

# Solar Energy

## LESSON PLAN

### NEXT GENERATION SCIENCE STANDARDS

K-PS3-1 Energy Make observations to determine the effect of sunlight on Earth's surface.  
4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.

### OBJECTIVES

The student will be able to differentiate solar energy as being either active or passive.  
The student will be able to understand that some materials store heat better than others.  
The students will be able to create graphs based on data they record

### ACTIVITIES

- Have students set out materials in the sun: bin of sand, black bin of water, white bin of water, sheets of foil, Insulation foam and a bin of mulch.
- Students hypothesize which materials will get hotter
- Each students measures the temperature of the materials every hour and records their own data.
- Middle of the day bring the materials Indoors
- Students measure temperatures of the materials every hour after sitting indoors and record.
- Students hypothesize which materials will cool down fastest
- Draw student's attention to the difference between the water In the black and the white bin as well as the foil and the mulch. Ask students why that Is Important to think about when designing solar panels/photovoltaic cells. Video: <https://www.khanacademy.org/partner-content/nova/nova-labs-topic/energy/v/solarpower>
- Draw student's attentions to which materials retained heat the best, discuss the idea of a conductor.
- Define and discuss the differences between active and passive solar energy

### OPPORTUNITIES FOR DIFFERENTIATION

#### YOUNGER STUDENTS

- Students record all data by journaling and making qualitative observations as well as noting the temperature.
- Students can get help from parents and an adult when doing this.
- In order to recognize active versus passive energy, play a game.
  - back of hand = active energy
  - palm of hand = passive energy
  - instructor reads out different scenarios of either active (solar powered oven, etc.) or passive energy (hot sand, etc.)
  - students flip their hands to choose which type of energy
  - instructor repeats faster and faster

#### OLDER STUDENTS

- Students can record all data and create line graphs based on their data either physically or using excel.
- Excel help: <https://www.youtube.com/watch?v=0kzlo84ptjg>
- Use these websites to explore the difference between active and solar energy:
  - <https://www.mrcool4ac.com/blog/heating-service/solar-heating-2/>
  - [https://www.ducksters.com/science/environment/solar\\_power.php](https://www.ducksters.com/science/environment/solar_power.php)