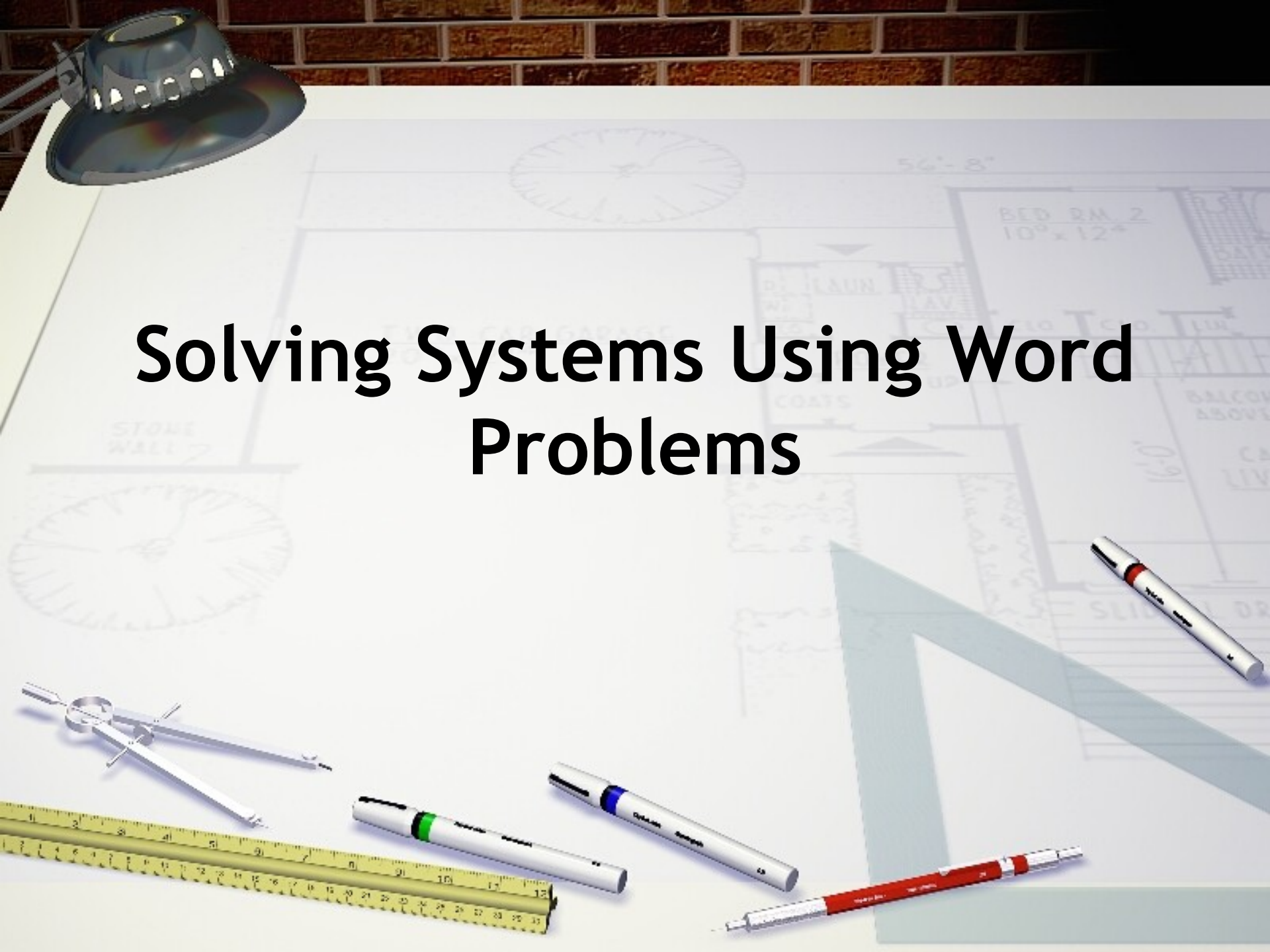
Solving Systems Using Word Problems



Objectives

- Use reading strategies to write formulas
- Solve the equations using substitution or elimination

Steps to Follow

- 1. Identify Variables
- 2. Write 2 equations
- (Use key words and reading strategies to help)
- 3. Solve using substitution or elimination
- 4. Write answer in a complete sentence

Example 1

Kevin would like to buy 10 bouquets. The standard bouquet costs $7, and the deluxe bouquet costs $12. He can only afford to spend $100. How many of each type can he buy?

Define Variables:
X: standard bouquet Y: deluxe bouquet

Equation 1 Cost:
$7x+12y=100$

Equation 2 Bouquets :
$x+y=10$

Best Method :
Elimination

Solution: (4,6)

Example 2

A hot air balloon is 10 meters above the ground and rising at a rate of 15 meters per minute. Another balloon is 150 meters above the ground and descending at a rate of 20 meters per minute. When will the two balloons meet?

Define Variables:

x=minutes

y=height in meters

Equation 1

$y=15x+10$

Equation 2

$y=-20x+150$

Best Method:

Substitution

Solution: (4,70)

Example 3

A group of 3 adults and 10 students paid $102 for a cavern tour. Another group of 3 adults and 7 students paid $84 for the tour. Find the admission price for an adult ticket and a student ticket.

Define Variables:

x= adult ticket price y=student ticket price

Equation 1

$3x+10y=102$

Equation 2

$3x+7y=84$

Best Method

Elimination

Solution (14,6)

Example 4

Melissa and Frank were jogging. Melissa had a 2 mile head start on Frank. If Melissa ran at an average rate of 5 miles per hour and Frank ran at an average rate of 8 miles per hour, how long would it take for Frank to catch up with Melissa?

Define Variables:

x=hours y=miles

Equation 1

$y=5x+2$

Equation 2

$y=8x$

Best Method

Substitution

Solution (2/3, 5 1/3) or (2/3, 16/3)

Example 5

An Algebra Test contains 38 problems. Some of the problems are worth 2 points each. The rest of the questions are worth 3 points each. A perfect score is 100 points. How many problems are worth 2 points? How many problems are worth 3 points?

Define Variables:

x=2 pt. questions

y=3 pt. questions

Equation 1

$x+y=38$

Equation 2

$2x+3y=100$

Best Method

Elimination or Substitution

Solution (14,24)

Example 6

Ashley has $9.05 in dimes and nickels. If she has a total of 108 coins, how many of each type does she have?

Define Variables

x=dimes

y=nickels

Equation 1

x+y=108

Equation 2

.10x+.05y=9.05

Best Method

Substitution

Solution (73,35)

Example 7

The perimeter of a parking lot is 310 meters. The length is 10 more than twice the width. Find the length and width. (Remember: P=2L+2W)

Define Variables

L=length W=width

Equation 1

2L+2W=310

Equation 2

L=2W+10

Best Method

Substitution

Solution (106 2/3, 48 1/3)

Example 8

The sum of two numbers is 112. The smaller is 58 less than the greater. Find the numbers.

Define Variables

x=smaller number

y=larger number

Equation 1

x+y=112

Equation 2

x=y-58

Best Method

Substitution

Solution (27,85)

Example 9

The sum of the ages of Ryan and his father is 66. His father is 10 years more than 3 times as old as Ryan. How old are Ryan and his father?

Define Variables

x=Ryan's age

y=Dad's age

Equation 1

x+y=66

Equation 2

y=3x+10

Best Method

Substitution

Solution (14,52)

Example 10

A total of $10,000 is invested in two funds, Fund A and Fund B. Fund A pays 5% annual interest and Fund B pays 7% annual interest. The combined annual interest is $630. How much of the $10,000 is invested in each fund?

Define Variables

a=Fund A

b=Fund B

Equation 1

a+b=10,000

Equation 2

.05a+.07b=630

Best Method

Substitution

Solution (6500,3500)

Example 11

We need to rent a large truck for one week. Rental companies charge an initial cost plus an additional cost for each mile driven. One company, Paenz, will rent a 27 foot truck for us for $525 plus $0.21 per mile. Another company, Opan, will rent us the same size truck for $585 plus $0.13 per mile.

Define Variables

x=miles

y=total cost

Equation 1

$y=0.21x+525$

Equation 2

$y=0.13x+585$

Best Method

Substitution

Solution (750,682.50)

Example 12

The larger of two numbers is 7 less than 8 times the smaller. If the larger number is decreased by twice the smaller, the result is 329. Find the two numbers.

Define Variables

x=smaller number

y=larger number

Equation 1

$y=8x-7$

Equation 2

$y-2x=329$

Best Method

Substitution

Solution (56,441)