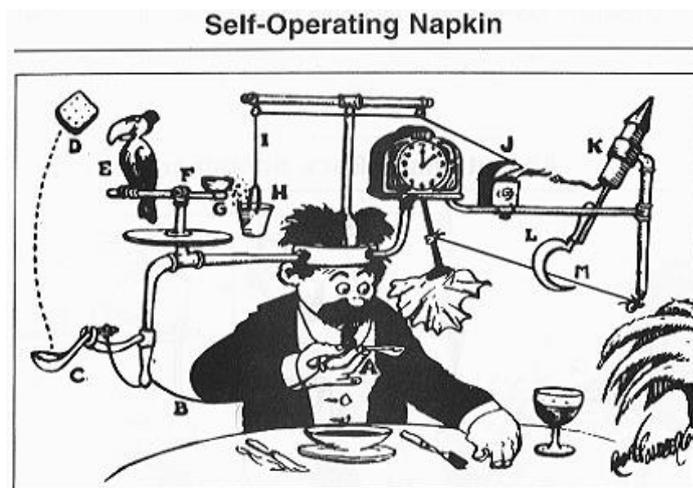


# Rube-Goldberg Machine

By Doaa George, based on the workshop investigation by David Gove

## Introduction:

A “Rube Goldberg” machine is a device designed to do something simple in an over-complicated and over-engineered way. It is normally a chain of smaller machines which link together to form one huge device. The expression is named after American cartoonist and engineer Rube Goldberg (1883–1970). An example of this is the “Self-Operating Napkin”, which is shown below. Today you will get to build your own Rube Goldberg machine.



chin.

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As you raise a spoon of soup (A) to your mouth, it pulls a string (B), thereby jerking a ladle (C), which throws a cracker (D) past a parrot (E). The parrot jumps after the cracker, and the perch (F) tilts, upsetting seeds (G) into a pail (H). The extra weight in the pail pulls a cord (I), which opens and lights an automatic cigar lighter (J), setting off a sky-rocket (K), which causes a sickle (L) to cut string (M), causing a pendulum with an attached napkin to swing back and forth, wiping off your

## Risk Analysis:

In this investigation, you will design your own Rube Goldberg machine. You might like to use launchers or any other moving objects.

Write your own safety and risk precautions according to the design of your machine, make sure you consider the safety of yourself, your peers and the laboratory space you are working in.

## Questions:

You will watch a video and examine some energy transformations and energy transfers in Rube Goldberg machines.

**Aim:** Construct your own Rube Goldberg machine.

## Plan:

The investigation has two parts, in the first part you will watch one of the videos for which the links are provided and answer the questions provided.

In the second part, you will design, build and test your own Rube Goldberg machine which has to include both energy transfers and transformations.

## **Part A: Examining Rube Goldberg machines**

## Conduct:



## **Part B: Designing and building a simple Rube Goldberg machine**

### **Plan:**

In your group, plan your device and sketch it out. How will you start and what will be your end result? Discuss what materials you can use and how they can be applied.

You will write a list of the materials you need and the school will provide you with the materials. You may also decide to bring additional materials from home as well.

### **Conduct:**

You will now build and test out your Rube Goldberg machine. It must involve both energy transfers and transformations.

- a. Construct it and test to see if it works. Modify it as necessary.
- b. Evaluate...what went wrong? How could you do it better?

### **Analysis:**

Describe two energy transformations that occurred in your device. You can use energy chain diagrams to describe them.

Sometimes energy will be transferred between two objects without transforming into a different type of energy. Describe two occurrences of this in your device.

Did all the energy transform/transfer between stages of the device? Where OR how was it lost?

**Discussion-Problem solving and reasoning:**

Discuss with your group which parts of the device worked well?

Decide with your team the changes you could do if you will repeat the challenge again?

Can you think of a way of combining your device with others in the class?

**Conclusion:**

Did your Rube Goldberg device achieve its purpose? If not, why didn't it work?

You can record your experiment as a video clip and present it to your school.