Properties of Circles

**CORE STANDARDS**

HSG.C.A.2

HSG.C.A.3

LESSON

**6-1**

OBJECTIVE **1. SWBAT apply properties of circles to solve problems.**

NOTES Definitions and Theorems

Arc: An arc is any portion of the curved edge of a circle. The MEASURE of an arc is in degrees, and any circle measures a total of 360, no matter its size. The LENGTH of an arc or *arclength* is a distance measured in a unit of length like inches, for example.

Radius: Line segment from center to edge.

Diameter: Line segment from edge to edge, through the center.

Chord: Line segment from edge to edge.

*A*

*H*

*G*

*F*

*E*

*D*

*C*

*B*

Secant: Line that intersects the circle at two points.

Inscribed Angle: Angle formed by two chords, with vertex at edge.

Central Angle: Angle formed by two radii, with vertex at center.

Tangent: Line that intersects circle at exactly one point, called the Point of Tangency.

Rad Tan Thm.: A

radius is perpendicular

to a tangent line at its

point of tangency.

*a*

2*a*

2*a*

Star Trek Thm.: The arc intercepted

by an inscribed angle is twice the measure

of the angle. Also, a central angle is equal

to the arc it intercepts.

Cylclic Quadrilateral Thm.: If a

quadrilateral in inscribed in a circle, then opposite

angles are supplementary. That is:

*a* + *b* = 180 and *c* + *d* = 180

*a*

*b*

*c*

*d*

Intersecting Chords Thm.:

If two chords intersect in a circle, then

the measure of vertical angles formed

is the average of the two arcs intercepted

by those vertical angles.

*a*

*b*

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Two Tangents Thm.: If two distinct tangents

are drawn from an exterior point, the distances

from the exterior point to the points of tangency

are equal. Also, in the figure shown, *a* + *b* = 180

*a*

*b*

EXAMPLES Find the value of each labeled part in degrees. Assume bold points are centers or points of tangency.

*g*

*e*

*f*

85

97

126

*h*

*a*

*b*

*c*

*d*

38

41

**1.** **2.**

80

58

*p*

*q*

*r*

**3.** **4.**

80

96

*m*

*k*

*n*

*j*

132

PRACTICE **6-1** NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 [SHOW YOUR WORK]

Find the value of *x* and *y* in degrees. Assume bold points are centers or points of tangency.

1. 2. 3.

*y*

53

*x*

*y*

88

*x*

84

125

*y*

*x*

1. 5. 6.

*y*

100

*x*

110

*y*

66

*x*

78

138

*y*

*x*

*y*

250

*x*

1. 8. 9.

*y*

*x*

92

*y*

100

*x*

Find the length of each indicated segment.

*A*

8cm

*B*

6cm

*D*

*C*

*A*

3cm

*B*

2cm

*D*

*C*

*E*

1.8cm

1. *AB* = ? 11. *EB* = ?
2. Find the perimeter of *BDFH.*

5cm

*A*

*B*

44.8cm

*C*

*D*

*E*

*H*

*F*

*G*

*I*

9cm

16cm

13. Referring to the previous problem, if the radius of circle *A* measures 12cm, find the area of quadrilateral *BDFH*.