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## Unit 4: Heat and Matter Overview: Day 1-2

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Title: Solar Oven: Radiation

Unit: Heat and Matter

Rationale: The lesson is designed to help the student understand heat transfer through radiation.

Outcomes:

- The student will be able to explain heat transfer through radiation.
- The student will be able to identify a typical heating curve.

Preparation:

Situation:

Duration: 100 minutes

Setting: Laboratory

Materials: Cardboard, aluminum foil, plastic wrapping paper, other materials as provided by teacher and students, student worksheets for Lab 4-1: Solar Oven: Conduction

Interactions: groups of three to five students

Procedure:

1. Warm up: Have students respond in writing to the question: What effect does standing at a window that the sun is shining into have?
2. **K** – Ask students what they know about how things get hotter. Accept and record all answers. Prompt for answers having to do with heating by radiation, including heat lamps, incandescent bulbs, tanning lamps and beds and sunlight.
3. **W** – Ask students what kind of questions they think they can answer by making measurements of how sunlight increases temperature. These are the researchable questions students will be investigating. Have students make predictions of what they think the answers will be.
4. Begin Lab 4-1: Solar Oven: Conduction. Monitor the investigation. Focus students' attention on the researchable questions. Have students complete the Observations and Analysis sections of the lab.
5. **L** – Discuss what was learned about heating by radiation. Record these under Learn on the K-W-L.
6. Wrap up: Have students write two ways that we use and enjoy the heat from the sun, two ways we do not enjoy the heat from the sun and two ways that we take precautions or use something to avoid damage or discomfort because of the heat from the sun.

## Daily Lesson Plans

### Description

#### Instructional Strategy

Have students discuss radiation (Think-Pair-Share). Have students report out with a list of radiation sources. Examples may include radio transmitter, heat lamp, microwave oven, microwave transmitter, cell phone, television, objects that have colors (reflected visible light is a radiation), UV lamp, nuclear power plant, and numerous others, but must include the sun. Discuss the “danger” of each radiation source and note that the danger may be related to the energy of the radiation absorbed. Have students make up, or add to a chart that ranks the radiation danger from one to ten. Discuss which radiations come from the sun and how to protect yourself.

#### Content Background:

This lab involves building a collector for solar energy. The important materials include 1) a cardboard box or other insulated chamber to serve as a heat reservoir and 2) a clear panel to serve as a solar collector. The panel should let radiant heat in, but not allow conduction to the outside air. The collector will eventually reach a point of equilibrium where the amount of heat being lost will be equal to the amount of heat being gained.