Section 2.6 Reviewing Properties of Equality and Writing Two-Column Proofs

# Objective 1: Use Properties of Equality to Justify Reasons for Steps

**Algebra Properties of Equality**

Let *a*, *b*, and *c* be any real numbers.

|  |  |
| --- | --- |
| **Addition Property** | If , then . |
| **Subtraction Property** | If , then . |
| **Multiplication Property** | If , then . |
| **Division Property** | If and , then . |
| **Reflexive Property** |  |
| **Symmetric Property** | If , then . |
| **Transitive Property** | If  and , then . |
| **Substitution Property** | If , then *b* can replace *a* in any expression. |

**The Distributive Property**

Use multiplication to distribute a to each term of a sum or difference within the parentheses:





The properties of equality can also be stated in terms of segment lengths and angle measures.

|  |  |  |
| --- | --- | --- |
| **Property** | **Angle Measures** | **Segment Lengths** |
| **Reflexive Property** |  |  |
| **Symmetric Property** | If , then . | If , then . |
| **Transitive Property** | If  and , then . | If  and , then . |

a. Give a reason to justify each step of the following solution.

| **Statement** | **Reason** |
| --- | --- |
|  | Given |
|  | a. |
|  | b. |
|  | c. |

b. Give a reason to justify each statement below.

Given:  and  are supplementary in the figure below.



| **Statement** | **Reason** |
| --- | --- |
|  and  are supplementary. | Given |
|  | a. |
|   | b. |
|  | c. |
|  | d. |
|  | e. |

c. Given , fill in the blank:  Justify your answer.

d. Given  and , fill in the blank:  . Justify your answer.

e. Fill in the missing reasons:

 Given: 

Given: 

  because .

  because .

f. Consider the relationship “has the same birthday as” among people. State whether the relationship is “reflexive”, “symmetric”, “transitive”, or “none of these”. Explain.

g. Consider the relationship “is taller than” among people. State whether the relationship is “reflexive”, “symmetric”, “transitive”, or “none of these”. Explain.

# Objective 2: Write a Two-Column Proof

A **proof** is an argument that uses logic to establish the truth of a statement.

A **two-column proof** lists numbered statements on the left and corresponding numbered reasons or justifications on the right.

g. Write a two-column proof.



Given: Ray  is the angle bisector of .

Prove: 

h. Write a two-column proof.



Given: 

Prove: 