Math 1312
Section 6.1
Circles

Definitions:

A **circle** (symbol O) is the set of all points in a plane that are at a fixed distance from a given point known as the **center** of the circle.

A **radius** is a segment that joins the center of the circle to a point on the circle.

A **chord** is a segment that joins two points of the circle.

A **diameter** of a circle is a chord that contains the center of the circle.

Facts:

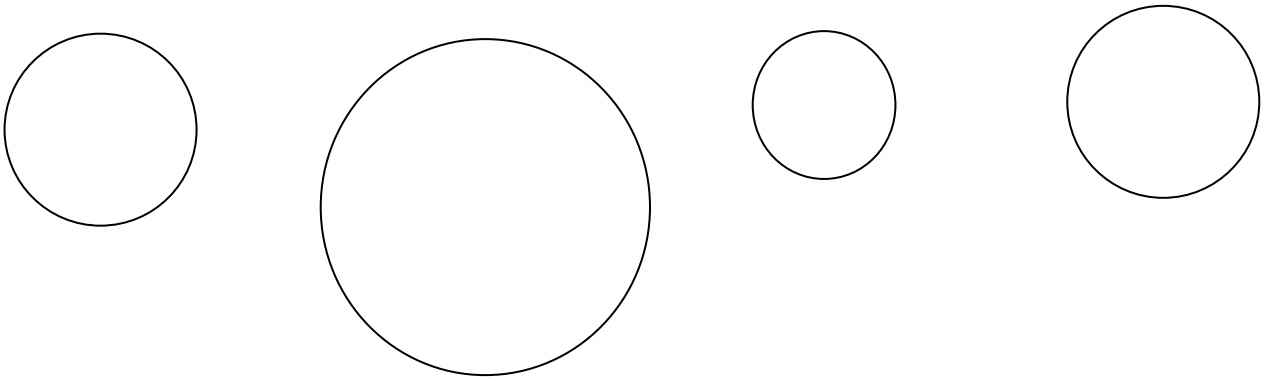
- All radii of a circle are congruent.
- In a circle, the length of a diameter (d) is twice that of a radius (r). ($d = 2r$, $r = \frac{d}{2}$)

Definitions:

Congruent Circles are two or more circles with congruent radii.

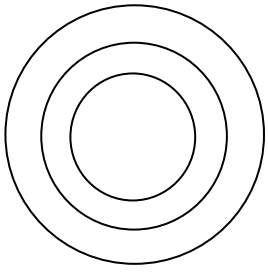
Concentric Circles are coplanar circles that share a common center.

Example 1:
Which circles are congruent?

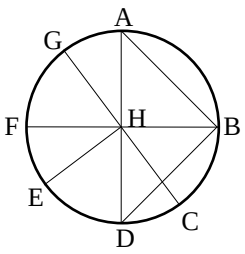


Example 2:

Congruent or concentric?



Example3:
For the given circle name:



a) Center

b) Diameters

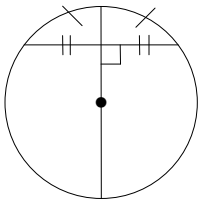
c) Chords

d) Radii

Theorem:

A radius that is perpendicular to a chord bisects that chord.

Example 4:



More Definitions:

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

An **arc** (symbol) consists of two points on a circle and all points that needed to connect them by a single path.

A **minor arc** is an arc with a measure less than 180^0.

A **major arc** is an arc with a measure more than 180^0.

A **semicircle** is an arc whose endpoints are the endpoints of a diameter.

Facts:

- A semicircle measures 180^0.
- The sum of the measures of the consecutive arcs that form a circle is 360^0
- The measure of a minor arc is equal to the measure of its central angle.

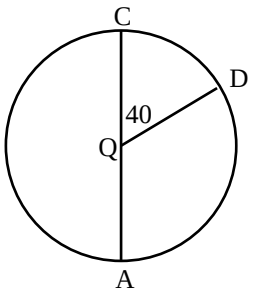
Example 5:
In circle Q, $\overline{AC}$ is a diameter and $m\angle CQD = 40^0$. Find the following:

a) $mCD =$

b) $mCAD =$

c) $mAD =$

d) $mDCA =$



Definitions … again:

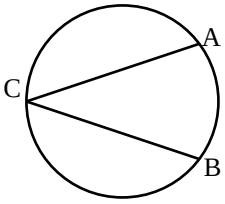
An **intercepted arc** is an arc whose endpoints are the two points of intersection of an angle with the circle and all points that lie within the angle.

An **inscribed angle** of a circle is an angle whose vertex is on the circle (but not in the center of the circle) and whose sides are chords of the circle.

Facts:

- The measure of an inscribed angle is equal to half the measure of its intercepted arc.
- An angle inscribed in a semicircle is a right angle (measures 90^0).
- If two inscribed angles intercept the same arc, then these angles are congruent.

Example 6: If $mAB = 40^0$, then find $m\angle ACB$.



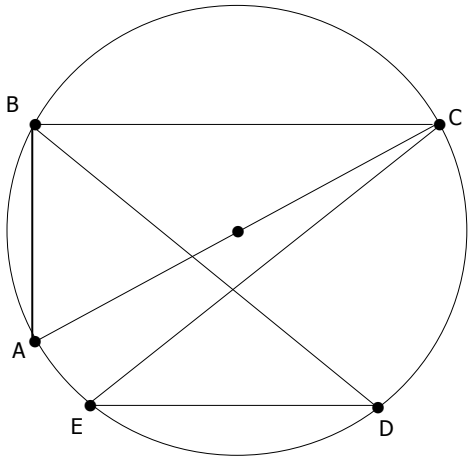
Example 7: In the circle below, $\overline{AC}$ is a diameter, $mCD = 68$, and $mBE = 96$.
Find:

a) $m\angle ABC$

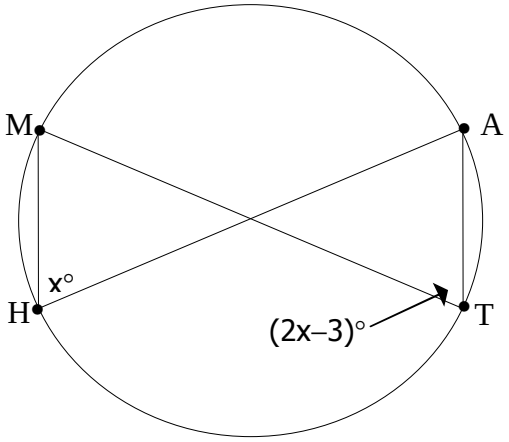
b) $m\angle BDE$

c) $m\angle CED$

d) mAD

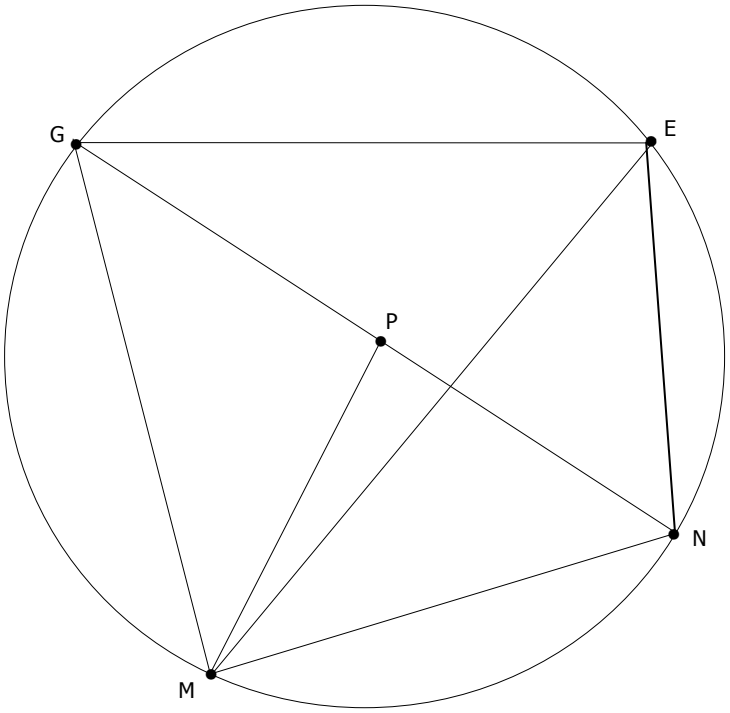


Example 8: Find the value of "x".



Example 9: In circle P, $mEN = 66$, $m\angle GPM = 89$, and $\overline{GN}$ is a diameter.
Find:

a) $m\angle MPN$



b) mGE

c) $m\angle GNE$

d) $m\angle MEN$

e) $m\angle MGE$