

Kinematics

Objectives for Student Activities

- Identify and demonstrate the correct usage of simple machines
- Design and construct a machine that will complete a simple task using a series of creative and complex steps

Teacher Resources

Merrill, “Physics”, Chapter 10, Work, Energy, and Simple Machines

Holt, “Modern Physics”, Chapter 6, Conservation of Energy and Momentum

Hewitt, “Conceptual Physics”, Chapter 6, Energy

Merrill, “Physical Science”, Chapter 7, Machines

“Complex Creations From Simple Machines”, Janet Young, The Science Teacher, January 1994, page 16

Websites

<http://www.rubegoldberg.com/>

<http://ousdmail.ousd.k12.ca.us/~codypren/machines.html>

<http://www.anl.gov/OPA/rube/rubeolive.html>

<http://sln.fi.edu/qa97/spotlight3/spotlight3.html>

Materials

A Rube Goldberg Cartoon or similar Picture

Mouse Trap game

Demonstrations

Use the Rube Goldberg Cartoon and the MouseTrap game to introduce the Simple Machines.

Go to <http://www.centralconnector.com/GAMES/mousetrap.html> for more info on the MouseTrap game.

Procedures

Designing the Project

- a. Students will design a “Rube Goldberg” Machine planning to recycle materials in a unique way to complete a simple task such as to turn on a light switch.
- b. Pairs of students will provide a scaled drawing of their design (preferably on CADD or other similar software).
- c. Teacher evaluates and approves student’s designs.

Constructing the Machine

- a. Students gather materials and construct their machines at home using the approved designs as a blueprint of the machine.
- b. Students test their machines at home and revise the machines as needed to complete the task.
- c. Students select a theme relating to the task being accomplished and decorate the machine to match the theme.
- d. Students demonstrate their completed project in the classroom in competition format.
- e. Student projects are evaluated on a scale system. The rubric may include: scaled drawing, scale identified, parts labeled, contains 6 (or more) machines, neatness, completes task, works more than once, etc.

Applications in the Workplace

Learning to work as a team is an important quality that industries are seeking from their employees. The ability to identify problems and to select proper materials and/or processes to eliminate the problems is a skill that ensures the success of an individual or team in today's technological world. We met a small group of individuals at Peavey Electronics who were required to build machines to complete particular tasks. These individuals worked as a team to determine what materials and resources were available and how to best use those resources to efficiently complete the assigned task. These individuals had to rely on previous experiences with a variety of types of machinery and their creativity to combine these into a new design capable of completing an assigned task.

Integration Across the Curriculum

Faculty from physics, art, and technology could identify a part of the project relevant to their discipline and could contribute to the success of the project. Engineers in the community could serve as consultants during construction of the projects, providing important real world insight for students, or as judges to evaluate the finished projects.