Big Idea: Keeping Cool on a Hot Day

Inquiry Questions

Science:

- How can I protect rock, soil, water and sand from the heat from the sun on a hot day?

Technology:

- How do digital tools help us measure heat?

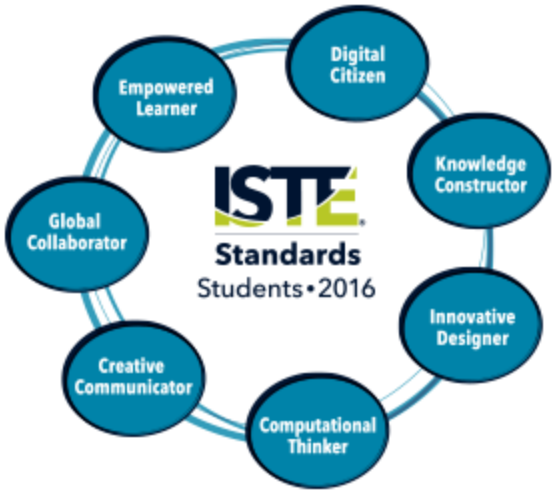
Engineering:

- How can we design a shelter that will protect soil, water, rocks, and sand from the sun on a hot day?

Mathematics:

- How does measurement helps us compare?

Content Area	Grade Level Standards
Science	• K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface. • K-PS3-2. Use tools and materials to design and build a structure that will reduce the warming effect of sunlight on an area.* [Clarification Statement: Examples of structures could include umbrellas, canopies, and tents that minimize the warming effect of the sun.]
Technology	• 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment • 8.2.2.A.1 Define products produced as a result of technology or of nature

	• 8.2.2.A.2 Describe how designed products and systems are useful at school, home and work. 
Engineering	• K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. • K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. • K-2-ETS1-3. Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs

STEM Integrated Concepts: Earth and Space Science | Kindergarten

Mathematics	K.MD A. Describe and compare measurable attributes. ● K.MD A 1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. ● K.MD A 2. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.
Science Process Standards	Standards for Mathematical Practice

Science Process Standards

Nature of Science

☒ Make predictions and formulate testable questions
☐Design a fair test.
☐Plan and carry out investigations—often over a period of several lessons—as a class, in small groups or independently.
☐Perform investigations using appropriate tools and technologies that will extend the senses.
☒ Use measurement skills and apply appropriate units when collecting data.
☐Test predictions with multiple trials.
☒ Keep accurate records in a notebook during investigations and communicate findings to others using graphs, charts, maps and models through oral and written reports.
☒ Identify simple patterns in data and propose explanations to account for the patterns.
☐Compare the results of an investigation with the prediction.

Design Process

☒ Identify a need or problem to be solved.
☒ Brainstorm potential solutions.
☒ Document the design throughout the entire design process.
☒ Select a solution to the need or problem.
☒ Select the most appropriate materials to develop a solution that will meet the need.
☒ Create the solution through a prototype.
☒ Test and evaluate how well the solution meets the goal.
☒ Evaluate and test the design using measurement.
☒ Present evidence by using mathematical representations (e.g. graphs, data tables)
☒ Communicate the solution (including evidence using mathematical representations (graphs, data tables), drawings or prototypes.

☒ Communicate how to improve the solution.

Mathematical Practices

- ☒ MP.1. Make sense of problems and persevere in solving them.
- ☐ MP.2. Reason abstractly and quantitatively.
- ☒ MP. 3 Construct viable arguments and critique the reasoning of others.
- ☐ MP.4. Model with mathematics.
- ☒ MP.5. Use appropriate tools strategically.
- ☐ MP.6. Attend to precision.
- ☐ MP.7 Look for and make use of structure.
- ☐ MP. 8 Look for and express regularity in repeated reasoning.

Plan of Work

Common Misconceptions

What misconceptions might students have with these ideas?

All shapes are good for building
All things that block the sun can keep you cool
All materials are good for building
Color does not matter with heat absorption
High numbers for temperature are what we want
All tools are equally accurate

Activities

- Everyday math lessons with measurement to build schema
- Intro lesson- read a book about the beach and make an anchor about what you wear in the summer at the beach, what do you bring to keep cool and why do you bring it? talk about hot sand
- Put 4 surfaces in a box and have them feel it and describe it . What are the Earth's surfaces (water, sand, rock, soil) - what does the sand feel like without shoes? What happens to plants in the summer without water? Let them explore the water, sand, rock and soil. 5 senses?

video clip how sun feels in January versus August Bill Nye brainpopjr video clip on seasons

- Explore items that block the sun from warming things- umbrella, tent, hat, trees?
- Pose the problem of how do the surfaces of Earth keep cool? Why are parks built in shady areas?
- Introduce the materials for building a structure to keep items cool- touch and feel them
  - Have tents with the names of the fabrics
  - Put vocab on the smartboard with names of items they are touching and exploring
  - Design on paper the idea for a structure
- Build in teams of three or 4 (7 groups total) Limit the structure height and it can't be higher than _____ so the heat lamp will warm items
- Test the structures with tools- Three tools, three stations, make a table to record the data

Kids will stay put with their chart, we will rotate around with the soil, sand, rock and water, and thermometers

- Build our own samples so we can ask the students to predict which structures they think will keep the coolest and why
- Test two colors of rocks to see how the colors of a rock may affect the temperature reading
- Math lessons - analyze data- make note of temperature, tool and color fabric in our data spreadsheet
- Look at what structure kept Earth's materials coolest (lowest temp)
- What color fabric worked the best ?
- What color of rock was the warmest and coolest?
- Compare the temperature readings of the three tools? Which ones worked the best? How do you determine which one worked the best?
- Look at data from HW and bar graph results of which tool is best liked by parents
- Skype with an expert on the tools we used
- Invite Karen to come in and talk to the children about how she measures body temperature- have the children ask questions about her tools
- How does technology help us? How does Math help us? How does a design process help us problem solve?
- How does the sun's light affect things on the Earth's surface?
- Make a video clip about what you recommend to keep you cool next time you go to the beach

Suggested Vocabulary	
Resources	

Assessment	
Type of Assessment	Example
Performance Task	
