

TOPIC: 11.4 Circumference and Arc Length

NAME: KEY

DATE:

ESSENTIAL QUESTION:

QUESTIONS:

**Vocabulary:**

Circumference

The distance around a circle.

Arc Length

\* distance  
A portion of the circumference of a circle

Revolutions

A complete turn around a circle  
1 revolution =  $360^\circ$

**Theorem 11.8: Circumference of a Circle**

The circumference (perimeter)  $C$ , of a circle is

$C = 2\pi r$  or  $d\pi$ , where  $d$  is the diameter and  $r$  is the radius of the circle.

$$d = \frac{r}{2}$$

$$r = \frac{d}{2}$$

**A1. Find the indicated measure.**

a. Circumference of a circle with a radius of 5 ft.

$$C = 2\pi(5) = 10\pi \text{ ft}$$

$$\approx 31.42 \text{ ft}$$

b. Circumference of a circle with a diameter of 17 mi.

$$C = 17 \cdot \pi = 17\pi \text{ mi}$$

$$\approx 53.41 \text{ mi}$$

**A2.** How far does a 27-inch bike tire travel after 300 revolutions?

$$d = 27 \text{ in} \quad C = 27\pi$$

$$\text{Travel} = (\text{Revolutions})(C) = (300)(27\pi) \approx 25,446.90 \text{ in}$$

$$\approx 2120.58 \text{ ft}$$

**A3.** Find the radius of a circle with a circumference of 100 in.

$$C = d\pi$$

$$\frac{100}{\pi} = \frac{d\pi}{\pi}$$

$$d = 31.83$$

$$r = \frac{d}{2}$$

$$r = \frac{31.83}{2} \approx 15.92 \text{ in}$$

SUMMARY:

QUESTIONS:

Arc Length = s

Arc Measure =  $\theta$

Circumference = C

Radius = r

diameter = d

**Arc Length Corollary** Arc Length = s

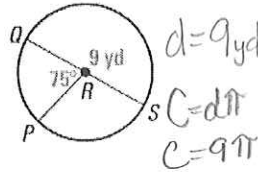
In a circle, the ratio of the length of a given arc to the circumference is equal to the ratio of the measure of the arc to 360°.

$$\frac{\text{Arc Length}}{\text{Circumference}} = \frac{\text{Arc Measure}}{360}$$

OR - Arc Length =  $\frac{\text{Arc Measure}}{360} \cdot \text{Circumf.} \rightarrow s = \frac{\theta}{360} \cdot C$

**A4. Find the arc length.**

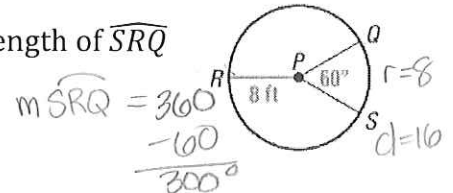
a. Length of  $\widehat{PQ}$



$$\frac{75}{360} (2\pi \cdot 4.5)$$

OR  $\frac{75}{360} (9\pi) \approx 5.89 \text{ yd}$

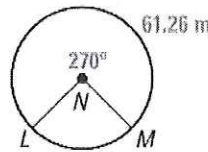
b. Length of  $\widehat{SRQ}$



$$\frac{300}{360} (16\pi) = 41.89 \text{ ft}$$

**A5. Find the indicated measure.**

a. Circumference



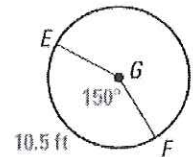
$$\frac{LM}{C} = \frac{m\widehat{LM}}{360}$$

$$61.26 = \frac{270}{360} (C)$$

$$61.26 = .75 (C)$$

$$C = 81.68 \text{ m}$$

b. Radius



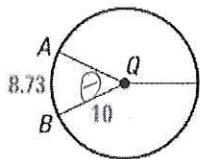
$$10.5 = \frac{150}{360} (C)$$

$$10.5 = .41667 (C)$$

$$C = 25.2 = \frac{2\pi r}{2\pi}$$

$$r = 4.01 \text{ feet}$$

A6. Find  $m\widehat{AB}$ .



r = 10  
d = 20

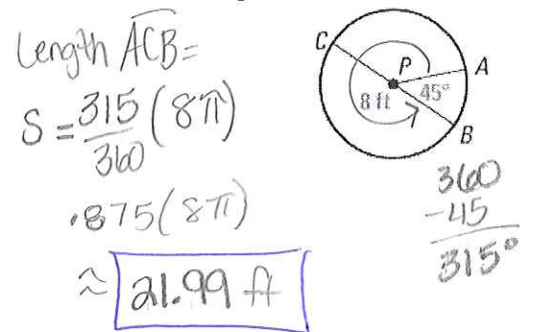
$$8.73 = \frac{\theta}{360} (20\pi)$$

$$8.73 = \theta \left(\frac{20\pi}{360}\right)$$

$$8.73 = \theta (.1745)$$

$$\theta = 50.02^\circ$$

A7. Find the length of  $\widehat{ACB}$



Length  $\widehat{ACB}$  =

$$s = \frac{315}{360} (8\pi)$$

$$= .875 (8\pi)$$

$$\approx 21.99 \text{ ft}$$

A7. The Pizza Castle is known for its excellent crust edge. Their small "Prince" pizza is a 12" pie costing \$9.75. The medium "Queen" pizza costs \$12 and has an 8" radius. The "King" is their large pizza at 20" in diameter that costs \$16.50. Which size gives the most crust edge per dollar?

 $S = \$9.75$ $C = 12\pi$ $\approx \frac{37.699}{9.75}$	 $M = \$12$ $C = 16\pi$ $\approx \frac{50.27}{12}$	 $L = \$16.50$ $C = 20\pi$ $\approx \frac{62.83}{16.50}$
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Crust size ?

$$S = 3.87 \text{ "/>$$

$$M = 4.19 \text{ "/>$$

1 - 20" / 16.50