THINKING WRITING

14.B Up and Down Stream

BOATS AND CURRENTS

The L.A. Barge Company operates boats on canals, lakes, and rivers. One of their boats, the *Huck Finn*, moves at a maximum rate of 11 mi/hr in still water. The boat regularly does a round trip on the Leumas River, going 32 miles upstream, and returning. The river flows at a rate of 2 mi/hr.

To calculate the total time for the round trip, you need to use the formula

$$\text{distance} = \text{rate} \cdot \text{time}.$$

Assuming the boat goes at its maximum rate, it goes upstream at a rate of $(11 - 2)$ mi/hr, and it goes downstream at a rate of $(11 + 2)$ mi/hr.

1. What is the total time for the round trip? Assume a one-hour stop before heading back.
2. What is the average speed
   a. with a stop?
   b. without a stop?
3. True or False? Since the boat goes upstream on the way there, and downstream on the way back, the effect of the current is cancelled, and the trip takes as long as it would on a lake. Explain.
4. How long does the upstream portion of the trip take? How about the downstream portion?

For problems 5 and 6 assume the boat moves at a rate of r miles per hour in still water.

5. What would its rate be in terms of r,
   a. going upstream if the river is moving at 2 miles per hour?
   b. going downstream if the river is moving at c miles per hour?
6. If the river is moving at 3 miles per hour,
   a. how long does the upstream portion of the trip take in terms of r?
   b. how long does the downstream portion of the trip take in terms of r?
   c. how long does the whole trip take in terms of r?
7. How fast should the boat go (still water rate), if the L.A. Barge Co. wants to conserve fuel, but needs to make the round trip (including a one-hour stop) in:
   a. 13 hours? b. 8 hours?

AIRPLANES AND WINDS

An airplane flies from Alaberg to Bergala with a headwind of 20 miles per hour and returns with a tailwind of 20 miles per hour. The plane stopped in Bergala for an hour. The whole trip took 4 hours. The towns are 500 miles apart.

8. How long did each portion of the trip take?

YOUR OWN PROBLEM

9. Create a problem involving currents, winds, or moving sidewalks that requires solving a quadratic equation. Solve your problem.