

# Circles and Circumference

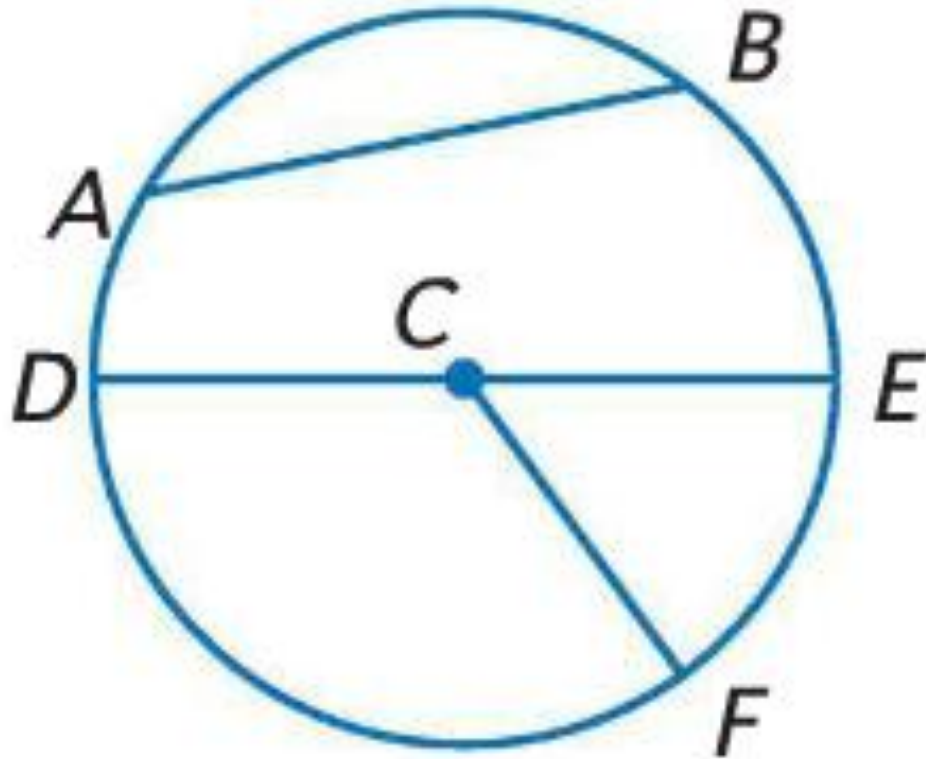
# Circles

- A circle is a locus or set of all points in a plane equidistant from a given point called the center of the circle.
- A circle is usually named by its center point.
- All circles are similar.

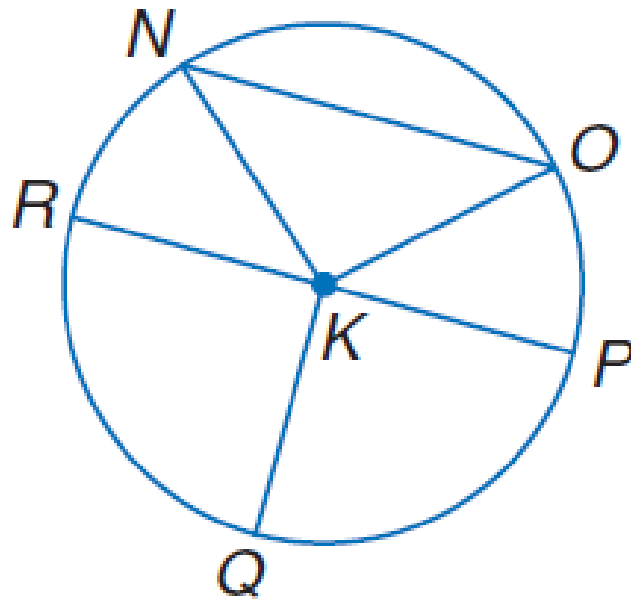
# Special Segments in a Circle

- Radius – a segment with endpoints at the center and on the circle.
- Chord – a segment with endpoints on the circle.
- Diameter – a chord that passes through the center and is made up of collinear radii.

# Special Segments in a Circle

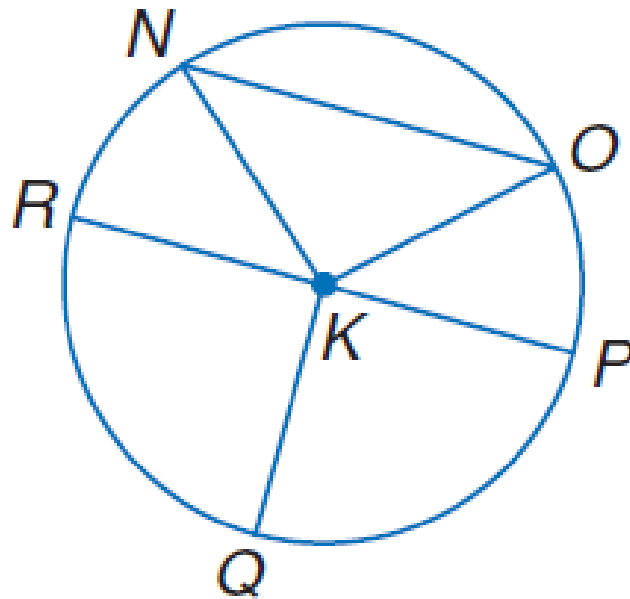


# Examples



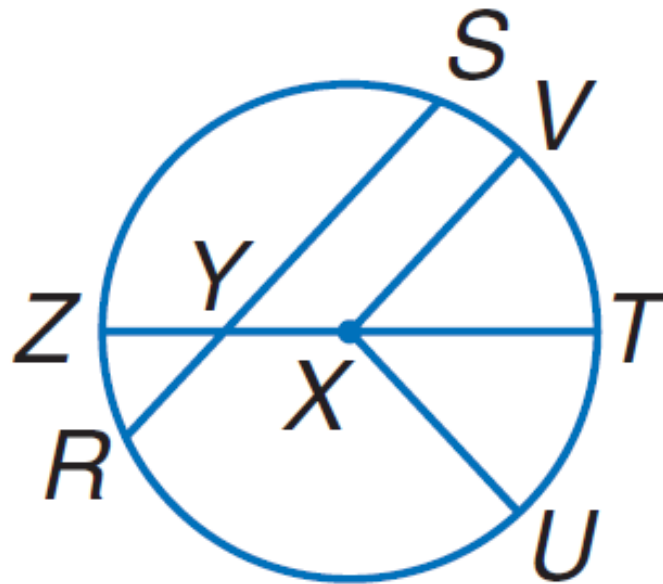
- Name the circle.  $K$
- Name a radius of the circle.  $RK, KQ, KP, KN, KO$
- Name a chord of the circle.  $NO, RP$
- Name a diameter of the circle.  $RP$

# Examples



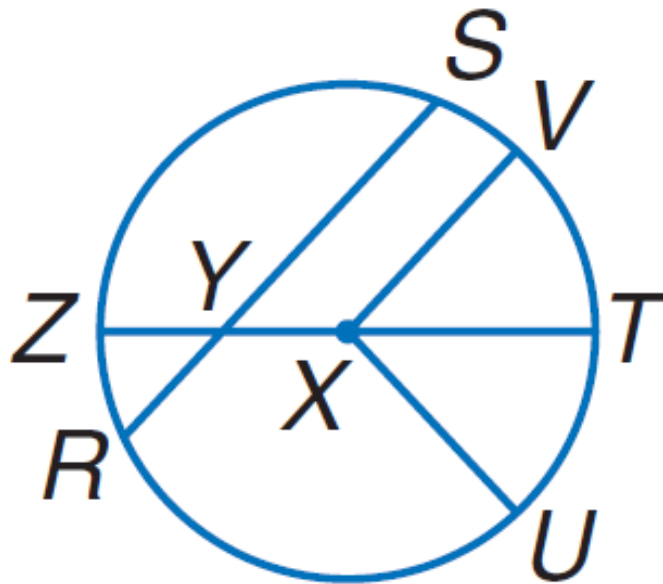
- Name the circle. **K**
- Name a radius of the circle. **KR, KN, KO, KP, KQ**
- Name a chord of the circle. **NO, RP**
- Name a diameter of the circle. **RP**

# Examples



- Name the circle.  $X$
- Name a radius of the circle.  $XT, XU, XV, XZ,$
- Name a chord of the circle.  $RS, ZT$
- Name a diameter of the circle.  $ZT$

# Examples



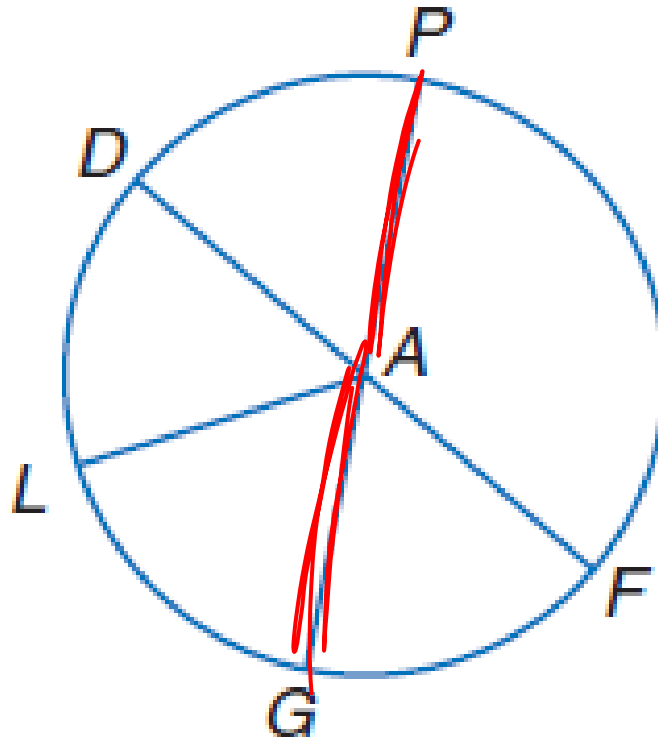
- Name the circle. **X**
- Name a radius of the circle. **XZ, XV, XT, XU**
- Name a chord of the circle. **SR, ZT**
- Name a diameter of the circle. **ZT**

# Radius and Diameter

- By definition, the distance from the center to any point on a circle is always the same. Therefore, all radii  $r$  are congruent.
- A diameter  $d$  is composed of two radii, so all diameters are congruent.
- Thus,  $d = 2r$  and  $r = \frac{d}{2}$  or  $\frac{1}{2}d$ .

# Examples

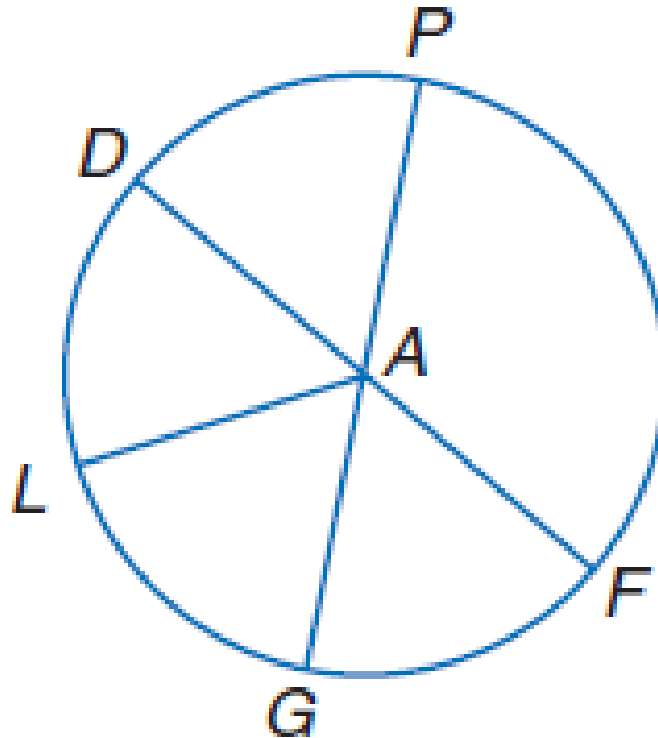
- Circle A has diameters  $\overline{DF}$  and  $\overline{PG}$ .
- If  $PA = 7$ , find  $PG$ . *14*



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# Examples

- Circle A has diameters  $\overline{DF}$  and  $\overline{PG}$ .
- If  $PA = 7$ , find  $PG$ .



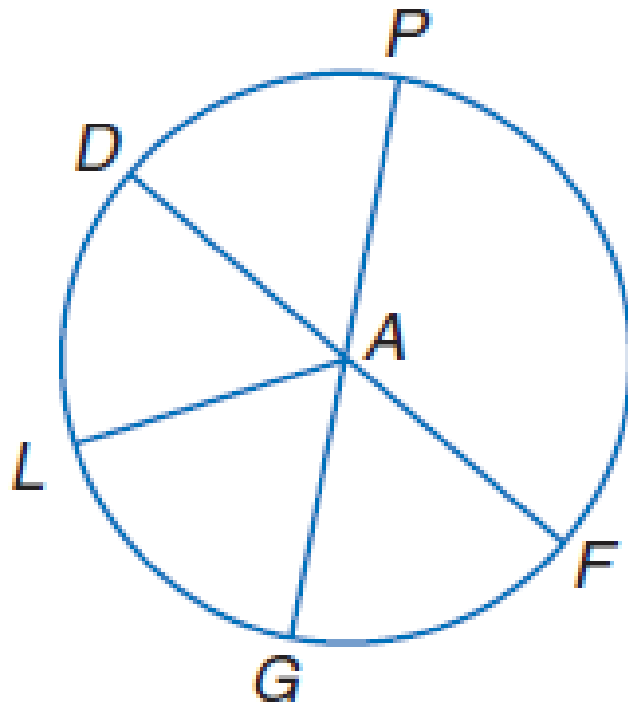
$$PG = 2 * PA$$

$$PG = 2 * 7$$

$$PG = 14$$

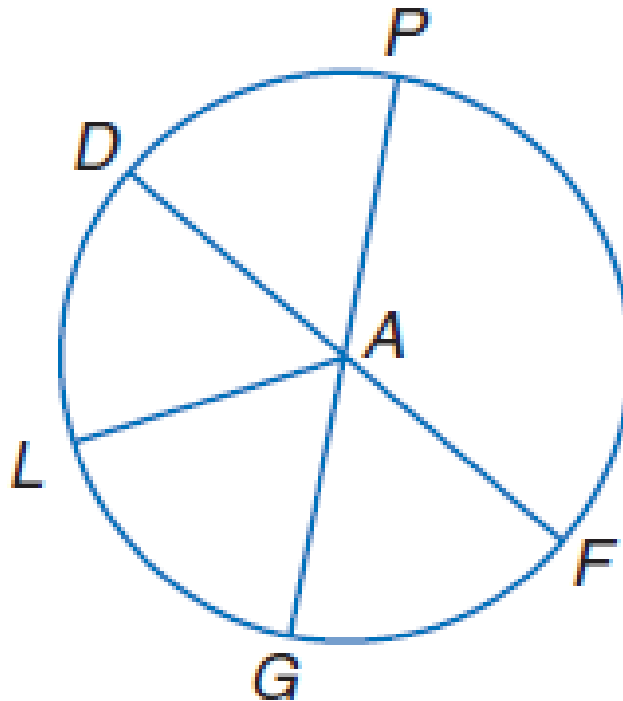
# Examples

- Circle A has diameters  $\overline{DF}$  and  $\overline{PG}$ .
- If  $PG = 15$ , find  $DF$ . *15*



# Examples

- Circle A has diameters  $\overline{DF}$  and  $\overline{PG}$ .
- If  $PG = 15$ , find  $DF$ .



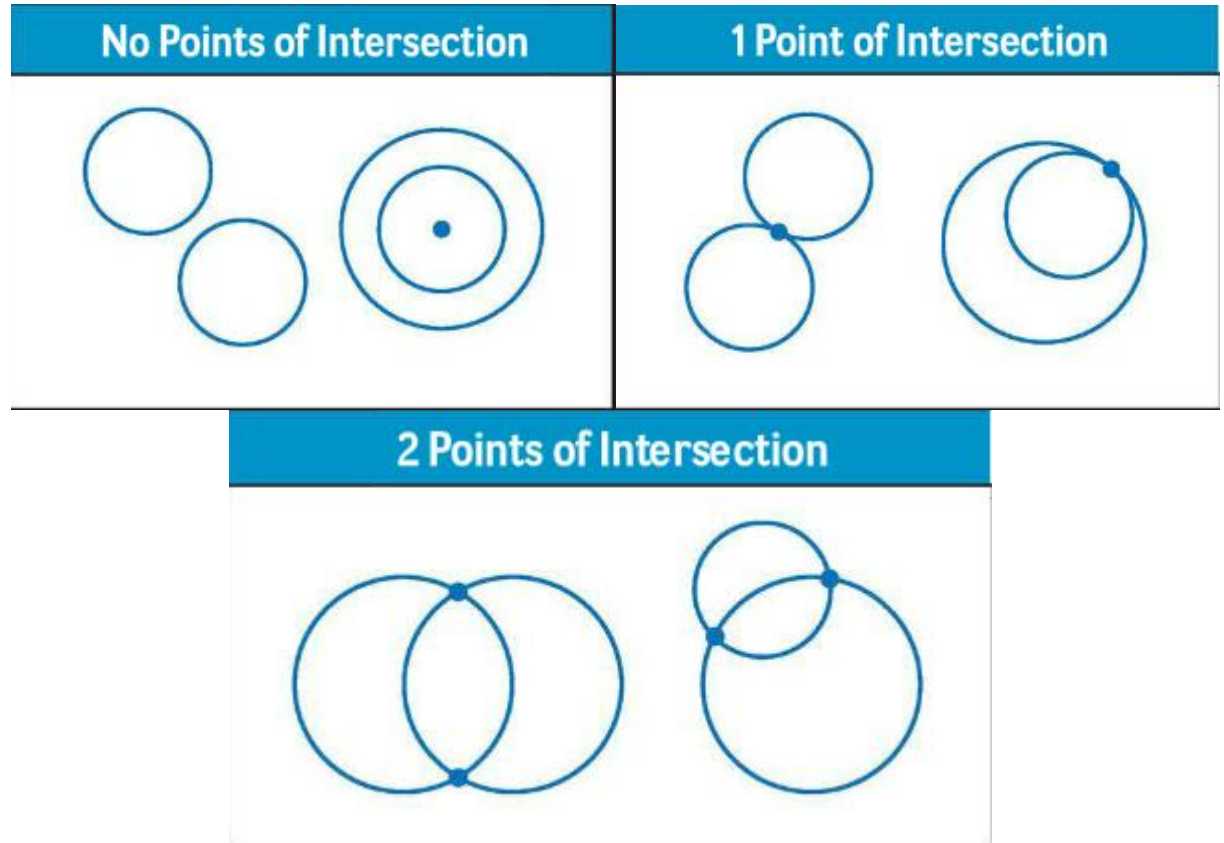
~~$PG = 2 * P$~~

~~$PG = 2 * 7$~~

~~$PG = 14$~~

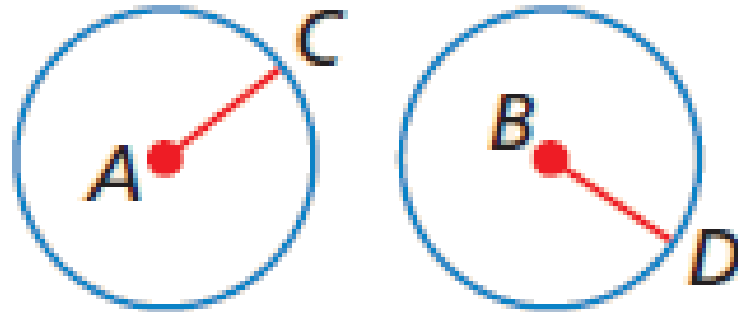
# Circle Pairs

- Two circles can intersect in two different ways.



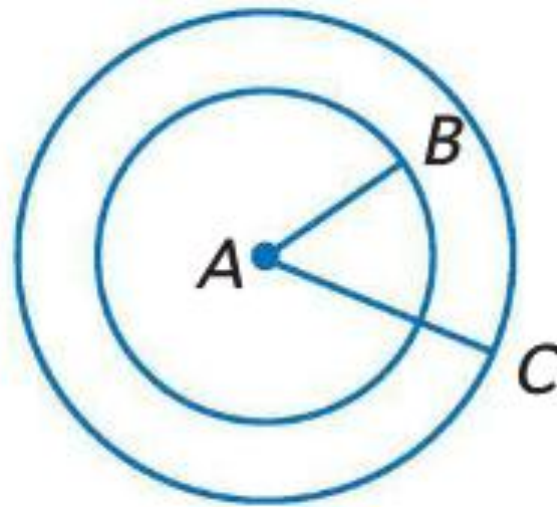
# Circle Pairs

- Two circles are congruent if and only if they have congruent radii.



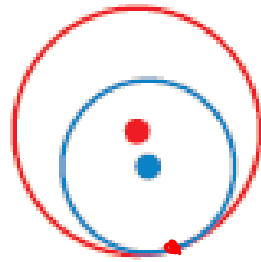
# Concentric Circles

- Concentric circles are coplanar circles that have the same center.

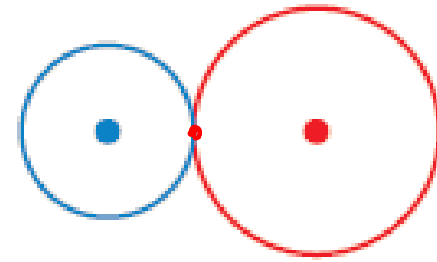


# Tangent Circles

- Two coplanar circles that intersect at exactly one point are called tangent circles.



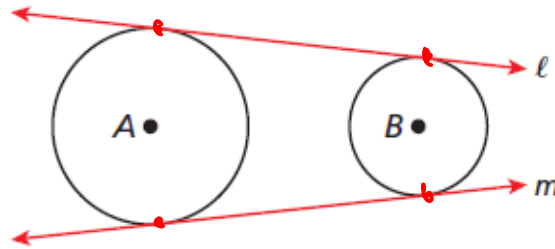
**Internally  
tangent circles**



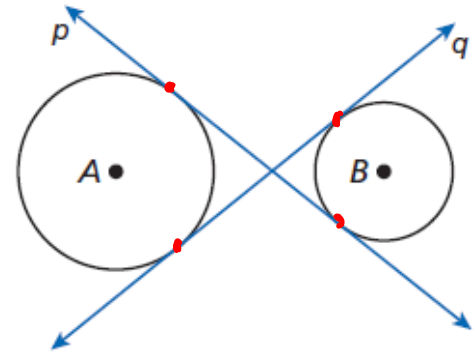
**Externally  
tangent circles**

# Tangent Circles

- A common tangent is a line that is tangent to two circles.



Lines  $\ell$  and  $m$  are common external tangents to  $\odot A$  and  $\odot B$ .



Lines  $p$  and  $q$  are common internal tangents to  $\odot A$  and  $\odot B$ .

# Circumference

- The circumference of a circle is the distance around the circle. If a circle has a diameter  $d$  or radius  $r$ , the circumference  $C$  equals the diameter times pi or twice the radius times pi.

$$C = \pi d \text{ or } C = 2\pi r$$

# Examples

$$\pi = 3.14 \rightarrow \text{round}$$

$$\pi = \frac{22}{7} \rightarrow \text{fraction}$$

$$\text{exact} \rightarrow \pi$$

- Find C if  $r = 7$  cm.

$$\begin{aligned} C &= 2\pi r \\ &= 2\pi 7 \\ &= 14\pi \end{aligned}$$

- Find C if  $d = 12.5$  in.

$$\begin{aligned} C &= \pi d \\ &= 12.5\pi \end{aligned}$$

# Examples

- Find C if  $r = 7$  cm.
- $C = 2\pi r$
- $C = 2\pi(7)$
- $C = 14\pi$  or 43.98 cm

- Find C if  $d = 12.5$  in.
- $C = \pi d$
- $C = \pi(12.5)$
- $C = 12.5\pi$  or 39.27 in

# Examples

- Find  $d$  and  $r$  to the nearest hundredth if  $C = 136.9$  meters.

$$C = \pi d$$

$$C = 2\pi r$$

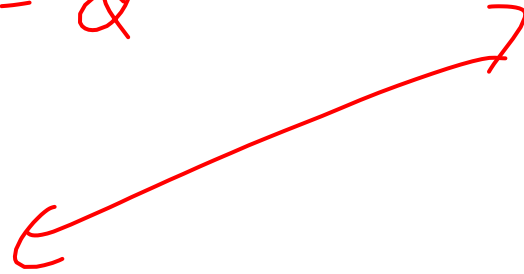
$$\frac{136.9}{\pi} = \frac{\pi d}{\pi}$$

$$\frac{136.9}{(2\pi)} = \frac{2\pi r}{2\pi}$$

$$= d$$

$$= r$$

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



# Examples

- Find  $d$  and  $r$  to the nearest hundredth if  $C = 136.9$  meters.
- $C = \pi d$
- $136.9 = \pi d$
- $\frac{136.9}{\pi} = d$
- $43.58 \text{ m} = d$
- $r = \frac{1}{2}d$
- $r = \frac{1}{2}(43.58)$
- $r = 21.79 \text{ m}$