

Using Rational Equations to Solve Context Problems – Notes

1) Cleo can paint a room in 8 hours, while Phil can paint the same room in 6 hours. If they paint the room together, how long will it take them to paint the room?

$x = \#$ of hours it will take them together

$$\frac{x}{8} + \frac{x}{6} = 1 \quad \text{LCD: 24} \quad \frac{1\text{room}}{8\text{hrs}} \cdot x \text{ hours} + \frac{1\text{room}}{6\text{hrs}} \cdot x \text{ hrs} = 1 \text{ room} \quad (100\% \text{ of the room})$$

$$\frac{3x}{24} + \frac{4x}{24} = \frac{24}{24}$$

$$3x + 4x = 24$$

$$7x = 24$$

$$x = \frac{24}{7} = 3\frac{3}{7}$$

It will take them $3\frac{3}{7}$ hours to complete the job together!

2) Ricky paddles his canoe at a rate of 6 miles per hour in still water. Last weekend, he canoed on Carver Creek going downstream with the current for 9 miles and then returning upstream against the current. If the trip took him 4 hours to complete, what was the speed of the current?

$x =$ the speed of the current.

$$\frac{9\text{ miles}}{(6+x)\text{ mi/hr}} + \frac{9\text{ mi}}{(6-x)\text{ mi/hr}} = 4\text{ hours total}$$

$$\frac{9}{6+x} + \frac{9}{6-x} = 4 \quad \text{LCD: } (6+x)(6-x) \quad \text{miles} \div \text{miles/hr} = \text{hrs.}$$

$$9(6-x) + 9(6+x) = 4(6-x)(6+x)$$

$$54 - 9x + 54 + 9x = 144 - 4x^2$$

$$108 = 144 - 4x^2$$

$$4x^2 - 36 = 0$$

$$4(x^2 - 9) = 0$$

$$4(x-3)(x+3) = 0$$

$$x-3=0 \quad x+3=0$$

$$x=3 \quad x=-3$$

The speed of the current was 3mph.

3) Kiki walked to the grocery store which was 2 miles away. Her walking rate of the way back was 0.75 of her walking rate on the way to the store because she was carrying a bag of groceries. If it took Kiki 1 hour to make the round trip, what was her walking rate on the way to the store?

$$\frac{2}{x} + \frac{2}{.75x} = 1$$

$$\frac{2\text{ miles}}{x \text{ mi/hr}} + \frac{2\text{ mi}}{.75x \text{ mi/hr}} = 1 \text{ hour total}$$

$$.75(2) + 2 = 1(.75x)$$

$$1.5 + 2 = .75x$$

$$3.5 = .75x$$

$$\frac{3.5}{.75} = \frac{.75x}{.75}$$

Her walking rate on the way to the store was $x = 4\frac{2}{3}$ mph