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**Math and Data are Everywhere**  
**June 8th, 2022**  
**Melting Ice Experiment**

**1. Data**

<https://www.jpl.nasa.gov/edu/teach/activity/melting-ice-experiment/>

In this lesson, students will be collecting their own data based on three different experiments that they conduct with water and ice cubes. The three experiments will be with still water, flowing water, and salt water. During this experiment, students will be collecting data and graphing it based on fastest and slowest melt times from the parameters of their experiments. This is a simulation of ice melt in Greenland and students are conducting experiments centered around the phenomena of which water will make ice melt faster. I will be modifying the activity by having students do each experiment with one ice cube, two ice cubes, and three ice cubes to introduce the concept of “the graph looks proportional, but is it truly proportional?” Students will be using the forms from this link to collect their data as well as graph their data for comparison between their group members.

**2. How does the data serve as an engaging context for the math concept(s) you teach?**

7th grade Math standards are stacked full of statistics, probability, ratios, and proportions. With that being said, sometimes it is challenging to figure out exactly how to make statistics and graphing fun for the students to practice. With NASA Space Math, this problem has been greatly reduced due to there being tons of lessons that put students in a “job” so to speak to figure out a real-life problem that scientists are dealing with. I have found that students enjoy Math a lot more when they can connect it to an end goal that they are trying to achieve. In this case, the ice melt problem in Greenland is being connected in a way where students are trying to figure out if still water, running water, or salt water speeds up the process or not. Of course, all students will have a prediction based on prior knowledge, but many students will be surprised and engaged when they start figuring out their results.

**3. What is the measurable objective of the activity?**

Due to this experiment being so diverse with many different goals, students will have several measurable objectives that they must complete.

1. Students will first be measured on the objective of collecting accurate and unique data and be able to use that data to graph and compare their results.

2. Students will also be measured on the objective of being able to follow an experiment's parameters.
3. Finally, students will be measured on the objective of writing a full paragraph based on their findings, highlighting what they found to be true from their experiment.

**4. Provide the CCSS-M principles addressed.**

**MS-PS1-4 Matter and its Interactions** - Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

**CCSS MATH - 7.RP.A.2.A** - Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

**5. Collect evidence regarding the use of data in the classroom.**

**a. How did you plan to collect evidence? Create a brief survey or interview a few students about the activity.**

By teaching summer school, I was fortunate enough to be able to interview a few students that were in my class this past year and a few students that are going to be in my class this upcoming school year about the lesson. I gave each student a "run down" of what the lesson would consist of as well as the experiment that we would be conducting and the math that was behind this lesson and the students seemed to be excited about it. From the students that were in my class previously, I heard things like "we totally should have done this!" and "it is easy to see the connection between this lesson and some of the lessons we did about proportional graphs." From my upcoming students I heard things like "I feel like this would really help us understand how proportions can be applied to real world things" and "this experiment sounds fun!" With that being said, I was very happy to hear the positive feedback about doing this activity and I can't wait to do it this upcoming year.

**b. Did it enhance the understanding of the concept?**

With this being more centered around Science, it should be very evident to see students making connections and understanding the difference that motion and matter makes in this experiment, but I could foresee some issues with students making connections with the graph.

For starters, I think the students will do very well with following the parameters of the experiment as well as conducting the experiment in its entirety. To really help bring together proportional relationships, I am going to have groups of 5-6

students each doing the experiment themselves but comparing their data to find patterns. With the prior knowledge that students have about proportional relationships and proportional graphs, I think students will be able to make connections with what their graphs are looking like. Of course, it will be very odd if their graphs are proportional, but it will be a good learning opportunity for them to talk about factors such as size of the ice, temperature of the water, and things of that nature. Students will be able to make connections that proportional relationships are only things that are guaranteed, such as a bill that is the same amount each month, or even things like capacities of containers.

Moreover, I think when students are graphing what happens with one ice cube, two ice cubes, and so on, they will start to see relationships that look proportional and they will make the connection to the tables and graphs that we have been looking at prior to this lesson. With each student also comparing their data, there will be tons of productive conversations about relationships as well as many hypotheses on which experiment they think will make the fastest results. It is always great for students to be able to practice collecting their own unique data, follow parameters, and graph their own data as they will be using this for years to come in all of their Math and Science courses!