



## Fernbank Science Center

**Title:** RUBE GOLDBERG (D4450)  
**Level:** 4th - 5th Year Discovery  
**Location:** Local School

**Type:** Outreach  
**Length:** 90 min  
**Limit:** 20 students

### **Program Description**

There's more than one way to do anything. Simply (no pun intended) refer to the master of the crazy contraptions himself, Rube Goldberg. In this program students have the opportunity for some 'hands-on' experiences they may never have had before. Teams are presented with a task, problem or contraption to construct and, in the 90-min time period, develop their invention to present to other teams.

**S4P3.** Obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces.

- a. Plan and carry out an investigation on the effects of balanced and unbalanced forces on an object and communicate the results.
- b. Construct an argument to support the claim that gravitational force affects the motion of an object.
- c. Ask questions to identify and explain the uses of simple machines (lever, pulley, wedge, inclined plane, wheel and axle, and screw) and how forces are changed when simple machines are used to complete tasks.

### **Objectives**

The students will be able to:

- 1) participate in challenging and motivating hands-on science activities;
- 2) learn to work with others as a team developing self-confidence by creating solutions, evaluating their ideas and making final decisions;
- 3) develop their creative skills through problem solving and independent thinking;
- 4) actively engage in the learning process via hands-on/minds-on science activities and experiences. Uses appropriate tools to collect and analyze data and solve problems.
- 5) explain the difference between kinetic and potential energy. Demonstrate examples of each type of energy.
- 6) Use information about human impacts on Earth's system to construct inventions that protect Earth's resources and environment.

### **Vocabulary**

acceleration

inclined plane

Rube Goldberg

axle  
balance  
energy  
speed  
machine

lever  
momentum  
pulley  
velocity  
balanced

wedge  
wheel  
screw  
forces  
unbalanced

### **Pre-Visit Activities**

The Fernbank instructor will coordinate with the Discovery teacher regarding items students will need to bring with them to class in order to participate in the scheduled activities and make lunch arrangements

### **Post-Visit Activities**

This class may encourage student participation in Science Olympiad events or Odyssey of the Mind competitions.

### **Resources**

**[http://www.teachengineering.org/view\\_activity.php?url=http://www.teachengineering.com/collection/cub/activities/cub\\_simp\\_machines/cub\\_simp\\_machines\\_lesson05\\_activity1.xml](http://www.teachengineering.org/view_activity.php?url=http://www.teachengineering.com/collection/cub/activities/cub_simp_machines/cub_simp_machines_lesson05_activity1.xml)**

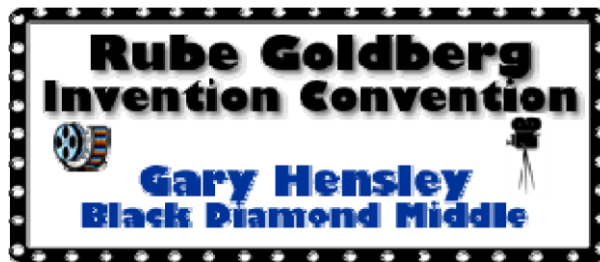
**Notes:** Please take note that this is a 3 hour class. Please check out a video camera and bring a blank VHS tape to record events.

## RUBE GOLDBERG (D4755)Post Visit Activity

This class may encourage student participation in Science Olympiad events or Odyssey of the Mind competitions.

### **"Teacher Double Feature"**

A competitive grant opportunity provided through a partnership between the Contra Costa County Office of Education and Pacific Bell.



**Class Time Required:** 2 weeks

**Specific Objectives:**

Teacher wants to reinforce all of the principles of motion taught earlier in the year to include:

- 1) Newton's three Laws of Motion
  - a--balanced motion,
  - b--constant forces,
  - c-- opposite momentum
- 2) Universal law of gravitation
- 3) circular motion and outward/inward force
- 4) statics and balanced forces
- 5) trajectory and direction of a vector
- 6) potential and kinetic energy
- 7) conservation of energy and momentum.

**Materials Needed:**

Most of the materials needed for this project are supplied by parents as donations or students seem to just "find things around the house" to use for their inventions. The teacher usually has a handout explaining Rube Goldberg and his ideas he drew in the paper. Some of our teachers have used the first 5 minutes of the movie "Back to the



Future" (part 1) to show an example of a Rube Goldberg device. Sometimes an additional area or room is needed for students to just spread out. We are lucky at our school to have several quad areas that can be used for this. In order for the students to get ideas for project, a gallery of Rube Goldberg contraptions are shown on the second day to spur interest in the invention process. Also, three posters are available in PDF form to print and advertise the upcoming "Invention Convention".

### **Activities:**

Day 1 - Students will read the article about Rube Goldberg and how he became a celebrity with his outrageous cartoon serial.

Day 2 - Students will research various internet sites that celebrate the contraptions that Rube Goldberg drew. As this research continues each student will partner up with another student to formulate an idea to construct their own contraption.

Day 3 - Each team will first make a small sketch of their "invention" keeping in mind that it must have five energy transfers and move for at least three seconds.

Day 4 - Teams will make a large poster and explain the motion involved highlighting the principles of momentum, acceleration, friction, and heat/energy loss.

Day 5 - Partners will begin to assemble materials and construct the actual invention. It is suggested that most of the material used be found around the house. Extra points will be awarded for non-manufactured materials that encourage student creativity.

Day 6 - Test the feasibility of the invention to see if modifications need to be made to get the desired result. Keep in mind the original spirit of Rube Goldberg's ideas.

Day 7 - Modify the materials and construction of the group project to achieve the desired motion and transfer of energy.

Day 8 & 9 - Continue to test and modify the project preparing for the Invention Convention. Students develop a rubric that will be used to grade projects.

Day 10 - Invention Convention Day.....every team evaluate others with student created rubric. Movie will document all projects and provide authentic assessment.

### **Teaching Strategies:**

Students research collaboratively on the internet to find information about Rube Goldberg and to start thinking about a contraption similar to one Rube Goldberg would draw. Teacher gives instructions on the parameters of the Invention i.e. 5 energy transfers and 3 seconds in length. Teacher additionally supplies the restrictions in terms of materials teams can use. Students work collaboratively on creating the Invention project. Students present the project to entire class on Invention Convention Day.

### **Resources and References:**

[Handout \(PDF file\)](#)

[Gallery of Inventions \(PDF file\)](#)

[Poster 1 \(PDF file\)](#)

[Poster 2 \(PDF file\)](#)

[Poster 3 \(PDF file\)](#)

[Rubric \(PDF file\)](#)



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<http://www.cccoe.net/tdf/Hensley/rgic/lesson.html>

Find another follow-up activity at:

<http://pbskids.org/zoom/activities/sci/rubegoldberginventio.html>