Name:_____ Name:_____

**HW 4.2 Changing the Period of Sine and Cosine Functions**

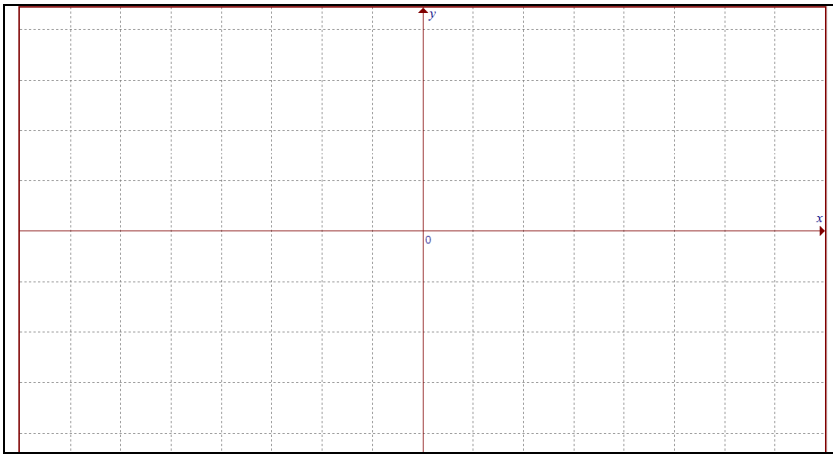
1. Indicate the transformations for each of the following equations:

| | |
|---|---|
| a) $y = \cos\theta \rightarrow y = -4\cos 3\theta$ | b) $y = \cos\theta \rightarrow -4\cos\frac{\theta}{3} + 5$ |
| c) $y = \sin\theta \rightarrow y = \cos^2\theta - 3\sin\theta\cos\theta + \sin^2\theta$ | d) $y = \cos\theta \rightarrow 3\cos^2\theta - 3\sin^2\theta$ |
| e) $y = \cos\theta \rightarrow y = \cos^2\theta + 2$ | f) $y = \sin\theta \rightarrow y = 4\sin^2\theta - 3$ |

2. Indicate the period for each of the following functions:

| | |
|---|---|
| a) $y = 3\cos\frac{3\theta}{2} + 1$ | b) $y = 2\sin 3\theta - 4$ |
| c) $y = 3\sin 2\theta\cos 2\theta$ | d) $y = \cos^2 3\theta - \sin^2 3\theta$ |
| e) $y = \sqrt{\frac{1-\cos\theta}{2}}$ | f) $y = \frac{\sin\theta}{1+\cos\theta}$ |

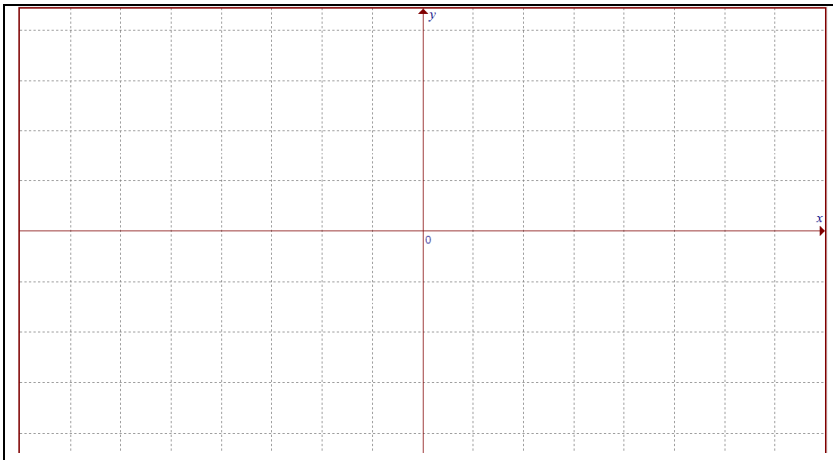
3. Graph the function on the graph provided. Set and label the increments to have at least two cycle of the function: $y = 3\sin(2\theta) + 1$




i) Label the maximum and minimum points on the graph (provide coordinates)

ii) What is the period of the function?

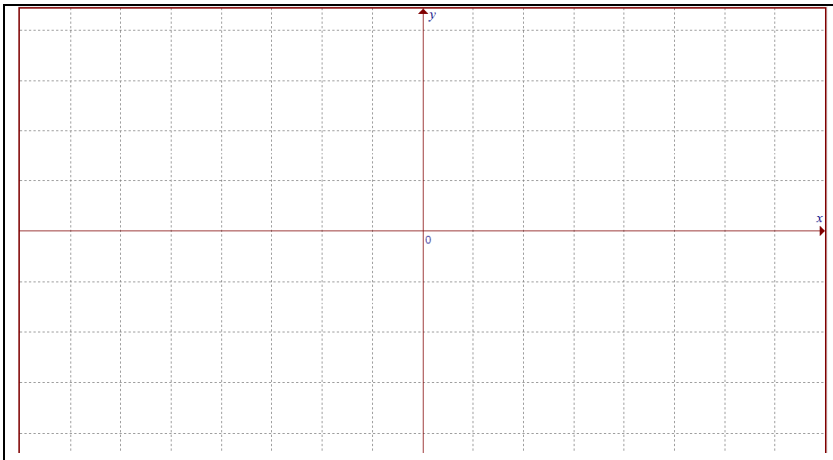
4. Graph the function on the graph provided. Set and label the increments to have at least two cycle of the function: $y = -3\cos\left(\frac{\theta}{2}\right) - 1$




i) Label the maximum and minimum points on the graph (provide coordinates)

ii) What is the period of the function?

5. Graph the function on the graph provided. Set and label the increments to have at least two cycle of the function: $y = -4\cos\left(2\theta - \frac{\pi}{3}\right) + 2$




i) Label the maximum and minimum points on the graph (provide coordinates)

ii) What is the period of the function?

6. Given the equation $0.5 = a\cos b\theta + d$ , how many solutions will there be for $0° \le \theta \le 360°$ in terms of "a", "b", and "d"

7. Given the equation $\sin 3\theta = k$ , for what values of "k" will there be only three solutions $0° \le \theta < 360°$

8. Given the equation $\sin 3\theta = k$ , for what range in values for "k" will there be only six solutions $0° \le \theta < 360°$

9. Which two of the functions below are the same function?

$i) y = 3\sin 2\left(\theta + \frac{\pi}{2}\right)$ $ii) y = 3\cos 2\theta$ $iii) y = 3\cos 2\left(\theta + \frac{\pi}{4}\right)$ $iv) y = 3\sin 2\left(\theta + \pi\right)$

10. Which two of the functions below are the same function?

$i) y = 3\sin 2\left(2\theta + \pi\right)$ $ii) y = 3\cos\left(2\theta + \frac{\pi}{2}\right)$ $iii) y = 3\cos 2\theta$ $iv) y = 3\sin 2\left(2\theta + 2\pi\right)$

11. Evaluate $\cos x$ if $\cos 3x = 1$

12. Prove that $\sin 3\theta = 3\sin\theta - 4\sin^2\theta$

13. Use the identity above to prove that: $\sin 18° = \frac{\sqrt{5}-1}{4}$