Solving Rational Functions Analysis Name:_____

1. Working together, Bill and Tom painted a fence in 8 hours. Last year, Tom painted the fence by himself. The year before, Bill painted it by himself, but took 12 hours less than Tom took. How long did Bill and Tom each take when painting alone?

a) What is this problem asking us to do?

b) We called the time it takes Bill to paint B. Why is the time it takes Tom B+12?

c) Why does it not make sense to set up an equation $B + B + 12 = 8$?

d) Why is the rate for Bill $\frac{1}{B}$?

e) Explain what the equation represents.

f) Now that we have the equation, what is our goal?

g) Why is the LCM $8B(B + 12)$?

h) Why do we multiply the entire equation by the LCM?

i) Explain how the equation simplified to $8(B + 12) + 8B = B(B + 12)$.

j) Now that you have B, do you need to do anything else to answer the question?

	Fences	Time (hrs)	Rate
Bill	1	B	$\frac{1}{B}$
Tom	1	B+12	$\frac{1}{B+12}$
Together	1	8	$\frac{1}{8}$

$$\frac{1}{B} + \frac{1}{B+12} = \frac{1}{8}$$

LCM: $8B(B + 12)$

$$\frac{8B(B+12)1}{B} + \frac{8B(B+12)1}{B+12} = \frac{8B(B+12)1}{8}$$

$$8(B + 12) + 8B = B(B + 12)$$

$$8B - 96 + 8B = B^2 + 12B$$

$$0 = B^2 - 4B + 96$$

$$0 = (B - 8)(B + 12)$$

$$B = 8, B = -12$$

Bill spent 8 hours

Tom spent 20 hours

Follow Up Question:

Cindy takes twice as long to mow the lawn as her mom Carolyn. Together they can mow the lawn in 24 minutes. Working alone, how long does it take Cindy to mow the lawn?

2. A train can travel at a constant rate from New York to Washington, a distance of 225 miles. A new train that travels 50 miles per hour faster can get from New York to Richmond, a distance of 375 miles in the same time as the old train makes it to Washington. Find the speed of each train.

a) What is this problem asking us to do?

b) Why can the time for the old train and new train both be x?

c) How did we use the time and distance given to create an expression for speed?

d) In words, describe what the equation represents.

e) Why do we multiply every term by x?

f) How does the equation simplify to $225 + 50x = 375$?

g) Now that you have x, do you need to do anything else to answer the question?

	Distance	Time	Rate
Old	225	x	$\frac{225}{x}$
New	375	x	$\frac{375}{x}$

$$\frac{225}{x} + 50 = \frac{375}{x}$$

$$\frac{225x}{x} + 50x = \frac{375x}{x}$$

$$225 + 50x = 375$$

$$50x = 150$$

$$x = 3$$

Old Train: $\frac{225}{3} = 75$ mph

New Train: $\frac{375}{3} = 125$ mph

Follow Up Question:
A car was driven a total of 76 miles in the same amount of time that it took for a bicycle to travel 16 miles. The bicycle travels 30 miles per hour slower than the car. What is the speed of both vehicles?