Solving Systems Word Problems - Guided Lesson Explanation

For all the problems, make sure the equations have opposite x terms or opposite y terms.

Explanation #1

Currently, neither the x terms (6x and 3x) nor the y terms (8y and 8y) are opposites. Use multiplication to rewrite the equations with either opposite x terms or opposite y terms. One good approach is to multiply the first equation by -1.

$$-1 (6x + 8y = 42) \quad \rightarrow \quad -6x - 8y = 42$$

$$3x + 8y = 33 \quad \rightarrow \quad 3x + 8y = 33$$

Now the y terms (-8x and 8x) are opposites.

Add to eliminate one variable and solve for the other.

Add to eliminate the y terms, and then solve for x.

$$6x - 8y = 42$$

$$\underline{3x + 8y = 33}$$

$$3x + 0 = 9 \qquad \text{Add to eliminate the y terms}$$

$$x = 9/3 \qquad \text{Divided}$$

$$x = 3$$

Plug the result of step 2 into one of the original equations and solve.

Take the result of Step 2 (x = 3), and plug it into one of the original equations, such as 6x + 8y = 42. Then find the value of x.

$$6x + 8y = 42$$

$$6(3) + 8y = 42 \qquad \text{Plug in x = 3}$$

$$18 + 8y = 42 \qquad \text{Multiply}$$

$$8y = 42 - 18 \qquad \text{Subtract 18 from both sides}$$

$8y = 24$

$y = 24/8$ Divide by 8

$y = 3$

Since $x = 3$ and $y = 2.625$, the solution is (3, 3).

The small row contains 3 muffins and the large one contains 3 muffins.

Explanation# 2

Currently, neither the x terms (4x and 7x) nor the y terms (2y and 7y) are opposites. Use multiplication to rewrite the equations with either opposite x terms or opposite y terms. One good approach is to multiply the first equation by -1.

$-(4x + 7y = 33)$ → $-4x - 7y = -33$

   $2x + 7y = 27$ → $2x + 7y = 27$

Now the y terms (-7y and 7y) are opposites.

Add to eliminate one variable and solve for the other.

Add to eliminate the y terms, and then solve for x.

$-4x - 7y = -33$

$\underline{2x + 7y = \ \ 27}$

$-2x + 0y = -6$ Add to eliminate the x terms

$x = -6/2$ Divided

   $x = 3$

Plug the result of step 2 into one of the original equations and solve.

Take the result of Step 2 (x = 3), and plug it into one of the original equations, such as 4x + 7y = 33. Then find the value of y.

$4x + 7y = 33$

$4(3) + 7y = 33$ Plug in x = 3

12 + 7y = 33   Multiply

7y = 33 - 12   Subtract 12 from both sides

7y = 21

y = 21/7   Divide by 7

y = 3

Since x = 3 and y =3, the solution is (3, 3).

There are 3 pearls used in each set of pearls and 3 diamonds used for each set of diamonds.

Explanation# 3

Currently, neither the x terms (7x and 3x) nor the y terms (3y and 1y) are opposites. Use multiplication to rewrite the equations with either opposite x terms or opposite y terms. One good approach is to multiply the second equation by -3.

7x + 3y = 22   →   7x + 3y = 22

-3(3x + 1y) = -3(8) →   -9x - 3y = -24

Now the y terms (3y and -3y) are opposites.

Add to eliminate one variable and solve for the other.

Add to eliminate the x terms, and then solve for y.

7x + 3y = 22

 -9x - 3y = -24

-2x + 0y = -2   Add to eliminate the y terms

y = -2/-2   Divide

y = 1

Plug the result of step 2 into one of the original equations and solve.

Take the result of Step 2 (x = 1), and plug it into one of the original equations, such as 7x + 3y = 22. Then find the value of y.

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7x + 3y = 22

7(1) + 3y = 22   Plug in x = 1

7 + 3y = 22   Multiply

3y = 22 − 7   Subtract 7 from both sides

3y = 15

x = 15/3   Divide by 3

x = 5

Since x = 1 and y =5, the solution is (1, 5).

The cost of 1 bag of peanuts is $1. One sandwich costs $5.