

Going For Speed

Major Topic: Graphing, Relations, Functions, Comparisons of Graphical Representation

Length of Unit: 4- 80 minute blocks

Unit Summary: Teams of students will put together identical vehicle kits. Using motion sensors and graphs that measure speed and distance, students will be presented with the problem of how they can modify the vehicles to get the maximum distance in the least amount of time.

Interdisciplinary Connections: To integrate history, reading and writing, students will research and write an essay on the past, present and future of an invention; explaining modifications made to create new inventions from old ones.

Understanding Goals: The students will construct a car from a given design and test it using motion sensors to get a baseline graph. During a discussion, students will talk about what information can be obtain from the graphs using the probeware. The students will then take that information to redesign their car to see if they can get more speed in less time on a controlled ramp. They can retest and modify as many times as time allows. They must record their results in a table of values and a list of ordered pairs. They must identify if the graph is a function or not and explain if the graph shows a positive, negative, or no relationship. At the end of the unit; students will be asked to research and write a five paragraph essay on any invention that they are interested in. They must discuss how and when it was created (history), how the product was tested and modified to what we have presently (present), and what are the creators or engineers working on to redesign or modify it for future use. Give examples, such as: cell phones, video games, televisions, sports equipment.

Essential Questions:

- Does weight have any effect on speed?
- Analyzing the graphical information, how can you determine what happened?
- How do you think inventors could use the process to create new products or modify existing ones?

Student Objectives:

Students will be able to:

MATH 8.13 Make comparisons, predictions, and inferences, using information displayed in graphs.

MATH 8.14 Make connections between any two representations (tables, graphs, words, and rules) of a given relationship

Blooms Taxonomy	21st Century Skills
Creating Evaluating Analyzing Applying Understanding Remembering	Critical Thinking Problem Solving Communication Creativity & Innovation Collaboration Information & Media Contextual Learning Global/Multicultural Research

Performance Tasks:

Students will:

- Apply modifications based on graphing results
- Write a 5 paragraph essay
- Create table of values and list of ordered pairs
- Presentation of process and end results
- Collaboration observations

Evidence of formative assessment:

- Student portfolios of testing and table of values of graphs
- Practice worksheets (not included)
- Quizzes (not included)

Evidence of Summative Assessment:

- Videos of collaboration and learning process/activities
- Research essay

Technology

Hardware	Software
Computers Document Camera Printer Video Camera Internet Connection Projection System Motion Detectors (probeware) Laptop	Internet Web Browser Database/Spreadsheet Concept Mapping LoggerLite Word Processing

Resources from the web:

Students will use and visit websites to gain information about their researched inventions.

Supplies:

- building kits that contain similar or identical vehicles (legos, erector set of vehicles)
- ramp that the vehicles can roll down
- motion detectors (probeware)

Lesson 1: (2- 80 minute blocks)

- The students will construct a car from a given design and test it using the probeware to get a baseline graph.
- When using the probeware, discuss what information can be obtained from the graphs.
- Students will use information obtained from their probeware to redesign their car to see if they can get more speed in less time on a controlled ramp. They can retest and modify as many times as time allows.
- The students will discuss their results with the class and discover how using graphs simplifies understanding.
- The students will look at additional types of graphs and obtain information from them.
- As a closer, ask the students, “How did we use the information obtained from the graph to modify our cars?” (exit ticket)

Lesson 2: (1- 80 minute block)

- The students will use the information obtained from the activity and create sets of ordered pairs.
- The students will define what relations and functions are, and be able to identify them. They will determine if the graph shows a positive, negative, or no relationship.

- The students will complete 2 worksheets (not included)
- As a closer, ask the students, “How would the information that we learned today help us modify our cars?” (exit ticket)

Lesson 3 (1- 80 minute block)

- Review solutions to worksheets.
- Quiz (not included)
- The students will research and write an essay on one invention. They must include creation of invention; how it was modified to present day, and what they think the future modifications could be.
- As a closer, discuss how past innovators used an activity similar to ours to redesign or recreate a new product.