

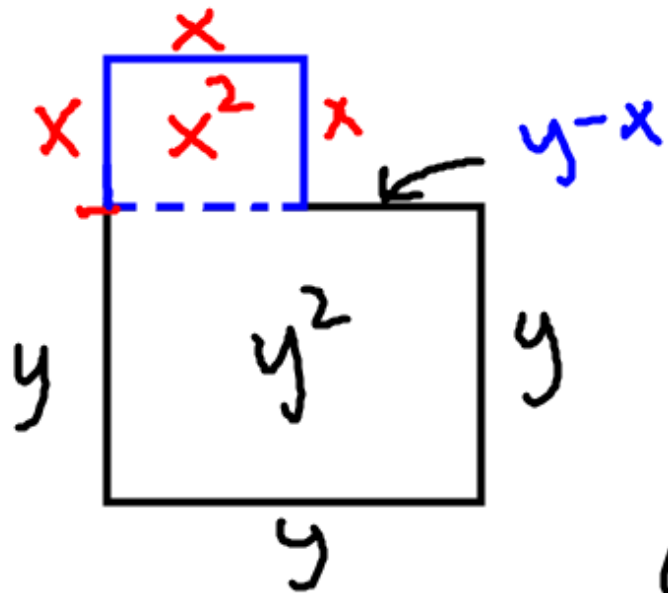
## Lesson 7.4: Applications of Systems of Equations

### Hints:

1. Draw a Picture
2. Know your Vocab
  - Product = Multiplication
  - Difference = Subtraction
  - Sum = Addition
3. Identify the "unknowns"

## Perimeter

- 2- A farmer has 300 feet of fence available to enclose a <sup>Area</sup> 4500 square foot region in the shape of adjoining squares, with sides of length  $x$  and  $y$ . (Note: the shape is similar Utah's shape, but they are squares instead of rectangles.)



## Perimeter

$$3x + 3y + y - x = 300$$

$$\textcircled{1} \quad 2x + 4y = 300$$

## Area

$$\textcircled{2} \quad x^2 + y^2 = 4500$$

4- The product of two numbers is 4, and the sum of their squares is 8. Find the numbers.  $\rightarrow x, y$

$$\textcircled{1} \quad x \cdot y = 4$$
$$\textcircled{2} \quad x^2 + y^2 = 8$$

$$\frac{xy}{x} = \frac{4}{x} \rightarrow y = \frac{4}{x}$$
$$x^2 + y^2 = 8$$

$$x^2 + \left(\frac{4}{x}\right)^2 = 8$$
$$\left(x^2 + \frac{16}{x^2} = 8\right) x^2$$
$$x^4 + 16 = 8x^2$$
$$x^4 - 8x^2 + 16 = 0$$
$$(x^2 - 4)(x^2 - 4) = 0$$
$$\underline{(x+2)}^2 \underline{(x-2)}^2$$

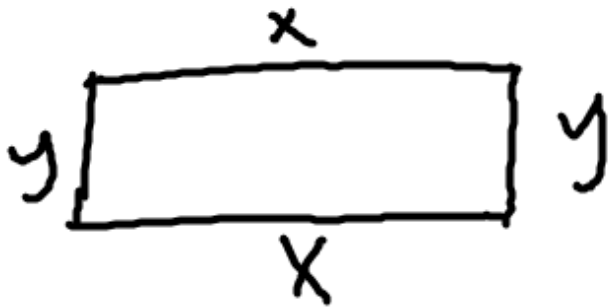
$$x = -2$$
$$y = \frac{4}{-2} = -2$$

-2 and -2

2 and 2

$$x = 2$$
$$y = \frac{4}{2} = 2$$

6- The perimeter of a rectangle is 16 inches and its area is 15 square inches. What are its dimensions?



Perimeter

$$\textcircled{1} \quad 2x + 2y = 16$$

Area

$$\textcircled{2} \quad x \cdot y = 15$$

8- A movie theater charges \$9 for adults and \$7 for senior citizens. On a day when 325 people paid admission the total receipts were \$2495. How many who paid were adults? How many were seniors?

x

y

$$\textcircled{1} \quad 9x + 7y = 2495$$



$$\textcircled{2} \quad x + y = 325$$

12- Pamela requires  $\overset{t}{3}$  hours to swim  $\overset{D}{15}$  miles downstream on the Illinois River. The return trip upstream takes  $\underline{5}$  hours. Find Pamela's average speed in still water.

$$\boxed{11-14}$$
$$D = rt$$

How fast is the current?

P - Pam's speed

C - current's speed

Down:  $15 = (P + C) \cdot \underline{3}$  →  $5 = P + C$

Up:  $15 = (P - C) \cdot 5$

$$\boxed{5 - P = C}$$

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$$15 = (P - (5 - P)) \cdot 5$$

$$15 = (P - 5 + P) \cdot 5$$

$$\underline{15} = (2P - 5) \cdot \underline{5}$$

$$\underline{3} = 2P - 5$$

$$\underline{\frac{8}{2}} = \underline{\frac{2P}{2}}$$

$$\boxed{P = 4 \text{ mph}}$$

$$\boxed{C = 5 - 4 = 1 \text{ mph}}$$

14- A rowing team rows about 6 meters per second on still water. They decide to explore a local river with little current. It takes them about 20 minutes to row upstream to a location of their choice and 15 minutes for the return trip down stream. What is the speed of the river?  $\rightarrow$  ~~River~~ Current's speed - C

$$D = r t$$

$$20 \cdot 60 = 1200 \text{ s}$$

$$15 \cdot 60 = 900 \text{ s}$$

$$\text{Up: } D = (6 - c) \cdot 1200 \text{ s}$$

$$\text{Down: } D = (6 + c) \cdot 900 \text{ s}$$

① Area:  $\Theta: \pi r^2$   
Circumference:  $2\pi r$

⑫ With wind:  
Against wind:

⑬