So, what is a “Rube Goldberg”? 

GOLDBERG, RUBE | 'gold,berg | 
Adjective : N. America 

A comically involved, complicated invention, laboriously contrived to perform a simple operation 

—WEBSTER’S NEW WORLD DICTIONARY
Professor Butts jumps from a plane in a moth-eaten parachute, lands on his head and lives to invent a self-scrubbing bath brush. Soap slips from bather’s hands. Monkey outfielder (A) tries to catch it and fumbles. Soap (B) hits bottle (C) which falls on handle of hair brush (D) causing brush to fly up and smash mirror (E). Flying fragments of glass cut cord (F) allowing weight (G) to drop and pull string (H) which opens hook (I) releasing jack-in-box (J) which jumps up and hits handle (K) turning on water in shower (L). As water runs down trough (M) it falls on mill-wheel (N) causing it to revolves and work brush (O) up and down on bather’s back. You can rent an organ and keep the monkey busy when you are not taking a bath.
As you walk past cobbler shop, hook (A) strikes suspended boot (B) causing it to kick football (C) through goal posts (D). Football drops into basket (E) and string tilts sprinkling can (G) causing water to soak coat tails (H). As coat shrinks cord (I) opens door (J) of cage, allowing bird (K) to walk out on perch (L) and grab worm (M) which is attached to string (N). This pulls down window shade (O) on which is written “You Sap, mail that letter.” A simple way to avoid all this trouble is to marry a wife that can’t write.
Professor Lucifer Gorgonzola Butts A.K. invents a safe firecracker. Obedient child (A) pulls in wash (B), lifting hood (C) from midget ball player’s face (D), allowing him to bat ball (E), which starts phonograph (F) playing hot tune. Jazz-bird (G) goes into a fast dance. Steel shoes (H), rubbing on flint platform (I) cause spark (J) to light firecracker (K). Explosion goes into microphone (L) which carries sound to radio in dining room where child hears it in safety.
History of Rube Goldberg

1883
Born

1887
Traced his first illustrations

1904
Began career as cartoonist

1930
Wrote feature film Soup to Nuts (Three Stooges)

1932
Rube Goldberg added to the Merriam Webster Dictionary as an Adjective

1948
Won Pulitzer Prize for political cartooning

1960
Mouse Trap game debuts

1970
RG passes, but his legacy lives on

1980s
First collegiate RGM contest

1995
Commemorative RG postage stamp

1996
RGM contest expands to high school

2012
International Online MIDDLE SCHOOL RGM contest launched

2015
International MAD Science Grade School Competition launched

2016-2018
RG museum exhibits

2018
RG Movie
Rube Goldberg is as relevant as ever...
Rube Goldberg Machine Contests (ages 13-22)

Global Competition Tasks
- Pop a balloon - 2012
- Hammer a Nail - 2013
- Zip a zipper - 2014
- Erase a chalkboard - 2015
- Open an umbrella - 2016
2017 MACHINE CONTEST

RUBE GOLDBERG®

APPLY A BAND-AID® BRAND ADHESIVE BANDAGE
Elements of Art and Design

• The visual components of a painting, drawing, design or other visual piece.

• Unity/harmony, balance, hierarchy, direction, size, color, form, line, shape, space, texture, and value.

• Connections between art and science are limitless: Both artists and scientists try to answer the same questions.

• What is true?
• Why does it matter?
• How can we move society forward?
• Who am I in the world?
• How does this work?
• How can I make it better?
Simple Machines: basic mechanical device for applying force.

- Lever
- Wheel/Axel
- Wedge
- Inclined Plane
- Pulley
- Screw
Complex/Compound Machines

• Every machine is a complex machine.
• Combination of simple machines; **purpose is to make work easier.**
• Ex. Scissors (2 levers, fulcrum, 2 wedges), Wheelbarrow (wheel and axle, 2 levers), Stapler (wedge and lever).
Mechanical advantage

- Ratio of the **force produced by a machine to the force applied to it**, used in assessing the performance of a machine.

- Output work of a **simple machine** can never be greater than the input work, but a **simple machine** can multiply input forces OR multiply input distances (but never both at the same time).
  - Mechanical advantage = output force/input force
  - Mechanical advantage = input distance/output distance
Potential and Kinetic Energy

- What is always present but never visible? ENERGY!

- **Energy** is the ability to do work or cause change. Much like mass or volume, energy is a property of an object. Movement, sound, heat, and light provide evidence that energy is present and being used.

- **Potential energy (PE)** appears in many different forms, and is defined as the energy in matter due to its position or the arrangement of its parts. The various forms of potential energy include gravitational potential energy, elastic potential energy, chemical potential energy, and electrical potential energy.

- **Kinetic energy (KE)** is the energy of motion. Potential energy is converted into kinetic energy as soon as the object begins to move. A thrown football, a speeding automobile, a waterfall, or a rock falling from a cliff are examples of objects that have kinetic energy.
Energy Transfers/Steps

• The conversion of one form of energy into another, or the movement of energy from one place to another.

• The official Rule Book for RGMCM’s defines a machine *step* as a... “transfer of energy from one action to another action.”

• Identical transfers of energy in succession should be counted as 1 step. *Example:* A sequence of dominos hitting each other should be counted as 1 step.
• A series of steps that engineers follow to come up with a solution to a problem.
• Many times the solution involves designing a product that meets certain criteria and/or accomplishes a certain task.
• How can this process be used in education?
Design Thinking for Schools
D3: Dream It, Design It, Do It

• Process focused methodology to build **creative, confident and critical thinkers** by teaching them how to think like designers.

• Breaks down the creative process into easily digestible portions.

• **Dream It: Discover and Dig Deeper**
  • Identify a problem, challenge, or issue that is in need of a creative response.
  • Learn more about the context and details of the challenge, and carefully frame opportunities.

• **Design It: Brainstorm and Define**
  • Get as many ideas out into the open as possible.
  • Determine the best idea to focus on.

• **Do It: Plan it out and Get it done**
  • Work out the details and develop a plan of action.
  • Execute and share!
Build:
Pop a Balloon!

Find a table: Form a team.
Plan 15 mins: Draw a plan for your machine.
Build 90 mins: Use materials on the tables and anything you have in your pockets! Must have at least 8+ steps/energy transfers per machine and must be able to run at least twice.
Run your machine: Make sure I’m watching!
Our lessons

• Learning Outcomes:
  • Understand the basic simple machines.
  • Evaluate the mechanical advantage of simple machines.
  • Design simple and compound machines.

• 1: Draw a Simple Machine Cartoon
• 2: Human Rube Goldberg Machine
• 3: Experiment with Simple Machines
• 4: Machine Poetry
• 5: Machine Stories
• 6: Energy Transfers
• 7-9: 3, 7 & 15 Step RGMs
• Accompanying worksheets