Projectile Simulation

Teacher's Guide

Topic:

Vectors and Projectiles

The following information is provided to the student:

Question:
How can a vector diagram be used to describe the changes (or lack of changes) in the horizontal and vertical components of velocity and how can such changes (or lack of changes) be described in words?

Purpose:
To use a vector diagram to represent the changes (or lack of changes) in the horizontal and vertical components of velocity and to describe those changes (or lack of changes) over the course of time.

A complete lab write-up includes a Title, a Purpose, a Data section, a Conclusion and a Discussion of Results. The Data Section should include the provided diagrams with components of the velocity vectors drawn and labeled (v_x and v_y) on the diagram; the size of the vector components should be representative of their relative magnitude. The Conclusion section should use words to respond to the question raised in the Purpose section. The Discussion of Results should include answers to the provided post-lab questions.

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

Materials Required:

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

Description of Procedure:

Students log on to the above page and observe the animation of a projectile. On-screen buttons allow the students to alter the launch angle, launch speed and launch height and to display the components of a projectile's velocity.

Alternative Materials and Procedure:

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

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

The alternative exercise is a guided exercise with a much more 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

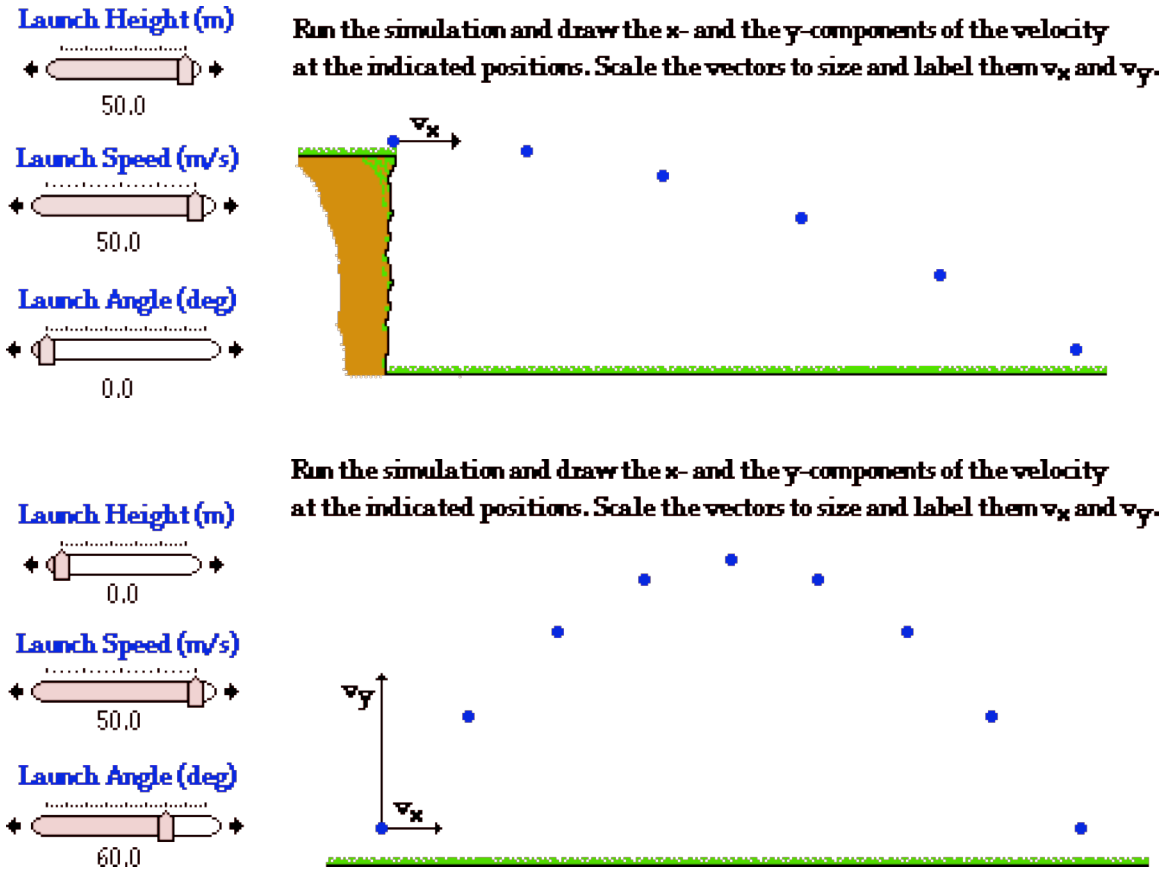
Suggestions, Precautions, Notes:

1. Students often confuse force and velocity. Remind students that the vectors they are drawing are velocity vectors and not force vectors. As a separate exercise, ask students to draw the force(s) acting upon a projectile as it moves upward and rightward towards the peak, at the peak and as it moves downward and rightward after the peak of the trajectory.

Auxiliary Materials:

The following graphic is provided to the student for completion and inclusion in the Data section of their lab notebook.

Tape the graphic(s) below into the Data section of your lab.



Scoring Rubric:

VP7.	**Projectile Simulation**	**Score**
____	Included, labeled and organized all parts of the lab report.	____/____
____	Data section includes provided graphic. The velocity components are drawn and labeled; the relative size of the v_x and v_y vectors were accurately drawn for both the horizontally-launched and the angle-launched projectile.	
____	Conclusion uses words to clearly and completely described the changes (or lack of changes) in the v_x and v_y vectors for both types of projectiles.	
____	Discussion of Results includes accurate answers to the provided post-lab questions; writing is thorough and complete.	

Connections to The Physics Classroom Tutorial:

The following readings are a suitable accompaniment to this lab:

http://www.physicsclassroom.com/Class/vectors/u3l2b.cfm
http://www.physicsclassroom.com/Class/vectors/u3l2c.cfm

Connections to Minds on Physics Internet Modules:

Sublevels 8 and 9 of the Vectors and Projectiles module are a suitable accompaniment to this lab:

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