

BSA Columbia-Montour Council presents the 2023

8th Annual Rube Goldberg Challenge®

April 1, 2023

RULES

Objective

Design and build an overly complex machine to achieve a simple task in a ridiculous way! To boost the fun and creativity, teams are free to choose their own task (*but must not use the official 2023 RGMC task of build a lunch*).

Background Information

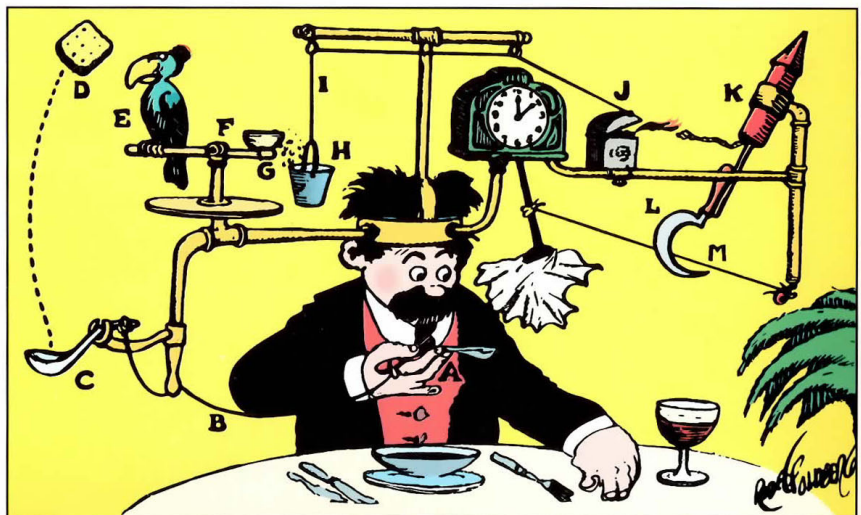
Rube Goldberg was an American Pulitzer Prize-winning cartoonist, sculptor, author, engineer and inventor who lived from 1883-1970. He drew funny cartoons illustrating elaborate ways to achieve simple tasks. So great was his cultural impact that his name became an adjective in the dictionary! With humor, his legacy continues to inspire innovation by encouraging young minds to think in unconventional ways.

Watch this fantastic primer at <http://bit.ly/RubeVideo> and explore the educational links at www.rubegoldberg.com. And just for fun, try to watch these awesome videos only once: OK Go's music video <https://youtu.be/qybUFnY7Y8w> and Technion's Rube Goldberg machine <https://www.youtube.com/watch?v=baQfqoZrEvl>. Check out this kid who discovered how to improve a Rube Goldberg-style contraption at <https://youtu.be/-i6lBgspPtA>.

The underlying spirit is exemplified below (don't forget to read his silly engineering notes!):

Self-Operating Napkin

Professor Butts walks in his sleep, strolls through a cactus field in his bare feet, and screams out an idea for a self-operating napkin: As you raise spoon of soup (A) to your mouth it pulls string (B), thereby jerking ladle (C) which throws cracker (D) past parrot (E). Parrot jumps after cracker and perch (F) tilts, upsetting seeds (G) into pail (H). Extra weight in pail pulls cord (I), which opens and lights automatic cigar lighter (J), setting off sky-rocket (K) which causes sickle (L) to cut string (M) and allow pendulum with attached napkin to swing back and forth thereby wiping off your chin. After the meal, substitute a harmonica for the napkin and you'll be able to entertain the guests with a little music.



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Terms

- Machine The entire Rube Goldberg apparatus. This includes “Steps” and “Simple Machines.”
- Step A transfer of energy from one action to another action, such as:
- Mechanical energy: a sequence of dominos hitting each other.
 - Pressure energy: a fan blowing air onto a balloon.
 - Electromagnetic energy: a cell phone sending a text message.
 - Potential energy: an object dropping onto another object.
- Simple Machine A Step consisting of physical objects that use mechanical or potential energy, such as:
- Inclined plane, lever, pulley, wheel/axle, wedge, screw, gear, pendulum
- Non-Simple Machines A Step that DOES NOT use mechanical energy. Examples include:
- fan, electrical switch, WiFi signal, chemical reaction.

Requirements

1. General
 - Teams up to 4 people maximum in the same grade category must design, construct, and operate the machine.
 - Machine must be constructed using common, household materials provided by the team. (Do not spend a lot of money!)
 - Machine must NOT use the following: flammable or toxic materials, open flames, radioactive isotopes.
 - Machine must complete a simple task. Examples include: kick a ball, snap a mouse trap, raise a flag, etc.
 - Machine layout must fit within a 6 feet x 6 feet area, with a maximum height of 6 feet.
2. Machine Design
 - Machine must include the following **minimum** number of Steps and Simple Machines:

Level	Minimum # of Steps	Minimum # of Simple Machines
Level I: Grades 1-3	5	3
Level II: Grades 4-5	8	3
Level III: Grades 6-8	10	5
Level IV: Grades 9-12	12	5

- Machine should include at least one Step that is NOT a Simple Machine (i.e., physical objects that move), such as: wind, electricity, WIFI, chemical reaction.

3. Machine Operation

- Machine should be designed to operate at least once in 2 tries.
- Machine should be designed to operate for a **minimum** of 10 seconds.
- Extra points will be given within each category Level if the Machine has an “unusual” Step that no one else’s Machine uses, provided it works.

4. Communication

- A written report must be completed for each Machine.
- The written report must be typed and printed on paper (no computer screens).
- The written report should be well organized and have the following:
 - Summary of Machine
 - Table with a list of Steps
 - Step-by-step description
 - Diagram
- An oral presentation must be delivered by the team to the judges. One team member can take the lead.
- All team members should participate in the oral presentation.