

S3P1: Heat
Dates: 11/2 – 12/11

Key Terms

Heat²

Heat Energy²

Heating²

Cooling²

Temperature²

Celsius²

Friction²

Conduction²

Conductor²

Insulators²

Insulation²

Hot¹

Cold¹

Warm¹

Light/Dark Colors¹

Thermal Energy³

Chemical Reaction³

Thermometer²

Measurement²

Energy²

Energy Transfer²

Melting²

Freezing²

Boiling²

Vapor²

Solids²

Liquids²

Gases²

Evaporation²

Categorize²

Framework for Teaching:

Students Will Be Able To:

1. Classify different ways in which heat is produced [burning, rubbing (friction), mixing different substances].
2. Compare and contrast the ways that heat is produced [burning, rubbing (friction), mixing different substances].
3. Relate insulation to heating and cooling using cause and effect relationships.
4. Discuss and explain the transfer of heat from the sun to different types of materials.

5. Compare and contrast the transfer of heat from the sun to objects based the physical attributes of the objects (i.e. color, size, composition, etc.)
6. Do an experiment with thermometers and evaluate the changes in temperature using time and appropriate academic vocabulary.
7. Differentiate and relate the terms heat and temperature. Use vocabulary to describe terms related to thermal energy, hot, cold, and warm.
8. Identify and categorize situations where boiling, freezing, and melting are involved.
9. Relate phase changes to solids, liquids, and gases. (I recommend using water per the Milestones study guides)

For the teacher to know for their own understanding and to avoid misconceptions:

1. Insulators are materials that do not allow heat or energy to flow through them easily. Conductors are materials that allow heat, energy, and electricity to flow through them fairly easily (depending on the material). This unit covers insulators.
2. Temperature is not heat but it is the measure of kinetic energy in particles. For example gas particles move quickly giving them a great deal of kinetic energy (KE is directly related to speed).
3. A kid friendly definition would be temperature is the measure of hotness or coldness an object has. This explains why the gas form of substances are at higher temperatures than liquid forms of the same substance (e.g. Water is in liquid form until the temperature reaches 212°F/100°C).
4. Heat is the amount of energy in a substance.
5. The transfer of heat from the sun is called radiation.
6. Lighter colors reflect more of the sunlight making them cooler. Dark colors absorb more of the sunlight making them hotter.
7. A thermometer measures temperature NOT heat.
8. Energy is wasted in the form of heat. (Our cars waste gas due to heat lost by the engine)
9. Friction is a force that produces heat.

Activities (Suggestions)

- ✓ **Heat and Insulation Activity (via Milestones Study Guide)****
- ✓ **Measuring Temperature (pg. 152 in the textbook)**
- ✓ **Getting Warmer (pg. 164 in the textbook)**
- ✓ **Where's the Heat (pg. 176 in the textbook)**

Notes:

This unit requires a great deal of demonstrations where students are using touch. Heat cannot be seen but it can be felt. Heat is very abstract so make sure that you use hands on activities to support the idea of heat. Cold is a lack of heat or energy. Have discussions with students about heat and use the instruments that are involved with this unit (i.e. thermometers) to help students quantify the idea of heat and temperature. There is a great deal of journaling and data collection that can be done with this unit due to the time it takes for ice to melt and water to boil. Allow students to collect both qualitative (written without numbers) and quantitative (numeric) data measurements.