Circles and Circumference

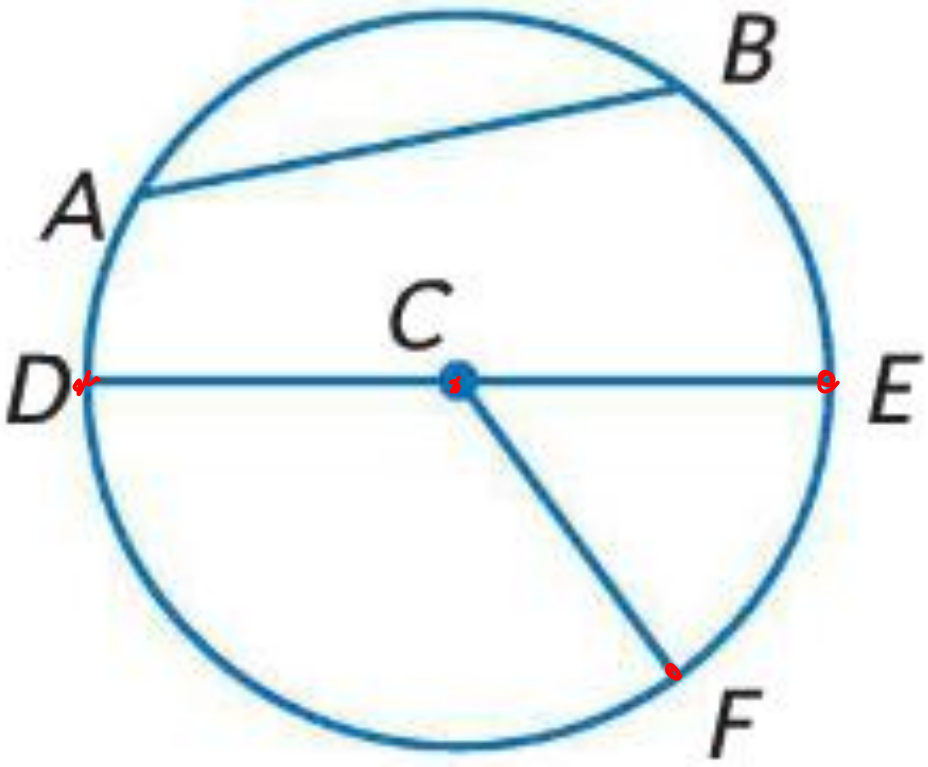
Circles

- 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.

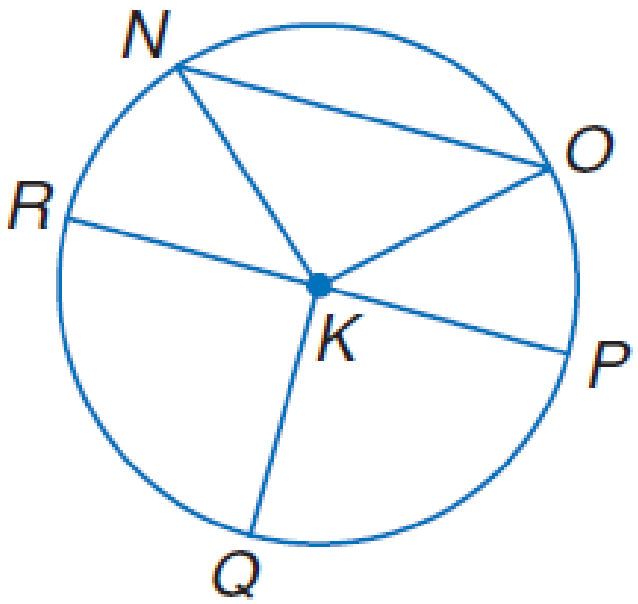
Special Segments in a Circle

- 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

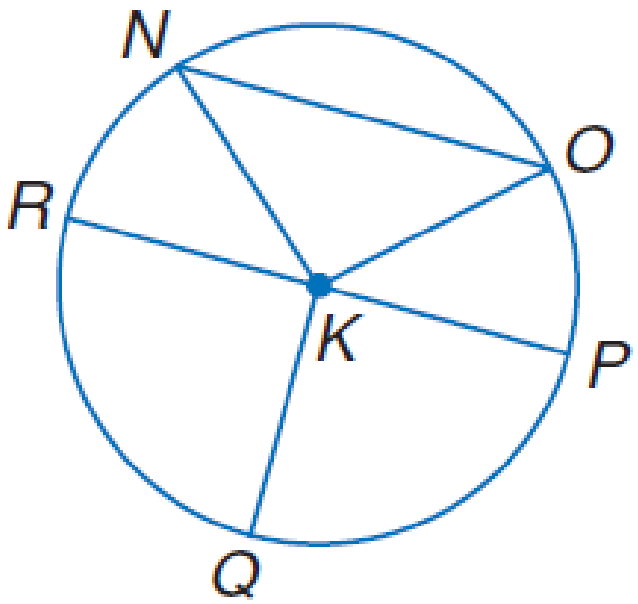


Examples



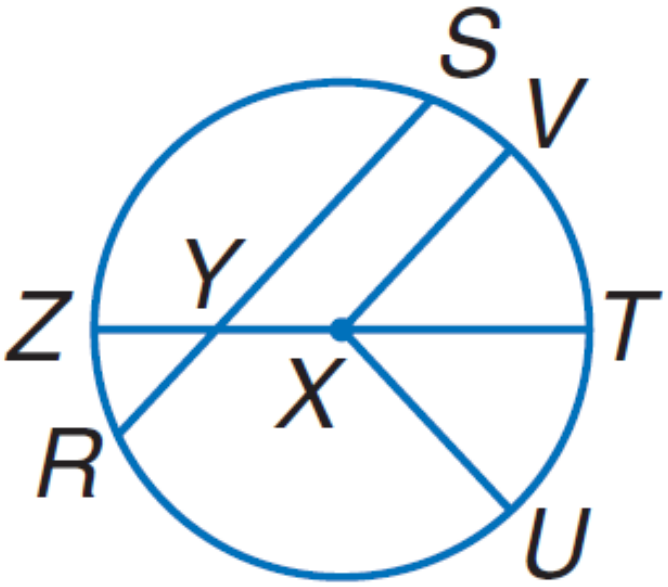
- Name the circle. K
- Name a radius of the circle. KN, KO, KP, KQ, KR
- Name a chord of the circle. NO, RP
- Name a diameter of the circle. RP

Examples



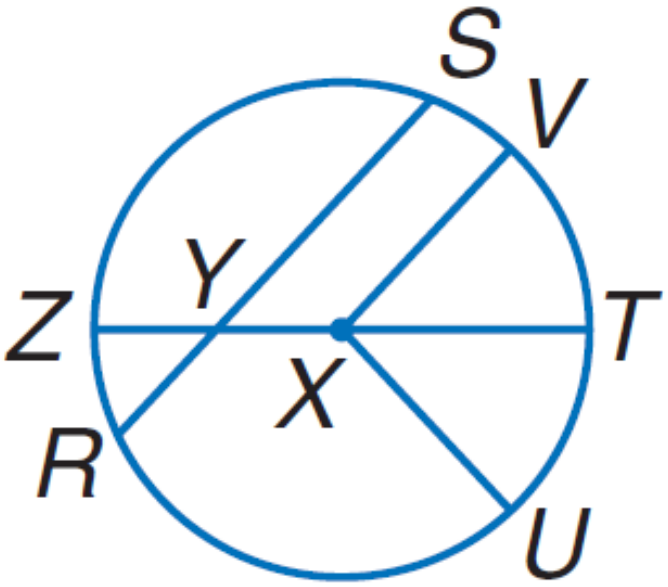
- Name the circle. **K**
- Name a radius of the circle. **KR, KN, KO, KP, KQ**
- Name a chord of the circle. **NO, RP**
- Name a diameter of the circle. **RP**

Examples



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

Examples



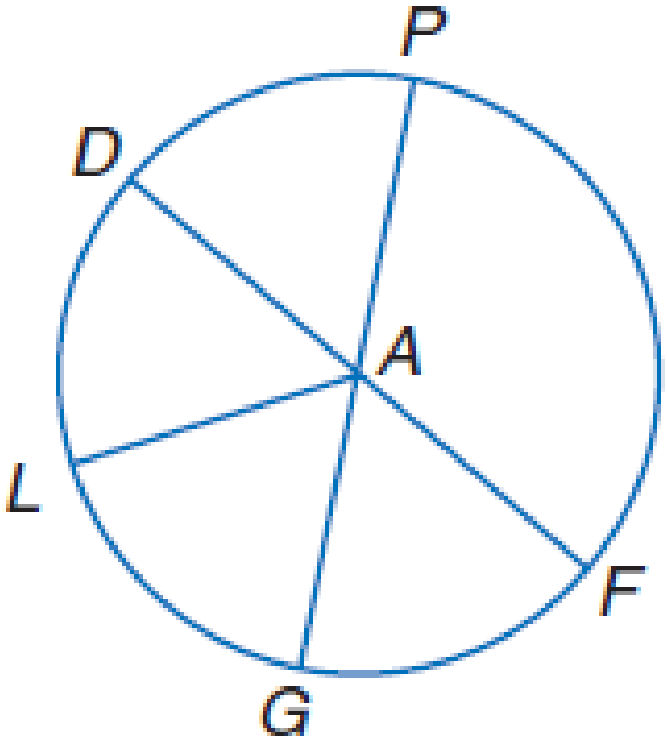
- Name the circle. X
- Name a radius of the circle. XZ, XV, XT, XU
- Name a chord of the circle. SR, ZT
- Name a diameter of the circle. ZT

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 $\frac{1}{2}d$.

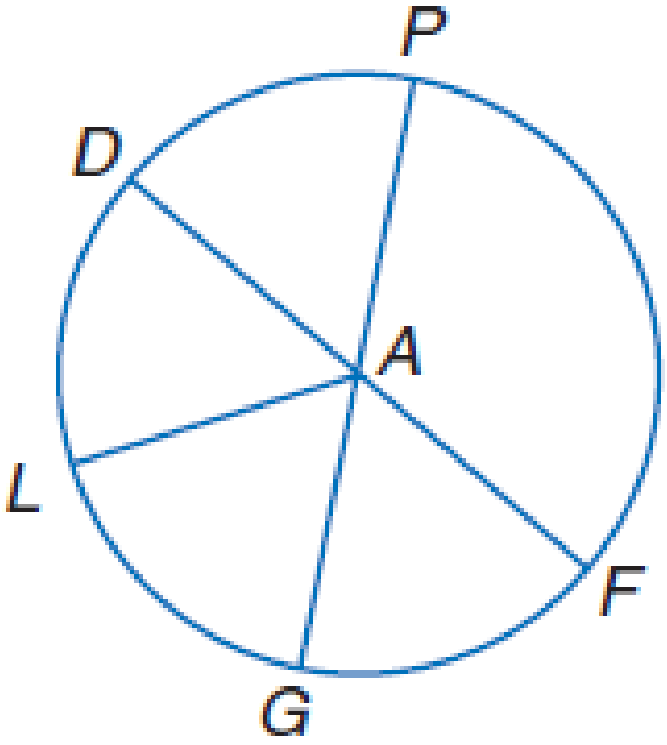
Examples

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



Examples

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



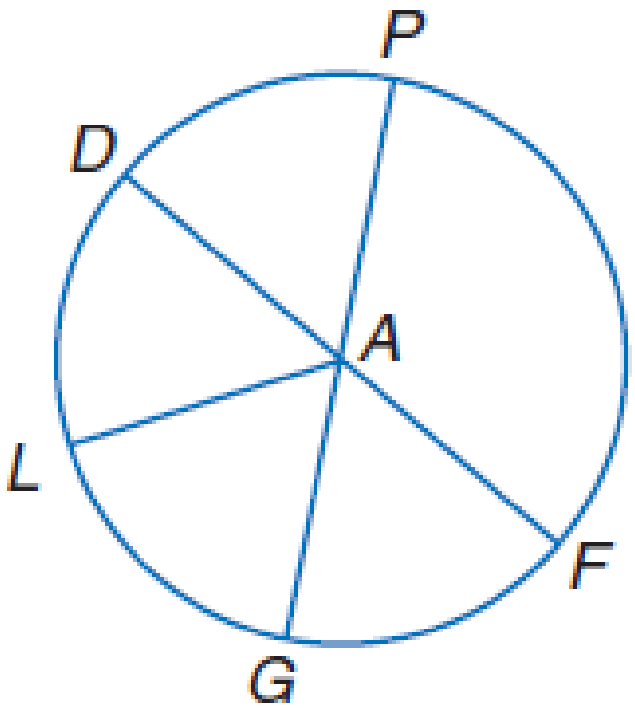
PG = 2 * PA

PG = 2 * 7

PG = 14

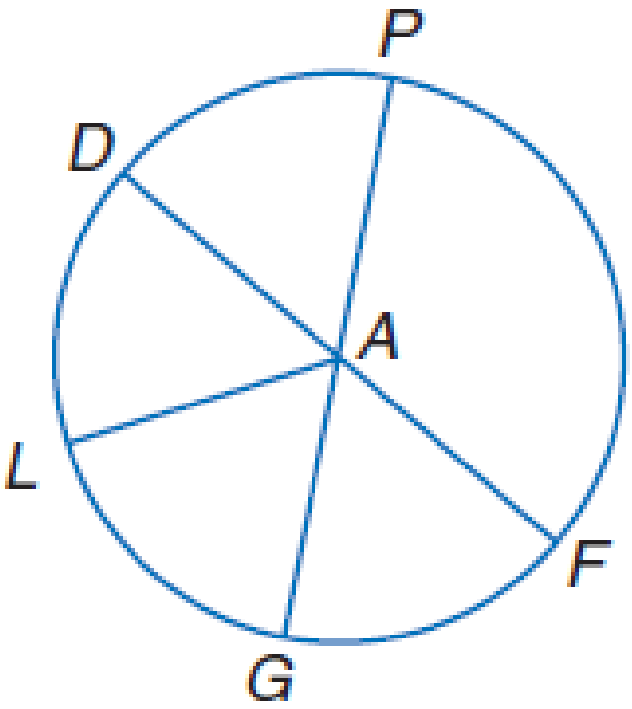
Examples

- 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

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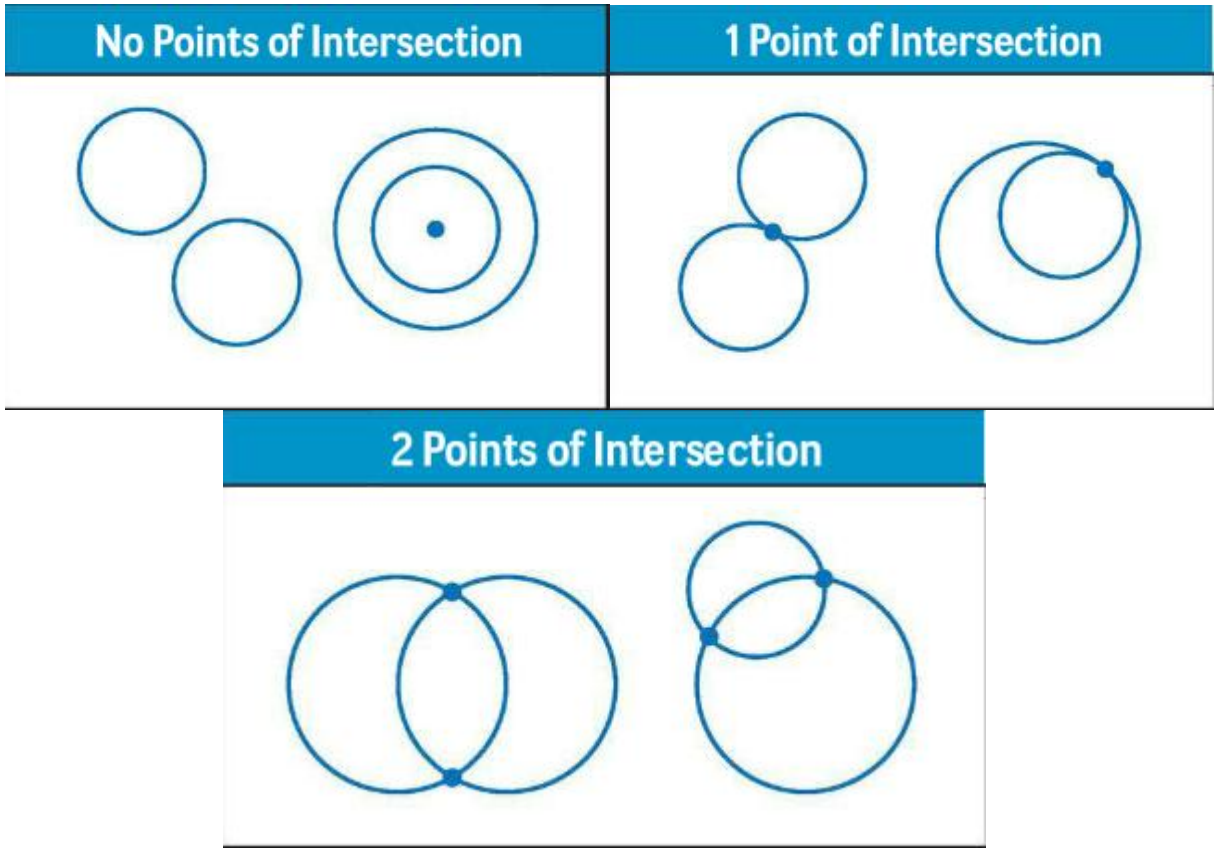
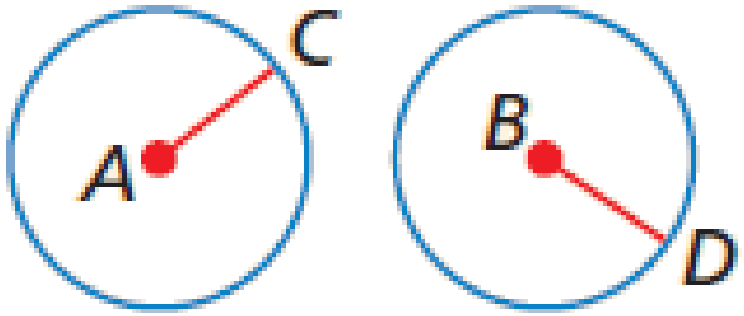
Circle Pairs

- Two circles can intersect in two different ways.



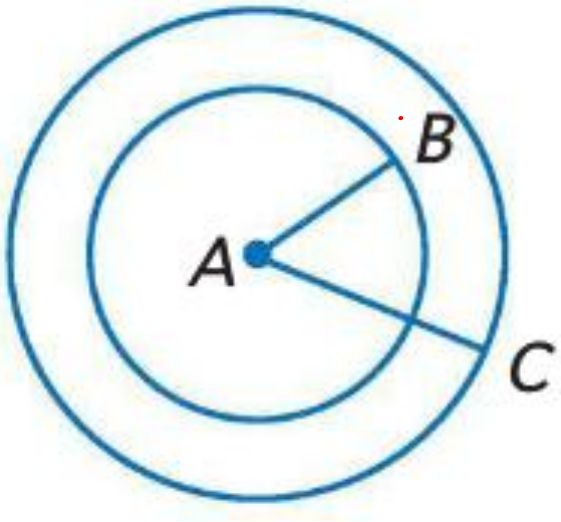
Circle Pairs

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



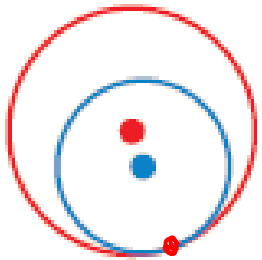
Concentric Circles

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

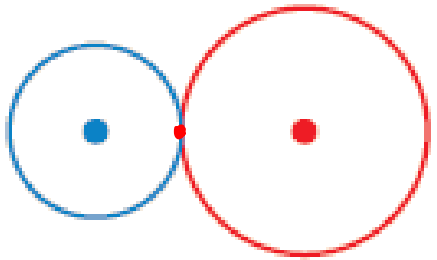


Tangent Circles

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



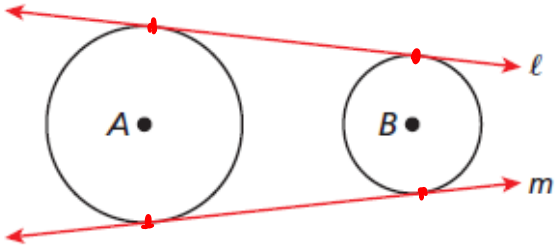
Internally tangent circles



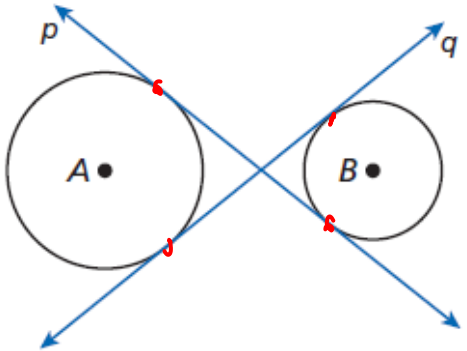
Externally tangent circles

Tangent Circles

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



Lines ℓ 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.

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

$\pi = 3.14 \rightarrow$ multiply

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

Examples

- Find C if r = 7 cm.

$C = 2\pi r$

$= 2\pi 7$

$= 14\pi$

- Find C if d = 12.5 in.

$C = \pi d$

$= 12.5\pi$

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.

$C = d\pi$

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

$= d$

$C = 2\pi r$

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

$= r$

Examples

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

- C = πd
- 136.9 = πd
- $\frac{136.9}{\pi} = d$
- 43.58 m = d

- r = $\frac{1}{2}$d
- r = $\frac{1}{2}$(43.58)
- r = 21.79 m