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Physics Lab

Materials



small battery-powered car
(or physics bulldozer)

meterstick

protractor

stopwatch

a piece of paper,
1 m \times 10 m

1. a. Calculate the velocity

The Paper River

Problem

How does a boat travel on a river?

Procedure

1. Your car will serve as the boat. Write a brief statement to explain how the boat's speed can be determined.

2. Your boat will start with all wheels on the paper river. Measure the width of the river and predict how much time is needed for your boat to go directly across the river. Show your data and calculations.

3. Determine the time needed to cross the river when your boat is placed on the edge of the river. Make three trials and record the times.

4. Do you think it will take more or less time to cross when the river is flowing? Explain your prediction.

5. Have a student (the hydro engineer) walk slowly, at a constant speed, while pulling the river along the floor. Each group should measure the time it takes for the boat to cross the flowing river. Compare the results with your prediction.

6. Devise a method to measure the speed of the river. Have the hydro engineer pull the river at a constant speed and collect the necessary data.

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Data and Observations

Table 1			
Moving River			
Trial #	Time (s)	Trial #	Time (s)

1. Does the boat move in the direction that it is pointing?

2. Did the motion of the water affect the time needed when the boat was pointed straight across?

3. Which had the greater speed, the river or the boat? Explain your choice.

Analyze and Conclude

1. **Calculating Results** Calculate the speed of the river.

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2. **Inferring Conclusions** Using your results for the speed of the boat and the speed of the river, calculate the speed of the boat compared to the ground when the boat is headed directly downstream and directly upstream.

Apply

1. Do small propeller aircraft always move in the direction that they are pointing? Do they ever fly sideways?

2. Explain why you guessed as you did in #4 above:

3. Explain in physics terms - time, displacement, speed, velocity, component, magnitude, direction, resultant, etc. (but you don't have to use all of these) why you were right or wrong
