

# Lesson #11: Solving Systems of Equations Story Problems

By the end of this lesson, you will be able to:

- ~ Solve story problems by elimination
- ~ Solve story problems by substitution

## Lesson #11: Systems Story Problems

### Steps for Solving Problems with Mathematical Models

**Step 1: Identify what you are looking for.**

**Step 2: Give Names to the Unknowns.**

**Step 3: Translate the Problem into the Language of Mathematics.**

**Step 4: Solve the Equation(s) Found in Step 3.**

**Step 5: Check the Reasonableness of your Answer.**

**Step 6: Answer the Question (in a complete sentence).**

## Lesson #11: Systems Story Problems

**Ex 7:** The school that Lisa goes to is selling tickets to the annual talent show. [On the first day of ticket sales the school sold 4 senior citizen tickets and 5 student tickets for a total of \$102.] The school took in \$126 on the second day by selling 7 senior citizen tickets and 5 student tickets.] What is the price each of ~~one~~ each? senior citizen ticket and one student ticket?

**Step 1: Identify what you are looking for.**

Price of tickets

**Step 2: Give Names to the Unknowns.**

$x$  = Sr. citizen tickets  
 $y$  = student tickets

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**Ex 7:** The school that Lisa goes to is selling tickets to the annual talent show. On the first day of ticket sales the school sold 4 senior citizen tickets and 5 student tickets for a total of \$102. The school took in \$126 on the second day by selling 7 senior citizen tickets and 5 student tickets. What is the price each of one senior citizen ticket and one student ticket?

**Step 3: Translate the Problem into the Language of Mathematics.**

$$4x + 5y = 102$$

$$7x + 5y = 126$$



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**Ex 7:** The school that Lisa goes to is selling tickets to the annual talent show. On the first day of ticket sales the school sold 4 senior citizen tickets and 5 student tickets for a total of \$102. The school took in \$126 on the second day by selling 7 senior citizen tickets and 5 student tickets. What is the price each of one senior citizen ticket and one student ticket?

**Step 5: Check the Reasonableness of your Answer.**

$$x=8$$

$$y=14$$

$$4(8) + 5(14) = 102$$

$$32 + 70 = 102$$



**Step 6: Answer the Question (in a complete sentence).**

Lisa sold 8 senior citizen tickets that cost \$8 and student tickets cost \$14.

## Lesson #11: Systems Story Problems

We need to know a formula when dealing with interest rates and money:

$$\underline{I = Prt}$$

- ✦ I = Interest
- ✦ P = Principal (What we start with \$\$\$)
- ✦ r = rate (yearly)
- ✦ t = time (years)

You will normally find an equation for each: total principal and total interest.

## Lesson #11: Systems Story Problems

**Ex 8:** Paul wants to invest his \$25,000 bonus check. His investment advisor has recommended that he put some of the money in Bonds that yeild 5% per annum<sup>year</sup> and the rest in <sup>I</sup> Stocks that yields 9% per annum. If Paul wants to earn \$1875 each year from his investments, how much should be placed in each?

**Step 1: Identify what you are looking for.**

How much \$ to be put in stocks & bonds.

**Step 2: Give Names to the Unknowns.**

$x = \$$  in bonds

$y = \$$  in stocks



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**Step 3: Translate the Problem into the Language of Mathematics.**

$$P r t = I$$

	Principal	Rate	Time	=	Interest
<i>bond</i> $x$	$x$	$.05$	$1$		$.05x$
<i>stock</i> $y$	$y$	$.09$	$1$		$.09y$
Total	25000		$1$		1875

total principal equation:  $x + y = 25000$

total interest equation:  $.05x + .09y = 1875$

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total principal equation:  $x + y = 25000 \rightarrow x = 25000 - y$

total interest equation:  $.05x + .09y = 1875$

**Step 4: Solve the Equation(s) Found in Step 3.**

$$.05(25000 - y) + .09y = 1875$$

$$1250 - .05y + .09y = 1875$$

$$\begin{array}{r} 1250 + .04y = 1875 \\ -1250 \qquad \qquad -1250 \\ \hline \end{array}$$

$$\begin{array}{r} .04y = 625 \\ \hline \end{array}$$

$$\begin{array}{r} .04 \qquad \qquad .04 \\ \hline y = 15625 \end{array}$$

$$x = 25000 - 15625$$

$$x = 9375$$

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**Step 5: Check the Reasonableness of your Answer.**

$$\begin{array}{r|l} x = 15625 & 15625 \\ y = 9375 & + 9375 \\ \hline & 25000 \checkmark \end{array}$$

**Step 6: Answer the Question (in a complete sentence).**

Paul should put \$9375 in Stocks  
and \$15,625 in Bonds.

# **Rest of Journal #11**

Due at the end of Math Lab

# **Assignment #11**

Due at the Beginning of B1