**Lesson 50**

* Relationships between Radians and Degrees: $2π$ radians = 360°, 1 radian = $\frac{180°}{π}≈57.3°$ , 1° = $\frac{π radians}{180}≈0.017$ radians
* Convert Radians to Degrees: Multiply by $\frac{180°}{π}$
* Convert Degrees to Radians: Multiply by $\frac{π}{180°}$
* The UNIT CIRCLE is a circle with radius of 1 unit, centered at the origin of a coordinate plane.
* Angles in STANDARD POSITION on the unit circle have their vertex at the origin.
	+ One side of the angle, called the INITIAL SIDE, is on the positive x-axis.
	+ The other side, called the TERMINAL SIDE, determines the measure of the angle, and is measured counterclockwise.

**Lesson 51**

* Points (x, y) on the unit circle: $\sin(θ)=y$ $\cos(θ)=x$ $\tan(θ)=\frac{y}{x}$

|  |  |
| --- | --- |
|  |  |

**Lesson 52**

* **Arc length** when $θ$ is in radians: $s=rθ$
* **Sector area** when $θ$ is in radians: $A=\frac{1}{2}r^{2}θ$

(continued on next page…)

**Lesson 53**

* **Transformations of trig functions:** $y=a\sin(b(x-h))+k$ $y=a\cos(b(x-h))+k$
	+ ***a*** gives **amplitude** (vertical stretch)
	+ ***b*** gives **period** (horizontal stretch), use the formula: period = $\frac{2π}{b}$
	+ ***h*** gives the horizontal shift, called **phase shift**
	+ ***k*** gives the **vertical shift**
		- ***We are not going to worry about h and k this year. Just the amplitude and period!***

Complete the following table of trig values, and use it to graph the function.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| $θ$ (radians) | 0 | $\frac{π}{6}$  | $\frac{π}{4}$  | $\frac{π}{3}$  | $\frac{π}{2}$  | $\frac{3π}{4}$  | $$π$$ | $\frac{5π}{4}$  | $\frac{3π}{2}$  | $\frac{7π}{4}$  | $$2π$$ |
| $\cos(θ)$  |  |  |  |  |  |  |  |  |  |  |  |



$y=\cos(θ)$

Amplitude:

Period:

Critical Values:

Domain: Range:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| $θ$ (radians) | 0 | $\frac{π}{6}$  | $\frac{π}{4}$  | $\frac{π}{3}$  | $\frac{π}{2}$  | $\frac{3π}{4}$  | $$π$$ | $\frac{5π}{4}$  | $\frac{3π}{2}$  | $\frac{7π}{4}$  | $$2π$$ |
| $\sin(θ)$  |  |  |  |  |  |  |  |  |  |  |  |



$y=\sin(θ)$

Amplitude:

Period:

Critical Values:

Domain: Range:

**Steps to graph trig functions:**

 **1.** Identify amplitude and calculate the period.

 **2.** If there is a vertical shift, sketch a line at $y=k$, along which the graph will oscillate.

**3.** Identify the start and end points of one period, and then the middle and quarter points. Graph the 5 critical values.

 **4.** Connect the critical points with a sine/cosine wave.

 **5.** Continue the pattern for additional periods if there is space on the graph.

**Steps to get critical values:**

 1. Calculate the period. This will be your end point (the x-value).

 2. Divide the period by 2. This will be your middle point (the x-value).

3. Divide the middle point value (from step 2) by 2. This will be the value between the start value and the middle value.

4. Take the values from step 2 and step 3 and add them together. This is your point between the middle point and

 the end point.