Solids, Liquids and Gases

Lesson #1: Introduction to Solids, Liquids, and Gases

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: Observable Properties of Objects

1) Sort objects by observable properties such as size, shape, color, weight, and texture.

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Ask questions about objects, organisms, and events in the environment.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Describe the differences between solids, liquids, and gases.

Anticipatory Set: Give each student (or pair of students) 3 ziploc bags, one bag containing a solid (rock), one bag containing a liquid (water), and one bag filled with air and closed. Allow the students to manipulate the bags.

Activity:

1) Ask the students to experiment with the 3 bags and think about how the materials in the bags are different. Then, discuss the bags as a class. Start with the bag with the rock. Ask the students to share their observations about the rock. Then, discuss the bag with the water. Ask the students to share their observations about the water and discuss how it is different than the rock. Finally, ask the students what is in the last bag. Students may think it is empty so ask questions to make them think about why it is inflated. Discuss how the air in the last bag is different from the water and the rock.
2) Tell the students that you will be discovering information about solids, liquids, and gases. Write these three words on the board. Ask the students to discuss in small groups (by table) which material is a solid, which is a liquid, and which is a gas and then share ideas as a class.
3) If time permits, give students other types of solids and liquids to experiment with. For example, students can compare different types of liquids (oil, honey) and different types of solids (foam, wood). Students may be curious about what will happen if different liquids are mixed. This can be done as a demonstration for the class.

4) Discuss the solid, liquid, and gas chart (laminated, provided by the teachers) with the students. Then, as a class, fill in the chart about solids, liquids, and gases with discussion and demonstrations from the different types of solids, liquids, and gases, investigated during this lesson. Some parts of the chart may remain blank and can be filled in and returned to after future lessons. This chart will be a good reference point as this unit progresses.
5) Pass out the solid, liquid, and gas student worksheet and ask students to complete it working in small groups (by table). If necessary, write the names of 6 substances on the board (2 solids, 2 liquids, and 2 gases and let the students decide where to write them (i.e. are they solids, liquids, or gases?).

Closure: Discuss the following ideas and questions with the students. How do we know if something is a solid? A liquid? A gas? How are solids, liquids, and gases different? Can a solid change into a liquid? A gas? Point to different objects are the room and ask the students to identify them as either a solid, liquid, or gas.

Assessment: Participation in class discussions and activities (student worksheet)

Resources and Materials: Ziploc bags with rocks, water, and air, sealed containers with different types of liquids (honey, oil), foam, wood, solid, liquid, and gas student worksheets, solid, liquid, and gas laminated chart

Name:_____ Date:_____

Solids, Liquids, and Gases

Matter	**Solid**	**Liquid**	**Gas**
Does it take up space?			
Does it have weight?			
Is it visible?			
Can it change shape easily?			

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Solids, Liquids, and Gases

Matter	**Solid**	**Liquid**	**Gas**
Does it take up space?	Yes	Yes	Yes
Does it have weight?	Yes	Yes	Yes
Is it visible?	Yes	Yes	No *(some gases are visible)
Can it change shape easily?	No	Yes	Yes

Solids, Liquids and Gases

Lesson #2: Gases

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: Observable Properties of Objects

1) Sort objects by observable properties such as size, shape, color, weight, and texture.

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Ask questions about objects, organisms, and events in the environment.
- Tell about *why* and *what would happen if?*
- Make predictions based on observed patterns.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Make predictions and observations about gas demonstrations.
2) Explain if gases are visible, take up space, have weight, and change shape easily.

Anticipatory Set: Place a helium-filled balloon and a regular blown up balloon in the front of the room. Ask the students to share their observations and then ask them questions about how the balloons are different. Tell them that today they will learn more about gases.

Activity:

1) Refer to the solids, liquid, and gas chart from the last lesson. Discuss the questions about gases (do gases have weight, take up space, change shape easily, and are gases visible). Explain that students will make predictions and observe demonstrations with gases to help answer these questions.
2) Ask the students to take a deep breath and then exhale. What is going into their bodies? What is coming out? Can we see these gases? Are they visible? Record information as a class on the solid, liquid, and gas chart.
3) Show students a funnel. Ask the students what they think will happen to water if they pour it into the funnel. (It will run through and out the spout.) Demonstrate to the students that water does indeed pass through the funnel. Place the spout of the funnel into a flask. Seal the neck of the

funnel into the mouth of the flask with clay. Ask the students what they think will happen to water when you pour it into the funnel. (Most will say that it will pour into the flask. When you pour water into the funnel, the water stays in the funnel and does not pour into the flask. The water does not flow into the flask because it is already filled with air. Air is matter and takes up space. Since no air can get out, the space in the flask is filled and no water can get in.)

4) Blow up a balloon in front of the class and discuss the results. What is going into the balloon? Does the gas fill up the balloon (take up space)? Does it change shape easily to fill the balloon? Record information on the solid, liquid, and gas chart.
5) Make a simple balance and place it in the front of the room. Blow up two balloons relatively equally and place one on each end of the balance until they are balanced. Ask the students what will happen when you stick a pin in one of the balloons. Stick one of the balloons (allowing the air the escape) and observe the results. Why are the balloons no longer balanced? Does air have weight?
6) Examine the two balloons again from the anticipatory set. Ask why one balloon filled with gas floats and one does not? Do gases have weight? Which balloon has a gas that weighs more?

Closure: Discuss the following ideas and questions with the students. Do gases take up space? How do you know? Do gases change shape easily? How do you know? Do gases have weight? How do you know? Are gases visible? How do you know?

Assessment: Participation in class discussions and activities (student worksheet)

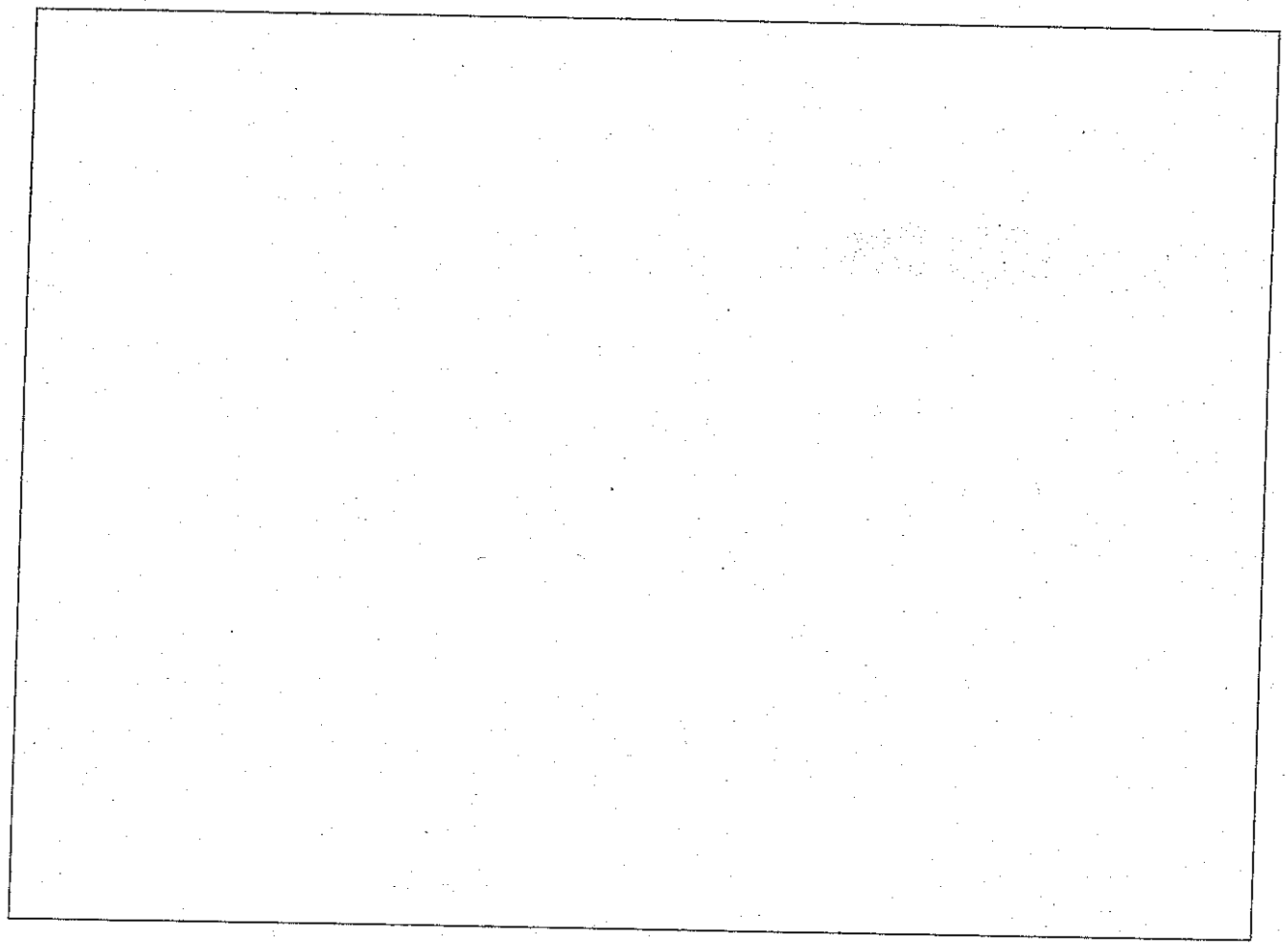
Resources and Materials: Helium-filled balloon*, balloons, funnel, glass flask, clay, made balance (can be borrowed from the 3rd grade matter unit materials or made – hang a meter stick or dowel from a string and tape the balloons to each side, move the balloons as necessary to make the stick balance), pin

***Requires advance purchase.**

Name:_____ Date:_____

Gases

Draw a picture of one science demonstration you saw today.



Solids, Liquids and Gases

Lesson #3: Mystery Liquids

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: Observable Properties of Objects

1) Sort objects by observable properties such as size, shape, color, weight, and texture.

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Ask questions about objects, organisms, and events in the environment.
- Make predictions based on observed patterns.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Observe, make predictions, identify, and compare different types of liquids.

Anticipatory Set: Before class, get all of the materials prepped and ready to go (add the food coloring to the liquids and mix). Set up a tall glass container with 3 different types of liquids. First, add a drop of red food coloring to some corn syrup and pour it into the container. Then add some milk. Finally, add drop of blue coloring to some alcohol and pour it on top. Pour all of the liquids in gently along the side of the container to get 3 nice stripes of liquid. Ask the students questions as you conduct the demonstration and discuss the results with the students.

Activity:

1) Review the properties of liquids with the class. Liquids have weight, take up space, change shape easily, and are visible. Explain that students will observe different mystery liquids today and make predictions about the types of liquids present.
2) Pass out a mystery liquids student worksheets. Ask the students to write their name and the date on the worksheet. Explain that the students will use their senses of sight and smell to observe the liquids (they are not allowed to touch them or taste them). Pass out containers of the mystery liquids to each table (these need to be made ahead of time and then hide the original solid containers). The containers should be numbered from 1-6. Remind the students to gently swirl the liquids in the containers to get more information.

3) Give the students time to observe the liquids and make predictions about the different types present. Discuss the predictions as a class and then reveal the actual identities of all of the mystery liquids.
4) Write the names of the mystery liquids on the board and allow students to finish filling in their chart about the mystery liquids.

Closure: Discuss the following ideas and questions with the students. How were these liquids the same? How were these liquids different? Why do we keep liquids in containers? How did you make guesses about the mystery liquids?

Assessment: Participation in class discussions and activities (student worksheet)

Resources and Materials: Tall glass container, corn syrup, milk, alcohol, food coloring, mystery liquids (molasses, water, oil, orange soda, rice milk, pink/red juice), containers for the liquids, mystery liquid student worksheet

Name:_____ Date:_____

Mystery Liquids

Number	Observations	Guess	Actual
1			
2			
3			
4			
5			
6			

Solids, Liquids and Gases

Lesson #4: Measuring Liquids

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: Observable Properties of Objects

1) Sort objects by observable properties such as size, shape, color, weight, and texture.

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Make predictions based on observed patterns.
- Name and use simple equipment and tools (e.g., rulers, meter sticks, thermometers, hand lenses, and balances) to gather data and extend the senses.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Make predictions and measure liquids using droppers and graduated cylinders.

Anticipatory Set: Place a variety of objects used to make measurements on each of the 4 tables (such as rulers, measuring tape, scales, droppers, graduated cylinders, measuring cups, etc.). Ask the students to identify which objects should be used to measure the amount of a liquid (review the properties of liquids).

Activity:

1) Explain that students will learn how to measure liquids using droppers and graduated cylinders. Discuss why droppers and graduated cylinders are good tools to use when measuring liquids. Show the students how to make measurements using the graduated cylinder. Fill several graduated cylinders to different heights in the front of the room (or at each table) and ask students to make measurement readings. Explain that milliliters (mL) are how scientists measure liquid.
2) Pass out the measuring liquids student worksheet. Ask the students to write their name and the date on the worksheet.
3) Working in pairs or small groups, ask the students to measure how much water they can transfer from a beaker to a graduated cylinder using an eye dropper. (Provide each group with a beaker of water, eye dropper,

and a graduated cylinder) Students should make predictions about how much water they can transfer and then conduct the experiment. Use a stopwatch (or clock) to make the time measurements (call out the start and stop to the class) and conduct each trial as a class. If working in pairs and if time allows students can conduct this experiment twice so that each student gets to conduct one trial.

4) Discuss the results as a class. Groups can share their predictions and the actual amount of water transferred. Why did the amount of water get bigger when the time was longer?

Closure: Discuss the following ideas and questions with the students. Why is a graduated cylinder narrow? Would a flat pan be a good way to measure liquids? Why or why not? Could a straw be used to measure liquids? Why or why not?

Assessment: Participation in class discussions and activities (student worksheet)

Resources and Materials: Measuring devices (rulers, measuring tape, scales, droppers, graduated cylinders, measuring cups, etc.), droppers, graduated cylinders, beakers, minute timers, measuring liquids student worksheet

Name:_____ Date:_____

Measuring Liquids

Time	Guess (in milliliters)	Actual Amount (in milliliters)
Trial 1: **1 minute**	_____ mL	_____ mL
Trial 1: **2 minutes**	_____ mL	_____ mL
Trial 1: **3 minutes**	_____ mL	_____ mL
Trial 2: **1 minute**	_____ mL	_____ mL
Trial 2: **2 minutes**	_____ mL	_____ mL
Trial 2: **3 minutes**	_____ mL	_____ mL

Solids, Liquids and Gases

Lesson #5: Mystery Solids

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: Observable Properties of Objects

1) Sort objects by observable properties such as size, shape, color, weight, and texture.

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Ask questions about objects, organisms, and events in the environment.
- Make predictions based on observed patterns.
- Name and use simple equipment and tools (e.g., rulers, meter sticks, thermometers, hand lenses, and balances) to gather data and extend the senses.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Observe, make predictions, identify, and compare different types of solids.

Anticipatory Set: Place a big hunk of dirt or Styrofoam on the front table. Ask the students if this item is a solid, liquid, or gas. Explain that solids can be broken into tiny pieces. Break up the solid (with student help) and put the tiny pieces into a container.

Activity:

1) Review the properties of solids with the class. Solids have weight, take up space, don't change shape easily, and are visible. Explain that students will observe different mystery solids today and make predictions about the types of solids present. All of these solids will be powders (tiny pieces) so they will take the shape of the containers.
2) Pass out a mystery solids student worksheets. Ask the students to write their name and the date on the worksheet. Explain that the students will use their senses of sight, smell, and touch to observe the solids (they are not allowed to taste them). Students may also use magnifying glasses to observe the powders. At each table, demonstrate proper use of the magnifying glasses (it might be easier to put a little bit of each powder on a piece of black paper to examine with a magnifying glass). Pass out containers of the mystery solids to each table (these need to be made

ahead of time and then hide the original solid containers). The containers should be numbered from 1-6. Remind the students to gently touch the solids in the containers to get more information.

3) Give the students time to observe the solids and make predictions about the different types present. Discuss the predictions as a class and then reveal the actual identities of all of the mystery solids.
4) Write the names of the mystery solids on the board and allow students to finish filling in their chart about the mystery solids.

Closure: Discuss the following ideas and questions with the students. How were these solids the same? How were they different? Do solids need to be kept in containers? How were these solids different from the mystery liquids?

Assessment: Participation in class discussions and activities (student worksheet)

Resources and Materials: Large hunk of dirt or Styrofoam, magnifying glasses, black paper, mystery solids (sugar, salt, baking soda, corn starch, flour, baking powder), containers for the solids, mystery solid student worksheet

Name:_____ Date:_____

Mystery Solids

Number	Observations	Guess	Actual
1			
2			
3			
4			
5			
6			

Solids, Liquids and Gases

Lesson #6: Measuring Solids

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: Observable Properties of Objects

1) Sort objects by observable properties such as size, shape, color, weight, and texture.

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Make predictions based on observed patterns.
- Name and use simple equipment and tools (e.g., rulers, meter sticks, thermometers, hand lenses, and balances) to gather data and extend the senses.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Make predictions and measure solids using balances.

Anticipatory Set: Place a variety of objects used to make measurements on each of the 4 tables (such as rulers, measuring tape, scales, droppers, graduated cylinders, measuring cups, etc.). Ask the students to identify which objects should be used to measure the amount of a solid (review the properties of solids).

Activity:

1) Explain that students will learn how to measure solids using balances. Discuss why balances (or scales) are good tools to use when measuring solids. Show the students how to make measurements using the balances. Demonstrate how to make balance measurement readings with several different objects in the front of the room (or at each table). Explain that grams (g) are how scientists measure the weight of solids.
2) Pass out the measuring solids student worksheet. Ask the students to write their name and the date on the worksheet.
3) The students will work in small groups at each of the tables. Give each table a balance and a container of different types of objects to weigh. Write the names of the different types of solids on the board so that the students can write them down in their charts (alternatively, students can draw a picture of the object on their chart). The students will probably

need quite a bit of assistance using the balances and adding up the gram weights. Make sure that the students make a weight prediction before using the balance and rotate turns using the balance so that each student uses it at least once.

4) Discuss the results as a class. Groups can share their predictions and the actual weight of different objects.

Closure: Discuss the following ideas and questions with the students. Why are balances or scales a good weigh to measure solids? Is a graduated cylinder a good way to measure the amount of a solid? Why or why not?

Assessment: Participation in class discussions and activities (student worksheet)

Resources and Materials: Measuring devices (rulers, measuring tape, scales, droppers, graduated cylinders, measuring cups, etc.), balances and weights, different sizes and shapes of objects to weigh (powders, rocks, Styrofoam, coins, etc.)

Name:_____ Date:_____

Measuring Solids

Name of Solid	Guess (in grams)	Actual Weight (in grams)
	_____ g	_____ g
	_____ g	_____ g
	_____ g	_____ g
	_____ g	_____ g
	_____ g	_____ g
	_____ g	_____ g
	_____ g	_____ g
	_____ g	_____ g
	_____ g	_____ g

Solids, Liquids and Gases

Lesson #7: Sparkle Jars

***Each student must have a small glass or plastic jar (brought from home) to complete this lesson.**

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: Observable Properties of Objects

1) Sort objects by observable properties such as size, shape, color, weight, and texture.

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Tell about *why* and *what would happen if?*
- Make predictions based on observed patterns.
- Name and use simple equipment and tools (e.g., rulers, meter sticks, thermometers, hand lenses, and balances) to gather data and extend the senses.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Make sparkle jars, measure amounts of solids and liquids, identify solids, liquids, and gases, and discuss the results.

Anticipatory Set: Tell students that today they will make something that contains solids, liquids, and gases. Encourage them to be on the look-out for the three types of matter and review the characteristics of each as necessary.

Activity:

1) Organize all of the materials at the front of the room and explain the activity to the class. Each student will make their own sparkle jar. The jar will have corn syrup and water inside of it and then students can add different amounts of different types of solids (glitter, beads, buttons, seeds, sequins, crayon shavings, etc.).
2) Write directions on the board clearly indicating the amount of water to add to the jar and the amount of corn syrup to add to the jar (2/3 water and 1/3 corn syrup in mL). The directions can specify other measurements that the students must make if they are highly proficient at using the graduated

cylinders and balances. Alternatively, this activity can be done without asking the students to make any measurements.

3) Place the necessary materials at each table (water, corn syrup, graduated cylinders, and solids of different types). Working individually, students will make their sparkle jars following the directions on the board and with help from the adult at their table. Use funnels (can be made out of paper) to add the solids to the jars (each student should add 3-5 solids). Students should not shake or move the jar as they work.
4) When the students complete the jar ask them to observe their jar and identify the solids, liquids, and gases (air bubbles) present. Then, ask the students to guess what will happen when they shake the jars, allow the students to shake the jars and then observe what happens.
5) If time permits, students can make a drawing of their jar and label the solids, liquids, and gases in their sparkle jars (write the words solid, liquid, and gas on the board).
6) Discuss the results as a class. Individuals can share their sparkle jars with the class. Students can take their sparkle jars home.
7) As a final review of solids, liquids, and gases students can complete the solid, liquid, and gas chart (the same chart that you have worked together to complete as a class). Pass out the chart and discuss as necessary as a whole class or in small groups (at each table). If you are short on time, this can be done back in the classroom.

Closure: Discuss the following ideas and questions with the students. How did the water and corn syrup mix together? What happens to the solids in the jar? Where do the air bubbles come from?

Assessment: Participation in class discussions and activities (student worksheet)

Resources and Materials: Clear plastic or glass jars*, graduated cylinders, balances and weights, corn syrup, glitter, beads, buttons, seeds, sequins, crayon shavings (in containers for each table), funnels, solid, liquid, and gas student chart

***Small glass or plastic jars must be brought from home.**

Name:_____ Date:_____

Solids, Liquids, and Gases

Matter	**Solid**	**Liquid**	**Gas**
Does it take up space?			
Does it have weight?			
Is it visible?			
Can it change shape easily?			

Teacher Copy

Solids, Liquids, and Gases

Matter	**Solid**	**Liquid**	**Gas**
Does it take up space?	Yes	Yes	Yes
Does it have weight?	Yes	Yes	Yes
Is it visible?	Yes	Yes	No *(some gases are visible)
Can it change shape easily?	No	Yes	Yes

Solids, Liquids and Gases

Lesson #8: Sink or Float?

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: Observable Properties of Objects

1) Sort objects by observable properties such as size, shape, color, weight, and texture.

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Tell about *why* and *what would happen if?*
- Make predictions based on observed patterns.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Make predictions about whether or not different objects will sink or float, test the objects, and record and discuss the results.

Anticipatory Set: Discuss what it means to sink or float. Ask the students what happens when different types of solids are put in liquid water. What types of objects float? What types of objects sink?

Activity:

1) Explain that the students will be investigating whether or not different objects sink or float in water. Pass out the sink or float student worksheet and explain how to record predictions and results for this experiment.
2) Divide the class into approximately 8 groups (2 at each table). Provide each group with a large container of water and at least 8 different types of objects that sink or float. Write the names of the objects on the board so that students can fill in the names of the objects on their charts (alternatively, students can draw a picture of the object on their chart).
3) Assist groups as necessary as they make predictions about which objects will sink or float and the conduct two trials to test their predictions. Note: Some objects may float the first time but sink the 2nd time once they are already wet. This can provide some interesting discussion.
4) Discuss the results as a class. Groups can share their results and compare and contrast their results for the same objects.

Closure: Discuss the following ideas and questions with the students. What types of objects floated? What types of objects sank? Did the bigger items always sink? Explain. Why did some objects float the first time and sink the second time?

Assessment: Participation in class discussions and activities (student worksheet)

Resources and Materials: Large water containers (8), sink or float student worksheets, 8-10 different types of objects (corks, Styrofoam, rocks, different types of balls, plastic containers, plastic containers with holes or plastic balls with holes, wood, pencil, paper, metal, sponge, etc.)

Name:_____ Date:_____

Sink or Float?

Object	Guess	1st Try: Sink or Float?	2nd Try: Sink or Float?
	float sink	float sink	float sink
	float sink	float sink	float sink
	float sink	float sink	float sink
	float sink	float sink	float sink
	float sink	float sink	float sink
	float sink	float sink	float sink
	float sink	float sink	float sink
	float sink	float sink	float sink

Solids, Liquids and Gases

Lesson #9: Water Changes

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Ask questions about objects, organisms, and events in the environment.
- Tell about *why* and *what would happen if?*
- Make predictions based on observed patterns.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Student will be able to:

1) Design and construct a simple structure out of paper that can hold water.
2) Make predictions, conduct tests, record results, and make design changes.

Anticipatory Set: Give each small group 3 tied off balloons, one with liquid water inside, one with ice inside, and one blown up (water as a gas). Do not tell the students what is inside each balloon. Ask them to feel the balloons and make observations and predictions about what is inside. Encourage the students to discuss if the balloons contain solids, liquids, or gases. Collect the balloons and, as a demonstration, cut open one set in front of the class and discuss the contents.

Activity:

1) Explain that the students will learn about water as a solid, liquid, and a gas. The balloons contained water as a solid, liquid, and a gas. Pass out the water changes student record sheet and tell the class that they will make drawings and write down observations (optional) of water as a solid, liquid, and a gas.
2) Give each student a cup with ice in it. Ask then to make a drawing of water as a solid on their worksheet. Then, ask the students to turn the ice into liquid water as quickly as possible. Discuss the results as a class. Then, ask the students to make a drawing of water as a liquid on their worksheet. How did you turn the ice into water? How is the liquid water different from the ice (temperature)? How would you make the water turn into ice again?
3) Ask the class how to turn liquid water into a gas. After discussing different ideas do a demonstration with a glass beaker of water on a hot plate.

Observe the steam (water vapor, water as a gas) that is produced and ask the students to make a drawing of water as a gas on their worksheet. Hold a metal pan up above the boiling water to show that water as a gas turns back into liquid water when it cools. How is the liquid water different from the steam (water as a gas)? Why did the water gas turn back into a liquid on the metal pan?

4) Either individually or in pairs give students 3 different colored cards, one with the word gas, one with the word solid, and one with the word liquid written on them. Call out different examples of water, give wait time, and then ask the students to reveal their answers. Water examples: rain, icicles, fog, snow, hail, breath on a cold morning, river, steam after a hot shower, etc.

Closure: Discuss the following ideas and questions with the students. How is liquid water different from solid water? How is water as a gas different from solid water? How is water as a gas different from liquid water? What makes water change between a solid, liquid, and a gas?

Assessment: Participation in class discussions and activities (student worksheet)

Resources and Materials: Balloons, ice, cups, water changes student worksheet, glass beaker, hot plate, metal pan, colored cards with solid, liquid, and gas written on them (cards of the same color should have the same word on them)

Water Extension Activity: Have each table (or group of students) put some water in a cup and mark the level with a marker. Take the cups down to the classroom (or set the cups up in the classroom) and make observations every day until all of the water is gone. Discuss this process with the class. Where did the water go? Did the liquid water turn into another type of water? How could we test this? To test this, place a cup with some water in the window and cover it with a piece of saran wrap. Over time, the students should be able to see water droplets form on the saran wrap. How did the water get out of the cup and onto the saran wrap?

Name:_____ Date:_____

Water Changes

Ice – *Solid Water*	Water – *Liquid Water*	Steam – *Water Gas*

Solids, Liquids and Gases

Lesson #10: Water Container Design Challenge

Time Frame: 1 session of 30 minutes

Learning Standards:

Science

Physical Science: States of Matter

1) Identify objects and materials as solid, liquid, or gas. Recognize that solids have a definite shape and that liquids and gases take the shape of their container.

Skills of Inquiry

- Ask questions about objects, organisms, and events in the environment.
- Tell about *why* and *what would happen if?*
- Make predictions based on observed patterns.
- Record observations and data with pictures, numbers, or written statements.
- Discuss observations with others.

Technology/Engineering

Materials and Tools

1.3 Identify and describe the safe and proper use of tools and materials (e.g., glue, scissors, tape, ruler, paper, toothpicks, straws, spools) to construct simple structures.

Student will be able to:

1) Design and construct a simple structure out of paper that can hold water.
2) Make predictions, conduct tests, record results, and make design changes.

Anticipatory Set: Assemble containers of different types in the front of the classroom (such as cups, plates, bowls, spoons, bags, plastic containers with lids, etc.). Tell the students that the teacher down the hall (or make up another story) is really thirsty and asked you to bring water. Experiment with putting water in different containers and ask them which types of containers work best.

Activity:

1) Explain that the students will design and make a container out of paper that can hold water. Show the students the materials they will be able to use including one piece of regular white paper per design, glue sticks, tape, scissors, and rulers (types of materials can vary). Each group gets only one piece of paper per design. Pass out the water design student worksheet and discuss.
2) Working in pairs, students will draw a design for their paper water structure and make the structure. Holding it over a plastic bin, they will fill it with water and then dump it out. Students will record how many times

they can fill their container with water before it breaks. If time permits, students can make another design.

3) Discuss the results as a class. Different groups can share their designs with the class and students can discuss which types of designs worked best.

Closure: Discuss the following ideas and questions with the students. Is paper a good way to carry liquid water? Why or why not? What types of materials are better for moving water? Why? How did you improve your designs?

Assessment: Participation in class discussions and activities (student worksheet)

Resources and Materials: Different containers (such as cups, plates, bowls, spoons, bags, plastic containers with lids, etc.), regular white paper, glue sticks, tape, scissors, plastic bins, water design student worksheet

Name:_____ Date:_____

Water Design Challenge

Design (drawing)	How many times did it hold water?
#1	
#2	
#3	