Science Planning

**Unit 2: Energy Affects Matter (7-9 weeks)**

**Week 6 Big Idea: Some materials help maximize or minimize the flow of heat transfer.**

Week 6 –12/16- 12/20

12/16 - YWBAT determine the relationship between temperature, the amount of heat transferred, and the change of average particle motion in various types or amounts of matter

Success is: recording and evaluating data, and communicating the results of the investigation

Phenomena: ice in different containers melts at different rates

* Students are asked to feel the carpet and then feel the tops of their desks. What do they notice about the temperature?
  + They should say that one feels colder, while the other feels warmer.
  + Explain that even though they feel different, they are actually the same temperature. How could this be? Different materials conduct heat differently.
* Each table is given ice, and 5 different types of cups (red solo cup, styrofoam cup, glass, double-walled plastic, thermos paper cup, porcelain, etc.)
* Guide whole class on how to plan an investigation to answer a question (How do different substances or types of matter affect the rate of change in temperature or average speed of particles?).
  + 1. Come up with a plan; 2. Identify variables; and 3: Record and track data.
* Students put the same amount of ice in each cup and time how long it takes for the ice to melt.
* After data collection, students classify materials based on how well they let heat transfer or didn't
  + Those that allowed heat to transfer easily and had ice melt the fastest are called conductors, while those that did not allow heat to transfer are called insulators
* Exit ticket: write about the difference between insulators and conductors
* Frontload next week’s challenge: bring insulating materials!

12/17 - YWBAT define a problem, its criteria, and decide constraints

YWBAT build, test, and evaluate design solutions; will propose modifications for optimizing design solutions and then test them again

Success is: design an object, tool, or process that minimizes or maximizes heat energy transfer

Success is: use engineering design solutions to explain how the structure of different materials allows them to function as either conductors or insulators

Phenomena: Minimize Heat Transfer ideas: winter clothes, snow boots, thermoses, mini coolers, oven mitts, solar ovens, and cooking utensils

* Students are presented with an engineering challenge:
  + Students must insulate a plastic solo cup in order to keep hot chocolate warmer for longer. No lids are allowed.
* Provided materials: foil, fabric scraps, rubber bands, ziploc bags, paper
  + Additional materials may be brought from home
* Students begin brainstorming a solution. In their journals, they should be drawing a prototype, listing materials needed, and explaining why they think their idea will work

12/18 - YWBAT define a problem, its criteria, and decide constraints

YWBAT build, test, and evaluate design solutions; will propose modifications for optimizing design solutions and then test them again

Success is: design an object, tool, or process that minimizes or maximizes heat energy transfer

Success is: use engineering design solutions to explain how the structure of different materials allows them to function as either conductors or insulators

Phenomena: Minimize Heat Transfer ideas: winter clothes, snow boots, thermoses, mini coolers, oven mitts, solar ovens, and cooking utensils

* Engineering day
  + Discuss process: test, revise, test, revise
* Students build initial models

12/19 - YWBAT define a problem, its criteria, and decide constraints

YWBAT build, test, and evaluate design solutions; will propose modifications for optimizing design solutions and then test them again

Success is: design an object, tool, or process that minimizes or maximizes heat energy transfer

Success is: use engineering design solutions to explain how the structure of different materials allows them to function as either conductors or insulators

Phenomena: Minimize Heat Transfer ideas: winter clothes, snow boots, thermoses, mini coolers, oven mitts, solar ovens, and cooking utensils

* Engineering day
* Students test initial models and make revisions

12/20 - YWBAT define a problem, its criteria, and decide constraints

YWBAT build, test, and evaluate design solutions; will propose modifications for optimizing design solutions and then test them again

Success is: design an object, tool, or process that minimizes or maximizes heat energy transfer

Success is: use engineering design solutions to explain how the structure of different materials allows them to function as either conductors or insulators

Phenomena: Minimize Heat Transfer ideas: winter clothes, snow boots, thermoses, mini coolers, oven mitts, solar ovens, and cooking utensils

* Final test day
  + Students test insulation ability by taking the temperature of hot chocolate at one-minute intervals for five minutes.
* Students analyze data and results and discuss, in writing, what was happening and how they might improve their design.