Rube Goldberg Machine

**Background Information**: Rueben (Rube) Goldberg (1883 – 1970) was a Pulitzer Prize winning cartoonist, sculptor, and author. He was trained as an engineer but chose to work as an artist instead. He eventually published his drawings in newspapers and became an outstanding success. He was best known for his Crazy Inventions feature in which elaborate, zany mechanisms are rigged up to perform simple operations; see the example below. The term "a Rube Goldberg device" has come to mean “an incredibly complicated, impractical scheme or contraption, accomplishing by complex means what could be done quite simply.”

**Purpose**: In this activity, you will design and build a Rube Goldberg machine. A good Rube Goldberg machine incorporates everyday machines people are used to seeing and connects them in ways that may seem idiotic or ingenious. It is your mission to construct a machine that uses at least **2-3 individual steps/stages per group member** to complete a task. **Students who are MSO or quarantined must have 3 steps.**

**Instructions**:

1. Together your group will choose a task that your machine will complete (i.e. pop a

balloon, answer a cell phone call, open a letter, etc.)

1. Before you build your machine, you need to make a plan for your machine which needs to include the following.
* A list of materials (You are discouraged from buying new items. Use items you have at home already! Do not bring items that are not allowed at school)
* Your machine must fit on 2 classroom tables
* A drawn diagram or "blue print" of your machine which has each step numbered and labeled
* There needs to be a written description for each STEP which describes:
	+ What is happening during the step which links it to the next step
	+ The type of simple machine(s) it uses
	+ The type of energy conversion or transfer it shows. (i.e. from gravitational

potential to kinetic energy, from electrical energy to mechanical energy, from mechanical energy to sound energy, etc.)

3. After you build and test your machine, you may need to modify the original plan of your machine. DO NOT THROW AWAY YOUR OLD PLANS!

* Before your final test, you should have 3 successful consecutive test runs of your machine.
* Video record each test in order to submit the best run to your teacher!

**Guidelines:**

1. Rube Goldberg Machine is designed such that a single action starts the machine, such as pressing  a button, letting go of a marble, cutting a string, removing a barrier, etc. No other additional  human actions are required once your machine has started.
2. Each group member must contribute a minimum of **two steps**, and must include:
	1. A *different* simple machine (for a machine to count, it must do work!)
	2. Two different types of energy
3. Your project must have a minimum running time of 10 seconds, and a maximum run time of 1  minute.
4. It should take less than 5 minutes for your group to properly set up your machine. All objects used in your machine should be stored in boxes/containers.
5. If your machine fails to work on its first graded attempt, you are allowed one free restart, which  must occur within five minutes of the first run.
6. Your machine should run smoothly all the way through. You will be penalized 5 points EACH TIME  you interact with your machine after its initial start, for up to 15 points lost.

**Project Write Up**:

1. **Project Proposal**: Each group member will submit a written proposal of what your group’s “goal” will be,  the simple machines you will use, and the two types of energy you will incorporate.  The  proposal will also include a flow chart of at least two potential “steps” you are thinking about. A  list of intended materials should also be recorded (may change later).
2. **Project Blog**: Each day you have class time to work on your project, one person in your group is  responsible for keeping a “log” detailing how you spent your time, what you tried, what worked,  what didn’t, etc. Post it on EduBlogs by 6pm the next day.
3. **Final Write Up**: Submit a lab report with the following sections:
	1. **Purpose**  (1 point)
	2. **Materials** (2 points)
	3. **Machine Strategy** (3 points) (How did you come up with your ideas? What were at least three things you had to change while building your machine from your original proposal?)
	4. **Final Device Steps** (3 points) (Flow chart of your entire machine’s steps, labeled with simple machines and energy types)
	5. **Description of Model** (4 points) (Description of how each step functions. Where is the potential energy stored in your machine? What are the energy transfers? What simple machines are used?)
	6. **Team Strategy and Accomplishments** (4 points) (Each person must do this individually. What were the different jobs on your team? Did you work well together? How did you solve differences  of opinion? What are you most proud of?)

**Grading**:

You will be graded on the following criteria. A rubric will be provided on machine test day.

|  |  |
| --- | --- |
| **Name:**  |  |
| **Individual** | **Group** |
| Creativity | **/5** | Completed task | **/5** |
| 2 simple machines | **/6** | 10s – 1 minute | **/4** |
| 2 steps | **/6** | **TOTAL** | **/9** |
| 2 energy transfers | **/2** | **Comments**: |
| Functions |  **/5** |
| **TOTAL** | **/24** |

**Plus score from lab write up (17 points)**

**Total of 50 point possible.**

**Rube Goldberg Build Schedule (Tentative)**

We will use half of our class time to build on the following days. First period will build for about 50 minutes on days marked with an asterisk (\*)

**A DAY B DAY**

**Thursday, March 4th** & \***Friday, March 5th**: Build Day 1- Proposal and Blueprint Sketching

**Monday, March 8th & \*Tuesday, March 9th**: Build Day 2- Bring in materials and begin testing ideas.

**Wednesday, March 10th & \*Thursday, March 11th**: Build Day 3- Bring in materials and finalize ideas.

**\*Friday, March 12th & \*Monday, March 15th**: Build Day 4- Touch ups and video record functioning machine.

**Rube Goldberg Due Dates**:

Video submission of functioning machine:

**A Day**: Tuesday, March 16th **B Day**: Wednesday, March 17th

**Write up Due Dates**

**A Day**: Monday, March 22nd **B Day**: Tuesday, March 23rd