

### Developing Systems of Equations

1. During a clothing sale, 2 jackets and 2 sweaters cost \$228. A jacket costs \$44 more than a sweater.

- a) Identify some variables to represent the unknown quantities in the problem.

Let  $x \rightarrow$  jackets  
 $y \rightarrow$  sweaters

- b) Create a linear system to model this situation.

$$2x + 2y = 228$$
$$x = y + 44$$

2. A store has 80 packages of wheels for inline skates and roller skates. The store sells wheels for roller skates in packages of 4 and wheels for inline skates in packages of 8. The total number of wheels in all packages is 440.

- c) Identify some variables to represent the unknown quantities in the problem.

Let  $x \rightarrow$  roller skates  
 $y \rightarrow$  inline skates

- d) Create a linear system to model this situation.

$$4x + 8y = 440$$

$$x + y = 80$$

wheels + wheels = wheels

packages + packages = packages

3. A store display had packages of 8 batteries and packages of 4 batteries. The total number of batteries was 320. There 1.5 times as many packages of 4 batteries as packages of 8 batteries.

e) Identify some variables to represent the unknown quantities in the problem.

$$\begin{aligned} \text{let } x &\rightarrow 8 \text{ batteries} \\ y &\rightarrow 4 \text{ batteries} \end{aligned}$$

f) Create a linear system to model this situation.

$$\begin{aligned} 8x + 4y &= 320 \\ 1.5y &= x \end{aligned}$$

Remove (g)

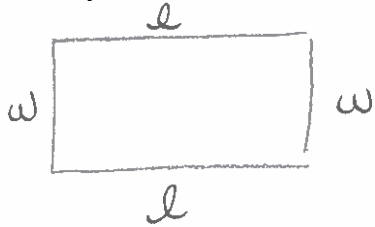
~~g)~~ The store determined that there are 30 packages of 8 batteries and 20 packages of 4 batteries. Use the linear system you created to verify that the store is correct.

$$\begin{aligned} 8x + 4y &= 320 \\ 8(30) + 4(20) &= 320 \\ 240 + 80 &= 320 \\ 320 &= 320 \end{aligned}$$

$$\begin{aligned} 1.5y &= x \\ 1.5(20) &= 30 \\ 30 &= 30 \end{aligned}$$

4. The perimeter of a Nunavut flag is 16 ft. Its length is 2 ft. longer than its width.

h) Identify some variables to represent the unknown quantities in the problem.



Let  $l \rightarrow$  length  
 $w \rightarrow$  width

i) Create a linear system to model this situation.

$$2l + 2w = 16$$

$$l = w + 2$$

j) Hailey determined that the Nunavut flag is 5 ft. long and 3 ft. wide. Use the linear system you created to verify that Hailey is correct.

$$2l + 2w = 16$$

$$2(5) + 2(3) = 16$$

$$10 + 6 = 16$$

$$16 = 16$$

$$l = w + 2$$

$$(5) = (3) + 2$$

$$5 = 5$$

$$5¢ \rightarrow 0.05$$

$$20¢ \rightarrow 0.20$$

5. LCHS raised \$195 by collecting 3000 items for recycling. The school received 5 cents for each pop can and 20 cents for each large plastic bottle.

k) Identify some variables to represent the unknown quantities in the problem.

let  $x \rightarrow$  pop can

$y \rightarrow$  large plastic bottle

l) Create a linear system to model this situation.

$$x + y = 3000$$

cans + cans = cans

$$0.05x + 0.20y = 195$$

money + money = money

m) The school collected 2700 pop cans and 300 plastic bottles. Use the linear systems you created to verify these numbers.

$$x + y = 3000$$

$$0.05(2700) + 0.20(300) = 195$$

$$2700 + 300 = 3000$$

$$135 + 60 = 195$$

$$3000 = 3000$$

$$195 = 195$$

6. Wolf Creek Schools has buses that carry 12 passengers and buses that carry 24 passengers. The total passenger capacity is 780. There are 20 more small buses than large buses. How many of each type of bus does WCPS own?

a) What are the unknown quantities?

let  $x \rightarrow$  small buses  
 $y \rightarrow$  large buses

small buses  
 large buses

b) Identify some variables to represent these unknown quantities.

c) Develop two equations that could be used to model the information given in the problem.

$$12x + 24y = 780$$

$$x = y + 20$$

d) Suppose you are told that there are 35 small buses and 15 large buses. Could this be a possible solution to the problem? How could you verify this answer?

$$12(35) + 24(15) = 780$$

$$420 + 360 = 780$$

$$x = y + 20$$

$$35 = 15 + 20$$

$$35 = 35$$

$$12x + 24y = 780$$

$$x - y = 20$$

$$\begin{array}{r} 12x + 24y = 780 \\ - 12x + 12y = -240 \\ \hline 36y = 540 \\ y = 15 \end{array}$$

35 small buses  
 +  
 15 large buses

$$x = 15 + 20$$

$$x = 35$$

(35, 15)