RUBE GOLDBERG

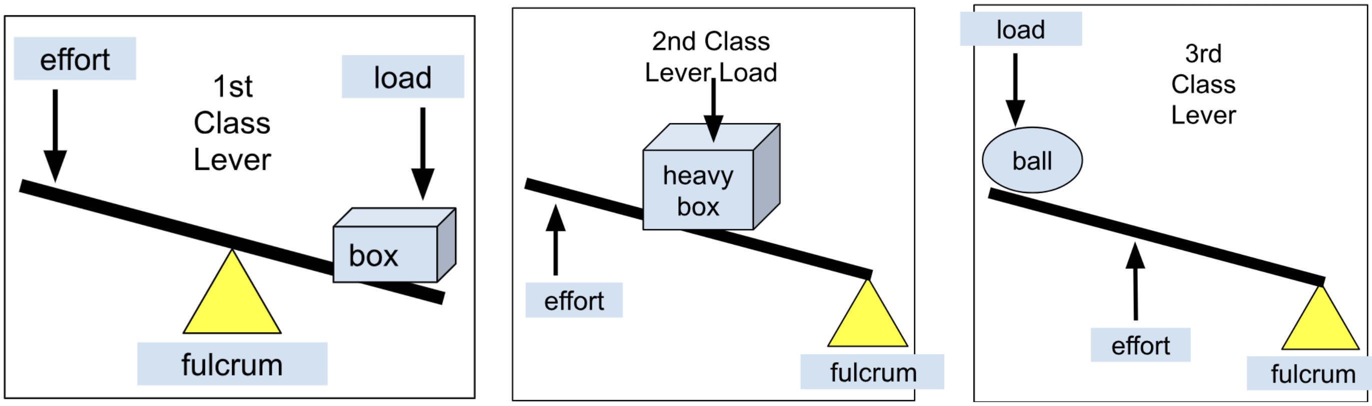
CALLING ENGINEERS

SCIENCE CIRCUS

Your Task: Develop a sophisticated Rube Goldberg Machine with a minimum of six stages, utilizing principles of forces and motion to complete a task of your choice. Your machine could water a plant, close a door, etc. For inspiration, check out this video of a Rube Goldberg Machine which pours a bowl of cereal. Your machine should include at least one of the three classes of levers shown in the levers diagrams. First class levers like a Seesaw help move objects in the opposite direction of the force applied. Second class levers like a wheelbarrow help move heavy objects in the direction that the force is applied but tend to do so slowly. Lastly, third class levers like a shovel move objects quickly but have a difficult time moving heavy objects.

Step One: Research and Inspiration

Dive deeper into the concept of chain reactions and sequences by studying this video of a Rube Goldberg machine. Use the settings button to change the video to half speed for a better viewing experience. You will notice that this machine uses levers, pulleys, ramps, springs, projectiles, and a variety of other methods to transfer energy from place to place. How will your machine continue to progress through each sequence of the chain reaction?



Step Two: Material and Force Consideration

Select materials that can integrate different principles of forces and motion in your machine. Think about the roles of gravity, friction, inertia, tension, and various masses in your design. Reflect on how each material can alter the energy transfer throughout the system.

Step Two Continued: Material Suggestions

- Spherical and cylindrical objects
- Levers and ramps
- Books
- Various sized tubes
- Aluminum Foil
- Different types of cardboard
- Cans of different weights
- Bottle caps
- Marbles
- Funnels
- String
- Cups of various materials
- Toy cars

Step Three: Designing your Rube Goldberg Machine

Draw a detailed diagram of your Rube Goldberg Machine. Outline each of the six stages of your chain reaction, and identify the forces at work in each stage.

Step Four: Constructing your Rube Goldberg Machine

Construct your machine according to your design.

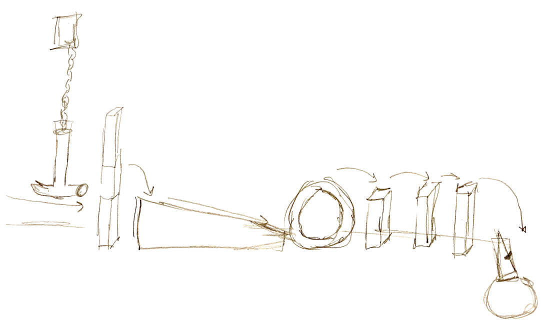
Remember, engineering is an iterative process, which means you may need to make changes and adjustments as you build and test. Be persistent and keep refining your machine until it works.

If you're facing challenges...

Use teamwork! Collaborate with peers to brainstorm solutions.

Review your design and materials. Could a different approach or additional materials solve the problem?

Sometimes taking a short break can give you fresh perspectives!



Reflection Questions:

How successful was your Rube Goldberg Machine?
How did the principles of forces and motion play out in your design?
If you were to modify your machine, what changes would you consider?
What task did your machine accomplish?

Extra Challenges:

Can you add more stages to your machine while ensuring it still works reliably?
Measure the efficiency of your machine - how long does it take to complete the task? Can you adjust your design to increase or decrease this time?
Could you include all three classes of levers in your design?
Could you modify your machine to accomplish more than one task?

Step 5: Sharing your... on Instagram or email.

We want to see your Rube Goldberg! With permission from your parent, or guardian, share a picture of your Ruber Goldberg for our instagram page. By direct messaging or emailing an image of your challenge, you are giving us written consent to redistribute the image on our official instagram page and webpage.

Instagram: @sciencecircuswhittier Email: sciencecircuswhittier@gmail.com

This activity is intended for use by adults and children who can read and follow directions and warnings. Adult supervision advised.