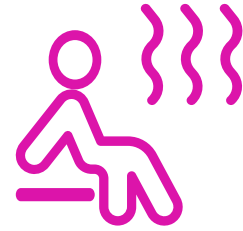


# It's Getting Hot in Here



## OVERVIEW

The heating and cooling of our homes are necessary for comfort and survival. Before the advent of independent sources of energy for such purposes (wood, natural gas, electricity), humans depended on solar energy. Young scientists investigated the absorption and reflection of solar energy on the top surface of a simple model house by collecting and analyzing actual temperature data. As an extension, young scientists are encouraged to work with family to further investigate and research the interaction of solar energy and surfaces on the heating and cooling of dwellings.

## OBJECTIVES

Students will be able to:

- collect, organize, display, and analyze temperature data.
- investigate the effect of a covering on the solar heating of a model house.

## BACKGROUND INFORMATION

Energy comes from the sun primarily as electromagnetic radiation. Sometimes the word 'radiation' connotes something dangerous and threatening. If the radiation is of high enough energy, it can be dangerous; x-rays and gamma rays are examples. At lower energies, however, radiation is not harmful to humans; light, heat, and radio waves are examples. Most of the electromagnetic radiation striking Earth coming from the sun is in the visible or infrared (heat) range. In this lesson, light and heat from the sun will be referred to as solar energy. When light or heat shines on a surface, it can be absorbed, reflected, or transmitted. Dwelling roofs of course are directly impacted by solar energy and their properties affect the extent to which the roof mainly absorbs or reflects that energy. In a few situations, people want their roofs to transmit light such as with a skylight. Knowing the absorptive and reflective properties of roofing materials is important for the design of dwellings.

## MATERIALS

- Internet
- Disposable object (brick, rock, water bottle)
- Paint (black and white)

## HOME ACTIVITIES

1. **Share Activity:** Your student could share the results and findings of the solar energy investigation they did at school for this lesson.
2. **Short Activity:** Sound, like light and heat, can reflect and be absorbed by surfaces. Locate and test surfaces found around the home that are good absorbers and reflectors of sound. Which surfaces are poor at absorbing and reflecting sounds?
3. **Short Investigation:** Paint the surface of a disposable object like a brick, rock, or water bottle black and the surface of a similar object white. After they are dry, touch both surfaces to check their temperatures then set the two objects in the sun. After several hours, again touch both surfaces to check their temperatures. Did one color do better than the other in warming the object? Why?
4. **Research Activity:** You and your young scientist could use the Internet to research a new cooler shingle made by 3M with reflecting granules: [http://solutions.3m.com/wps/portal/3M/en\\_US/IMP/DP/RoofingSolutions/Products/Cool-Roofing-Granules/](http://solutions.3m.com/wps/portal/3M/en_US/IMP/DP/RoofingSolutions/Products/Cool-Roofing-Granules/)
5. How much solar energy do these shingles reflect back into the air? Learn more about saving energy by visiting this Web site from the Department of Energy on radiant barriers and insulation.  
<https://www.energy.gov/energysaver/air-sealing-your-home>  
<https://www.energy.gov/energysaver/insulation>

## VOCABULARY

- **Solar Energy:** energy emitted by the sun.

## THOUGHT/CONVERSATION STARTERS

- I heard you created models of dwellings this week and collected data. Tell me about the project. What did you learn?
- How were homes heated and cooled before air conditioning?
- How is our home heated and cooled?

## DOCUMENT THE LEARNING IDEA

- Allow the young scientist to document the learning by reflecting in their science journal.
- Take photos using a smartphone or tablet of the object before it was painted and after. Use a free photo collage app to add the photos of the home investigation. Use text and stickers to tell what happened.
- Record a video to inform the class about what was learned after researching.

If your young scientist documents the learning, encourage them to bring their creations to class and share with the teacher.

## CONTINUE MAKING CONNECTIONS

Talk with your student about how this topic relates to the type and color of clothing people wear during different seasons and in different parts of the world. What have they noticed? If they haven't, start noticing together and make connections.

