Key

# Unit 6 – Graphing Trigonometric Functions

| | Function | Amplitude | Period | Phase Shift | Midline |
|---|---|---|---|---|---|
| 1. | $y = 2\sin\theta$ | 2 | $2\pi$ | — | $y=0$ |
| 2. | $y = 4\cos\theta + 1$ | 4 | $2\pi$ | — | $y=1$ |
| 3. | $y = -\sin\frac{1}{2}\theta$ | 1 | $4\pi$ | — | $y=0$ |
| 4. | $y = 2\cos(3\theta + 3\pi)$ | 2 | $2\pi/3$ | $-\pi$ | $y=0$ |
| 5. | $y = 2\sin(2\theta - \pi)$ | 2 | $\pi$ | $\pi/2$ | $y=0$ |
| 6. | $y = -4\cos\left(\frac{1}{2}\theta\right) + 2$ | 4 | $4\pi$ | — | $y=2$ |

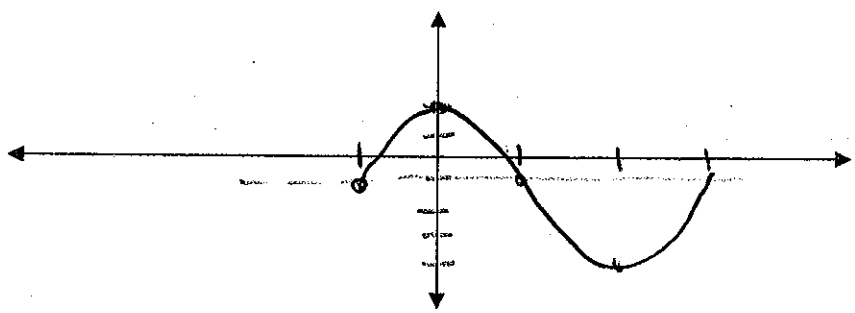
**Write an equation for each of the following**

7. A cosine function with an amplitude of ½, a period of 2π, and a phase shift of $\frac{3\pi}{2}$ $y=\frac{1}{2}\cos(\theta-$
8. A sine function with an amplitude of 4, a period of $\frac{\pi}{2}$, and a phase shift of $\frac{\pi}{4}$ $y=4\sin(4\theta-\pi$
9. A sine function with an amplitude of 2, a period of 6π, and reflected over the x-axis $y=-2\sin(\frac{1}{3}\theta)$
10. A cosine function with an amplitude of 3, a period π, reflected over the x-axis, and a midline of 2 $y=-3\cos(2\theta)+2$

**Graph the following**

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

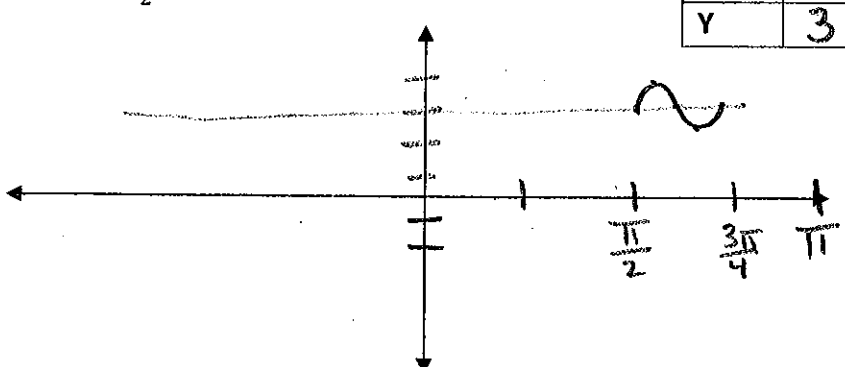
| X | $-\pi$ | 0 | $\pi$ | $2\pi$ | $3\pi$ |
|---|---|---|---|---|---|
| Y | -1 | 2 | -1 | -4 | -1 |



Amp = 3
mid: $y=-1$
Period: $4\pi$
P.S: $-\pi$

12. $y = \frac{1}{2}\sin(8\theta - 4\pi) + 3$

| X | $\pi/2$ | $9\pi/16$ | $5\pi/8$ | $11\pi/16$ | $3\pi/4$ |
|---|---|---|---|---|---|
| Y | 3 | 3.5 | 3 | 2.5 | 3 |

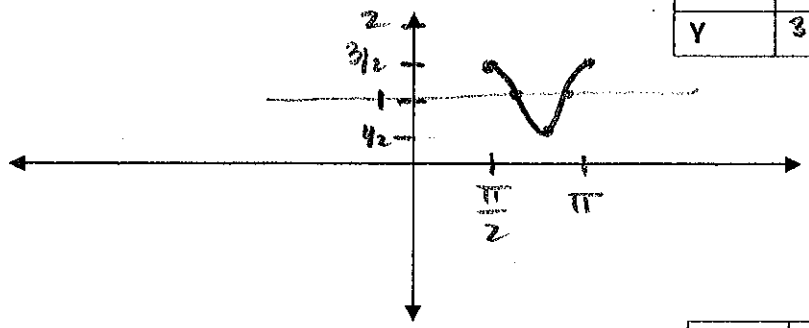



Amp = $\frac{1}{2}$
Period = $\frac{\pi}{4}$
P.S = $\frac{\pi}{2}$
mid
$y=3$

Amp: 1/2 Period = $\frac{\pi}{2}$ P.S = $\frac{\pi}{2}$

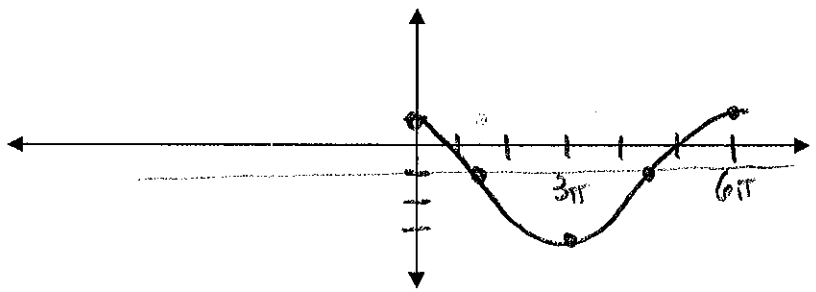
**13.** $y = \frac{1}{2}\cos(4\theta - 2\pi) + 1$

| X | $\pi/2$ | | | | $\pi$ |
|---|---|---|---|---|---|
| Y | 3/2 | 1 | 1/2 | 1 | 3/2 |




**14.** $y = 2\cos\left(\frac{\theta}{3}\right) - 1$

| X | 0 | $3\pi/2$ | $3\pi$ | $9\pi/2$ | $6\pi$ |
|---|---|---|---|---|---|
| Y | 1 | -1 | -3 | -1 | 1 |




Amp: 2
Period: $6\pi$
mid y = -1

**15.** Write the equation of a tangent function with a period of $3\pi$ $y = \tan(\frac{1}{3}\theta)$

**16.** Write the equation of a tangent function with a period of $\frac{1}{2}\pi$ $y = \tan(2\theta)$

## Application Problem

The temperature in an office is controlled by an electronic thermostat. The temperatures vary according to the sine function

$$y = 6\sin\left[\frac{\pi}{12}(x - 11)\right] + 19$$

Calculator in Radian Mode

Where $y$ is the temperature $(°C)$ and $x$ is the time in hours past midnight.

a) What is the temperature in the office at 9 A.M. when employees come to work?

16°

b) What are the maximum and minimum temperatures in the office?

25° 13°