|  |  |  |
| --- | --- | --- |
| M. Angileri | **6th grade science** | **Lesson Plans 1-14-19 Thermal Energy Transfer #2** |
| NGSS Standards | **MS-PS3-3**DCI :  **MS-PS3-4****MS-PS3-3**S & E practicesCCC | Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.Temperature is a measure of the average kinetic energy of particles of matter. The relationship between the temperature and the total energy of a system depends on the types, states, and amounts of matter present.Energy is spontaneously transferred out of hotter regions or objects and into cooler ones.Apply scientific ideas or principles to design, construct, and test a design of an object, tool, process, or system.**Energy and Matter:** The transfer of energy can be tracked as energy flows through a designed or natural system. |
| Essential Question | What type of cup would keep my coffee the hottest?How can you maximize the thermal energy transfer in a system? |
| Vocabulary: | **Conductor:** A substance that allows the flow of electric charge or transfers thermal energy through matter.**Conduction**: Transfer of thermal energy that occurs in solids, liquids, and gasses when two substances of different temperatures touch.**Convection:** Heat transfer caused by the rising of hotter, less dense fluids and the falling of cooler more dense fluids.**Energy:** The ability of a system to do work; required for changes to happen within a system.**Heat Transfer:** The thermal energy exchanged between two objects of different temperatures; energy will continue to move in a predictable pattern from warmer site to a cooler site; until all sites have reached the same temperature.**Kinetic Energy:** Energy of motion.**Matter:** Anything that has volume and mass; occurs as elements, compounds, and mixtures.**States:** Distinct forms of matter known in everyday experience; states include solid, liquid, and gas; also referred to as phases.**System:** A group of interacting or interdependent elements forming a complex whole as in all the factors or variables in a environment or all the variables that might affect a science experiment.**Temperature:** Average kinetic energy of all the particles in a material; measured by a thermometer in degrees. Usually C or F.**Thermal Energy:** Thermal Energy is the total kinetic energy of the tiny particles that make up matter. The faster the particles move, the warmer the matter becomes.**Solid:** A state of matter that has a definite shape and a definite volume.**Liquid:** A state of matter that has no definite shape but has a definite volume.**Gas:** A state of matter with no definite shape or volume.**Particle:** Used as a general term for the atoms and molecules that make up all matter. |
|  | **MONDAY** | **TUESDAY** | **WEDNESDAY** | **THURSDAY** | **FRIDAY** |
| Content Objective: | SW demonstrate how the transfer of energy can be tracked as energy flows through a designed or natural system by carrying out and investigation. | SW demonstrate how the transfer of energy can be tracked as energy flows through a designed or natural system by carrying out and investigation. | SW demonstrate how the transfer of energy can be tracked as energy flows through a designed or natural system by carrying out and investigation. | SW demonstrate analysis of the relationship between the temperature and the total energy of a system by finding connections between the data presented in a graph. | SW demonstrate evaluation of the relationship between the temperature and the total energy of a system by reflecting on classroom experiences. |
| Language objective | SW write to evaluate the relationship between the transfer of energy can be tracked as energy flows through a designed or natural system by drawing conclusions using sentence frames. | SW write to evaluate the relationship between the transfer of energy can be tracked as energy flows through a designed or natural system by drawing conclusions using sentence frames. | SW write to evaluate the relationship between the transfer of energy can be tracked as energy flows through a designed or natural system by drawing conclusions using sentence frames. | SW read/write to synthesize information about the relationship between the temperature and the total energy of a system using complete sentences. | SW speak/write to explain the relationship between the temperature and the total energy of a system using content specific vocabulary. |
| In class today | Revisit KWL and Graphic OrganizerExplore2: Energy Transfer and Matter Experiment and follow up. | Ex 2 write up dueExplore 1 Types of Thermal Energy Transfer (Part 2 convection and Part 3 Radiation) | Explore 1 Types of Thermal Energy Transfer (part 1 conduction) | Ex 1 write up dueCER writing (Type 3)Read Science A: Thermal Transformations | Peer editing of CERRewriteReview Science A and Quiz |
| Unit Guiding Questions | What is the relationship between temperature and thermal energy? | Does energy transfer from hot to cold or cold to hot? | What is the difference between conduction, convection, and radiation. | What factors affect the amount of energy transfer needed to change the temperature of matter? |  |

**Preconceptions:** These preconceptions can be addressed as students move through the scope; they do not need to be clarified at this point. Be sure to keep in mind the preconceptions uncovered during this APK as you move through the scope.

**Students may think that heat and cold are different.**

Cold is the absence of heat. Heat and cold can be thought of as opposite ends of a continuum.

**Students may think that cold is transferred from one object to another.**

Heat is transferred from one object to another. Heat moves from high temperature to low temperature.