Module 7 Lesson 6
Share 1 – 5 Possible Solutions

The student is required to work with a partner (if possible) to complete this activity.

1. Answers may vary. Here is one possible response.

System	System Equations	Graphing Method	Substitution Method	Elimination Method
A	$2x+y=15$ $3x-5y=3$			√
B	$y=\frac{1}{3}x-4$ $y=\frac{3}{4}x+6$	√		
C	$9x-4y=22$ $5x-7y=17$			√
D	$y=\frac{3}{5}x-3$ $2x+3y=6$		√	

2. The student is required to solve each system with each method indicated in the column heading beginning with the method that was chosen in step 1. The correct responses are shown.

System A

Multiply Equation 1 by 5.

$$5\ \ 2x+y=15 \quad \rightarrow \quad 10x+5y=75 \quad \leftarrow \text{Equation 1}$$

$$3x-5y=3 \quad \rightarrow \quad 3x-5y=3 \quad \leftarrow \text{Equation 2}$$

Add the equations to eliminate *y*.

$$\begin{array}{rl} 10x+5y &= 75 \\ +\,(\ 3x-5y &= \ \ 3) \\ \hline 13x \qquad &= 78 \end{array}$$

$$\frac{13x}{13}=\frac{78}{13}$$

$$x=6$$

Solve for *y* by subbing x = 6 into equation (1)

$$2x+y=15$$

$$2\ \ 6\ +y=15$$

$$12+y=15$$

$$y=3$$

Verify by subbing the answers into equation (2)

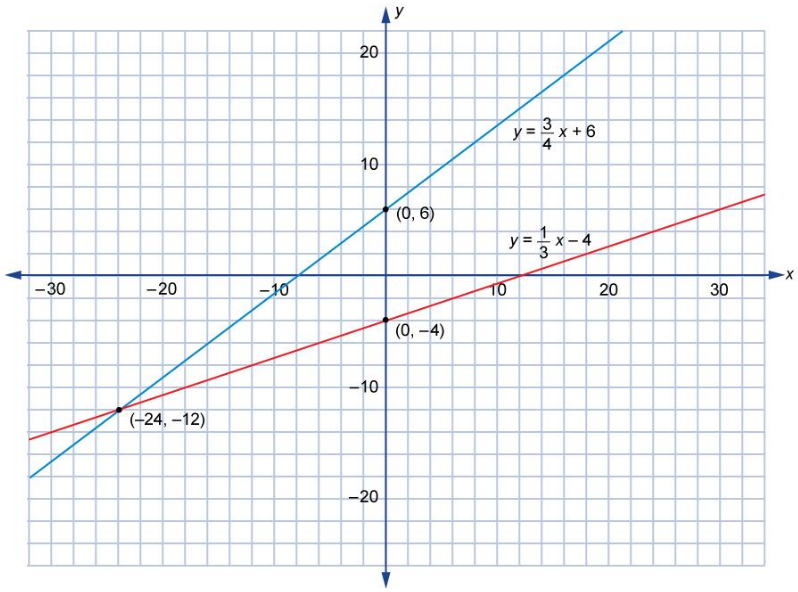
3x – 5y = 3
3(6) – 5(3) = 3
18 – 15 = 3
3 = 3

The solution of System A is (6, 3).

System B

$$y = \frac{1}{3}x - 4$$

$$y = \frac{3}{4}x + 6$$



The solution is $(-24, -12)$.

Verify the solution by subbing the point in each equation

y = 1/3x – 4 equation (1)

-12 = 1/3(-24) – 4

-12 = - 8 – 4

-12 = -12

y = 3/4x + 6 equation (2)

-12 = ¾(-24) + 6

-12 = -18 + 6

-12 = -12

System C

Multiply Equation 1 by 5.

$$7 \quad 9x - 4y = 22 \quad \rightarrow \quad 63x - 28y = 154 \quad \leftarrow \text{Equation 1}$$

$$4 \quad 5x - 7y = 17 \quad \rightarrow \quad 20x - 28y = 68 \quad \leftarrow \text{Equation 2}$$

Subtract the equations to eliminate y.

$$\begin{array}{r} 63x - 28y = 154 \\ \underline{-(20x - 28y = \ \ 68)} \\ 43x \qquad\quad = 86 \end{array}$$

$$\frac{43x}{43} = \frac{86}{43}$$

$$x = 2$$

Solve for y by subbing x = 2 into equation (1)

$$9x - 4y = 22$$
$$9\ \ 2\ \ - 4y = 22$$
$$18 - 4y = 22$$
$$-4y = 4$$
$$\frac{-4y}{-4} = \frac{4}{-4}$$
$$y = -1$$

Verify in equation (2)
5x – 7y = 17
5(2) – 7(-1) = 17
10 + 7 = 17
17 = 17

The solution is (2, -1).

System D

$$y = \frac{3}{5}x - 3 \qquad \leftarrow \text{Equation 1}$$
$$2x + 3y = 6 \qquad \leftarrow \text{Equation 2}$$

Substitute the expression for *y* into Equation 2 and solve for *x*.

$$2x + 3y = 6$$
$$2x + 3\left(\frac{3}{5}x - 3\right) = 6$$
$$2x + \frac{9}{5}x - 9 = 6$$
$$5\left(2x + \frac{9}{5}x - 9\right) = 5\ \ 6$$
$$10x + 9x - 45 = 30$$
$$19x = 75$$
$$x = \frac{75}{19}$$

Solve for *y* by subbing x = 75/19 into equation (1)

$$y = \frac{3}{5}x - 3$$
$$y = \frac{3}{5}\left(\frac{75}{19}\right) - 3$$
$$y = \frac{45}{19} - 3$$
$$y = \frac{45}{19} - \frac{57}{19}$$
$$y = -\frac{12}{19}$$

Verify in equation (2)
2x + 3y = 6
2(75/19) + 3(-12/19) = 6
150/19 – 36/19 = 6
114/19 = 6

6 = 6

The solution is $\frac{75}{19}, -\frac{12}{19}$ or approximately (3.947, $-$0.632).

3. Answers may vary. Here is one possible response.

		Prediction of Most Efficient Method			Deciding Factor for Prediction
System	**System Equations**	**Graphing Method**	**Substitution Method**	**Elimination Method**	
A	$2x + y = 15$ $3x - 5y = 3$			√	No variable is isolated, but equations can be multiplied so a coefficient of one of the variables will have same or opposite coefficients.
B	$y = \frac{1}{3}x - 4$ $y = \frac{3}{4}x + 6$	√			Equations are in the form $y = mx + b$. This form makes graphing easy.
C	$9x - 4y = 22$ $5x - 7y = 17$			√	No variable is isolated, but equations can be multiplied so a coefficient of one of the variables will have same or opposite coefficients.
D	$y = \frac{3}{5}x - 3$ $2x + 3y = 6$		√		One of the variables is already isolated.

4. Responses may vary. Here are some possible responses.

- System A solution worked out well.
- System B solution was a bit problematic in that the intersection point is some distance from the origin. The scale needed for the grid makes the intersection point coordinates hard to read.
- System C solution was ideal.
- System D solutions involved some “odd-ball” values, which make the calculations less than ideal.

5. Responses may vary. Here are some possible responses.

SOLVING SYSTEMS OF LINEAR EQUATIONS

Property of the Linear System	Recommended Way of Solving
The equations are in the form $y = mx + b$.	graphing
One variable is already isolated in one of the equations of the system.	substitution
• None of the variables are isolated. • One variable in the first equation already has the same or opposite coefficient in the second equation. • The equations can be multiplied by whole numbers so that one variable in the first equation has the same or opposite coefficient in the second equation.	elimination