

Ch. 4 Congruent Triangles

Chapter 4

4.1 Triangle Sum Properties

- **Triangle:** A polygon with 3 sides

- **Classify By Sides:**

- Scalene: no = sides
- Isosceles: 2 sides =
- Equilateral: 3 sides =

- **Classify By Angles**

- Acute: All angles acute
- Obtuse: One Obtuse angle
- Right: One right angle
- Equiangular: All = angles

- **Angles:**
 - Interior Angles: inside triangle
 - Exterior Angles: outside triangle
- **Theorem: Triangle Sum Theorem**
 - The sum of the measures of the interior angles of a triangle is 180°

- **Theorem: Exterior Angle**
 - An exterior angle of a triangle = the sum of the two nonadjacent interior angles
- **Corollary to Interior Angle Sum**
 - The acute angles of a right triangle are complementary

4.2 Apply Congruence and Triangles

- **Congruent:** same shape, same size
- **2 Triangles Congruent (To Prove)**
 - 1. All Corresponding sides \cong
 - 2. All Corresponding angles \cong
 - Order Important

- **Theorem: Third Angle**

- If two angles of one triangle are \cong to two angles of another triangle,

- Then the third angles are congruent

4.3 Transformations and Congruence

- **Transformation:** to move or change a figure
- **Rigid Motion:** Type of transformation
 - Preserves the length, angle measures, and area
 - Called isometry
 - **3 Types**
 - Translation: slide
 - Reflection: flip
 - Rotation: turns
 - Maintains Congruence

4.4 Prove Triangles Congruent by SSS

- **Postulate: Side-Side-Side Congruence**
 - If 3 sides of one Δ are \cong to 3 sides of another Δ
 - Then the two triangles are \cong
- **Note: the order a congruence statement is written is important**
 - The congruent sides and angles must match

4.5 Prove Triangles Congruent by SAS and HL

- **Postulate: SAS Congruence**

– If 2 sides and included angle of one triangle are \cong To 2 sides and the included angle of another triangle, Then the triangles are \cong .

SSA NOT true unless it's a **Right Triangle** (HL)

If the hypotenuse and leg of right triangle is congruent to the hypotenuse and leg of another triangle, Then the triangles are \cong .

4.6 Prove Triangles Congruent by ASA and AAS

- **Postulate 21: ASA Congruence**

- If two angles and the included side are congruent to the corresponding angles and side,
Then the triangles are congruent.

Theorem: AAS Congruence

- If 2 angles and any other side are congruent to the corresponding angles and side,
- Then the triangles are congruent.

Ways to Prove 2 Triangles Congruent

- 1. SSS
- 2. SAS
- 3. HL
- 4. ASA
- 5. AAS

4.7 Use Congruent Triangles

- If 2 triangles are congruent.....
- Then all the corresponding parts are congruent.
- **CPCTC**
- **Corresponding Parts of Congruent Triangles are Congruent**

- To Prove Corresponding sides or angles are \cong
- First Prove the two triangles are \cong .

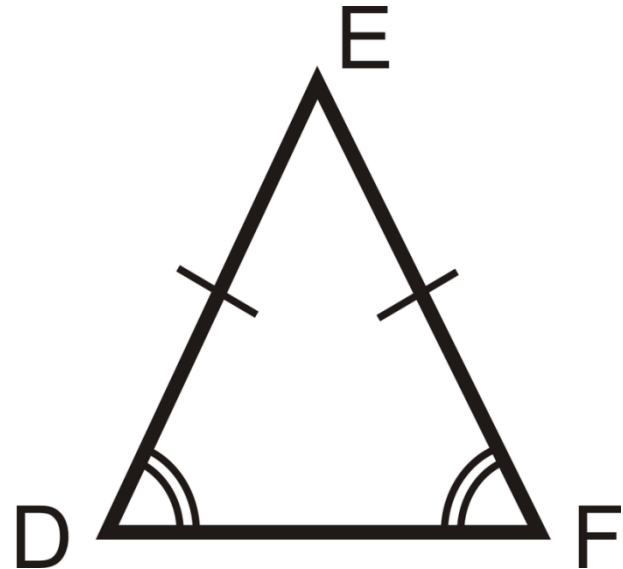
4.8 Use Isosceles and Equilateral Triangles

- 2 Special triangles.

- 1. **The Isosceles Triangle:**

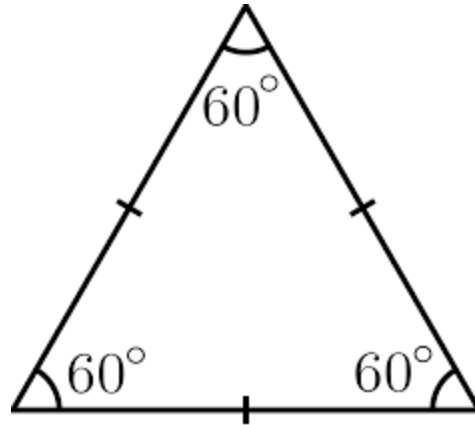
- If 2 sides $\triangle \cong$,
then base angles \cong .

- If Base angles \cong ,
then 2 legs \cong .



BAIT \cong **Base Angles of Isosceles Triangle** \cong

- **Equilateral Triangle:**



- Corollary:

- If Triangle is equilateral, then it is equiangular.
- If Triangle is equiangular, then it is equilateral.

4.9 Perform Congruence Transformations

- **Transformation:** operation that moves a figure.
- **3 kinds:**
 - 1. translation (slide)
 - 2. reflection (flip)
 - 3. rotation (turn)

- **1. Translation:** $(x,y) \rightarrow (x + a, y + b)$
- **2. Reflection:**
 - In the x-axis $(x,y) \rightarrow (x, -y)$
 - In the y-axis $(x,y) \rightarrow (-x, y)$
- **3. Rotation:**
 - preserves the distance from the center (pivot point)
 - Clockwise/ counterclockwise
 - Angle of rotation given