

October 4

SWBAT:

Graph and transform the sine and cosine functions

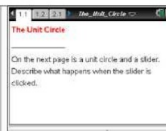


The Unit Circle Student Activity

Name _____
Class _____

Open the TI-Nspire document *Unit_Circle.tns*.

In this activity, you will click on a slider to change the measure of the central angle and create a series of line segments that determine the graph of a sinusoidal function.



Move to page 1.2.

Press **dir** **▶** and **dir** **◀** to
navigate through the lesson.

1. The circle pictured is called a unit circle. Why is that term used?
2. Click the slider three times. What is the relationship between the right triangle in the unit circle and the vertical line segments?
3. Will the lengths of the line segments continue to increase? Why or why not?
4. Click the slider until you obtain values of θ such that $\frac{\pi}{2} < \theta < \pi$. Are any of the line segments the same size? Why or why not?
5. Use right triangle trigonometry to explain the relationship between the angle θ and the highlighted leg of the right triangle in the unit circle. What trigonometric function can be represented by the length of the leg of the right triangle?

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$
$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$
$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\sin \theta = y$$
$$\cos \theta = x$$

Unit Circle
Student Activity

6. Click the slider until you obtain values of θ such that $\pi < \theta < \frac{3\pi}{2}$. Explain the placement of the line segments.

7. Continue to click the slider until $\theta = 2\pi$ to graph a continuous function. What do the coordinates of the points on the continuous function represent?

x -coordinate represents the angle
 y -coordinate represents the length of the opp. side

8. Write an equation of the continuous function that passes through those points.

$$y = \sin x$$

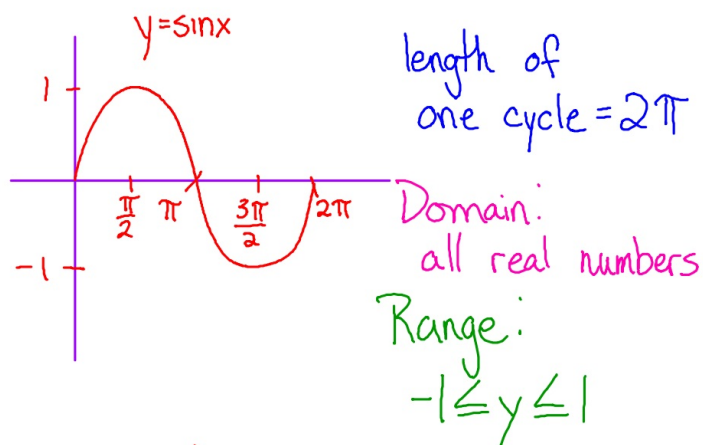
9. If we continued to graph the function for values of θ such that $2\pi < \theta < 4\pi$, describe what you would expect to see. Explain your reasoning.

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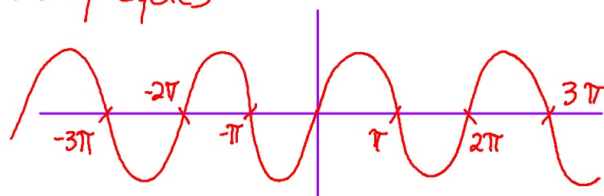
10. Click the slider three times. What is the relationship between the right triangle in the unit circle and the vertical line segments?

11. Use right triangle trigonometry to explain the relationship between the angle θ and the highlighted leg of the right triangle in the unit circle. What trigonometric function can be represented by the length of the leg of the right triangle?

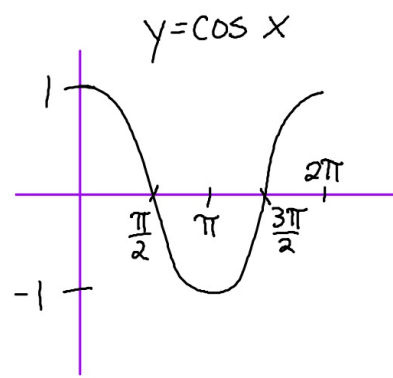
Sine
function



many cycles



cosine
function



length of one
cycle = 2π

Domain:
all real numbers

Range:
 $-1 \leq y \leq 1$

many cycles

