Lesson Plan

Course/Class: Grade 7 Science	**Name:** Melissa Creighton	**Date:** Jan 31/13
Topic: States of Matter, Temperature	**Unit:** Heat	**Grade:** 7

A. Intents/Objectives/Purpose *(from Aoki's IDAE Model)*

Scientific (Knowledge):

Students will be able to explain how each state of matter reacts to changes in temperature (308-3).

-Learning will be evident by student explanations provided throughout the class as well as through the graphs that they create on graph paper. Also students' ability to answer the questions devised would provide further evidence of learning.

Pedagogic (Skills):

Students will be able to communicate questions, ideas, intentions, plans, and results, using lists, notes in point form, sentences, data tables, graphs, drawings, oral language, and other means (211-2).

-Learning will be evident in the journals that students will be expected to complete throughout the class.

Personal:

Students will be able to go through the steps that a scientist completes and by doing so become invested in the material and want to know more.

-Learning and investment in the material will be evident by the student's reactions to the activities completed as well as their thoughts documented in their science journal and spoken aloud.

B. Activities	***C. Resources***	***D. Students are…***
Administration/Homework • Take attendance • Distribute student journals as they have just been marked from an earlier activity.	-Attendance sheet -Student journals	-Sitting at desks.
1. Introduction/Set/Advanced Organizers • Divide students in groups of 2, ensuring that a higher level student is paired with a lower level student in each case. Note: Students at the same level may also be paired together. It is important to also account for personality clashes. • Distribute an activity sheet to each group and ask students to open their science journals and glue the activity sheet into their journal on a fresh page. (Note: At this point students have used their journals before and are aware that are expected to write down any relevant data and observations since journals will be collected at the end of the class).	-Pre-made list of pairs -Activity Sheet (see attached) -glue	-Listening to hear who their partner is. -Reading the activity sheet. -Gluing their activity sheet into their science journal.

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2. Clarifying/Creating-Understanding/Concept-Development • Have students complete the activity on the activity sheet provided entitled "The Vanishing Ice Cubes."[1] Act as a facilitator while students complete the activity providing appropriate scaffolding questions as they go. • Have students glue their graph paper into their science journal after their recorded data and observations. • Have students generate a list of questions that they would like to have answers to after completing the activity. Write these questions on the board for the class to consider and build on. • <u>For teacher purposes:</u> Below are some possible questions and an explanation for the results of the activity to aid the teacher in scaffolding throughout the lesson. If students have difficulty generating questions the following questions can be used. **<u>Questions</u>:** 1. What was th temperature doing while there was still ice present? 2. Where did the heat from the alcohol flame go during that time? 3. What did the temperature do while the water was boiling? 4. Where did the heat from the flame go during this boiling time? 5. Wha will eventually be left over if the boiling was continued? 6. When heat is not added to the melting process, what will the melting ice do to the environment? 7. When heat is not added to the evaporating process, what will water that is evaporating do to the environment? **<u>Explanation</u>:** In the beginning of the heating process, the heat was used to melt the ice. This is why the temperature stayed on 0° C. This remains at that temperature as long as there is still ice present. As soon as all the ice is melted, the temperature rises steadily till 100° C, then it levels off and stays at the boiling temperature until all the water is evaporated (this temperature may be close to 98° C depending on the elevation of the place). The heat during the boiling process is used to transfer the liquid into the vapor state. • Discuss with the class the questions that they suggest. Address concerns students experienced while completing the activity. Also be sure to place emphasis on what students observed as the different states of matter reacted to changes in temperature in the activity.	(assuming a 30 person class, to be adjusted as necessary) -15 individual bags of ice cubes containing 3-4 pieces each -15 thermometers -15 beakers -15 stands -15 Bunsen burners -graph paper -pencils -glue	-Completing the activity sheet procedures. -Recording relevant information in their scientific journals. -Gluing their graph paper into their science journal. -Graphing the data collected. -Thinking of questions regarding why the things they are experiencing are happening. -Actively participating in the class discussion.

[1] **Adapted from:** Liem, Tik. (1987). What are the Characteristics of Matter: Invitations to Science Inquiry. (2nd ed., p. 96). Antigonish, NS: Ginn Press.

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3. Coached/Guide-Practice/Seatwork/Homework • Ask students to work in their original group and choose one question from the board to develop a solution to.	-List of student questions on the board.	-Brainstorming and developing answers to the question that they chose.
4. Closure/Summary • Inform students that the next class will be spent discussing the solutions and reasoning that they came up with as answers to their chosen question.		-Brainstorming and developing answers to the question that they chose.
5. Review/Assessment • Students learning will be formatively assessed using their science journal. All journals are to be collected at the end of class and the learning taking place reflected on by the teacher. Note: Journals will only receive a completion grade for having written something relevant down, as students scientific thoughts cannot be judged consistently.		

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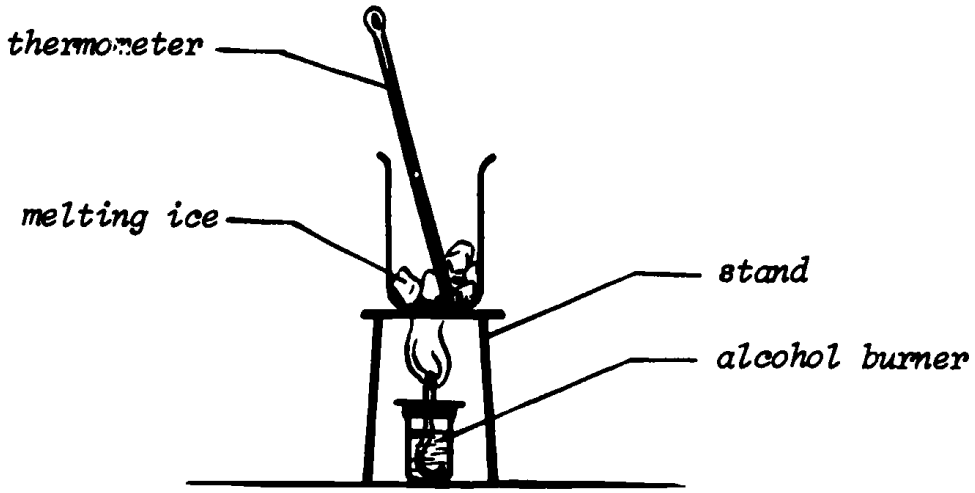
Activity Sheet-The Vanishing Ice Cubes

Name:_____ **Date:_____**

Materials: 1. A bag of ice cubes (3-4 cubes per pair of students).
2. A thermometer, beaker, alcohol burner and stand (for each pair).
3. Graph paper for all students.



Procedure:

1. **In your group gather the materials required and set up materials as shown in the above diagram.**
2. **Have one student stir the ice-water mixture and another student observe and record the temperature every minute while it is being heated. Use a table to record the temperature values.**
3. **After all the ice is melted, keep heating the water and record the temperature every minute until the water boils for about ten minutes.**
4. **Plot the observed temperatures (Y axis) against the time (X axis) on a graph.**

☺ **Remember to record all relevant data and observations in your science journal while performing the activity. You should also write down any questions that you have while completing the activity. Be Safe!**

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Explanation

I chose to complete an inquiry lesson for the context of a grade 7 science class, focusing on the heat unit. This is because I am currently placed in a middle school and thus am able to use students that I am regularly in contact with as a reference point when creating this lesson plan. In addition, the heat unit is one that I am the least familiar with and by creating a lesson plan I felt I would be able to increase my knowledge in this area, as well as develop ways to communicate material in a way that makes sense to students (a way I never experienced the material). The teaching strategies that I decided to use include some which commonly accompany inquiry based lessons, in particular the strategies of scaffolding and leading questions. These strategies I felt would be the most effective in having students reproduce their own questions about the results of an experiment that they performed.

In my inquiry lesson the students do not have full control as this was intimidating to me as a beginning teacher. However, that being said the teacher also does not have full control. Instead I decided to take an approach where students are able to complete a lab-like activity controlled and developed by the teacher, but then have the freedom to explore any questions that they have about the results that they experienced (bringing in the inquiry aspect). I felt that the "why" behind the experiment is where I wanted to focus student's attention and by having them generate reasoning their understanding of the effects of temperature on different states of matter would be solidified since the explanation was mainly student driven.

Since the activity itself was controlled by the teacher students are not exploring an area of interest in their choosing. However, students are able to choose one question out of many to look into further and develop knowledge about. By having the teacher pre-determine the activity to be completed students' questions of inquiry are directed around a curriculum specific topic. The questions that students come up with are not limited though and in that way students can explore an area of interest specific to the heat unit and the inquiry approach is utilized.

Depending what questions the students put forth and as a result the questions that they explore further, it is possible that students may walk away from the lesson having gained knowledge in different branches of the heat unit. However, since the activity ultimately addresses the effect of temperature on different states of matter students will at least gain that same knowledge. Also the process involved in the activity that students record in their science journals and the drive to want to know more (developed through producing questions) replicates the experience that a scientist goes through providing an invaluable experience to students. Although this lesson was aimed at achieving both knowledge and skill goals the overarching main purpose was to have students feel intrigued by science and to want to know more, so ultimately if students end up with varied knowledge then in my opinion the lesson will still have been successful.

The inquiry based approach is becoming more popular in science education due to the increase of inner motivation and excitement in learners when using this approach. Ownership of the material is given to students, to some extent, and as a result they are more willing to commit to learning and following a scientific approach. In my opinion, this approach is more successful when student's thinking is not assessed and thus my only form of assessment is in the form of a science journal. This is mainly because students are more willing to take risks and can release worries about meeting criteria when not assessed. Instead they are able to proceed at a pace suitable for them and focus on a deeper understanding of the material. I chose to use a science journal as a formative assessment in order to gain insight into the thoughts that students are experiencing as well as their interpretation of the scientific approach and as a way to reflect on the success of the lesson.