

Theorem 2.5 Properties of Angle Congruence

Reflexive Property of Congruence

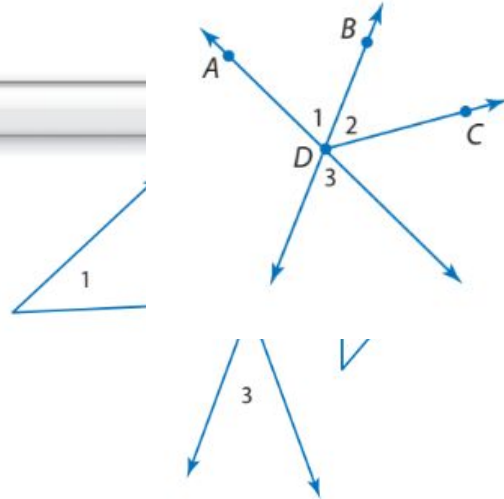
$$\angle 1 \cong \angle 1$$

Symmetric Property of Congruence

If $\angle 1 \cong \angle 2$, then $\angle 2 \cong \angle 1$.

Transitive Property of Congruence

If $\angle 1 \cong \angle 2$ and $\angle 2 \cong \angle 3$, then $\angle 1 \cong \angle 3$.



1. Prove the transitive property of angle congruence:

Given:

Prove:

| Statements | Reasons |
|------------|---------|
| 1. | 1. |
| 2. | 2. |
| 3. | 3. |
| 4. | 4. |
| 5. | 5. |

Geometry
2.8 Proving Angle Relationships

2. Given:

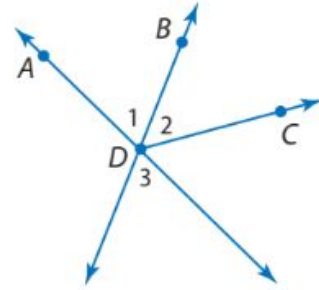
$$m\angle 3 = 40^\circ$$

$$\angle 1 \cong \angle 2$$

$$\angle 2 \cong \angle 3$$

Prove:

$$m\angle 1 = 40^\circ$$

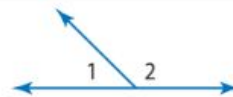


| Statements | Reasons |
|------------|---------|
| 1. | 1. |
| 2. | 2. |
| 3. | 3. |
| 4. | 4. |

Theorems

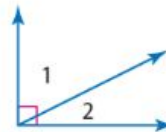
2.3 Supplement Theorem If two angles form a linear pair, then they are supplementary angles.

Example $m\angle 1 + m\angle 2 = 180$



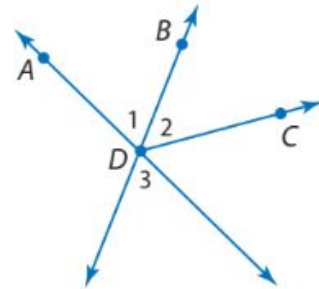
2.4 Complement Theorem If the noncommon sides of two adjacent angles form a right angle, then the angles are complementary angles.

Example $m\angle 1 + m\angle 2 = 90$



Supplement Theorem also called Linear Pair Postulate

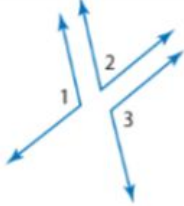
Geometry
2.8 Proving Angle Relationships



Theorems

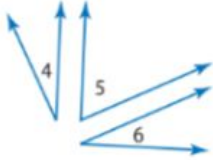
2.6 Congruent Supplements Theorem
 If two angles are supplementary to the same angle (or to congruent angles) then they are congruent.

Example If $m\angle 1 + m\angle 2 = 180$ and $m\angle 2 + m\angle 3 = 180$, then $\angle 1 \cong \angle 3$.



2.7 Congruent Complements Theorem
 If two angles are complementary to the same angle then the two angles are congruent.

Example If $m\angle 4 + m\angle 5 = 90$ and $m\angle 5 + m\angle 6 = 90$, then $\angle 4 \cong \angle 6$.

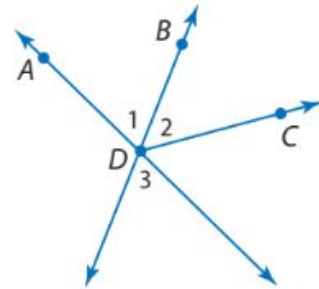


3. Prove the Congruent Supplements Theorem: If two angles are supplementary to the same angle (or to congruent angles) then they are congruent.

Given: $\angle 1$ and $\angle 2$ are supplements
 $\angle 3$ and $\angle 4$ are supplements
 $\angle 1 \cong \angle 4$
 Prove: $\angle 2 \cong \angle 3$

| Statements | Reasons |
|------------|---------|
| 1. | 1. |
| 2. | 2. |

| | |
|----|----|
| 3. | 3. |
| 4. | 4. |
| 5. | 5. |
| 6. | 6. |
| 7. | 7. |



4. Use the Transitive Property of Equality and the Supplements Theorem (Linear Pair Postulate) to find the $m\angle 7$, give $m\angle 8 = 125^\circ$

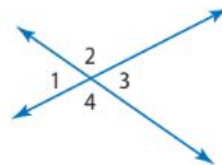


Theorem 2.8 Vertical Angles Theorem

If two angles are vertical angles, then they are congruent.

Abbreviation *Vert. \sphericalangle are \cong .*

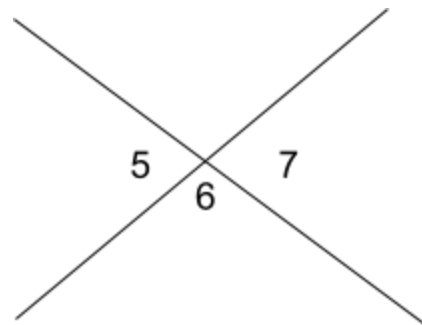
Example $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$



5. Prove the Vertical Angles Theorem:

Given: $\angle 5$ and $\angle 6$ are a linear pair
 $\angle 6$ and $\angle 7$ are a linear pair

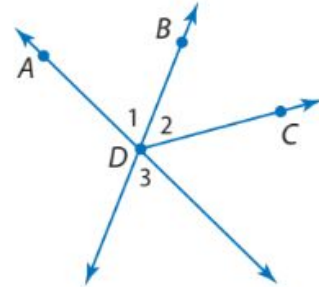
Prove: $\angle 5 \cong \angle 7$



| | |
|------------|---------|
| Statements | Reasons |
|------------|---------|

Geometry
2.8 Proving Angle Relationships

| | |
|----|----|
| 1. | 1. |
| 2. | 2. |
| 3. | 3. |



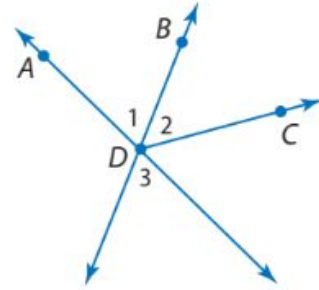
| Theorems Right Angle Theorems | |
|--|---------|
| Theorem | Example |
| <p>2.9 Perpendicular lines intersect to form four right angles. Example If $\overrightarrow{AC} \perp \overrightarrow{DB}$, then $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$ are rt. \sphericalangle.</p> | |
| <p>2.10 All right angles are congruent. Example If $\angle 1$, $\angle 2$, $\angle 3$, and $\angle 4$ are rt. \sphericalangle, then $\angle 1 \cong \angle 2 \cong \angle 3 \cong \angle 4$.</p> | |
| <p>2.11 Perpendicular lines form congruent adjacent angles. Example If $\overrightarrow{AC} \perp \overrightarrow{DB}$, then $\angle 1 \cong \angle 2$, $\angle 2 \cong \angle 4$, $\angle 3 \cong \angle 4$, and $\angle 1 \cong \angle 3$.</p> | |
| <p>2.12 If two angles are congruent and supplementary, then each angle is a right angle. Example If $\angle 5 \cong \angle 6$ and $\angle 5$ is suppl. to $\angle 6$, then $\angle 5$ and $\angle 6$ are rt. \sphericalangle.</p> | |
| <p>2.13 If two congruent angles form a linear pair, then they are right angles. Example If $\angle 7$ and $\angle 8$ form a linear pair, then $\angle 7$ and $\angle 8$ are rt. \sphericalangle.</p> | |

Geometry
2.8 Proving Angle Relationships

6. Prove that if \overrightarrow{DB} bisects $\angle ADC$, then $\angle 2 \cong \angle 3$

Given:

Prove:



| Statements | Reasons |
|------------|---------|
| 1. | 1. |
| 2. | 2. |
| 3. | 3. |
| 4. | 4. |
| 5. | 5. |
| 6. | 6. |