

Title - *Solids, Liquids, and Gases*

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Primary Subject - Science

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Grade Level - 2-5

Solids, Liquids, and Gases

Second Grade

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### Introduction

This lesson will focus on solids, liquids, and gases. The goal of the lesson is to have the children distinguish between the three. They will also be able to identify some of the physical properties of each of them. They will also be shown how we can do things to materials that change the physical properties of them. The children will see experiments and observe many solids, liquids. The children will focus primarily on the solids, and liquids. This is because gases are a concept that should be taught at a higher level. I am introducing this topic to the children because, it essential that they have an idea that things are classified as solids, liquids, or gases. They will be told what a gas is and will be expected to understand that there is not just open space, but many gases that fill the world. Solid - tend to keep its form rather than to flow or spread out like a liquid or gas; relatively firm or compact.

Liquid - readily flowing; fluid; specif., having its molecules moving freely with respect to each other so as not to flow readily, unlike a solid, but because of cohesive forces not expanding indefinitely like a gas.

Gas - the fluid form of a substance in which it can expand indefinitely and completely fill its container; form that is neither liquid nor solid; vapor

### Pre-requisite Knowledge

The children need to understand physical traits such as color, size, shape, weight, and texture. They will also need to understand that changes occur in nature very often.

### Objectives

Students will be able to classify materials as solids, liquids, and gases.

Students will define the terms solids, liquids and matter.

Students will be able to show that when materials are manipulated they can take on different properties.

### Standards/Benchmarks

Project 2061 Benchmarks:

-- Objects can be described in terms of the materials they are made of (clay, cloth, paper, etc.) and their physical properties (color, size, shape, weight, texture, flexibility, etc.).

-- Things can be done to materials to change some of their properties, but not all materials

respond the same way to what is done to them.

Philadelphia:

-- Identify properties of the earth's materials (rocks, soil, water and air) and understand how they interrelate.

-- Understand and recognize when heating and cooling occurs.

-- Observe how materials change over time (e.g. metal rusting).

Materials

Teacher:

Blackboard  
Chalk  
Candle  
Match  
Baking Soda  
Book  
Compact  
Alcohol  
Vinegar  
Juice  
Water

Students:

Sandwich bag with water or vinegar  
Balls, pen, or pencil  
Paper

Procedures

Activity 1 (five minutes as a group)

1. The goal statement, To find out what makes something a solid or liquid will be written on the board. The students will be asked to read the goal statement as a group. First, I will ask does anyone know what a solid is. I expect someone will give me an example of a solid, such as a desk. I will tell them that yes that is a solid, but to day we will learn why it is a solid. Next, I will ask does anyone know what a liquid is. I expect they will again give an example of a liquid such as water. I will tell them yes that is a liquid, and we will also find out today why they are liquids.

Activity 2 (twenty minutes individually and as a group)

1. There will be a table set up in the front of the class. The table will contain various liquids and solids. The students will be asked to identify many of them. They will also be asked to tell me why they believe the item they choose is a solid or liquid. I expect they will say things such as they moving, wet, soupy, and wavy. I expect to hear answers such as firm, hard, stays the same for solids. Next, I will say we are now going to hand out some solids and liquids to each of you to look at and think about. My partners will now pass out these items.

2. Each child will be given a solid and a liquid in a sandwich bag. They will be told to look at the liquid, and the solid. Then they will be told to look for some things that they notice that are different about them. Next they will be asked to write down the word liquid and write some words that describe a liquid. I will then, writes the word liquid on the board and ask the students to tell me what they think a solid is. I will then write the definition on the board. Next, they will be told to do the same for the solid. I will then write the word solid on the board and ask the students to tell me what they think a liquid is. I expect they will tell me the liquid is soupy, or wet, they will also tell me that it moves around. I expect they will say solids are hard, firm, they stay the same, etc. The students and I will then review the definitions that they come up with. Then, I will ask them if they think we can turn liquids to solids or solids to liquids. I expect someone to say yes. I will then say let's try it. If someone says no I will say I think we can. Let's look at ways it could happen.

#### Activity 3 (ten minutes as a group)

1. There will be four candles set up around the class. The children will be directed to look at one of them, but instructed to keep away to prevent injuries. The candle will then be lit. It will take some time for the wax to begin to melt. During this time I will ask the children what do they expect to see happen. I think some of them will say the candle will melt. I will then ask them why. I expect someone will say the fire. I will then tell them when a fire starts what do they feel. I expect someone will say heat. If no one says it I will tell them. By this time the candle should have started to melt. I will ask the children to look at the candle again. I suspect someone will say it is melting, if not I will say it. Then I will ask them what does the melted wax look like. Someone may say it is a liquid, if not I will say is it a solid still, and I expect someone to say no. Then I will say is a liquid. I expect someone will say yes. I will then ask the students what do they think will happen to the wax that is now a liquid if we blow out the fire. I am unsure if someone will be able to answer the question, if not I will say let's see and blow out the fire. Finally I will ask the students to go back to their desks and write down what they think made the solid candle turn not a liquid. Then I will ask them to write down what made the liquid candle turn back into a solid.

#### Activity 4 (ten minutes as a group)

1. I will tell the students that that scientists have a third group, in which they put materials, gases. I will then say this is really hard to learn about, something for seventh graders, but I think you guys are smart enough to handle it. We will now have a small discussion about gases. This will be done last to give the children an idea of gases, and to have them understand that they are out there. I will ask the children if they can name a gas. I expect they will again say things such as the air or my breath. I will tell them that these things are made up of many different gases. I will then blow up a balloon. I will ask the students what do they think is making the balloon get bigger. I expect they will say your breath. I will say yes, the gas from my breath is making the balloon get bigger. I will then show them an experiment that uses baking soda, vinegar, a 3 x 5 card, and a candle. The candle is lit, and baking soda and vinegar is mixed together. I will show the students the gases that are present in the mixture. The cup is tilted over the card and the candle is placed in the direct line of it. The gas will put the fire out. I will ask why do they the fire went out. I expect some one will say the vapors or gases that we saw in the cup. I will say yes, and that is one way that we know gases are present.

### Summary/Closure

The children will be asked to share their ideas with the group. Children will be given then opportunity to share their ideas and receive comment from other members of the class. I will allow other children to comment on each other's answers to help guide each other to the right answer. The children will be expected to realize that the hat turned the solid into a liquid and vice versa. If they are unable to see this I will go through the steps of the experiment, and ask them was the candle a solid before we lit it. I expect they will say yes. Then I will say what happened shortly after we lit it. I expect they will say it started to become a liquid. I will say so what do you think caused that. I expect they will then say the fire or heat. I will ask what happened after we blew out the fire. I expect they will say the liquid got hard or solid. I will say what do you think caused that. I expect they will say you blew the fire went out. I will then say yes, but did the candle still have heat when the fire was blown out. I expect they will say no. I will then say what did it need to do to become solid again. I expect this time someone will say stop getting heat or get cool.

### Extension Activity (ten minutes if time allows)

The children will be asked to look around the classroom and find some things that are liquids, and solids. They will be called on individually to show their item and tell why it is a solid or liquid.

### Assessment

The children will be assessed on their writings. They will be asked to write down some characteristics of the solid and liquid they are given. They will also be asked to write down why they think the wax turned to a liquid and why it turned back to a solid when we blew out the fire.

### Assignment

Students will be given a worksheet that requires them to label some liquids and solids. Please note, the above worksheet was not provided by the author, but the lesson plan can be performed without the worksheet or one could easily be made.

### Sources

Martin, Ralph et al.. "Heat Energy" Science For All Children. Massachusetts:  
Allyn and Bacon, 1999

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