1. Big Idea: The students will investigate how heat moves from one object to another.

2. Standards
   - **3-4**: The student will demonstrate an understanding of the changes in matter that are caused by heat.
   - **3-4.3**: Explain how heat moves easily from one object to another through direct contact in some materials (called conductors) and not so easily through other materials (called insulators).

3. Goals and Objectives:
   - The students will use creativity and resources available to investigate materials and the transfer of heat as exploration takes place.
   - The students will utilize materials to test different insulators and conductors to critically comprehend and communicate the exploration of heat.

4. Time Line: The Action Plan will be implemented during the end of the third nine weeks. Students will record their work/accomplishments in their Engineering Portfolio after each lesson.
   - Day 1: Students perform research on conductors and insulators answering essential questions such as: what are the purposes of conductors and insulators, how do they work, what types are already available?
   - Day 2: Design a poster that demonstrates student’s research findings (as opposed to a full report).
   - Day 3: Formulate plan of construction of an insulator and a conductor (use Plan and Development sheet)- list what materials are needed, sketch what proposed plan will look like.
   - Day 4: Begin constructing.
   - Day 5: Test different materials. Use a light bulb for energy heat along with a thermometer to measure the temperature outside the insulator and conductor.
   - Day 6: Students complete the Test and Evaluate sheet to reflect on how they would do this differently.
   - Day 6: Use the Test and Evaluate sheet to write a conclusion to the project in the journal.
   - Day 7: Students will present their poster of research findings, their conductor and insulator designs, and data.
   - Day 8: Guest Speaker- students will send the guest speaker thank-you cards at a later date.
5. Assessment

- The teacher will assess student engineering journals, graphs, and notes for understanding of goals and objectives. In addition, students will complete a KWL chart.

6. Resources/Materials

- Selection of insulators
- Heat source
- STEM resources and website
- EngineeringByDesign.com
- Science Lab Materials
- Thermometers, Light bulb, electrical source, thermos, styrofoam, etc.
- Additional materials will be provided upon student requests and needs as they generate ideas.

7. Learning Experiences

**Engineering Design Process**

- Research the purpose and functions of insulators and conductors.
- Compare/Contrast how different materials can project different solutions to the problem.
- Brainstorm different ways to construct/design insulators and conductors.
- Explore different designs of insulators and conductors.
- Illustrate designs and sketches of insulators and conductors.
- Explore how a light bulb is a source of energy and uses of.
- Test designs and record data on designated charts. Compare/Contrast data.
- Discuss safety issues of materials.
- Invite a guest speaker to speak about nuclear reactors and insulators (functions, design, purposes, safety, etc.)
- Create a journal consisting of which design was fastest, what they may do differently next time, and a sketch an improved model for the future. Also, record daily work in the reflection journal.