Ch. 10 Circles

10.1 Properties of Tangents

- **Circle**: set of all points equal distance from a center point
- **Radius**: segment, from center to edge of circle
- **Chord**: segment inside circle, endpoints on circle
- **Diameter**: segment, chord through center

- **Secant**: line, intersects the circle in 2 points
- **Tangent**: line or ray, intersects the circle once at the point of tangency, outside the circle

- **Coplanar Circles**:
  - 2 circles that intersect twice, once or not at all
- **Common Tangent**:
  - A tangent line, ray, or segment that touches both circles

- **Theorem**: A line is tangent to a circle iff that line is perpendicular to the radius

- **Theorem**: Tangents from a common point are congruent

10.2 Arc Measures

- **Central Angle**: an angle inside the circle, vertex at the center

- **Arc**: Piece of the circle (360°)

- Angle forms Arc:

- measure of central angle = the measure of the arc.

- **Minor Arc**: less than 180°, AB
- **Major Arc**: more than 180 ° , ABC
- **Semicircle**: = 180 °

- Adjacent arcs: common endpoint
- Arc Addition: arcAB + arcBC = arcABC

- **Congruent Circles**: Have the same radius

- **Congruent Arcs**: Have the same measure and come from same circle or congruent circles

10.3 Properties of Chords

- **Chord**: segment inside the circle
  - Creates minor arc and major arc

- **Theorem**: 2 arcs are congruent iff 2 chords are congruent

- **Theorem**: If a chord is a perpendicular of another chord then it is a diameter

- **Theorem**: If a diameter is a chord, then it bisects the other chord and the arc

- **Theorem**: 2 chords are congruent iff they are equal distance from the center (the perpendicular)

10.4 Inscribed Angles and Polygons

- **Angles** inside the Circle:
  - 1. **Central Angle**: vertex at center, $\angle$ = arc
  - 2. **Inscribed Angle**: vertex on circle, $\angle = \frac{1}{2}$ arc

- **Polygons** in Circles:
 - Polygon – inscribed
  - Circles – circumscribed

- **Theorem**: If right triangle is inscribed, then hypotenuse is diameter
  - If hypotenuse = diameter, then it's a right triangle

- **Theorem**: A quadrilateral can be inscribed iff the opposite angles are supplementary

10.5 Other Angles in Circles

- 1. **Angle on Circle**: tangent and chord, $\frac{1}{2}$ arc

- 2. **Intersecting Lines**:

  - a. Angles inside circle: the angle = $\frac{1}{2}$ (arc + arc)

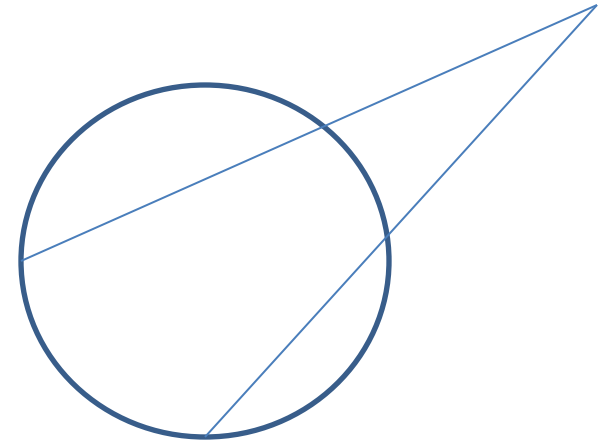 - b. Angles outside circle: the angle = $\frac{1}{2}$ (arc − arc)

10.6 Segment Lengths in Circles

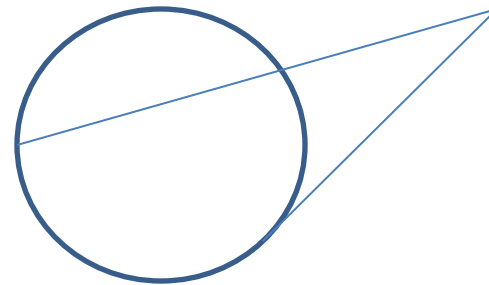- **2 Chords**: intersect in a circle, each chord divided into 2 segments
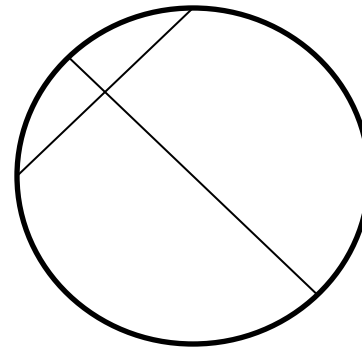
  – segment·segment = segment·segment

- **2 secants**:
  - top·whole = top·whole

- **Secant and Tangent**:
  - top·whole = side2

10.7 Write Equations and Graph Circles

- **To Write equation** of Circle need 2 things:
  - 1. Center point
  - 2. radius
- If center at origin (0,0) then….$x^2 + y^2 = r^2$
- If center (h,k) then…. $(x - h)^2 + (y - k)^2 = r^2$

- **To Graph** the Circle:
  - Plot the center
  - Use the radius to make 4 points