

Rube Goldberg Machines Activity

Grade Level: Science 8 and 9

Topics covered: Simple Machines (Science Probe 9 Chapter 19), Energy transformations (Grade 8)

Class Time: 2.5 to 3 one-hour periods

The original inspiration for this project came from a web site by Anthony Cody but was modified for my science 9 class. **The web address is <http://ousdmail.ousd.k12.ca.us/~codypren/machines.html>**

Any questions or for sample activity sheets and pictures of actual projects, you can email me at: **harryyuen@hotmail.com**

Preparation: At the start of the unit on machines, have students begin collecting materials from home to make these machines. Sample supplies include empty 2L bottles, empty margarine containers, empty cardboard cereal boxes, corrugated cardboard boxes, clean milk containers, cardboard paper towel rolls, Pringles cans, etc.

You can also check to see if the school has: marbles, scrap pieces of wood for ramps and levers (ask the wood shop for scraps), nails, pins, DUCT TAPE (this stuff is absolutely essential!), scissors, an assortment of weights, pulleys, metal rod stands used in chemistry, clamps, pivot stands for levers (if you don't have these, improvise).

Timeline:

Plan to have 10 - 20 minutes at the end of a period to discuss and introduce the Rube Goldberg Activity. You can hand out the information sheet along with the planning sheets and have the students go home and start thinking about what they are going to make and the materials they will need. Have students form groups of 2-3 to work together or assign groups. Each student should brainstorm at home for ideas and then bring them to class the next day to share ideas.

The next day, have the students begin the planning of their machine and make sure that a list of materials be given to you by the end of the period. All planning must be done before construction can take place. Groups that finish early can start making their machines.

The next day (ideally after a weekend to prepare) have all the supplies laid out for the students and let them create their machines. Give students the entire period but all machines must be complete. You can either leave time to test the project on this day or extend the activity for another half period to mark and debrief.

Hand out the reflection questions to be done in class or for homework.

Sample instructions for students (grade 9):

You will be required to make a Rube Goldberg type of machine to demonstrate your knowledge of energy and energy transformations. Emphasis will be made on the simple machines that you learned about in Chapter 19

For each pair of students they will be required to make a machine according to the following criteria:

- the machine must have a "useful" function in that it must actually do some kind of work (the term useful is used loosely here)
- the machine must contain at least 3 different simple machines in it
- a diagram or plan of the machine must be made before construction can take place
- the machine must work of its own accord. You may start the machine up with a single action, but the rest of the machine should run on its own after the initial start
- you are allowed to use Lego, Connex, or other types of materials however, the entire project can not consist entirely of these materials.

Marking will be as follows out of 30 marks

- Plan 10 marks
- Machine 20 marks
 - 5 marks for working machine (2 attempts allowed)
 - 5 marks for using 3 simple machines
 - 5 marks for noting the energy transformations between each step
 - 5 marks for creativity, design, and ingenuity

Sample Planning Instructions:

INSTRUCTIONS:

- Decide on a simple function for your machine to do. An example would be to fill a cup with marbles.
- Next pick three simple machines that you will use to make your machine
- plan a rough sketch of your machine and the individual parts of it
- your machine must have at least 5 steps all labeled on your drawing

FINAL DRAWING (*must be done before construction starts*):

- must be neatly done and all three simple machines must be labeled
- each step should be numbered and clearly identified
- when your final drawing is complete come up with a COMPLETE list of materials you will need to make this machine. Include tools needed, supplies you will bring from home, supplies you need from the teacher (i.e. me!) **HAND THIS IN BEFORE YOU LEAVE!!**

Sample Rubric:

This can be handed out at the beginning to give students an idea of what you are looking for. I asked my students to label the simple machines on the actual physical projects so that I could take a picture of them but you could modify this criterion. Another thing you could do would be to have the students label on their drawings the energy transformations in their project and give a mark for each transformation for each step.

Criteria	1 mark	2 marks	3 marks	4 marks	5 marks	TOTAL
Did the machine work?	Machine was incomplete and non-operational	Machine was incomplete however, some function did work	Machine had major correction to be made and eventually worked	Machine was complete worked on second try after minor adjustments	Machine was complete, worked on first try	
Did you use 3 simple machines ?	1 machine used and unlabeled	2 machines used and unlabeled	Only 1 or 2 machines used but labeled or 3 machines unlabeled	-----	Minimum of 3 machines were used and labeled	
Detailed Steps and planning	-----	Less than 3 steps	4 or more steps but unlabeled on sheet	4 Steps all labeled on sheet	5 Detailed steps complete and careful pre-planning and preparation evident	
Creative, design, ingenuity	-----	Machine was closely related to the one shown in class and could have more effort put into it	Machine was a bit ambitious and if it could have been made it would have been great but had to be modified due to time	Machine was simple in design and was planned in a way that could be completed in class time	Creative way of using machines demonstrated, machine is built in class time with careful thought and planning evident	