

Unit Summary

Cluster 1: Properties of Matter (Lessons 1–6)

Overview	<p>Students sort materials as solid, liquid, and gas, and list some of the properties of each. They arrive at a definition of matter. While studying the properties of weight and volume, they weigh and re-weigh solids after changing the solids' shapes, pour liquids into containers with different shapes, and measure the volume of solids using displacement. They discover that changing the shape of a solid or liquid does not change its weight or volume. Students design several simple investigations to answer the question, "How do we know that air takes up space?" Finally, they are introduced to the property of density, or how heavy something is for its size.</p>
Science Content	<ul style="list-style-type: none"> • Matter commonly exists in one of three states: solid, liquid, or gas. • Some properties help us classify matter as solid, liquid, or gas. • All matter takes up space (has a volume) and has mass (which we usually measure by weight). • Materials can be described in terms of their properties (e.g., size, weight, color, density). • Properties can be measured using tools. • When recording measurements, always include the unit of measurement. • When you change the shape of a solid or a liquid, its weight and volume remain the same. • Investigative questions, predictions, clear procedures, observations, and conclusions are basic elements of scientific investigations. • Field guides are used to identify rocks and learn more about their properties.
Science Center	<ul style="list-style-type: none"> • Post students' lists of solids, liquids, gases, and unanswered questions. • Examine balloons filled with mystery substances. • Change the shape of a solid, and weigh it each time. • Pour the same volume of liquid between containers of various sizes. • Try new investigations to show that air takes up space. • Explore materials with different densities.
Family Links	<ul style="list-style-type: none"> • Classify the objects in their home refrigerator according to states of matter. • Weigh themselves in different positions on a bathroom scale (standing, curled up, and stretched out). • Identify foods that are packaged by weight, not volume. • Describe the densities of two different objects to someone at home.
Further Science Explorations	<ul style="list-style-type: none"> • Briefly discuss how mass and weight are different, but related. • Invite students to bring in balloons of their own mystery materials. • Develop critical thinking skills by discussing ideas from the Lesson 1 science talk in small groups. • Explore and discuss properties of different collections of solids and a variety of liquids. • Weigh and re-weigh steel wool after compressing it and stretching it out. • Measure the air spaces in loose collections of solids by replacing the air with water and measuring the water. • Measure the volume of air in a cup. • Show that air has weight by comparing the weight of an inflated ball with a deflated ball. • Compare the effects of air resistance on flat paper and crumpled paper. • Create a column of layered liquids with different densities, and drop small objects into the column to see where they land.
Cross-Curricular Extensions	<p>Language Arts: Research questions about matter and present reports. Use descriptive language to compare materials. Read and discuss the book, <i>Mr. Archimedes' Bath</i>. Read about hot air ballooning.</p> <p>Mathematics: Express density as weight per volume (g/cc).</p> <p>Social Studies: Research aviation technologies that rely on the properties of air. Discuss population density.</p> <p>Arts: Create paintings while working with matter in its three common states. Make pinwheels, kites, and windsocks.</p>

Cluster 2: Changing States of Matter (Lessons 7–11)	Cluster 3: Mixing Matter (Lessons 12–15)	
<p>Students learn that the state of matter can change between solid, liquid, and gas. They discover that temperature can affect the state of matter as they melt substances, and investigate evaporation and condensation. They consider a number of variables that affect evaporation and then design and conduct a fair test to investigate their ideas. Students increase their scientific inquiry skills by collecting data and using the data to draw conclusions.</p>	<p>Students mix solids together and use visual properties, as well as properties of magnetism and floating or sinking, to separate them. They compare a sand/water mixture to a salt/water mixture. They dissolve salt in water. They also evaporate the water from a salt solution and examine the solid salt crystals that remain. They weigh the components of mixtures and compare the totals to the weight of the final mixtures. They investigate a mixture of cornstarch and water, and find that it has properties unlike any other substance explored in the unit. Finally, they are introduced to chemical changes and they discuss how these are different from the physical changes they have observed throughout the unit.</p>	<p>Overview</p>
<ul style="list-style-type: none"> • Matter can change between states. • Temperature affects the change of matter from one state to another. • Even if matter is not visible, it still exists. • Weight does not change between solid and liquid states. • Water that has evaporated is water vapor in the air. • Water condenses on cold surfaces. • In a fair test, the experimenter changes one variable while keeping all other variables the same. 	<ul style="list-style-type: none"> • When you mix materials together, the result weighs the same as the sum of the parts. • A mixture can often be separated by the properties of the different materials in it. • Materials may be in pieces so small they cannot be seen without magnification. • Sometimes when you mix materials together, you get a new material with different properties. 	<p>Science Content</p>
<ul style="list-style-type: none"> • Investigate evaporation with a variety of liquids. • Test variables that might affect evaporation. • Duplicate the evaporation experiments. 	<ul style="list-style-type: none"> • Mix and separate collections of solids that have different sizes and densities. • Discover metals that are attracted to magnets and metals that are not. • Examine a salt/water solution after it sits overnight. • Investigate how various powders dissolve in water. • Devise methods to separate solid/liquid mixtures. • Compare mixtures made from various powders and water to Whatzit (a mixture made from cornstarch and water). 	<p>Science Center</p>
<ul style="list-style-type: none"> • Compare frozen water with frozen oil. • Watch liquid chocolate change to solid chocolate. • Explore evaporation rates in various parts of their homes. • Design an experiment that answers a question about something they have observed outside the classroom. 	<ul style="list-style-type: none"> • Look at food labels and list the ingredients of a favorite food. • Make “Whatzit” at home. • Repeat mixing baking soda and vinegar at home in an attempt to create so much gas they pop the bag that contains the reaction. 	<p>Family Links</p>
<ul style="list-style-type: none"> • Develop ways to melt chocolate or suggest ways to create high enough temperatures for it to melt. • Explore how water evaporates from fabric and puddles. • Observe condensation on cups of colored beverage with ice, and identify water in its three states. • Measure different temperatures of water. • Compare evaporation from different soil samples. • Add up how much water evaporated from the class’s many evaporation investigations, and pour that much water into a container. • Create new investigative questions about evaporation and design experiments to answer the questions. 	<ul style="list-style-type: none"> • Separate mixtures using strainers. • Research quicksand. • Compare tearing a piece of paper (physical change) to burning the paper (chemical change). • Weigh a closed system of a vinegar and baking soda chemical reaction. 	<p>Further Science Explorations</p>
<p>Language Arts: Write a descriptive paragraph about an example of condensation.</p> <p>Mathematics: After evaporation investigations, calculate what percentage of the original water evaporated.</p> <p>Technology: Study cloud seeding, a method of artificially increasing rainfall from clouds.</p> <p>Art: Create soap, dipped candles, and colored wax “stained glass.” Make small colored water puddles on white paper.</p>	<p>Technology: Investigate a Materials Recovery Facility. Follow the path of a recycled aluminum can. Learn processes involved in creating drinking water from the ocean.</p> <p>Social Studies: Research the California gold rush and learn gravitational techniques that miners used to find gold. Learn about native peoples’ sources of salt.</p>	<p>Cross-Curricular Extensions</p>