

Learning Targets:

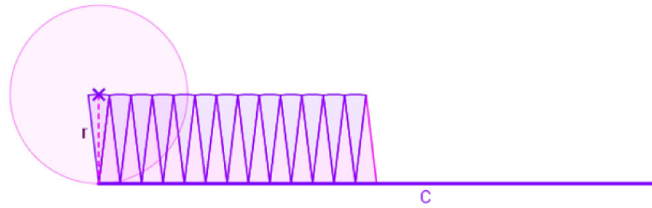
- a. I can derive the formula for the area of a circle.
- b. I can apply the area of a sector formula to solve problems.
- c. I can apply the area formulas of a circle and a regular polygon to solve problems.

Recall the circumference formula for a circle:

$$C = 2\pi r$$

Use the dynamic exploration on page 419 of your e-book to complete Investigation #1 in your handout.

Investigation #1: Deriving the Area of a Circle



1. After the circle's circumference is unfolded and the pieces are fit together, what shape does the figure start to resemble?

Parallelogram or Rectangle

2. How would you find the area of this shape?

$$A = b \cdot h$$

3. What are the dimensions of the shape in terms of r (the radius of the circle)?

$$h = r \quad b = \frac{1}{2}(2\pi r) = \pi r$$

4. Based on this information, make a conjecture about the area formula for a circle.

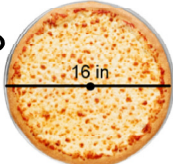

$$A = \pi r \cdot r$$

Formulas for Circles:

~~$A = \pi r^2$~~ ~~$C = 2\pi r$~~

$A = \pi r^2$ $C = 2\pi r$

Based on what you now know about area, answer example #1.

Deal #1	Deal #2
$r = 8$ 	 $r = 4$
Cost: \$20	Cost: \$10 each

1. What is a better deal, one 16-inch diameter pizza for \$20 or two 8-inch diameter pizzas for \$10 each? Why?

Deal #1 $r = 8$

$$A = \pi r^2$$

$$A = \pi (8)^2$$

$$A = 201.1 \text{ in}^2$$

Deal #2 $r = 4$

$$A = \pi (4)^2$$

$$A = 50.3$$

$$A = 2(50.3) = 100.6 \text{ in}^2$$

Deal #1 is the better deal

2. If the area of a circle is 196π ft², find the circumference of the circle.

$$A = \pi r^2$$

$$196\pi = \pi r^2$$

$$\sqrt{196} = \sqrt{r^2}$$

$$14 = r$$

$$C = 2\pi r$$

$$C = 2\pi(14)$$

Exact	Rounded or Decimal
28π ft	88.0 ft

3. If the circumference of a circle is 196π ft, find the area of the circle.

$$C = 2\pi r$$

$$\frac{196\pi}{2} = \frac{2\pi r}{2}$$

$$98 = r$$

$$A = \pi r^2$$

$$A = \pi(98)^2$$

Exact
9604π ft ²
Rounded
30,171.9

When calling to order the pizza, Mr. Lindahl decides to order himself a piece of pizza. P³ offers two slices of pizza, one with a 60 degree central angle and radius of 7 inches and the other with a 120 degree central angle and a 5 inch radius. If these pieces of pizza are the same price, which piece is the better deal?



Sector: The part of a circle enclosed by two radii of a circle and their intercepted area.

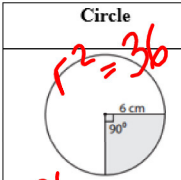
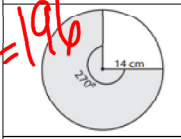

Investigation #2

Step 1: For each shaded region, find what fraction of the circle each sector is.

Step 2: Find the area of each full circle.

Step 3: Combine the results in Steps 1 and 2 to find the area of each sector.

$A = \pi r^2$

Circle	Fraction of Circle	Area of Circle (in terms of π)	Area of Sector (in terms of π)
	$\frac{90}{360}$	36π	$9\pi \text{ cm}^2$
	$\frac{270}{360}$	196π	$147\pi \text{ cm}^2$
	$\frac{45}{360}$	256π	$32\pi \text{ ft}^2$

Area of Sector:

$$A = \frac{\text{Central angle}}{360} \cdot \pi r^2$$

Example: We will complete this on Monday

- Suppose the slices of pizza below have the same price. Which piece of pizza is the better deal? Why?

