6.4 Word Problems

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6.4 – Systems of Linear Equations Word Problems

Example : Represents each situation using a linear system. Solve the system.

For each of the situations:

- Identify the unknown values.
- Choose a variable to represent each unknown value.
  - x = _____
  - y = _____
- Write two equations, including each variable, which represents the situation.
- Solve the system.

(Method of your choice)

a) In Calgary, a school raised $195 by collecting 3,000 bottles and cans for recycling. The school received 5¢ per can and 20¢ per large plastic bottle. How many cans and bottles do they have?

c = # of cans b = # of bottles

Equation 1 : Number of units

① $c + b = 3000$

Use substitution

① $c = 3000 - b$

Equation 2 : Value in money

② $0.05c + 0.2b = 195$

② $0.05(3000 - b) + 0.2b = 195$

$150 - 0.05b + 0.2b = 195$

$150 + 0.15b = 195$

$-150 \quad -150$

$\frac{0.15b}{0.15} = \frac{45}{0.15}$

$b = 300$

① $c = 3000 - 300$

$c = 2700$

The school collected 2700 cans and 300 bottles.

b) Susan invested $2,000: part at an annual interest rate of 8% and the rest at an annual interest rate of 10%. The total interest after one year is $190. How much did she invest in each part?

x = amount invested at 8%

y = amount invested at 10%

Equation 1 : Money invested

① $X + y = 2000$

① $X = 2000 - y$

Equation 2 : Total interested

② $0.08x + 0.1y = 190$

$0.08(2000 - y) + 0.1y = 190$

$160 - 0.08y + 0.1y = 190$

$160 + 0.02y = 190$

$-160 \quad -160$

$\frac{0.02y}{0.02} = \frac{30}{0.02}$

$y = 1500$

① $X = 2000 - 1500$

$X = 500$

$500 is invested at 8% and $1500 is invested at 10%

c) The perimeter of a Nunavut flag is 16 ft. Its length is 2 ft wider than its width. What are the dimensions of the flag?

L = length of flag

w = width of flag

Equation 1 : The length

① $l = w + 2$

Substitution

Equation 2 : Perimeter

② $2l + 2w = 16$

$2(w+2) + 2w = 16$

$2w + 4 + 2w = 16$

$4w + 4 = 16$

$-4 \quad -4$

$\frac{4w}{4} = \frac{12}{4}$

$w = 3$

① $l = 3 + 2$

$l = 5$

length of the flag is 5ft and the width is 3ft.

d) The revenue generated by 550 people who saw a show is $9184. Tickets are $20 per adult and $12 per child. Find out the number of adults and children who attended the show.

a = # of adults

c = # of children

Equation 1 : Total # of people

Equation 2 : Total money collected.

① $a + c = 550$

② $20a + 12c = 9184$

Use elimination and eliminate the a's

① $(-20)a + (-20)c = (-20)(550)$

① $-20a - 20c = -11000$

② $20a + 12c = 9184$

$-8c = -1816$

$-8 \quad -8$

$c = 227$

① $a + 227 = 550$

$-227 \quad -227$

$a = 323$

323 adults and 227 children saw the show.

Practice: p.410 #12, 13, 15; p.425 #11, 12, 15 – 17