

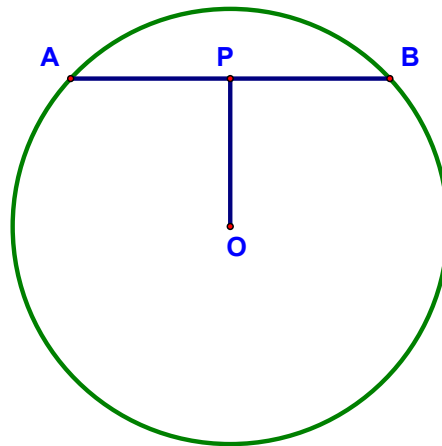


## The Circle - Lesson 10-1

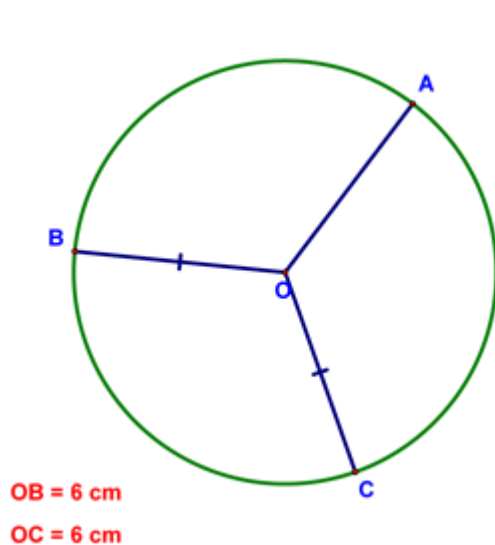
Here's the warmup!

**Given:**  $\odot O$   
radius = 12  
 $AB = 12$   
 $OP \perp AB$

**Find:**  $OP$



Today, we're going to go over quite a few notes about circles – lots of definitions, starting with *circle*, *the center of a circle*, and the *radius of a circle*:



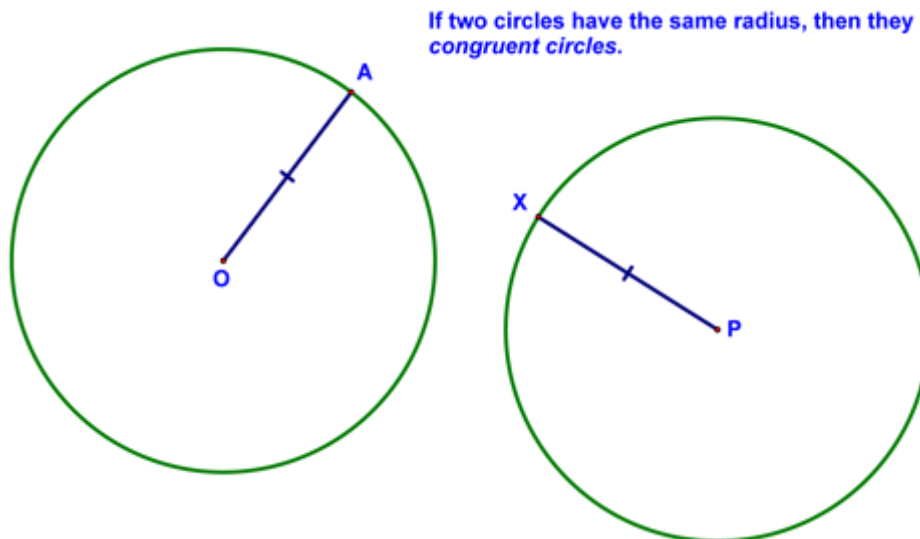
A *circle* is the set of all points in a plane at a given distance from a given point in the plane.

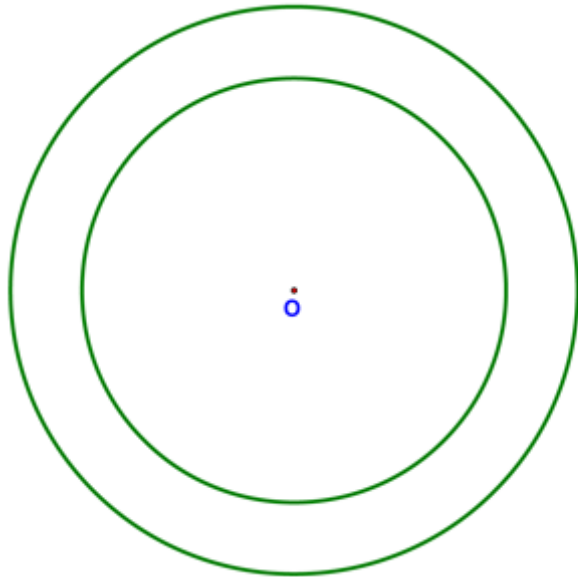
The given point is the *center of the circle*. You name a circle by its center (e.g.,  $\odot O$ ).

The given distance is called the *radius of the circle* (e.g.,  $OA$  is the radius of  $\odot O$ ). A segment from a point of the circle to the center is also called a radius (e.g.,  $OA$  is a radius).

Any two radii of a given circle are congruent.

Next are *congruent circles* and *concentric circles*:

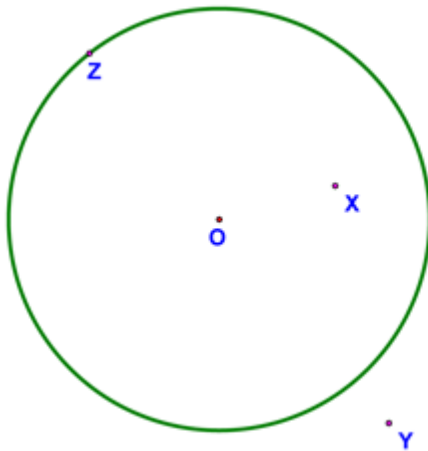




If two or more coplanar circles share the same center, then they are *concentric circles*.

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Next, let's look at what *interior*, *exterior*, and *on* the circle mean:

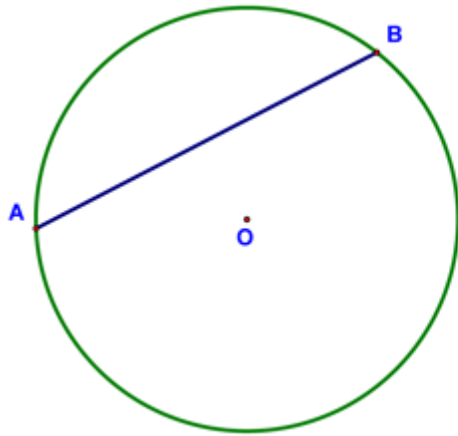


A point is *inside* (in the *interior* of) a circle if its distance from the center is less than the radius (e.g., Point X).

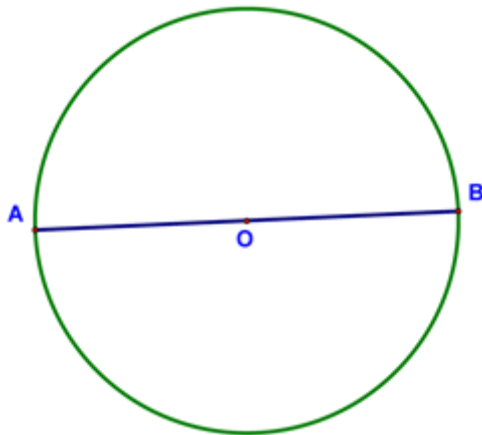
A point is *outside* (in the *exterior* of) a circle if its distance from the center is greater than the radius (e.g., Point Y).

A point is *on* a circle if its distance from the center is equal to the radius (e.g., Point Z).

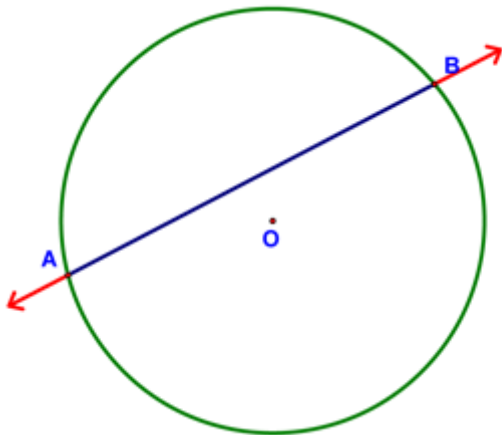
Here are *chords*, *diameters*, and *secants*:



A *chord of a circle* is a segment whose endpoints lie on the circle (e.g.,  $\overline{AB}$ ).

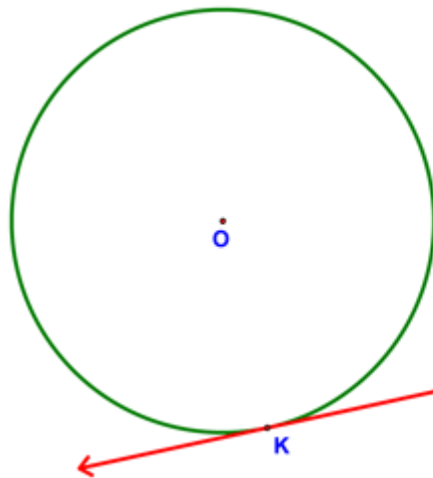


A *diameter of a circle* is a chord that passes through the center ( $\overline{AB}$  is a diameter when it contains point O).



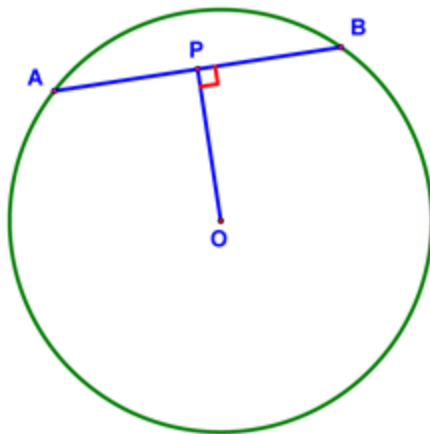
A *secant of a circle* is a line that contains a chord ( $\overleftrightarrow{AB}$  is a secant).

Now, let's define a *tangent to a circle* and the *distance from the center of a circle to a chord*.



A *tangent to a circle* is a line that lies in the plane of a circle and that intersects the circle at exactly one point.

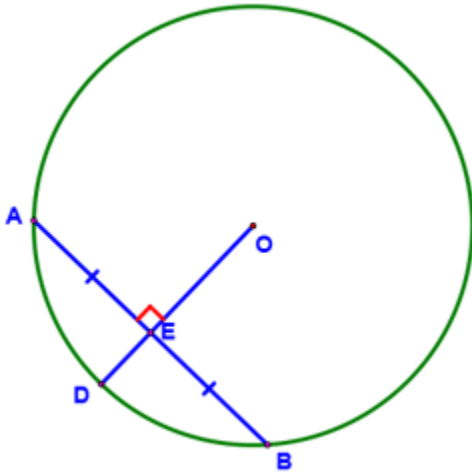
The *point of tangency* is the point at which the tangent touches the circle  
( $\overline{KW}$  is a tangent to  $\odot O$ ).



The distance from the center of a circle to a chord is the measure of the perpendicular segment from the center to the chord.

$OP$  is the distance from  $O$  to chord  $\overline{AB}$ .

We'll wrap up by discussing three theorems related to chords:



**Theorem 73**

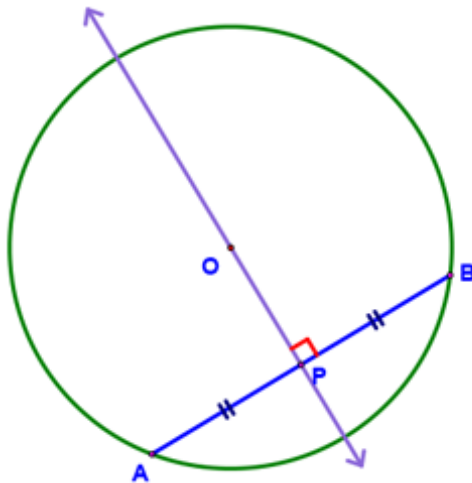
If a radius is perpendicular to a chord, then it bisects the chord.

$$\overline{OD} \perp \overline{AB} \Rightarrow \overline{OD} \text{ bisects } \overline{AB}$$

**Theorem 74**

If a radius of a circle bisects a chord that is not a diameter, then it is perpendicular to that chord.

$$\overline{OD} \text{ bisects } \overline{AB} \Rightarrow \overline{OD} \perp \overline{AB}$$



**Theorem 75**

The  $\perp$  bisector of a chord passes through the center of the circle.