Name Key Date _____ Period _____

Using Algebraic, Distributive Properties of Equality

Lesson Objective

USE ALGEBRAIC & DISTRIBUTIVE PROPERTIES OF EQUALITY TO JUSTIFY STEPS IN SOLVING EQUATIONS.

Algebraic Properties IF a, b, c ARE REAL NUMBERS

Name of Algebraic Property of Equality	Description of Algebraic Property
Addition Property of Equality	If a = b, then… $a+c=b+c$
Subtraction Property of Equality	If a = b, then… $a-c=b-c$
Multiplication Property of Equality	If a = b, then… $ac=bc$
Division Property of Equality	If a = b, then… $\frac{a}{c}=\frac{b}{c}$; $c \neq 0$
Substitution Property of Equality	If a = b, then a can be substituted for b (or b for a) in any equation or expression.

Example:

1. Solve $3x + 2 = 23 - 4x$ for x. Justify each step.

1. $3x+2=23-4x$ — 1. GIVEN

$+4x \quad +4x$

2. $7x+2=23$ — 2. ADDITION PROPERTY OF EQUALITY (ADD. PoE)

$-2 \quad -2$

3. $7x=21$ — 3. SUBTRACTION PROPERTY OF EQUALITY (SUBT. PoE)

$\frac{7x}{7}=\frac{21}{7}$

4. $x=3$ — 4. DIVISION PROPERTY OF EQUALITY (DIV. PoE)

2. Solve $-2p - 9 = 10p - 17$ for p. Justify each step.

1. $-2p-9=10p-17$ — 1. GIVEN

$-10p \quad -10p$

2. $-12p-9=-17$ — 2. SUBT. PoE

$+9 \quad +9$

3. $-12p=-8$ — 3. ADD. PoE

$\frac{-12p}{-12}=\frac{-8}{-12}$

4. $p=\frac{8}{12}$ — 4. DIV. PoE

5. $p=\frac{2}{3}$ — 5. SIMPLIFY

The Distributive Property: Let a, b, and c be real numbers.

Sum: $a(b+c) = ab + ac$

Difference: $a(b-c) = ab - ac$

Example:

3. Solve $-5(7w + 8) = 30$ for w. Justify each step.

1. $-5(7w+8)=30$	1. GIVEN
2. $-35w-40=30$ $\underline{\quad +40 \quad +40}$	2. DISTRIBUTIVE PROPERTY (DIST. PROP.)
3. $\frac{-35w}{-35} = \frac{70}{-35}$	3. ADD. PoE
4. $w = -2$	4. DIV. PoE

4. Solve the formula $A = \frac{1}{2}bh$ for b. Justify each step. Then find the base of a triangle whose area is 952 ft^2 and whose height is 56 ft.

1. $A = \frac{1}{2}bh$ $\underline{\quad \times 2 \quad \times 2}$	1. GIVEN
2. $\frac{2A}{h} = \frac{bh}{h}$	2. MULT. PoE
3. $\frac{2A}{h} = b$	3. DIV. PoE

$b = \frac{2A}{h}$

$b = \frac{2(952)}{56}$

$b = 34$ feet