**Activity 5.3.3 Arcs and Sectors**

**Circumference of a circle:** $c=πd$ or $c=2πr$.

*c* is the circumference, *d* is the diameter, *r*= the radius, π ≈ 3.14



1. You probably have learned the two formulas for the circumference of a circle. Explain why both formulas say the same thing.

2. An arc of a circle is part of the circle that lies between two points. There are three types of arcs as shown below.

Explain in your own words the differences between a major arc, a minor arc, and a semicircle.

3. In each figure below the radius of the circle and the measure of a central angle in degrees is given. Find the circumference and the length of the indicated arc. (Answer in terms of π and also to the nearest 0.1 cm2)

a. b. c.

Circumference = \_\_\_\_\_\_ Circumference = \_\_\_\_\_\_\_ Circumference = \_\_\_\_\_\_\_\_

Arc length = \_\_\_\_\_\_\_\_\_ Arc length = \_\_\_\_\_\_\_\_\_\_\_ Arc length = \_\_\_\_\_\_\_\_\_\_\_

4. If you know the radius of a circle and the degree measure of a central angle, how can you find the length of the intercepted arc?

5. In Unit 4 Investigation 2 you proved that all circles are similar to each other. In the figure circle *O*’ is the image of circle *O* under a dilation with center *P* and scale factor 1.5.
m$∠$ *SOT* = 90° and *OT* = 6 inches.

a. *O’T’* = \_\_\_\_\_\_\_

b. Find the length of arc *ST.*

c. Find the length of arc *S’T’*

d. In circle *O* find the ratio of the length of arc *ST* to radius *OT.*

e. In circle *O’* find the ratio of the length of arc *S’T’* to radius *O’T’.*

f. Find the measure of angle *SOT* and *S’O’T ’*in radians.

g. Compare your results in questions d, e, and f, and complete this sentence: The radian measure of a central angle is a circle is equal to the ratio of the length of its intercepted \_\_\_\_\_\_\_\_\_ to the \_\_\_\_\_\_\_ of the circle.

**

6. Central angle BAE measures two radians. The length of arc $BE $is 14 cm. Find the radius and circumference of the circle.

7. The length of an arc of a circle is half the length of the radius. Find the measure of the central angle that intercepts this arc

a. in radians b. in degrees

**Area of a circle:** *A* = π*r*2

You are probably familiar with the above formula for the area of a circle.

We can also find the area of a **sector** of a circle. A sector is the figure bounded by two radii and the arc intercepted by the central angle that they form.



8. The radius of circle *C* is 15 cm.

a. Find the area of the circle. (Answer in terms of π and also to the nearest 0.1 cm2)

b. Find the area of sector *FCD.* (Answer in terms of π and also to the nearest 0.1 cm2)

9. If you know the radius of a circle and the degree measure of a central angle, how can you find the area of the sector bound by the sides of the angle and the intercepted arc?



10. The diameter of a circle measures 12 yards. Find the area of a sector bounded by a diameter and a semicircle. *.* (Answer in terms of π and also to the nearest 0.1 cm2)

11. A central angle in a circle intercepts an arc and forms a sector with two radii. Complete this proportion

$$\frac{length of arc}{circumference of circle}=\frac{}{area of cirlce}=\frac{degree measure of central angle}{}$$

12. Find the area of the sector of a circle with central angle 1 radian if the radius is 4 feet.