Lesson 8.5: Areas of Circles

In this lesson you will:
* discover the area formula for circles

So far, you have discovered the formulas for the areas of various polygons. In this lesson you'll discover the formula for the area of a circle. Most of the shapes you have investigated in this chapter could be divided into rectangles or triangles. Can a circle be divided into rectangles or triangles? Not exactly, but in this investigation you will see an interesting way to think about the area of a circle.

Investigation 8.5: "Area Formula for Circles"

Circles do not have sides like polygons. However, the area of a circle can be rearranged. Let's investigate.

A.) Suppose you took a circle and folded it in half four consecutive times. (What is the name for each of the line segments that were made from the folds? _____) Then you cut along the folds to make 16 wedges. Finally, you arranged the wedges in a row, alternating tips up and down (like shown below). What shape does the newly arranged wedges resemble? _____

If you cut the circle into more wedges, you could rearrange these thinner wedges to look more like a rectangle, with fewer bumps. You would not lose or gain any area in this change, so the area of this new "rectangle" would be the same as the area of the original circle. If you could cut infinitely many wedges, you'd actually have a rectangle with smooth sides.

B.) What would the height of the new "rectangle" be as related to the original circle? _____

C.) What would the base length of the new "rectangle" be as related to the original circle? Half of the _____ = _____

D.) Find the area of the new "rectangle in terms of r. (This area will also be the area of the original circle.) $A =$ _____

E.) Use your findings to complete the following conjecture.

Circle Area Conjecture (C-80)

The area of a circle is given by the formula $A =$ _____, where A is the area and r is the radius of the circle.

•Example 1: At Maria's Pizzeria, a pepperoni pizza with a diameter of 10 inches costs $8, and a pepperoni pizza with a diameter of 12 inches costs $10. Which size is a better deal?

10 in.

12 in.

$8 $10
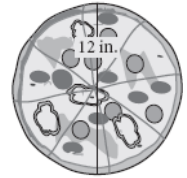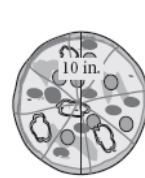
•Example 2: If the area of the circle at right is 256π m², what is the circumference of the circle?

256π m²

•Example 3: The circumference of a circle is 22π ft. What is the area of the circle?

⇒**ASSIGNMENT**: _____