

### Quiz 5

1. Brian can row a boat 10 mph in still water. He rows to his friends house down the river against the current in 1 hour. The way back, with the current, takes him 20 minutes ( $1/3$  of an hour).

How fast is the current?

How far away is his friends house?

*Answer.* Start by setting up variables. Let  $c$  be the speed of the current, and  $d$  be the distance to his friends house. The formula we need is

$$distance = rate \times time.$$

Since he travels 10 mph by himself, when he travels against the current he goes  $10 - c$ . With the current, he goes  $10 + c$ . This leads to two formulas:

$$d = (10 - c) \times 1$$

$$d = (10 + c) \times \frac{1}{3}$$

Distributing through, we end up with

$$d = 10 - c$$

$$d = 10/3 + c/3$$

We can either use substitution or elimination to solve from here. Since each equation is already solved for  $d$ , we can set these equal to each other

$$10 - c = 10/3 + c/3$$

multiply both sides by 3 to get

$$30 - 3c = 10 + c \rightarrow 20 = 4c$$

which leads to  $c = 5$ . Then just plug this back in to get  $d = 5$ . Therefore, the current is 5 mph and the distance is 5 miles.  $\square$