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Name Key
Mrs. Roumbos

Date _____
8R Period _____

How Do We Solve A System Of Linear Equations Algebraically?
Substitution Method

* The substitution method is used to eliminate one of the variables by replacement.

Procedure:

1) Make sure one variable is alone (ex x = ... ,y = ..., a =... etc)
2) Substitute (replace) that variable's equivalent expression into the other equation (using parentheses) so that we have one equation with one variable.
3) Solve for the variable
4) Substitute that value back into either original equation and solve for the second variable.
5) Check both answers back into both equations.

Solve each system of linear equations using the substitution method and check your answer.

1) $x = -2y$
$5x - 3y = 13$

D
C
M
S

$5x - 3y = 13$
$5(-2y) - 3y = 13$
$-10y - 3y = 13$
$-13y = 13$
$-13 \quad -13$
$y = -1$

$x = -2y$
$x = -2(-1)$
$x = 2$

$(2, -1)$

Chk #1 $(2, -1)$ x y
$x = -2y$
$2 = -2(-1)$
$2 = 2$ ✓

Chk #2 $(2, -1)$ x y
$5x - 3y = 13$
$5(2) - 3(-1) = 13$
$10 + 3 = 13$
$13 = 13$ ✓

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2) $x + y = 1$
$x = 9 - 3y$

D
C
M
S

$x + y = 1$
$9 - 3y + y = 1$
$9 - 2y = 1$
$-9 \quad -9$
$-2y = -8$
$-2 \quad -2$
$y = 4$

$x = 9 - 3y$
$x = 9 - 3(4)$
$x = 9 - 12$
$x = -3$

$(-3, 4)$

Chk #1 $(-3, 4)$ x y
$x + y = 1$
$-3 + 4 = 1$
$1 = 1$ ✓

Chk #2 $(-3, 4)$ x y
$x = 9 - 3y$
$-3 = 9 - 3(4)$
$-3 = 9 - 12$
$-3 = -3$ ✓

3) $y = 3x - 1$
$7x + 2y = 37$

D
C
M
S

$7x + 2y = 37$
$7x + 2(3x - 1) = 37$
$7x + 6x - 2 = 37$
$13x - 2 = 37$
$+2 \quad +2$
$\frac{13x}{13} = \frac{39}{13}$
$x = 3$

$y = 3x - 1$
$y = 3(3) - 1$
$y = 9 - 1$
$y = 8$
$(3, 8)$

Chk #1 (3, 8) x, y
$y = 3x - 1$
$8 = 3(3) - 1$
$8 = 9 - 1$
$8 = 8$ ✓

Chk #2 (3, 8) x, y
$7x + 2y = 37$
$7(3) + 2(8) = 37$
$21 + 16 = 37$
$37 = 37$ ✓

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4) $4x + 3y = 27$
$y = 2x - 1$

D
C
M
S

$4x + 3y = 27$
$4x + 3(2x - 1) = 27$
$4x + 6x - 3 = 27$
$10x - 3 = 27$
$+3 \quad +3$
$\frac{10x}{10} = \frac{30}{10}$
$x = 3$

$y = 2x - 1$
$y = 2(3) - 1$
$y = 6 - 1$
$y = 5$
$(3, 5)$

Chk #1 (3, 5) x, y
$4x + 3y = 27$
$4(3) + 3(5) = 27$
$12 + 15 = 27$
$27 = 27$ ✓

Chk #2 (3, 5) x, y
$y = 2x - 1$
$5 = 2(3) - 1$
$5 = 6 - 1$
$5 = 5$ ✓

Hyrule

5) $x = -6y - 7$
$3x + y = 13$

D
C
M
S

$3x + y = 13$
$3(-6y - 7) + y = 13$
$-18y - 21 + y = 13$
$-17y - 21 = 13$
$+21 \quad +21$
$\frac{-17y}{-17} = \frac{34}{-17}$
$y = -2$

$x = -6y - 7$
$x = -6(-2) - 7$
$x = 12 - 7$
$x = 5$
$(5, -2)$

Chk #1 (5, -2) x, y
$x = -6y - 7$
$5 = -6(-2) - 7$
$5 = 12 - 7$
$5 = 5$ ✓

Chk #2 (5, -2) x, y
$3x + y = 13$
$3(5) + (-2) = 13$
$15 - 2 = 13$
$13 = 13$ ✓