The Mitten Challenge

2nd Grade
Unit 1 – A Season for Chapters
Text Connection: *The Mitten* Retold by Jan Brett

Design Challenge Summary
Challenge: What will the students be required to do?
Nicki has once again lost his wool mitten that his Baba (grandmother) made for him. She will not make him a new pair of mittens, so he needs find a way to keep his hands warm while playing outside in the snow. Using the materials provided, can you help him find a way to design "hand wear" that will keep him warm? Your "hand wear" will be tested using a bucket of ice. *you only need to design the "hand wear" for one hand, which will then be used for testing.
Standards: What standards are addressed?
Science: NS.1.2.1 Communicate observations orally, in writing and in graphic organizers NS.1.2.2 Develop questions that guide scientific inquiry NS.1.2.3 Conduct scientific investigations as individually and in teams NS.1.2.4 Estimate and measure length… NS.1.2.5 Collect measurable empirical evidence in teams and as individuals NS.1.2.6 Make predictions in teams and as individuals based upon empirical evidence NS.1.2.7 Use age-appropriate equipment and tools in scientific investigations NS.1.2.8 Apply lab safety rules as they relate to specific science lab activities PS.5.2.2 Investigate the effect of physical phenomena on various materials **Math:** Mathematical Practice Standards 2.MD.1 Measure the length of an object by selecting and using appropriate tools… 1.MD.2 Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object end to end… **Other:** W.2.2 Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points and provide a concluding statement or section W.2.3 Write narratives in which they recount a well-elaborated event or short sequence of events, include details to describe actions, thoughts and feelings, use temporal words to signal event order, and provide a sense of closure W.2.7 Participate in shared research and writing projects SL.2.1 Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups SL.2.3 Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information or deepen understanding of a topic or issue SL.2.4 Tell a story or recount an experience with appropriate facts and relevant, descriptive details, speaking audibly in coherent sentences SL.2.6 Produce complete sentences when appropriate to task and situation in order to provide requested detail or clarification

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Result: What will students know, value, and be able to do as a result of the lesson? What's the big idea?

Know and apply the engineering design loop process.
Demonstrate ability to modify designs based on observations and predictions.
Work collaboratively on solving a problem.
Discover which materials make for the best insulation (keeping warm) or protection from the heat.

Assessment: What evidence will be used to determine student learning?

Did they create "hand wear" that would keep their hand warm when placed in a bucket of ice?
Did they follow the design loop process?
Did they work collaboratively?

Prior Knowledge/Experiences: What prior content knowledge and skills will the students need?

Experience with the Engineering Design Loop process
Connections to the Mathematical Practices
Investigations/inquiry in Science
Experiences with different types of clothing needed for different seasons
Experiences with hot and cold temperatures (PS.7.K.1)
Understanding of natural sources of heat vs. artificial sources of heat (PS.7.1.4)
If thermometers are used – experiences with reading a thermometer (PS.7.1.4, ESS.8.1.6)
Experiences in measuring with non-standard units (1.MD.2)

Summary/Connections: How will this design challenge connect with new/future learning, other content areas, real world experiences, etc.?

This lesson will help students develop problem solving skills and collaboration skills that are essential in succeeding in the 21st century. It will allow student the opportunity to transfer and apply skills from various content areas within one task.

Students can record their observations, reflections, new learning, etc., in their notebook or journal.

As a summary activity, you could engage students in:
W.2.2 Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points and provide a concluding statement or section
W.2.3 Write narratives in which they recount a well-elaborated event or short sequence of events, include details to describe actions, thoughts and feelings, use temporal words to signal event order, and provide a sense of closure

Extensions:

- Compare the actual temperature inside their "hand wear" to see which insulates the best – do this by taping/including a student thermometer inside the "hand wear". Then after the ice testing, remove the thermometers and compare temperature readings
  ESS.8.2.9 Read a Celsius thermometer PS.7.2.2 Compare temperatures using the Celsius scale

Materials/Equipment/Preparation: What materials and equipment will students need to successfully complete this design challenge?

Ziploc bags (various sizes)
Tape - no more than 6 cubes long (each group must measure out this material)
Cubes for measuring (snap cubes, unifix cubes, linking cubes, etc.)
Suggested items: Yarn, cotton, string, shredded paper, felt, material scrap, foam/packing peanuts, bubble wrap, saran wrap, paper, feathers, fake fur, fiber fill, beads, aluminum foil, etc… *(These items could provide the insulation – but we don't want to tell the students that is what they are for…it would give it away)*
Bucket of ice (for testing) **Optional:** Small student thermometers (like those in Science kit)

ADDITIONAL INFORMATION

Materials: the items listed are just "suggestions" for students to use as "insulation". You may not have all these available or you may have other items to pull. The idea is that there would be materials that would be "good" insulators and "bad" insulators and students would conclude this through their tests.

Ideas for Accessing Prior Knowledge:

- Bring in different types of mittens, gloves, and protective hand wear (gloves, insulated gloves, mittens, oven mitts, silicone mitts, potholders, rubber gloves, etc.) and talk about their purposes.
- Use pictures of a variety of these items for APK…here's a few:







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Group Supplies:

Ziploc bags, tape (6 cubes in length), various materials