Geometry Unit 3

Planning a Proof

Planning a Proof

- **Content Objective**: Students will be able to develop strategies for constructing two-column proofs

- **Language Objective**: Students will be able to identify and utilize key strategies for writing proofs.

Structure of a Proof

- As seen from the last few sections, the proof of a theorem consists of 5 parts:

1. *Statement* of the theorem.
2. A *diagram* that illustrates the given information.
3. A list, in terms of the figure, of what is *given*.
4. A list, in terms of the figure, of what you need to *prove*.
5. A series of *statements* and *reasons* that lead from the *given* information to the *statement* that is to be *proved*.

Planning a Proof

- Sometimes, the diagrams and statements will be given to you. Other times, you will have to make it yourself.
- Some tips for constructing your proof:
  - If you have to make the diagram, try to make it **reasonably accurate.**
  - Carefully plan your **two-column** proof
  - If you don't see the method for the proof immediately, try **reasoning backwards** from what you would like to prove. (Ex: "This conclusion will be true if __?__ .")
  - Study proofs from **previous theorems** for ideas.

Proving Theorem 2-7

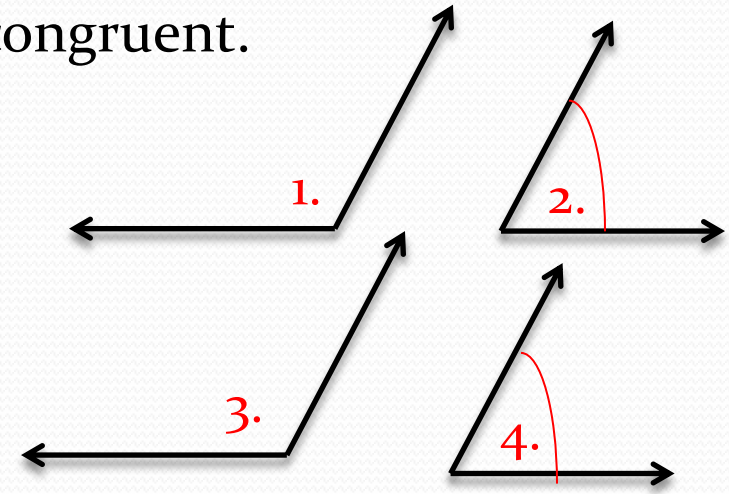
- Theorem 2-7: If two angles are supplements of congruent angles (or of the same angle), then the two angles are congruent.

Given: $\angle 1$ and $\angle 2$ are supplementary;

$\angle 3$ and $\angle 4$ are supplementary;

$\angle 2 \cong \angle 4$

Prove: $\angle 1 \cong \angle 3$



Statements	**Reasons**
1. $\angle 1$ and $\angle 2$ are supplementary; $\angle 3$ and $\angle 4$ are supplementary	1. Given
2. $m\angle 1 + m\angle 2 = 180°$ $m\angle 3 + m\angle 4 = 180°$	2. Def. of Supp. $\angle$'s
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	3. Subst. Prop.
4. $\angle 2 \cong \angle 4$, or $m\angle 2 = m\angle 4$	4. Given
5. $m\angle 1 = m\angle 3$, or $\angle 1 \cong \angle 3$	5. Subtr. Prop.

Proving Theorem 2-8

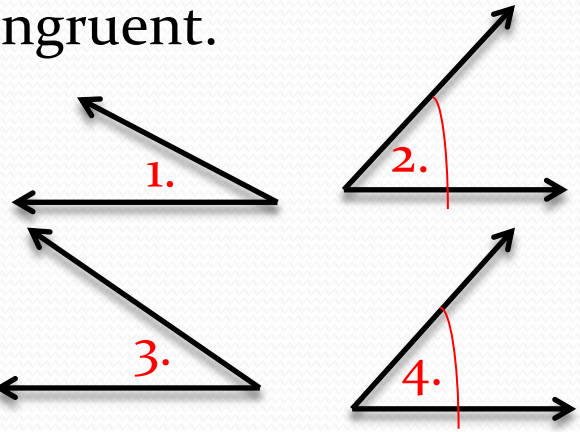
- Theorem 2-8: If two angle are compliments of congruent angles (or of the same angle), then the two angles are congruent.

Given: $\angle 1$ and $\angle 2$ are complementary;

$\angle 3$ and $\angle 4$ are complementary;

$\angle 2 \cong \angle 4$

Prove: $\angle 1 \cong \angle 3$



Statements	**Reasons**
1. $\angle 1$ and $\angle 2$ are complementary; $\angle 3$ and $\angle 4$ are complementary	1. Given
2. $m\angle 1 + m\angle 2 = 90°$ $m\angle 3 + m\angle 4 = 90°$	2. Def. of Comp. $\angle$'s
3. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	3. Subst. Prop.
4. $\angle 2 \cong \angle 4$, or $m\angle 2 = m\angle 4$	4. Given
5. $m\angle 1 = m\angle 3$, or $\angle 1 \cong \angle 3$	5. Subtr. Prop.