

Lesson 10: Simple Machines

Purpose: To expand student understanding that simple machines affect our everyday lives and make tasks easier.

Standards

NCTE/IRA Standards for English Language Arts

Standard 7- Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries in ways that suit their purpose and audience.

Standard 8- Students use a variety of technological and informational resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

Standard 12- Students use spoken, written, and visual information to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

National Science Education Standards

Science as Inquiry – Content Standard A

1. Abilities necessary to do scientific inquiry.
2. Understanding about scientific inquiry.

Physical Science – Content Standard B

1. Position and motion of an object – an object's motion can be described by tracing and measuring its position over time.
2. Position and motion of an object – the position and motion of objects can be changed by pushing or pulling.

Science and Technology – Content Standard E
Understanding about science and technology – people have always had problems and invented tools and techniques (ways of doing something) to solve problems.

Principles and Standards for School

Mathematics

Representation

Create and use representations to organize, record, and communicate ideas.

Overview

Although robots are complex, the core of their operations lie in simple machines. There are six types of simple machines: 1) lever, 2) pulley, 3) inclined plane, 4) screw, 5) wheel and axle, and 6) wedge. Machines made of two or more simple machines are called complex machines.

A Rube Goldberg Machine is a type of complex machine. These machines are made up of several simple machines and simplify performing a task. However, Rube Goldberg Machines illustrate how we sometimes put much more effort into accomplishing a simple task than is necessary (*visit <http://www.rube-goldberg.com/html/gallery.htm> for more information on Rube Goldberg Machines*).

Robots are even more complex because they combine machines **and** electronic sensors. Sensors detect the conditions in the environment around the robot and inform the robot on what actions to take. The simple machines components within a robot allow the robot to perform the actions. In this lesson, students will gain an understanding of simple machines and how they may be used in our everyday lives. Students will also have an opportunity to design a Rube Goldberg Machine of their own.

Understandings

1. Simple machines make tasks easier.
2. Simple machines affect our everyday lives.
3. Robots are made up of simple machines.

Materials

1. Simple Machines fact sheet: http://www.grc.nasa.gov/WWW/K-12/Summer_Training/KaeAvenueES/Resource_Chart.html
2. Paper
3. Pencils, pens, crayons, and/or markers

Time

Fifteen minutes for explanations

Forty-five minutes for activities

Directions

1. Discuss with the class the six types of simple machines: lever, pulley, wheel and axle, wedge, screw, and inclined

planes. Discuss with the class how each type may be used in everyday life.

- Have the class walk around the classroom asking them to identify simple machines they encounter in the classroom. Have the students create a chart on which they record the object and what type of simple machine it is.

Lever	Pulley	Wheel & Axle
Wedge	Screw	Inclined Plane

- Introduce students to Rube Goldberg Machines. Show and discuss the functions of the Rube Goldberg Machines found at <http://www.rube-goldberg.com/html/gallery.htm>.
- Have the students design their own Rube Goldberg Machine that will help them perform an everyday task. *Students should draw their Rube Goldberg device on a sheet of paper. The drawing should include an explanation of what the device is trying to accomplish*

and how the device will operate. If possible, students should include a list of materials that would be used to create the device.



Extension

Have students build their Rube Goldberg Machine either in class or at home and share it with the class. *If this extension is done in class you will need to provide materials or have the students bring building materials from home.*