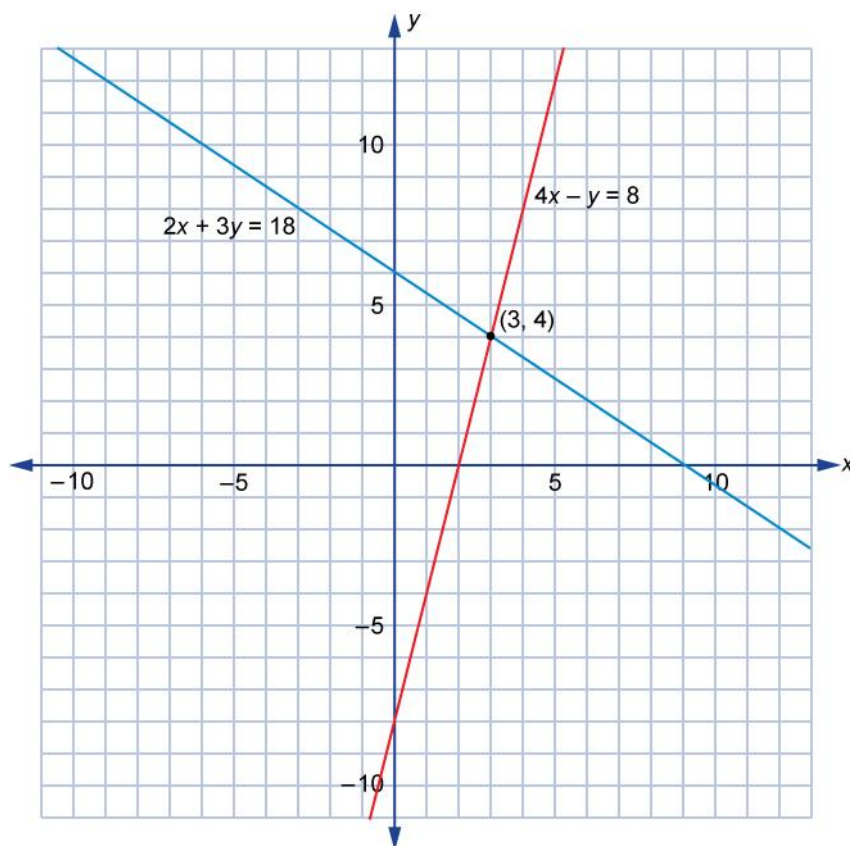


Module 7 Lesson 4

Math Lab: Properties of Linear Systems Possible Solutions

Analysis

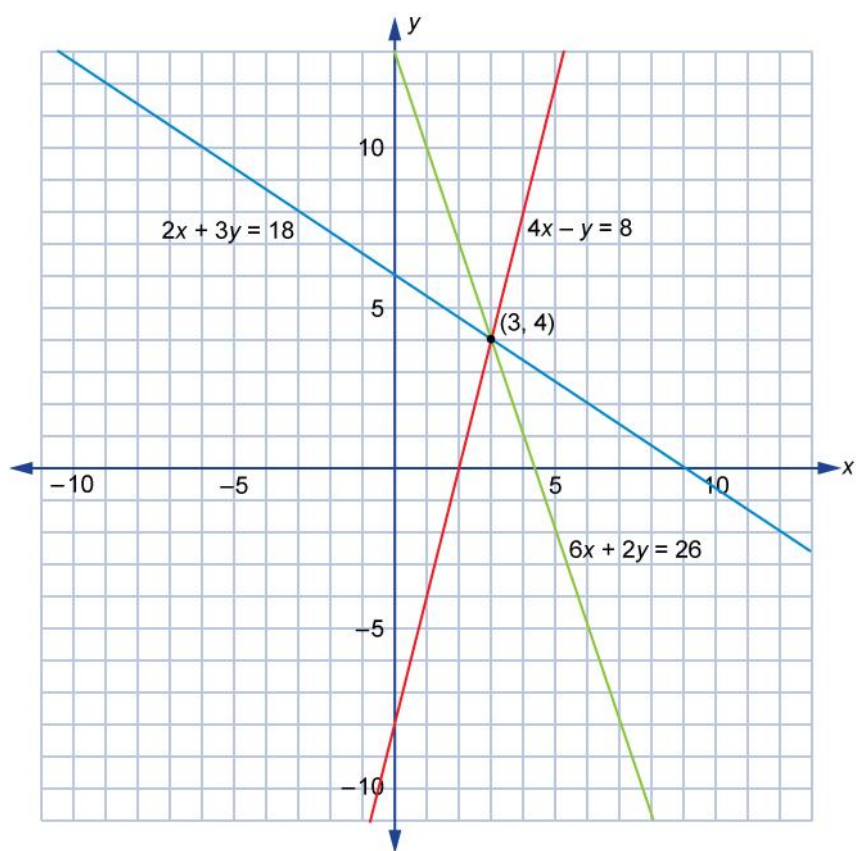
1. a. The solution of the linear system is (3, 4).



- b. Add the second equation to the first equation as follows:

$$\begin{array}{r} 2x + 3y = 18 \\ + (4x - y = 8) \\ \hline 6x + 2y = 26 \end{array}$$

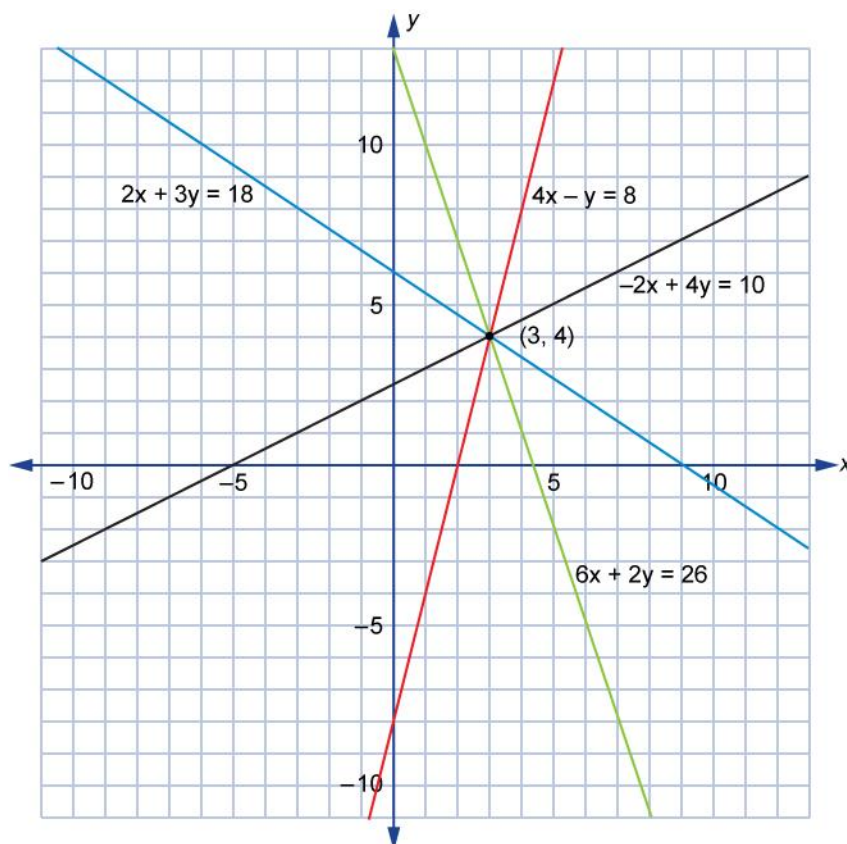
c. The graph should look like the following.



d. Subtract the second equation from the first equation as follows:

$$\begin{array}{r} 2x + 3y = 18 \\ - (4x - y = 8) \\ \hline -2x + 4y = 10 \end{array}$$

e. The student's graph should look like the following. The student will likely mention that all of the lines pass through the same point (3, 4).



f. Multiply both equations by 2.

$$\text{Equation 1: } 2 \cdot 2x + 3y = 18 \rightarrow 4x + 6y = 36 \leftarrow \text{Equation 1a}$$

$$\text{Equation 2: } 2 \cdot 4x - y = 8 \rightarrow 8x - 2y = 16 \leftarrow \text{Equation 2a}$$

g. The student may present either one of these equations.

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

$$y = 4x - 8 \leftarrow \text{Equation 2b}$$

The student's graph will be identical to one for the relations presented prior to question 1. The student would likely indicate that doubling an equation and then isolating y does not change the relation.

2. a. The solution to the system that is based on the new equations is the same as the solution to the original system. The solution is still (3, 4).
- b. The student can know this from the fact that the intersection point of the two new equations coincides with the intersection point of the original two equations.

3. Multiplying the terms of an equation by a common factor has no effect on its graph.
4. The equations can be added, subtracted, or multiplied to form simpler equations. In particular, one of the variables can be removed by adding and subtracting equations. Multiplying equations can eliminate fractions.

By adding or subtracting the well-chosen multiples of equations of a linear system, one can solve for the variables of the system.