

Transitive Property

Name Key
8A; Algebra 1

Date _____
Period _____

Homework: 4, 6 + 7

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

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

Procedure:

- 1) Make sure one variable is alone (ex $x = \dots$, $y = \dots$, $a = \dots$ etc)
- 2) Substitute (replace) that variable's equivalent expression into the other equation (using parenthesis) 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) $a = -2b$
 $5a - 3b = 13$

$5(-2b) - 3b = 13$
 $-10b - 3b = 13$
 $-13b = 13$
 $\frac{-13b}{-13} = \frac{13}{-13}$
 $b = -1$

$a = -2b$
 $a = -2(-1)$
 $a = 2$

CHK #1
 $a = -2b$
 $2 = -2(-1)$
 $2 = 2$

CHK #2
 $5a - 3b = 13$
 $5(2) - 3(-1) = 13$
 $10 + 3 = 13$
 $13 = 13$

$(2, -1)$

2) $2x - y = 5$
 $y = 7 - x$

$2x - y = 5$
 $2x - (7 - x) = 5$
 $2x - 7 + x = 5$
 $3x - 7 = 5$
 $+7 \quad +7$
 $3x = 12$
 $\frac{3x}{3} = \frac{12}{3}$
 $x = 4$

$y = 7 - x$
 $y = 7 - 4$
 $y = 3$

CHK #1
 $2x - y = 5$
 $2(4) - 3 = 5$
 $8 - 3 = 5$
 $5 = 5$

CHK #2
 $y = 7 - x$
 $(3) = 7 - (4)$
 $3 = 3$

$(4, 3)$

$$3) y = 3x - 1$$

$$7x + 2y = 37$$

$$7x + 2y = 37$$

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

$$7x + 6x - 2 = 37$$

$$13x - 2 = 37$$

$$\begin{array}{r} +2 \quad +2 \\ \hline \end{array}$$

$$13x = 39$$

$$\frac{13}{13} \quad \frac{39}{13}$$

$$x = 3$$

$$y = 3x - 1$$

$$y = 3(3) - 1$$

$$y = 9 - 1$$

$$y = 8$$

$$(3, 8)$$

$$\text{Check \#1}$$

$$(3, 8)$$

$$y = 3x - 1$$

$$8 = 3(3) - 1$$

$$8 = 9 - 1$$

$$8 = 8$$

$$\text{Check \#2}$$

$$(3, 8)$$

$$7x + 2y = 37$$

$$7(3) + 2(8) = 37$$

$$21 + 16 = 37$$

$$37 = 37$$

$$4) 4x + 3y = 27$$

$$y = 2x - 1$$

$$4x + 3y = 27$$

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

$$4x + 6x - 3 = 27$$

$$10x - 3 = 27$$

$$\begin{array}{r} +3 \quad +3 \\ \hline \end{array}$$

$$10x = 30$$

$$\frac{10}{10} \quad \frac{30}{10}$$

$$x = 3$$

$$y = 2x - 1$$

$$y = 2(3) - 1$$

$$y = 6 - 1$$

$$y = 5$$

$$(3, 5)$$

$$\text{Check \#1}$$

$$(3, 5)$$

$$4x + 3y = 27$$

$$4(3) + 3(5) = 27$$

$$12 + 15 = 27$$

$$27 = 27$$

$$\text{Check \#2}$$

$$(3, 5)$$

$$y = 2x - 1$$

$$5 = 2(3) - 1$$

$$5 = 6 - 1$$

$$5 = 5$$

$$5) 3x - 4y = 26$$

$$x + 2y = 2$$

$$x + 2y = 2$$

$$\begin{array}{r} -2y \quad -2y \\ \hline \end{array}$$

$$x = 2 - 2y$$

$$3x - 4y = 26$$

$$x = 2 - 2y$$

$$3x - 4y = 26$$

$$3(2 - 2y) - 4y = 26$$

$$6 - 6y - 4y = 26$$

$$6 - 10y = 26$$

$$\begin{array}{r} -6 \quad -6 \\ \hline \end{array}$$

$$-10y = 20$$

$$\frac{-10}{-10} \quad \frac{20}{-10}$$

$$y = -2$$

$$x + 2y = 2$$

$$x + 2(-2) = 2$$

$$x - 4 = 2$$

$$\begin{array}{r} +4 \quad +4 \\ \hline \end{array}$$

$$x = 6$$

$$(6, -2)$$

$$\text{Check \#1}$$

$$(6, -2)$$

$$3x - 4y = 26$$

$$3(6) - 4(-2) = 26$$

$$18 + 8 = 26$$

$$26 = 26$$

$$\text{Check \#2}$$

$$(6, -2)$$

$$x + 2y = 2$$

$$6 + 2(-2) = 2$$

$$6 - 4 = 2$$

$$2 = 2$$

$$6) x = -6y - 7$$

$$3x + y = 13$$

$$3x + y = 13$$

$$3(-6y - 7) + y = 13$$

$$-18y - 21 + y = 13$$

$$-17y - 21 = 13$$

$$\begin{array}{r} -17y - 21 = 13 \\ +21 \quad +21 \\ \hline -17y = 34 \\ \frac{-17y}{-17} = \frac{34}{-17} \\ y = -2 \end{array}$$

$$x = -6y - 7$$

$$x = -6(-2) - 7$$

$$x = 12 - 7$$

$$x = 5$$

$$(5, -2)$$

chk#1

$$(5, -2)$$

$$x = -6y - 7$$

$$5 = -6(-2) - 7$$

$$5 = 12 - 7$$

$$5 = 5$$

chk#2

$$(5, -2)$$

$$3x + y = 13$$

$$3(5) + (-2) = 13$$

$$15 - 2 = 13$$

$$13 = 13$$

$$7) x + y = 1$$

$$x = 9 - 3y$$

$$x + y = 1$$

$$(9 - 3y) + y = 1$$

$$9 - 3y + y = 1$$

$$9 - 2y = 1$$

$$\begin{array}{r} 9 - 2y = 1 \\ -9 \quad -9 \\ \hline -2y = -8 \\ \frac{-2y}{-2} = \frac{-8}{-2} \\ y = 4 \end{array}$$

$$x = 9 - 3y$$

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

$$x = 9 - 12$$

$$x = -3$$

$$(-3, 4)$$

chk#1

$$(-3, 4)$$

$$x + y = 1$$

$$-3 + 4 = 1$$

$$1 = 1$$

chk#2

$$(-3, 4)$$

$$x = 9 - 3y$$

$$-3 = 9 - 3(4)$$

$$-3 = 9 - 12$$

$$-3 = -3$$

$$8) y = \frac{1}{3}x - 3$$

$$2x - y = 8$$

$$2x - y = 8$$

$$2x - (\frac{1}{3}x - 3) = 8$$

$$2x - \frac{1}{3}x + 3 = 8$$

$$\frac{2}{3}x + 3 = 8$$

$$\begin{array}{r} \frac{2}{3}x + 3 = 8 \\ -3 \quad -3 \\ \hline \frac{2}{3}x = 5 \\ \frac{2}{3} \quad \frac{2}{3} \\ \hline x = 3 \end{array}$$

$$y = \frac{1}{3}x - 3$$

$$y = \frac{1}{3}(3) - 3$$

$$y = 1 - 3$$

$$y = -2$$

$$(3, -2)$$

chk#1

$$y = \frac{1}{3}x - 3$$

$$-2 = \frac{1}{3}(3) - 3$$

$$-2 = 1 - 3$$

$$-2 = -2$$

chk#2

$$(3, -2)$$

$$2x - y = 8$$

$$2(3) - (-2) = 8$$

$$6 + 2 = 8$$

$$8 = 8$$

