

STRUCTURES AND PROPERTIES OF MATTER (5.PS.NGSS)

UNIT AT A GLANCE

ACTIVITY 1 - Slime

QUESTIONS: What is matter? How can we identify matter by observing and measuring properties?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 20 minutes Activity: 5 classes Lesson 1A: 60–65 min. Lesson 1B: 60–65 min. Lesson 1C: 60–65 min. Lesson 1D: 60–65 min. Lesson 1E: 60–65 min.	<p>Make slime to raise questions about matter.</p> <p>Use properties to identify a mystery object.</p>	<ul style="list-style-type: none"> Review observable properties of matter. Measure weight. Measure volume. Distinguish between solids and liquids. Use standard units to measure and describe weight and volume. Establish a working explanation of the term <i>matter</i>.
Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Use the displacement method to measure the volume of different objects. Use observable properties to identify material. Explain matter as anything that has weight and volume. Obtain information from text to explain phenomena and compare to evidence gathered in classroom investigations. 	<p>Constructing Explanations and Designing Solutions</p> <p>Asking Questions and Defining Problems</p> <p>Planning and Carrying Out Investigations</p> <p>Analyzing and Interpreting Data</p> <p>Developing and Using Models</p> <p>Obtaining, Evaluating, Communicating Information</p> <p>Scale, Proportion, and Quantity</p>	<p>PE at Lesson Level Make observations and measurements of properties to help identify an unknown.</p> <p>Formative Assessment Use Science Talk, Activity Pages, and Journal Entry to assess students' ideas and ability to sort and classify objects by properties. Use the Journal Entry to assess the students' ability to construct explanations from observations and relationships.</p> <p>Summative Assessment Use student investigations to assess ability to plan and conduct investigations and to accurately measure weight and volume of solids and liquids.</p>

ACTIVITY 2 - Identify Materials from Properties

QUESTIONS: How do we determine specific properties that can identify matter?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 10 minutes Activity: 2 classes Lesson 2A: 55–60 min. Lesson 2B: 55–60 min.	<p>Why is the metal slide too hot and the plastic slide cool?</p> <p>What can be used to repair a broken electric circuit?</p> <p>Make observations of how magnets are used in a recycling plant.</p>	<ul style="list-style-type: none"> Conduct investigations to sort material based on: <ul style="list-style-type: none"> the ability to conduct heat the ability to conduct electricity magnetic properties

ACTIVITY 2 - Identify Materials from Properties - *Continued*

Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> • Use a heat source and measure temperature change in a variety of materials to test for conductivity. • Use a simple circuit to test a variety of materials for conductivity of electricity. • Use a variety of materials to test for magnetic properties. • Use evidence of tested properties to identify materials. 	<p>Planning and Carrying Out Investigations</p> <p>Constructing Explanations and Designing Solutions</p> <p>Patterns</p>	<p>PE at Lesson Level Plan and carry out investigations to determine if different materials are magnetic, conduct heat, and/or conduct electricity.</p> <p>Identify patterns in data related to properties.</p> <p>Formative Assessment Use the Activity Pages to assess the students' ability to conduct investigations and produce data as evidence.</p> <p>Summative Assessment Use the Activity Pages and Journal Entry to assess the students' ability to conduct investigations and construct explanations from evidence.</p>

ACTIVITY 3 - Solubility

QUESTIONS: What happens when solids dissolve in liquids?

Time to Complete	Phenomena	Summary: Students Will...
<p>Preparation: 10 minutes Activity: 4 classes Lesson 3A: 60–65 min. Lesson 3B: 55–60 min. Lesson 3C: 60–65 min. Lesson 3D: 55–60 min.</p>	<p>What happened to my sugar?</p>	<ul style="list-style-type: none"> • Conduct investigations to observe what happens to sugar and salt when added to water. • Conduct investigations into the solubility of a variety of materials. • Use solubility as a property to identify matter. • Construct a model to determine that matter is made up of tiny particles too small to see. • Determine a cause-and-effect relationship between temperature and dissolving rate.

ACTIVITY 3 - Solubility - Continued

Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Determine if the weight changes when a solid is dissolved in a liquid. Design an investigation into solubility of a variety of materials. Design an investigation to determine if the temperature of the liquid affects the rate at which salt will dissolve. Use a model to demonstrate what happens to a solid when it dissolves in a liquid. Obtain and evaluate information from text to support findings. 	<p>Planning and Carrying Out Investigations</p> <p>Constructing Explanations and Designing Solutions</p> <p>Asking Questions and Defining Problems</p> <p>Developing and Using Models</p> <p>Analyzing and Interpreting Data</p> <p>Obtaining, Evaluating, Communicating Information</p> <p>Cause and Effect</p>	<p>PE at Lesson Level</p> <p>Plan and carry out investigations to determine the solubility of material.</p> <p>Recognize the cause-and-effect relationship between the temperature of the solvent and the dissolving rate.</p> <p>Formative Assessment</p> <p>Use the Activity Page and Claim, Evidence and REasoning (CER) to assess students' ability to construct explanations using evidence.</p> <p>Summative Assessment</p> <p>Use the Science Talk and Journal Entry to assess the students' ability to use solubility as a property of matter to identify material.</p> <p>Use the Journal Pages and CER to assess the students' understanding that matter is made up of particles that are too small to see and their ability to use a model to describe the concept.</p>

ACTIVITY 4 - What Is That Order?

QUESTIONS: How can we find out if air is matter? How can air be used to inflate objects?

Time to Complete	Phenomena	Summary: Students Will...
<p>Preparation: 15 minutes</p> <p>Activity: 4 classes</p> <p>Lesson 4A: 60–65 min.</p> <p>Lesson 4B: 60–65 min.</p> <p>Lesson 4C: 60–65 min.</p> <p>Lesson 4D: 60–65 min.</p>	<p>Make observations of how odors move from the source and fill the room.</p>	<ul style="list-style-type: none"> Conduct tests to find out if air is matter. Develop a model to demonstrate how air has mass and takes up space. Make observations of how peppermint extract evaporates and becomes a gas that fills the room.

ACTIVITY 4 - What Is That Order? - Continued

Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Determine if air has mass and volume. Develop a model demonstrating the small particles that make up solids, liquids, and gases. Develop a model to demonstrate how odors are detected and fill the room. 	<p>Planning and Carrying Out Investigations</p> <p>Developing and Using Models</p> <p>Scale, Proportion, and Quantity</p> <p>Cause and Effect</p>	<p>PE at Lesson Level</p> <p>Plan and carry out investigations to find out if air is matter.</p> <p>Develop a model to demonstrate how air is matter and made up of tiny particles that are too small to see.</p> <p>Formative Assessment</p> <p>Use the Activity Pages and Science Talk to assess the students' ability to design and conduct an investigation to answer a question.</p> <p>Use the Science Talk to assess the students' understanding that the amount of matter is conserved when it changes state and when it appears to vanish.</p> <p>Summative Assessment</p> <p>Use the Journal Entry and model presentations to assess the students' ability to demonstrate that matter is made up of particles too small to see and that matter is conserved when it changes form.</p>

ACTIVITY 5 - Ice Cream and Phase Change

QUESTIONS: What is the effect of temperature change on matter? How can we separate a salt and water mixture?

Time to Complete	Phenomena	Summary: Students Will...
<p>Preparation: 20 minutes</p> <p>Activity 5: 6-7 classes</p> <p>Lesson 5A: 60-65 min.</p> <p>Lesson 5B: 60-65 min.</p> <p style="padding-left: 40px;">2-3 days</p> <p>Lesson 5C: 60-65 min.</p> <p>Lesson 5D: 60-65 min.</p> <p>Lesson 5E: 60-65 min.</p>	<p style="color: purple;">Make observations of dissolving and phase change when making ice cream.</p>	<ul style="list-style-type: none"> Make ice cream to determine the effect of temperature on phase. Measure the weight of the ice cream mixture before and after the phase change. Make a model of what is happening to the particles when making ice cream. Investigate the melting point of different solids. Build a model to separate a salt and water mixture.

ACTIVITY 5 - Ice Cream and Phase Change - *Continued*

Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Determine if mass is conserved during a phase change. Use a model to demonstrate the conservation of mass during a phase change. Plan and carry out an investigation to determine the melting point of different solids. Develop a model that will separate a salt and water mixture. 	<p>Constructing Explanations and Designing Solutions</p> <p>Developing and Using Models</p> <p>Planning and Carrying Out Investigations</p> <p>Constructing Explanations and Designing Solutions</p> <p>Cause and Effect</p> <p>Patterns</p>	<p>PE at Lesson Level Develop a model to demonstrate what happens during phase change.</p> <p>Plan and carry out investigations to find out the melting point of different materials.</p> <p>Summative Assessment Use the student-developed models and Journal Entry to assess the students' understanding of the motion and arrangement of particles during a phase change and how the total weight of the substance does not change.</p> <p>Use the scientific explanations to assess the students' ability to construct an explanation, using evidence to support a claim. Use the Science Talk to assess their understanding that the measurement of the melting point can be used to help identify a variety of materials.</p>

ACTIVITY 6 - Liquid to a Gas

QUESTIONS: What happens when liquids change to gases?

Time to Complete	Phenomena	Summary: Students Will...
<p>Preparation: 5 minutes Activity 6: 3-5 classes Lesson 6A: 55–60 min. Lesson 6B: 55–60 min. Lesson 6C: 55–60 min. (with multiple days of observations of solar stills)</p>	<p><i>"The Puddle is Missing"</i> Make observations of phase change from a liquid to a gas.</p>	<ul style="list-style-type: none"> Make observations of phase change from a liquid to a gas. Make observations of condensation.
Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Construct an explanation from observations to explain phase change from liquid to a gas. Determine the cause-and-effect relationship between temperature and phase change. Design a device to solve an evaporation problem. Design a model of a solar still. Obtain and relate information from text to support or dispute findings in student investigations. 	<p>Developing and Using Models</p> <p>Constructing Explanations and Designing Solutions</p> <p>Obtaining, Evaluating, Communicating Information</p> <p>Cause and Effect</p>	<p>PE at Lesson Level Use observations of boiling, evaporation, and condensation to solve an evaporation problem and separate salt and water using a solar still.</p> <p>Summative Assessment Use the Science Talk and Journal Entry to assess the students' understanding of the phase change from a liquid to a gas and their ability to use their understanding of evaporation to solve a problem.</p> <p>Use the <i>Designing a Solar Still Product Descriptor</i> and Journal Entry to assess the students' understanding of how matter is made up of particles too small to be seen and that matter undergoes phase change with a temperature change.</p>

ACTIVITY 7 - Earth & Beyond

QUESTIONS: What makes the land of the midnight sun? How do we get day and night? How do we get our seasons? How can we develop a model to explain the different temperatures and length of day in different regions?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 15 minutes Activity 7: Lesson 7A: 45–50 min. 2 days Lesson 7B: 55–60 min. 2 days Lesson 7C: 55–60 min. 2 days Lesson 7D: 55–60 min. Lesson 7E: 55–60 min.	<i>Arctic Lights, Arctic Nights: Light in Alaska and how it changes from month to month.</i>	<ul style="list-style-type: none"> • Raise questions about the changes in the amount of light in Alaska and the Arctic. • Develop and use models to explain the uneven lighting and heating of Earth. • Collect and analyze data to show patterns that give evidence as to why we get day and night, seasons, changes in the shape and location of shadows throughout the day and year, and the different locations of the sun and moon at different times of the day and year.
Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> • Use information from text to raise questions and gain information. • Demonstrate day and night, seasons, and changes in the position of sun and moon in the sky using models. • Analyze data to find patterns that provide evidence for the reason for day and night, the seasons, changes in the shape and location of shadows throughout the day and year, and the different locations of the sun and moon at different times of the day. 	<p>Developing and Using Models</p> <p>Constructing Explanations and Designing Solutions</p> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Systems and System Models</p> <p>Patterns</p> <p>Cause and Effect</p>	<p>PE at Lesson Level</p> <p>Collect and graph data to show patterns that demonstrate how we get day and night, the different position of the sun and moon in the sky, and different lengths and positions of shadows throughout the day.</p> <p>Formative Assessment</p> <p>Lesson 7A: Journal Entry Science Talk</p> <p>Summative Assessment</p> <p>Lessons 7B and 7C: Activity Pages Journal Entries Science Talk</p>