

STRUCTURE AND PROPERTIES OF MATTER (2.PS.NGSS)

UNIT AT A GLANCE

ACTIVITY 1 - What Are Objects Made Of?

QUESTIONS: How can we find out what properties are useful?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 20 minutes Activity: 4 classes Lesson 1A: 45-50 min. 2 class periods Lesson 1B: 45-50 min. 2 class periods	What would happen if tools and different items were made without considering the properties that will make them useful?	<ul style="list-style-type: none"> • Read about “What Would Happen If” situations when properties of materials are not considered in their construction. • Compare initial ideas about properties of objects. • Be introduced to a design challenge to choose material to move water from one place to another.
Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> • Construct explanations of the concept of how we identify properties of matter. • Determine different properties that make things useful. 	Constructing Explanations Patterns	PE at Lesson Level Develop an initial understanding of how to identify properties and how they make things useful. Formative Assessment Properties of Matter chart Activity Page Journal Entry Class Discussion

ACTIVITY 2 - Exploring Properties

QUESTIONS: How can we determine what properties are important for the purpose of objects?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 10 minutes Activity: 4 classes Lesson 2A: 45-50 min. 2 class periods Lesson 2B: 45-50 min. 2 class periods	Children on slide with different clothing descend the slide at a different speed. A tree has a rigid trunk and flexible branches that can sway in the wind. Children walk to school on a rainy day. One child has on rubber boots and the other is wearing tennis shoes. One child has dry socks and the other child has wet socks.	<ul style="list-style-type: none"> • Make observations and classify objects by texture, flexibility, buoyancy, and repel and absorb. • Complete a mini-design challenge at each property station.

ACTIVITY 2 - Exploring Properties - Continued

Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Construct explanations of the usefulness of the properties when designing objects. Begin to apply what they have learned to solve a problem. 	<p>Constructing Explanations and Designing solutions</p> <p>Carrying Out Investigations.</p> <p>Obtaining, Evaluating, and Communicating Information</p> <p>Patterns</p>	<p>PE at Lesson Level</p> <p>Use observations and explorations to develop an understanding of how texture, rigid and flexible, sink and float, and repel and absorb are properties that make things useful.</p> <p>Summative Assessment</p> <p>Activity Page Journal Entry</p>

ACTIVITY 3 - Solving Problems with Properties

QUESTIONS: How can we use materials to build a device that solves a problem?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 15 minutes Activity 3: 2 classes Lesson 3A: 55-60 min. Lesson 3B: 55-60min.	<p>Design challenge:</p> <p>Different materials are used based on the properties that are best suited for an intended purpose.</p>	<ul style="list-style-type: none"> Work together as a team of engineers to build a structure that can withstand wind and water, and keep things dry. Test their designs and make adjustments for improvement.

Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Work as a team of engineers. Choose material to fit the purpose. Test and redesign based on results and feedback. 	<p>Constructing Explanations</p> <p>Analyzing and Interpreting Data</p> <p>Patterns</p> <p>Cause and Effect</p>	<p>PE at Lesson Level</p> <p>Develop an understanding of the properties of solids compared to the properties of liquids.</p> <p>Summative Assessment</p> <p>Activity Pages Respond to Text Journal Entries Class Discussion</p>

ACTIVITY 4 - Liquids

QUESTIONS: How do the properties of solids and liquids differ?
How can we determine if change in temperature changes the properties of water?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 20 minutes Activity 4: 10 classes Lesson 4A: 45-50 min. 2 class periods Lesson 4B: 55-60 min. 2 class periods Lesson 4C: 45-50 min. 2 class periods Lesson 4D: 45-50 min. 2 class periods Lesson 4E: 45-50 min. 2 class periods	<p>Liquid water takes on the shape of its container.</p> <p>Ice keeps its own shape.</p>	<ul style="list-style-type: none"> Compare and adapt their ideas about properties of solids to properties of liquids. Develop an investigation into how temperature change can change water from solid to liquid and liquid to solid and determine what properties change in the phase change.

ACTIVITY 4 - Liquids - Continued

Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Construct explanations of the concept of how we identify properties of matter. Recognize patterns that can be used to describe properties of solids and liquids. 	<p>Constructing Explanations</p> <p>Analyzing and Interpreting Data</p> <p>Patterns</p> <p>Cause and Effect</p>	<p>PE at Lesson Level</p> <p>Develop an understanding of the properties of solids compared to the properties of liquids.</p> <p>Summative Assessment</p> <p>Activity Pages Respond to Text Journal Entries Class Discussion</p>

ACTIVITY 5 - Heating and Cooling: Beyond Water

QUESTIONS: How can we determine if change in temperature changes the properties of different substances? Are the changes caused by heating and cooling reversible?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 20 minutes Activity 5: 2 classes Lesson 5A: 50-60 min. Lesson 5B: 45-50 min.	<p>Popsicles change from a solid to a liquid when there is a temperature change.</p> <p>When a lettuce leaf is frozen it cannot be thawed to return to its original form.</p>	<ul style="list-style-type: none"> Plan and carry out an investigation into temperature change of a material of their choosing.
Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Construct explanations of the effect of heating and cooling on different material. Determine if heating and cooling of different material is reversible or not reversible. 	<p>Constructing Explanations and Designing solutions</p> <p>Carrying out investigations.</p> <p>Cause and Effect</p>	<p>PE at Lesson Level</p> <p>Construct an argument using evidence that some changes caused by heating and cooling are reversible and some are not.</p> <p>Formative Assessment</p> <p>Activity Page Class Discussion Journal Entry</p>

ACTIVITY 6 - Taking Our Property Observations Outdoors

QUESTIONS: How can we mimic nature when designing useful objects?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 5 minutes Activity 6: 5 classes Lesson 6A: 50-60 min. Lesson 6B: 45-50 min. Lesson 6C: 45-50 2 class periods	Popsicles change from a solid to a liquid when there is a temperature change. When a lettuce leaf is frozen it cannot be thawed to return to its original form.	<ul style="list-style-type: none"> Make observations of properties in nature. Determine the importance of properties of living organisms for survival.
Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Design an object that mimics a characteristic of an animal. 	<p>Constructing Explanations and Designing solutions</p> <p>Analyzing and Interpreting Data</p> <p>Engaging in Argument from Evidence</p> <p>Patterns</p> <p>Cause and Effect</p>	

ACTIVITY 7 - Rearranging the Pieces

QUESTIONS: How can we determine if an object made of a small set of pieces can be disassembled and rearranged into a different and new object?

Time to Complete	Phenomena	Summary: Students Will...
Preparation: 10 minutes Activity 7: 2 classes Lesson 7A: 50-60 min. Lesson 7B: 50-60 min.	Design Challenge Part 2: Rearrange blocks to make new structures. Rearrange existing structure with a purpose to make a new structure with a different purpose.	<ul style="list-style-type: none"> Disassemble and rearrange a structure. Determine if the properties and function have changed.
Students Figure Out How To:	Practices	Performance Expectations (PE) at Lesson Level and Assessment
<ul style="list-style-type: none"> Construct a new structure from and existing structure by rearranging a small set of pieces. Test the structure to determine if the properties have changed. 	<p>Constructing Explanations and Designing Solutions</p> <p>Engaging in Argument from Evidence</p> <p>Energy and Matter</p>	<p>PE at Lesson Level</p> <p>Construct an argument using first hand experience that a structure made of small pieces can be disassembled and rearranged to make a new structure.</p> <p>Summative Assessment</p> <p>Activity Page Journal Entry</p>