Accelerated Geometry **Name** ____________________________

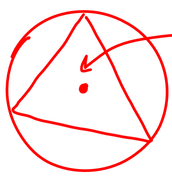
Section 10.7: Inscribed and Circumscribed Polygons **Date** ____________________________

After this lesson, you will be able to
- Recognize inscribed and circumscribed polygons
- Apply the relationship between opposite angles of an inscribed quadrilateral
- Identify the characteristics of an inscribed parallelogram

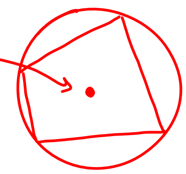
DEFINITIONS

A polygon is **inscribed in** a circle if all of its vertices lie on the circle.

Draw an example of: a) triangle inscribed in a circle b) quadrilateral inscribed in a circle



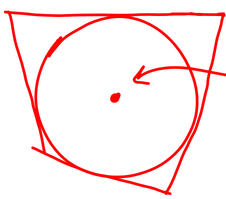
Circumcenter



A polygon is **circumscribed about** a circle if each of its sides is tangent to the circle.

Draw an example of a quadrilateral circumscribed about a circle.

Walk Around



Incenter

The center of a circle circumscribed about a polygon is the **circumcenter** of the polygon. Label the circumcenter in one of your diagrams above.

The center of a circle inscribed in a polygon is the **incenter** of the polygon. Label the incenter in one of your diagrams above.

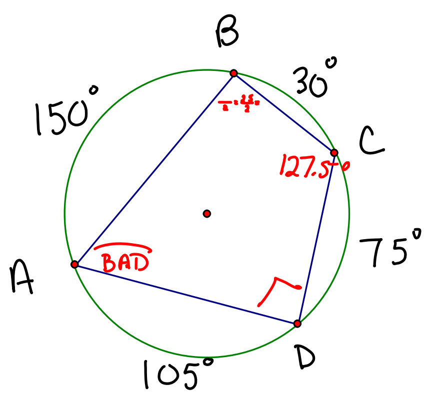
In the diagram below, find the measures of all four angles of the quadrilateral.

$\measuredangle A = \frac{\overset{\frown}{BD}}{2} = \frac{105}{2} = 52.5°$

$\measuredangle B = \frac{\overset{\frown}{ADC}}{2} = \frac{180}{2} = 90°$

$\measuredangle C =$ 52 5° 5 127.5°

$\measuredangle D = \frac{\overset{\frown}{ABC}}{2} = \frac{180}{2} = 90°$



What do you notice about $\measuredangle A$ and $\measuredangle C$? supp

What do you notice about $\measuredangle B$ and $\measuredangle D$? supp

Theorem: If a quadrilateral is inscribed in a circle, its opposite angles are supplementary.

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Let's now think about what happens when we inscribe a parallelogram in a circle.

In a parallelogram, the opposite angles are $\cong$.

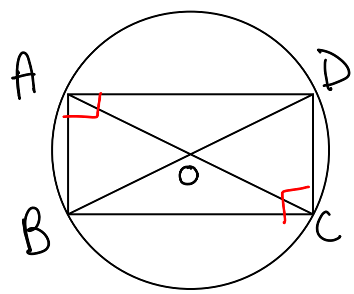
In a quadrilateral inscribed in a circle, the opposite angles are supplementary.

In a parallelogram inscribed in a circle, the opposite angles are both $\cong$

and supplementary.

Theorem: If a parallelogram is inscribed in a circle, it must be a rectangle.

If ABCD is an inscribed parallelogram, then



1. $\measuredangle A$ and $\measuredangle C$ are right ∠s.

2. $\overset{\frown}{BAD}$ and $\overset{\frown}{BCD}$ are semicircles.

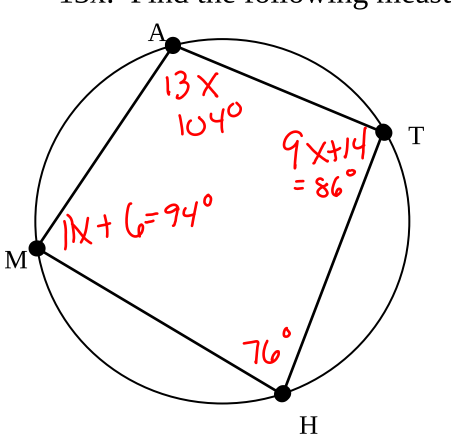
3. $\overline{BD}$ and $\overline{AC}$ are diameters.

4. The intersection of the two diagonals/diameters $\overline{BD}$ and $\overline{AC}$ is O. O is the center of the circle.

5. $\overline{OA}, \overline{OB}, \overline{OC}$ and $\overline{OD}$ are radii.

6. $(AB)^2 + (BC)^2 = (AC)^2$, and so forth.

Practice: Quad MATH is inscribed within the circle above. ∠AMH = 11x + 6, ∠HTA = 9x + 14, ∠MAT = 13x. Find the following measurements.



1) x

$11x+6+9x+14=180$

$20x+20=180$

$20x=160$

$x=8$

2) ∠AMH = 94°

3) ∠MHT = 76°

4) ∠HTA = 86°

5) ∠MAT = 104°

6) $\overset{\frown}{HTA}$ = 188°

7) $\overset{\frown}{TAM}$ = 152°

8) $\overset{\frown}{AMH}$ = 172°

9) $\overset{\frown}{MHT}$ = 208°