

Study Guide

**Integration: Algebra
Using Proof in Algebra**

Many rules from algebra are used in geometry.

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

Example: Prove that if $4x - 8 = -8$, then $x = 0$.

Given: $4x - 8 = -8$

Prove: $x = 0$

Proof:

Statements	Reasons
a. $4x - 8 = -8$	a. Given
b. $4x = 0$	b. Addition Property (=)
c. $x = 0$	c. Division Property (=)

Name the property that justifies each statement.

1. Prove that if $\frac{3}{5}x = -9$, then $x = -15$.

Given: $\frac{3}{5}x = -9$

Prove: $x = -15$

Proof:

Statements	Reasons
a. $\frac{3}{5}x = -9$	a. _____
b. $3x = -45$	b. _____
c. $x = -15$	c. _____

2. Prove that if $3x - 2 = x - 8$, then $x = -3$.

Given: $3x - 2 = x - 8$

Prove: $x = -3$

Proof:

Statements	Reasons
a. $3x - 2 = x - 8$	a. _____
b. $2x - 2 = -8$	b. _____
c. $2x = -6$	c. _____