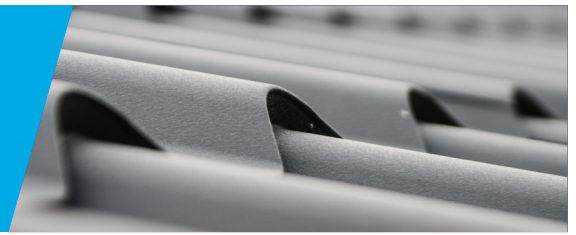


CURIOSITY AT HOME

KEEPING IT COOL



We use energy to do everyday things like cook dinner, drive cars and keep our homes cool in the summer. Much of our energy comes from burning fossil fuels, like coal and gasoline, which puts carbon dioxide and pollutants in our atmosphere. To reduce our impact on the environment, energy engineers look for ways to reduce the amount of energy we use. One of their challenges is to design buildings that require less energy to heat and cool. Could the color we paint our roofs affects how much energy we use trying to keep our houses cool in the summer? Follow the activity below to find out!

MATERIALS

- Black construction paper
- White paper
- Sunlight or incandescent lamp (any light bulb that gets hot when turned on)
- Science notebook or paper
- Something to write with
- **Optional (for older students):**
 - Thermometer
 - Two bottles or jars (same size)
 - Tape
 - Water

PROCEDURE

- Place a piece of black paper and a piece of white paper in direct sunlight or under the lamp and turn it on.
- Make a prediction: What color paper will heat up faster? What makes you think that? Record your prediction in your science notebook.

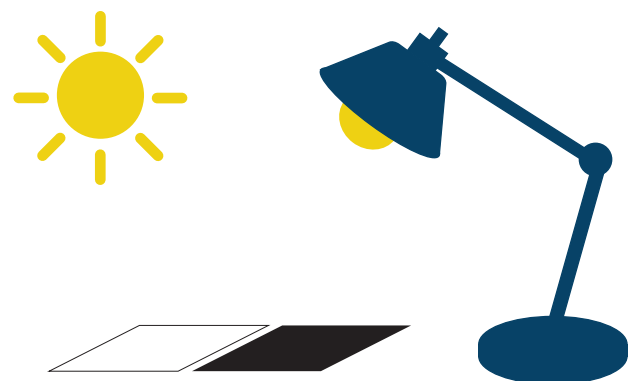
Experiment continued on next page...



Solar Panels



Green Roof



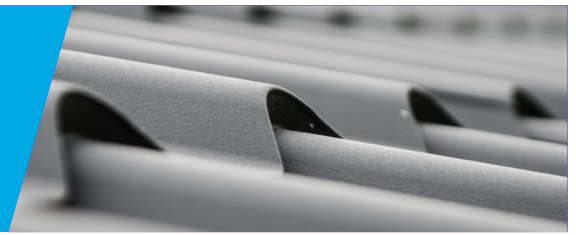
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CURIOSITY AT HOME

KEEPING IT COOL



PROCEDURE *continued...*

- After 15 minutes, feel the temperature of both papers.
- Do they feel the same temperature? Which color feels warmer? Record your results in your science notebook.
- To test your results without bias, perform a “blind test.” Ask a friend or family member to close their eyes and feel the two papers, without telling them which paper is which. Ask them which paper feels warmer.



Feel the temperature of both papers

WHAT'S HAPPENING

Materials that are white reflect light and heat, while materials that are black absorb them. Energy engineers have found that by building homes with white roofs instead of the traditional black, residents spend up to 20% less on air conditioning to keep their homes cool!

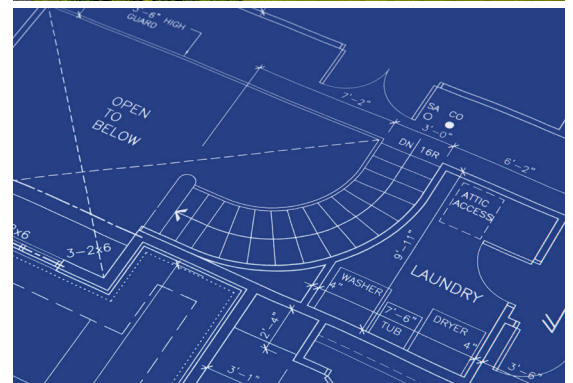


DID YOU KNOW?

Energy engineers have developed a special material that can be added to any color paint to make it reflect more sunlight, thereby keeping a building cooler no matter what color you want it to be!

EXPLORE MORE

- Imagine you were designing an energy efficient home for someone who lives in a hot, sunny place. What materials would you use? What colors would you paint it? What other features might you include? Draw a picture of your design and include labels explaining your design choices. Now imagine that you had to design an energy efficient home for someone who lives in a cool, rainy place. What features of your design would you keep? What would you change?
- Another way that energy engineers reduce energy consumption is by designing building with “green roofs.” A “green roof” is a roof that is completely or partially covered with plants, growing on top of a waterproof layer. Design a green roof for a home in your neighborhood and draw it in your science notebook. Now imagine that you’re making a green roof for your school building. How would you redesign your drawing for your school’s roof?



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CURIOSITY AT HOME

KEEPING IT COOL



K-2 GRADE EXPLORATION

Here are some questions you can explore together:

- Do you think other colors reflect or absorb heat differently? Try repeating the experiment with two other colors. Can you notice a difference in temperature?
- Different materials also reflect and absorb heat differently. Find a sunny spot near a sidewalk or driveway where the concrete meets the grass. Feel the temperature of the concrete. How does it compare to the temperature of the soil or dirt? What other materials heat up quickly in the sun? What materials can you find that stay cool?



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KEEPING IT COOL



3–5 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Record your prediction about which color paper will heat up faster. Explain your reasoning.

I predict that _____

because _____

- After 15 minutes, compare the temperature of both pieces of paper. Record your observations in the chart below, or in your science notebook.
- Perform two “blind tests.” Ask a friend or family member to close their eyes and feel the two papers, without telling them which paper is which. Ask them which paper feels warmer. Record your observations in the chart below, or in your science notebook.

	Black Paper	White Paper
Your Observations		
Blind Test #1		
Blind Test #2		

Experiment continued on next page...

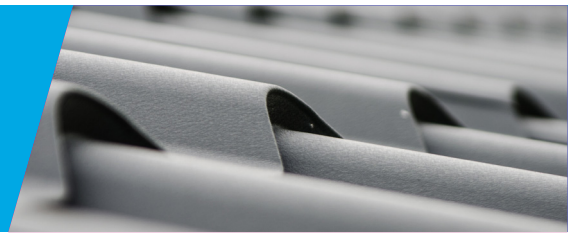


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CURIOSITY AT HOME

KEEPING IT COOL



3–5 GRADE EXPLORATION *continued...*

Different types of materials reflect more or less light and heat. Find two similarly shaped objects that are the same color but made out of different material. Repeat the experiment above. Which material feels warmer after 15 minutes? Record your observations in the table below, or in your science notebook.

	Material A: _____	Material B: _____
Your Observations		
Blind Test #1		
Blind Test #2		

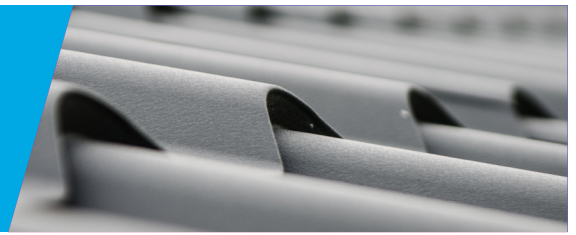


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CURIOSITY AT HOME

KEEPING IT COOL



6–8 GRADE EXPLORATION

Explore the following questions and write your observations in your science notebook.

- Wrap one bottle or jar with white paper and secure with tape. Wrap the other bottle or jar with black paper. Fill both jars with the same amount of water.
- Make a prediction: Which bottle of water will heat up faster? What makes you think that?

Position both bottles so that the light from the lamp or sun is directed towards the side of the bottles.

- Use a thermometer to compare the temperature of the water in each bottle every 5 minutes. Record your observations in the chart below, or in your science notebook.

Time	Temperature of water in white-covered container (°F)	Temperature of water in -covered container (°F)
5 minutes		
10 minutes		
15 minutes		
20 minutes		
25 minutes		
30 minutes		

- What do you notice from your data? Does it support your initial prediction?

Experiment continued on next page...



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CURIOSITY AT HOME

KEEPING IT COOL



6–8 GRADE EXPLORATION *continued...*

How does the type of material used affect the rate of heat absorption?
Repeat the experiment above, this time using two different types of materials to cover each jar (try to keep the color of each material the same as a control). Record your observations in your science notebook.

Time	Temperature of water in container cover with Material A: ____ (°F)	Temperature of water in container cover with Material B: ____ (°F)
5 minutes		
10 minutes		
15 minutes		
20 minutes		
25 minutes		
30 minutes		



Show us how you're being curious! Share your results with us.

