



# Solar Power

Can you create a music box that is powered by the sun? Learn how solar panels convert light from the sun into electrical energy. Explore how the electrical energy can power a motor to add a spinning figurine to your music box design - as your figurine rotates you will see the energy at work!

## TEKS:

4.6A Differentiate among forms of energy, including mechanical, sound, electrical, light, and heat/thermal.

## How To:

1. With the help of an adult, cut a small hole in the middle of one of the cardboard squares. The hole should be large enough for the motor shaft to fit through and turn without hindrance. This is going to be the top of your music box.
2. Use the other cardboard squares and tape to complete the box, making sure to only attach one side of the top square so that it can flip open like a lid.
3. Slide the motor pulley onto the motor. Attach the alligator clips of the solar panel to the two metal terminals at the back of the motor. Solar panels produce direct current electricity, so you should be able to take your solar panel outside and see the motor start to spin instantly. If it doesn't, make sure that your alligator clips are attached correctly.

## Materials:

- 6 cardboard squares (1 ft. x 1 ft. works best)
- Small wooden dowel (3 in. long)
- Small wooden wheel (minimum 1 in. diameter)
- Hot glue gun and glue replacements
- X-acto knife
- Tape
- Materials to decorate your music box:
  - Foam shapes/sheets
  - Pom poms
  - Pipe cleaners
  - Felt
  - Sequins/rhinestones
  - Paper
  - Sharpies/markers
- Sunnyside Up Solar Car Kit (can be purchased [here](#)). From the kit, you will need:
  - 1 motor
  - 1 red motor pulley
  - Solar panel with alligator clips

31 Days of STEM FUN!

[www.destember.org](http://www.destember.org) | [#deSTEMber](https://twitter.com/deSTEMber) | © 2015 by Girlstart [www.girlstart.org](http://www.girlstart.org)

DeSTEMber is a trademark of Girlstart

## How To (continued):

4. Tape (or hot glue with adult assistance) the solar panel to the top of the box so sunlight will reach it. You may want to hold the solar panel in place with tape until you find the angle and location that catches the most sun, and then glue it permanently once you find the most effective position.
5. Run the wires and motor under the top square, and hot glue (with adult assistance) the motor to the inside of the top square so that the axle goes through the hole in the middle. Make sure you only put glue on the white plastic piece of the motor. If you get glue on the motor shaft, it won't turn.
6. Glue the wooden wheel to the top of the red motor axle, while still ensuring no glue gets on the motor shaft. Glue the wooden dowel in the hole in the middle of the wheel. This is the platform and support for the spinning object of your music box.
7. Now it's time to be creative! Using the remaining materials, design your spinning object and decorate your music box.
8. Once you've finished, take your music box outside to test it. If your object spins too fast, cover a small part of the solar panel with foam or felt so that the panel isn't receiving as much sunlight. If your object doesn't spin at all, your object may be too heavy for the motor to spin. Try removing some of the heavier materials to decrease the object's weight. Redesign and test your music box as needed.

## The STEM Explanation:

Solar energy is a renewable resource, which is beneficial for many reasons. A renewable resource is replaced naturally and can be used again and again. Solar energy is also beneficial because it does not produce air pollutants. *Can you think of any difficulties about the process of collecting and converting solar energy into electricity?* Solar panels collect varying amounts of solar energy based on the angle they are facing the sun and how long they are in sunlight each day. This can be affected by how cloudy it is or if the sun is blocked by something. Additionally, the Earth's elliptical revolution around the sun changes the amount of sunlight we receive each day throughout the year. All of these complications are reasons that we must use a combination of solar energy and fossil fuels.

## Career Connection:

*Solar design engineers* help people and buildings harness the sun's energy potential using solar photovoltaic cells. Solar design engineers work for architecture, engineering, and design firms, as well as energy companies and solar equipment manufacturers. Solar design engineers design, review, and approve solar installations for commercial and industrial buildings, as well as government and utility projects.

## Resources:

- Energy Kids: [http://tonto.eia.doe.gov/kids/energy.cfm?page=solar\\_home-basics](http://tonto.eia.doe.gov/kids/energy.cfm?page=solar_home-basics)
- Try Engineering: Here Comes the Sun: <http://www.tryengineering.org/lessons/herecomesthesun.pdf>

**31 Days of STEM FUN!**

[www.destember.org](http://www.destember.org) | [#deSTEMber](https://twitter.com/deSTEMber) | © 2015 by Girlstart [www.girlstart.org](http://www.girlstart.org)

DeSTEMber is a trademark of Girlstart