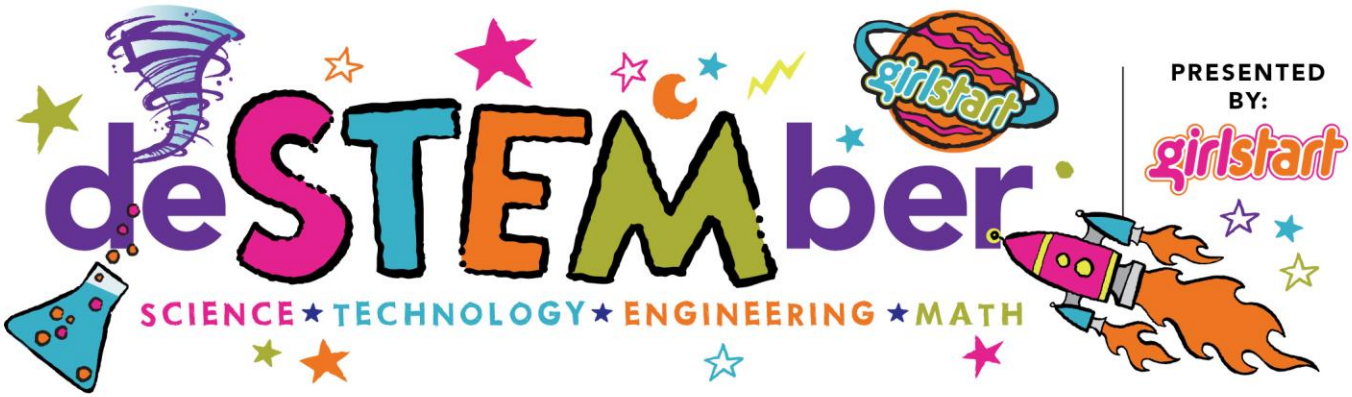

Vibrating Dinosaur

Harness the power of the sun to create a vibrating dinosaur! Learn how to solder, connect a circuit, and discover how solar panels absorb the sun's rays to make your dinosaur move.

TEKS:

5.7C: The student is expected to identify alternative energy resources, such as wind, solar, hydroelectric, geothermal, and biofuels.
6.7: Matter and energy. The student knows that some of Earth's energy resources are available on a nearly perpetual basis, while others can be renewed over a relatively short period of time. Some energy resources, once depleted, are essentially nonrenewable.

Materials:

- Dinosaur template (attached)
- Googly eyes
- Heat gloves
- Heat goggles
- Hot glue
- Pipe cleaners
- 2V solar cell (can be purchased here)
- Solder
- Soldering iron
- Soldering safety tips (attached)
- Tape
- Vibrating motor (can be purchased here)
- Wet sponge (to clean soldering iron)

How To:

Soldering Instructions:

1. Peel off the adhesive backing from the motor, align the wires on the motor with the leads (gold colored squares) on the sides of the solar cell, and stick the motor on to the cell. Make sure the motor is attached to the bottom of the solar cell (the non-solar panel side)!
2. Read over the attached soldering safety tips with an adult.
3. With adult supervision, turn the soldering iron on and let it heat up. To check if the iron is ready to use, touch the tip of the solder to the soldering iron and the solder should begin to melt.
4. The part that requires solder is the connection between the wires and the leads on the solar cell.
5. Once the iron is hot enough, unroll part of the solder, and hold the solder in your gloved hand. Touch the tip of the solder to the tip of the soldering iron. Once the solder becomes liquid, be sure the liquid drop stays on the iron, and then gently wipe the liquid drop onto the wires touching the leads on the solar cell. Be very careful that the liquid solder does not touch your skin, as it will cause serious burns!
6. Let the solder dry and cool before making sure the connection is secure. (Touching the solder while it's still hot can burn you!) If needed, add more solder to fully attach and connect the motor's wires to the solar cell's leads.

Decorating Instructions:

1. Color and cut out the pterodactyl template (both sides of the paper should be colored).
2. Hot glue the wings to the bottom of the solar cell (the same side the motor is on). Be sure not to glue the motor.
3. Cut a slit on the back end of the dinosaur head along the black line, slip the solar cell through the slit, and glue the head to the bottom side of the solar cell.
4. Cut 4 pieces of pipe cleaner into 2-3 inch sections to create the legs.
5. Hot glue or tape the legs to the bottoms of the solar cell, 2 on each long side of the solar cell.
6. Attach the googly eyes to each side of the dinosaur head.
7. Take your finished dinosaur outside, let the solar cell absorb the sun's energy, and watch your dinosaur move!

STEM Explanation:

Solar panels/cells absorb the sun's rays to provide energy to create electricity or heat. They can serve as the battery for electrical circuits. In this activity, the solar cell and the sun are the battery of the circuit, and the motor is the object being powered. The wires that were soldered allow the electricity to flow from the solar cell to the motor. Soldering is the process of joining two metal pieces together by melting another metal, solder. Essentially, the liquid solder acts as "glue" to attach the metal pieces to one another. Solder is used because it is a metal, and metals are good conductors. Conductors allow electricity to flow from the battery to the object. By soldering two metal pieces together, connections between electrical parts become permanent.

Career Connection:

Solar energy engineers plan, design, and create solar energy projects. They suggest ways to use more passive solar design techniques to lower costs and energy use, minimize maintenance, reduce greenhouse gas emissions, and provide comfortable indoor environments for people.

Resources:

https://s-media-cache-ak0.pinimg.com/736x/8e/40/b5/8e40b507407b0f1722513a3bb4d5da06.jpg
http://www.browndoggadgets.com/products/2v-50ma-solar-cell

Soldering Safety Tips:

- Wear safety goggles and gloves when working with or near solder. Hot metal or water can splash while soldering.
- 'Tin' the solder tip by coating it with a thin layer of solder. This helps the heat transfer between the tip and the components.
- Wipe off excess solder on a wet sponge. Make sure to keep the cleaning sponge wet during use.
- Be careful when you wipe the iron on the sponge so hot water does not splash, but do not touch the iron to the sponge for too long.
- Avoid breathing in the smoke by keeping your head to the side of your work, not right above it.
- Apply solder directly to the metal/copper wires (not to the soldering iron) – hold the iron to one side of the components you are trying to join and feed the solder from the other side.
- Hold the flat edge of the iron's tip to the joint, not just the point of the iron.
- Don't put a blob of solder on to the iron and try to transfer it to your joint – it causes the flux to burn away which helps the solder to stick.
- DO NOT TOUCH THE IRON – it's around 700°F!
- Don't grab your joint while it's hot. It can take about a minute to cool down.
- Avoid holding the metal part of a component with your fingers. Metal is a conductor so the heat will transfer from the solder.
- Hold wires in place with tweezers, clamps, or play-doh.
- Always return the soldering iron to its stand when not in use. Do not just set it down on the work surface.
- Turn off unit and unplug when not in use.
- Wash your hands after using solder because the solder contains lead.
- Used solder sponges must be disposed of as hazardous waste.

Dinosaur Template