PHYSICS IN MOTION
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Unit 2F
Relative Velocity
Captain For A Day Lab

Name:

Date:

Ship captains and airplane pilots have to take the water and wind currents into account when driving their ships and planes. Not only does direction matter, but velocity relative to the stationary beginning and ending positions also determines how long the trip will take.

In this activity, you will create a "current" with a moving piece of paper and will determine how this current affects the velocity of a constant velocity car relative to the ground around it.

Materials:

- constant velocity car
- meter stick
- timer
- butcher paper

Predictions:

1. **Predict how the velocity of the car relative to the floor will change if the car is moving in the same direction as the current.**

2. **Predict how the velocity of the car relative to the floor will change if the car is moving in the opposite direction as the current.**

3. **Predict how the velocity of the car relative to the floor will change if the car is moving in a direction perpendicular to the current.**

You will need to determine the following values in this activity:

4. **Predict the average velocity of the car on a stationary surface.**

5. **Predict the relative velocity of the car to the stationary surface when the car is on a current moving in the same direction. What is the velocity of the current in this case?**

6. **Predict the relative velocity of the car to the stationary surface when the car is on a current moving in the opposite direction. What is the velocity of the current in this case?**

7. **Predict the relative velocity of the car to the stationary surface when the car is on a current that is moving in a perpendicular direction. What is the velocity of the current in this case?**

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Questions to consider:

1. If the speed of the current was faster than the speed of the car, and the car was moving against the current, in what direction would the car move relative to the stationary floor?

2. If the speed of the current was faster than the speed of the car, in what direction would the car move relative to the stationary floor if it was moving in the direction opposite the current?

3. How should a captain direct his ship to cross a river flowing perpendicularly to the ship's direction of motion?