

#

Name \_\_\_\_\_

# SOLAR RADIATION

This morning you were noticing how cool it is in the morning and how warm it gets by the afternoon. With your partner, discuss where the energy comes from to heat the earth.

We know the sun's energy heats the earth but what happens to the heat once it reaches the earth? With your partner, answer: Does the sun's energy stay in one place?

How could the light energy be transferred and transformed to heat materials?

In table groups, you each have 3 thermometers. We will use them to determine **thermal energy transfers from solar radiation**. We will place two inside white or black paper covers, and leave the 3rd alone in the sun (no cover). Make a prediction which thermometer will get hotter faster? \_\_\_\_\_

Explain why: (The \_\_\_\_\_ thermometer will get hotter because \_\_\_\_\_)

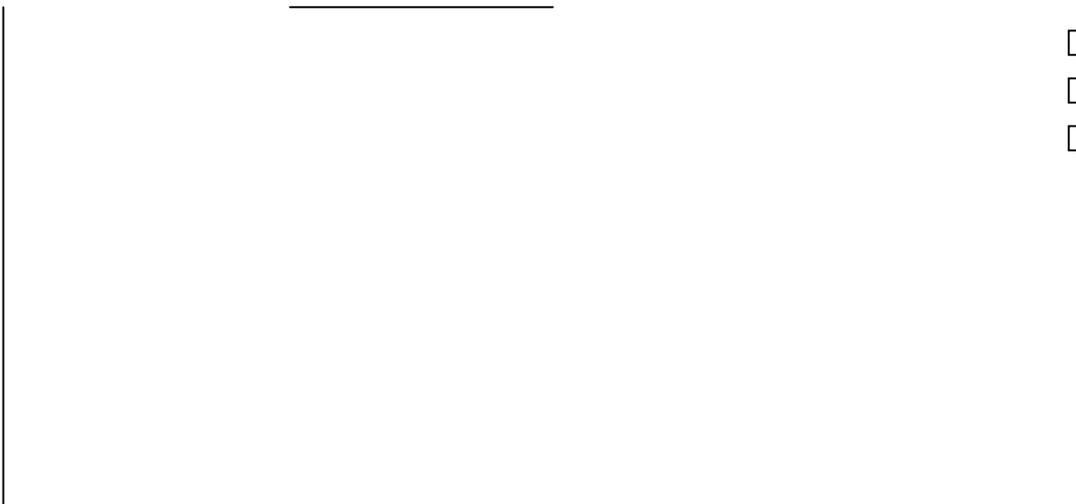
Assign a thermometer to each student. Record your location: \_\_\_\_\_

Time – Minutes	Temp – Black Cover	Temp – White Cover	Temp – No Cover
0 Min –Beginning			
1 minute			
2 minutes			
3 minutes			
4 minutes			
5 minutes			

Based on the data collected, which color shirt would keep you cooler on a sunny day?

Explain: (On a sunny day, a \_\_\_\_\_ colored shirt will keep you cooler because\_\_)

Create a triple line graph to show your results. Use a different colored line for black cover, white cover and no cover. Make a colored key to make it easily read.



- KEY
- Black
  - White
  - Alone

Conclusion:

1. What relationship(s) do you see on your graph? Explain
2. What differences do you see between the maximum/minimum temperatures for each thermometer each group found? Explain
3. Why do you think these differences occurred? (does the location of the thermometer affect the maximums?)
4. Which thermometer and/or environment would maximize the thermal energy transfer? Explain why
5. Which thermometer and/or environment would minimize the thermal energy transfer? Explain why

Solar Radiation Set Up Photos



#

Name

# Peanut Energy!

There is energy in food... it is stored energy – Potential Energy. The burning of a peanut releases heat stored in the carbohydrates and fats making up the peanut. When you eat a peanut, your body performs the chemical reactions necessary to release the energy stored in the carbohydrates and fats. We will actually light the peanut on fire and let it burn so that the hydrocarbons in the carbs and fats undergo **combustion**. Burning something is **combustion**. The heat from the peanut will be transferred to the water. **The energy stored in the peanut is released and transformed to heat and light.** There is a similar reaction in our body, we burn the food out in combustion, but we don't use a match, we use enzymes. The fuel (peanut) will be consumed.

## Materials Needed:

Goggles	Metal can or beaker	Wire stand	Stopwatch
Thermometer	Graduated Cylinder	Peanut	Water
Foil Shield for desk	Cork with pin	Wood block	Taper Candle

## Procedure;

1. Put on goggles and leave them on until end of lab.
2. Measure 100 ml water in the graduated cylinder and pour into can/beaker.
3. Place beaker on the wire stand.
4. Take initial temperature of the water and record using C°.
5. Weigh your peanut and record the mass
6. Carefully place shelled peanut on the end of the pin.
7. Place foil shield between you and your partner and place wood block in the center.
8. Put cork with peanut on the block and carefully place wire stand over the middle.
9. Let your teacher know when you are ready to light the peanut (teacher will light).
10. Start your stopwatch and make careful observations and record temperature of water every 30 seconds.
11. When the peanut burns out, let it cool, then weigh it again and record.
12. Pour water back into graduated cylinder and measure amount.

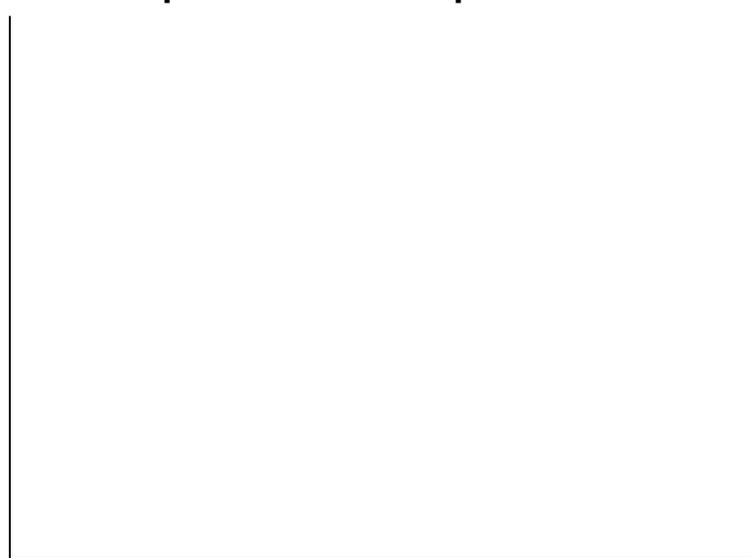
## Temperature Recording Table C°

Beginning water temperature	
:30 minute	
1:00 minute	
1:30 minutes	
2:00 minutes	
2:30 minutes	
Ending water temperature	

Ending time:

Explain what your graph shows:

## Line Graph of Water Temperature



### Data Table:

You will record the data from your trial and compare it with your tablemates' data

<u>Energy of a Peanut</u>	<u>Your Trial</u>	<u>Tablemate Trial</u>
Mass of Peanut (g)	_____g	_____g
Mass of remaining material (g)	_____g	_____g
Calculate mass burned	_____g	_____g
Volume of liquid water (beginning)	<u>100</u> mL	<u>100</u> mL
Volume of water after heated	_____mL	_____mL

### Observations:

1. Describe how the peanut burned.
2. How did the peanut look after it burned?
3. Compare the mass of the peanut before and after burning it. Explain what happened. Tell where the mass went.
4. Compare your trial results with that of your tablemates. Discuss how they are the same and how different. Give reasons for being similar and also for any differences.  
Same: \_\_\_\_\_ Different: \_\_\_\_\_

Reasons:

Conclusion:

5. The **Law of Conservation of Energy** says Energy is always conserved. Therefore, the energy given off by the burning peanut, equals the energy gained by the water. Look at your results and observations and give evidence that when fuel (peanut) is consumed, the energy transforms to a different form in the water.

Explain all the ways the energy was transferred/transformed.

Using your evidence/data, explain how you know this.

## Peanut Lab Set Up Photos



Cork with pin and foil shield



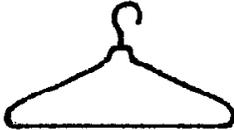
Peanut attached. Note, insert peanut on the pin so that it is perpendicular to natural break of peanut. It is important to insert pin in this portion of the peanut so that the peanut does not break and stays whole on the pin.



Set up for each table group of 3 - 4 students. At this time, the teacher will come around and light the peanut for the students using the taper candle. It takes a bit of time to ignite the peanut... be patient. Must wait until the peanut is burning on its own before placing it back on the block.

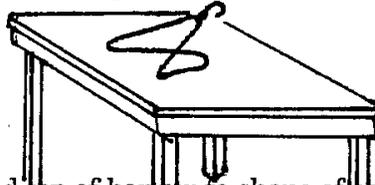
## Nuts to You Assembly (Coat Hanger)

Pull corners of hanger together



Bend the hook down and under to make a holder for bottom of can

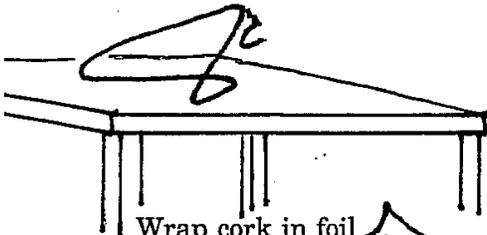
The new shape will stand on a table



Bend top of hanger to shape of can.



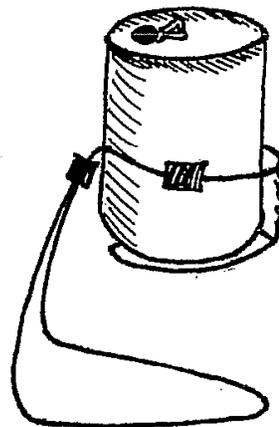
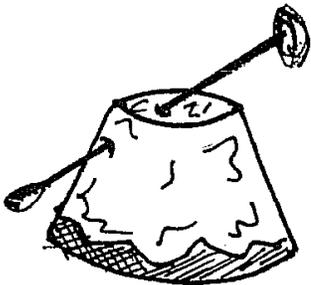
Next put can in place and hold with tape



Wrap cork in foil



Put pin through top edge of cork and put nut on point of pin carefully



Put cork and nut under can. There should be about one inch between nut and bottom of can

