## Geometric Properties Review

### Angle Properties

<table>
<thead>
<tr>
<th>Acute</th>
<th>Right</th>
<th>Complimentary</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtuse</td>
<td>Straight</td>
<td>Supplementary</td>
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<tr>
<td>Angles on a line</td>
<td>Reflex</td>
<td>Angles at a point</td>
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<td></td>
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<tr>
<td>Vertically opposite angles</td>
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</table>

### Triangle Properties

![Triangle Properties Diagram]

- Acute triangle
- Right triangle
- Obtuse triangle
- Reflex triangle
- Angles at a point
- Vertically opposite angles
Quadrilateral Properties

Trapezoid

Parallelogram

Rectangle

Rhombus

Square

Assignment: Geometric Properties Worksheet
2.1 Exploring Parallel Lines

Parallel Lines and Transversals

A transversal is a line that intersects two or more other lines at distinct points.

Parallel lines are lines with the same slope but different y-intercepts. Parallel lines will never intersect each other.

If two parallel lines are cut by a transversal, eight angles are created.

Corresponding angles are on the same side of the transversal, and on the same side of the parallel lines. (They are in the same position)
**Interior angles** lie inside the parallel lines.

**Co-Interior Angles:** Interior angles on the same side of the transversal.

**Alternate Interior Angles:** Interior angles on opposite sides of the transversal.

**Exterior angles** lie outside the parallel lines.

**Co-Exterior Angles:** Exterior angles on the same side of the transversal.

**Alternate Exterior Angles:** Exterior angles on opposite sides of the transversal.

***If two parallel lines are cut by a transversal then Corresponding Angles, Alternate Interior Angles, & Alternate Exterior Angles are equal.***

***Likewise, if two lines are cut by a transversal and the Corresponding Angles, or Alternate Interior Angles, or the Alternate Exterior Angles are equal then the lines are parallel.***
Example 1: Find each indicated angle:

a. 

b. 

c. 

d. 

e. 

Assignment: Pg. 72 #2-6
From last day we know that when a transversal crosses parallel lines, the corresponding angles are equal. There are two other sets of angles that have a relationship when a transversal crosses parallel lines.

**Alternate Interior Angles**
When a transversal intersects a pair of parallel lines, the *alternate interior angles* are equal.

Proof:
Co-Interior Angles:
When a transversal intersects a pair of parallel lines, the **co-interior angles** are supplementary.

![Diagram of co-interior angles](image)

Proof:

![Diagram of proof](image)

**Example 1:** Determine the measures of $a$, $b$ and $c$. 

![Diagram of example](image)
Example 2: Find the measure of $\angle 1$.

$$\left( x^2 - 25x \right)^\circ$$

$$\left( x \right)^\circ$$

Example 3: Determine the measures of $a$, $b$, $c$ and $d$.

Assignment: pg. 78 #1-4, 10, 12, 13, 15, 16, 20
The sum of the angles in a triangle is $180^\circ$.

We can use our knowledge of parallel lines to prove (deductively) this theorem.

Example 1: Given $\triangle ABC$, prove $\angle 1 + \angle 2 + \angle 3 = 180^\circ$.

Example 2: Determine the measures of $\angle 1$ and $\angle 2$. 
The measure of an exterior angle of a triangle is equal to the sum of the measures of the two non-adjacent interior angles.

Example 3: Prove $\angle e = \angle a + \angle b$.

Example 4: Determine $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$.

Example 5: Given $AB \parallel CD$

$\angle 1 = \angle 4$

Prove $\angle 1 = \angle 2$

Assignment: pg. 90 #2, 3, 5-9, 12, 15, 16, 18
A **polygon** is a closed geometric figure made up of \( n \) straight sides.

A **convex polygon** has all interior angles less than 180°.

A **concave polygon** has at least one interior angle greater than 180°.

<table>
<thead>
<tr>
<th># of sides in a polygon</th>
<th>sketch</th>
<th># of triangles formed</th>
<th>Sum of interior angles of the polygon</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td><img src="image" alt="Triangle" /></td>
<td>1</td>
<td>1( \times 180° = 180° )</td>
</tr>
<tr>
<td>4</td>
<td><img src="image" alt="Quadrilateral" /></td>
<td>2</td>
<td>2( \times 180° = 360° )</td>
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<td>5</td>
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<tr>
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<td>( n )</td>
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</table>
In any polygon with \( n \) sides, the sum of the interior angles is \( 180°(n-2) \). A **regular polygon** has equal sides and equal angles.

**Example 1:** Determine the measure of each interior angle of a regular 17-sided polygon.

The sum of the exterior angles of any convex polygon is \( 360° \).

Each exterior angle of a regular polygon is \( \frac{360°}{n} \).

**Example 2:** Show that the sum of the exterior angles of a pentagon is \( 360° \).

**Example 3:** What type of regular polygon has an interior angle 3 times the exterior angle?

**Assignment:** Pg. 99 #1-4, 6-11, 14, 18