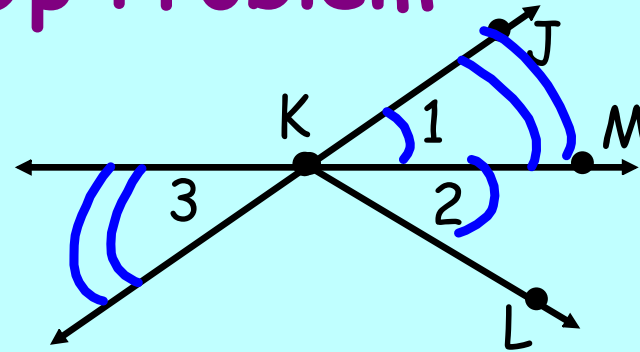


# 10/7/19 - Warm Up Problem

Given:  $\overrightarrow{KM}$  bisects  $\angle JKL$

Prove:  $\angle 2 \cong \angle 3$



| Statements   | Justifications           |
|--|--------------------------|
| 1. $\overrightarrow{KM}$ <u>bisects</u> $\angle JKL$ | given                    |
| 2. <u><math>\angle 1</math></u> $\cong \angle 2$     | definition of bisect     |
| 3. <u><math>\angle 1</math></u> $\cong \angle 3$     | vertical angles theorem  |
| 4. $\angle 2 \cong \angle 3$                         | transitive prop. $\cong$ |

## Section 2.6 - Proving Angles Congruent

**Goal:** prove and use theorems about congruent angles

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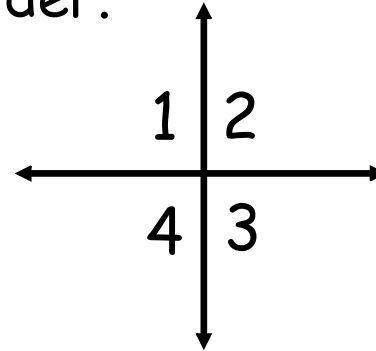
### ORDER OF STEPS FOR 2-COLUMN PROOFS

1. **GIVEN INFORMATION** – Mark your given info on the diagram after writing it in the proof
2. **DEFINITIONS** – If your given statements are sentences, turn them into equations with a definition.
3. **POSTULATES/THEOREMS** – New equations are written in using postulates and theorems.
4. **PROPERTIES** – Manipulate and combine equations using properties.  
Substitution and Transitive Properties are ones to remember!

Complete the proof by putting the statements and justifications in the correct order.

Given:  $\angle 1 \cong \angle 4$

Prove:  $\angle 2 \cong \angle 3$



| Statements                               | Justifications                       |
|--|--------------------------------------|
| 1. $\angle 1 \cong \underline{\angle 4}$ | Given                                |
| 2. $\angle 2 \cong \underline{\angle 4}$ | Vertical Angles Theorem              |
| 3. $\underline{\angle 1} \cong \angle 3$ | Vertical Angles Theorem              |
| 4. $\underline{\angle 1 \cong \angle 2}$ | Transitive Property of $\cong$ ( , ) |
| 5. $\underline{\angle 2 \cong \angle 3}$ | Transitive Property of $\cong$ ( , ) |

## Theorems about Congruent Angles

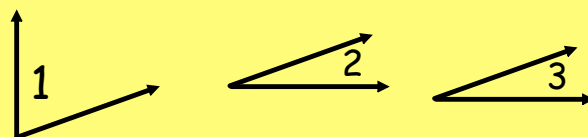
### Congruent Supplements Theorem

If two angles are supplements of the same angle (or of congruent angles), then **the two angles are congruent**.



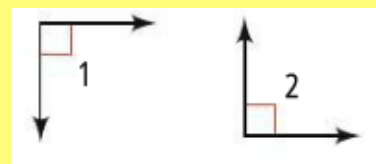
### Congruent Complements Theorem

If two angles are complements of the same angle (or of congruent angles), then **the two angles are congruent**.



### Congruent Right Angles Theorem

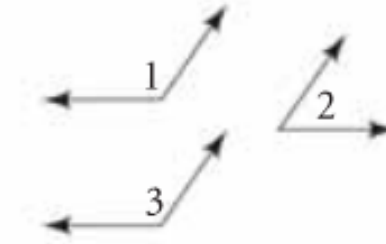
All right angles are congruent.



# Proving the Congruent Supplements Theorem

**Given:**  $\angle 1$  and  $\angle 2$  are supplementary.  
 $\angle 3$  and  $\angle 2$  are supplementary.

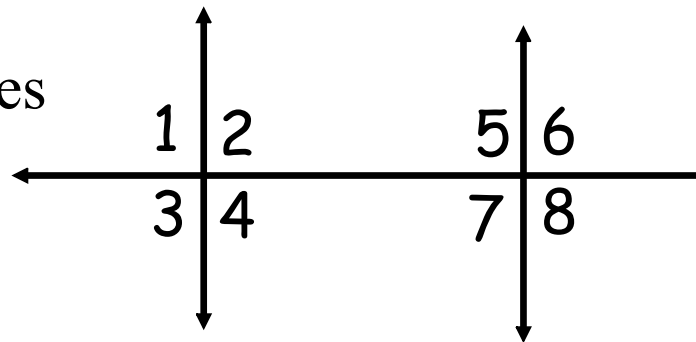
**Prove:**  $\angle 1 \cong \angle 3$



| Statements   | Justifications              |
|--|-----------------------------|
| 1. $\angle 1$ and $\angle 2$ are supplementary                       | Given                       |
| 2. $\angle 3$ and $\angle 2$ are supplementary                       | Given                       |
| 3. $m\angle 1 + m\angle 2 = \underline{180}$                         | Def. of Supplementary       |
| 4. $m\angle 3 + m\angle 2 = \underline{180}$                         | Def. of Supplementary       |
| 5. $m\angle 1 + m\cancel{\angle 2} = m\angle 3 + m\cancel{\angle 2}$ | Transitive Prop. of = ( , ) |
| 6. $m\angle 1 = m\angle 3$   | Subtraction Prop.           |
| 7. $\angle 1 \cong \angle 3$   | Def. of Congruent           |

**Given:**  $\angle 1$  and  $\angle 8$  are right angles

**Prove:**  $\angle 4 \cong \angle 5$

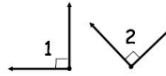


| Statements                                    | Justifications                       |
|---|--------------------------------------|
| 1. $\angle 1$ and $\angle 8$ are right angles | Given                                |
| 2. $\angle 1 \cong \angle 8$                  | Congruent Right Angles Theorem       |
| 3. $\angle 1 \cong \angle 4$                  | Vertical Angles Theorem              |
| 4. $\angle 5 \cong \angle 8$                  | Vertical Angles Theorem              |
| 5. $\angle 8 \cong \angle 4$                  | Transitive Property of $\cong$ ( , ) |
| 6. $\angle 4 \cong \angle 5$                  | Transitive Property of $\cong$ ( , ) |

**Assignment:**

**Concept 6 Worksheet #2 - due by Friday 10/5**

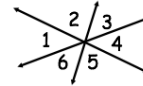
10. **Given:**  $\angle 1$  is a right angle  
 $\angle 2$  is a right angle  
**Prove:**  $\angle 1 \cong \angle 2$



| Statements                            | Justifications          |
|---------------------------------------|-------------------------|
| 1. $\angle 1$ is a <u>right angle</u> | given                   |
| 2. $\angle 2$ is a <u>right angle</u> | given                   |
| 3. $m\angle 1 = 90$                   | Def. of Right Angle     |
| 4. $m\angle 2 = 90$                   | Def. of Right Angle     |
| 5. $m\angle 1 = m\angle 2$            | Transitive Prop. of $=$ |
| 6. $\angle 1 \cong \angle 2$          | Def. of Congruent       |

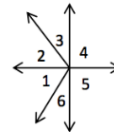
**PROOFS USING THE VERTICAL ANGLES THEOREM**

11. **Given:**  $\angle 1 \cong \angle 2$   
**Prove:**  $\angle 5 \cong \angle 4$



| Statements                   | Justifications |
|------------------------------|----------------|
| 1. $\angle 1 \cong \angle 2$ |                |
| 2. $\angle 1 \cong \angle 4$ |                |
| 3. $\angle 2 \cong \angle 5$ |                |
| 4. $\angle 2 \cong \angle 4$ |                |
| 5. $\angle 5 \cong \angle 4$ |                |

12. **Given:**  $\angle 4$  is a right angle  
 $m\angle 1 = m\angle 2$   
**Prove:**  $\angle 2$  and  $\angle 6$  are complementary



| Statements                                     | Justifications |
|--|----------------|
| 1. $\angle 4$ is a right angle                 |                |
| 2. $m\angle 1 = m\angle 2$                     |                |
| 3. $m\angle 4 = 90$                            |                |
| 4. $m\angle 1 + m\angle 6 = m\angle 4$         |                |
| 5. $m\angle 1 + m\angle 6 = 90$                |                |
| 6. $m\angle 2 + m\angle 6 = 90$                |                |
| 7. $\angle 2$ and $\angle 6$ are complementary |                |