Reflexive, Symmetric, Transitive, and Substitution Properties of Equalities

Date: _____

SOL A.2 The students will represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables. Students will choose an appropriate computational technique, such as mental mathematics, calculator, or paper and pencil.

Recall Your Vocabulary

$\frac{3}{7}$ is a _____ expression that is _____.

$\frac{4-3}{10+8}$ is a _____ expression that is _____ _____.

$-4x+7y-9$ is an _____ expression that is _____.

$5x+11y=6x+12y$ is an _____ expression that is _____ _____.

Build Your Vocabulary

Properties of Equality

Name: Reflexive Property

Words: Any quantity is equal to itself.

Symbols: For any number a, $a = a$.

For any numbers a and b, $a + b = a + b$.

Examples: $5 = 5$

$3x = 3x$

$2(x+4) = 2(x+4)$

What is one way that we can remember the reflexive property?

"reflect" → copying it

Name: Symmetric Property

Words: If one quantity is equal to a 2nd quantity, then the 2nd quantity is equal to the 1st.

Symbols: For any number *a*, *b*, and *c* if a + b = c, then c = a + b.

Examples:
If 5+4=9, then 9=5+4.
If 3+3=6, then 6=3+3.
If 4-4=0, then 0=4-4.

What is one way that we can remember the symmetric property?

Symmetry → fold statement in half to match

Name: Transitive Property

Words: If one quantity is equal to a 2nd quantity and the 2nd quantity is equal to a third quantity, then the 1st quantity is equal to the 3rd.

Symbols: For any number *a*, *b*, and *c* if a = b and b = c, then a = c.

Examples:
If 3x = 10 and 10 = 5y, then 3x=5y.
If 4y=7 and 7=6x, then 4y=6x.
If 9x+8=3 and 3=8y, then 9x+8=8y.

What is one way that we can remember the Transitive property?

transform → turning 2 things into One.

Name: Substitution Property

Words: A quantity may be changed for its equal in any expression.

Symbols: If $a = b$, then a may be replaced by b in any expression.

Examples: If $x=6$, then $3x+4 \rightarrow 3(6)+4$.

If $x+9=y$, then $y=10x-4 \rightarrow x+9=10x-4$.

If $y=10$, then $5x+6y \rightarrow 5x+6(10)$.

What is one way that we can remember the Substitution property?

Substituting one for another

Checkpoint

Name the property used in each equation.

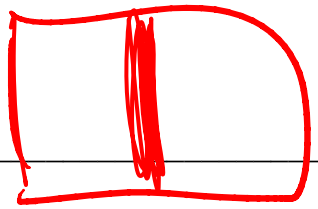
a. If $n = -12$, then $4n = -48$.

-12 in for n

Substitution $\rightarrow 4(-12) = -48$

b. If $\frac{1}{5} \cdot 5 = 1$, then $1 = \frac{1}{5} \cdot 5$.

Symmetric



c. $a + b = a + b$

reflexive (equal to self)

d. If $x = 5$, then $7x = 7(5)$.

5

Substitution (replacing "x")

1 2 → 3

e. If 1 + 8 = 5 + 4 and 5 + 4 = 9, then 1+ 8 = 9.

transitive

f. $1 \bullet 12 = 1 \bullet 12$

reflexive

g. If 5 = 4 + 1, then 4 + 1 = 5.

Symmetric

h. If you live in Bealeton and Bealeton is in Virginia, then you live in Virginia.

transitive