



DIY ACTIVITY

MAKE YOUR OWN RUBE GOLDBERG MACHINE GRADES 3-5

OBJECTIVES

- Use the transfer of energy of motion from one object to another to move candy into a dish.
- Utilize their understanding of energy transfer and collisions to design their own Rube Goldberg machine.

PROCEDURE



WATCH THE GENERATION GENIUS COLLISIONS VIDEO AS A GROUP.

1. Explain to students that they will be building a Rube Goldberg machine like Zoe's on the video.
2. Arrange several books into a stack on a table or counter top. Move a desk or table that is lower than the first surface to the counter top. Place a bowl on the lower counter.



3. Pour your favorite candy (or other non-liquid material) into a cup. Tape the cup to the edge of the table above the bowl.
4. Set up a ramp between two books. Stand one book upright at the far side of the pile. Prop a ruler or piece of wood at an angle on top of the stack of books. Then insert a pencil lengthwise through the center part of a binder clip. Fold the handles of the binder clip open and insert the end of a marker perpendicularly to hold the pencil in place.
5. Next set up a series of books like dominoes - arrange the books on end in a row so that the last will fall near the cup at the edge of the table.
6. Tape a pencil perpendicularly across a highlighter to create a teeter-totter.
7. Place the eraser end of the pencil where the last book will land, with the tip of the pencil under the cup so that it is tilted toward the bowl.
8. If necessary, watch this portion of the video again. (8:09-9:25).

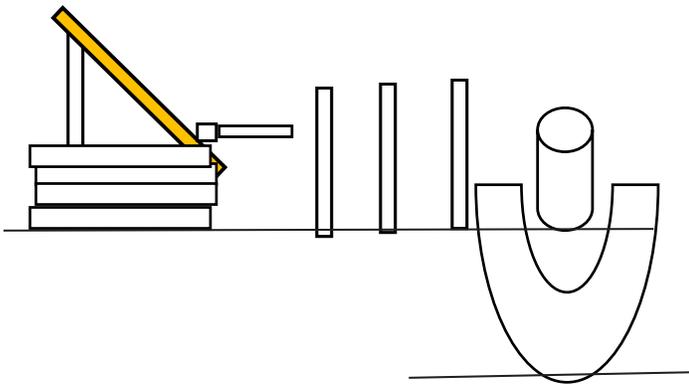
MATERIALS NEEDED

- Several books
- Two surfaces at different heights
- Ruler
- Marker
- Binder clip
- 2 pencils
- Books
- Highlighter
- Tape
- Cup
- Candy (or other non-liquid material)
- Bowl
- Battery or other small heavy object
- An additional variety of classroom objects

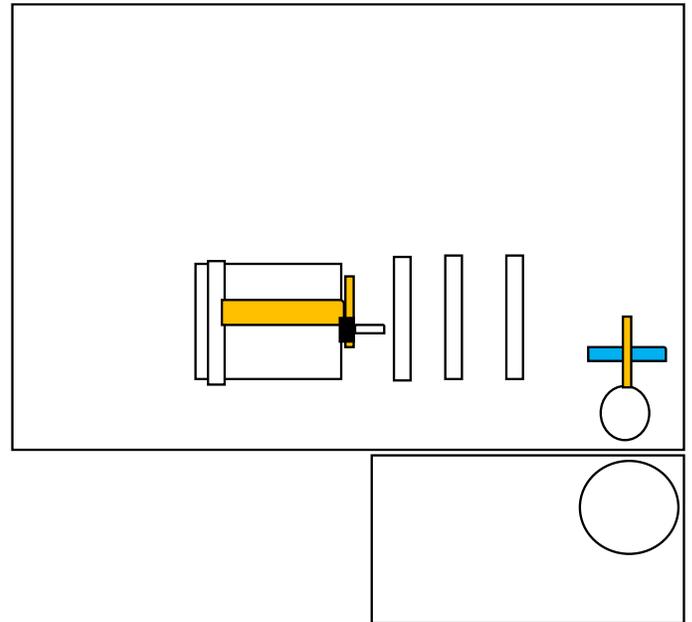
Activity Duration: One or more 45-minute class period

9. When everything is set up, students can slide a battery or similarly sized item from the top of the ruler to set off the chain reaction of energy transfers that eventually tips the contents of the cup into the bowl.

ARRANGEMENT OF MATERIALS FROM SIDE



ARRANGEMENT OF MATERIALS FROM ABOVE



WHAT IS GOING ON HERE?

This Rube Goldberg style energy transfer machine uses strategically placed interactions to transfer energy to complete a task. The goal is to dump the candy from the cup into the bowl. This is accomplished using the initial energy of the battery sliding down the ramp. This energy is transferred as the battery collides with the pencil at the bottom of the ramp, which causes the pen to collide with - and transfer energy to - the first book. In turn, the books collide with each other as they fall. The last book eventually falls on the eraser end of the pencil. This hinges over the highlighter and under the cup to tip the cup and pour the candy into the bowl. With each interaction energy is transferred to do work.

FURTHER EXPLORATION

Now that students have experience building energy transfer mechanisms, they can engineer their own using the Engineering Design Process. Provide a variety of materials and a task as a challenge to students, or let students define the problem on their own and use any materials that they think will work. Add constraints to the challenge by defining the number of energy transfers that must take place as the machine completes the task.

