### 2.4 Congruent Supplements and Complements.

Objective: Prove angles congruent by means of FOUR new theorems

## Supplementary Angle Theorems

Theorem 4: If angles are supplementary to the same angle, then they are congruent.
Theorem 5: If angles are supplementary to congruent angles, then they are congruent.

## Proof of Th ${ }^{\mathrm{m}}$ 5: Supplements to Congruent Angles are Congruent



| Statements | Reasons |
| :---: | :---: |
| 1. $\Varangle 1$ is supplementary to $\Varangle 2$ | 1. Given |
| 2. $\ddagger 3$ is supplementary to $\Varangle 4$ | 2. Given |
| 3. $\mathrm{m} \Varangle 1+\mathrm{m} \Varangle 2=180, \mathrm{~m} \Varangle 3+\mathrm{m} \Varangle 4=180$ | 3. If 2 ¢ S are supp, then their sum $=180$ |
| 4. $\mathrm{m} \Varangle 1+\mathrm{m}$ ¢ $2=m \not \leq 3+m \Varangle 4$ | 4. Substitution $(180=180)$ |
| 5. $\mathrm{m} \Varangle 2=\mathrm{m} \Varangle 3$ | 5. Given |
| 6. $\mathrm{m} \Varangle 1=\mathrm{m} \Varangle 4$ | 6. Subtraction Property |
| 7. $¢ 1 \cong \Varangle 4$ | 7. If two angles have the same measure, then they are congruent |

## Complementary Angle Theorems

Theorem 6: If angles are complementary to the same angle, then they are congruent.
Theorem 7: If angles are complementary to congruent angles, then they are congruent.
Proof of $\mathbf{T h}^{\mathbf{m}}$ 6: Complements to the Same Angle are Congruent

Given: $\Varangle \mathrm{A}$ is complementary to $\Varangle \mathrm{B}$ $\Varangle C$ is complementary to $\Varangle B$
Prove: $\Varangle \mathrm{A} \cong \Varangle \mathrm{C}$

| Statements | Reasons |
| :--- | :--- |
| 1. $\Varangle \mathrm{A}$ is complementary to $\Varangle \mathrm{B}$ | 1. Given |
| 2. $\Varangle \mathrm{C}$ is complementary to $\Varangle \mathrm{B}$ | 2. Given |
| 3. $\mathrm{m} \Varangle \mathrm{A}+\mathrm{m} \Varangle \mathrm{B}=90 ; \mathrm{m} \Varangle \mathrm{C}+\mathrm{m} \Varangle \mathrm{B}=90$ | 3. If $2 \Varangle$ s are comp, then their sum $=90$ |
| 4. $\mathrm{m} \Varangle \mathrm{B}=\mathrm{m} \Varangle \mathrm{B}$ | 4. Reflexive Property |
| 5. $\mathrm{m} \Varangle \mathrm{A}=\mathrm{m} \Varangle \mathrm{C} \longleftarrow$ | 5. Subtraction Property $(90-m \nleftarrow \mathrm{~B})$ |
| 6. $\Varangle \mathrm{A} \cong \Varangle \mathrm{C}$ | 6. If two angles have the same measure, then they are <br> congruent. |

