

STEM *Sims*™

Sunny Shelter



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**Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.**

Start learning right now about earth sheltering and other methods of making your home environmentally friendly. Take the following brief quiz to see how much you already know about green homes. See the bottom of page 4 to check your answers.

1. What percentage of energy in a building is used inefficiently or unnecessarily according to estimates by the United States Environmental Protection Agency?
 - a. 5%
 - b. 15%
 - c. 30%
 - d. 50%
2. Which world event sparked a renewed interest in earth sheltering?
 - a. World War II
 - b. The Great Depression
 - c. The Vietnam War
 - d. The Oil Crisis of 1973
3. What famous innovator has an earth-sheltered home?
 - a. Sir Richard Branson
 - b. Bill Gates
 - c. Mark Zuckerberg
 - d. Donald Trump
4. Besides making your home more energy efficient, window tinting can prevent 99% of _____ from entering your home.
 - a. germs
 - b. infrared lights
 - c. ultraviolet rays
 - d. rodents
5. Which building material has the highest R-value (meaning that it insulates the best)?
 - a. vacuum insulated panels (VIP)
 - b. aerogel
 - c. phenolic foam
 - d. polyurethane



Testing Temperature

Making your home energy efficient often has to do with heating and cooling your home. Many factors go into maintaining a comfortable temperature indoors: insulation, windows, and the size of your home. You can test these factors on a smaller scale by completing the activity below.

Supplies Needed:

- an assortment of cups (one large foam cup, one small plastic cup, four large plastic cups)
- cling wrap
- wax paper
- water
- thermometer



Instructions:

1. Fill up all of your cups with room temperature water.
2. Measure the temperature and make sure all of the cups start at the same temperature.
3. Record this temperature in the tables below in the initial temperature slot.
4. Cover one of the large plastic cups with wax paper, cover the rest of the cups with cling wrap.
5. Take all of your cups out to a sunny area and leave them there with equal exposure to the sun.
6. Come back in fifteen minutes and record the new temperatures in the tables below.

	Size	
	Small Plastic Cup w/ Cling	Large Plastic Cup w/ Cling
Initial Temperature		
Final Temperature		

	Insulation	
	Large Plastic Cup w/ Cling	Large Foam Cup w/ Cling
Initial Temperature		
Final Temperature		

	Window Type	
	Large Plastic Cup w/ Cling	Large Plastic Cup w/ Wax Paper
Initial Temperature		
Final Temperature		

Questions:

1. Which cup got the hottest? Which cup stayed coolest?
2. Did the window type have any effect on the temperature?
3. What effect does the size have on the temperature? Why do you think that is?

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“Green” His House with a South Facing Window...

A “green” home refers to a home that was built using techniques or materials that reduce its impact on the environment. The biggest way to help the environment is to become more energy efficient. Since most homes still rely on coal-burning energy, there are a lot of toxins released into the environment and heat wasted to generate all of the energy needs of our buildings. By using energy-saving techniques, you are indirectly reducing the amount of fossil fuels burned.

One energy-saving technique you can use when building your home is to maximize the use of the Sun’s heat in the winter. If you are in the Northern Hemisphere, it is best to have a large window facing south. This will get the maximum amount of natural heat to help regulate the temperature indoors. On the other hand, if you are in the Southern Hemisphere, you should build your window to face the north.



It is not enough to just have your building facing the right direction. Energy is often wasted if a building is not insulated. Insulation blocks heat from entering the house during the summer and leaving the house during the winter. A home insulating material is rated by its thermal resistance. The higher the thermal resistance, the more it will prevent unwanted heat transfer from occurring.

Another way to reduce your impact on the environment is to use alternative energy sources. Solar and wind power both harness natural energy, from the Sun and the wind, respectively. Natural energy has many positive benefits for the environment and for you; 1) no pollutants are released into the environment, and 2) solar and wind energy is free. The expense, rather, comes from the materials required to convert the natural energy into usable electricity.

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Answers: Page 2 Answers: 1) c. 2) d. 3) b. 4) c. 5) a.

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