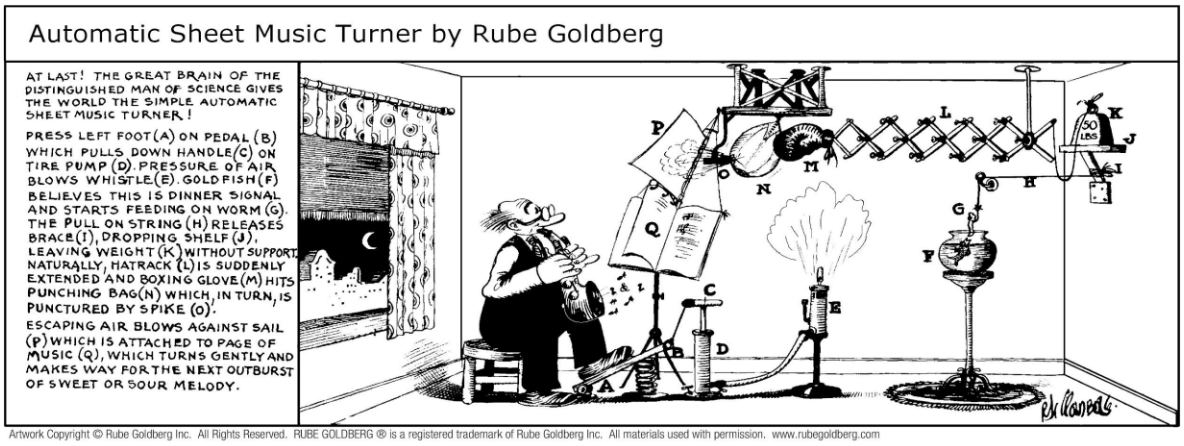
Build a Rube Goldberg Machine

Learning Goal: I can design, build, and refine a device that converts one form of energy to another (Product).

Introduction: Every time something in the Universe moves, heats, cools, or explodes, some form of energy is transferred from one piece of matter to another. Since there are many different forms of energy, there are also a large number of ways to transfer it. This project is designed to let you demonstrate your understanding of those transfers by creating some of your own.



From http://www.rubegoldberg.com/gallery#

Rube Goldberg (1883-1970) was a cartoonist who is famous for his drawings of marvelous inventions that did simple things. You are going to create a marvelous invention that uses many transfers of energy to do one simple thing.

Task: Your task is to design and construct a Rube Goldberg machine using at least 3 simple machines, which include pulley, lever, wedge, screw, wheel and axle, and inclined plane) and **at least 2 energy transfers** to successfully complete an "end task." For example, your machine can:

- Pour water into a cup;
- Shut off an alarm clock;
- Put toothpaste on a toothbrush;
- Hit play on your iPod;
- Put coins into a bank;
- Ring a bell; or
- Any number of things you could think of on your own.

You will be working independently or with family members to complete this machine using household materials.

Machine "Rules"

1. Your machine must have a title.

2. The machine must complete a described task (as reliably as possible) -- choose an achievable goal; eg. filling a pet food bowl, turning off/on a television, opening/closing a window etc.)

3. The machine must contain at least 3 different simple machines at least 3 forces acting on or within structures, 2 energy transfers. **Label or identify your energy transfers, forces and simple machines when you film your machine in**

action.

REVIEW THE FOLLOWING RESOURCES (see my blog adeney.commons.hwdsb.on.ca to access these links):
Simple machines: http://www.justscience.in/articles/the-six-types-of-simple-machines/2017/05/30
Energy: https://www.youtube.com/watch?v=snj1wBtn6I8
External Forces: Identifying External Forces
Internal Forces: Identifying Internal Forces

Examples of Energy Transformations:
- chemical to heat energy
- electrical to Light energy
- potential to kinetic energy
Other examples:
https://www.e-education.psu.edu/egee102/sites/www.e-education.psu.edu.egee102/files/images/Lesson1/conversions.jpg

OPTIONAL: Work and Energy: https://www.khanacademy.org/science/physics/work-and-energy/work-and-energy-tutorial/v/introduction-to-work-and-energy -- this video gets into some more challenging mathematics -- exponents and square roots. You don't need to follow this part, but it's helpful to understand the general relationship between work and energy.

4. There is a minimum of 5 steps if working individually (8 steps if you have partners). There is no maximum number of steps.

5. No live animals or hazardous materials may be used by the machine.

6. The machine must not imply or contain any profanity, indecent or lewd expressions, or any illegal items.

7. Any loose or flying objects must remain within the set boundaries of the machine.

PART 1 - Planning your RGM
(Due Friday, March 31)
Create a Rube-Goldberg style comic that includes a detailed picture of your machine with labeled steps (A, B, C, etc…) and a written explanation of each step (See the Rube Goldberg comic above and visit **http://www.rubegoldberg.com/gallery#** for more example).. Your explanation can be humourous, but try to keep each step of your machine believable/achievable (Rube Goldberg was known for his ridiculous, impossible machines… yours needs to actually WORK). Your plan should include a list of materials that you will need to complete your machine (try to use materials found around the house to avoid any unnecessary trips to the store). Spend some time on your comic to make it look great and easy to follow.
Here is an example of a student-created Rube Goldberg machine. Notice that she has all of her energy transfers labeled. Nice touch!

PART 2 - Presentation
(Due Friday, April 21)

Have a look at this example Rube Goldberg Machine video that a grade 8 student made
https://www.youtube.com/watch?v=3rjLPX-LcB8

You will film your Rube Goldberg machine operating successfully and submit your video to the MS Team Assignment. Make sure you film your machine in one 'take' (in other words, no starting, stopping and editing the video). Each student will be expected to explain the energy transfers that occur in your machine either with voiceover or text in your video, or by including a written document to be handed in with the video. Written document should include:

1. Provide a written explanation of each step.
2. Include a description of the energy transfers.

Now! Let's get building!