

Vehicle ACTIVITY



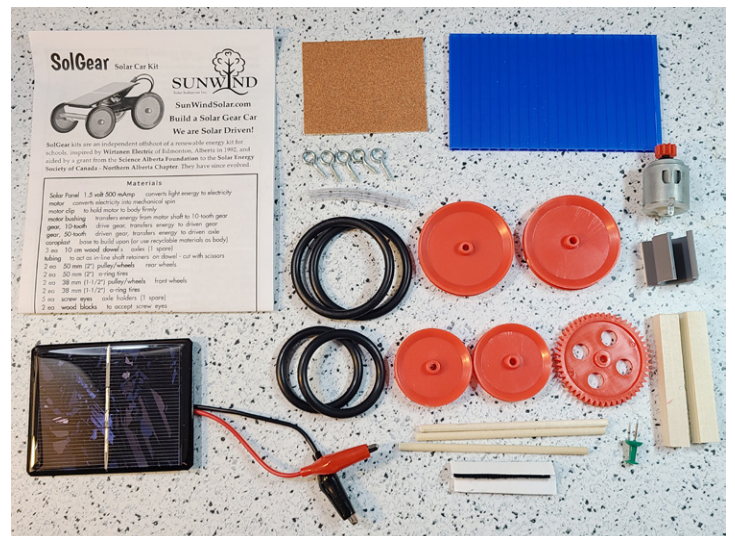
DIY Solar EV

Have fun building a simple electric car that is powered by a solar panel!

Materials

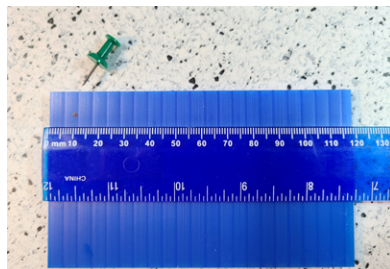
- ◆ 1.5 volt x 500 mAmp (0.75 watt) solar panel with alligator clip leads
- ◆ electric motor with 10-tooth gear
- ◆ motor clip
- ◆ coroplast square
- ◆ clear plastic tubing
- ◆ gear - 50-tooth
- ◆ 4 wheels - 2 small, 2 large
- ◆ 4 screw eyes (axle holders)
- ◆ 2 wooden dowels (axles)
- ◆ 2 wooden blocks
- ◆ sandpaper
- ◆ push pin
- ◆ clear tubing
- ◆ 2 adhesive Velcro strips
- ◆ scissors
- ◆ access to sunlight or very bright lamp

Need more kits? Visit [SunWind Solar.com](http://SunWindSolar.com)

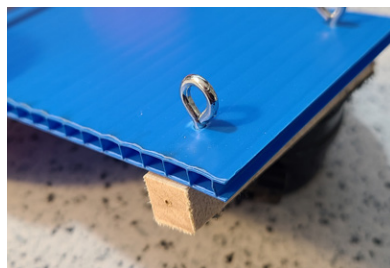


Instructions

Step 1: Use the push pin to start holes in the corners of the coroplast for the screw eye axle holders. You'll want the holes parallel and 1 cm from the corners.



Step 2: Screw the screw eyes through the coroplast into the wooden blocks.



Step 3: Add the O-ring tires to all of the wheel.



Step 4: Lightly sand the wooden axle using the sandpaper by twisting the axle against the sandpaper.



Step 5: Slide a pulley/wheel onto the end of the axle.

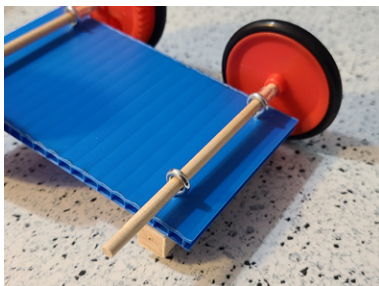


Photos: Greenplanet Energy Analytics

Step 6: Cut clear tubing into 6 mm pieces and slide a segment onto the axle.



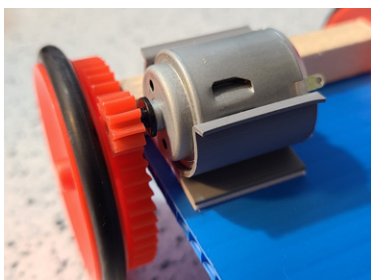
Step 7: Put axle through screw eyes, add another piece of tubing and attach second wheel.



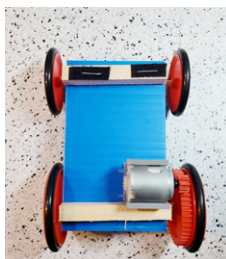
Step 8: Repeat for second axle, adding the 50-tooth gear before the last wheel is attached.



Step 9: Attach the motor to the car by removing the adhesive pad cover and placing the motor so the small motor gear matches up with the large wheel gear as shown.



Step 10: Attach the hook side of the Velcro strip to the wood strip away from the motor.



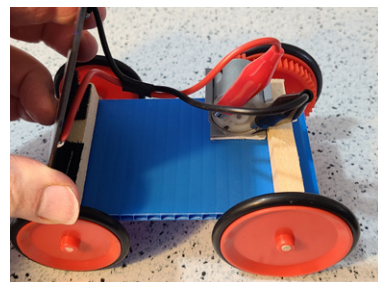
(OPTIONAL: It may help to cut it in two pieces and reinforce it with staples as shown here.)



Step 11: Attach the loop side of the Velcro strip to the back of the solar panel as shown. (It should match the position of the hook side velcro on the car body.)



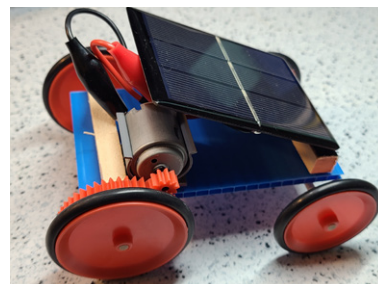
Step 12: Attach the solar panel to the car using the Velcro.



Step 13: Attach the alligator clips from the solar panel to the tabs on the motor. (You will learn more about what clip goes to which tab in Step 15.)



Step 14: Place the solar car under **bright sunlight or a very bright lamp** to run it. Just unhook one alligator clip to stop it.



Step 15: You can change the direction of the car by switching the alligator clips to the opposite tabs on the motor. (You can mark which tabs to use with dots from a black and red marker as shown in the photo in Step 13.)

Video

You can use your smart phone to see a slightly different instruction video - just use the camera and point at the QR code below and accept the link that it shows.

If you are viewing this as a PDF on your computer, just click on the link below:



Instructional Video:

<https://www.youtube.com/watch?v=kQ2KvB43E2Q>

TEACHER RESOURCE:

DIY Solar Car - Grade 7 - 9

Let's Take It Further

Design Challenge

You can encourage students to explore designing alternative construction and functions for this solar car kit. The solar panel and motor assembly can be removed from the models to power the student's projects. See the images at the right. Students can do drawings of their ideas for approval before they try them out.



Investigate Gears and Energy Changes

This car model has two gears which demonstrate gear use of different gear ratios as well as converting electrical energy into mechanical energy.

Experiment with Solar Panels and Light

The amount and angle of light available to the solar panel will effect the energy going to the motor and therefore the speed. Try different light sources as a demonstration or have the students experiment with the set-up.

Exploring a Circuit (See diagram below)

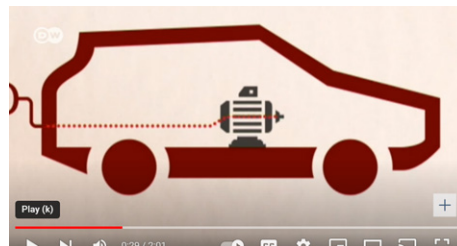
The connection between the solar panel and the motor complete a simple circuit. Use the alligator clips as a method of demonstrating a completed circuit.

Video

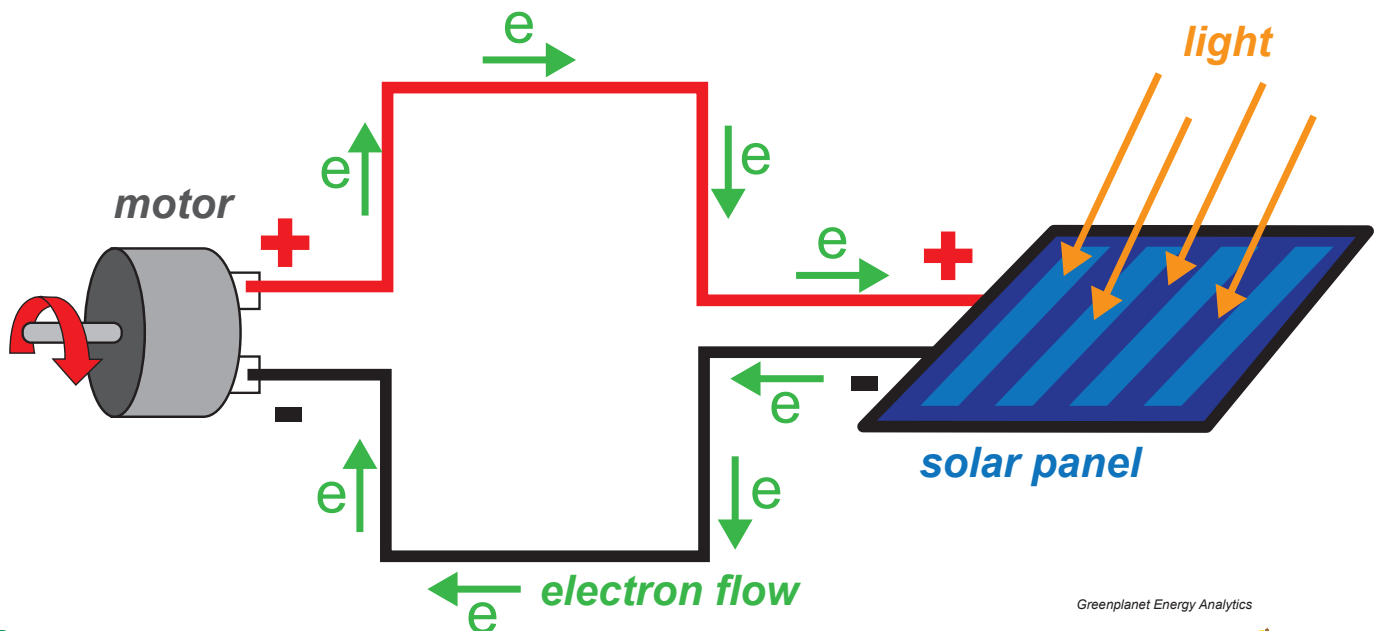
Have students watch a video about how electric cars work:

How do electric cars work?- DW News

<https://www.youtube.com/watch?v=x1ystf-nnE8&t=1s>



Electric Solar Car CIRCUIT



Greenplanet Energy Analytics

Teacher Notes: DIY Solar EV - Curriculum Connections

Overview

These hands-on activities are a great opportunity to demonstrate how electric cars work and how solar electricity is produced.

This is a great complementary exercise for exploring society's impact on the environment in regards to greenhouse gases.

Science Grade 7

Unit A: Interactions and Ecosystems (Social and Environmental Emphasis)

1. Investigate and describe relationships between humans and their environments, and identify related issues and scientific questions.
4. Describe the relationships among knowledge, decisions and actions in maintaining life-supporting environments

Unit D: Structures and Forces (Science and Technology Emphasis)

1. Describe and interpret different types of structures encountered in everyday objects, buildings, plants and animals; and identify materials from which they are made.
2. Investigate and analyze forces within structures, and forces applied to them.

3. Investigate and analyze the properties of materials used in structures.
4. Demonstrate and describe processes used in developing, evaluating and improving structures that will meet human needs with a margin of safety.

Science Grade 8

Unit D: Mechanical Systems (Science and Technology Emphasis)

1. Illustrate the development of science and technology by describing, comparing and interpreting mechanical devices that have been improved over time.
2. Analyze machines by describing the structures and functions of the overall system, the subsystems and the component parts.
3. Investigate and describe the transmission of force and energy between parts of a mechanical system.
4. Analyze the social and environmental contexts of science and technology, as they apply to the development of mechanical devices.

Science Grade 9

Unit D: Electrical Principles and Technologies

1. Investigate and interpret the use of devices to convert various forms of energy to electrical energy, and electrical energy to other forms of energy.
 - Construct, use and evaluate devices for transforming mechanical energy into electrical energy and for transforming electrical energy into mechanical energy.
2. Describe technologies for transfer and control of electrical energy.
 - Investigate toys, models and household appliances; and draw circuit diagrams to show the flow of electricity through them (e.g., safely dismantle discarded devices, such as heating devices or motorized toys, and draw diagrams to show the loads, conductors and switching mechanisms).

All curriculum connections were derived from:

<https://education.alberta.ca/media/159711/elemsci.pdf>

