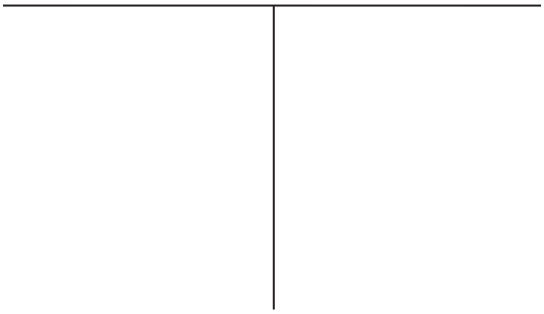
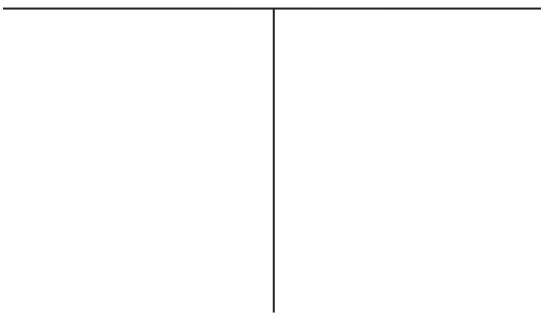
Name: _____ WORKSHEET: Algebraic Proof

Solve each equation. Write a reason for every step.

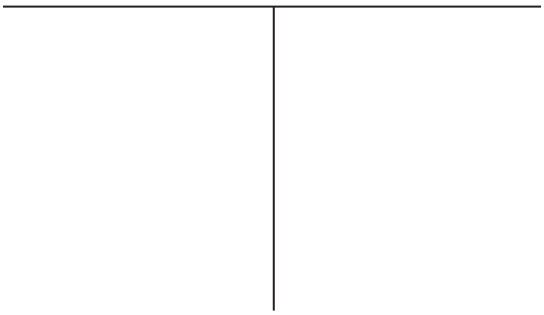
1. $4x = 12x + 32$



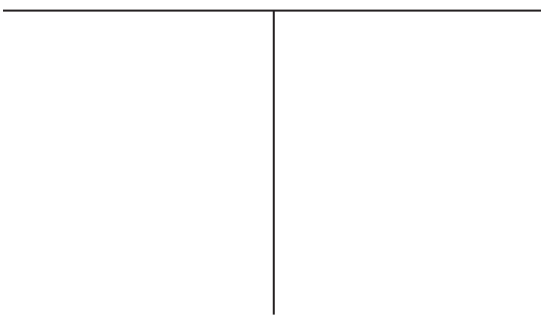
2. $28 + 12x = 8x - 4$



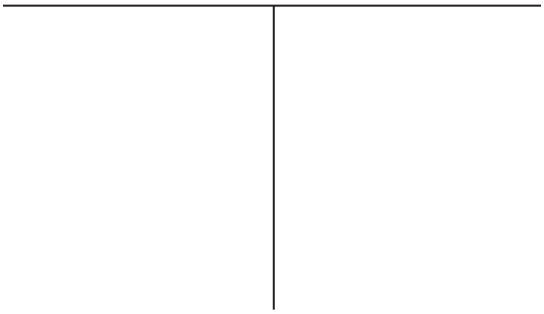
3. $60x + 153 = 9x + 51$



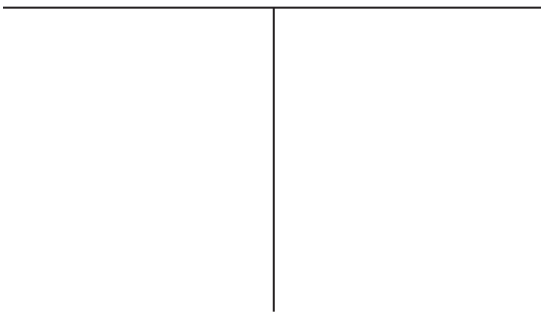
4. $-4x + 10 = -5x + 18$



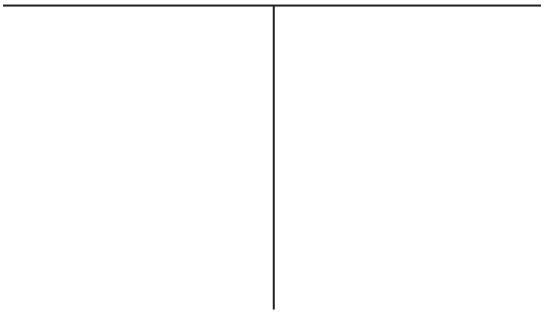
5. $-3(x + 2) = 16 - x$



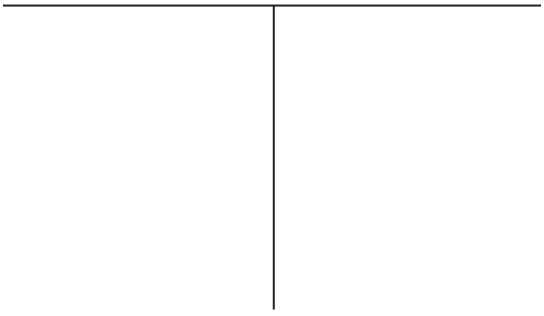
6. $-x - 2(9 - 8x) = 12$



7. $6(x - 6) = x(16 - 7)$



8. $\frac{1}{4}x + 10 = 2$



NAME _____ DATE _____ PERIOD _____

2-6 Study Guide and Intervention

Algebraic Proof

Algebraic Proof A list of algebraic steps to solve problems where each step is justified is called an **algebraic proof**, The table shows properties you have studied in algebra.

The following properties are true for any real numbers *a*, *b*, and *c*.

Addition Property of Equality	If $a = b$, then $a + c = b + c$.
Subtraction Property of Equality	If $a = b$, the $a - c = b - c$.
Multiplication Property of Equality	If $a = b$, then $a \cdot c = b \cdot c$.
Division Property of Equality	If $a = b$ and $c \neq 0$, then, $\frac{a}{c} = \frac{b}{c}$.
Reflexive Property of Equality	$a = a$
Symmetric Property of Equality	If $a = b$ and $b = a$.
Transitive Property of Equality	If $a = b$ and $b = c$, then $a = c$.
Substitution Property of Equality	If $a = b$,then a may be replaced by b in any equation or expression.
Distributive Property	$a(b + c) = ab + ac$

Example **Solve $6x + 2(x - 1) = 30$. Write a justification for each step.**

Algebraic Steps	Properties
$6x + 2(x - 1) = 30$	Original equation or Given
$6x + 2x - 2 = 30$	Distributive Property
$8x - 2 = 30$	Substitution Property of Equality
$8x - 2 + 2 = 30 + 2$	Addition Property of Equality
$8x = 32$	Substitution Property of Equality
$\frac{8x}{8} = \frac{32}{8}$	Division Property of Equality
$x = 4$	Substitution Property of Equality

Exercises

Complete each proof.

1. Given: $\frac{4x + 6}{2} = 9$
Prove: $x = 3$
Proof:

Statements	Reasons
a. $\frac{4x + 6}{2} = 9$	**a.** _____
b. $\left(\frac{4x + 6}{2}\right) = 2(9)$	**b.** Mult. Prop.
c. $4x + 6 = 18$	**c.** _____
d. $4x + 6 - 6 = 18 - 6$	**d.** _____
e. $4x =$ _____	**e.** Substitution
f. $\frac{4x}{4} =$ _____	**f.** Div. Prop.
g. _____	**g.** Substitution

2. Given: $4x + 8 = x + 2$
Prove: $x = -2$
Proof:

Statements	Reasons
a. $4x + 8 = x + 2$	**a.** _____
b. $4x + 8 - x = x + 2 - x$	**b.** _____
c. $3x + 8 = 2$	**c.** Substitution
d. _____	**d.** Subtr. Prop.
e. _____	**e.** Substitution
f. $\frac{3x}{3} = \frac{-6}{3}$	**f.** _____
g. _____	**g.** Substitution