

$$4x + 7 - x + 3 = 34$$

<u>Steps</u>	<u>Reasons</u>
$4x + 7 - x + 3 = 34$	Given
$3x + 10 = 34$	Combine like terms
$3x = 24$	Subt. prop.
$x = 8$	Division prop.

$$5 - 4(2x - 3) = -15$$

<u>Steps</u>	<u>Reasons</u>
$5 - 4(2x - 3) = -15$	Given
$5 - 8x + 12 = -15$	Dist. prop.
$-8x + 17 = -15$	Combine like terms
$-8x = -32$	Subt. prop.
$x = 4$	Division

**Objective 1: Connecting Reasoning in Algebra and Geometry**

Recall that in geometry, we accept postulates and properties as true.  
Some of the properties that we accept as true are the properties of equality from algebra 1. These are the properties that allow us to solve equations.

**Summary: Properties of Equality****Addition Property****Subtraction Property**

## **Multiplication Property**

## **Division Property**

## **Symmetric Property**

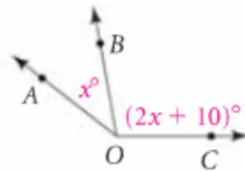
## **Transitive Property**

## Distributive Property

## Symmetric Property

We use these properties to prove every step or statement that we make when solving equation. These properties are the reason you are *allowed* to solve equations. Today, you will be asked to justify the steps that you take: use one of the properties listed above (or an earlier definition) for your justification. When solving problems using segments, you can use the seg. Add post from Section 1-5. When solving problems using angles, you can use the Angle Add post from section 1-6.

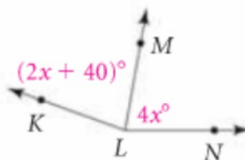
**Example 1:** Solve for  $x$  and justify each step.



Given:  $m\angle AOC = 139^\circ$ ,

Statement	Justification
$m\angle AOB + m\angle BOC = m\angle AOC$	Angle Addition Post.
$x + 2x + 10 = 139$	Substitution prop.
$3x + 10 = 139$	Simplify
$3x = 129$	Subtraction prop of eq.
$x = 43$	Division prop of eq.

**QC 1:** Fill in each missing reason.



Given:  $\overrightarrow{LM}$  bisects  $\angle KLN$

**Statements:**

$\overrightarrow{LM}$  bisects  $\angle KLN$

$m\angle MLN = m\angle KLM$

$4x = 2x + 40$

$2x = 40$

$x = 20$

**Justifications:**

Given

Definition of angle bisector

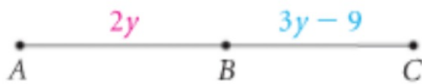
subt. prop.

subtraction.

division prop.

\*\*We can also use the Seg. Add post postulate from Section 1-5 to justify statements about lengths of segments.

Example 2: Solve for  $y$  and justify each step. Then find  $AB$  and  $BC$ .



**Given:**  $AC = 21$

**Statements:**

$$AB + BC = AC$$

$$2y + (3y - 9) = 21$$

$$5y - 9 = 21$$

$$5y = 30$$

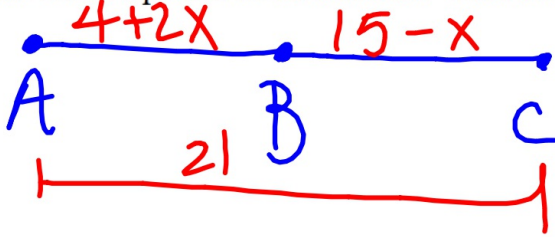
$$y = 6$$

**Justifications:**

segment Add. post  
substitution prop.  
simplify  
Add. prop.  
division

Example 2 1/2: Suppose points A, B, and C are collinear with point B between points A and C. Solve for  $x$  if  $AB = 4 + 2x$ ,  $BC = 15 - x$  and  $AC = 21$ . Justify each step.

(Hint: Draw a picture of the situation. Then set up your statement and justifications columns.)



$$AB + BC = AC$$

$$2x + 4 + 15 - x = 21$$

$$19 + x = 21$$

$$x = 2$$

Seg. Add.

subst.

simplify

subtr.

### Summary: Properties of Congruence

#### **Reflexive Property**

$$\overline{AB} \cong \overline{AB} ; \angle A \cong \angle A$$

#### **Symmetric Property**

$$\text{If } \overline{AB} \cong \overline{CD}, \text{ then } \overline{CD} \cong \overline{AB}$$

#### **Transitive Property**

$$\text{If } \overline{AB} \cong \overline{CD} \text{ and } \overline{CD} \cong \overline{EF}, \\ \text{then } \overline{AB} \cong \overline{EF}$$



Example 3: Using Properties of Equality and Congruence

Name the property of equality or congruence that justifies each statement.

A.  $\angle K \cong \angle K$

Reflexive Prop. of Cong.

B. If  $2x - 8 = 10$ , then  $2x = 18$ .

Add. Prop. of Eq.

C. If  $m\angle A = 45$  and  $m\angle B = 45$ , then  $m\angle A = m\angle B$ .

Symm. Prop. of Eq.

D. If  $\angle P \cong \angle Q$ ,  $\angle Q \cong \angle R$ , and  $\angle R \cong \angle S$ , then  $\angle P \cong \angle S$ .

Transitive Prop. of Cong.  
Subst. Prop. of Equality.

E. If  $x + 4 = 3x$ , then  $4 = 2x$ .

Hwk #11 - due tomorrow

Sec. 2.4

Pages 105-107

Problems 2, 4-8, 15, 17, 18, 22, 25-27

IXL #4 - B.8 & I.1 (I not an L) due Friday, Sept. 28th!