Name: _____ Period: _____ Date: _____

SOLVING LINEAR SYSTEMS USING SUBSTITUTION Bell Work

Find the solution of the following systems by substitution and determine if it is an independent, inconsistent or dependent system

1. $\begin{cases} 5x + 3y = -7 \\ x - 2y = 3 \end{cases}$

2. $\begin{cases} x + y = 4 \\ 5x - 4y = 6 \end{cases}$

3. $\begin{cases} 4x + 3y = 0 \\ x + y = 5 \end{cases}$

4. $\begin{cases} 6x - y = 3 \\ 5x - 2y = -8 \end{cases}$

5. $\begin{cases} x - 3y = 4 \\ -2x + 6y = 5 \end{cases}$

6. $\begin{cases} 3/2x + 2y = 10 \\ y = 2x + 1 \end{cases}$

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ANSWERS

Find the solution of the following systems by substitution and determine if it is an independent, inconsistent or dependent system

1.

I. 5x + 3y = -7 and II. x – 2y = 3

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable "x" from equation II and then substitute it in equation I to find the value of the other variable, like follows:

$$x = 3 + 2y$$

Substituting in I:

$$5(3 + 2y) + 3y = -7$$

Applying distributive property: $15 + 10y + 3y = -7 \quad \rightarrow \quad 13y = -22 \rightarrow \quad y = -\frac{22}{13}$

Now, we calculate the value of variable "x" by substituting the result of "y" into the equation x = 3 + 2y

$$x = 3 + 2\left(\frac{-22}{13}\right) = -\frac{5}{13}$$

Solution (-5/13, -22/13). Independent System

2.

I. x + y = 4 and II. 5x – 4y = 6

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable "x" from equation I and then substitute it in equation II to find the value of the other variable, like follows:

$$x = 4 - y$$

Substituting in II:

$$5(4 - y) - 4y = 6$$

Applying distributive property: $20 - 5y - 4y = 6 \quad \rightarrow \quad 9y = 14 \rightarrow \quad y = \frac{14}{9}$

Now, we calculate the value of variable "x" by substituting the result of "y" into the equation x = 4 - y

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$$x = 4 - \frac{14}{9} = \frac{22}{9}$$

Solution (22/9, 14/9). Independent System

3.

I. 4x + 3y = 0 and II. x + y = 5

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable "y" from equation II and then substitute it in equation I to find the value of the other variable, like follows:

$$y = 5 - x$$

Substituting in I:

$$4x + 3(5 - x) = 0$$

Applying distributive property: $4x + 15 - 3x = 0 \quad \rightarrow \quad x = -15$

Now, we calculate the value of variable "y" by substituting the result of "x" into the equation y= 5 - x

$$y = 5 - (-15) = 20$$

Solution (-15, 20). Independent System

4.

I. 6x - y = 3 and II. 5x – 2y = -8

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable "y" from equation I and then substitute it in equation II to find the value of the other variable, like follows:

$$y = 6x - 3$$

Substituting in II:

$$5x - 2(6x - 3) = -8$$

Applying distributive property: $5x - 12x + 6 = -8 \quad \rightarrow -7x = -14 \rightarrow \quad x = 2$

Now, we calculate the value of variable "y" by substituting the result of "x" into the equation y= 6x - 3

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$$y = 6(2) - 3 = 9$$

Solution (2, 9). Independent System

5.

I. x - 3y = 4 and II. -2x + 6y = 5

We choose the equation which contains the easiest variable to solve. In this case we select to solve variable "x" from equation I and then substitute it in equation II to find the value of the other variable, like follows:

$$x = 4 + 3y$$

Substituting in II:

$$-2(4 + 3y) + 6y = 5$$

Applying distributive property: $-8 - 6y + 6y = 5 \quad \rightarrow \quad 0 = 13$

No Solution. Inconsistent System

6.

I. 3/2x + 2y = 10 and II. y= 2x +1

We choose the equation which contains the easiest variable to solve. In this case we select variable "y" from equation II and then substitute it in equation I to find the value of the other variable, like follows:

$$y = 2x + 1$$

Substituting in I:

$$\frac{3}{2}x + 2(2x + 1) = 10$$

Applying distributive property: $\frac{3}{2}x + 4x + 2 = 10 \quad \rightarrow \quad \frac{11}{2}x = 8 \rightarrow \quad x = \frac{16}{11}$

Now, we calculate the value of variable "y" by substituting the result of "x" into the equation y= 2x +1

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$$y = 2\left(\frac{16}{11}\right) + 1 = \frac{43}{11}$$

Solution (16/11, 43/11). Independent System