**Spring Arbor University School of Education**

**Lesson Plan Guide: Direct Instruction**

**Title: Solid Matter Freeze Out by Megan Muzljakovich**

**Subject: Solid**

**Grade Level: 2nd/Sheltered English Time Allotted: 45 minutes**

**Materials Required:**

* **Thermometer**
* **Glass coffee cup**
* **Tap water**
* **Refrigerator freezer**
* **Kitchen knife**
* **Wax**
* **Small aluminum pot**
* **Hairdryer (hand)**
* **sink**
* **Freezer**

**Vocabulary:**

* **Heating**
* **Melting**
* **Freezing**
* **Freezing Point**

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**Michigan Curriculum framework: Benchmark and/or GLCE/HSCE/EGLCE**

**M.UN.02.09 Read temperature using the scale on a thermometer in degrees Fahrenheit**

**W.PR.02.05 Draft a coherent piece with appropriate grammar, usage, mechanics, and temporary spellings.**

**Language Proficiency Standards:**

**R.3 Build vocabulary to develop concepts**

**W.4 Construct sentences and develop paragraphs to organize writing supporting a central idea**

**S.4 Use English to interact in the classroom**

**L.1 Follow simple and complex directions**

**L.6 Make inferences and predictions**

**Common Core- With guidance and support from adults and peers, focus on a topic and strength writing as needed by revising and editing.**

**Objective(s): A portion of a GLCE or HSCE stated in terms of Bloom’s taxonomy**

**The student will be able to identify when fluids freeze at different temperatures and this is the understanding level of blooms taxonomy.**

**Purpose: To have an understanding of how a liquid turns to a solid.**

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**Instructional Procedure:**

**Building Background: 10 minutes**

* 1. “What is the World Made of?” by Kathleen Weidner Zoehfeld says “a change in temperature is what usually causes matter to change its state. Whenever you make ice cubes, you are changing water from a liquid to a solid state. To make ice cubes, all you have to do is pour water into an ice-cube tray and put the tray in the freezer. Then wait. The cold air in the freezer cools the water. In a few hours the liquid water gets so cold that it freezes and turns into a solid (pg. 19).
  2. Thermometer
     1. A glass tube instrument with a number scale inside for determining temperature. It has a colored liquid inside that rises and falls with the change of the temperature.
  3. Heat
     1. The energy of moving particles in a substance
  4. Melting
     1. Changing from a solid to a liquid form by heat or pressure, both.
  5. Freezing
     1. Changing from a liquid to a solid form by loss of heat.
  6. Freezing Point
     1. The temperature below which a liquid turns into a solid.

1. **State Purpose and Objective of Lesson: 2 minutes**
   1. We want the students to learn that matter can change its state by temperature
   2. The students need to learn that there are different freezing points.
   3. It is important to learn that the temperature of a liquid will continue to drop as more cooling is applied. Once the liquid reaches the freezing point, the temperature will remain at that point until all of the liquid is solidified. Then the temperature of the solid can continue to decrease.
2. **Plan for Instruction: 30 minutes**
   1. Modeling **(Strategy # 48/Webquests)** 
      1. Have the students fill out their hypothesis on the “You are the Scientist” worksheet. Explain that, in this lesson, as a class we will discover that all liquids have different freezing points to turn into a solid.
      2. Tell the students interesting facts
         1. Sea Water freezes at -1.9 C
         2. Milk freezes at -0.50 to -0.5650 C
      3. Some frogs can survive even when 65% of their body water has turned to ice. For example, in winter, a wood [tree frog](http://www.wisegeek.com/what-is-a-tree-frog.htm) will bury itself in a few inches of dirt or leaves, and freeze virtually solid with the soil. It appears solid as an ice cube, yet amazingly when the temperature warms the frog comes back to life as it thaws.
      4. Properties of Solids
         1. Definite shape
         2. Definite mass
         3. Definite volume
      5. Demonstrate how we are going to do the experiment step by step in detail. Then hand each student their “Freeze Out” worksheet to fill out while doing the experiment.
   2. Guided Practice**:** 
      1. We are going to learn that when substances freeze they turn into the solid state of matter**.**
      2. Set out the materials needed for the experiment: glass coffee cup, tap water, refrigerator freezer, kitchen knife, wax, small aluminum pot, hair dryer (hand), sink, freezer, and thermometer.
      3. Fill a cup with 2.5 cm or 1 inch of tap water and take the temperature. Answer question one on the freeze out worksheet.
      4. Take the temperature of the freezer. Then place the cup in a freezer and leave it there for about an hour.
      5. Using a knife shave off a small sliver of wax and lace it in a pot
      6. Heat the bottom of the pot with a hair dryer
      7. When the wax has melted measure the temperature of the liquid. Answer question two. Then place the pot in the sink and run cold tap water around the bottom of the pot. Record what you see and answer questions three on the freeze out worksheet.
      8. Remove the cup from the freezer and examine the water. Record what you see.
      9. The students will answer questions five through thirteen individually on the freeze out worksheet.
   3. Independent Practice**:** Each student will fill out their “Freeze Out” worksheet individually while doing the experiment.
      1. Once the class has finished the worksheet we will go over the correct answers as a class.
3. **Differentiation Considerations:**
   1. For children who are having trouble writing on the worksheet the teacher can write what the student dictates to them.
   2. The students who are having trouble finishing the “Freeze-Out” worksheet can just do problems one through ten.
   3. Have those who finish early have them write down examples of liquids that they have seen turn into a solid on a separate piece of paper.
4. **Assessment: 10 minutes (Strategy # 48/Webquests)**
5. Have the students go to the computer lab and visit this website below to help them understand how different items can change their state by temperature. They get to choose different items to click on and put in the oven or freezer to see how their form changes by temperature. The students will fill out their “You are the Scientist” worksheet and hand it in.

**Website Link:** http://www.fossweb.com/modulesK-2/SolidsandLiquids/activities/changeit.html

1. **Closure: 3 minutes (Strategy # 39/Ticket Out the Door)**
2. Let’s review what we learned today by looking over our “You are the Scientist” worksheet. Review the correct answers with the class under the ELMO so the students can see what the correct answers are before they leave for the day.
3. Think of a liquid that changes to a solid as it freezes for your ticket out the door.

**Explanation of Identified Instructional Strategies:**

During the modeling the students will be doing a WebQuest that goes with the “You are the Scientist” worksheet. The WebQuest will be a good activity for assessment because the students do it individually. After each student is done with their WebQuest then as a class we will go over the answers. Students can go over their WebQuest at home to review for a test and it’s a great way for students to learn how to use technology. For the closure each student will write down on their “ticket out the door” a liquid that changes to a solid as it freezes. Then the next day in the beginning of class the teacher can write down on the board multiple liquids that the students wrote down on their tickets.