

# ASSESSMENT

## Student Assessment Questions/Answers

- 1 Assessment:** Informal observation of participation, handout with written hypotheses, as this can extend the lessons offered for inclined planes and Newton's laws of motion as found with Hall's carriage.  
**friction** - surface resistance to relative motion, as of a body sliding or rolling.  
**air drag** - air pressure which resists movement  
**acceleration** - an increase in speed  
**incline** - a slope or slant  
**solar cells** - a mechanism that changes sunshine into electricity  
**photovoltaic cells** - another term for solar cells  
**variables** - a changeable part of an experiment, which may affect the outcome of the experiment
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- What do calculators that run with no batteries and the interior of a car on a summer day have in common?  
- They each demonstrate power collected from sunlight.
- If light is power, how can it be harnessed to accomplish work?  
- Solar or photovoltaic cells
- Write a hypothesis stating which is more efficient, solar power or gasoline, and what the benefits and drawbacks will be with solar power.  
Answers will vary.  
A suggestion might be: Solar energy will be a more efficient fuel as soon as soon as limited lighting issues are solved.  
*See handout for more details.*

# TEACHERS GUIDE



**SOLAR CELL DOLLY**  
ITEM # 1000-13

## ENERGY - ELECTRICITY

Discover how sunlight can be converted to energy. Experiment with changing the angle of the solar panel, adding weight, running it uphill, and running it on rough and smooth surfaces. Good for standard motion labs as well as lessons on energy and alternative energy. Runs on solar power or batteries; switch to solar drive, battery drive, or battery charge!



# Materials

- pictures of solar-powered items from online sites such as goldmine-elec-products.com and survivalcenter.com
- 3-4 solar cars
- Hall's carriage
- gas spectrum tubes w/power supply
- stopwatch or clock
- age-appropriate website about photovoltaic cells

# Goals & Objectives

## Students will:

- explain the process of harnessing solar power and applying it to the car.
- describe factors affecting the car's performance. (such as power supply, friction, air drag, acceleration, incline)
- compare positives and negatives of solar power and gasoline power

# ACTIVITIES

- 1 Allow students to read about solar cells, or photovoltaic cells. They complete the handout, attached.
- 2 Show students pictures of solar-powered items online, pointing out where the 2 solar panel is, and how it connects to other parts.
- 3 Ask students if they feel solar energy really could be more efficient, and what some of the drawbacks may be. (Observe participation as one informal, formative assessment. If confused, more explanation may be required.)



- 4 Group students into groups of 5-7 for ease of viewing, more connection to activities. Approximately half of the groups will expose their cars to bright light for a set time, 2-5 minutes. The other groups will expose cars to a distant nightlight for the same amount of time.
- 5 In each case, after exposure the cars should be allowed to run on

a flat, smooth surface. Groups should measure and chart (on whole-class chart, attached) how long the cars ran, or how far, or both.

- 6 Students should take turns directly exposing cars to light from various gases in a darkened room. Split gases between the groups. Each group charts their findings on the class chart.

## Note

It is always best to DO an experiment ahead of time to be able to best present it to the class.



- 7 Groups should add variables to test this power source. What if the surface were rougher? What if the car had to perform up an incline? What if light were of a different kind or duration?
- 8 As a result of the findings written on the chart, each individual should write a hypothesis about which is more efficient, and what the benefits and drawbacks will be with solar power.

S T U D E N T  
H A N D O U T

Student Name: \_\_\_\_\_

**1 Define the following terms:**

- friction
- air drag
- acceleration
- incline
- solar cells
- photovoltaic cells
- variables

**2** What do calculators that run with no batteries and the interior of a car on a summer day have in common?

**3** If light is power, how can it be harnessed to accomplish work?

**4** Write a hypothesis stating which is more efficient, solar power or gasoline, and what the benefits and drawbacks will be with solar power.



# CLASS CHART

Group 1

Group 2

Group 3

Group 4

Group 5

Bright Light

Night Light

Gas 1

(gas name)

Gas 2

(gas name)

Gas 3

(gas name)

Gas 4

(gas name)