PAP Alg. 2 Name: Mrs. Benton

Currents D=st

Ou take your boat on a trip 36 miles down the river. On the way to your destination (going down river), the 3mph current speeds you up. On the way back (going up river) the same current slows you down. Your total travel time is 9 hours.

A. Write an expression for the time it takes going down river, which means with the current speeding you up. (recall that d=st therefore t=$\frac{d}{s}$). solve for time! $\frac{36}{x+3}$

B. Write the expression for the time it takes going up river $\frac{36}{x-3}$

C. Since $Time_{downriver} + Time_{upriver} = Time_{total}$ write an equation using your expressions from parts a and b. $\frac{36}{x+3} + \frac{36}{x-3} = 9$

D. Solve for the variable

$\frac{36(x-3)}{(x+3)(x-3)} + \frac{36(x+3)}{(x+3)(x-3)} = 9(x+3)(x-3)$

$36x - 108 + 36x + 108 = 9(x^2-9)$

$72x = 9x^2 - 81$

$0 = 9x^2 - 72x - 81$

$9(x^2 - 8x - 9)$

$9(x-9)(x+1)$

$x = 9 \quad x = -1$

What does your answer represent in this situation?

x = Speed of the Boat

Nancy drove from Houston to San Antonio, a distance of 250 miles. She increases her speed by 10 miles per hour for a 360 miles drive from San Antonio to Dallas.

A. What is her speed from Houston to San Antonio? What do you use if you don't know? x

B. What is her speed from San Antonio to Dallas? x+10

$t = \frac{d}{s}$

C. If the total trip took 11 hours, write an equation to represent this situation.

(Time +Time = 11, remember t = $\frac{d}{s}$)

$\frac{250}{x} + \frac{360}{x+10} = 11$

$\frac{250(x+10) + 360(x)}{(x+10)x} = 11x(x+10)$

D. Solve your equation, what does your answer tell you?

$250x + 2500 + 360x = 11x^2 + 110$

$610x + 2500 = 11x^2 + 110x$

$0 = 11x^2 - 500x - 2500$

Quad Formula or Graphing

$x = -4.545$ or $\boxed{x = 50}$

Speed From Houston to San = 50

Speed From SAN to Dallas = 60

The speed of a stream is 4km/hr. A boat travels 6 km upstream in the same time it takes to travel 12 km downstream. (ie Time=Time) $d/s = d/s$

A. What is the expression for the time it takes to travel upstream (against the current)?

$$\frac{6}{x-4}$$

B. What is the expression for the time it takes to travel downstream (with the current)?

$$\frac{12}{x+4}$$

C. Solve for the speed of the boat in still water. (remember Time = Time)

$$\frac{6}{x-4} = \frac{12}{x+4}$$

$6x+24 = 12x-48$

$-6x+48 \quad -6x+48$

$72 = 6x$ $\boxed{x=12}$

Speed of Boat = 12km/hr

A plane flies 1000 miles from New York to Chicago at a speed of 580 mph. On the return trip, a tailwind helps the plane move faster. The total flying time for the round trip is 3.4 hours.

A. Write an expression for the time going from New York to Chicago.

$$= \frac{1000}{580}$$

B. Write an expression for the time going from Chicago to New York.

$$\frac{1000}{580+x}$$

C. Write an equation for the total time of the trip and solve for the speed of the tailwind.

(Time + Time = Total Time)

$$\frac{1000}{580} + \frac{1000}{580+x} = 3.4$$

$1000(580+x) + 1000(580) = 3.4(580)(580+x)$

$580000 + 1000x + 580000 = 1972(580+x)$

$1000x + 1160,000 = 1143760 + 1972x$

$-1000x$

$16240 = 972x$ $\boxed{x=16.707}$

Rational Word Problems
Current and Speed Problems

$t = d/s$

A paddleboat can move at a speed of 2 km/hr in still water. The boat is paddled 4 km downstream in a river in the same time it takes to go 1 km upstream. What is the speed of the river?

a) Set up equation time = time

x = current

$$\frac{4}{2+x} = \frac{1}{2-x}$$

b) Solve for the variable. What does your answer tell you about the situation?

$2+x = 4(2-x)$ $x = 1.2$ km/hr

$2+x = 8-4x$

$-2+4x \quad -2+4x$

$5x = 6 \quad x = 6/5$

2. Joey is taking a trip with a friend. He travels 200 miles to Sam's home at an unknown speed. Then, he and Sam travel 300 more miles going 25 miles per hour faster for the same amount of time that it took Joey to get to Sam's. How fast were Joey and Sam going on the second part of the trip?

a) Set up Equation time = time

$$\frac{200}{x} = \frac{300}{x+25}$$

b) Solve for the variable. What does your answer tell you about the situation?

$300x = 200(x+25)$

$300x = 200x + 5{,}000$

$100x = 5{,}000$

$x = 50$ mph

x = Sam's speed

Joey + Sam = 75 mph

Name Mrs. Benton

3. The speed of an Amtrak passenger train is 14 mph faster than the speed of a Central Railway freight train. The passenger train travels 400 mi in the same time it takes the freight train to travel 330 mi. Find the speed of each train.

a) Set Up Equation time = time

$$\frac{400}{x+14} = \frac{330}{x}$$

x = Freight train

b) Solve for the variable. What does your answer tell you about the situation?

$400x = 330x + 4620$

$70x = 4620$

$x = 66$

Freight

passenger train = 80 mph

4. On the first part of her trip Natalie road her bike 16 miles and on the second part of her trip she road her bike 42 miles. Her average speed during the second part of the trip was 6 miles per hour faster than her average speed on the first part of the trip. Find her average speed for the second part of the trip if the total time for the trip was 5 hours.

a) Set up Equation time + time = total

$$\frac{16}{x} + \frac{42}{x+6} = 5$$

$(x)(x+6)$

$16(x+6) + 42x = 5(x)(x+6)$

b) Solve for the variable. What does your answer tell you about the situation?

$16x + 96 + 42x = 5x^2 + 30x$

$96 + 58x = 5x^2 + 30x$

$0 = 5x^2 - 28x - 96$

$x = 8$ $\quad x = -2.4$

Second Speed = 14