Thermo #2: Melts in you bag, not in your hands

OBJECTIVE	Show the transfer of heat through radiation.
OVERVIEW	The students will learn how the sun transfers heat to the earth through radiation.
TOTAL TIME	20 minutes
SUPPLIES	Two (2) small pieces of chocolate Two (2) small resealable snack bags
PRINTED/AV MATERIAL	None
TEACHER PREPARATION	This works best on a hot sunny day. You can also complete this demonstration indoors on a sunny winter day.

Background

The earth receives its heat from the sun in the form of radiation. Many in the animal kingdom lay out in the sun to absorb this form of energy to warm their bodies. This form of energy is vital to life on this planet.

Procedure

1. Place one piece of chocolate in a bag, seal it and label it with an 'A'.
2. Do the same with the second piece of chocolate but label that bag with a 'B'.
3. Take both bags outside and place bag 'A' in the sun and bag 'B' in the shade. Suspend bag 'A' in such a way to ensure is not touching the ground or located near a wall to limit any transfer of heat by convection or conduction. (If this experiment is done indoors, place bag 'A' in the window, exposed to the sun and keep bag 'B' in the shade.)
4. 20 minutes later, inspect the chocolate in both bags.
5. Ask the students to explain any change in consistency of the chocolate.

Discussion

Depending on how hot it is, the chocolate in the shade may also be softened or even partially melted. However, the chocolate in bag 'A' will be more melted. The bulk of the heating that takes place in bag 'A' is from direct solar radiation. This radiation is what

causes objects, such as the metal on automobiles, to become hot. Radiation also causes sunburns.

Fast Facts
The initial melting temperature of chocolate is approximately 122°F (50°C). Americans eat an average of 11 lbs. (5 kg) of chocolate per person per year. The Swiss eat an average of 26 lbs. (12 kg) per person per year.

NOAA – National Weather Service