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## 3.2. Advanced Algebra

### Story Problems

DATE: 11/4

Target 3A. Translate a verbal model into an algebraic model.



1. Kristin spent \$131 on shirts. Fancy shirts cost \$28 and plain shirts cost \$15. If she bought a total of 7 then how many of each kind did she buy?

Let  $x$  be the number of FANCY shirts.  
Let  $y$  be the number of PLAIN shirts.

Fancy - \$28  
Plain - \$15  
Total \$131  
Bought 7 total

# of shirts  $\begin{cases} x + y = 7 \\ 28x + 15y = 131 \end{cases}$

Total spent

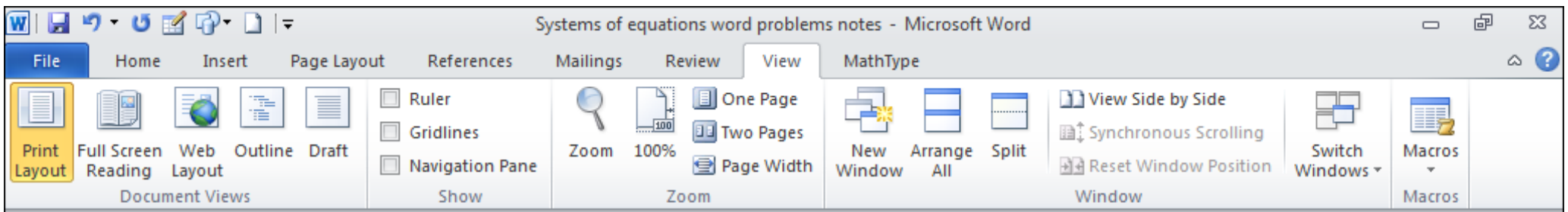
Now solve.

$$\begin{array}{r} -15(x + y = 7) \\ 28x + 15y = 131 \\ \hline -15x - 15y = -105 \\ 28x + 15y = 131 \\ \hline 13x = 26 \\ \frac{13x}{13} = \frac{26}{13} \quad \boxed{x = 2} \end{array}$$

$x + y = 7$   
 $2 + y = 7$   
 $y = 5$

$\therefore$  Kristen bought 2 Fancy shirts and 5 plain shirts.

2. 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 of one senior citizen ticket and one student ticket?



2. 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 of one senior citizen ticket and one student ticket?

Let  $x$  be the price of a senior ticket  
 Let  $y$  be the price of a student ticket

1st day  
 2nd day

$$\begin{cases} -(4x + 5y = 102) \\ 7x + 5y = 126 \end{cases} \rightarrow \begin{cases} -4x - 5y = -102 \\ 7x + 5y = 126 \end{cases}$$

1st DAY - 4 senior and 5 student. Total \$102.  
 2nd DAY - 7 senior and 5 student. Total \$126.

$$\begin{array}{r} 4x + 5y = 102 \\ 4(8) + 5y = 102 \\ 32 + 5y = 102 \\ -32 \quad -32 \\ \hline 5y = 70 \\ \frac{5y}{5} = \frac{70}{5} \\ \boxed{y = 14} \end{array}$$

$\therefore$  The price of one senior ticket is \$8 and \$14 is being charged for student tickets

3. Kate and Gina are selling pies for a school fundraiser. Customers can buy apple pies and lemon pies. Kate sold 6 apple pies and 4 lemon pies for a total of \$80. Gina sold 6 apple pies and 5 lemon pies for a total of \$94. What is the cost of each kind of pie?

Let  $x$  be the price of an apple pie  
 Let  $y$  be the price of a lemon pie

Kate  
 Gina

$$\begin{cases} -(6x + 4y = 80) \\ 6x + 5y = 94 \end{cases} \rightarrow \begin{cases} -6x - 4y = -80 \\ 6x + 5y = 94 \end{cases}$$

Kate sells: 6 apple, 4 lemon. Total \$80  
 Gina sells: 6 apple, 5 lemon. Total \$94.

$$\begin{array}{r} 6x + 4y = 80 \\ 6x + 4(14) = 80 \\ 6x + 56 = 80 \\ -56 \quad -56 \\ \hline 56 = 24 \\ \frac{56}{6} = \frac{24}{6} \\ \boxed{x = 4} \end{array}$$

$\therefore$  The price of one apple pie is \$4 and price of one lemon pie is \$14.

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4. Mr. B. is writing a test. The test will have true-false questions worth 2 points each and multiple-choice questions worth 4 points each, for a total of 100 points. He wants to have twice as many multiple-choice questions as true-false. How many multiple-choice questions will be on the test?

Let  $x$  be the number of multiple choice questions

Let  $y$  be the number of T/F questions

$$\begin{cases} 4x + 2y = 100 \\ x = 2y \end{cases}$$

$$\begin{aligned} 4(2y) + 2y &= 100 \\ 8y + 2y &= 100 \end{aligned}$$

$$\frac{10y}{10} = \frac{100}{10} \quad y = 10$$

T/F questions: 2 pts      Total: 100 pts  
M/C questions: 4 pts

$x = 2y$   
 $x = 2(10) = 20$   
 $\therefore$  Mr. B wants to have 20 M/C questions on the test.

5. The difference of two numbers is 3. Their sum is 13. Find both numbers.

Let  $x$  be a number

Let  $y$  be another number

$$\begin{cases} x - y = 3 \\ x + y = 13 \end{cases}$$

You solve it!

Ans:  $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 8 \\ 5 \end{pmatrix}$

Systems of equations word problems notes - Microsoft Word

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6. You are selling tickets to the boys' soccer game. Student tickets cost \$3 and general admission costs \$5. You sell 350 tickets and collect \$1450. How many of each type of ticket did you sell?

Let  $x$  be the # of student tickets.  
Let  $y$  be the # of general tickets.

Stud: \$3      Total sold 350  
Gen: \$5      Total \$ took in \$1450

$$\begin{cases} x + y = 350 \\ 3x + 5y = 1450 \end{cases}$$

You solve it & check with me!

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