Saturday Science Lesson Plan – Fall 2008

LEARNING OBJECTIVES

STANDARDS

1.1.1 Observe, describe, draw, and sort objects carefully to learn about them.
1.2.6 Describe and compare objects in terms of number, shape, texture, size, weight, color, and motion.
2.1.3 Describe, both in writing and verbally, objects as accurately as possible and compare observations with those of other people.
2.1.4 Demonstrate the ability to work with a team but still reach and communicate one's own conclusions and feelings.

1.1.4 Use tools, such as rulers and magnifiers, to investigate the world and make observations. (measuring cups)
1.3.1 Recognize and explain that water can be a liquid or a solid and can go back and forth from one form to the other. Investigate by observing that if water is turned into ice and then the ice is allowed to melt, the amount of water is the same a it was before freezing.
1.6.2 Observe that and describe how certain things change in some ways and stay the same in others, such as in their color, size, and weight.
2.1.1 Manipulate and object to gain additional information about it.
2.2.5 Draw pictures and write brief descriptions that correctly portray key features of an object.
2.3.5 Investigate that things can be done to materials- such as freezing, mixing, cutting, heating, or wetting – to change some of their properties. Observe that not all materials respond in the same way.

WEEK 1: Introduction to States of Matter and Exploring Solids

A) MATERIALS
- PART I: Introduction to States of Matter
  - Chart paper (solid, liquid, gas)
  - Markers
  - Science journals
  - Individual KWL charts
  - Chart Paper (class KWL)
- PART II: Exploring Solids
  - solid chart
  - 20 solids/group
  - Large sheet of paper – 5
  - Markers (each group)
  - sentence strips
  - science journals

B) DESCRIPTION OF LESSONS

INTRODUCTION TO STATES OF MATTER

Engage: Read Aloud – What is the World Made of? As we read we will generate a list of solids, liquids, and gases from the story. These will be listed on a solid, liquid, or gas chart on the board.

Explore: After reading, students will add more examples of solids, liquids, and gases to the charts from personal experience. As a class, observe a solid (wooden block), liquid (water), gas (air in a plastic baggy). Describe different characteristics of each state of matter. Generate a list of characteristics and add them to appropriate charts.

Explain: Discuss how students made observations and described objects. Introduce terms observation and inference in reference to the experiences students have just had in describing the states of matter.

Elaborate: Generate individual KWL charts in student science journals. With ideas from personal KWL charts, create a class KWL chart that will be referenced throughout the unit. What do we know? What do we want to know? What have we already learned? (add questions and comments with student name next to it on the chart)

Evaluate: Look at individual KWL charts, class KWL charts, and the properties/characteristics already discussed in class. In journals students will copy charts and make their own KWL chart.

EXPLORING SOLIDS

Engage: Revisit solid chart from PART I. What did we learn about solids? Have you thought of any new examples of solids? Pass out science journals.

Explore: In science groups, students will work together to group solids in like groups. They will be given 20 solids, a large sheet of white paper, and markers. It is their task to sort the solids into like groups using whatever strategies (properties) that they would like.

Explain: As a class, groups will share-out the strategies they used to sort solids. I will list strategies on the board or solid chart. After all groups have shared, we will discuss the properties that they experienced during the sorting activity. These properties will be listed on the solids chart.

Elaborate: In groups, students will receive one sentence strip. Each group should write a 'definition' for the term solid. All sentence strips will be posted on the board and as a class we will compare and contrast descriptions and either combine or choose one definition. This definition will be recorded on a single sentence strip and we will use this definition of a solid for the duration of our unit on states of matter.

Evaluate: Students will complete this prompt in their science journals “I think _____ is a solid because…” Students should also record one question they have about solids after completing our activity today.

WEEK 2: Exploring Liquids

A) MATERIALS
   - PART I: EXPLORING LIQUIDS
     - Properties of Solid chart
     - 4 cups/ group
     - 4 plastic spoons/ group
     - 4 different liquids/ group
     - Wax paper (1 piece per person)
     - Magnifying class (1 per person)
     - Properties of Liquid Chart (chart paper)
     - Markers
     - Sentence Strips
     - Properties of Liquid Chart
     - Sentence Strips
     - KWL Chart
     - Journals
   - PART II: ARE ALL LIQUIDS ALIKE?
     - 2 new liquids (per group)
     - 2 cups per group
     - Flat surface (1 per group, marked with start and finish lines)
     - Droppers (1 per liquid)
     - Sentence Strip
     - Journals

B) DESCRIPTION OF LESSONS
   PART I

   Engage: Discuss how students made observations about solids in the previous class. What did we find out about solids? We discussed properties of solids. What's a property? Get students thinking about how they looked at solids in different ways. Introduce today's topic of liquids.

   Explore: Students will receive 4 different liquids to observe. Students will work in groups and compare and contrast the 4 liquids (observe in cups, stir, drip from spoon, feel). Groups will observe one spoon full of each liquid on wax paper with hand magnifying glasses.

   Explain: As a group, discuss and record observations of each (look like, feel like, how does it move?). Share out as a whole class. Record observations on the class Properties of Liquid chart.

   Elaborate: In groups, students should work together to help describe a liquid and write their description on a sentence strip. As a class, compare and contrast sentence strips. Vote on final description (description will work as our 'definition' of a liquid).

Evaluate: Properties of Liquid chart, sentence strips with liquid definitions, Revisit KWL Chart – class (students can revisit their own as well)

Journals:

Students respond to this prompt, "I think ____ is a liquid because…"

What was surprising?

PART II

Engage: Discuss liquids we worked with the previous week. Discuss properties of liquids and how we made observations and worked with the liquids to discover the properties. Explain today's activity. The purpose of today's lesson is to compare and contrast liquids to see if all liquids are alike.

Explore: Observe the two liquids at your seat. Have students record their observations and drawings in their journals. Give students 1 minute to complete observations. Explain that students will race the two liquids by dropping a similar amount of each liquid at the same starting point on a flat surface, tipping the surface, and watch to see which liquid crosses the finish line first. Have students complete the 'race.'

Explain: Record results in journals and discuss if their 'guesses' were supported or not after their races were complete. Why or why weren't they 'right'? Why do they believe those outcomes happened? Discuss which properties linked winning liquids and losing liquids. (thickness, texture, etc.)

Elaborate: Share out results as a class. Discuss different outcomes and the importance of evidence or support to check your guesses. Explain the term hypothesis. Create a sentence strip for the term hypothesis?

Evaluate: Journals

WEEK 3: Solids to Liquids

A) MATERIALS

PART I: Water Race

- Plastic Bag (1 per person)
- Ice Cube (1 per person)
- Plastic Cub (1 per group)
- Journals
- Stop Watches? (1 per person)
- Journals
- Permanent Markers (to mark waterline, label cups for experiment)
- Journals
- Class Chart

PART II: Can Solids Be Liquids?

- Property of Solid Chart
- Property of Liquid Chart
- Different shape containers (1 per person)
- Water (1 container per table)
- Journals
- Sand (1 container per table)
- Wax paper (1 piece per person)
- Sand (1 grain per person)
- Hand magnifying glass (1 per person)
- Journals

B) DESCRIPTION OF LESSONS

PART I: Water Race

Engage: Discuss journals at the beginning. Discuss observations. How do we make them? We use are FIVE senses to help make observations. Emphasize how scientists use observations to help them learn more about what they're studying. We're scientists, too, because we're learning more about the states of matter and we must use observation to help us learn.

Explore: Every student should receive a baggy and they should place one full ice cube in the baggy. Make observations about the ice cube. Record observations on the board. Have students draw a picture of their ice cube before the race and their observations in their journals. Give students the challenge of melting the ice cube as fast as they can without removing the ice cube from the baggy or adding anything to the baggy. Complete the water race.

Explain: Record your results in your journal. What strategy(ies) did you use? How long did it take for you to melt your ice cube? Have students share out their melting strategies and how well they worked or if they did not work very well. Record all strategies. Compare and contrast

strategies. Overall, which strategies worked the best? What did they all have in common? (Element of heat) "When we add heat to matter it often helps states change from one to the other. What state did our ice cube begin in? (solid) What properties of a solid did you observe? What state did our ice cube end in? (liquid) What properties of a solid did you observe? Great. What did we do to add heat to our solid to help it change into a liquid? (ask for strategies)"

Elaborate: After students have a strong understanding of how the states of matter changed, we will discuss evaporation.

"What do you think will happen if we leave this water sitting out for awhile? (discuss ideas) How can we set up an experiment to see what would happen if we left out the water? (discuss ideas) Does it matter where we put our cups? Why? Let's try this. I would like one person to mark the water line on your cup so we will be able to see how much water we started with in our cup. I would then like each group to discuss for 1 minute, where they would like to place their cup for this experiment. After this time, we will place our cups there and we will check in with them next week to see if any changes have occurred." (after one minute)

Evaluate: In journals, have students record where they will place their cup. Why did you choose this location?

***Record ideas on a class chart. Group Name. Location. Reason. Results.

PART II: Can Solids Be Liquids?

Engage: Discuss properties of liquids and solids based on our property charts. Explain challenge: Determine whether sand is a liquid or a solid based on its properties. Have students hypothesize over what they think will happen when we pour water into different containers. Make sure students are pulling from previous experiences and using what they already know about the properties of liquid to help support their hypothesis.

Explore: Have students observe how water acts in different containers. Draw, in their journals, how water looks in different containers. Have students pour water in different containers, draw, and write their observations about their containers. Have students hypothesize about how sand will act in the containers. Have students draw, pour, and then record their observations about the sand just as they did for the water. Were their hypothesis supported or not?

Explain: Discuss students' hypothesis about water and sand. What properties did the water have? What properties did the sand have? Is water a liquid, solid, or gas? Is sand a liquid, solid, or gas? Why do you think that? What properties of solids and liquids does the sand have?

Elaborate: Have students observe one grain of sand with a hand magnifying glass. What do you observe about a single grain? What properties does it have? As a single grain does it share more properties with a solid or a liquid? Have students discuss and record ideas in their journals.

Evaluate: Journals, property charts

WEEK 4: EXPLORING GAS

A) MATERIALS

B) DESCRIPTION OF LESSONS

WEEK 5: 3 STATES OF MATTER

A) MATERIALS

PART I: 3 States Of Matter

- property charts for solids and liquids
- Ziploc bags
- Ice cubes – 1/student
- Plastic cups with group names
- Measuring cups
- Hot plate
- Pot
- Water from student cups
- Mirror
- Student journals with record sheets
- Pencils
- Property chart for gas

PART II: From Gas to Liquid to Solid

- Ice
- salt
- 6 standard size soup cans
- Teaspoons (1 for each group)
- Thermometer
- journals

B) DESCRIPTION OF LESSONS

PART I: 3 States Of Matter

Engage: In circle, discuss the properties of solids and liquids that we know from previous experiences. Discuss the ice melting race. What were some strategies that we used? Which strategies worked the best? What did we have to add to our solid ice to change it and make it liquid water? (heat)

Explore: At tables, complete melting race using the same strategies as before. Make sure students do not open their bags or put holes in their bags. It is very important that the amount of water that went into the bag is the same as what comes out of the bags. After we melt our ice cubes, students will carefully pour their water into their table's plastic cup. We will then measure the water and compare that amount to the amount I will provide them with (how much water did I put in the trays before melting).

Explain: After we measure and compare the beginning amount before the ice and after the ice we will discuss the concept of conservation of water. How did we change the states of matter from a solid to a liquid? (we added heat) Were you surprised by the amounts of water that we started with and what we ended with? Did you think there would be more water as a liquid? Less water? Why? We will discuss student reasoning for their beliefs about the conservation of water and the changing of states of matter.

Elaborate: If we had to add heat to our solid to make it liquid, what do you think we will do to our liquid to make it a solid? Demonstrate how water becomes a gas by pouring student cups into a pot. Heat the pot until it boils. Hold a mirror over the pot to show the rising steam.

Evaluate: Have student draw the solid, liquid, and gas forms of water in their journals. Discuss the properties of the gas in comparison to the properties of solids and liquids. Have students answer this question, “What was most surprising to you after today’s activity?”

PART II: From Gas to Liquid to Solid

WEEK 6: MOLECULAR STRUCTURE GAME

A) MATERIALS
- Science Video
- Building blocks
- Plastic container
- String
- Students moving like atoms
- Journals

B) DESCRIPTION OF LESSONS

Engage: Discuss properties of gas, liquids, and solids. Discuss matter and atoms and how atoms work together to build our gases, liquids, and solids. We know that gases, solids, and liquids are all different, and they're different because the atoms that build them, build them different and work together in different ways. That is why we have different properties for our 3 states of matter. Discuss how we used heat to change our states of matter.

Explore: Using building blocks, discuss and demonstrate the structure of atoms in gases, liquids, and solids. Drop blocks into a plastic container and arrange them to show the different structures. Now have students 'act' like atoms. Place a ring of string on the floor large enough for a small group or the whole class to stand in. Have a group of students 'act' like solids, 'act' like liquids, 'act' like gases. Simulate the heating process. If we are solid ice, how will the atoms act differently if we add heat to our solid? (move like liquid) If we are water, how will the atoms act differently if we add heat to our liquid? (move like gas). Go back and forth, cooling and heating our atoms until students have a good understanding that the structure of atoms help determine the properties and the state of our substance.

Explain: Draw pictures of atoms in journals. Discuss the structure of the 3 states of matter again. Encourage students to link the structure of atoms to the properties of the states of matter. Have 2 charts hanging next to each other (1 chart for drawing the atom structure and property chart hanging next to it).