

**Geometry****Unit 3—Formal Proofs****Day 15—algebraic proofs****Name:** _____**Period:** _____

A **proof** is a logical argument that shows a conclusion is true. An algebraic proof uses algebraic properties, including the Distributive Property and the properties of equality.

Properties of Equality	Symbols	Examples
Addition	If $a = b$, then $a + c = b + c$.	If $x = -4$, then $x + 4 = -4 + 4$.
Subtraction	If $a = b$, then $a - c = b - c$.	If $r + 1 = 7$, then $r + 1 - 1 = 7 - 1$.
Multiplication	If $a = b$, then $ac = bc$.	If $\frac{k}{2} = 8$, then $\frac{k}{2}(2) = 8(2)$.
Division	If $a = 2$ and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$.	If $6 = 3t$, then $\frac{6}{3} = \frac{3t}{3}$.
Reflexive	$a = a$	$15 = 15$
Symmetric	If $a = b$, then $b = a$.	If $n = 2$, then $2 = n$.
Transitive	If $a = b$ and $b = c$, then $a = c$.	If $y = 3^2$ and $3^2 = 9$, then $y = 9$.
Substitution	If $a = b$, then b can be substituted for a in any expression.	If $x = 7$, then $2x = 2(7)$.

When solving an algebraic equation, justify each step by using a definition, property, or piece of given information.

	Statement	Reasons
Step 1	$2(a + 1) = -6$	Given equation
Step 2	$2a + 2 = -6$	Distributive Property
Step 3	$\underline{-2} \quad \underline{-2}$	Subtraction Property of Equality
Step 4	$2a = -8$	Simplify.
Step 5	$\frac{2a}{2} = \frac{-8}{2}$	Division Property of Equality
Step 6	$a = -4$	Simplify.

Notes: