

Module 7 Lesson 4
Share 1 – 3 Possible Solutions

Sample responses are provided.

1. Multiply the first equation by 2. Then subtract.

$$\begin{array}{lcl} 2(x + 8y = -9) & \rightarrow & 2x + 16y = -18 \\ 2x - 5y = 45 & \rightarrow & 2x - 5y = 45 \end{array}$$

Subtract the second equation from the first equation, and solve for y .

$$\begin{array}{r} 2x + 16y = -18 \\ - (2x - 5y = 45) \\ \hline 21y = -63 \\ 21y = -63 \\ \hline 21 = 21 \\ y = -3 \end{array}$$

Solve for x by subbing $y = -3$ into equation (1)

$$\begin{array}{l} x + 8y = -9 \\ x + 8(-3) = -9 \\ x - 24 = -9 \\ x = 15 \end{array}$$

Verify in equation (2)

$$\begin{array}{l} 2x - 5y = 45 \\ 2(15) - 5(-3) = 45 \\ 30 + 15 = 45 \\ 45 = 45 \end{array}$$

As a final check, you can verify in equation (1) if you like.

$$\begin{array}{l} x + 8y = -9 \\ 15 + 8(-3) = -9 \\ 15 - 24 = -9 \\ -9 = -9 \end{array}$$

2. Multiply the first equation by 3. Multiply the second equation by 5. The b -terms will then have coefficients that are additive inverses. You can then add the two equations to eliminate the b -terms.

$$\begin{array}{lcl} 3(3a - 5b = 2) & \rightarrow & 9a - 15b = 6 \\ 5(4a + 3b = 22) & \rightarrow & 20a + 15b = 110 \end{array}$$

Add the second equation to the first equation, and solve for a .

$$\begin{array}{r} 9a - 15b = 6 \\ + (20a + 15b = 110) \\ \hline 29a = 116 \\ 29a = 116 \\ \hline 29 = 29 \\ a = 4 \end{array}$$

Solve for b by subbing $a = 4$ into equation (1)

$$3a - 5b = 2$$

$$3(4) - 5b = 2$$

$$12 - 5b = 2$$

$$-5b = -10$$

$$\frac{-5b}{-5} = \frac{-10}{-5}$$

$$b = 2$$

Verify in equation (2)

$$4a + 3b = 22$$

$$4(4) + 3(2) = 22$$

$$16 + 6 = 22$$

$$22 = 22$$

As a final check (not needed though) you can verify in equation (1) as well.

$$3a - 5b = 2$$

$$3(4) - 5(2) = 2$$

$$12 - 10 = 2$$

$$2 = 2$$

3. Note that the first equation has the y -term first followed by the x -term. Rearrange the first equation and multiply by 5. Multiply the second equation by 2. Then add the two equations to eliminate the y -terms.

$$3y - 2x + 4 = 0 \rightarrow 5(-2x + 3y = -4) \rightarrow -10x + 15y = -20$$

$$5x - 8y - 11 = 0 \rightarrow 2 \ 5x - 8y = 11 \rightarrow 10x - 16y = 22$$

Add the second equation to the first equation, and solve for y .

$$-10x + 15y = -20$$

$$+ (\ 10x - 16y = \ 22)$$

$$\hline -y = 2$$

$$y = -2$$

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

$$3y - 2x + 4 = 0$$

$$3(-2) - 2x + 4 = 0$$

$$-6 - 2x + 4 = 0$$

$$-2x - 2 = 0$$

$$-2x = 2$$

$$\frac{-2x}{-2} = \frac{2}{-2}$$

$$x = -1$$

Verify in equation (2)

$$\begin{aligned}
 5x - 8y - 11 &= 0 \\
 5(-1) - 8(-2) - 11 &= 0 \\
 -5 + 16 - 11 &= 0 \\
 0 &= 0
 \end{aligned}$$

As a final check, you can verify in equation (1).

$$\begin{aligned}
 3y - 2x + 4 &= 0 \\
 3(-2) - 2(-1) + 4 &= 0 \\
 -6 + 2 + 4 &= 0 \\
 0 &= 0
 \end{aligned}$$

**** Remember, whatever equation you use to find the second unknown with, you use the OTHER equation for the verification step.**