

Rational Equations: Distance=Rate*Time Problems

Distance = rate • time or time = distance / rate or rate = distance / time

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

Unknowns: $B = B$'s speed, $K = K$'s speed

Equations: $B = K + 10$

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

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

$600K = 500(K + 10)$ 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:

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

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

