

Match that Graph Lab

Teacher's Guide

Topic:

One Dimensional Kinematics

The following information is provided to the student:

Question:

What general principles allow one to transpose a position-time graph into a velocity-time graph (and vice versa)?

Purpose:

To describe the general principles which can guide the process of transposing a position-time graph into a velocity-time graph (and vice versa).

A complete lab write-up includes a Title, a Purpose, a Data section, and a Conclusion/Discussion of Results. The Data section should include the provided page – completed and taped in. The Conclusion/Discussion should thoroughly describe all principles required to transpose a position-time graph into a velocity-time graph (and vice versa). The discussion should be detailed and elaborate on the principle. The detail should be sufficient enough to allow a novice to read and follow and be successful at transposing a graph.

Materials Required:

Computer-interfaced motion detector and accompanying software.

Description of Procedure:

Students are provided with the graphic below. Once the motion detector is set up, students must walk in front of the detector in such a manner as to create a graph that matches the given graph. Position-time and velocity-time graphs should be displayed on the screen at the same time. Once they have matched the motion for a position-time graph, they should draw the corresponding velocity-time graph. All motion matching should be done using a trial-and-error process (and an understanding of the underlying physics).

Alternative Materials and Procedure:

Alternative procedures are not recommended.

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 working environment is as safe as possible. Student *horseplay* and off-task behaviors should not be tolerated.

Suggestions, Precautions, Notes:

1. Lots of good thinking and discussions are likely to emerge from this lab. Avoid succumbing to the temptation of providing the students the *answers*. They will benefit more from struggling with the graphs and the manner in which they relate to each other.

The Laboratory

- Students may wish to have a fan cart in order to attain smooth accelerations. If using fan cart, students should be mindful of the hazard of the rotating fan blades.

Auxiliary Materials:

None

Scoring Rubric:

K7. Match That Graph Lab	Score
____ Included, labeled and organized all parts of the lab report. ____ Data section includes the provided page of graphs. The characteristics of a motion required to match each graph is briefly identified; the transposing of the p-t graph into the corresponding v-t graph (and vice versa) is clear and accurate. ____ Conclusion/Discussion accurately describes the principles which must be used to transpose one type of graph into the other type of graph. Discussion is thorough, elaborate and accurate. Focus of discussion is on the corresponding features of each type of graph. Discussion reveals understanding.	____/____

Connections to The Physics Classroom Tutorial:

The following readings are a suitable accompaniment to this lab:

<http://www.physicsclassroom.com/Class/1DKin/u1l3a.cfm>

<http://www.physicsclassroom.com/Class/1DKin/u1l3b.cfm>

<http://www.physicsclassroom.com/Class/1DKin/u1l4a.cfm>

<http://www.physicsclassroom.com/Class/1DKin/u1l4b.cfm>

Connections to Minds on Physics Internet Modules:

Sublevel 11 of the Kinematic Graphing module is a suitable accompaniment to this lab:

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