

# RUBE GOLDBERG

## Core Outcomes -

Students will be able to explain and demonstrate examples of Simple and Compound Machines. Students should be able to demonstrate examples of each which exists in their project design. Students should be able to demonstrate principle of conservation of energy, potential energy, Transfer of energy and gravitational energy. Students should know and be able to give an example of a lever, ramp/incline, pulley, gear, screw, and wheel and axle.

## The Challenge

Place a regulation-size golf ball on a tee in 10 steps or more.

## The Rules For The Contest

- **Steps:** Each team must submit a step-by-step description of its machine by the step deadline date, Monday, April 26, 2010. The description must be legible and concise. A step is defined as a linear process, not a parallel process. If a plane, for example, moves up a wire and triggers a switch that would be an example of one complete step. If the plane causes two things to happen, that would be a parallel result and would only count as one complete step.
- **Number of steps:** The machine must complete its task in no fewer than 10 steps. The more steps the machine has, the better the score. The machine must complete a full cycle in no more than nine minutes. A full cycle includes a first run to completion of the task, a complete reset, and a second run to completion of the task.
- **Dimensions:** The machine must operate within these set dimensions: Height, 5 feet; Width, 3 feet; Length, 3 feet. All machines must be displayed and operated on tables approximately 27 inches high, which will be provided at the contest by the organizer of the event. All machines must be placed on their assigned table.
- Each school within a site will be assigned a sequence for starting the competition.
- Once all machines within a site have completed their run and been judged, a finalist will be selected from that site to participate in the finalist



round.

- A finalist round will take place to determine the top three teams.
  - The number of members on a team is restricted to four, but only two team members may interact with the machine once the first run has begun.
  - Judging will be on an 18 point basis.
  - Each machine must be declared safe to operate by the judges. Any questionable items must be given prior consent by CPEP.
    - A machine must not imply profane, indecent, or lewd expressions.
    - A machine may not incorporate any live animal.
    - Students must operate the device.
    - A penalty will be assessed for any human intervention on a machine in motion.
  - Any loose or flying objects must remain within the set boundaries of the machine.
  - No combustible fluids, explosives, open flames, or hazardous materials. Batteries only for electrical operation. No cords. No remote controls. Must operate on its own.
  - Each team is responsible for the security of its own machine, but intentional destructive action against other machines is cause for disqualification.
  - Students are responsible for removing their machine and related debris immediately following the CPEP contest awards.
  - No machine may be taken down or disassembled until the contest is over.
- ### Making of a Great Machine
- A successful Rube Goldberg machine (one that is competitive in Rube Goldberg Machine Contests), combines a number of objective and subjective qualities that fulfills tasks, follows rules and impresses judges.
- **The machine works.** When it starts, it runs all the way through to completion **with no human intervention** and completes the required task.

- No team is penalized for having electrically powered steps, but **mechanical steps are more in the spirit of Rube Goldberg’s machines** and tend to impress judges more.
- **It has clearly visible steps.** On many machines, it’s hard to follow all the steps. Judges appreciate machines that are laid out so that as many steps as possible are clearly visible in sequence.
- **Keep the oral description of your machine simple, clear and crisp.** Skits and other elaborate presentations tend to take too much time and distract rather than entertain.
- **Don’t use flammable or other dangerous chemicals!** This violates the rules. When the judges sit down to determine the winners, your machine will not be considered.

### Design Strategy

Start with how you are going to finish your project. Perhaps a string is going to pull something. Work your way backwards from there. How is the string going to be pulled? Maybe a weight will pull it? Or a mousetrap. **Yeah... a mousetrap!** How will the

Mousetrap be triggered? You see the pattern? Come up with more than one way to “finish” the machine. Perhaps a lever arm will be used in place of the string to “finish” the machine. Now begin to think backwards as to how the lever arm will be moved. It is very important that the machine be built on a stand. A stand will make sure that everything is in its proper place when the device is set up and will force your machine to work within its boundaries. Finally, the most important step in the process: **Test everything together before it is brought to the competition!**

### Examples of Simple Machines:

- Ramps and inclines, levers, gears, pulleys, wedge, wheel and axle, and screw

All simple machines must operate sequentially such that the output of one simple machine activates the next simple machine. Simple machines of the same type that are used in series only count as one machine. For example, three levers in a row only count as a single simple machine.

ENTRY NUMBER \_\_\_\_\_ SCHOOL \_\_\_\_\_  
 DISTRICT \_\_\_\_\_ TEAM \_\_\_\_\_

	Does not meet criteria value = 1	Almost meets criteria value = 2	Meets criteria value = 3	Somewhat above criteria value = 4	Exceeds criteria value = 5
COMPLEXITY	<b>Complexity:</b> There are 1-3 Steps in Project.	<b>Complexity:</b> There are 5-9 Steps in Project.	<b>Complexity:</b> There are 10 steps in project.	<b>Complexity:</b> There are 11-13 steps in project.	<b>Complexity:</b> There are 14 OR MORE STEPS IN PROJECT.
CREATIVITY	<b>Creativity:</b> Lacks creativity in both design and resources (1)	<b>Creativity:</b> Incomplete and unimaginative in design and use of resources (2)	<b>Creativity:</b> Standard approach and good use of resources in design (3)	<b>Creativity:</b> Imaginative extension of standard approach to design and use of resources (4)	<b>Creativity:</b> Original, resourceful and novel approach. Creative use of design and equipment (5)
USE OF SIMPLE MACHINE EVIDENT:	1 simple machine = 1	2 simple machines = 2	3 simple machines = 3	4 simple machines = 4	5 or more = 5 or more
ACCURACY/ REPEATABILITY (3 ATTEMPTS)					
<b>TOTAL</b>					
				<b>GRAND TOTAL</b>	