

SOLAR ENERGY

DETECTING ULTRAVIOLET RADIATION:

Light comes to us as waves of electric and magnetic fields. That's why the scientific term for light waves is "Electromagnetic Radiation." Radiation is a way of transferring energy from one place to another. In addition to the light we see, electromagnetic radiation includes infrared, ultraviolet, microwaves, radio waves and X-rays.

We can't see the sun's ultraviolet rays, but you can certainly see their effect. When your skin absorbs too much infrared or ultraviolet radiation, you get a sunburn or suntan. Too much can cause skin cancer. Most suntan lotions have a "Sun Protection Factor (SPF)" to protect you from these harmful rays. We will test an ultraviolet detector (tells the presence of ultraviolet rays) ... on our thumbnails!

1. What color is the nail polish in the classroom? _____
2. We will walk outside into the direct sunlight. Be sure to keep your fingernail covered until asked to reveal it.
3. When exposed to the sun, what color does your polished nail become? _____
4. What does this indicate is present in the sun's rays: _____
5. Explain how the energy is being transferred/transformed.

6. Look at the cartoon below and explain what it means.

This means the dinner roll is burned because



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DAY 2...

A solar collector is one way to collect heat from the sun. A closed car on a sunny day is a **passive solar collector**. As sunlight passes through a car's glass windows, it is absorbed by the seat covers, walls and floor of the car. The light that is absorbed is transformed into heat. The windows let the light in but keep the heat in also. This is how greenhouses stay warm. An **active solar collector** uses special equipment to collect sunlight that is then converted/transformed into heat.

1. Working together in your group, write a detailed list of steps that your group will use to build your solar oven on the *Solar Oven Procedure* sheet. Get approval by your teacher to receive your materials to begin to make your solar oven.

2. Build your solar oven. As you build, refer to your procedure. *If any changes are made as your group builds your design, **record all changes** on your Solar Oven Procedure sheet in color pencil.*

3. **Draw** your solar oven in the space below. On your drawing, **describe the characteristics** of your oven that will allow your s'more to be quickly melted and retain the greatest temperature. Include the sun in your drawing. Show how energy is **transferred** from the sun to your oven and inside the oven.

Is this an example of a passive or active solar collector? (circle)

4. Build your s'more, then place in baggie with your name on it.

5. Take a gallery walk to view your classmates' oven designs. Complete the first 2 columns on the *Solar Oven Recording Sheet*. This will be started in class and then completed outside as your s'more is cooking. Complete the predicted ranking of all the solar ovens (column 3) outside after you have finished your gallery walk of all the ovens.

6. We will use thermometers to measure the temperature (°F) in various ways:

a) Place one thermometer in oven.

Record: Beginning temperature: _____ Ending temperature: _____

b) Place one thermometer on cement.

Record: Beginning temperature: _____ Ending temperature: _____

7. Place s'more baggie in your oven outside (we'll keep an eye on it... seagulls!!)

8. Let your s'more bake for 10 minutes, then record your ending temperatures. Make sure to complete the first 3 columns on the *Solar Oven Recording Sheet*. Do not continue until the first 3 columns on the *Solar Oven Recording Sheet* are completed.

9. Once in class, record your ending inside oven temperature on a post-it and attach to your oven.
8. Repeat the gallery walk of looking over all the ovens and complete the last 3 columns on your *Solar Oven Recording Sheet*.
9. Describe on the bottom of the recording sheet the similarities and differences of the ovens.
10. Now, based on the similarities and differences of all the ovens, write a procedure for a new design below incorporating your new knowledge of solar ovens..

Procedures:

1.)

2.)

3.)

4.)

5.)

6.)

7.)

8.)

9.)

10.)

11.)

12.)



Draw your new design. Make sure to label and describe any new changes that will help your oven retain the greatest temperature. Show all energy transfers and transformations.

Names _____
Group _____

SOLAR OVEN PROCEDURE

Write a detailed lists of steps that your group will follow to build your solar oven. Use the back of this worksheet if needed.

- 1.)
- 2.)
- 3.)
- 4.)
- 5.)
- 6.)
- 7.)
- 8.)
- 9.)
- 10.)
- 11.)
- 12.)