Congruence

- **Notation:**$\angle ABC$ denotes the angle with vertex B.
- Two angles are **congruent** if they measure the same degrees. $\angle ABC \cong \angle DEF$ means the angles $\angle ABC$ and $\angle DEF$ are congruent.
- A line bisects an angle (angle bisector) if it splits the angle in half.
- $\overline{AB}$ denotes the segment from A to B.
- Two segments are **congruent** if they have the same length. $\overline{AB} \cong \overline{CD}$ means the segments are congruent.

- The symbol $\triangle ABC$ denotes the triangle with vertices A, B, and C.
- Two triangles, $\triangle ABC$ and $\triangle DEF$ are **congruent** if there is a one-to-one correspondence between their vertices so that corresponding sides are congruent and corresponding angles are congruent.
- $\triangle ABC \cong \triangle DEF$ means the triangles are congruent. Furthermore, it means that...
  $A \leftrightarrow D$, $B \leftrightarrow E$, $C \leftrightarrow F$,
  $\overline{AB} \cong \overline{DE}$, $\overline{BC} \cong \overline{EF}$, $\overline{CA} \cong \overline{FD}$,
  $\angle ABC \cong \angle DEF$, $\angle BCA \cong \angle EFD$, and $\angle CAB \cong \angle FDE$.

- A rigid transformation is a transformation that preserves collinearity, distance, and angle measure.
- Two triangles are congruent if there is a rigid transformation taking one triangle to the other.
- **Isosceles Triangle Theorem:**
  If $\triangle ABC$ is a triangle such that $\overline{AB} \cong \overline{AC}$, then

$$\angle ABC \cong \angle ACB$$

- **Side-Angle-Side (SAS) Condition:**
  If two sides and the included angle between them are congruent to two sides and the included angle of a second triangle, then the triangles are congruent.
- **Angle-Side-Angle (ASA) Condition:**
  If two angles and the included side of one triangle are congruent to the corresponding parts of a second triangle, then the triangles are congruent.
- **Angle-Angle-Side (AAS) Condition:**
  If $\triangle ABC$ and $\triangle DEF$ are such that $\angle ABC \cong \angle DEF$, $\angle BCA \cong \angle EFD$, and $\overline{AC} \cong \overline{DF}$, then
  $\triangle ABC \cong \triangle DEF$
- **Side-Side-Side (SSS) Condition:**
  If the three sides of a triangle are congruent to the corresponding sides of another triangle, then the triangles are congruent.