

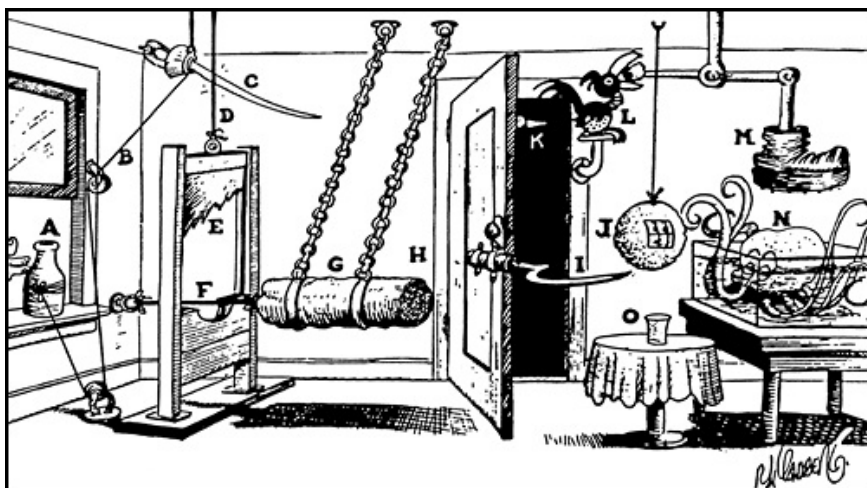
### Background

A Rube-Goldberg is:

“a comically involved, complicated invention, laboriously contrived to perform a very simple operation.”

An example of a Rube-Goldberg device is given below, complete with a description of the energy conversions involved.

#### A RUBE-GOLDBERG “ORANGE JUICER”



The milk man grabs the empty milk bottle (A) over which pulls the string (B) - kinetic to kinetic - which causes the sword (C) to sever the cord (D) - kinetic to kinetic - which allows the guillotine blade (E) to drop and cut rope (F) - gravitational to kinetic - which releases the battering ram (G). The ram then bumps against the open door (H) - gravitational to kinetic - which causes it to close. The grass sickle (I) attached to the door then cuts a slice off the end of the hanging orange (J) - kinetic to kinetic - while at the same time the tack (K) attached to the door pokes the "prune bird" (L). The bird then opens its beak to squawk in surprise which causes it to release the prune which allows the divers boot (M) to drop and step on the sleeping octopus (N) - gravitational to kinetic. The sleeping octopus then awakens in a rage and seeing the hanging orange attacks it and crushes it with tentacles - elastic to kinetic - thereby causing all the juice in the orange to run into the glass (O).

### Task

Your task is to design a 3-D poster of a Rube-Goldberg that uses a minimum of 9 different devices (i.e. forms of energy) to:



### Instructions

1. This is an individual project but you may help each other.
2. You must use all 9 forms of energy (see the marking scheme) at least once in your Rube-Goldberg.
3. Each device can only be used for one energy conversion (i.e. one device = one energy conversion).
4. Each device can only be used once (i.e. a mousetrap) and counted. However, you can use the same/similar device later in the sequence to trigger another energy conversion device.
5. You must include the device or a diagram/graphic/prop of each device.
6. On the poster, each device must be clearly identified and labelled with:
  - its letter/number in the sequence
  - the name of the device
  - the energy conversion occurring (i.e. (D) Mousetrap - elastic to kinetic)
7. Each device must trigger the next device in the sequence otherwise it will not be counted!

### Action Plan

1. Brainstorm Rube-Goldberg/3D ideas and then locate the devices/diagrams/graphics/props for your poster.
2. Assemble your poster.
3. Write a descriptive paragraph that not only explains in detail how your Rube-Goldberg works (i.e. how does one device trigger the next) but also explains the energy conversion that is occurring at each stage (see the "orange juicer" example). Attach this to the front of your poster.

NOTE: The "orange juicer" example is not representative of the poster/report required - it is only using 3 of the 9 forms of energy. Your poster/report will require the use of all 9 forms of energy (see Table 1/P.236 of Nelson Physics 11).

## RUBE-GOLDBERG POSTER

Student:

P O S T E R	<b>IDENTIFICATION</b> <input type="checkbox"/> Marking Scheme with Student Name <b>DEVICES</b> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Labelled (# or letter - name of device - conversion) <input type="checkbox"/> Each triggers the next <input type="checkbox"/> Different from previous <input type="checkbox"/> One device = one energy conversion <b>CONVERSIONS</b> <input type="checkbox"/> Present & Correct (descriptive paragraph - separate page)	/8
	<b>ENERGY FORM</b> (present & labelled correctly) <input type="checkbox"/> chemical potential <input type="checkbox"/> elastic potential <input type="checkbox"/> electrical <input type="checkbox"/> kinetic <input type="checkbox"/> gravitational potential <input type="checkbox"/> nuclear potential <input type="checkbox"/> radiant <input type="checkbox"/> sound <input type="checkbox"/> thermal	/9
	✓ = correct/present/good      ✗ = wrong/absent/poor	
H O W	<b>PRESENTATION</b> • 3-D (½ mark each)                      0 + 1 + 2 + 3 • Neat & Organized (title, easy to follow, no loose objects, ...)      0 + 1 + 2 + 3 • Creativity/Use of Colour (the "WOW" factor)      0 + 1 + 2 + 3	
	<b>DESCRIPTIVE PARAGRAPH</b> • Complete/Correct/Works, ...      0 + 1 + 2 + 3      X2 • Grammar & Spelling                      0 + 1 + 2 + 3	
0 = poor, not done    1 = good    2 = very good    3 = excellent		
<b>TOTAL</b>		/35

Comments

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NOTE: Failure to either ① use all 9 energy forms or ② submit a complete and polished poster will result in an incomplete being assigned. However, you will still be required to submit a poster in order to demonstrate your understanding of the ministry expectations.

## RUBE-GOLDBERG POSTER

Student:

P O S T E R	<b>IDENTIFICATION</b> <input type="checkbox"/> Marking Scheme with Student Name <b>DEVICES</b> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Labelled (# or letter - name of device - conversion) <input type="checkbox"/> Each triggers the next <input type="checkbox"/> Different from previous <input type="checkbox"/> One device = one energy conversion <b>CONVERSIONS</b> <input type="checkbox"/> Present & Correct (descriptive paragraph - separate page)	/8
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