

1D Relative Motion

1. A boat can travel 10.0 m/s as measured from the shore when traveling with the current with the throttle fully open. The same boat, still with the throttle fully open, can travel 7.0 m/s when traveling against the current.

- a. What is the speed of the current?
- b. How fast can the boat travel in still water?

2. Two swimmers cover the same 200.0 m stretch of river but in opposite directions. The current is flowing at 0.5 m/s. The swimmer who is traveling against the current completes the distance in 3.00 minutes. The swimmer who is traveling with the current completes the distance in 2.00 minutes. Which swimmer would be faster in calm water?

3. A kayaker is paddling as hard as he can (5.0 m/s with respect to the water) upstream when his hat falls off the back of the boat. He doesn't realize it for two minutes as the hat has floated with the current (1.0 m/s). When he does realize the hat is gone, he quickly turns around and paddles as hard as he can until he catches up with his hat.

- a. How long will it take him to catch up to his hat?
- b. How far downstream (with respect to the shore) has the hat traveled between when it was dropped and when he catches up to it.
- c. How far does the boat travel in that time?

4. It takes 40.0 seconds for a person to walk up a stalled escalator. When she stands on the same escalator (now fixed), she is at the top in 60.0 seconds. How long will it take for her to walk up the escalator when it is moving up?