CLEAN ENERGY INSTITUTE
UNIVERSITY of WASHINGTON


# SUNDAWG BAG

## BRINGING SOLAR TO THE CLASSROOM

Mini Solar Cars and Lessons

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## *Background*

The Clean Energy Institute at University of Washington is working to accelerate a scalable clean energy future through scientific and technological advances in solar, energy storage and smart grids. Part of our education mission is to increase the interest in these topics in the science classroom. Our **Clean Energy Ambassadors** have used mini solar cars to generate children's interest and give them a hands-on experience with the power of the sun. The enclosed lesson cards give you some ideas for simple experiments you can do with your cars to learn more about solar energy. Take the **Sun Dawg Bag** to your science teacher and they can learn more about education outreach programs and materials available through the Clean Energy Institute.

BRINGING SOLAR TO THE CLASSROOM

## *Sun Dawg Lesson 1: Shakedown drive*

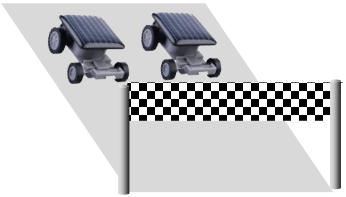

Take the mini solar cars out of their plastic packaging. Cut out and fold a purple and gold car body from the enclosed card.

Check the tires to make sure they are on straight and not rubbing. Now place the car in the full sun or under an incandescent work light, or handheld spot light. Watch them go!

*Why does the car stop when it runs out of the light? What makes the car go faster? Can you explain how the cars works?*

Light energy is converted is converted by a small solar cell into electricity that then powers a small motor and makes the little cars zoom around.

## *Sun Dawg Lesson 2: To the races*



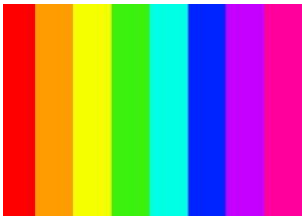
Set up a race track on a table or smooth piece of wood or card board.

Mark your start and finish lines. Set up the two cars side by side while holding a card to block the light. One, two, three: go! Remove the card and see which car crosses the finish line first. Hint: If your light is not quite strong enough try tilting the track a bit so the cars can roll downhill to help them get started. Repeat the race several times.

*Does the same car win each time?*

*What might make one car faster than the other?*

## *Sun Dawg Lesson 3: Fun with filters*



Light from the sun appears white. Actually, white light is a mixture of many different colors. Solar cells are able to use some colors to make electricity, but other colors not so well.

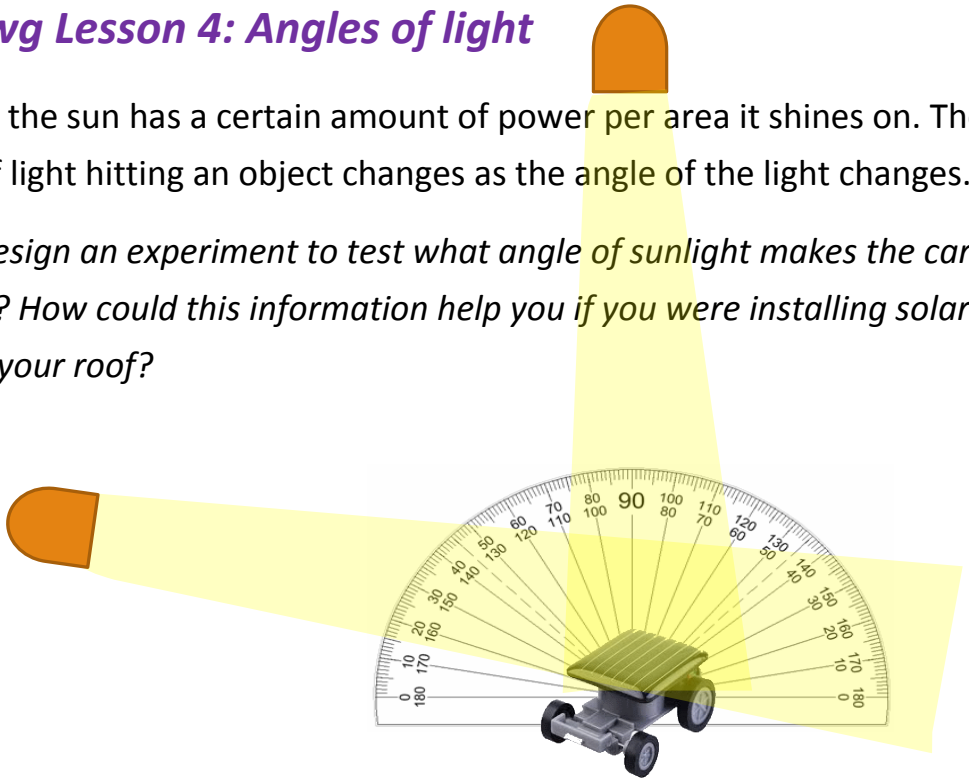
Use the plastic color filters to experiment with what color light solar cars prefer. Attach the color filters to the top of the cells with a small piece of transparent double sticky tape. Compare cars with and without filters, or with different filters on each car.

*What color light is best for these solar cells?*

## *Sun Dawg Lesson 4: Angles of light*

Light from the sun has a certain amount of power per area it shines on. The amount of light hitting an object changes as the angle of the light changes.

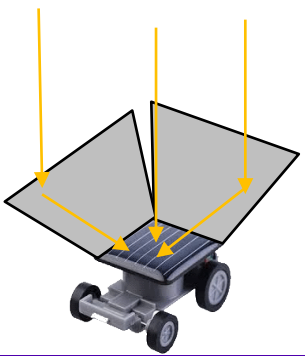
*Can you design an experiment to test what angle of sunlight makes the cars go fastest? How could this information help you if you were installing solar panels on your roof?*



## *Sun Dawg Lesson 5: Concentrators*

Another way to boost the output of a solar cell is to force more light on to it using a reflector or concentrator. Use the aluminized cardboard to make a reflector that focuses more light on to your car.

*What angles on the reflector work best? Does it matter if the reflector is pointed directly towards the light? How would this work on solar panels on a house?*



Mirrors focus light on a solar power tower to generate electricity.

## *Sun Dawg Lesson 6: Ask your own question and answer it*

Now ask your own question and then design an experiment to answer it. Experimentation is a skill that both scientists and engineers use to learn how the world works, and how to make inventions work better.

*How does distance from a light source affect the speed of the car?*

*How does the car do with different lights such as LED, incandescent, fluorescent, and sunlight?*

For more ideas visit http://www.cei.washington.edu/dawg-bag

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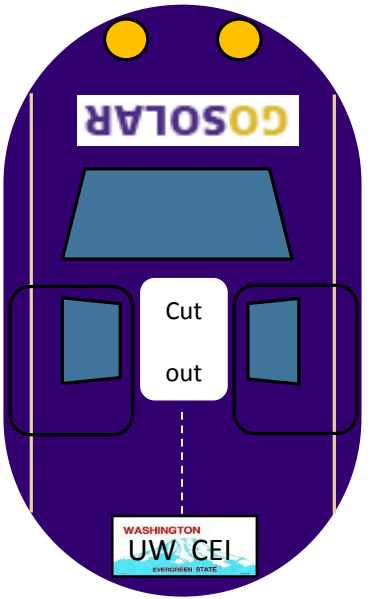
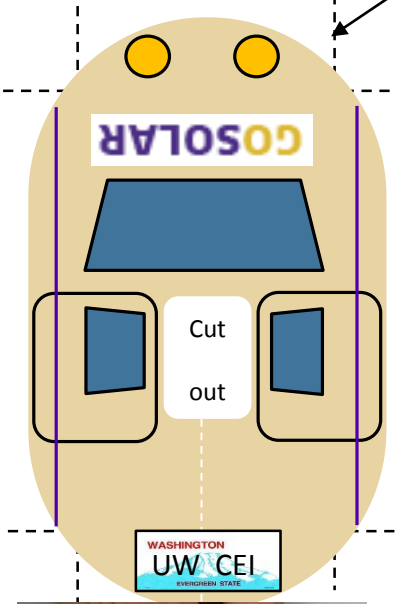
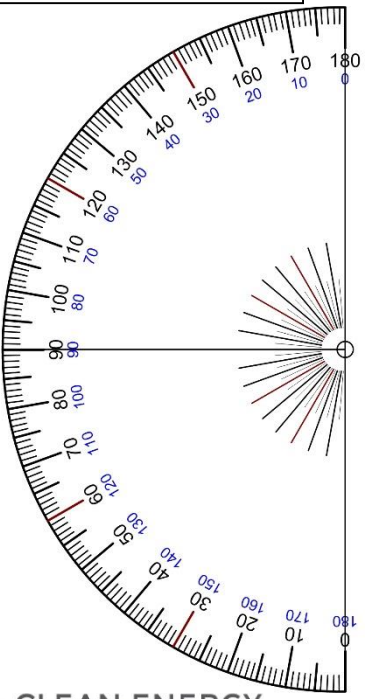



Cut here and remove cut out area. Slip the cut carefully under the solar cell. Fold and secure with tape.




Fold sides, headlights, and rear bumper down

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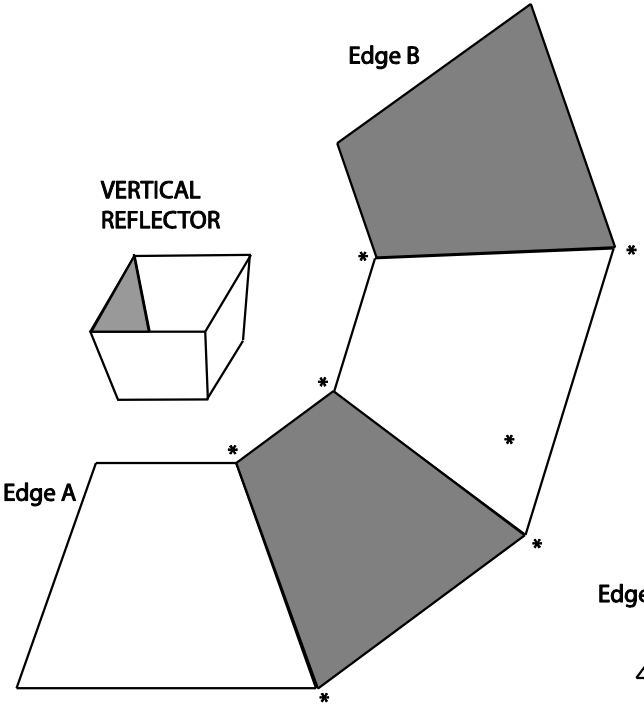


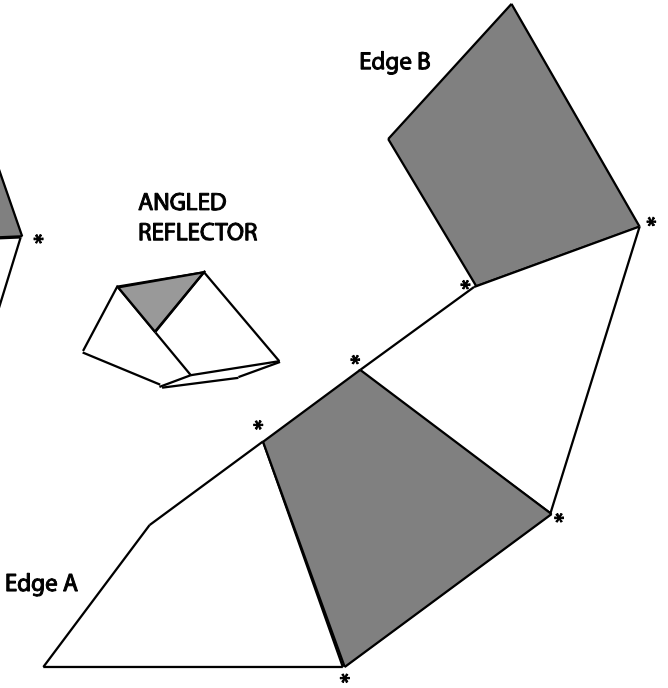


1) Copy and cut out outline of the reflector
2) Trace outline on the back of the reflective material- or line with foil
3) Cut out the shape in the reflective material
4) Use a straight edge to fold at lines marked *
5) Join Edge A to Edge B with tape
6) Place the reflector around the solar cell and secure with tape