

Anoka Hennepin K-12 Curriculum Unit Plan

Department: Elementary Science

Course/Grade Level: 2nd

Unit Title: Physical Science – Solids and Liquids

Number of Lessons/Days: 9- 1 hour lessons

Unit Summary: In this unit students will investigate and sort objects based on their properties. They will have opportunities to observe, describe, and compare the properties and behaviors of solids and liquids. Students will use their science notebooks to record observations with pictures, numbers, and words. Students will practice for the unit GRASPSS-bridge building through an investigation where students will recognize the properties of solid materials that make them appropriate for tower construction; build towers.

***Please note that even though gas is a matter, it will not be covered in this unit. Gas will be covered in fourth grade.**

DESIRED RESULTS (STAGE 1)

Program Understanding and/or Minnesota State/Local/Core Standards and Technology Standard(s) addressed:

- III. Students will understand that scientists use the properties and interactions of energy and matter to explain how the physical world works.
- IV. Students will understand the study of science involves processes that unify science disciplines and provide students with ideas and structures to help them understand the natural world.
- V. Students will understand the process of inquiry is the collection of information verified through observation and experimentation which allow scientists to critically analyze, draw conclusions and make inferences about the natural world.
- VI. Students will understand scientists use various communications to share knowledge and promote understanding about our natural world.

MN Standards

- 2.1.1.2 Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.
 - 2.1.1.2.1 Raise questions about the natural world and seek answers by making careful observations, noting what happens when you interact with an object, and sharing the answers with others.
- 2.1.2.2 Engineering design is the process of identifying problems and devising a product or solution.
 - 2.1.2.2.1 Identify a need or problem and construct an object that helps to meet the need or solve the problem. *For example:* Design and build a tool to show wind direction. *Another example:* Design a kit
 - 2.1.2.2.2 Describe why some materials are better than others for making a particular object and how materials that are better in some ways may be worse in other ways. *For example:* Objects made of plastic or glass.
 - 2.1.2.2.3 Explain how engineered or designed items from everyday life benefit people.
- 2.2.1.1 Objects can be described in terms of the materials they are made of and their physical properties.
 - 2.2.1.1.1 Describe objects in terms of color, size, shape, weight, texture, flexibility, strength and the types of materials in the object.
- 2.2.1.2 The physical properties of materials can be changed, but not all materials respond the same way to what is done to them.
 - 2.2.1.2.1 Observe, record and recognize that water can be a solid or a liquid and can change from one state to another and that the amount of water stays the same when it melts and freezes.
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Overarching Understanding(s) from Curriculum Map/Course Understandings:

Students will understand that....

objects have physical properties that can be used to describe and sort them.
 materials have physical properties, which can be changed.
 there are patterns that help make connections in the world.
 scientists ask questions and make observations to gather data to support their thinking about the world.
 scientists work individually and collaboratively to understand the natural world and learn from one another.
 engineers use the design process to identify problems and devise a product or solution.

Topical Understanding(s) Specific to Unit:

Students will understand that....

objects can be described or sorted by their physical properties such as color, size, weight, texture, flexibility, strength and the types of materials in the object.
 some materials can be changed from one state to another such as solid to liquid and that the amount of matter stays the same throughout the change.
 scientists see patterns, raise questions, seek answers, make observations and communicate with others in order to make connections in the natural world.
 there is a process that engineers use to solve a problem or meet a need.

Essential Question(s) from Curriculum Map/Course Essential Questions:

To understand, student will need to consider such questions as...

- How and why is sorting done?
- How can physical properties change?
- How do scientists find and use patterns?
- How accurate does an observation have to be?
- What makes a good question?
- Why and how do scientists share what they know with others?
- What is the engineering design process?

Topical Essential Questions for Unit:

To understand, student will need to consider such questions as...

- How do scientists describe and sort objects?
- How can physical properties of materials change?
- What makes a good question?
- How do scientists learn, record and share about the world around them?
- How do engineers determine what materials they will use in the design process?

To understand, student will need to...

know... Student will need to know the following in order to... (e.g. facts, concepts, generalizations, rules, theories, principles)

- objects have different observable properties.
- materials can be in a solid or liquid form or change from solid to liquid, without loss of matter.
- inquiry process is the way scientists learn and study the world around them.

Essential new vocabulary:

- **engineer:** a scientist who uses creativity and knowledge of science, math and materials to solve problems.
- **liquid:** takes on the shape of any container and can move (flow) freely.
- **material:** what an object is made of.
- **matter:** anything that takes up space.

be able to... (Students will be able to DO...skills, procedures, processes)

- describe objects by properties.
- observe, record and recognize that materials can change from solid to liquid and liquid to solid, without loss of matter.
- ask testable questions and investigate to answer the student's questions.
- record observations in science notebooks.
- use knowledge of material properties to defend why some materials are better than others as part of the engineering process.

- **phase:** a step in the process of change or development.
- **solid:** an object that has a shape that doesn't change.
- **state:** the form of matter such as solid, liquid or gas.

Common misunderstanding(s):

- Materials can only exhibit properties of one state of matter.
- An object's properties are the same as the material it is made of. (Ice is a liquid, an igloo is a liquid.)
- A liquid is flat, runny.
- Children tend to think that water is the only liquid that exists (shampoo, soap, orange juice, ketchup).
- Ice is a different substance from water.
- Students tend to classify objects according to their uses rather than their properties.
- Children often use the word "solid" to mean heavy, not flexible, or in one big piece.
- Powder is not a solid.
- All scientists conduct experiments in a lab.