Physical Science

UNIT 3 – ENERGY

Standards, Elements & Skills:

S8P2. Students will be familiar with the forms and transformations of energy.

a. Explain energy transformation in terms of the Law of Conservation of Energy.

Skills:

- Identify the energy form being transformed from one form to another.
- Illustrate the flow of energy through a system.
- Explain energy transformation using the Law of Conservation of Energy

b. Explain the relationship between potential and kinetic energy.

Skills:

- Differentiate between potential energy and kinetic energy.
- Give examples of potential energy converting to kinetic energy.
- Predict how an increase in potential energy will affect kinetic energy.

c. Compare and contrast the different forms of energy (heat, light, electricity, mechanical motion, sound) and their characteristics.

Skills:

- Compare and contrast the characteristics of the different forms of energy.

d. Describe how heat can be transferred though matter by the collision of atoms (conduction) or through space (radiation). In a liquid or gas, currents will facilitate the transfer of heat (convection).

Skills:

- Describe how heat can be transferred through matter by
- the collision of atoms (conduction)
- through space (radiation)
- Describe how convection currents will facilitate the transfer of heat in gas or liquid.

Key Learnings

Students will know that:

- Energy is the ability to cause change.
- Kinetic energy is the energy of motion.
- Potential energy is the energy of position.
- The Law of Conservation of Energy states that energy is neither created nor destroyed but is interchangeable with matter.
- Energy can be transformed from one form to another (i.e. electric to mechanical in a radio).
- Temperature is a measure of the average value of the kinetic energy of the molecules in a substance.
- Temperature is measured using a thermometer having a scale that is Fahrenheit, Celsius, or Kelvin.
- Heat is transmitted by conduction, convection, and radiation.
- Heat moves from an object or material having a greater temperature to one having a lower temperature.

Vocabulary:

- Energy - The ability to do work or cause change; the ability to move an object some distance.
- Thermal energy - The total potential and kinetic energy of the particles in an object.
- Heat - Thermal energy that is transferred from matter at a higher temperature to matter at a lower temperature.
- Temperature - A measure of the average energy of motion of the particles of a substance.
- Fahrenheit - The temperature scale on which water freezes at 32 degrees and boils at 212 degrees.
- Celsius - The temperature scale on which water freezes at 0 degrees and boils at 100 degrees.
- Kelvin - The temperature scale on which 0 is the temperature at which no more energy can be removed from matter.
- Conduction - The transfer of heat from one particle of matter to another; a method of charging an object by allowing electrons to flow by direct contact from one object to another.
- Convection - The transfer of heat by the movement of currents within a fluid.
- Radiation - The transfer of energy by electromagnetic waves.

Essential Questions:

1. What is energy?
2. How does energy change form?
3. What is temperature?
4. How is heat transferred?
5. What are the two basic kinds of energy?
6. How are energy, work, and power related?
7. How can you determine an object's mechanical energy?
8. How are different forms of energy related?