

Name: _____ Period: _____ Date: _____

APPLICATIONS OF LINEAR SYSTEMS Exit Quiz

Solve the following verbal problems involving linear systems:

1. A chemist has one solution that is 50% basic and another solution that is 25% basic. How many liters of each type of basic solution should be combined to obtain 10 liters of 40% final solution?
2. 800 tickets were sold for a Rock Music Concert with a total revenue of \$7500. If adult tickets were sold for \$12 and students tickets were sold for \$8. How many of each type of ticket were sold?
3. The length of a rectangle is 5 cm less than two times its width. If the perimeter of the rectangle is 80 cm, which are the values of length and width?
4. The sum of two numbers is 12 and their difference is 6. Find the values of these numbers.
5. Joseph decided to divide his savings of \$12,000 in two investments, one in an account that pays 8% annual interest and the other a bond that pays 9% of annual interest. If his annual interest was \$1010, how much did he invest at each rate?

APPLICATIONS OF LINEAR SYSTEMS Exit Quiz**ANSWERS**

Solve the following verbal problems involving linear systems:

1. A chemist has one solution that is 50% basic and another solution that is 25% basic. How many liters of each type of basic solution should be combined to obtain 10 liters of 40% final solution?

- Identify variables

x: Liters of Basic Solution at 50%

y: Liters of Basic Solution at 25%

- Set up equations

$$0.50x + 0.25y = 0.40(0.10) \quad \text{and} \quad x + y = 10$$

- Solve linear System

We will use the elimination method, like follows:

$$\begin{cases} x + y = 10 \\ 0.50x + 0.25y = 4 \end{cases}$$

We interchange the “x” or “y” coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the “x” coefficients of both equations, like follows:

$$\begin{cases} 0.50(x + y = 10) \\ -1 (0.50x + 0.25y = 4) \end{cases}$$

Applying distributive property:

$$\begin{cases} 0.50x + 0.50y = 5 \\ -0.50x - 0.25y = -4 \end{cases}$$

The result would be:

$$0.25y = 1 \quad \rightarrow y = \frac{1}{0.25} = 4 \text{ liters}$$

Now, we calculate the value of variable “x” by substituting the result of “y” into one of the equations

$$x = 10 - y = 10 - 4 = 6 \text{ liters}$$

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6 liters of basic solution at 50% and 4 liters of basic solution at 25% should be combined to obtain 10 liters of 40% final solution.

2. **800 tickets were sold for a Rock Music Concert with a total revenue of \$7500. If adult tickets were sold for \$12 and students tickets were sold for \$8. How many of each type of ticket were sold?**

- Identify variables

x: Number of adult tickets sold.

y: Number of student tickets sold.

- Set up equations

$$12x + 8y = 7500 \quad \text{and} \quad x + y = 800$$

- Solve linear System

We will use the elimination method, like follows:

$$\begin{cases} x + y = 800 \\ 12x + 8y = 7500 \end{cases}$$

We interchange the “x” or “y” coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the “x” coefficients of both equations, like follows:

$$\begin{cases} 12(x + y = 800) \\ -1 (12x + 8y = 7500) \end{cases}$$

Applying distributive property:

$$\begin{cases} 12x + 12y = 9600 \\ -12x - 8y = -7500 \end{cases}$$

The result would be:

$$4y = 2100 \quad \rightarrow y = \frac{2100}{4} = 525$$

Now, we calculate the value of variable “x” by substituting the result of “y” into one of the equations

$$x = 800 - y = 800 - 525 = 275$$

275 adult tickets and 525 student tickets were sold in the concert.

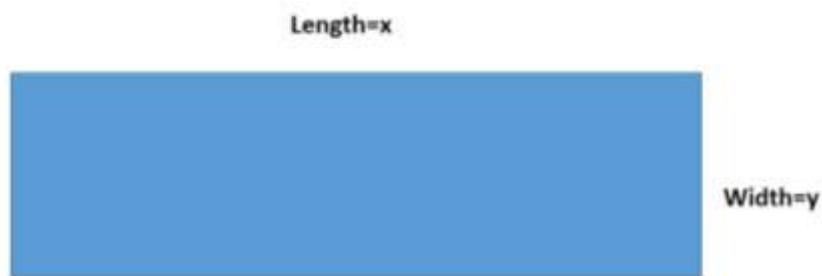
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3. The length of a rectangle is 5 cm less than two times its width. If the perimeter of the rectangle is 80 cm, which are the values of length and width?

- Identify variables

x: Length

y: Width



- Set up equations

$$x = 2y - 5 \text{ (I)} \quad \text{and} \quad 2x + 2y = 80 \rightarrow x + y = 40 \text{ (II)}$$

- Solve linear System

We will substitute equation I in II and solve for "y"

$$2y - 5 + y = 40 \rightarrow 3y = 45 \rightarrow y = 15$$

Now, we calculate the value of variable "x" by substituting the result of "y" into one of the equations

$$x = 40 - y = 40 - 15 = 25$$

The length of the rectangle is 25 cm and its width is 15 cm.

4. The sum of two numbers is 12 and their difference is 6. Find the values of these numbers.

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- Identify variables

x: First unknown number

y: Second unknown number

- Set up equations

$$x + y = 12 \text{ (I)} \quad \text{and} \quad x - y = 6 \text{ (II)}$$

- Solve linear System

We will use the elimination method, like follows:

$$\begin{cases} x + y = 12 \\ x - y = 6 \end{cases}$$

$$2x = 18 \quad \rightarrow \quad x = 9$$

Now, we calculate the value of variable “y” by substituting the result of “x” into one of the equations

$$y = 12 - x = 12 - 9 = 3$$

The numbers are 9 and 3.

5. **Joseph decided to divide his savings of \$12,000 in two investments, one in an account that pays 8% annual interest and the other a bond that pays 9% of annual interest. If his annual interest was \$1010, how much did he invest at each rate?**

- Identify variables

x: Amount invested at 8%

y: Amount invested at 9%

- Set up equations

$$0.08x + 0.09y = 1010 \quad \text{and} \quad x + y = 12000$$

- Solve linear System

We will use the elimination method, like follows:

$$\begin{cases} x + y = 12000 \\ 0.08x + 0.09y = 1010 \end{cases}$$

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We interchange the “x” or “y” coefficients from equation I and equation II to eliminate one of the variables. In this case, we are going to interchange the “x” coefficients of both equations, like follows:

$$\begin{cases} 0.08(x + y = 12000) \\ -1 \quad (0.08x + 0.09y = 1010) \end{cases}$$

Applying distributive property:

$$\begin{cases} 0.08x + 0.08y = 960 \\ -0.08x - 0.09y = -1010 \end{cases}$$

The result would be:

$$-0.01y = -50 \quad \rightarrow y = \frac{50}{0.01} = 5000$$

Now, we calculate the value of variable “x” by substituting the result of “y” into one of the equations

$$x = 12000 - y = 12000 - 5000 = 7000$$

Joseph invested \$7000 in the account at 8% and \$5000 in the account at 9%.