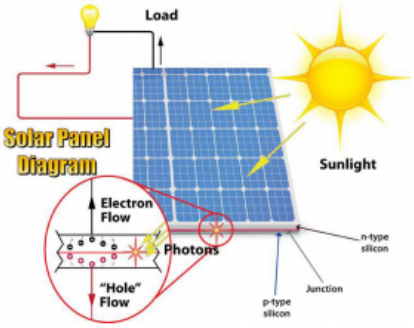
Name:_____

# SOLAR-POWERED CARS




## INTRODUCTION

Not only is the sun a source of heat and light, it's a source of electricity too! Solar cells are used to convert sunlight to electricity. Solar energy is a clean source of renewable energy to replace fossil fuels.

A solar cell, also called a photovoltaic cell (PV cell), is a light-sensitive semiconductor device that uses the photoelectric effect to convert sunlight into electricity. The amount of current produced by a PV cell is proportional to the amount of light striking the cell. Wires attached to the PV cell allow the electricity to power calculators, watches, recharge batteries, electric motors, and many more electrical devices.

The purpose of this activity is to design a car that runs on solar power. The lab begins with an introductory activity to build and test a solar car prototype. Then different variables are tested to determine their effects on the car's performance. Finally, the prototype is modified to increase the efficiency of the car, measured by its speed.

## MATERIALS

Cardboard base, 11.5cm x 14 cm (if your cardboard base is not this size, measure and cut it).

Scissors, Motor, Straw, Ruler, Tape, Stopwatch, Solar panel, Paper, Wheels, Axles, Gears, Tires

## PART 1- BUILDING THE SOLAR CAR

*****Follow the instructions on the "Building the Solar Car" sheet to build the solar car.*****

## PART 2- TESTING THE CAR

1. Take the car outside to an area designated by the teacher, keeping the solar panel covered with your hand or a piece of paper.

2. Set the car on the ground and uncover the solar panel.

3. The car should start moving across the ground. If it does not, check the following:

    a. The motor does not turn. Check the wire connections.

    b. The motor spins, but the car does not move. Check the gear alignment. Make any necessary adjustments.

4. Note which direction the car moves. If the motor is in front, the car has "front-wheel drive." If the motor is in the back as the car moves, the car has "rear-wheel drive."

5. If the car veers to the right or left, check the axle alignment and adjust as needed.

6. Once the car is functioning well, go to the start of the prepared race track.

7. Set the car down at the start, and time how long it takes to travel 3 meters. Record the time and any observations in Data Table A.

8. Repeat step 7 for a total of 5 trials.

9. Calculate the car's speed for each trial and the average speed. Record the values in the data table.

## DATA TABLE

| Trial | Distance (m) | Time (s) | Speed (m/s) | Observations |
|---|---|---|---|---|
| **1** | **3 m** | | | |
| **2** | **3 m** | | | |
| **3** | **3 m** | | | |
| **4** | **3 m** | | | |
| **5** | **3 m** | | | |
| **Average** | | | | |

## QUESTIONS:

1. What improvements could be made to your design?

    -

    -

2. Draw a diagram of your improved design.

**CLEAN-UP:** The wheels, axle, motor, motor gear, and solar panel must be taken apart to be used by the next class.

If you altered the cardboard base, you may throw it away. Throw away any tape, cardstock or paper that you used.