

Big Idea: Structure & Properties of Matter (Module 1) AND Physical & Chemical Changes (Module 2)**Inquiry Questions****Science:**

- How are the particles in matter organized? (Mod 1 - Lesson 1)
- How do the particles of matter affect its properties? (Mod 1 - Lesson 2)
- What happens to the amount of matter when it changes ? (Mod 2 – Lesson 1)
- What happens to the mass when different types of matter are mixed? (Mod 2 – Lesson 2)
- How does matter change when it interacts with other matter? (Mod 2 – Lesson 3)

Technology:

- How have new technologies affected the mass and performance of water or land vehicles?

Engineering:

- How have ship builders designed heavy things that float?

Mathematics:

- What are mass, volume, and weight? How are they different?

Social Studies:

- How did early settlers use buoyancy to explore and adapt to their new environments?
- How did the use of buoyancy effect the development of communities?

Content Area Grade Level Standards

Science	5.PS.1: Describe and measure the volume and mass of a sample of a given material. (Mod 1 – Lesson 1) {Science Handbook p. 252, p. 253, p. 260-261} 5.PS.4: Describe the difference between weight being dependent on gravity and mass comprised of the amount of matter in a given substance or material. (Ch 1 – Lesson 2) {Science Handbook p. 252, p. 260-261} 5.PS.2: Demonstrate that regardless of how parts of an object are assembled the mass of the whole object is identical to the sum of the mas of the parts; however, the volume can differ from the sum of the volumes. (Law of Conservation of Mass) (Ch 2 Lessons 2 & 3) {Science Handbook p. 275} 5.PS.3: Determine if matter has been added or lost by comparing mass when melting, freezing, or dissolving a sample of a substance. (Law of Conservation of Mass) (Ch 2 – Lesson 1) {Science Handbook p. 275}
Technology	2.H Resources are the things needed to get a job done, such as tools and machines, materials, information, energy, people, capital, and time. 2.J Materials have many different properties. 4.B Using technology, results can be good or bad.
Engineering	1.D Tools, materials, and skills are used to make things and carry out tasks. 2.I Tools are used to design, make, use, and assess technology. 2.K Tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing. 9.C The engineering design process involves defining a problem, generating ideas, selecting a solution, testing the solution(s), making the item,

Big Idea: Structure & Properties of Matter (Module 1) AND Physical & Chemical Changes (Module 2)

evaluating it, and presenting the results.

9.D When designing an object, it is important to be creative and consider all ideas

9.E Models are used to communicate and test design ideas and processes.

Mathematics

5.MD.1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.

5.MD.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

5.MD.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

5.MD.5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.

Social Studies

5.1.2 Ways of Life Before and After the Arrival of Europeans to 1610. Examine accounts of early European explorations of North America including major land and water routes, reasons for exploration and the impact the exploration had.

5.3.3 Places and Regions: Name and locate states, regions, major cities and capitals, major rivers and mountain ranges in the United States.

5.3.11 Environment and Society: Describe adaptation and how Native American Indians and colonists adapted to variations in the physical environment.

ELA**Reading: Informational Text**

CCSS.ELA-Literacy.RI.4.1 Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-Literacy.RI.4.2 Determine the main idea of a text and explain how it is supported by key details; summarize the text.

CCSS.ELA-Literacy.RI.4.3 Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

CCSS.ELA-Literacy.RI.4.4 Determine the meaning of general academic and domain-specific words or phrases in a text relevant to a *grade 4 topic or subject area*.

CCSS.ELA-Literacy.RI.4.5 Describe the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in a text or part of a text.

CCSS.ELA-Literacy.RI.4.6 Compare and contrast a firsthand and secondhand account of the same event or topic; describe the differences in focus and the information provided.

CCSS.ELA-Literacy.RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.

CCSS.ELA-Literacy.RI.4.8 Explain how an author uses reasons and evidence to support particular points in a text.

CCSS.ELA-Literacy.RI.4.9 Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

CCSS.ELA-Literacy.RI.4.10 By the end of year, read and comprehend informational texts, including history/social studies, science, and technical texts, in the grades 4–5 text complexity band proficiently, with scaffolding as needed at the high end of the range.

WRITING

CCSS.ELA-Literacy.W.4.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

- W.4.2a Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.
- W.4.2b Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.
- W.4.2c Link ideas within categories of information using words and phrases (e.g., *another, for example, also, because*).
- W.4.2d Use precise language and domain-specific vocabulary to inform about or explain the topic.
- W.4.2e Provide a concluding statement or section related to the information or explanation presented.

Big Idea: Structure & Properties of Matter (Module 1) AND Physical & Chemical Changes (Module 2)

CCSS.ELA-Literacy.W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.

CCSS.ELA-Literacy.W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

CCSS.ELA-Literacy.W.4.9 Draw evidence from literary or informational texts to support analysis, reflection, and research.

CCSS.ELA-Literacy.W.4.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences

Science Process Standards

Science Process Standards

Nature of Science

- ☒ Make predictions and formulate testable questions
- ☐ Design a fair test.
- ☒ Plan and carry out investigations—often over a period of several lessons—as a class, in small groups or independently.
- ☒ Perform investigations using appropriate tools and technologies that will extend the senses.
- ☒ Use measurement skills and apply appropriate units when collecting data.
- ☒ Test predictions with multiple trials.
- ☒ Keep accurate records in a notebook during investigations and communicate findings to others using graphs, charts, maps and models through oral and written reports.
- ☒ Identify simple patterns in data and propose explanations to account for the patterns.
- ☒ Compare the results of an investigation with the prediction.

Design Process

- ☒ Identify a need or problem to be solved.
- ☒ Brainstorm potential solutions.
- ☒ Document the design throughout the entire design process.
- ☒ Select a solution to the need or problem.
- ☒ Select the most appropriate materials to develop a solution that will meet the need.
- ☐ Create the solution through a prototype.
- ☒ Test and evaluate how well the solution meets the goal.
- ☐ Evaluate and test the design using measurement.
- ☒ Present evidence by using mathematical representations (e.g. graphs, data tables)
- ☒ Communicate the solution (including evidence using mathematical representations (graphs, data tables), drawings or prototypes.
- ☐ Communicate how to improve the solution.

Standards for Mathematical Practice

Mathematical Practices

- ☒ MP.1. Make sense of problems and persevere in solving them.
- ☒ MP.2. Reason abstractly and quantitatively.
- ☒ MP.3. Construct viable arguments and critique the reasoning of others.
- ☒ MP.4. Model with mathematics.
- ☒ MP.5. Use appropriate tools strategically.
- ☒ MP.6. Attend to precision.
- ☒ MP.7. Look for and make use of structure.
- ☐ MP.8. Look for and express regularity in repeated reasoning.

Plan of Work

Common Misconceptions

Weight and mass are the same thing.
 Weight can be changed by altering the shape of an object.
 Heavy things don't float.
 If things are lighter they float better.
 Certain materials will always float or always sink.

Suggested Activities

- Students will observe various objects in a tank of water to investigate the relationship between mass, volume, density and buoyancy. (Mod 1 L 1)
- Students will use what they have learned about matter to identify a mystery substance in boxes of various shapes, colors & sizes. (Mod1 L 2)
- Students will conduct an investigation using liquid water and frozen water. (Mod 2 L 1)
- Students will investigate how temperature affects the ability of a solid to be mixed with a liquid. (Mod 2 L 2)
- Students will examine what happens when 2 or more different substances are mixed and produce a new substance. (Mod 2 L 3)

Suggested Vocabulary

Mod 1 Lesson 1

Matter

Mass

Volume

Weight

Density

Buoyancy

Mod 1 Lesson 2

Element

Compound

Atom

Molecule

Mod 2 Lesson 1

Boiling point

Freezing point

Physical change

Conservation of Mass

Melting point

Mod 2 Lesson 2

Mixture

Solution

Solubility

Colloid

Distillation

Mod 2 Lesson 3

Chemical Properties

Chemical Change

Chemical Reaction

Reactant

Product

Precipitate

Resources

www.brainpop.com/science/matterandchemistry/measuringmatter.

www.carolhurst.com/titles/whosank.html

STEM Integrated Concepts: Physical Science | 5th Grade

Assessment	
Type of Assessment	Example
☐ Observation	
☐ Oral Questioning	
☒ Exit Slip	Students explain what they learned about mass and volume each day.
☒ Journal	Students journal their experiences with the experiment. They document their designs.
☐ Graphic Organizers	
☒ Self-Assessment	Students document what worked, what didn't and if modifications were made to the experiment.
☐ Writing Prompt	
☒ Presentation	Students present their solution and explain how and why they built their solution.
☐ Electronic media	
☐ Think Pair Share	
☐ Whiteboards	
☐ Experiment/projects	
☐ Quiz	
☐	
☐	
☐	