

1. You plan to rent a 14-foot truck for a two-day local move. At truck rental agency A, you can rent a truck for \$29.95 per day plus \$0.49 per mile. At agency B, you can rent a truck for \$50 per day plus \$0.25 per mile.

a. Write a total cost equation in terms of x and y for the total cost of renting the truck from each agency.

Agency A: $f(x) = 29.95(2) + 0.49x$ $\Rightarrow f(x) = 59.90 + 0.49x$
2 days # of miles

Agency B: $g(x) = 50(2) + 0.25x$ $\Rightarrow g(x) = 100 + 0.25x$
2 days

b. Find the point of intersection of the two equations. Interpret the meaning of the point of intersection in the context of the problem.

$$59.90 + 0.49x = 100 + 0.25x$$

$$59.90 + 0.24x = 100$$

$$0.24x = 40.1$$

$$x = 167$$

Since x represents the # of miles, at 167 miles, the cost would be the same whether you rented from Agency A or B

c. Which agency should you choose if you plan to travel a total of 100 miles during the two-day move? Why?

$$f(100) = 59.90 + 0.49(100) = \$108.90 \leftarrow \text{Agency A is cheaper}$$

$$g(100) = 100 + 0.25(100) = \$125$$

d. How does the situation change if you plan to drive 200 miles during the two-day move?

$$f(200) = 59.90 + 0.49(200) = \$167.90$$

$$g(200) = 100 + 0.25(200) = \$150 \leftarrow \text{Agency B is cheaper}$$

2. Two cheeseburgers and one small order of French fries from a fast-food restaurant contain a total of 830 calories. Three cheeseburgers and two small orders of French fries contain a total of 1360 calories. Find the caloric content of each item.

cheeseburgers = c french fries = f

$$2c + 1f = 830$$

$$3c + 2f = 1360$$

$$\Rightarrow f = 830 - 2c$$

substitution

$$\Rightarrow 3c + 2(830 - 2c) = 1360$$

$$3c + 1660 - 4c = 1360$$

$$1660 - c = 1360$$

$$-c = -300$$

$$c = 300$$

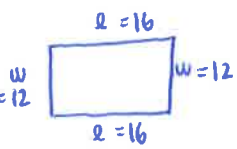
$$f = 830 - 2(300)$$

$$f = 830 - 600$$

$$f = 230$$

Cheeseburgers: 300 calories
 Fries: 230 calories

3. Find the dimensions of the rectangle given that the perimeter is 56 meters and the length is 4 meters greater than the width.



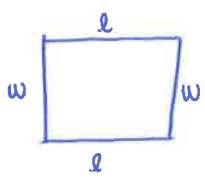
Perimeter = $l + w + l + w$
 $P = 2l + 2w$

$$\begin{cases} 2l + 2w = 56 \\ l = 4 + w \end{cases} \Rightarrow \begin{aligned} 2(4+w) + 2w &= 56 \\ 8 + 2w + 2w &= 56 \\ 4w &= 48 \\ w &= 12 \end{aligned}$$

$$\begin{aligned} l &= 4 + 12 \\ l &= 16 \end{aligned}$$

Dimensions are 16m and 12m

4. What are the dimensions of a rectangular tract of land if its perimeter is 44 kilometers and its area is 120 square kilometers?



Perimeter = $2l + 2w$
 Area = lw

$$\begin{cases} 2l + 2w = 44 \\ lw = 120 \end{cases} \Rightarrow \begin{aligned} 2l &= 44 - 2w \Rightarrow l = 22 - w \\ (22 - w)w &= 120 \\ 22w - w^2 &= 120 \\ 0 &= w^2 - 22w + 120 \\ 0 &= (w - 10)(w - 12) \\ w &= 10, w = 12 \end{aligned}$$

$$\begin{aligned} l &= 22 - 10 \\ l &= 12 \end{aligned}$$

OR
 $l = 22 - 12$
 $l = 10$

Dimensions are 10km and 12km

5. There are 13 animals in the barn. Some are chickens and some are pigs. There are 40 legs in all. How many of each animal are there?

Chickens = c , pigs = p ; chickens: 2 legs, pigs: 4 legs

$$\begin{aligned} c + p &= 13 \Rightarrow c = 13 - p \\ 2c + 4p &= 40 \end{aligned} \Rightarrow \begin{aligned} 2(13 - p) + 4p &= 40 \\ 26 - 2p + 4p &= 40 \\ 26 + 2p &= 40 \\ 2p &= 14 \Rightarrow p = 7 \end{aligned}$$

$$\begin{aligned} c &= 13 - 7 \\ c &= 6 \end{aligned}$$

There are 7 pigs and 6 chickens

6. Ms. R. reached into her pocket and had a total of 13 quarters and dimes mixed together. They totaled \$2.50. How many quarters and dimes did she have?

Quarters = Q , Dimes = d ; Quarters: 0.25, Dimes: 0.10

$$\begin{aligned} Q + d &= 13 \\ .25Q + .10d &= 2.50 \end{aligned} \Rightarrow \begin{aligned} Q &= 13 - d \\ .25(13 - d) + .10d &= 2.50 \\ 3.25 - 0.25d + .10d &= 2.50 \\ 3.25 - .15d &= 2.50 \\ -.15d &= -.75 \\ d &= 5 \end{aligned}$$

$$\begin{aligned} Q &= 13 - 5 \\ Q &= 8 \end{aligned}$$

There are 5 dimes and 8 quarters