
2) $y = -3\sin x$



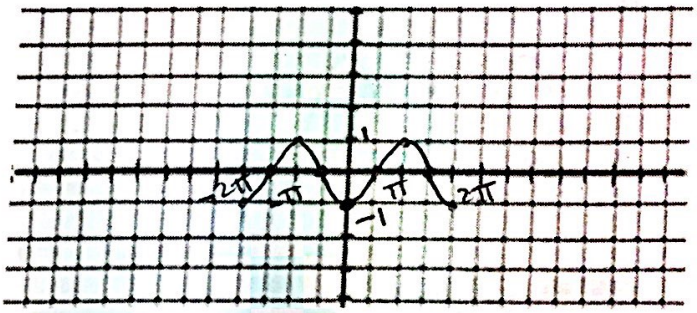
3) $y = \cos x + 3$



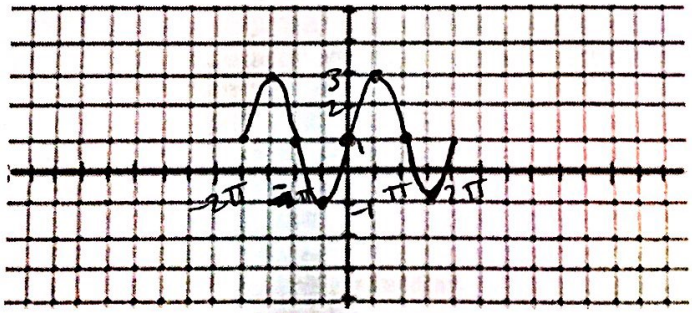
4) $y = 4\cos x$



5) $y = -\cos x$



6) $y = 2\sin x + 1$



Basic Form: $y = a\sin(bx-h)+k$ { $y = a\cos(bx-h)+k$

Amplitude: $|a|$ *always positive* **Period:** $\frac{2\pi}{b}$

Phase Shift: ⊕h = LEFT h units, ⊖h = RIGHT h

Vertical Shift: ⊕k = up k units, ⊖k = down k

Determine the amplitude and period of each function.

1. $y = \sin 4x$

Amplitude = 1

Period = $\pi/2$ $\frac{2\pi}{4}$

2. $y = \cos 5x$

Amplitude = 1

Period = $2\pi/5$

3. $y = \sin x$

Amplitude = 1

Period = 2π

4. $y = 4\cos x$

Amplitude = 4

Period = 2π

5. $y = -2\sin x$

Amplitude = 2

Period = 2π

6. $y = 2\sin(-4x)$

Amplitude = 2

Period = $\pi/2$ $\frac{2\pi}{4}$

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

Amplitude = 3

Period = 3π $\frac{2\pi}{2/3}$

8. $y = -4\cos 5x$

Amplitude = 4

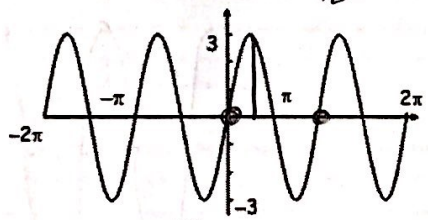
Period = $2\pi/5$

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

Amplitude = 3

Period = π $\frac{2\pi}{2}$

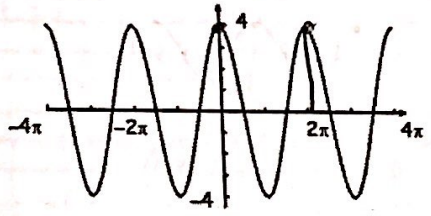
10. $2\pi \cdot \frac{3}{2}$



Amplitude = 3

Period = π

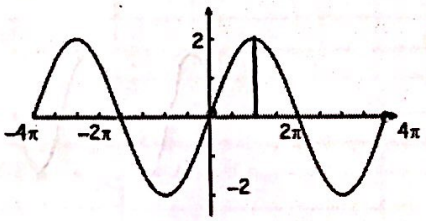
11.



Amplitude = 4

Period = 2π

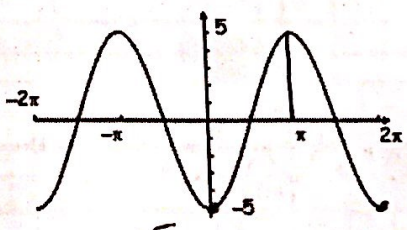
12.



Amplitude = 2

Period = 4π

13.



Amplitude = 5

Period = 2π

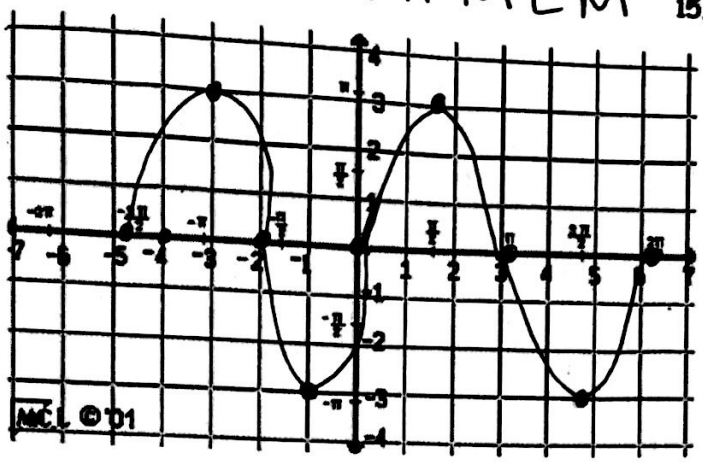
5 Key Points of Sine Curves: Middle, High, Middle, Low, Middle

5 Key Points of Cosine Curves: High, Middle, Low, Middle, High

* ⊖ means switch order of High / Low

Give the amplitude and period of each function.
Then sketch the graph of the function over $-2\pi \le x \le 2\pi$ using the key points for each function.

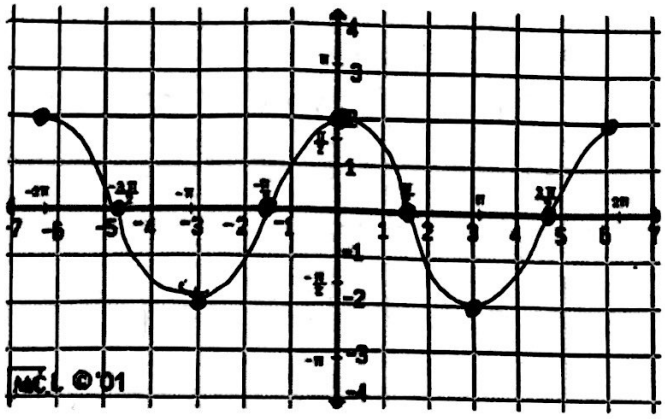
14. $y = 3 \sin x$ M H M L M



Amplitude = 3

Period = 2π

15. $y = 2 \cos x$ H M L M H



Amplitude= 2

Period= 2π

Determine the amplitude, period, phase shift, and vertical shift of each function.

1. $y = -\cos\frac{x}{2}$

amp=1 per $= \frac{2\pi}{1/2} = 4\pi$

no shifts

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

amp = 1 per = 2π

right $\frac{\pi}{2}$ no V.S.

3. $y = -5\cos\left[\frac{1}{3}(x-2)\right]$

amp=5 per= 6π

right $\frac{2}{3}$ no V.S.

5. $y = \frac{1}{2}\sin(2x-1)+3$

amp=1/2 per= π

right 1 up 3

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

amp=3 per=2

right 2 no V.S.

7. $y = \cos \pi x - 2$

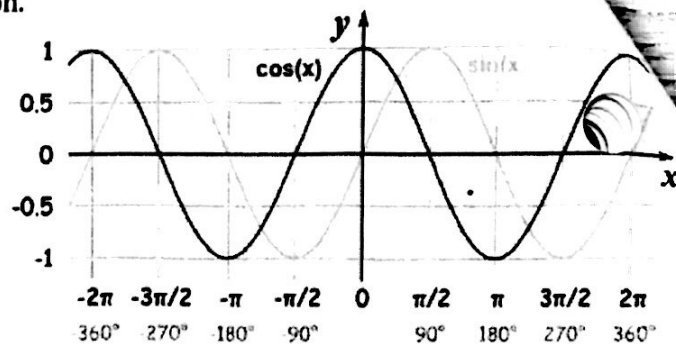
amp=1 per=2

down 2 no P.S.

8. Write the cosine function as a phase shift of the sine function.

$\cos\theta = \sin\left(\theta + \frac{\pi}{2}\right)$

or $\sin\left(\theta - \frac{3\pi}{2}\right)$

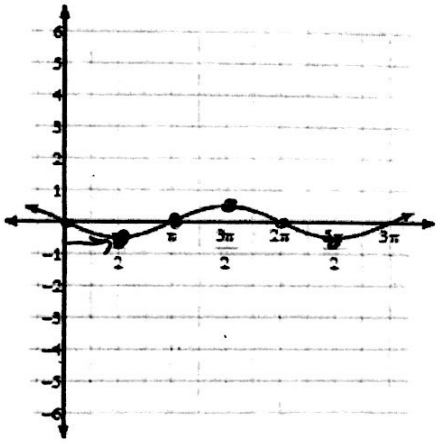


9. Write the sine function as a phase shift of the cosine function.

$\sin\theta = \cos(\theta - \pi/2)$

or $\cos(\theta + 3\pi/2)$

10. Write the equation of the following cosine function:

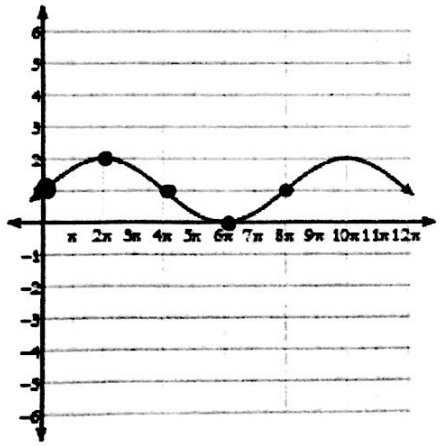


$y = \frac{-1}{2}\cos\left(x - \frac{\pi}{2}\right)$

flip amp = 1/2

per = 2π

11. Write the equation of the following sine function:



$y = \sin\left(\frac{\theta}{4}\right) + 1$

amp = 1

up 1

per = $\frac{8\pi}{1} = \frac{2\pi}{b}$

$8\pi b = 2\pi$

$8b = 2$

$b = \frac{1}{4}$

USING THE UNIT CIRCLE TO EVALUATE TRIG FUNCTIONS:

We can answer questions, giving EXACT (non-decimal) values, for questions involving the angles listed on the unit circle. Each coordinate on the Unit Circle represents

$(\cos\theta, \sin\theta)$

x y

Ex 1: Find the exact value of $(\sin 45°)(\cos 60°)$.

$(\sqrt{2}/2)(1/2) = \frac{\sqrt{2}}{4}$

Ex 2: What is $\frac{\sin\theta}{\cos\theta}$? $\tan\theta$

Ex 3: Find the exact value of $\tan 60°$.

$\frac{\sin(60°)}{\cos(60°)} = \sqrt{3} \leftarrow \frac{y}{x}$

You try: *(You will ultimately need to do this on the test WITHOUT being given the circle and WITHOUT a calculator, so you should figure out a method for approaching the problems without any resources!)*

1. $\sin\left(\frac{5\pi}{6}\right)$ $1/2$
2. $\cos\left(\frac{5\pi}{3}\right)$ $1/2$
3. $\sin\left(\frac{-5\pi}{4}\right)$ $\sqrt{2}/2$
4. $\cos\left(\frac{3\pi}{4}\right)$ $-\sqrt{2}/2$
5. $\sin\left(\frac{11\pi}{3}\right)$ $-\sqrt{3}/2$
6. $\cos\left(\frac{5\pi}{2}\right)$ 0
7. $\cos\left(\frac{-4\pi}{3}\right)$ $-1/2$
8. $\sin\left(\frac{-2\pi}{3}\right)$ $-\sqrt{3}/2$
9. $\sin\left(\frac{15\pi}{4}\right)$ $-\sqrt{2}/2$
10. $\cos\left(\frac{7\pi}{6}\right)$ $-\sqrt{3}/2$
11. $\sin\left(\frac{3\pi}{2}\right)$ -1
12. $\cos(-\pi)$ -1
13. $\tan\left(\frac{5\pi}{4}\right)$ 1
14. $\tan\left(\frac{-\pi}{3}\right)$ $-\sqrt{3}$
15. $\tan\left(\frac{7\pi}{6}\right)$ $\frac{\sqrt{3}}{3}$
16. $\tan(\pi)$ 0
17. $\tan\left(\frac{2\pi}{3}\right)$ $-\sqrt{3}$
18. $\tan\left(\frac{\pi}{2}\right)$ undefined
19. $\tan\left(\frac{7\pi}{4}\right)$ -1
20. $\tan\left(\frac{11\pi}{6}\right)$ $-\frac{\sqrt{3}}{3}$