Definition: A circle is the set of all points in a plane that are at a fixed distance from a given point known as the center.

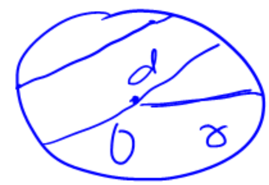
Definitions:

radius - a segment that has one endpoint at the center of a circle and the other endpoint on the circle. Its measure is ½ the measure of the diameter.

diameter - a chord that contains the center of a circle. Two (2) radii make up the diameter.

chord - a segment that has endpoints that lie on the circle. The diameter is considered a chord.

Formulas:




$r = \frac{d}{2}$ $d = 2r$ (r = radius, d = diameter)

The circumference of a circle (that is…the measure around the circle) is represented by the formula:

$C = 2\pi r$ or $C = d\pi$ $C = 2\pi r = \pi(2r) = \pi d$

**When asked to find the EXACT circumference - leave the π in your answer (do not multiply it through).**

**Example 1:**

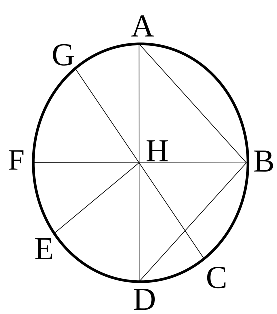
For the given circle name all the:

center: H

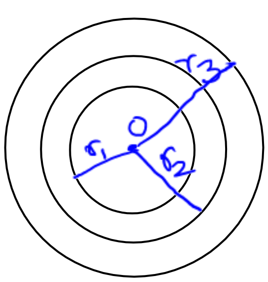
diameters: $\overline{FB}, \overline{GC}, \overline{AD}$

chords: $\overline{AB}, \overline{BD}, \overline{FB}, \overline{GC}, \overline{AD}$

radii: $\overline{FH}, \overline{GH}, \overline{AH}, \overline{HB}, \overline{HC}$
$\overline{HD}, \overline{HE}, \overline{HF}$



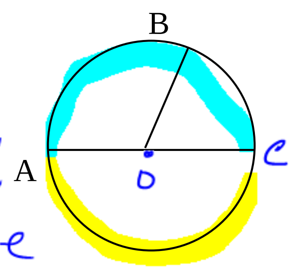

Definition: Concentric circles are coplanar circles that have a common center.



Semi-circle $\overset{\frown}{ABC}$, $\overset{\frown}{AC}$

Minor arc $\overset{\frown}{AB}$, $\overset{\frown}{BC}$

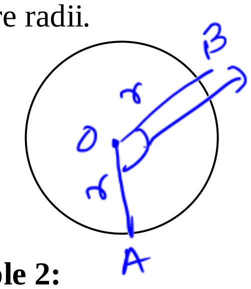
Major arc $\overset{\frown}{ACB}$ / $\overset{\frown}{BCA}$, $\overset{\frown}{BAC}$



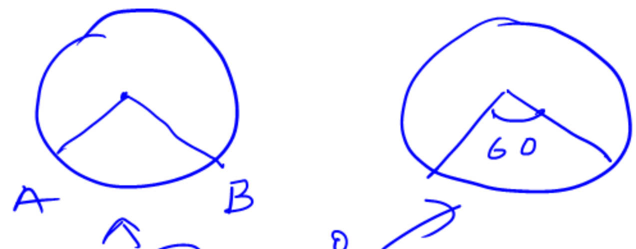

less than semi-circle

more than semi-circle

Definition: A central angle of a circle is an angle whose vertex is the center of the circle whose sides are radii.




central angle

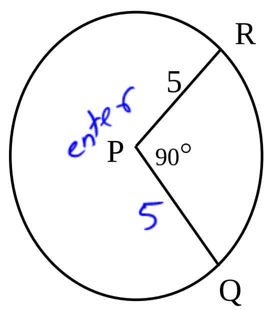



$\overset{\frown}{AB} = 60^\circ$

**Example 2:**

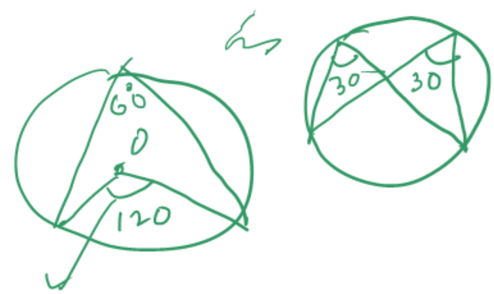
Given the circle below, find the ***length*** of PQ and arc RQ

.



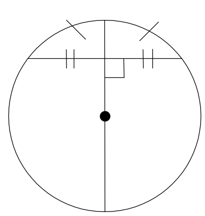

$PQ = 5$

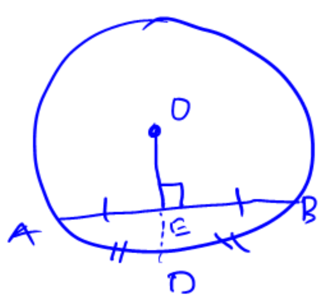
$\overset{\frown}{RQ} = 90^\circ$




central angle

Theorem 6.1.1: A radius that is perpendicular to a chord bisects the chord.



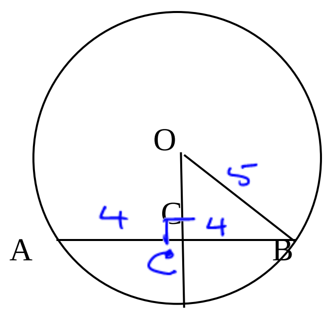



$AE = EB$

$\overset{\frown}{AD} = \overset{\frown}{DB}$

Example 3:

Given $\overline{\mathbf{OD}} \perp \overline{\mathbf{AB}}$ at point C. If AB = 8 and OB = 5, find OC.




$OC^2 + CB^2 = OB^2$

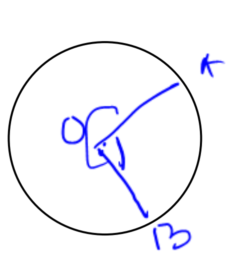
$OC^2 + 4^2 = 5^2$

$OC^2 + 16 = 25$

$OC^2 = 9$

$OC = 3$

Postulate 16: (Central Angle Postulate) In a circle, the degree measure of a central angle is equal to the degree measure of its intercepted arc.




$m\overset{\frown}{AB} = 110$

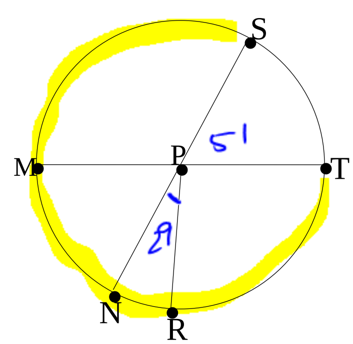
$360 - 110 = 250^\circ$

Note: the sum of the measures of consecutive arcs that form a circle is exactly $360°$ .

Example 4:

If $\overline{SN}$ and $\overline{MT}$ are diameters with m∠SPT = 51 and m∠NPR = 29, determine whether each arc is a minor arc, a major arc, or a semicircle. Then find the **degree measure** of each arc. P → center

1. $m\overset{\frown}{NR} = 29^\circ$
2. $m\overset{\frown}{ST} = 51^\circ$
3. $m\overset{\frown}{TRS} = 360 - 51^\circ$ $= 309^\circ$
4. $m\overset{\frown}{MST} = 180^\circ$ (semicircle)




5. $m\overset{\frown}{RT} = 180 - 29 - 51$ $= 100^\circ$

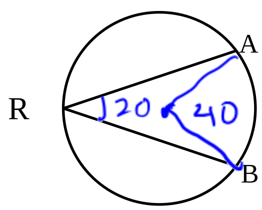
Definition: In a circle or congruent circles, congruent arcs with equal measures.

Postulate 17: (Arc –Addition postulate) If B lies between circle A and C on a circle, then measure of arc AB + the measure of arc BC = the measure of arc ABC.

Definition: An inscribed angle of a circle is an angle whose vertex is a point on the circle and whose sides are chords of the circle.

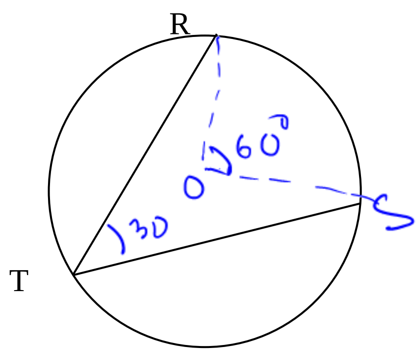
Theorem6.1.2: The measure of an inscribed angle of a circle is one half the measure of its intercepted arc.

Inscribed Angle - an angle whose vertex is on the circle (not in the center of the circle) and whose sides contain chords.




$m\overset{\frown}{AB} = 40$ So $m\angle ARB = 20°$

**Example 5:** Find the measure of arc RS if the $m\angle T = 30°$




$m\overset{\frown}{RS} = 2m\angle T$

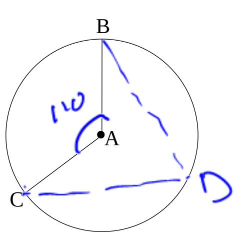
$= 2 \cdot 30$

$= 60°$

**Example 6:**
Given center A. Find the indicated information to the nearest tenth.

A. $m\overset{\frown}{BC}$ = 110°

a. $m\angle BAC = 110$

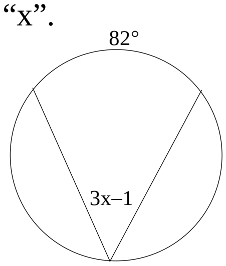



$m\angle BDC = \frac{1}{2} m\overset{\frown}{BC}$

$= \frac{1}{2}\, 110°$

$= 55°$

b. Find “x”.




$3x-1 = \frac{1}{2}(82)$

$2(3x-1) = 82$

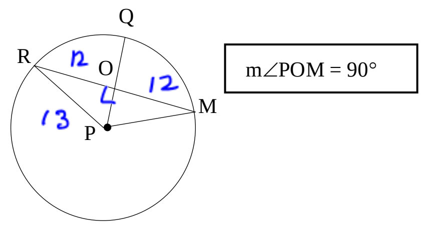
$6x-2 = 82$

$6x = 84$

$x = 14$

b. x = 14

c. If PR=13 and RM=24, find PO.




$PO^2 + OR^2 = RP^2$

$PO^2 + 12^2 = 13^2$

$PO^2 + 144 = 169$

$PO^2 = 25$

$PO = 5$

Note: Theorems 6.1.3-6.1.10 please read over.