CHAPTER 9 – CIRCLES

Objectives/Goals

9-1 – Basic Terms
Be able to identify parts of circles and spheres

9-2 – Tangents
Be able to apply theorems relating to tangents and radii of circles

9-3 – Arcs and Central Angles
Be able to recognize and use relationships between arcs and central angles

9-4 – Arcs and Chords
Be able to apply theorems about arcs and chords, and make conclusions about their relationships

9-5 – Inscribed Angles
Be able to solve problems involving inscribed angles and their relationships to their arcs

9-6 – Other Angles
Be able to solve problems using angles formed by chords, secants, and tangents

9-7 – Circles and Lengths of Segments
Be able to solve problems involving lengths of chords, secant segments, and tangent segments

Essential Questions

1.) What can we conclude about the lengths of tangents to a circle from a common point?

2.) How do the lengths of chords change as they approach the center of the circle?

3.) What are the properties of a quadrilateral inscribed in a circle?

4.) How do we find the measures of angles based on their intercepted arcs?

5.) What must be true if a diameter bisects a chord and its arc?

Chapter 9 terms to know

Circle
Center
Radius
Chord
Common chord
Diameter
Secant
Tangent
Point of tangency

Sphere
Concentric circles
Inscribed polygon
Circumscribed polygon
Common tangent
Internal tangents
External tangents
Tangent circles
Internally tangent circles

Externally tangent circles
Central angle
Arc
Minor arc
Major arc
Semicircle
Adjacent arcs
Inscribed angle

Intercepted arc

CHAPTER 9

Postulate 16 Arc Addition Postulate – The measure of the arc formed by two adjacent arcs is the sum of the measures of these two arcs.

Theorem 9-1 If a line is tangent to a circle, then the line is perpendicular to the radius drawn to the point of tangency.

Corollary - Tangents to a circle from a point are congruent.

Theorem 9-2 If a line in the plane of a circle is perpendicular to a radius at its outer endpoint, then the line is tangent to the circle.

Theorem 9-3 In the same circle or in congruent circles, two minor arcs are congruent if and only if their central angles are congruent.

Theorem 9-4 In the same circle or in congruent circles,

1) congruent arcs have congruent chords.
2) congruent cords have congruent arcs.

Theorem 9-5 A diameter that is perpendicular to a chord bisects the chord and its arc.

Theorem 9-6 In the same circle or congruent circles,

1) chords equally distant from the center (or centers) are congruent.
2) congruent chords are equally distant from the center (or centers).

Theorem 9-7 The measure of an inscribed angle is equal to half the measure of its intercepted arc.

Corollary 1 If two inscribed angles intercept the same arc, then the angles are congruent.

Corollary 2 An angle inscribed in a semicircle is a right angle.

Corollary 3 If a quadrilateral is inscribed in a circle, then its opposite angles are supplementary.

Theorem 9-8 The measure of an angle formed by a chord and a tangent is equal to half the measure of the intercepted arc.

Theorem 9-9 The measure of an angle formed by two chords that intersect inside a circle is equal to half the sum of the measures of the intercepted arcs.

Theorem 9-10 The measure of an angle formed by two secants, two tangents, or a secant and a tangent drawn from a point outside a circle is equal to half the difference of the measures of the intercepted arcs.

Theorem 9-11 When two chords intersect inside a circle, the product of the segments of one chord equals the product of the segments of the other chord.

Theorem 9-12 When two secant segments are drawn to a circle from an eternal point, the product of one secant segment and its external segment equals the product of the other secant segment and its external segment.

Theorem 9-13 When a secant segment and a tangent segment are drawn to a circle from an external point, the product of the secant segment and its external segment is equal to the square of the tangent segment.