Rational Equations: Distance=Rate*Time Problems

Distance = rate • time or time = d

time = distance / rate

or rate = distance / time

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1. B can drive 600 miles in the same time as it takes K to drive 500miles. If B drives 10 mph faster than K, then how fast does B drive?

Unknowns: B = B's speed, K = K's speed Equations: B = K + 10

B.time = K.time
B.time =
$$\frac{B.dist}{B}$$

$$K.time = \frac{K.dist}{K}$$
So $\frac{B.dist}{B} = \frac{K.dist}{K}$
 $\frac{600}{K+10} = \frac{500}{K}$

600K = 500(K+10) Once K is found, be sure to solve for B to answer the question.

- 2. The speed of Lazy River's current is 5 mph. If a boat travels 20 miles downstream in the same time that it takes to travel 10 miles upstream, what is the speed of the boat in still water?
 - When the time is the same, the equation for the still-water speed of a boat with (downstream) or against (upstream) a current and for the still-air speed of a plane traveling with (a tailwind) or against (into) the wind (current) is:

$$\frac{Downstream}{Still + current} = \frac{Upstream}{Still - current}$$

Unknown: $S = Still$ Equation: $\frac{20}{S+5} = \frac{10}{S-5}$

3. A small jet has airspeed (rate in still air) of 300 mph. One day the co-pilot noted that the plane traveled 85 mph with a tailwind in the same time it took to travel 65 miles against the same wind. What was the rate of the wind?

Unknown:
$$W = wind$$
 Equation: $\frac{85}{300+W} = \frac{65}{300-W}$

TRY:

1. Norma can row her boat 12 miles in the same time as it takes Marietta to cover 36 miles in her motorboat. If Marietta's boat travels 15 mph faster than Norma's boat, then how fast is Norma rowing her boat?

2. The new DogJet flew 500 miles with a steady 25 mph tailwind in the same amount of time it took to fly 400 miles against the same wind. What was the plane's airspeed (rate in still air)?

3. A boat can travel 16 mph in still water. If the boat can travel 5 mi downstream in the same time it takes to travel 3 miles upstream, what is the speed of the current?