The Therminator
5th Grade

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Benchmarks:

PS-1:Define temperature as the measure of thermal energy and describe the way it is measured.

PS-2:Trace how thermal energy can transfer from one object to another by conduction.

Objectives:

Students should be able to identify and understand the differences between thermal conductors and insulators. They should also be able to give the "scientific" definition of temperature as "the measure of thermal energy in an object."

Materials

Hot water
Plastic utensils
Metal utensils
Straws
Aluminum foil
Copper wire
Teflon tape
Plastic tubing
Any other conductor or insulator you wish to test

Initial Observation/Demonstration:

I will show the students a variac hooked onto a heating pad. I will ask if they think the heating pad is hot (this is a chemistry lab item that looks like it is made out of cotton). Depending on the responses, we will discuss how it can get hot. I will introduce the fact that electrical energy can be transformed into other forms (light, heat) of energy.

Initial Observations:

Students should observe (actually should already know) that some items are thermal insulators and some are thermal conductors.

Initial Model:

Students will write down a list of characteristics for what they think of insulators and conductors (ie: Conductors: shiny, metal, reflective…etc.)

Procedure:

Students will be broken into small groups and given the opportunity to get some items that they believe will conduct heat (thermal energy) from hot water. They will also be supplied with tape to create their device.

Each group will be told to create a "therminator" that is as long as possible. They need to keep in mind that their therminator must conduct the heat all the way to the end. The

temperature of the end of their device will be tested before and after it is inserted in the water with an electronic thermocouple thermometer.

The group whose therminator is the longest and hottest will win a special prize.

Discussion/Summary:

The students will make a revised list of the characteristics of thermal conductors and insulators. Their lists must be composed of at least 5 characteristics for conductors and 5 for insulators. They will be allowed to use their new books for this.

Revised Model:

Each student will write a conclusion of what they learned. The last portion of their writing will be a plan for what material they would use if they could have anything to create their therminator.