Crossing the River Lab

Teacher's Guide

Topic:

Vectors and Projectiles

The following information is provided to the student:

Question:
For a boat heading straight across a river, how does an change in the boat speed effect the resulting velocity, the crossing time and the downstream distance? How does a change in current speed effect the resulting velocity, the crossing time and the downstream distance?

Purpose:
To determine the effect of varying boat speeds on the resulting velocity, the crossing time and the downstream distance for a boat which **heads** straight across a river AND to determine the effect of varying current speeds on the resulting velocity, the crossing time and the downstream distance for a boat which **heads** straight across a river.

A complete lab write-up includes a Title, a Purpose, a Data section, and a Conclusion/Discussion. The Data section should include suitable data for investigating the purpose; the data should be organized in tables with column headings and units. The organization of data should reflect your ability to systematically conduct an investigation. The Conclusion/Discussion should respond to the multi-part Purpose of the lab; each conclusion should reference appropriate data in order to provide supporting evidence.

URL: http://www.physicsclassroom.com/shwave/rboat.cfm

Materials Required:

A page from The Shockwave Physics Studios:
http://www.physicsclassroom.com/shwave/rboat.cfm

Description of Procedure:

Students log on to the above page and manipulate the variables of the animation in an effort to explore the answers to the given *question* (purpose).

Alternative Materials and Procedure:

A more thorough approach to this lab is provided at The Shockwave Physics Studios:

http://www.physicsclassroom.com/shwave/rboatdirns.cfm

The alternative exercise is a guided exercise with an extensive procedure.

Safety Concern:

There is always a higher than usual level of risk associated with working in a science lab. Teachers should be aware of this and take the necessary precautions to insure that the working environment is as safe as possible. Student *horseplay* and off-task behaviors should not be tolerated.

The Laboratory

Suggestions, Precautions, Notes:

1. Students will have to use the Pythagorean theorem to calculate the resultant velocity. The resultant velocity is not an output variable of the animation.
2. The controlled environment of this animation makes this activity a great means of assessing student understanding of variable control and manipulation. Students have an opportunity to experiment with changing variables and observing the outcome on a target variable without the added complication of manipulating and reading instruments.

Auxiliary Materials:

None

Scoring Rubric:

VP5.	**Crossing the River Lab**	**Score**
____	Included, labeled and organized all parts of the lab report.	____/____
____	Data section includes a collection of data for each independent variable; data is organized in a table with column headings and units; data is complete enough to allow student to accomplish the purpose. Reflects student understanding of how to conduct a systematic and controlled experiment.	
____	Conclusion/Discussion responds to the purpose in its entirety (six parts); each concluding statement is supported by a reference to the data and results; conclusions are accurate and consistent with data.	

Connections to The Physics Classroom Tutorial:

The following readings are a suitable accompaniment to this lab:

http://www.physicsclassroom.com/Class/vectors/u3l1f.cfm

http://www.physicsclassroom.com/Class/vectors/u3l1g.cfm

Connections to Minds on Physics Internet Modules:

Sublevel 6 of the Vectors and Projectiles module is a suitable accompaniment to this lab:

http://www.physicsclassroom.com/mop/module.cfm