Graphing Speed vs. Time Part 2

Grade Level: 7th - 8th

Lesson Time: 30 Minutes

Key Terms:

Acceleration
Line Graph
Slope
Speed
Time
Velocity

Resources:

Graphing Speed vs. Time Challenge Worksheet
Sample Answers
-Graph 1 Demo
-Graph 2 Demo

Lesson Overview

Activity video available at edu.zspace.com

Students will be given a pre-made graph and asked to create an experimental setup, by using ramps and platforms, which will replicate the motion of a provided graph.

Objectives

- Design an experiment setup using ramps and platforms, which replicate the motion of a provided graph
- Analyze and explain a line graph

Standards (NGSS and Common Core)

For state specific standards visit edu.zspace.com

Next Generation Science Standards

- Physical Science – Energy
    - MS-PS3-1 Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object.

Common Core Connections

- Language Arts
    - RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
    - WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- Mathematics
    - 8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

Differentiation

- Students may be grouped heterogeneously to allow students with a strong command of the English language to assist in reading or interpreting questions
- Provide a handout with a list of vocabulary terms and definitions that will appear in their activity
- Allow students to provide answers that are handwritten, typed, or verbal

Introduction

Students should have a firm knowledge of speed and understand that velocity is the speed of an object in a given direction. Furthermore, the students should be able to read a line graph and explain what it represents. Students should have completed the "Graphing Speed vs. Time" activity in Newton's Park prior to doing this lesson. The teacher will tell the students that they will be analyzing a line graph and then using their knowledge of slope, speed, and velocity to help them design a replica of that graph by using ramps and platforms.

Activity – Graphing Speed vs. Time Challenge

1. You will be given a graph of speed vs. time of a zBall. Use ramps and platforms to construct an experiment that replicates the motion you see in the graph. Take a screen shot of your experimental set up.

Teacher Note

Students will discover how slope, velocity, and time affect the movement of a ball. To see an example of a possible solution for each graph, go to the activities titled "Graph 1 Demo" and "Graph 2 Demo" within Newton's Park.

Closing

After the students have completed the activity, students can share their screenshots of their experimental setups and compare them to solutions developed by other groups by using the zView machine. A discussion can be had about the decision-making process of developing the setups and what challenges the students faced.

Questions for Discussion

1. Was it harder to have the graph and then make the set up?

   Answers will vary. Sample Answer: Yes but it was more fun to do it this way.

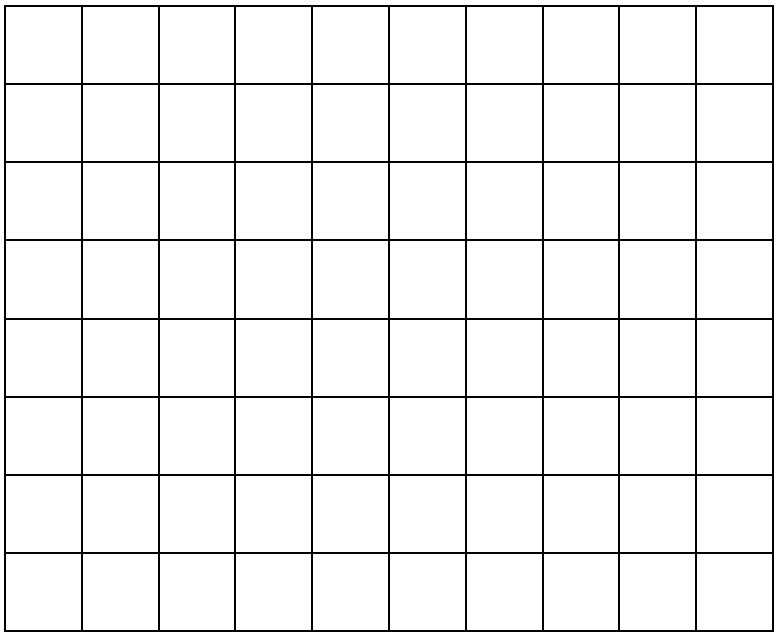
2. Do you see a connection between the graphs and set up.

   Answers will vary. Sample Answer: The graph is flat when the surface is flat but the rest is the opposite. For example if the ramp goes down the graph goes up.

Graphing Speed vs. Time

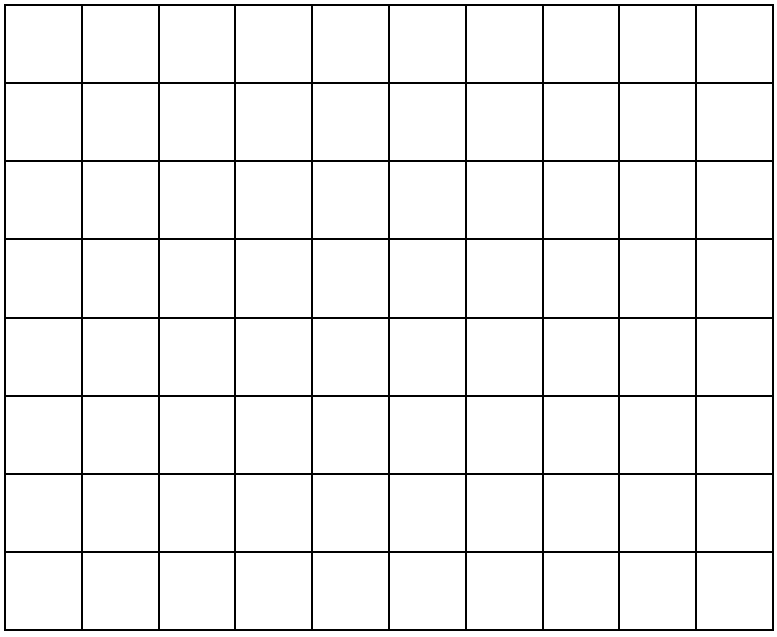
Name: _____ Date: _____

Experiment 1:



Time (s)

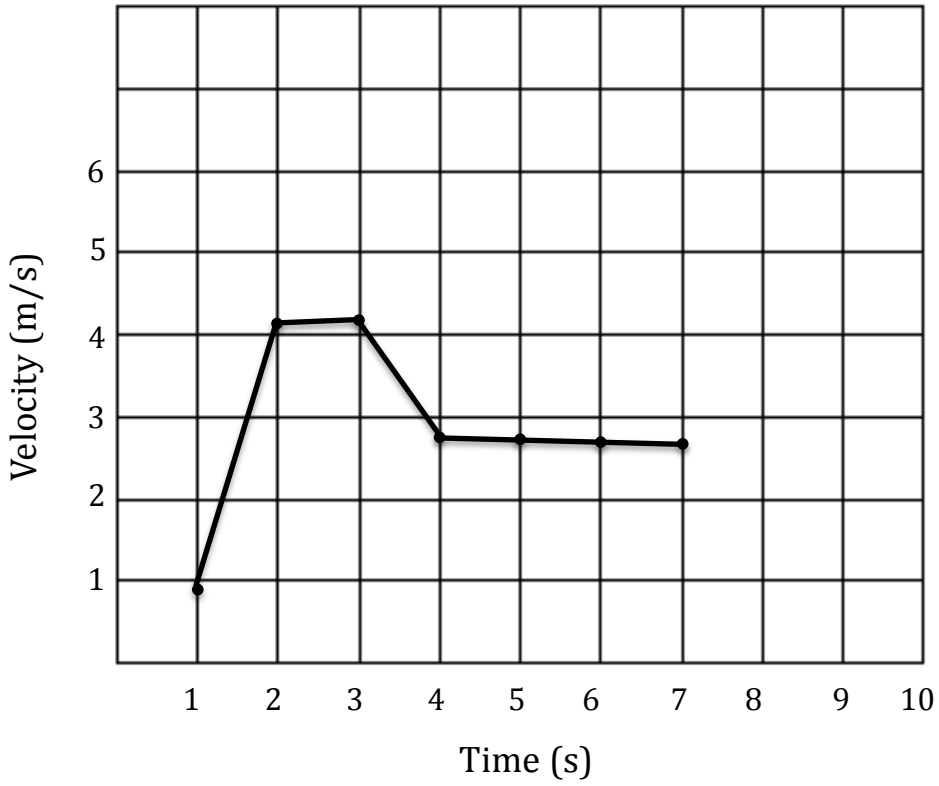
Experiment 2:



Time (s)

Graphing Speed vs. Time Part 2

Graph 1



Graph 2