

Applications of Linear Systems

Steps to solve an application problem using linear systems

- 1) Let statements.
- 2) Develop the two linear equations.
- 3) Solve the system.
- 4) Write a final statement answering the problem.

Example 1: A restaurant manager wants to purchase 200 sets of dishes. One design costs \$25 per set and another design cost \$45 per set. Her total budget for buying dishes is \$7,400. How many sets of each kind should she buy to spend her entire budget?

let $x = \#$ of \$25 sets
 $y = \#$ of \$45 sets

$$\begin{array}{r} (x + y = 200) - 25 \\ 25x + 45y = 7400 \\ - 25x - 25y = -5000 \\ \hline 20y = 2400 \\ y = 120 \end{array}$$

Findy

$$x + y = 200$$

$$x + 120 = 200$$

$$x = 80$$

Manager bought 80 sets at \$25
and 120 sets at \$45.

Example 2: A collection of quarters and dimes contains 20 coins and has a total value of \$3.20. How many coins of each are there?

let $q = \#$ quarters
 $d = \#$ dimes

$$q + d = 20$$

$$(.25q + .10d = 3.20) \quad | \times 100$$

$$~~25q + 10d = 320~~$$

$$(q + d = 20) \quad | \times 10$$

$$~~-10q - 10d = -200~~$$

$$15q = 120 \quad q = 8$$

$$q + d = 20$$

$$q + d = 20$$

$$d = 12$$

The collection has 8 quarters
and 12 dimes .

Example 3: Fred delivers pizza. On his first trip of the day the bill was \$ 44.85 for 2 medium and one large pizza. On his second trip, he delivered three medium and two large and the bill was \$ 76.75. What is the cost of each pizza ?

let $m = \text{cost of medium}$
 $l = \text{cost of large}$

$$\begin{pmatrix} 2m + l = 44.85 \\ 3m + 2l = 76.75 \end{pmatrix} - 2$$

$$-4m - 2l = -89.70$$

$$3m + 2l = 76.75$$

$$-m = -12.95$$

$$m = 12.95$$

Fund l

$$2m + l = 44.85$$

$$2(12.95) + l = 44.85$$

$$25.90 + l = 44.85$$

$$l = 18.95$$

The large pizza costs \$18.95 and the medium costs \$12.95

Example 4: The admission fee at a small fair is \$1.50 for children and \$4.00 for adults. On a certain day, 2200 people enter the fair and \$5050 is collected. How many children and how many adults attended?

let $a = \#$ adults
 $c = \#$ children

$$(a + c = 2200) \cdot 4$$

$$4a + 1.50c = 5050$$

$$-4a - 4c = -8800$$

$$-2.5c = -3750$$

$$c = 1500$$

Find a

$$a + c = 2200$$

$$a + 1500 = 2200$$

$$a = 700$$

∴ 700 adults attended the fair and
1200 children attended the fair.

Assignment: Handout