Name _______________ Hr ____

Chapter 10 Guided Notes

Properties of Circles

Chapter Start Date:_____
Chapter End Date:_____
Test Day/Date:_____

10.1 Use Properties of Tangents

Term	Definition	Example
circle		
center		
radius (radii)		
chord		
diameter		
secant		
tangent		
point of tangency		
tangent ray		
tangent segment		
coplanar circles		

tangent circles		
concentric circles		
common tangent		
Theorem 10.1	In a plane, a line is tangent to a circle if and only if the line is perpendicular to a radius of the circle at its endpoint on the circle.	
Theorem 10.2	Tangent segments from a common external point are congruent.	

10.2 Find Arc Measures

Term	Definition	Example
central angle		
minor arc		
major arc		
semicircle		
measure of a minor arc		
measure of a major arc		
measure of a semicircle		
adjacent arcs		
Postulate 23 Arc Addition Postulate	The measure of an arc formed by two adjacent arcs is the sum of the measures of the two arcs.	
congruent circles		
congruent arcs		

10.3 Apply Properties of Chords

Term	Definition	Example
Theorem 10.3	In the same circle, or in congruent circles, two minor arcs are congruent if and only if their corresponding chords are congruent.	
bisecting arcs		
Theorem 10.4	If one chord is a perpendicular bisector of another chord, then the first chord is a diameter.	
Theorem 10.5	If a diameter of a circle is perpendicular to a chord, then the diameter bisects the chord and its arc.	
Theorem 10.6	In the same circle, or in congruent circles, two chords are congruent if and only if they are equidistant from the center.	

10.4 Use Inscribed Angles and Polygons

Term	Definition	Example
inscribed angle		
intercepted arc		
Theorem 10.7 Measure of an Inscribed Angle Theorem	The measure of an inscribed angle is one half the measure of its intercepted arc. Case 1: Center *C* is on a side of the inscribed angle. Case 2: Center *C* is inside the inscribed angle. Case 3: Center *C* is outside the inscribed angle.	
Theorem 10.8	If two inscribed angles of a circle intercept the same arc, then the angles are congruent.	
inscribed polygon		
circumscribed circle		
Theorem 10.9	If a right triangle is inscribed in a circle, then the hypotenuse is a diameter of the circle. Conversely, if one side of an inscribed triangle is a diameter of a circle, then the triangle is a right triangle and the angle opposite the diameter is the right angle.	
Theorem 10.10	A quadrilateral can be inscribed in a circle if and only if its opposite angles are supplementary.	

10.5 Apply Other Angle Relationships in Circles

Term	Definition	Example
Theorem 10.11	**If a tangent and a chord intersect at a point on a circle, then the measure of each angle formed is one half the measure of its intercepted arc.**	
intersecting lines and circles	**If two lines intersect a circle, then there are three places where the lines can intersect.** **<u>Case 1:</u> On the circle** **<u>Case 2:</u> Inside the circle** **<u>Case 3:</u> Outside the circle**	
Theorem 10.12 Angles Inside the Circle Theorem	**If two chords intersect *inside* a circle, then the measure of each angle is one half the *sum* of the measures of the arcs intercepted by the angle and its vertical angle.**	
Theorem 10.13 Angles Outside the Circle Theorem	**If a tangent and a secant, two tangents, or two secants intersect *outside* a circle, then the measure of the angle formed is one half the positive difference of the measures of the intercepted arcs.** **<u>Three Cases:</u>** **a. Two secants** **b. A Secant and a Tangent** **c. Two Tangents**	

10.6 Find Segment Lengths in Circles

Term	Definition	Example
segments of the chord		
Theorem 10.14 Segments of Chords Theorem	If two chords intersect in the interior of a circle, then the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord.	
secant segment		
external segment		
Theorem 10.15 Segments of Secants Theorem	If two secant segments share the same endpoint outside a circle, then the product of the lengths of one secant segment and its external segment equals the product of the lengths of the other secant segment and its external segment.	
Theorem 10.16 Segments of Secants and Tangents Theorem	If a secant segment and a tangent segment share an endpoint outside a circle, then the product of the lengths of the secant segment and its external segment equals the square of the length of the tangent segment.	

10.7 Write and Graph Equations of Circles

Term	Definition	Example
Equation of a Circle	Let *(x,y)* represent any point on a circle with center at the origin (0,0) and radius *r*. By the Pythagorean Theorem, $x^2 + y^2 = r^2$.	
Standard Equation of a Circle	The standard equation of a circle with center *(h, k)* and radius *r* units is $(x-h)^2 + (y-k)^2 = r^2$.	
Steps to Write the Equation of a Circle Determined by 3 Non-collinear Points	a. Draw the triangle formed by the three points. b. Construct the perpendicular bisectors of the two sides. The center of the circle is their point of intersection. c. Find the distance between the center and any of the three given points. This is the radius of the circle. d. Use the center and radius to write an equation of the circle.	