

HOMEWORK - RELATIVE MOTION - DAY #2

Name: _____

Period: _____ Date: _____

1.) A wide river flows from North to South at a steady rate of 2 m/sec. The motor boat has been tested on a calm pond and it was found that it goes through the water at eight m/sec.

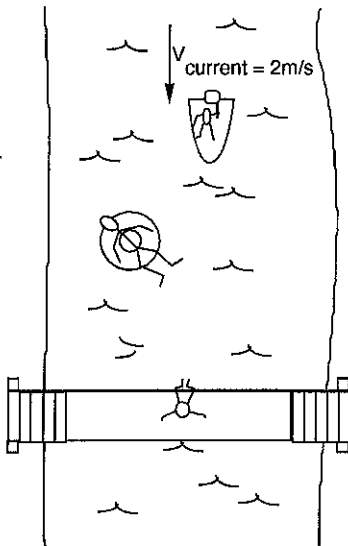


Figure 2.26

a.) During a five second period *how much distance* does the boat move over the water as seen by the person in the inner tube. _____

b.) Find the boat's *displacement* as seen by the observer watching from the bridge for five seconds. _____

c.) What is the *velocity* of the boat relative to the inner tube? _____

d.) What is the velocity of the boat as seen from the bridge? _____

e.) What is the velocity of the inner tube as seen from the bridge? _____

2.) Consider the situation in Question 1 when the boat's engine is not running. Determine the following:

a.) Velocity of the boat with respect to the inner tube. _____

b.) Velocity of the boat with respect to the water molecules. _____

c.) Velocity of the boat with respect to the ground. _____

d.) Velocity of the inner tube with respect to the ground. _____

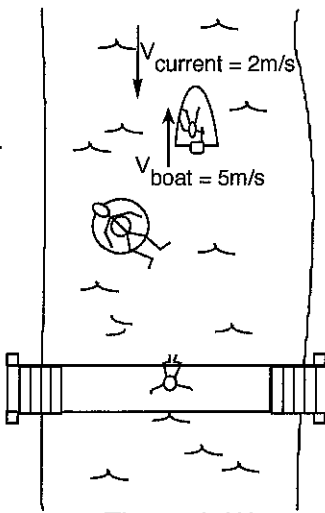


Figure 2.27

3.) If the boat in Question 1 turns around (points North) and travels five m/s through the water molecules find:

a.) Velocity of the boat with respect to the inner tube.

b.) Velocity of the boat with respect to the bridge.

c.) Displacement of the boat with respect to the ground during a ten second period.

4.) If the boat slows down until it is heading North with a speedometer reading of 2 m/s, find:

a.) Velocity of the boat with respect to the inner tube.

b.) Velocity of the inner tube with respect to the boat.

c.) Velocity of the boat with respect to the ground.

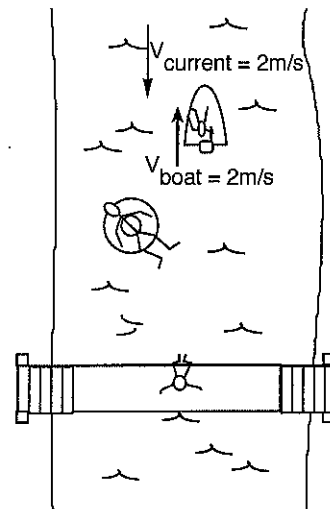


Figure 2.28

5.) After landing on the East shore, the boat points due West and travels 5 m/s with respect to the water. Make a diagram of this situation including a box around the block of water in the river.

a.) Determine how wide the river is if the trip to the West shore requires 10 seconds. (Hint: think about the swimming pool.)

b.) Velocity of the boat with respect to the river.

c.) Velocity of the boat as seen from the bridge.

d.) Distance the boat is swept down stream (South) while the boat is making the 10 second crossing.

e.) Distance the inner tube travels with respect to the ground during the 10 seconds.

6.) The boat wishes to leave the East shore and travel at five m/s with respect to the water so that it will move *directly* across the river and land on the opposite shore without sliding down stream. Add a neat and clearly labeled velocity vector diagram within the picture.

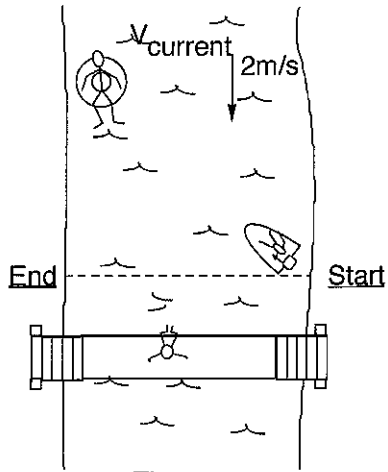


Figure 2.29

a.) Determine the correct bearing angle so the boat can move directly across on the dotted line.

b.) Find the velocity of the boat with respect to the ground.

c.) How much time is required to make the crossing (width found in Problem 5)?

d.) Find the speed with which the inner tube sees the boat pass.

e.) What is the velocity of the boat relative to the water?

f.) If the boat wants to pick up the person in the inner tube, which way should it point?

- To the right of the inner tube.
- Straight toward the inner tube.
- To the left of the inner tube.