**The Olympics of Complexity: Rube Goldberg Machine**

Goal: Build a complex machine involving a minimum of 10 steps water a plant.

Machine Specifications:

* The machine must complete the task as described in the challenge.
* The machine must be no larger than 6 ft x 6 ft x 6 ft.
* The machine must have a minimum of ten (10) steps and make use of at least three (3) of the six types of simple machines. There is no maximum number of steps.
* The machine must run for no more than two (2) minutes per run.
* The machine will have a maximum twenty (20) minute reset time.
* No corporate logos or names may be displayed on the machines.
* No live animals may be used in the machine.
* The machine must not imply profane, indecent or lewd expressions.
* Any loose or flying objects must remain within the set boundaries of the machine. This includes, but is not limited to, drops of water, slivers of balloon, and other “small” objects. Steam and other gasses are exempt from this rule.
* The machine may utilize one (1) air compressor hose and one (1) power cord. No other cords may be run to or from the machine; however there is no limit to the number of hoses and cords utilized within the space of the machine.
* No flames or electrical arching may be used on or within the machine.
* No hazardous materials or explosives can be used on or within the machine.
* The machine must be safe to the satisfaction of the Falcon High School Science Department and Administration.



**Progress Checks**

**Assignment #1 Due August 16**

* Research Rube Goldberg and his inventions.
* Brainstorm ideas for your own machine.
* ***Submit a ½ - 1 page summary of your research on Rube Goldberg and his inventions.***

**Assignment #2 Due September 8**

* Decide on steps or to accomplish the task
* Gather materials
* Begin building your machine
* ***Turn in a rough draft of the design schematic of your project. This must be a neatly drawn picture of your device, include a creative name for your machine, descriptions of each of the steps in complete sentences, and labels for all the simple machines included. (subject to change)***

**Assignment #3 Due October 8**

* Continue building your machine
* ***Turn in your final draft of your design schematic outlining your steps in a logical sequence (not to be changed).***

**Assignment #4 Due November 30**

* Complete and test out your machine.
* ***Submit a copy of your journal/log for your work up to this point.***

**Assignment #5 Due December 9**

***Present your machine to the physics class.***

**Assignment #6 Due December 13**

* ***Turn in a 3 -5 page report describing the scientific principles involved, specifically focusing on mechanics, forces, and simple machines.***
* ***Turn in your research journal for all of your work.***

# Research Journal

Directions: In your research journal, use the following format to track your progress. List an activity (example: search, obtain, read, organize, design, collect data, etc.) and explain it. What did you do? Where did you do it? How did you do it? Who did you talk to? Keep track of what worked well and what didn’t work; what changes you made to your design and why. BE SPECIFIC! Write down the date and the time that you spent doing the activity. Include sketches, photos, animations, notes, and calculations.

YOU MUST KEEP THIS UP TO DATE IN ORDER TO EARN THE MAXIMUM NUMBER OF POINTS!

Please use this format for all activity entries in your research journal.

|  |  |  |
| --- | --- | --- |
| Date | Time | Description of Activity |
| Sept 4,2003 | 6:15 – 7:20 | Search for ideas and examples online: found lots of help at [www.rubegoldberg.com](http://www.rubegoldberg.com) and printed out some tips on how to get started. |
| Sept. 5, 2003 | 4:34 – 4:55 | Talked with my dad about which experiment would be better. Decided to keep looking for something that doesn’t cost as much money. |
| Sept. 6, 2003 | 10:00 – 12:15 | Sketched rough draft idea for machine with 14 steps (see sketch below) |

**Grading Guidelines**

1. **Machine – Does it accomplish the goal?**

Design Schematic:

a. Is the schematic neat and easy to interpret?

b. Does it adequately represent the finished product?

c. Are all the steps and simple machines labeled?

d. Does the machine have a title?

Points out of 10: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Adherence to Directions:

a. Does the final product have at least ten separate steps?

b. Does the machine make use of at least three out of the six different simple machines?

c. Is the machine easy to assemble and reset, fitting within the given dimensions?

Points out of 10: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Style

1. Is there a coherent theme?
2. Is the machine wacky and unnecessarily complex?
3. Does the machine make use of common household items?

Points out of 10: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Final Product:

a. Does the machine show evidence of the time and effort put into its construction?

b. Does each step work reliably (best score out of 3 runs)?

c. Does the machine complete the desired task?

Points out of 20: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Research Log – Keep track of what you are doing as you design and build your machine.**

Is the journal thorough and complete, containing appropriate detailed entries?

Does the journal include clearly labeled pictures, sketches, animations, or diagrams?

Does the journal present an accurate reflection of the planning, building, and testing of the machine?

Points out of 20: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Report – Summarize your process and results in a written report.**

**Does the student use the 6+1 Traits of Writing in the report?** [**http://www.nwrel.org/assessment/pdfRubrics/6plus1traits.PDF**](http://www.nwrel.org/assessment/pdfRubrics/6plus1traits.PDF)

1. Ideas – This paper is clear and focused. It holds the reader's attention. Relevant anecdotes and details enrich the central theme.

Points out of 25 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Organization – The organization enhances and showcases the central idea or theme. The order, structure, or presentation of information is compelling and moves the reader through the text.

Points out of 5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Voice – The writer speaks directly to the reader in a way that is individual, compelling, and engaging. The writer crafts the writing with an awareness and respect for the audience and the purpose for writing.

Points out of 5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Word Choice – Words convey the intended message in a precise, interesting, and natural way. The words are powerful and engaging.

Points out of 5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Sentence Fluency – The writing has an easy flow, rhythm, and cadence. Sentences are well built, with strong and varied structure that invites expressive oral reading.

Points out of 5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Conventions – The writer demonstrates a good grasp of standard writing conventions (e.g., spelling, punctuation, capitalization, grammar, usage, paragraphing) and uses conventions effectively to enhance readability. The writing is sufficiently complex to allow the writer to show skill in using a wide range of conventions.

Points out of 5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Presentation – The form and presentation of the text enhances the ability for the reader to understand and connect with the message. It is pleasing to the eye. Is the paper formatted correctly? Each page needs to be typed, double-spaced with 1-inch margins on each side. All pages should be numbered except the cover page. Bibliography should list 5 resources, at least one of which is not web-based.

Points out of 5\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_