**8.2 Exploring Graphs of Periodic Functions**

**By the end of the lesson you will be able to:**

* Examine the characteristics of sine and cosine graphs including x-intercepts, y-intercepts, domain, range, amplitude, period and midline equations.

**Periodic functions** are functions whose graph \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ intervals or cycles.

They describe things like riding a Ferris wheel, where the motion oscillates.

The two most common periodic functions are the **sine** **and cosine functions**.

**Example 1 – Graphing the Sine Function**

$$y=\sin(x)$$

|  |  |
| --- | --- |
| x | y |
| 0° | 0 rad |  |
| 45° |  |
| 90° | $\frac{π}{2}$ rad |  |
| 135° |  |
| 180° | $π$ rad |  |
| 225° |  |
| 270° | $\frac{3π}{2}$ rad |  |
| 315° |  |
| 360° | $2π$ rad |  |
| 405° |  |



 **Characteristics of the Sine Graph**



|  |  |
| --- | --- |
| 1. x-intercept(s)2. y-intercept | 3. Domain4. Range |



**Midline** is the horizontal line \_\_\_\_\_\_\_\_\_\_\_\_\_\_ between the maximum and minimum values of a periodic function.



The **amplitude** is the distance from the \_\_\_\_\_\_\_\_\_\_\_ to either the maximum or minimum value of a periodic function; the amplitude is always expressed as a \_\_\_\_\_\_\_\_\_\_ value.



The **period** is the length of the interval of the domain to complete one cycle.

*Back to our sine function…*

5. Midline equation

6. Amplitude

7. Period

**Example 2 – Graphing the Cosine Function**

|  |  |  |
| --- | --- | --- |
| x |  | y |
| 0° | 0 rad |  |
| 45° |  |  |
| 90° | $\frac{π}{2}$ rad |  |
| 135° |  |  |
| 180° | $π$ rad |  |
| 225° |  |  |
| 270° | $\frac{3π}{2}$ rad |  |
| 315° |  |  |
| 360° | $2π$ rad |  |
| 405° |  |  |

$y=\cos(x)$

**Characteristics of the Cosine Graph**



|  |  |
| --- | --- |
| 1. x-intercept(s)2. y-intercept5. Midline equation7. Period | 3. Domain4. Range6. Amplitude  |

**Practice**: