Delaware Science Coalition

Grade 1 Solids and Liquids Unit Template

Preface: This unit has been created as a model for teachers in their designing or redesigning of course curricula. It is by no means intended to be inclusive; rather it is meant to be a springboard for teacher thought and creativity. The information we have included represents one possibility for developing a unit based on the Delaware content standards and the Understanding by Design framework and philosophy.

Unit Summary:
This unit is a study of solids and liquids. Students conduct tests to identify and compare the physical properties of these two states of matter. Their similarities and differences are observed in order to sort and group them.

Stage 1: Desired Results
Delaware Science Content Standards

Delaware Science Content Standards

This course focuses on the Delaware Science Content Standards and Grade Level Expectations in Standards 1 and 2 found on the following web site: http://www.doe.k12.de.us/programs/ci/content_areas/science.shtml

Standard 1- Nature and Application of Science and Technology
Understanding and Abilities of Scientific Inquiry
Students should know and be able to:

1. Understand that: Scientific investigations, whether conducted by students or scientists, involve asking a question about the natural world.
    - Be able to: Generate questions and predictions using observations and exploration about the natural world.
3. Understand that: The purpose of accurate observations and data collection is to provide evidence. Scientists use tools to enhance their senses in order to obtain more evidence.
    - Be able to: Collect data using observations, simple tools and equipment. Record data in tables, charts, and bar graphs. Compare data with others to examine and question results.
4. Understand that: Scientists use observations from investigations and knowledge that is already known to develop an explanation.
    - Be able to: Construct a simple explanation by analyzing observational data. Revise the explanation when given new evidence or information gained from other resources or from further investigation.
5. Understand that: The purpose of communicating with others is to share evidence and conclusions. Scientists communicate the results of their investigations to others.
    - Be able to: Share simple plans, data, and explanations with an audience and justify the results using the evidence from the investigation.
6. Understand that: The use of mathematics, reading, writing, and technology are important in conducting scientific inquiries.

- Be able to: Use mathematics, reading, writing, and technology when conducting an investigation and communicating the results.

Standard 2: Materials and Their Properties

Properties and Structures of Materials

Students should know that:

1. Materials can be described and classified according to the following physical properties: size, shape, mass, texture, color, and material composition. Students can observe materials' physical properties by using tools that include rulers, balances, thermometers and hand lenses.

Students should be able to:

- Conduct simple investigations to identify the physical properties (e.g., ability to sink or float, dissolve in water, roll or stack) of solids and liquids. Record the results on charts, diagrams, graphs, and/or drawings.
- Sort and group solids based on physical properties such as color, shape, ability to roll or stack, hardness, magnetic attraction, or whether they sink or float in water.
- Compare and describe similarities and differences in physical properties of various solid objects.
- Sort and group liquids based on physical properties such as color, odor, tendency to flow, and whether they sink, or float.
- Compare and describe similarities and differences in physical properties of various liquids.
- Use writing, drawing, and discussion to communicate observations, descriptions, investigations, and experiences concerning solids and liquids.

2. Materials exist in one of three states – solid, liquid, or gas. Solids and liquids have easily observable properties and may change from one form to the other.

Students should be able to:

- Construct individual and class diagrams (e.g., Venn, pictographs) to compare the similarities and differences between the properties of solids and liquids.

3. Physical properties of materials can be changed by exposure to water, heat, light, or by cutting, mixing, and grinding.

Students should be able to:

- Observe and describe changes in the physical properties of solids and liquids after exposure to various treatments (i.e., temperature, sunlight, water).

Material Technology

Students should know that:

1. The properties of materials influence their use. Some materials are more suitable for making a particular product or device.
2. Technology has created new materials that can help people solve problems.

Big Ideas

Investigate the physical properties of solids and liquids.

Observe the similarities and differences among solids and among liquids

Organize solids and liquids into groups based on their physical properties

Unit Enduring Understandings

Students will understand that…

The senses can be used to observe, describe, gather data and communicate about the physical properties of solids and liquids.

Tests can be performed to investigate the physical properties of solids and liquids.

Solids and liquids can be sorted based on the similarities and differences of their physical properties.

Unit Essential Question(s)

Which physical properties determine if something is a solid or liquid?

How do the physical properties of solids and liquids determine their use?

How do the similarities and differences of a solid or a liquid determine how they should be sorted and grouped?

How do the senses provide information about the physical properties of a solid or a liquid?

Knowledge & Skills

Knowledge:

- Physical properties of solid objects may include color, shape, ability to roll, ability to stack, hardness, ability to sink, ability to float, and attraction to a magnet.
- Solids have a definite shape.
- Physical properties of liquids include color, viscosity, opaqueness/transparency/translucency, and ability to sink/float in water.
- Liquids take the shape of their container.
- Properties can be used to sort and describe solids and liquids.
- Solid objects can be put in order by hardness.
- A Venn diagram or a T-chart is useful in comparing properties.

Skill:

- Generate questions and predictions using observations and exploration about the natural world.
- Generate and follow simple plans using systematic observations to explore questions and predictions.
- Collect data using observations, simple tools and equipment. Record data in tables, charts, and bar graphs. Compare data with others to examine and question results.
- Construct a simple explanation by analyzing observational data. Revise the explanation when given new evidence or information gained from other resources or from further investigation.
- Share simple plans, data, and explanations with an audience and justify the results using the evidence from the investigation.
- Use mathematics, reading, writing, and technology when conducting an investigation and communicating the results.
- Conduct simple investigations to identify the physical properties (e.g., ability to sink or float, dissolve in water, roll or stack) of solids and liquids. Record the results on charts, diagrams, graphs, and/or drawings.
- Sort and group solids based on physical properties such as color, shape, ability to roll or stack, hardness, magnetic attraction, or whether they sink or float in water.
- Compare and describe similarities and differences in physical properties of various solid objects.
- Sort and group liquids based on physical properties such as color, odor, tendency to flow, and whether they sink, or float.
- Compare and describe similarities and differences in physical properties of various liquids.
- Construct individual and class diagrams (e.g., Venn, pictographs) to compare the similarities and differences between the properties of solids and liquids.
- Observe and describe changes in the physical properties of solids and liquids after Exposure to various treatments (i.e., temperature, sunlight, water).
- Use writing, drawing, and discussion to communicate observations, descriptions, investigations, and experiences concerning solids and liquids.

Stage 2: Assessment Evidence

Suggested Performance Task(s)

A – Audience—Ex: A family member or close friend
S – Situation—Ex: Creating a scrapbook chronicling a character's life, real and inferred
P – Product, Performance, and Purpose—Ex: Scrapbook
S – Standards and Criteria for Success—Ex: Your scrapbook should include all components on included rubric

Solids and Liquids Assessment for Grade One can be found at
www.doe.k12.de.us
http://www.doe.k12.de.us/programs/sci_assess/default.shtml

Transfer Key Ideas:

- Solids and liquids can be described by their physical properties.
- Solids and liquids can be sorted by their physical properties.
- Physical properties can be used to categorize solids and liquids.

Students are expected to:

- Observe and record physical properties of a solid.
- Recognize that solids have a definite shape.
- Recognize that liquids are fluids that take the shape of their container.
- Classify objects on the basis of physical properties.
- Observe and record physical properties of liquids.
- Identify physical properties that can be used to sort solids and liquids.
- Use tools to separate solids on the basis of particle size.

Rubrics/checklists for Performance Tasks

Solids and Liquids Assessment Rubrics for Grade One can be found at
http://www.doe.k12.de.us/programs/sci_assess/default.shtml

Other Evidence

Formative Assessment #1 Solid Reflection (use after lesson 3)

Directions: Given a reflection sheet (attached) with the statement "I think the ball is solid because_____", students will complete the statement.

Scoring Guide: Rubric

2-Student is able to name at least two physical properties of a solid.
(hardness, definite shape, volume, color, size)
1-Student only gives one physical property of a solid

0-Student gives incorrect or no physical properties of a solid

Formative Assessment #2 Classification of Objects by Characteristics (use after lesson 7)

Directions: Teacher gives students the collection of 20 objects (supplied in kit) that vary according to certain characteristics (color, shape, and magnetic attraction, ability to roll, stack, sink, or float). Teacher poses questions and students respond by selecting and holding up the object.

Possible Questions:

Examine your objects, hold up an object that:

- will sink?
- will not stack?
- can be attracted to a magnet?
- has a similar shape to this object? (teacher holds up an example such as a cylinder)
- will float?
- will not roll?
- is harder than this? (teacher holds the big, blue ball)

Scoring Guide: Teacher observes the objects that students hold up for correctness and for misunderstandings. Based on observations, teacher determines what properties need review.

Formative Assessment #3 Liquid Reflection (use after lesson 10)

Directions: Given the reflection sheet (attached) with the statement "I think the glue is liquid because _____", students will complete the statement

Scoring Guide: Rubric

2-Student is able to name at least two physical properties of a liquid.
(moves, spreads out, no definite shape, can be stirred, poured, and will drip)

1-Student only gives one physical property of a liquid

0-Student gives incorrect or no physical properties of a liquid

Student Self-Assessment and Reflection

See above.

Stage 3: Learning Plan

Key learning events needed to achieve unit goals

Resource: STC *Solids and Liquids*, National Science Resource Center, Washington DC

Lesson 1: Pre-Unit Assessment
This lesson allows students to observe and describe two solids. (spoon and ball)

Lesson 2: Observing Properties
Students use their senses to classify 20 solids by color and shape.

Lesson 3: Comparing Solids that Roll with Solids that Stack
Students classify 20 solids on their ability to roll, stack or roll and stack.

Lesson 4: Rolling Solids
Students classify 20 solids on their ability to roll short or long distances.

Lesson 5: Testing the Hardness of Solids
Students classify 20 solids based on a hardness continuum.

Lesson 6: Investigating Solids and Water
Students classify 20 solids based on their ability to sink or float.

Lesson 7: Testing solids with a Magnet
Students classify 20 solids based on their attraction to a magnet.

Lesson 8: Guess My Reason

Students sort the 20 solids and their partner tries to guess the sorting rule. (physical properties)

Lesson 9: Investigating Two New Solids
Students conduct tests to describe the physical properties of two different solids.

Lesson 10: Observing and Describing Two Liquids
Students use their senses to explore the look and feel of two liquids.

Lesson 11: Investigating Liquids
Students use their senses and a hand lens to explore the look and feel of four liquids.

Lesson 12: Flowing Liquids
Students investigate the concept that liquids have no definite shape.

Lesson 13: The Drop Races
Students explore the concept that liquids have different viscosities. (flow rates)

Lesson 14: Mixing Liquids
Students explore the concept that liquids mix differently (miscibility)

Lesson 15: Investigating Two New Liquids
Students conduct tests to describe the physical properties of two different liquids.

Lesson 16: Comparing Solids and Liquids
Students compare the similarities and differences between solids and liquids.

Resources & Teaching Tips

Stories included in the *Solids and Liquids* Teacher's Guide

- **Sorting Solids, Scientist Do It Everyday (lesson 4)**
- **Snow Friends (lesson 9)**
- **Oil Spills: Cleaning Up, Keeping Clean (lesson 14)**

Lesson 1
Type the sentence "I think the ball is a solid because _____" (from final activities #2). Use it as a recording sheet for lesson 1.

Lesson 2
Copy an extra set of the 20 solids pictures. Color the pictures like the solid. Put the pictures on chart paper and label each solid. Keep this posted as a reference for the students to use.

Make this into three separate lessons. The first lesson would be to distribute the 20 solids in big Ziploc bags, one bag to each two students. Play a game to identify each solid. (ex: Partner 1 finds the clear lid. or Partner 2 can you find something clear shaped like a cylinder?).

Classify the solids by color and discuss groupings as a separate lesson.
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Lesson 3
Use the extra clear plastic trays as sorting containers. Make paper labels (stack, roll) to put in each tray. Students test their solids and place them in the correct containers. If the solid stacks and rolls, it can between the two trays.

Lesson 4
Make this into two separate lessons. The students make the ramp and test the 20 solids and discuss their findings.
Students test the 20 solids by blowing them across the grooved side of a ruler and discuss their results.

Lesson 5
Discuss with the children how they can line up the solids if they think some are equally hard. (Place 1 on top of another or put 1 solid in a line above another solid with the same hardness, like making a graph.).

Lesson 6
Use the extra clear plastic trays as sorting containers. Put a paper towel in the bottom of each tray. Make paper labels (sink, float) to put in each tray. Students test their solids, placing them in the correct tray. The solids dry off as children work. Solids that sink and float can be placed on a paper towel between the 2 trays.

Reduce the 20 solids pictures and provide a copy for each student. The student can cut them out and glue them onto their own Venn diagram (a Venn diagram black line is provided in the appendix).

Lesson 7
Use the extra clear plastic trays as sorting containers. Make paper labels (magnetic, non-magnetic) to put in each tray. Students test their solids, placing them in the correct tray.

Lesson 10
Type the sentence "I think that glue is a liquid because _____" (from final activities #3). Use it as a recording sheet for lesson 10.

Lesson 12
Store the plastic bags of liquids in a tub or container. Sometimes the bags will leak, especially the ones with oil in them.

Lesson 13
Draw the two circles in the clear plastic trays with a black permanent marker (included in the science kit) for the drop races.

Accommodation/Differentiation ideas and tips

Name _____
Date_____

I think the ball is solid because

Name _____
Date_____

I think the glue is liquid because