2nd Grade Unit 1
12 weeks

Structure and Properties of Matter

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Essential Questions

How do the properties of materials determine their use?

How are materials similar and different from one another?

How can matter change?

Structure and Properties of Matter

Students who demonstrate understanding can:

2-PS1-1 **Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.** [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

2-PS1-2 **Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*** [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]

2-PS1-3 **Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.** [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]

2-PS1-4 **Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.** [Clarification Statement: Examples of reversible changes could include materials such as water or butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*.

Science and Engineering Practices

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-PS1-1)

Analyzing and Interpreting Data

Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations.

- Analyze data from tests of an object or tool to determine if it works as intended. (2-PS1-2)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (2-PS1-3)

Engaging in Argument from Evidence

Engaging in argument from evidence in K–2 builds on prior experiences and progresses to comparing ideas and representations about the natural and designed world(s).

- Construct an argument with evidence to support a claim. (2-PS1-4)

Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Scientists search for cause and effect relationships to explain natural events. (2-PS1-4)

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)
- Different properties are suited to different purposes. (2-PS1-2, 2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (2-PS1-3)

PS1.B: Chemical Reactions

- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)

Crosscutting Concepts

Patterns

- Patterns in the natural and human designed world can be observed. (2-PS1-1)

Cause and Effect

- Events have causes that generate observable patterns. (2-PS1-4)
- Simple tests can be designed to gather evidence to support or refute student ideas about causes. (2-PS1-2)

Energy and Matter

- Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (2-PS1-3)

Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science on Society and the Natural World

- Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world. (2-PS1-2)

Structure and Properties of Matter

Background knowledge videos:

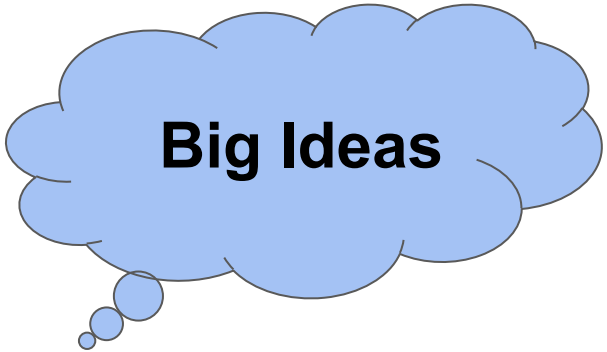
PS1A - Structure and Properties of Matter

PS1B - Chemical Reactions

These videos are designed to assist in providing background knowledge with the associated DCI. The information in the videos follows the progression through high school.

EQ's: How do the properties of materials determine their use?

How are materials similar and different from one another?



★ Every human-made product is designed by applying some knowledge of the natural world and is built using materials derived from the natural world.

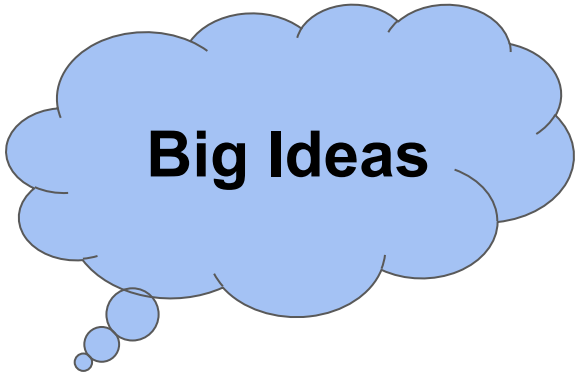
★ Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature.

★ Matter can be described and classified by its observable properties.

★ Different properties are suited to different purposes.

★ Objects or samples of a substance can be weighed, and their size can be described and measured.

EQ: How can matter change?



- ★ Objects can be built up from a small set of pieces; objects may break into smaller pieces and be put together into larger pieces, or change shapes.
- ★ Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature.
- ★ Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not.

Structure and Properties of Matter

Students who demonstrate understanding can:

2-PS1-1 Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. [Clarification Statement: Observations could include color, texture, hardness, and flexibility. Patterns could include the similar properties that different materials share.]

2-PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.* [Clarification Statement: Examples of properties could include, strength, flexibility, hardness, texture, and absorbency.] [Assessment Boundary: Assessment of quantitative measurements is limited to length.]

2-PS1-3 Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. [Clarification Statement: Examples of pieces could include blocks, building bricks, or other assorted small objects.]

Structure and Properties of Matter

Students who demonstrate understanding can:

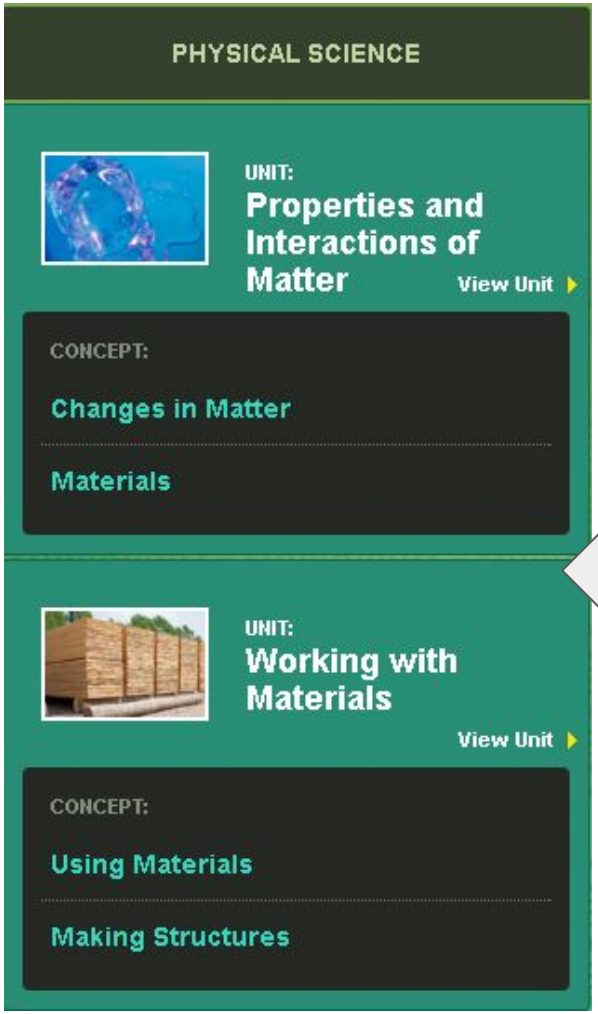
2-PS1-4 Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot. [Clarification Statement: Examples of reversible changes could include materials such as water or butter at different temperatures. Examples of irreversible changes could include cooking an egg, freezing a plant leaf, and heating paper.]

PS1.A: Structure and Properties of Matter

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)
- Different properties are suited to different purposes. (2-PS1-2, 2-PS1-3)
- A great variety of objects can be built up from a small set of pieces. (2-PS1-3)

Clarifications:

- Observation is a key skill in NGSS and is found in the science and engineering practices for K-4 students, therefore much time should be devoted to developing this skill.
- Observable physical properties of matter may include, but are not limited to: color, shape, size, texture, hardness, flexibility, strength, absorbency, magnetic, and buoyancy.
- Observable properties of a liquid may include, but are not limited to: thickness, consistency, movement, and appearance.
- STEM connections are explicitly denoted in the performance expectations with an *.

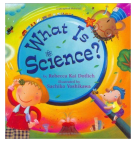


Gather and study the RESOURCES

Discovery Education Science Techbook Units

Helpful Hint:

To access the Science Techbook links in the unit plan, make sure you are logged into Discovery Education before clicking on the link in this PowerPoint.

Week	Performance Expectation/ DCI	5E Model	Other Resources
1	2-PS1-1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (Properties of Matter may include, but are not limited to: color, shape, size, texture, hardness, flexibility, strength, absorbency, magnetic, buoyancy)	Classifying Observable Properties lesson (All 5Es are included in lesson) -school supplies	Pose and answer questions: *What is Science?* Book: What is Science? By R. K. Dotlich (additional resource)  *What is a Scientist?* *What is an Engineer?* *"Rosie Revere Engineer"*

DIVIDE the unit into weeks and **DISTRIBUTE** the standards

Week	Performance Expectation/ DCI	5E Model	Other Resources
2	2-PS1-1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. 2PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.	Engage: Motorcycle Picture (DE) Explore: Describe Me! Activity Students will complete Describe Me! Activity in the science station. They will choose 10 items from the bucket and fill in the **color** and **shape** on their Describe Me! *graphic organizer. (focusing on color and shape only) Explain: "How do you know the attributes of the object?" Use questioning and vocabulary to pull out content. (ex. Color, shape, observation, evidence) Elaborate: Take a walk outside, have students write or draw pictures of things that see with different colors and shapes. Evaluation:Observation	Properties of Matter (use properties listed on anchor chart from Wk. 1 Observable Properties of Matter) Describe Me Graphic Organizer **This graphic organizer will be used through Wk. 7* DE Board Builder: Physical Properties

Week	Performance Expectation/ DCI	5E Model	Other Resources
3	2-PS1-1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. 2PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.	Engage: Tire Picture (Discovery Education) Explore: Students will complete Describe Me! Activity in the science station. They will choose 10 items from the bucket and fill in the **size** and **texture** on their Describe Me! *graphic organizer. Explain:Texture Video to use after you have have completed the Describe me for texture. Discuss vocabulary that come out in the video. Elaborate: Student will walk around the room to find things with different textures. Evaluate: Observation	Additional activity you can use this week to go along with size: Snap Cubes probe and teacher pages Snap Cubes adapted student page

Week	Performance Expectation/ DCI	5E Model	Other Resources
4	2-PS1-1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. 2PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.	Engage: Show pictures of Goldilocks and the 3 bears, have students describe what is happening in the story, focusing on the different beds (too hard, too soft and just right) Explore: Students will complete Describe Me! Activity in the science station. They will choose 10 items from the bucket and fill in the **hardness** and **flexibility** on their Describe Me! *graphic organizer. Explain: Whole group discussion of question on bottom of student recording sheet. Evaluate: Completed activity sheet and observation.	Hardness/Flexibility Activity Hardness/Flexibility student recording sheet *Extension activity: Venn diagram compare and contrast with two different objects.

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Week	Performance Expectation/ DCI	5E Model	Other Resources
6	2-PS1-1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. 2PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.	Engage: Pose sink or float question to students from Discovery Techbook Use the Youtube video: https://www.youtube.com/watch?v=cr_UC4U-CKc stop at 0:45 and ask the class to make a prediction graph (interpret and discuss) Explore: Students will be exploring tubs of materials that sink or float. Students will be making a prediction before they test their thinking on the items. They will record observations on the Describe Me! page. Explain: Bring students back together to discuss their findings. Ask students about any “wows” or “I wonders” they had. During the discussion pull in buoyancy and density. Elaborate: (will need a whole day) Read Friend on Freedom River (Unit 4) and have students complete the STEM activity from TCR Evaluate: After completing the STEM activity have students answer a prompt. “Did your raft float or sink? Explain why it did or didn’t. What changes will you make to your raft and why?”	Watermelon and Grape probe -intranet password required Sink or Float student page Does it sink or float station directions

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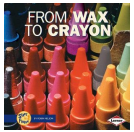
7	2-PS1-1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. 2PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.	Engage: Show students the Mr. Doodleface video (TURN SOUND OFF). Ask the students how they think it works? Explore: Students will complete Describe Me! Activity in the science station. They will choose 10 items from the bucket and fill in the **magnetic** section on their Describe Me! *graphic organizer. Explain: Vocabulary focus: observable properties Elaborate: "How do magnets affect our lives?" Read: Cow Magnets Discuss ways that magnets improve daily life and are all around us. Evaluate: How do you know if an object is magnetic? List one object that is magnetic and one that is not.	Use in the explore section: Magnetic Station Directions Magnetic Station Student Recording Sheet Wrap-Up of Physical Properties- *What is a Solid?* DE Board Builder: Magnets

Week	Performance Expectation/ DCI	5E Model	Other Resources
8	2-PS1-1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. 2PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. Teacher note: (Properties of Liquids may include other characteristics: thickness, consistency, movement, appearance) For more information, go to: https://www.youtube.com/watch?v=gqaNCkNZoz8	View the video of the overview for the lesson sequence here. (5E components are modeled in the videos) <u>Another engage Option:</u> Show students lava lamp video and ask what they observe about the liquid in the lamp. https://www.youtube.com/watch?v=xB5FUYNXt9c "What is a liquid? Do all liquids look the same?" <u>Possible materials to use for explore:</u> Oil, bubble solution, water, soap, paint.	Wrap-Up of Liquid Properties-*What is a Liquid?* *What is the difference between a Solid and a Liquid?* DE Board Builder: Solid, Liquid,or Gas (expectation is solids and liquids only)

Week	Performance Expectation/ DCI	5E Model	Other Resources
9	2-PS1-1.A Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. 2PS1-2 Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose. Teacher note: (Properties of Liquids may include other characteristics: thickness, consistency, movement, appearance) For more information, go to: https://www.youtube.com/watch?v=gqaNCkNZoz8	Engage: How candy is made video https://www.youtube.com/watch?v=0TcFYfoB1BY Explore: Candy Melt activity instructions Candy Melt Student page Explain:What is causing the different candy to change? Does this happen with everything? Watch video on how to make twizzlers and gummy bears. Elaborate: Ask students to write to describe what happens when changes occur to the following objects: Popsicles Eggs Are the changes reversible or irreversible? Explain. Evaluate: Use student responses from Elaborate to assess understanding	Wrap-Up of Liquid Properties-Anchor Chart: *What is a Liquid?* Anchor Chart: *What is the difference between a Solid and a Liquid?*

Week	Performance Expectation/ DCI	5E Model	Other Resources
10	2PS1-4 Construct an argument with evidence that some changes caused by heating and cooling can be reversed and some cannot.	Crayon Melting: Reversible Changes in Matter Day 1 Lesson (All 5Es are included in lesson)	Book: From Wax to Crayon By Robert Nelson *(additional resource - not district purchased)* 

DIVIDE the unit into weeks and DISTRIBUTE the standards

Week	Performance Expectation/ DCI	5E Model	Other Resources
11	2PS1-4 Construct an argument with evidence that some changes caused by heating and cooling can be reversed and some cannot. 2PS1-3 Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.	Crayon Melting: Reversible Changes in Matter Day 2 Lesson (all 5Es are included in lesson) Discovery Education Model Lesson (all 5E components are addressed in the lesson)	Wemberly's Ice Cream Star By Kevin Henkes Why Did My Ice Pop Melt? By Susan Korman Video: Sid: My Ice Pop 

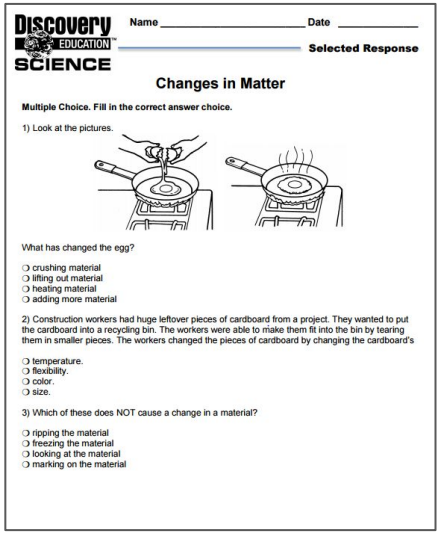
DIVIDE the unit into weeks and DISTRIBUTE the standards

Week	Performance Expectation/ DCI	5E Model	Other Resources
12	2PS1-3 Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.	Making Something Out of Tiny Objects (5E components are included in this lesson)	Discovery Education Natural vs. Manmade video

Make or locate SUMMATIVE and PERFORMANCE ASSESSMENTS

Assessments from Science Techbook Unit Concept: Changes in Matter

Selected Response



Discovery EDUCATION SCIENCE

Name _____ Date _____

_____ Selected Response

Changes in Matter

Multiple Choice. Fill in the correct answer choice.

1) Look at the pictures.

What has changed the egg?

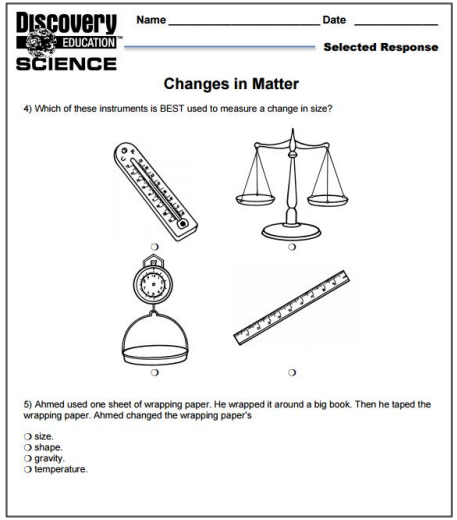
❍ crushing material
❍ lifting out material
❍ heating material
❍ adding more material

2) Construction workers had huge leftover pieces of cardboard from a project. They wanted to put the cardboard into a recycling bin. The workers were able to make them fit into the bin by tearing them in smaller pieces. The workers changed the pieces of cardboard by changing the cardboard's

❍ temperature.
❍ flexibility.
❍ color.
❍ size.

3) Which of these does NOT cause a change in a material?

❍ ripping the material
❍ freezing the material
❍ looking at the material
❍ marking on the material



Discovery EDUCATION SCIENCE

Name _____ Date _____

_____ Selected Response

Changes in Matter

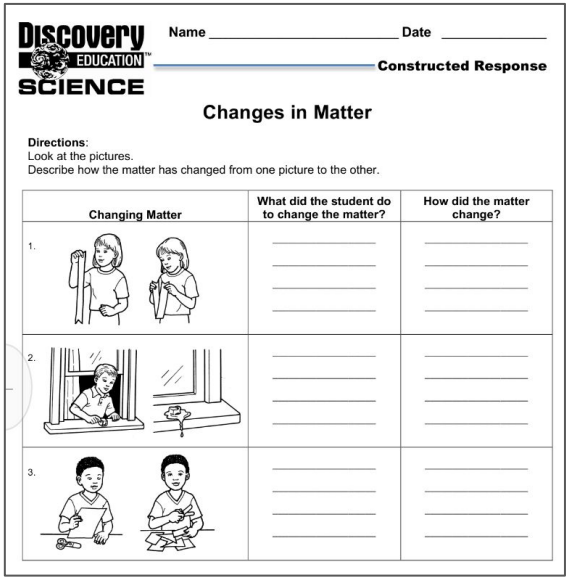
4) Which of these instruments is BEST used to measure a change in size?

❍ ❍ ❍ ❍

5) Ahmed used one sheet of wrapping paper. He wrapped it around a big book. Then he taped the wrapping paper. Ahmed changed the wrapping paper's

❍ size.
❍ shape.
❍ gravity.
❍ temperature.

Constructed Response



Discovery EDUCATION SCIENCE

Name _____ Date _____

_____ Constructed Response

Changes in Matter

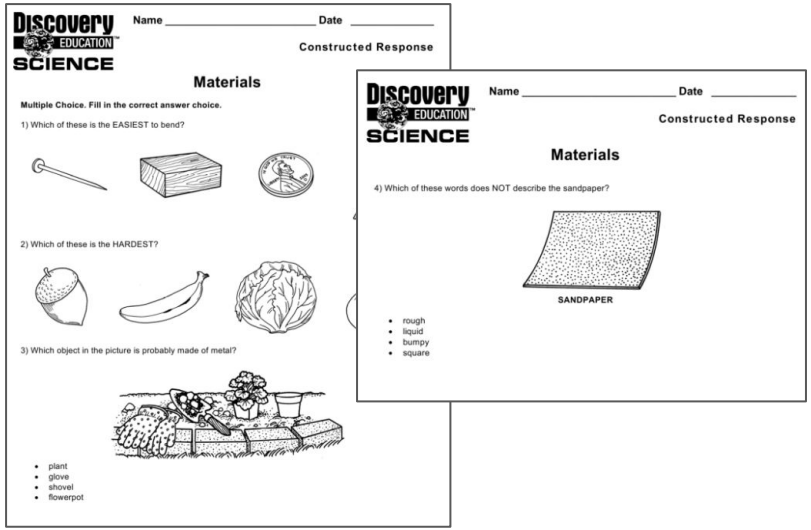
Directions:
Look at the pictures.
Describe how the matter has changed from one picture to the other.

Changing Matter	What did the student do to change the matter?	How did the matter change?
1.		
2.		
3.		

Make or locate SUMMATIVE and PERFORMANCE ASSESSMENTS

Assessments from Science Techbook Unit Concept: Materials

Selected Response


Discovery EDUCATION SCIENCE

Name _____ Date _____

Constructed Response

Materials

Multiple Choice. Fill in the correct answer choice.

1) Which of these is the EASIEST to bend?

2) Which of these is the HARDEST?

3) Which object in the picture is probably made of metal?

- plant
- glove
- shovel
- flowerpot

Discovery EDUCATION SCIENCE

Name _____ Date _____

Constructed Response

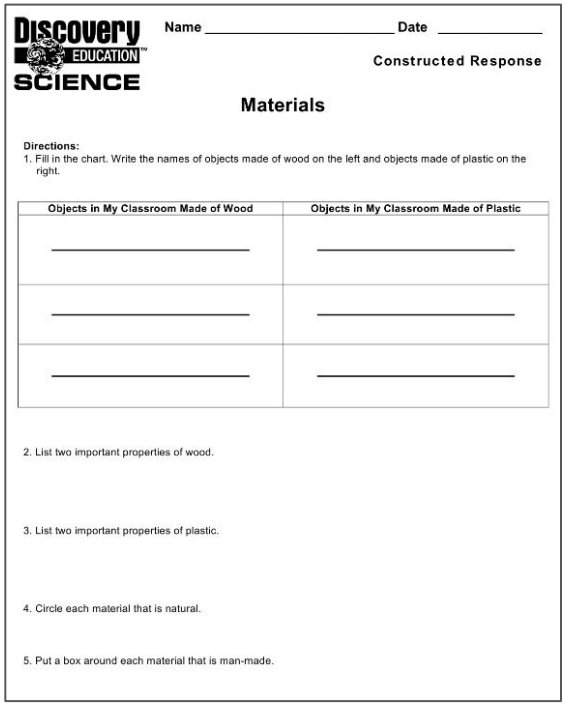
Materials

4) Which of these words does NOT describe the sandpaper?

SANDPAPER

- rough
- liquid
- bumpy
- square

Constructed Response


Discovery EDUCATION SCIENCE

Name _____ Date _____

Constructed Response

Materials

Directions:
1. Fill in the chart. Write the names of objects made of wood on the left and objects made of plastic on the right.

Objects in My Classroom Made of Wood	Objects in My Classroom Made of Plastic

2. List two important properties of wood.

3. List two important properties of plastic.

4. Circle each material that is natural.

5. Put a box around each material that is man-made.

Make or locate SUMMATIVE and PERFORMANCE ASSESSMENTS

Assessments from Science Techbook Unit Concept: Using Materials

Constructed Response

Discovery EDUCATION SCIENCE

Name _____ Date _____

Constructed Response

Using Materials

Directions:
Look at the picture of the umbrella. Name three things that an umbrella must have if it is going to keep you dry in the rain.

_____

_____

_____

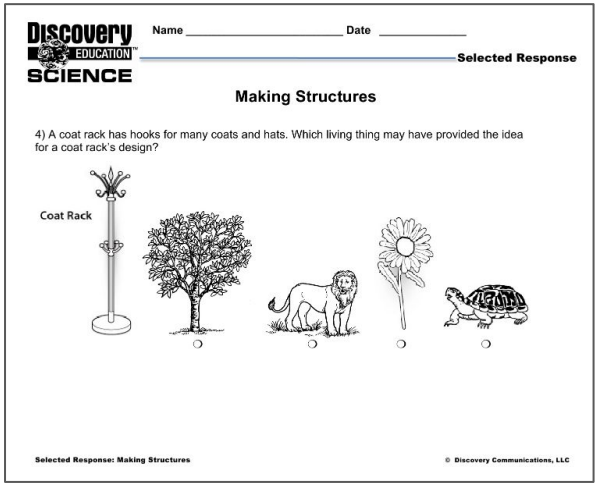
_____

_____

Make or locate SUMMATIVE and PERFORMANCE ASSESSMENTS

Assessments from Science Techbook Unit Concept: Making Structures

Selected Response



Discovery EDUCATION SCIENCE

Name _____ Date _____

Selected Response

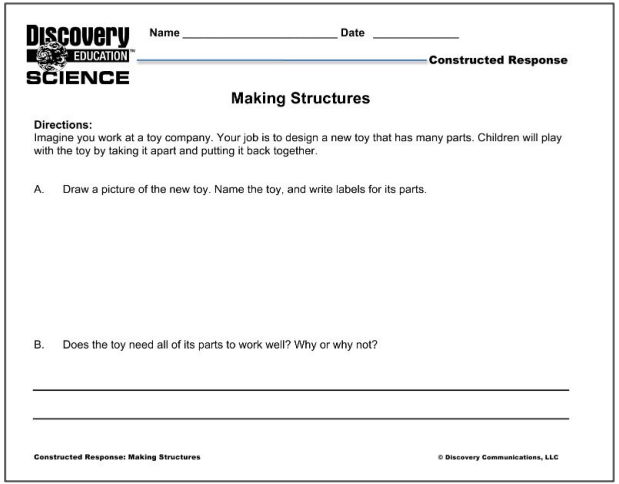
Making Structures

4) A coat rack has hooks for many coats and hats. Which living thing may have provided the idea for a coat rack's design?

Coat Rack

Selected Response: Making Structures

Constructed Response



Discovery EDUCATION SCIENCE

Name _____ Date _____

Constructed Response

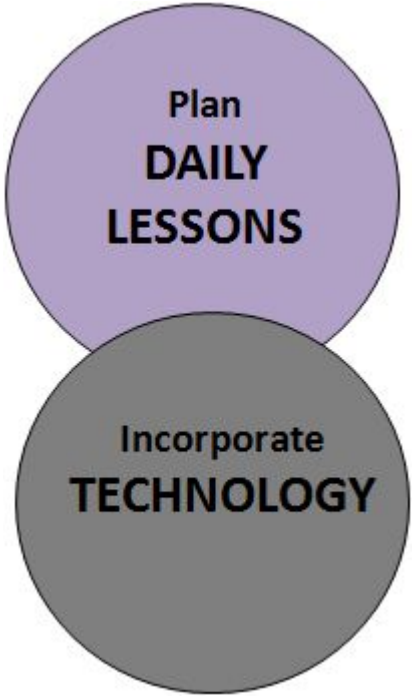
Making Structures

Directions:
Imagine you work at a toy company. Your job is to design a new toy that has many parts. Children will play with the toy by taking it apart and putting it back together.

A. Draw a picture of the new toy. Name the toy, and write labels for its parts.

B. Does the toy need all of its parts to work well? Why or why not?

Constructed Response: Making Structures



Additional Resources:

Structure and Properties of Matter Online Unit

STEM Resources from Discovery Education:

STEM in Action: Master Chef

Project: Changing Flowers

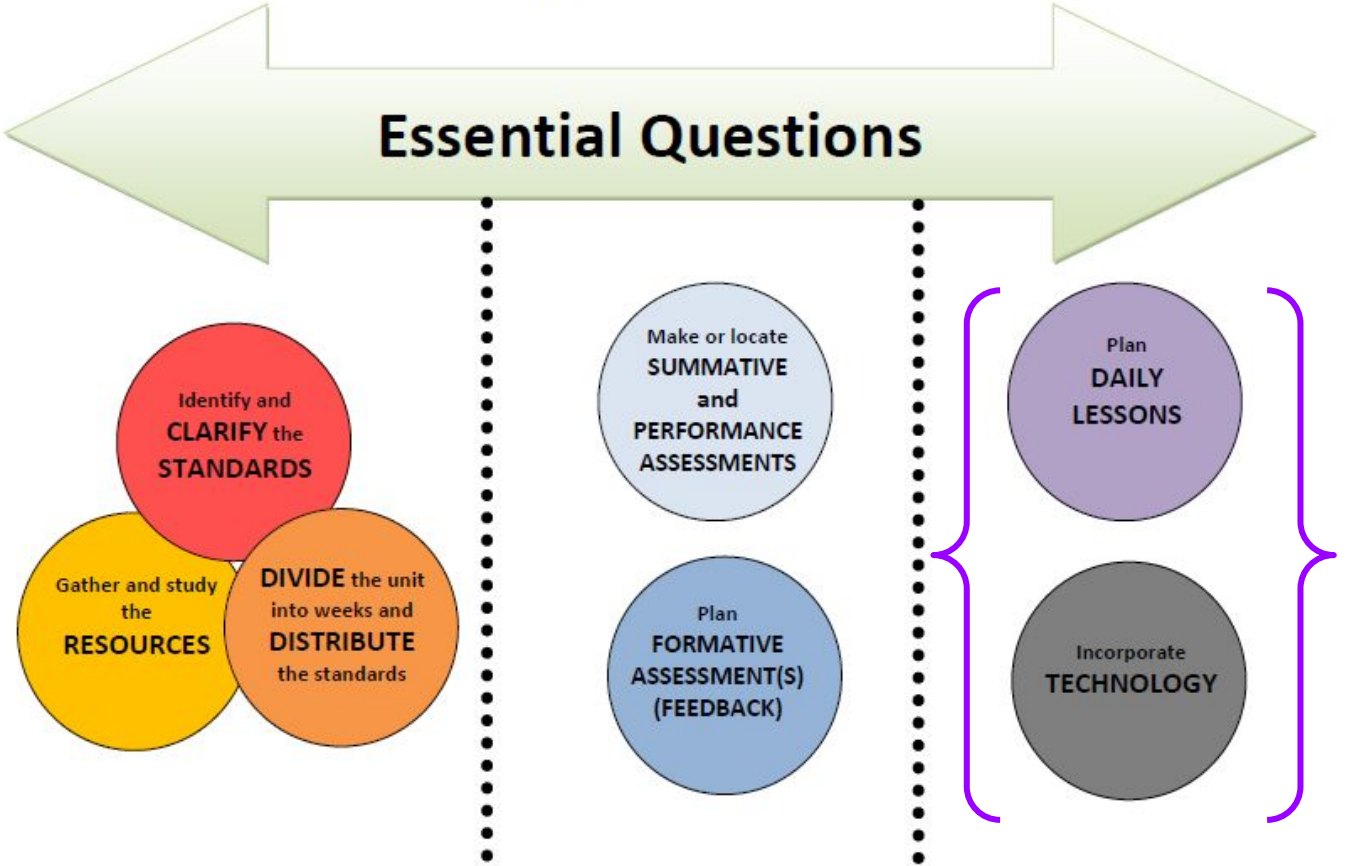
Project: Making a Cooling Pack

STEM in Action: Building Houses

Project: Jumping Out of the Sky

Project: Designing a House

Backward Unit Planning 1.0



Now you're ready to plan your daily lessons!