



4-H Club Sample Agenda - Jumping Machine

Agenda Outline

WELCOME

As people are arriving, play "energy I spy." Each person takes turns getting other people to guess. "I spy something moving (or something that moves) that begins with the letter ___."

MEETING PURPOSE

Welcome new members and learn about potential energy by making a jumping machine!



BUSINESS (5-10 MINUTES)

Remember if too much business is planned, members might not come back! Below is just a sample. See other [optional business items](#) on our Leading a 4-H Club web page.

- [4-H Pledge](#)
- Roll Call: What is something that makes you jump for joy?
- Recap what we did last time
- Welcome new members
- Celebrate any member accomplishments!

EDUCATIONAL ACTIVITY - [Jumping machine](#) (20-30 MINUTES)

[RECREATIONAL ACTIVITY](#) (10-15 MINUTES)

[REFLECTION](#) (5 minutes)

- How did we do?
- How did we live out the 4-H Pledge today?

REFRESHMENTS



Educational activity - Engineering a jumping machine

4-H Project Area

Engineering design, STEM

What it is

Build a machine that can jump vertically.

Why it matters

Getting started

Time: 20 - 30 minutes

Materials (per person):

- Plastic or paper cups (at least 2 of the same type per club member)
- Rubber bands
- Scissors
- Tape
- Hole punch (optional)

COVID-19 prep for in-person delivery:

- To promote safety protocol, separate materials for each youth before they arrive.
- If using paper cups and you don't have enough hole punches or scissors to for each member to have their own, or don't have enough to share with proper sanitizing procedure, prepare paper cups ahead of time:
 - Hole punch: punch 2 holes directly opposite of each other, near the rim; punch 2 more holes 90 degrees from the original holes (total of 4 evenly spaced holes)
 - Scissors: cut two ½ inch slits directly opposite of each other; cut 2 more slits 90 degrees from the original slits (total of 4 evenly spaced slits)
 - Cut each rubber band once.

Prep for virtual delivery:

- Make sure to let families know ahead of time to bring the supplies listed above.

Background

Potential energy is energy that is stored in an object, either because of the object's position (a book teetering on the edge of a shelf) or the state of the object (like a spring that has





been compressed). Elastic potential energy comes from an object being deformed, like a spring that is compressed or stretched, or a rubber band that is stretched or twisted.

Kinetic energy is the energy an object has because of its motion.

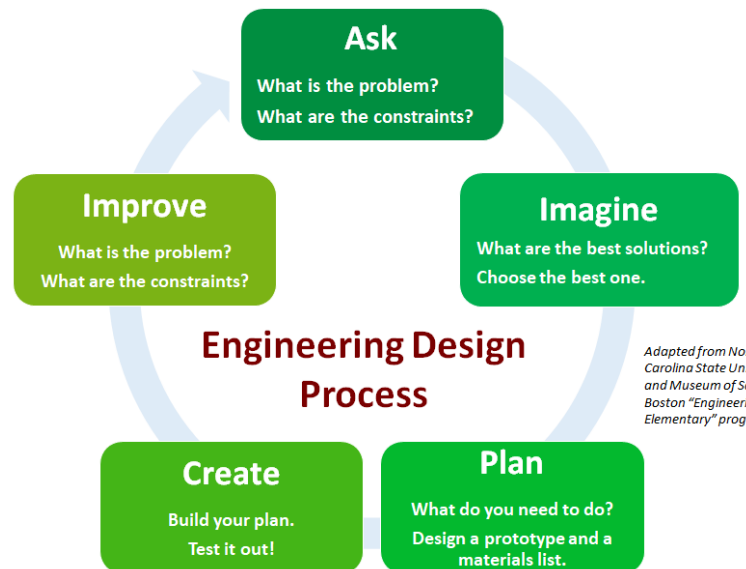
Mechanical energy is the sum of an object's kinetic and potential energy.

In this activity youth will create an object that will use mechanical energy to cause it to jump in the air. Potential energy will come from rubber bands.

The engineering design process will help club members to think systematically about how to create their jumping machine.

THE PROBLEM: Create a machine that will jump vertically.

THE CONSTRAINTS: The machine must be made of the materials provided. A human being can activate or start the machine.



How to do it

1. Introduce participants to the engineering design process (see background information) and provide them with the challenge or problem (create a vertical jumping machine) and constraints or limitations (use only the materials provided).
2. Provide the instructions below as one way to create the jumping machine:
 - If rubber bands have not been cut in preparation for activity, instruct club members to cut rubber bands once.
 - Attach rubber bands in crosswise manner. If using a paper cup: Insert end of rubber band into hole or slit and tape to outside of cup; attach other end in hole or slit directly across; do the





- same for the second rubber band in the other set of holes so the rubber bands are perpendicular to each other and cross in the center of the cup. If using a plastic cup, the same can be done without the holes.
- Set the second cup on a flat surface and put the cup with rubber bands on top of that cup and push down.
 - Let go of the cup! Encourage club members to try their jumping machine several times, paying attention to how they push down the cup and how they release it to get the highest jump.
3. Encourage club members to use the engineering design process to make changes to improve their machine. They can try different things to see if they can get their cup to go higher, such as taping the base cup to a flat surface, or trying different types or configurations of rubber bands. Or they can design a different machine using the same materials.
 4. Reflect as a group:
 - What material in your machine contains potential energy?
 - Do different types of rubber bands have different potential energy? How do you know?
 - What was challenging in getting your machine to jump? What did you do to address the challenge?
 - What made your machine jump the highest?
 - What are other examples of potential energy? (the bow of a bow and arrow, youth at the top of a slide, water behind a dam, springs in a trampoline)

Take it further (an optional science investigation!)

Encourage youth to build additional structures around the machine that would allow this machine to do a task (for example, hit a light switch, or dunk a ball into a net).

Use the potential energy in rubber bands to build a [rubber band car](#) or [rubber band helicopter](#) (if you don't have a plastic propeller, what else could you use?).

Recreation Ideas

How do you jump? Have club members jump, keeping their legs straight without bending their knees. Then have club members bend their knees and jump.

Energy charades: Write down or print out the following different [types of energy](#) and examples on scraps of paper and place them all in a hat or other container. Have people take turns randomly selecting one out of the hat and then acting it out for the others without sound or words.

- Chemical energy



Example: Your little brother just drank a whole liter of sugary soda and his body is converting the sugar into squirrely energy!

- Electrical

Example: You're using electricity to operate your hair dryer to dry your hair!

- Radiant

Example: You just laid out in the sun way too long...you have a sunburn!

- Mechanical energy (kinetic or potential energy)

Example: You use a slingshot to shoot down a target!

- Thermal energy

Example: You're so cold! So you make a cozy fire to sit by.

Additional Resources

Check out this video: [Running, Jumping and Hitting: The Science of Sports](#)

Jumping machine activity adapted from "Build a Vertical Jumping Machine" from Curiosity Machine, <https://www.curiositymachine.org/challenges/102/>

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