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| **Teacher: Dr. Jeffery, Ms. Blonigen, Mr. Moreno, Ms. Phillips** |
| **Date: 9/22/2015** |
| **Subject: Science**  **Grade level: 4th** |
| **Materials:**  **1)** **Milk**  **2)** **Sugar**  **3)** **Vanilla**  **4)** **Plastic cups**  **5)** **Plastic spoons**  **6)** **Rock salt**  **7)** **Crushed ice**  **8)** **Measuring cups**  **9)** **Measuring spoons**  **10)** **Plastic zipper bags, sandwich and freezer size**  **11)** **Thermometer**  **12)** **Thermometer covers**  **13)** **Disposable aprons**  **14)** **Gloves** |
| **TEKS:**  (5) Matter and energy. The student knows that matter has measurable physical properties and those properties determine how matter is classified, changed, and used. The student is expected to:  (A) measure, compare, and contrast physical properties of matter, including size, mass, volume, states (solid, liquid, gas), temperature, magnetism, and the ability to sink or float;  (B) predict the changes caused by heating and cooling such as ice becoming liquid water and condensation forming on the outside of a glass of ice water; |
| **ENGAGEMENT**    1) Tell students that today we will be doing an experiment involving ice and salt, and that we are going to begin by watching a video. Explain that in places where it snows in the winter, salt is put on the roads to help drivers/ask if any of the students have experienced snow.  2) Pass out worksheet.  3) Show the students the video: How Does Salt Melt Ice?  <https://www.youtube.com/watch?v=JkhWV2uaHaA>  4) Have a student-based discussion of the video, but make sure to clarify the main point- salt lowers the freezing point of water from 32 degrees Fahrenheit to 20 degrees Fahrenheit, which is why it is more difficult for icy roads to freeze when outside temperatures are above 16 degrees Fahrenheit. The water is as cold or colder than what actual solid ice would normally be.  5) Guide discussion by asking the following questions:   * According to the video, what does salt do to icy roads up north? * What state of matter does the salt turn ice into? * If we were to put salt on ice, do you think the ice that changes to a liquid would be colder or warmer?   6) Transition to the exploration with this statement: We have just watched a video of how salt is utilized to melt ice on roads and we've discussed how salt changes ice from a solid to a liquid. In the next activity, we will further explore these two states of matter---solids and liquids. |
| **EXPLORATION**  1) Each student should have a worksheet to guide them and for them to record their answers on. The materials for the experiment will be set up at the front of the room and clearly visible to all students. The teacher will ask the students to look at the materials (or read them on their worksheet) and think about what they might be making today, then call on volunteers to share their answers. During this time, the teacher will also assign roles to students, i.e. what they will be measuring.  2) The students will begin the initial task of categorizing the materials as solids or liquids, as indicated on the worksheet. They will make decisions about the materials, then place the material into one of the two categories indicated: solid or liquid.  3) The students will be instructed to read through the procedure, then return to the first page to make a prediction about what is going to happen (“I think \_\_\_\_\_\_ because \_\_\_\_\_\_\_”).  4) The procedure will begin, with the assigned students measuring and mixing the milk, sugar, and vanilla in a plastic cup, then pouring the mixture into a sandwich sized Ziploc® bag. They will use a thermometer to take the temperature of the mixture at this point and record their finding on the second page of the worksheet. The students will close the bag, removing the excess air as well. At this point, they will pause to make a second prediction.  5) Continuing with the procedure, the students will add the ice to a large Ziploc® bag and take the temperature of the ice, recording the data on the sheet. They will add the rock salt to the ice and pause to make another prediction.  6) At this time, the students will complete the procedure by placing the smaller bag inside the larger bag and sealing the larger bag as well. Each group’s timer will then start recording the time while the other students take turns shaking the bag. The timer will stop timing when the teacher directs the students to stop shaking their bags.  7) The teacher will transition into the next E with the statement, “Now that we’ve completed the procedure, let’s see what happened and if we can find an explanation for our results.” |
| **EXPLANATION**  **1)** Teacher will ask the students what happened, guiding them towards using the vocabulary terms liquid and solid if necessary. The students will verbalize what happened and try to provide an answer for why it happened. They will explain what happened to the mixture and whether the evidence supported their hypothesis on the worksheet.  **2)** The teacher will address the concept of mixtures by asking the students if the ice cream could be separated into its original ingredients again.  **3)** Variables will be identified by the students with teacher guidance, especially when differentiating between dependent and independent variables. The variables will be written on the worksheet as well. |
| **ELABORATION**  **1)** Turning to the last page of their worksheet, the students will be prompted to compare their times with other groups and determine the shortest and longest lengths of time in the class. This data will be recorded on the worksheet.  **2)** The last task for the students is to contemplate how they could change the variables of the experiment and what might happen differently if they did so. This will be discussed as a Think, Pair, Share and whole-group as well as recorded on the worksheet. |
| **EVALUATION**  1) Upon finishing with the elaboration, the students will receive a 3-2-1 to complete. They will write three things they learned, two questions they still have, and one opinion about the lesson. |