

# Brunswick School Department

## Science

### Grade 7: Heat Energy

Adopted:

#### **Unit Overview**

In this unit, students will investigate the three types of heat transfer caused by the Rule of Heat – conduction, convection, and radiation. They will explore the relationship between heat energy, temperature and phase change on both a macro scale and a molecular level.

#### **Essential Understandings**

- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other.
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they collide. In a solid, atoms are closely spaced and may vibrate in position.
- As heat energy and/or pressure is added or removed, changes of state can be predicted and described.
- Thermal energy is the motion of atoms or molecules within a substance.
- Heat refers to both thermal energy and the energy transfer due to the temperature difference between two objects.
- The temperature of a system is proportional to the average kinetic energy of the particles. Temperature is not the same as total thermal energy.
- Thermal energy will always travel from where there is more to where there is less (via conduction, convection, and/or radiation), unless prevented, as by insulation.

#### **Priority Standards and Performance Indicators**

(as based on Next Generation Science Standards)

##### **P.S.S-1: Demonstrate an understanding of energy and matter.**

c. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

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**Next Generation Science Standards addressed in this unit**

- MS-PS3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.
- MS-PS3-4 Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

**Examples of Formative / Summative Assessments**

- Heat Energy pre-test
- Labs
- Activities
- Quizzes
- Discussions
- Handouts
- Home work
- Penguin Shelter Engineering Activity

**Sample Texts and Materials/Resources**

University of Colorado PhET simulations  
American Chemical Society Middle School Chemistry