

## LESSON

**Problem Solving****3-2****Using Algebraic Methods to Solve Linear Systems**

Shanae mixes feed for animals at the zoo. Feed X is 18% protein. Feed Y is 10% protein. Use this data for Exercises 1–4.

1. How much of each feed should Shanae mix to get 50 lb of feed that is 15% protein?  
a. Write a linear system of equations.

**Solution:**

$$x + y = 50 \quad x = 50 - y$$

$$0.18x + 0.10y = 0.15(50)$$

$$(100)0.18 + (100)0.10y = (100)0.15(50) \quad \text{Multiply by 100.}$$

$$18 + 10y = 750$$

$$18(50 - y) + 10y = 750 \quad \text{Substitute for } x.$$

$$900 - 18y + 10y = 750 \quad \text{Use the Distributive Property.}$$

$$-8y = -150 \quad \text{Simplify. Subtract 900 from both sides.}$$

$$y = 31.25 \quad \text{Divide by } -8.$$

$$x = 50 - 31.25 = 18.75$$

18.75 pounds of Feed X and 31.25 pounds of Feed Y

2. Shanae has 15 lb of Feed Y left. She wants to make a mixture that is 12% protein. She needs to know how much of Feed X to use, and how much of the mixture she can make.  
a. Write a linear system of equations.

Let \_\_\_\_\_ = number of pounds of Feed X and \_\_\_\_\_ = number of pounds of Feed Y.

$$(0.1) \text{ _____} + (0.18) \text{ _____} = (0.12) \text{ _____}$$

- b. How much of Feed X should she use? \_\_\_\_\_  
c. How much of the mixture will she make? \_\_\_\_\_

**Choose the letter for the best answer.**

3. Raul mixes 12 lb of Feed X with 20 lb of Feed Y. Which equation gives the percent of protein ( $c$ ) in the mixture?  
**A**  $12(0.18) + 20(0.10) = 32c$   
**B**  $12(0.18) + 20(0.10) = c$   
**C**  $[12(0.18) + 20(0.10)]c = 32$
4. Alonzo needs to know how much of Feed X and Feed Y to mix to get 25 lb of a mixture that is 12% protein. Which equation can be used as part of a system of equations to find the solution?  
**F**  $(0.10 + 0.18)(x + y) = (0.12)25$   
**G**  $(0.18)x + (0.10)y = (0.12)25$   
**H**  $25(0.18 + 0.10) = (0.12)x$

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$$(100)0.18 + (100)0.10y = (100)0.15(50) \quad \text{Multiply by 100.}$$

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$$900 - 18y + 10y = 750 \quad \text{Use the Distributive Property.}$$

$$-8y = -150 \quad \text{Simplify. Subtract 900 from both sides.}$$

$$y = 31.25 \quad \text{Divide by } -8.$$

$$x = 50 - 31.25 = 18.75$$

18.75 pounds of Feed X and 31.25 pounds of Feed Y

2. Shanae has 15 lb of Feed Y left. She wants to make a mixture that is 12% protein. She needs to know how much of Feed X to use, and how much of the mixture she can make.
- a. Write a linear system of equations.

Let **X** = number of pounds of Feed X and **15** = number of pounds of Feed Y.

$$(0.1) \underline{15} + (0.18) \underline{x} = (0.12) \underline{15 + x}$$

- b. How much of Feed X should she use?
- c. How much of the mixture will she make?

**5 lb of Feed X**

**20 lb of the mixture**

**Choose the letter for the best answer.**

3. Raul mixes 12 lb of Feed X with 20 lb of Feed Y. Which equation gives the percent of protein ( $c$ ) in the mixture?
- A**  $12(0.18) + 20(0.10) = 32c$
- B**  $12(0.18) + 20(0.10) = c$
- C**  $[12(0.18) + 20(0.10)]c = 32$
4. Alonzo needs to know how much of Feed X and Feed Y to mix to get 25 lb of a mixture that is 12% protein. Which equation can be used as part of a system of equations to find the solution?
- F**  $(0.10 + 0.18)(x + y) = (0.12)25$
- G**  $(0.18)x + (0.10)y = (0.12)25$
- H**  $25(0.18 + 0.10) = (0.12)x$