# **Definitions:**

A **circle** (symbol  $\Theta$ ) 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 = d = 2r

# **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:



### **Theorem:**

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

# Example 4:





## **More Definitions:**



#### Facts:

- $\blacktriangleright$  A semicircle measures 180<sup> $\circ$ </sup>.
- $\blacktriangleright$  The sum of the measures of the consecutive arcs that form a circle is 360<sup>o</sup>
- > 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  $m \angle CQD = 40^{\circ}$ . Find the following:

a) 
$$mCD = 40^{\circ}$$
  
b)  $mCAD = 360 - 40 = 320^{\circ}$   
c)  $mAD = 180 - 40 = 140^{\circ}$ 

$$\frac{1}{mDCA} = \frac{360 - 140}{140} = 220^{\circ}$$
$$= 180 + 40 = 220^{\circ}$$



#### **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. ABC is intercepted by  $\angle ABC$ 

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.  $\angle PQP$ 

#### 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  $90^{\circ}$ ).
- > If two inscribed angles intercept the same arc, then these angles are congruent.

<b>Example 6:</b> If $mAB = 40^\circ$ , then find $m \angle ACB$ .	30 60
$m < ACB = \pm mAB = \pm (40)^{\circ}$	
= 20°	



**Example 8:** Find the value of "x".





e)  $m \angle MGE = \frac{1}{2}(66+91) = \frac{1}{2}(157) = 78.5^{\circ}$