

# 4-H Science: Energy Literacy for In and After School, Club & Camp



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# Project Overview

- Why Energy Literacy
- Next Generation Science Standards
- How Does 4-H Science Fit



# Lesson Titles & Content

1 - What is Energy?

2 - Energy Transformation and Flow

3 – Sources of Energy

4 - Energy Sources: Renewable and Nonrenewable

5 - What is Static Electricity?

6 - Current Electricity: Circuits and Switches

7 - Closed Circuits and Light Bulbs

8 - Parallel and Series Circuits

9 - Electricity from Batteries

10 - Electricity and the Turbine Generator

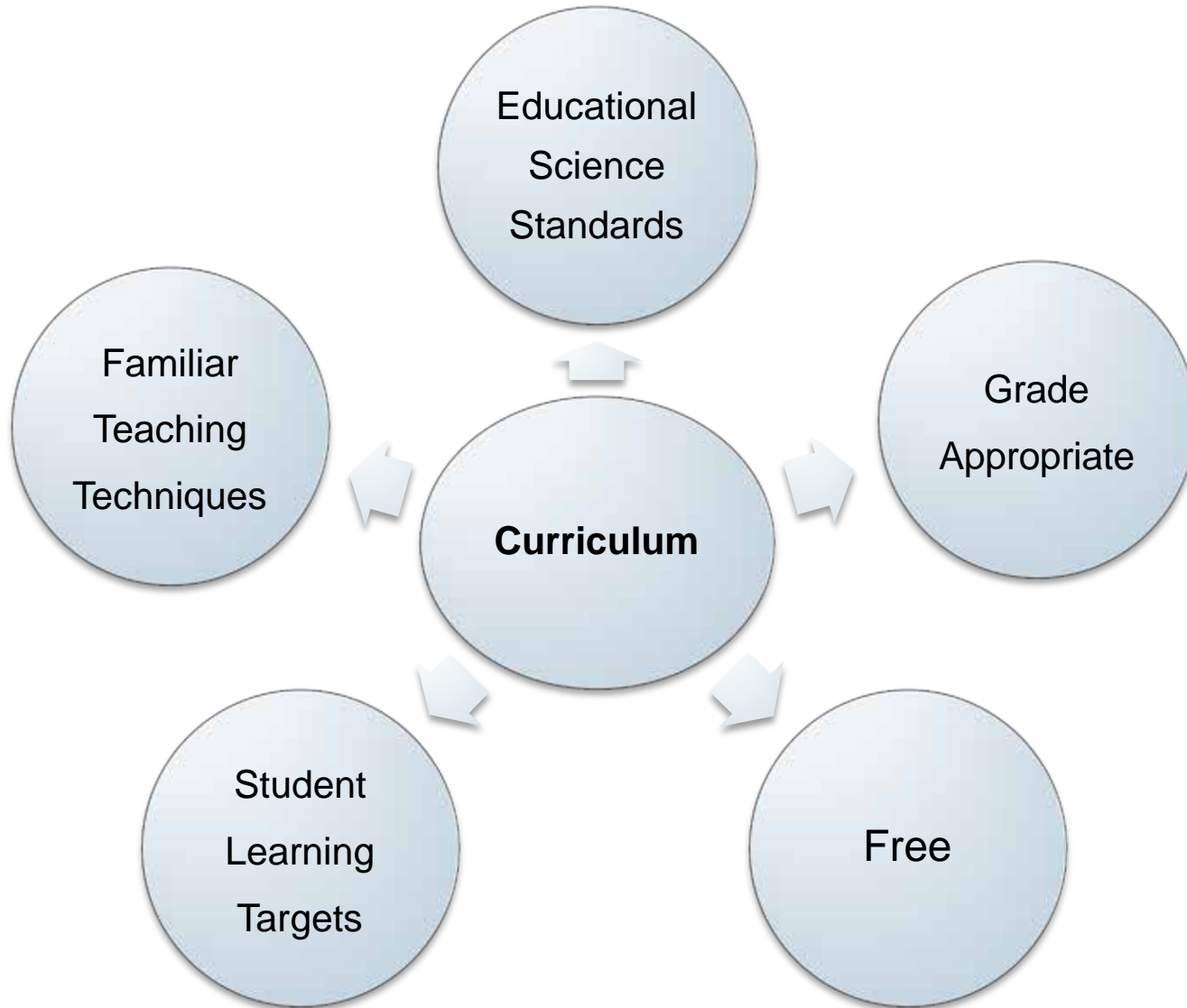
11 - Design and Build a Wind Turbine

12 - Energy Efficiency and Conservation

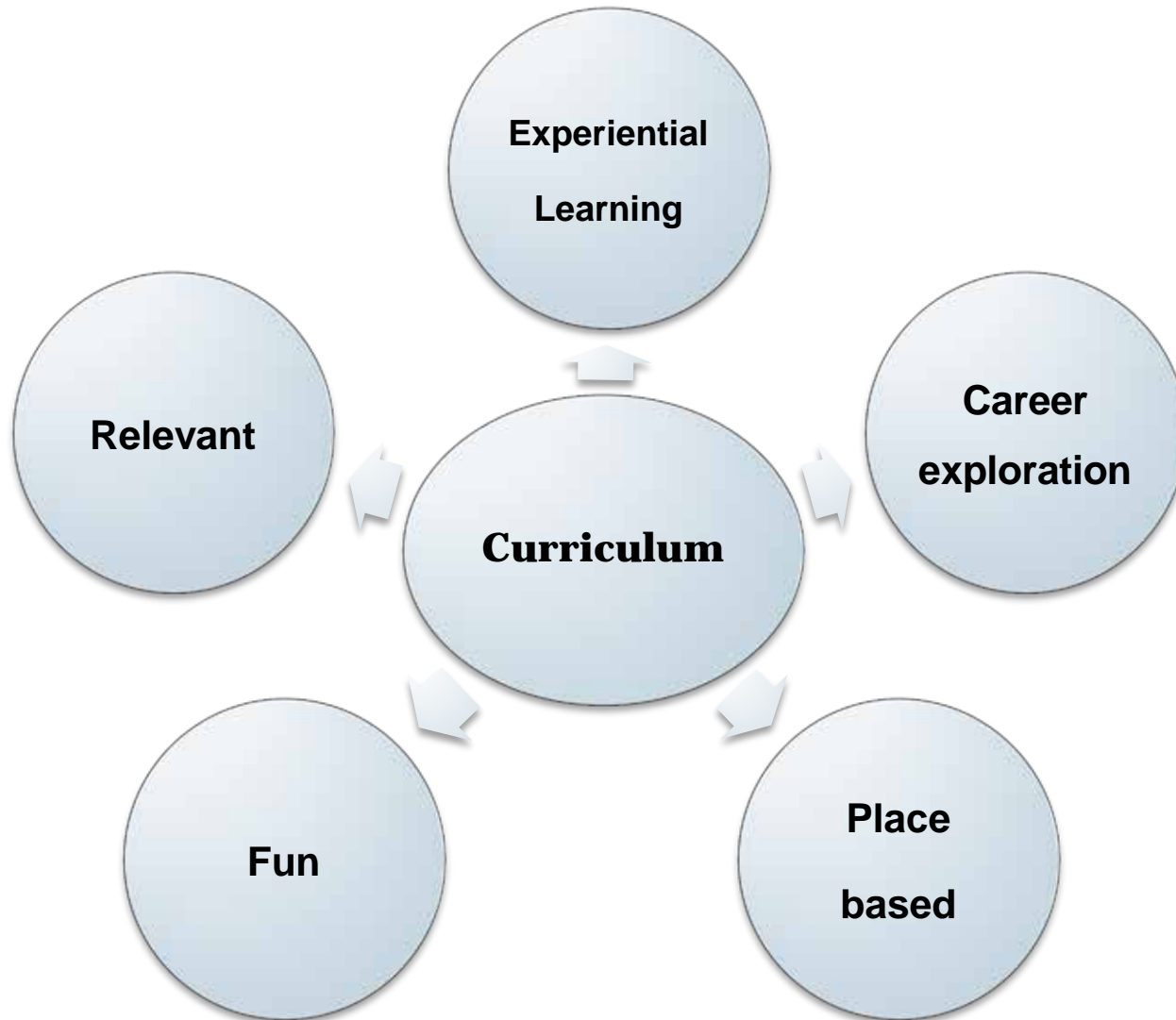
13 - Solar Power: An Alternative to the Turbine Generator

14 - Solar Car Experiment

# Design Elements for the Teacher



# Design Elements for Student Engagement



# Lesson 1: **What Is Energy**

NGSS:

- **Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.**

## **FORMS OF ENERGY**

All forms of energy fall under two categories

<b>KINETIC:</b> Kinetic energy is energy in motion	<b>POTENTIAL:</b> Potential energy is stored energy
✓ <b>RADIANT ENERGY</b>	✓ <b>CHEMICAL ENERGY</b>
✓ <b>THERMAL ENERGY</b>	✓ <b>NUCLEAR ENERGY</b>
✓ <b>SOUND</b>	✓ <b>STORED MECHANICAL ENERGY</b>
✓ <b>MOTION</b>	✓ <b>GRAVITATIONAL ENERGY</b>
✓ <b>ELECTRICAL ENERGY</b>	

# Challenge:

Using the supplies at your table, get your boat to move under its own power.

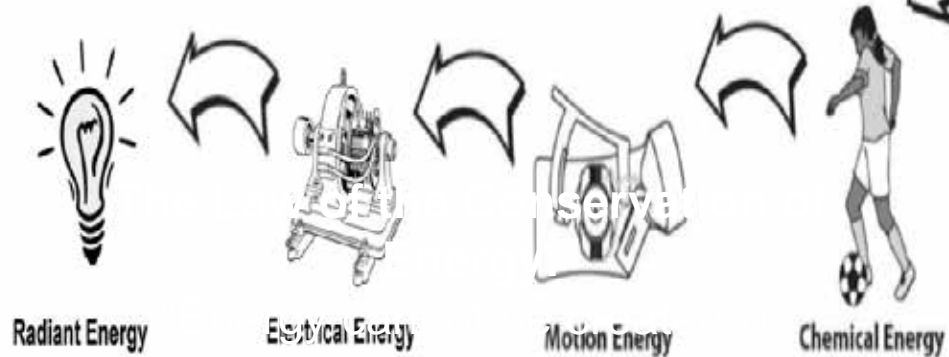
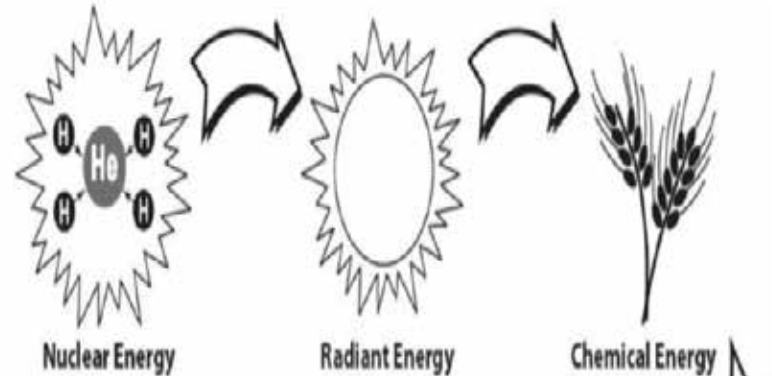
<http://www.youtube.com/watch?v=g3OLhFx8KZY>



## Lesson 2: **Energy Transform.**

NGSS:

- Plan an investigation to determine the relationships among the energy transferred, type of matter, mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.
- Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.





Lesson 13:  
**Photovoltaics**

NGSS:

**Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object.**



## Lesson 14: Solar Car Design

### NGSS

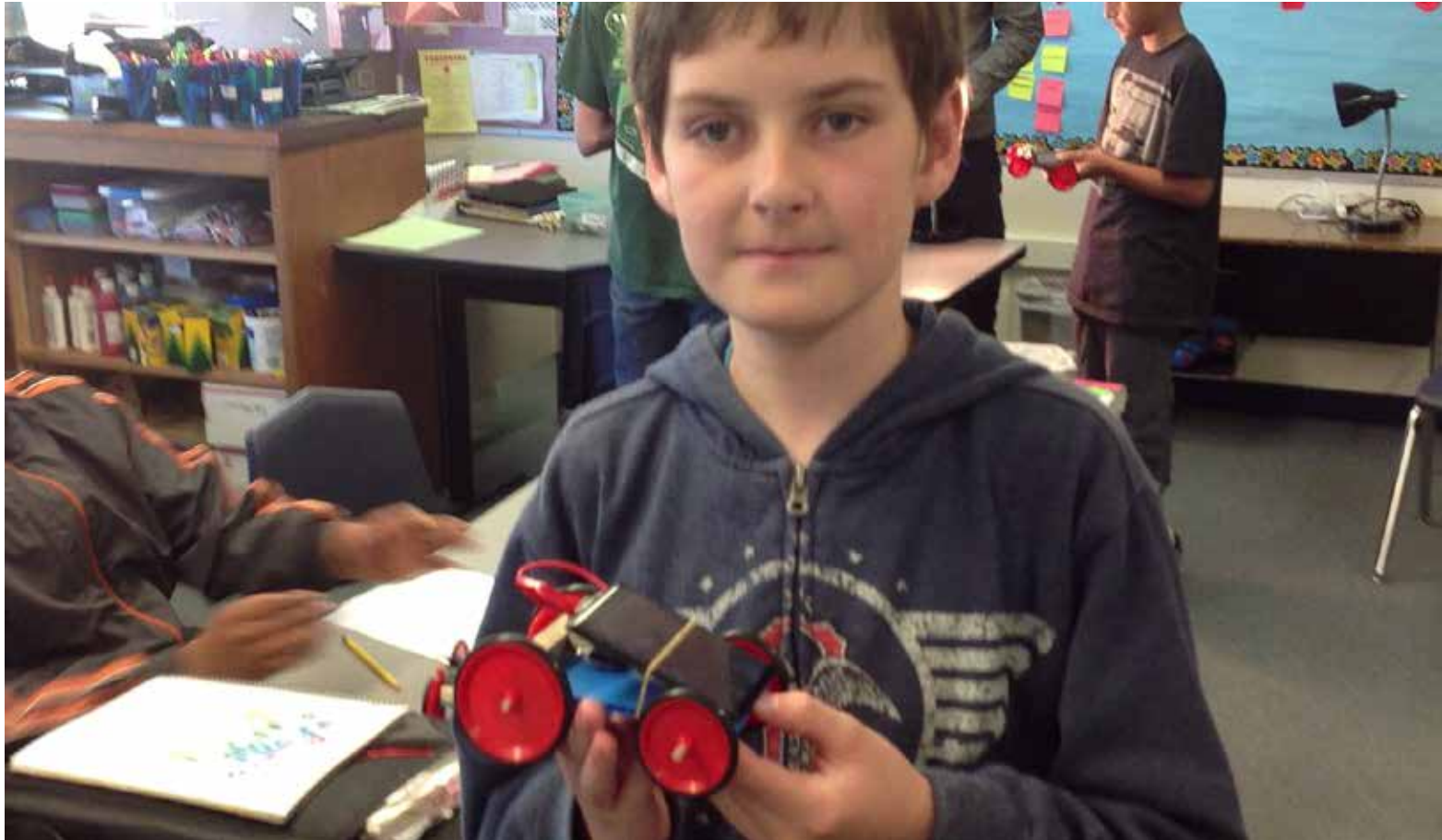
- **Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.**



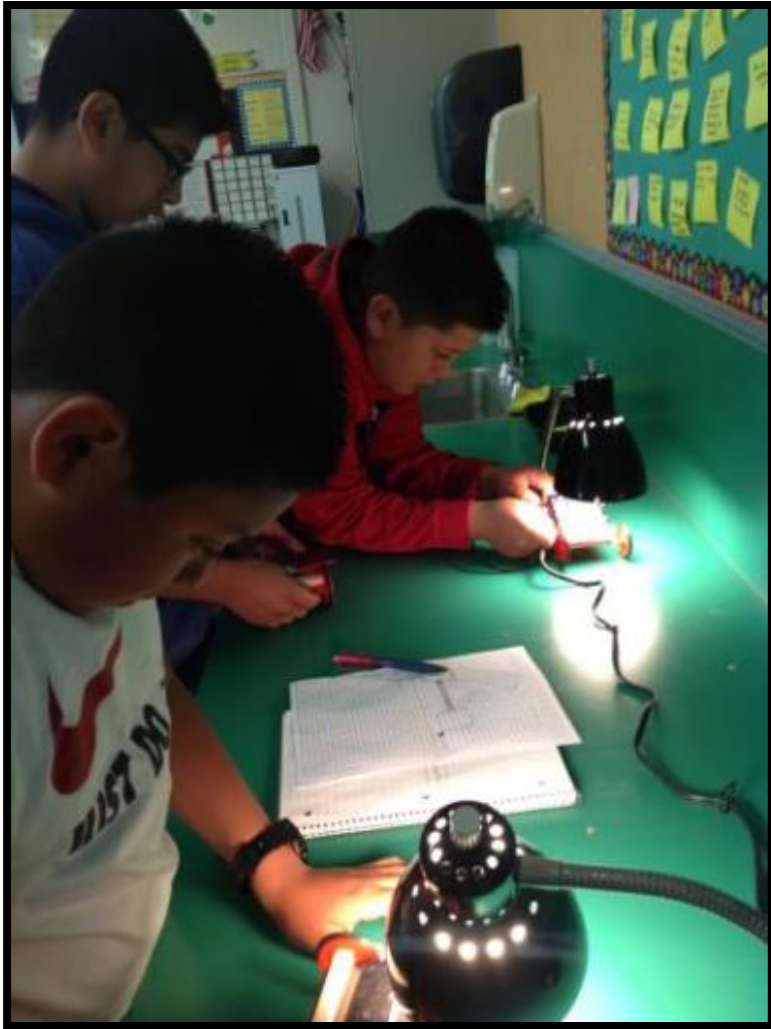
**Challenge:**  
**Using the supplies at your table, design and build the fastest car that will run on solar power**



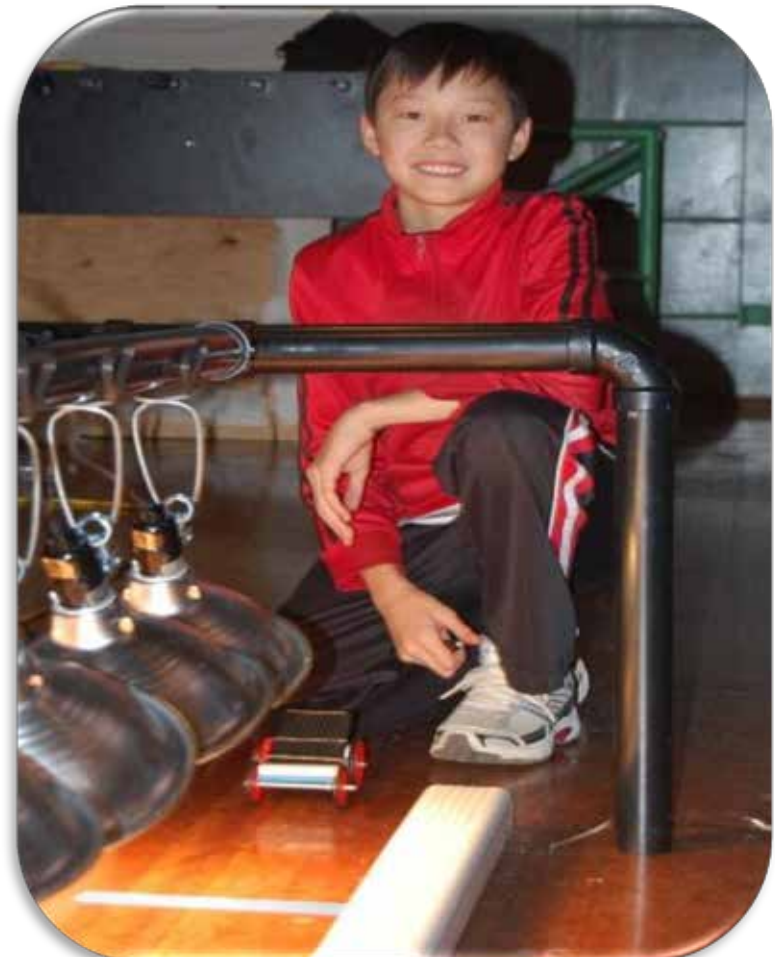
**Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.**



**Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.**



**Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.**



# Episodic Volunteer Model



**Volunteer  
Recruitment &  
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# Questions

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