ENGAGE/EXPLORE/EXPLAIN – Radian Measure

Materials for each cooperative group of 3-4 students

- One shoestring
- Marker
- Ruler /meter stick
- Protractor

1. Draw a point in the center of poster with your marker. Label it O.

2. Have one student hold one end of the shoestring on the point drawn and another student hold the other end of the shoestring to marker.

3. Hold the string taut and carefully draw a circle.

4. Mark a point on the circumference of the circle directly to the right of your center. Label this point A.

5. Draw a radius connecting the center point, O, to the point on the circumference, A.

6. Place the shoe string on the circumference of the circle, placing one end of the string on the point A on the circle. Mark another point on the circle at the other end of the string. Label it B.

7. Continue mapping the length of the shoestring around the circumference of the circle making sure that you mark the length along the circumference as you go. Label each point C, D, E, F, G.

8. Draw segments from the center of the circle to each of the points you made around the circumference of the circle using a meter stick.

9. Label each of the angles beginning with angle #1 drawn from the first radius and numbering consecutively until all angles are labeled.

10. Use the protractor to obtain the approximate angle measure for each central angle in you circle.

11. Complete the accompanying data sheet for this activity.

Radian Measure Data Sheet

1. MEASUREMENT

a. Length of your shoestring in cm: _____

b. Approximate measure of each angle in the circle.

$\measuredangle 1$= _____ $\measuredangle 2$= _____ $\measuredangle 3$= _____ $\measuredangle 4$= _____

$\measuredangle 5$= _____ $\measuredangle 6$= _____ $\measuredangle 7$= _____

2. MORE ABOUT THE ANGLES

a. What **should** the sum of all the central angles you drew equal? _____

b. How many of your angles are approximately the same in measure?_____

c. What is the sum of all the angles that are about the same measure?_____

d. What is the measure of the only angle not included in the sum above? _____

e. What is the actual sum of all the angles you measured? _____ If your actual sum is different the answer you gave in Part 2a, what do think caused this to happen?

_____

*Each of the angles you drew that were approximately the same measure will be represented as **1 radian**.*

f. If you were to cut the circle in half (having only 180 degrees), how many of these angles, or radians, can you draw within the half circle? _____

Can you think of a mathematical value or term that is close to your approximation above? What is the symbol for that value?_____(Hint: it is represented by a Greek letter)

g. With your previous observation in mind, how many of these radians could you then draw within the entire circle?_____

What mathematical value using symbols could we use to represent the entire circle?_____

We now have discovered that….

180 degrees =_____ radians and 360 degrees =_____ radians