HU GK-12 Program: 12-13-07

Activity:

The fellow will help demonstrate concepts of heat transformation and kinetic energy.

Title:

“ICEY HOT”

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DCPS Standards:

8.5.8.

Investigate and explain that heat energy is a common product of an energy transformation, for example, in biological growth, the operation of machines, the operation of a light bulb, and the motion of people.

8.2.8.

Describe how the atoms, molecules, or ions comprising an object are in constant individual motion, and explain how their average motional (kinetic) energy determines the temperature of the object and how the strength of the forces between them determines the state of matter at that temperature.

Goals

The students will demonstrate knowledge of heat transformation through a laboratory experiment and inquiry based slide show presentation.

Objectives

The students will form hypotheses, answer questions and make line graphs on data from experiment and presentation.

Background

Heat is defined by Prentice Hall as the transfer of thermal energy from one object to another because of a temperature difference, which essentially allows heat to flow spontaneously from hot objects to cold objects. Temperature is a measure of how hot or cold an object is compared to a reference point. Therefore, temperature is very similar to kinetic energy because particles in

motion act randomly. This is reason why hot liquids have molecules that are bumping past each other while solid liquids have molecules that are not in motion at all. Essentially, this goes to show the potential energy that will be transferred to kinetic energy during any of the liquid phase changes. The concept that was just described is known as thermal energy, because thermal energy is the total potential and kinetic energy of all particles in an object.

Materials:

- Beaker
- Hot plates
- Ice
- Thermometer
- Water

Procedure/Evaluation and Assessment

1) Heat beaker with approximately 100 – 200 mL of water
2) When temperature of water reaches approximately 70°F, record this temperature then place 3 ice cubes into the beaker.
3) Record the thermometer temperature once a minute for 15 minutes.
4) Repeat the same steps (1-3) with water that is at room temperature that is not being heated.
5) Record each set of results and make a line graph comparing the temperature fluctuation of each separate beaker.

Note to Teacher:

If you don't have enough time to do experiment in its entirety, you could do this experiment for 5-10 minutes, but if you have more time than planned you could do this for up to 20 minutes. Also, you can run each experiment concurrently, to help speed up the lab activity. This

experiment should be done under constant supervision; therefore, it may be wise to have only 1-2 lab stations to keep students safe.

Reference:

Classroom text:

Physical Science. Frank, Wysession, and Yancopolous. Prentice Hall. Boston, MA. 2006.

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