Angles Vocabulary

**Congruent angles** – two or more angles with the same measure.

**Complementary Angles** – two angles whose sum is $90^\circ$.

**Supplementary Angles** – two angles whose sum is $180^\circ$.

**Vertical angles** – Two angles that share a common vertex and their sides form two pairs of opposite rays. Vertical angles are congruent.
- A transversal is a line that intersects a system of two or more lines at different points.
- Two lines are parallel if they do not intersect.
- Perpendicular lines are two lines that intersect at a right angle.

**Transversal Notes**

**Corresponding Angles Postulate:**
If two parallel lines are cut by a transversal, then the pairs of corresponding angles are congruent.

\[ \angle A = \angle D \quad \angle B = \angle C \]

\[ \angle E = \angle H \quad \angle F = \angle G \]

**Alternate Interior Angles Theorem:**
If two parallel lines are cut by a transversal, then the pairs of alternate interior angles are congruent.

\[ \angle 3 = \angle 5 \]

\[ \angle 4 = \angle 6 \]

**Consecutive Interior Angles Theorem:**
(Same Side Interior Angles)
If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary.

\[ \angle 3 + \angle 5 = \angle 7 \]

\[ \angle 4 + \angle 6 = \angle 8 \]

**Alternate Exterior Angles Theorem:**
If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent.

\[ \angle 1 = \angle 5 \]

\[ \angle 2 = \angle 6 \]

**Consecutive Exterior Angles Theorem:**
(Same Side Exterior Angles)
If two parallel lines are cut by a transversal, then the pairs of consecutive exterior angles are supplementary.

\[ \angle 1 + \angle 5 = \angle 7 \]

\[ \angle 2 + \angle 6 = \angle 8 \]

**Perpendicular Transversal Theorem:**
If a transversal is perpendicular to one of the two parallel lines, then it is perpendicular to the other.
Ex.1 Identify the angles as corresponding, alternate interior, alternate exterior, consecutive interior, or consecutive exterior.

1. $\angle 3$ and $\angle 7$ ______________________
2. $\angle 4$ and $\angle 10$ ______________________
3. $\angle 5$ and $\angle 8$ ______________________
4. $\angle 8$ and $\angle 6$ ______________________
5. $\angle 9$ and $\angle 5$ ______________________
6. $\angle 5$ and $\angle 7$ ______________________

Ex.2

Ex.3

Ex.4

Ex.5

Ex.6

Ex.7

Ex.8

Ex.9
- **Triangle Sum Theorem** - the sum of the angle measures of a triangle is 180 degrees.

- A **scalene triangle** has no congruent sides.

  Ex.1

- An **isosceles triangle** has two congruent angles and two congruent sides.

  Ex.3

- An **equilateral triangle** has three congruent sides.

- An **equiangular triangle** has three congruent angles.

- If a triangle is equilateral then it is also equiangular and vice versa.

  Ex.5

- **Exterior Angle Theorem** - the measure of an exterior angle of a triangle is equal to the sum of the measures of its remote interior angles.

  \[ \angle A + \angle B = \angle D \]
### Criteria for Congruent Triangle

<table>
<thead>
<tr>
<th><strong>Side-Side-Side</strong></th>
<th><strong>Side-Angle-Side</strong></th>
<th><strong>Angle-Side-Angle</strong></th>
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</thead>
<tbody>
<tr>
<td>If three corresponding sides are congruent in two triangles, then the triangles are congruent.</td>
<td>If two corresponding sides and their included angle are congruent in two triangles, then the triangles are congruent.</td>
<td>If two corresponding angles and their included side are congruent in two different triangles, then the triangles are congruent.</td>
</tr>
<tr>
<td>ΔGIH (\cong) Δ_____ by _____</td>
<td>ΔMPN (\cong) Δ_____ by _____</td>
<td>ΔABC (\cong) Δ_____ by _____</td>
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</table>

**Angle-Angle-Side**

If two corresponding angles and their non-included side are congruent in two different triangles, then the triangles are congruent.

ΔTUV \(\cong\) Δ_____ by _____

**Hypotenuse-Leg**

If two corresponding hypotenuses and legs are congruent in two right triangles, then the right triangles are congruent.

ΔABC \(\cong\) Δ_____ by _____

### Complete the congruence statement and write the criteria (SSS, SAS, ASA, AAS, HL) for the congruent triangles.

1. \(\triangle MLW \cong \triangle _____ \) by _____
2. \(\triangle HTN \cong \triangle _____ \) by _____
3. \(\triangle STL \cong \triangle _____ \) by _____
4. \(\triangle NWY \cong \triangle _____ \) by _____
5. \(\triangle ABC \) is not congruent to \(\triangle _____ \)
6. \(\triangle FLA \cong \triangle _____ \) by _____
7. \(\triangle ACT \) is not congruent to \(\triangle _____ \)
8. \(\triangle ATL \cong \triangle _____ \) by _____

### Name the additional information that is sufficient to prove that the triangles are congruent by the given criteria.

9. \(\triangle DEF \cong \triangle \)JIH by SSS
   - DE \(\cong\) JI, EF \(\cong\) IH, ?
   - Additional information: _____ \(\cong\) _____

10. \(\triangle ABC \cong \triangle \)FED by SAS
    - BC \(\cong\) ED, \(\angle B \cong \angle E, ?
    - Additional information: _____ \(\cong\) _____

11. \(\triangle DEF \cong \)\(\triangle \)JIH by ASA
    - \(\angle D \cong \angle J, DE \cong JI, ?
    - Additional information: _____ \(\cong\) _____
- **Reflexive property**: any quantity is equal to itself.
- **Midpoint**: a point that divides a segment into two congruent segments.
- **Bisect**: divide into two equal parts.
- If two or more triangles are proven congruent, then all of their corresponding parts are congruent.
- **CPCTC**: corresponding parts of corresponding triangles are congruent

### Ex. 1 Prove: $\triangle WMO$ and $\triangle NME$ congruent

**Given:** M is the midpoint of $\overline{WN}$, M is the midpoint of $\overline{OE}$, $\angle W \cong \angle N$

<table>
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<tr>
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<th>Reason</th>
</tr>
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<tr>
<td>$\triangle WMO \cong \triangle \underline{}$</td>
<td>$\underline{}$</td>
</tr>
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### Ex. 2 Prove: $\triangle TSA$ and $\triangle OSA$ congruent

**Given:** $\overline{SA}$ is the angle bisector of $\angle TSO$, $\overline{AS}$ is the angle bisector of $\angle TAO$

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<tbody>
<tr>
<td>$\triangle TSA \cong \triangle \underline{}$</td>
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### Ex. 3 Prove $\overline{CS} \cong \overline{BU}$

**Given:** $\overline{CU}$ is parallel to $\overline{SB}$, $\overline{CS}$ is parallel to $\overline{UB}$

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<tbody>
<tr>
<td>$\triangle CUB \cong \triangle \underline{}$</td>
<td>$\underline{}$</td>
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$\overline{CS} \cong \overline{BU}$