Algebra 2
Word Problem

Name: KEY
Date: _____ Period: ____

Applications of Linear Systems

Learning Target: Students will be able to interpret word problems to write and solve systems of equations.

Steps:

1. Define two variables. Be specific about the quantity they represent.
2. Write a system of two equations.
3. Solve the system using substitution or elimination.
4. Use units to label both answers and check to make sure the answers make sense!

Set up a system of equations and solve.

1.) The Rocket Coaster has 15 cars, some that hold 4 people and some that hold 6 people. There is room for 72 people altogether. How many 4-passenger cars are there? How many 6-passenger cars are there?

- x = CAR W/ 4 PEOPLE
- y = CAR W/ 6 PEOPLE

$4x + 6y = 72$

$x + y = 15 \rightarrow x = 15 - y$

$x = 15 - 6$

$x = 9$

$4(15-y) + 6y = 72$

$60 - 4y + 6y = 72$

$60 + 2y = 72$

$2y = 12$

$y = 6$

$(9, 6)$

2.) Tickets to the Valentine Dance cost \$3 per person or \$5 per couple. If \$475 worth of tickets were sold and 180 people attended the dance, how many couples were there?

- x = INDIVIDUAL
- y = COUPLE

$3x + 5y = 475 \rightarrow 3x + 5y = 475$

$x + 2y = 180 \rightarrow -3x - 6y = -540$

$-y = -65$

$y = 65$

$x + 2(65) = 180$

$x + 130 = 180$

$x = 50$

$(50, 65)$

3.) Pi High School ordered 40 science books. The next week, the school ordered 30 algebra books. The bill for the first order was \$360 greater than the bill for the second order. The two bills together totaled \$3960. Find the price of an algebra book.

- x = 1ST ORDER
- y = 2ND ORDER

$40x = 30y + 360 \rightarrow 40x - 30y = 360$

$40x + 30y = 3960 \rightarrow 40x + 30y = 3960$

$80x = 4320$

$x = 54$

$40(54) + 30y = 3960$

$2160 + 30y = 3960$

$30y = 1800$

$y = 60$

ALGEBRA BOOK COSTS \$60

4.) To raise money for new uniforms, the band boosters sell t-shirts and hats. The cost of each t-shirt is \$6.00 and the cost for the hat is \$4.00. The boosters spend a total of \$2,000 on t-shirts and hats. The selling prices of the t-shirts are \$10.00 and the selling prices of the hats are \$7.00. They sell all of the merchandise and their revenue is \$3375. How many t-shirts and hats did they sell?

- x = T-SHIRTS
- y = HATS

$6x + 4y = 2000 \xrightarrow{(5)} 30x + 20y = 10000$

$10x + 7y = 3375 \xrightarrow{(-3)} -30x - 21y = -10125$

$-y = -125$

$y = 125$

$6x + 4(125) = 2000$

$6x + 500 = 2000$

$6x = 1500$

$x = 250$

$(250, 125)$

5.) Calvin has $8.80 in pennies and nickels. If there are twice as many nickels as pennies, how many pennies does Calvin have? How many nickels?

- p = PENNIES
- n = NICKLES

$n = 2p$

$.01p + .05n = 8.80$

$.01p + .05(2p) = 8.80$

$.01p + .10p = 8.80$

$.11p = 8.80$

$p = 80$

$n = 2(80)$

$n = 160$

(160, 80)

6.) A total of 78 seats for a concert are sold, producing a total revenue of $483. If seats cost either $2.50 or $10.50, how many $2.50 seats and how many $10.50 seats were sold?

- x = # 2.50 SEATS
- y = # 0.50 SEATS

$x + y = 78 \xrightarrow{-2.50}$ $-2.50x - 2.50y = -195$

$2.50x + 10.50y = 483 \rightarrow$ $2.50x + 10.50y = 483$

$8y = 288$

$y = 36$

$x + 36 = 78$

$x = 42$

(42, 36)

7.) You enroll in a book club in which you can earn bonus points to use towards the purchase of books. Each paperback book you order cost $6.95 and earns you 2 bonus points. Each hardcover book costs $19.95 and earns you 4 bonus points. The first order you place comes to a total of $60.75 and earns you 14 bonus points. How many of each type of book did you order?

- x = PAPERBACK
- y = HARD COVER

$6.95x + 19.95y = 60.75$

$2x + 4y = 14 \rightarrow x = -2y + 7$

$x = -2(2) + 7$

$x = -4 + 7$

$x = 3$

$6.95(-2y + 7) + 19.95y = 60.75$

$-13.90y + 48.65 + 19.95y = 60.75$

$6.05y + 48.65 = 60.75$

$6.05y = 12.10$

$y = 2$

(3, 2)

8.) Using only 34-cent stamps and 20-cent stamps, Peggy put $3.52 postage on a package. She used twice as many 34-cent stamps as 20-cent stamps. Determine how many of each type of stamp she used.

- x = 34-CENT STAMPS
- y = 20-CENT STAMPS

$.34x + .20y = 3.52$

$x = 2y$

$.34(2y) + .20y = 3.52$

$.68y + .20y = 3.52$

$.88y = 3.52$

$y = 4$

$x = 2(4)$

$x = 8$

(8, 4)

9.) The graph below was made to compare the coasts of renting copy machines from Company A and from Company B. What information is given by the point of intersection of the two lines.

A. The number of copies from which the fixed per-month charge is equal to the cost of copies
B. The price per copy for renting a copier from both companies
C. The fixed per-month charge for renting a copier from both companies
D. The number of copies for which the total cost per month is the same for both companies