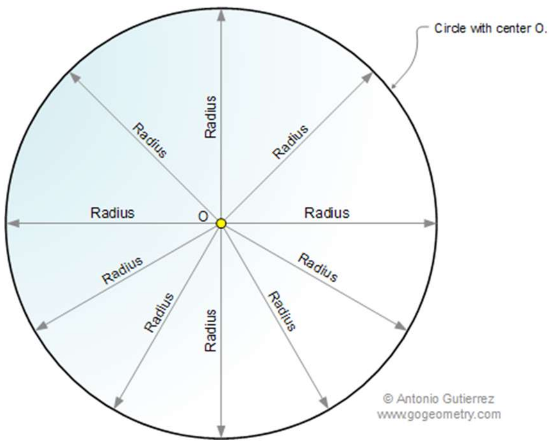
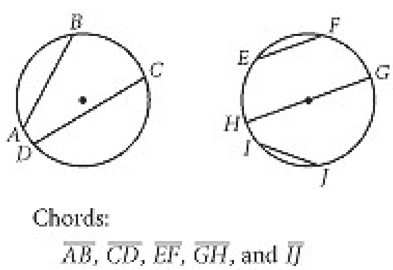
Lesson 1.7 – Circles

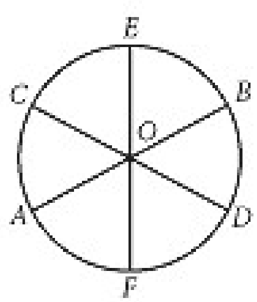
Circle - A circle is the set of all points in a plane at a given distance (called the radius) from a given point (called the center of the circle).



Chord - A chord is a line segment whose endpoints lie on the circle.

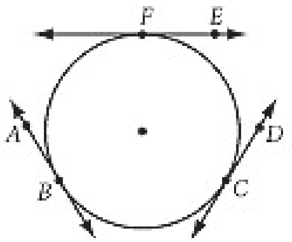


Diameter - A diameter is a chord that passes through the center of the circle.

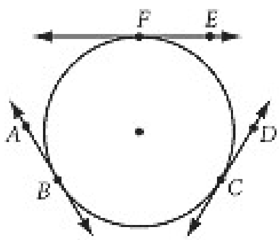


**A diameter is the longest chord possible in a circle.

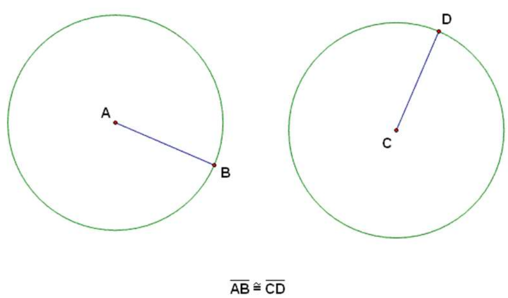
Tangent - A tangent is a line that intersects the circle only once.



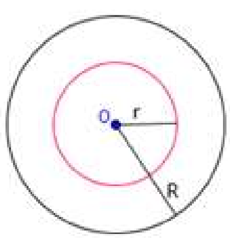
Point of tangency - The point of tangency is the point where the line intersects the circle. B, C, and F are all points of tangency.



Congruent Circles - If two or more circles have the same length radius they are congruent circles.



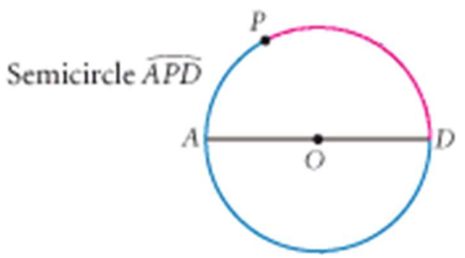
Concentric Circles - If two or more circles share the same center they are concentric circles.



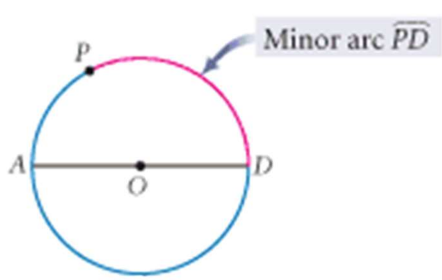
Two concentric circles

Arc - An arc is two points on a circle and the continuous portion of the circle between the two endpoints.

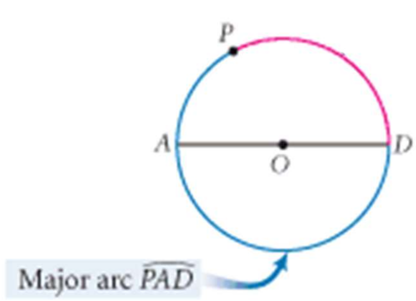
Semicircle - A semicircle is an arc whose endpoints are the endpoints of a diameter. Semicircles are named using three points and the order is specific.



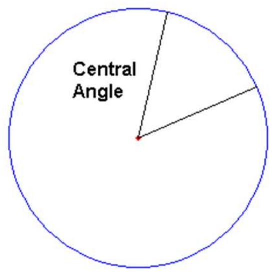
Minor Arc - A minor arc is an arc of the circle that is smaller than a semicircle. Minor arcs need only two points for naming. Order is not specific.



Major Arc - A major arc is an arc that is larger than a semicircle. Major arcs are named using three points and the order is specific.

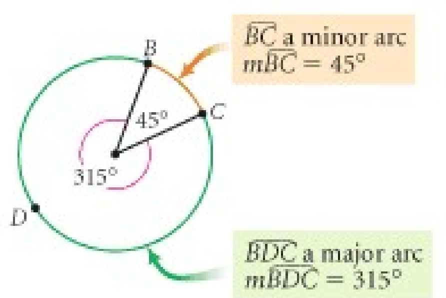


Central Angle - A central angle is an angle whose vertex is the center of the circle and whose sides pass through the circle.



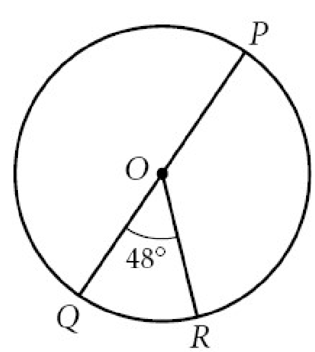
CONJECTURE:

Arc Measure - The measure of an arc is the same as the measure of the central angle that forms the arc.



Example 1: Use the figure to complete

$m\,\widehat{QR} =$_________

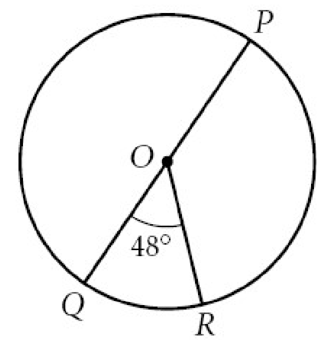


The measure of the arc is equal to the measure of the central angle that forms it. So, the measure of $\widehat{QR}$ is the same as $m\angle QOR$ which is 48°.

$m\,\widehat{QR} =$____48°___

Example 2: Use the figure to complete

$m\,\widehat{PR} =$_________

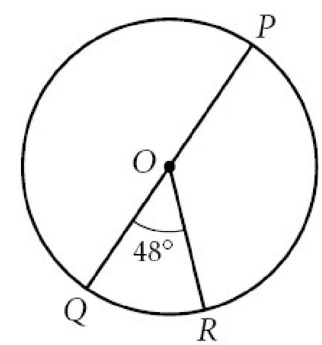


The measure of the arc is equal to the measure of the central angle that forms it. So, the measure of $\widehat{PR}$ is the same as $m\angle POR$ which makes a linear pair with $\angle QOR$. So, $m\angle POR = 180° - 48° = 132°$.

$m\,\widehat{PR} =$____132°___

Example 3: Use the figure to complete

$m\,\widehat{PQR} =$_________

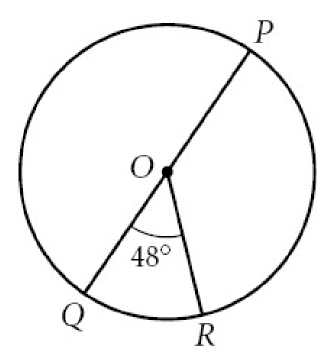


The measure of the arc is equal to the measure of the central angle that forms it. So, the measure of $\widehat{PQR}$ is the same as $m\angle QOR + m\angle POR$. We know that $m\angle POR = 180°$ because it is a line. So, $180° + 48° = 228°$.

$m\,\widehat{PQR} =$____228°___

Example 4: Use the figure to complete

$m\,\widehat{QPR} =$_________



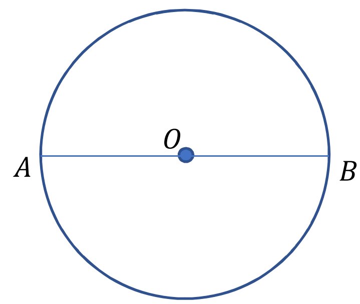
The measure of the arc is equal to the measure of the central angle that forms it. So, the measure of $\widehat{QPR}$ is the entire circle except $m\angle QOR$. So, $360° - 48° = 312°$.

$m\,\widehat{QPR} =$____312°___

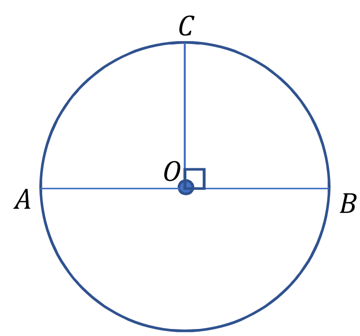
Example 5: Sketch, label, and mark the figure

Draw circle O with diameter $\overline{AB}$; radius $\overline{OC}$ with $\overline{OC} \perp \overline{AB}$; $\overline{OD}$, the angle bisector of $\angle AOC$, with D on the circle; chords $\overline{AC}$ and $\overline{BC}$; and a tangent at D.

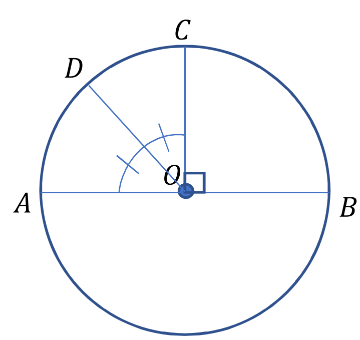
Let's start by drawing circle O with diameter $\overline{AB}$.



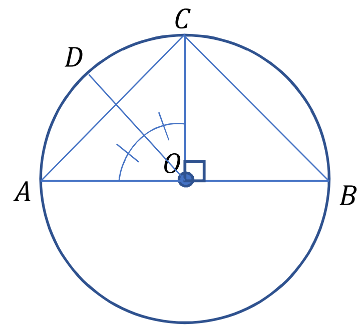
Add in radius $\overline{OC}$ with $\overline{OC} \perp \overline{AB}$. Make sure to mark the intersection of $\overline{OC}$ and $\overline{AB}$ with a right angle.



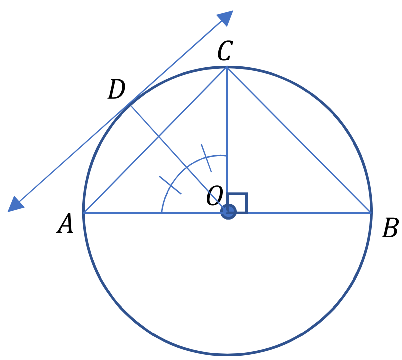
Add in $\overline{OD}$, the angle bisector of $\angle AOC$, with D on the circle. Make sure to mark the angle as a bisector.



Add in chords $\overline{AC}$ and $\overline{BC}$. Remember that you have to work with the points that are already in the figure.



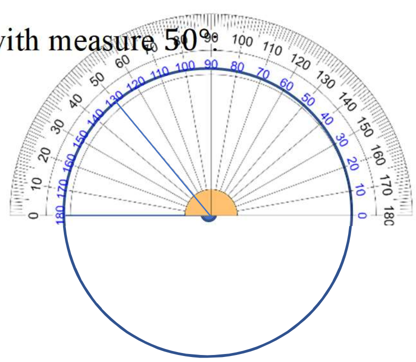
Finally, add in a tangent at D.



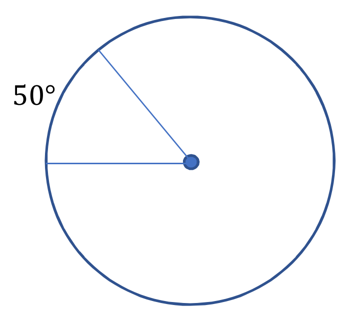
<u>Example 6: Construct arcs with each measure</u>

Make an arc with measure 50°, an arc with measure 180°, and an arc with measure 290°.

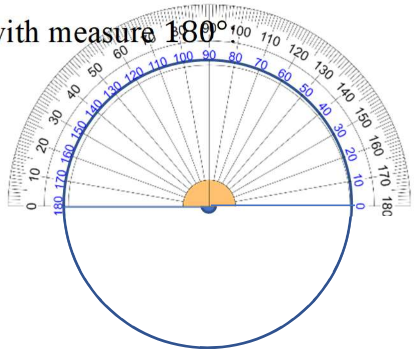
Arc with measure 50°:



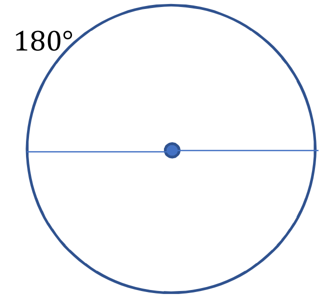
Arc with measure 50°:



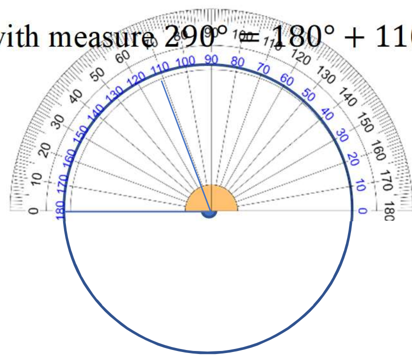
Arc with measure 180°:



Arc with measure 180°:



Arc with measure 290° = 180° + 110°:



Arc with measure 290°