

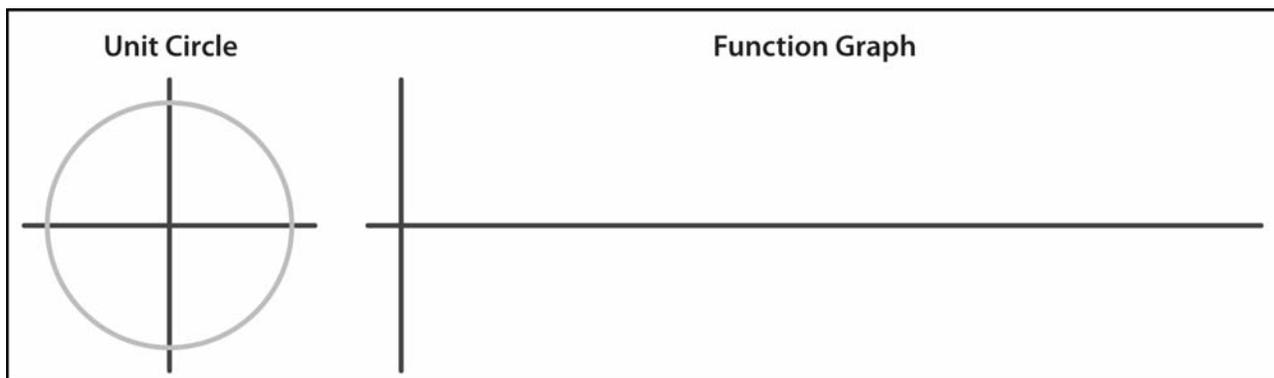
Graphs from the Unit Circle Radians

NAME _____

Materials needed:

- Butcher paper (about 8 feet long)
- Uncooked spaghetti (several pieces)
- Masking tape (a couple of pieces)
- Protractor
- Meter stick
- Colored marker
- Twine, rope, or yarn (about 7 feet long)

Tape the paper to the floor, and construct the diagram below. The circle's radius should be about the length of one piece of uncooked spaghetti. If your radius is smaller, break the spaghetti to the length of the radius. This is a unit circle with the spaghetti equal to one unit.



Using a protractor, make marks every 15° around the unit circle. Place a string on the unit circle at 0° , which is the point $(1, 0)$, and wrap it counterclockwise around the circle. Transfer the marks from the circle to the string.

1. How much is 15° in radians?

Transfer the marks on the string onto the x -axis of the function graph. The end of the string that was at 0° must be placed at the origin of the function graph. Label these marks on the x -axis with the related angle measures from the unit circle (e.g., 0 radians, $\frac{\pi}{12}$ radians, $\frac{\pi}{6}$ radians, etc.).

2. What component from the unit circle do the x -values on the function graph represent?

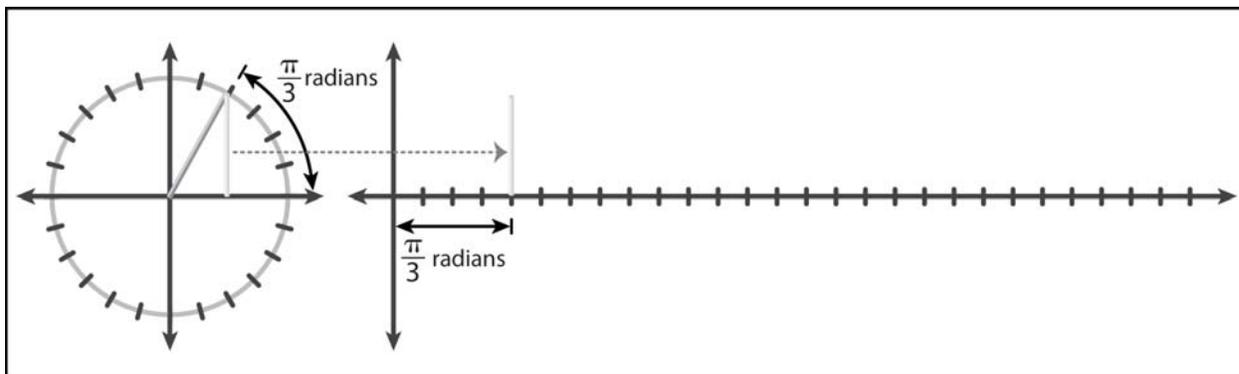
x -values = _____

Use the length of your spaghetti to mark one unit above and below the origin on the y -axis of the function graph. Label these marks 1 and -1 , respectively.

Draw a right triangle in the unit circle where the hypotenuse is the radius of the circle to the $\frac{\pi}{12}$ radians mark and the legs lie along and perpendicular to the x -axis.

Break a piece of spaghetti to the length of the vertical leg of this triangle, from the $\frac{\pi}{12}$ radians mark on the circle to the x -axis. Let this piece of spaghetti represent the y -value for the point on the function graph where $x = \frac{\pi}{12}$ radians. Place the spaghetti piece appropriately on the function graph and make a dot at the top of it. **Note:** Since this point is above the x -axis in the unit circle, the corresponding point on the function graph should also be above the x -axis.

Transferring the Spaghetti for the Triangle Drawn to the $\frac{\pi}{3}$ radians Mark



Continue constructing triangles and transferring lengths for all marks on the Unit Circle. After you have constructed all the triangles, transferred the lengths of the vertical legs to the function graph, and added the dots, draw a smooth curve to connect the dots.

3. The vertical leg of a triangle in the unit circle, which is the y -value on the function graph, represents what function of the related angle measure?

y -values = _____

Stop: Raise your hand when you get this far so your teacher can check your work.

OK _____