

States of Matter

States of Matter

Student Objectives

I will be able to:

- Read and analyze informational and procedural texts about matter.
- Share ideas with my peers.
- Build my vocabulary knowledge.
- Conduct research to write opinion texts.

Tips for Text Annotation

As you read closely for different purposes, remember to annotate the text. Use the symbols below to annotate.

Symbol	Purpose
<u>underline</u>	Identify a key detail.
★	Star an important idea in the margin.
① ② ③	Record a sequence of events.
jealous	Circle a key word or phrase.
?	Mark a place in the text where you have a question. Write your question in the margin.
!	Mark a place in the text where you have an idea. Write your idea or thought in the margin.

Your annotations might look like this.

Notes

1 Many moons ago, there lived a brave warrior. He was called the Invisible One.

★ No one could see him except his sister. He pledged to marry the first woman who could see him.

2 Nearby, there lived a man with two daughters. The elder daughter was callous and cruel. The younger, called Rough-Face Girl, was gentle and kind. Rough-Face Girl worked hard. She tended the fire. It made her face rough and chapped. Her idle sister did nothing.

3 One day, Idle Sister announced, "I want to marry the Invisible One!" She hurried

What does the word callous mean?

I wonder why she was called Rough-Face Girl.

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Essential Question

How can something old become new?

liquid



solid



gas



Remember
to annotate
as you read.

Notes

Soap Shapes

- 1 Soap can easily be sculpted into any shape you want! All it takes is imagination.
- 2 Start with a cup of soap flakes or ask someone to help you grate a bar of soap. Place the soap into a bowl and add just enough water to make it look and feel like dough. If you want colorful soap, add a few drops of food coloring.
- 3 Now you can shape the soap. You may want to think of a theme, such as ocean life. You can make soap in the shape of fish, turtles, and sea stars. Or use cookie cutters. Soap that you shape yourself is really fun to use!



It's All Water

by Constance Andrea Keremes

All the boys and girls I know
Say they love to play in snow.
Mention rain, what do they say?
“Come again some other day.”
As for sleet, no one's a fan.
We all avoid it if we can.
Who among us cares for fog
Except for bullfrogs in a bog?
Weather changes, as you see,
It's a great variety.
Drops of water start it all,
Chill them, warm them,
watch them fall.



Remember
to annotate
as you read.

Notes

The Art of Origami

- 1 For thousands of years, people have been changing the size and shape of paper by folding it. Origami, *the art of paper-folding*, began in China, and then spread to Japan, where it became popular. In fact, the word *origami* comes from the Japanese words *ori*, which means *folding*, and *kami*, which means *paper*.



Notes

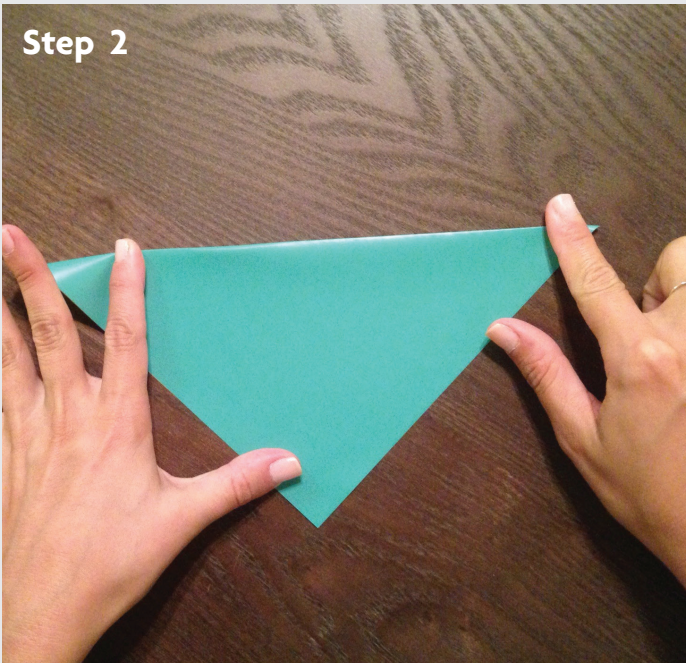
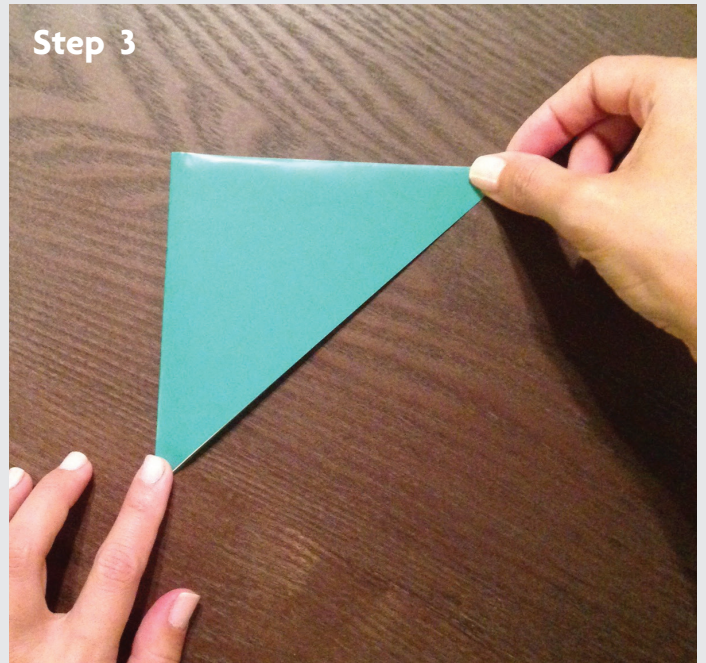
- 2 Today, you can try your hand at this ancient craft by folding a square of paper to create a dog's face. The directions are easy to follow, so let's get started.

- 3 **Step 1:** Begin with a square piece of white or colored paper. A paper that is 8 inches square works well.

Step 1

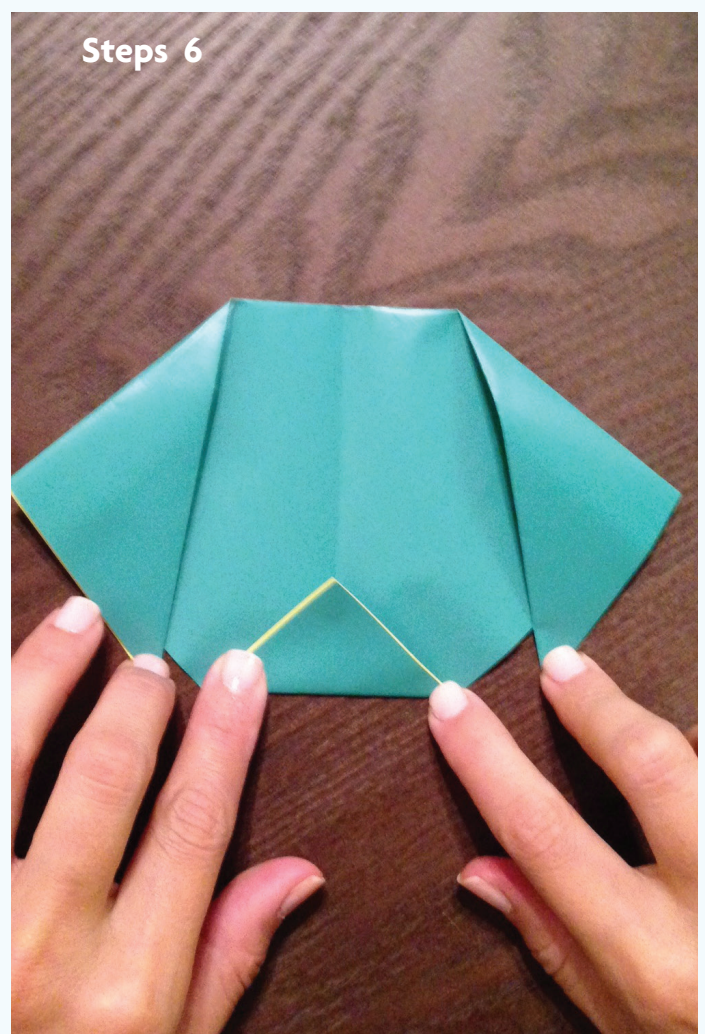
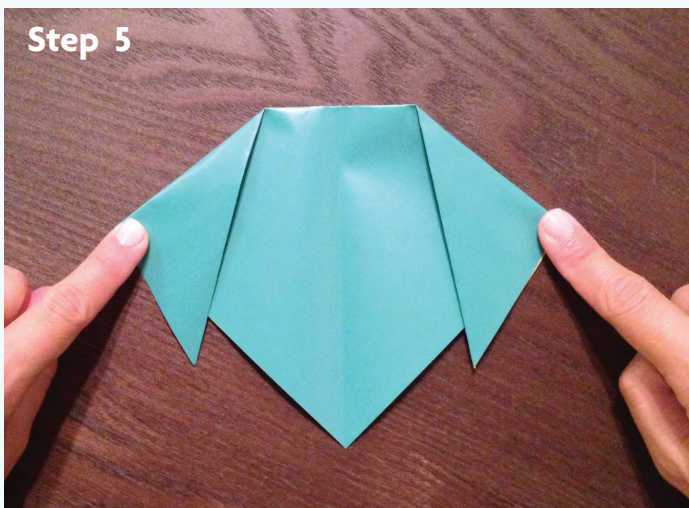
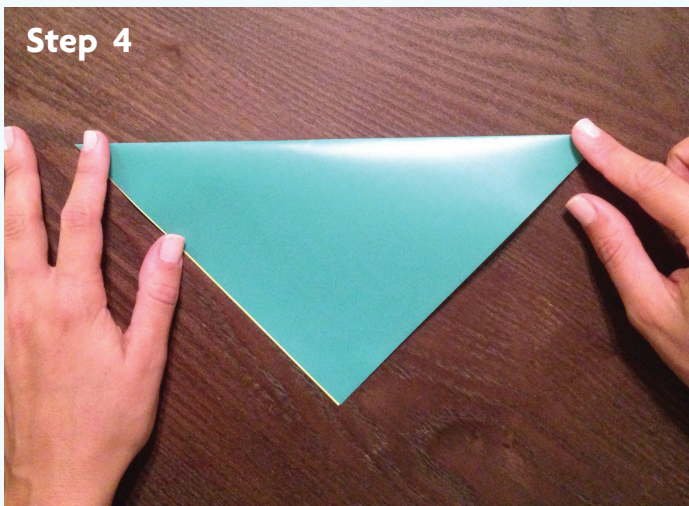
- 4 **Step 2:** Fold the paper in half from top corner to bottom corner. Now you have a triangle.

- 5 **Step 3:** Fold the triangle in half again, by folding the left point to the right point.

Step 2**Step 3**

Notes

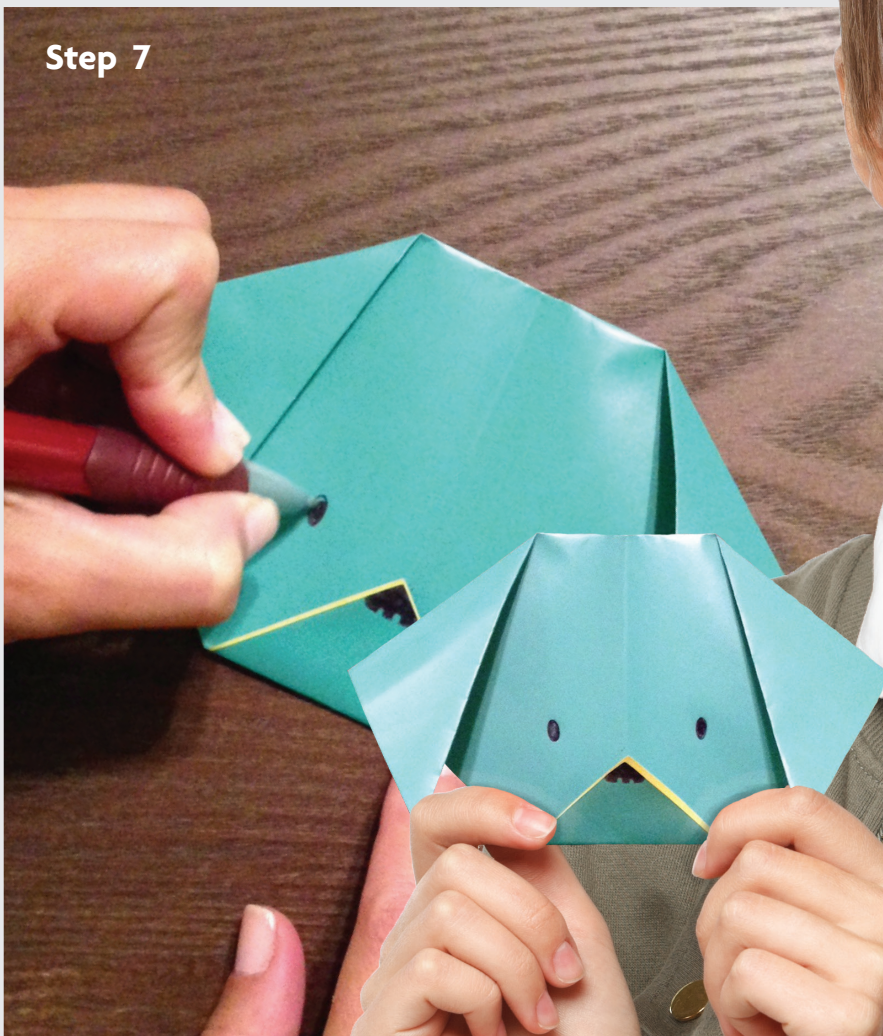
- 6 **Step 4:** Unfold the triangle. There will be a crease down the middle.
- 7 **Step 5:** To make the ears, fold both corners of the triangle down at an angle.
- 8 **Step 6:** Fold back the point at the bottom of the dog's head.



Notes

- 9 **Step 7:** Draw two eyes and a nose.
Now your dog has a face.
- 10 You began with a square piece of paper and transformed it into a dog's face. How amazing is that!

Step 7



Remember
to annotate
as you read.

Notes

Sand Sculpture

- 1 Picture yourself at the beach on a hot summer day—soft sand, crashing waves, squawking seagulls, and sunny skies. Did you remember to bring some pails and shovels? If so, you have everything you need to build a sand castle. Anyone can build one, but not all sand castles are the same.



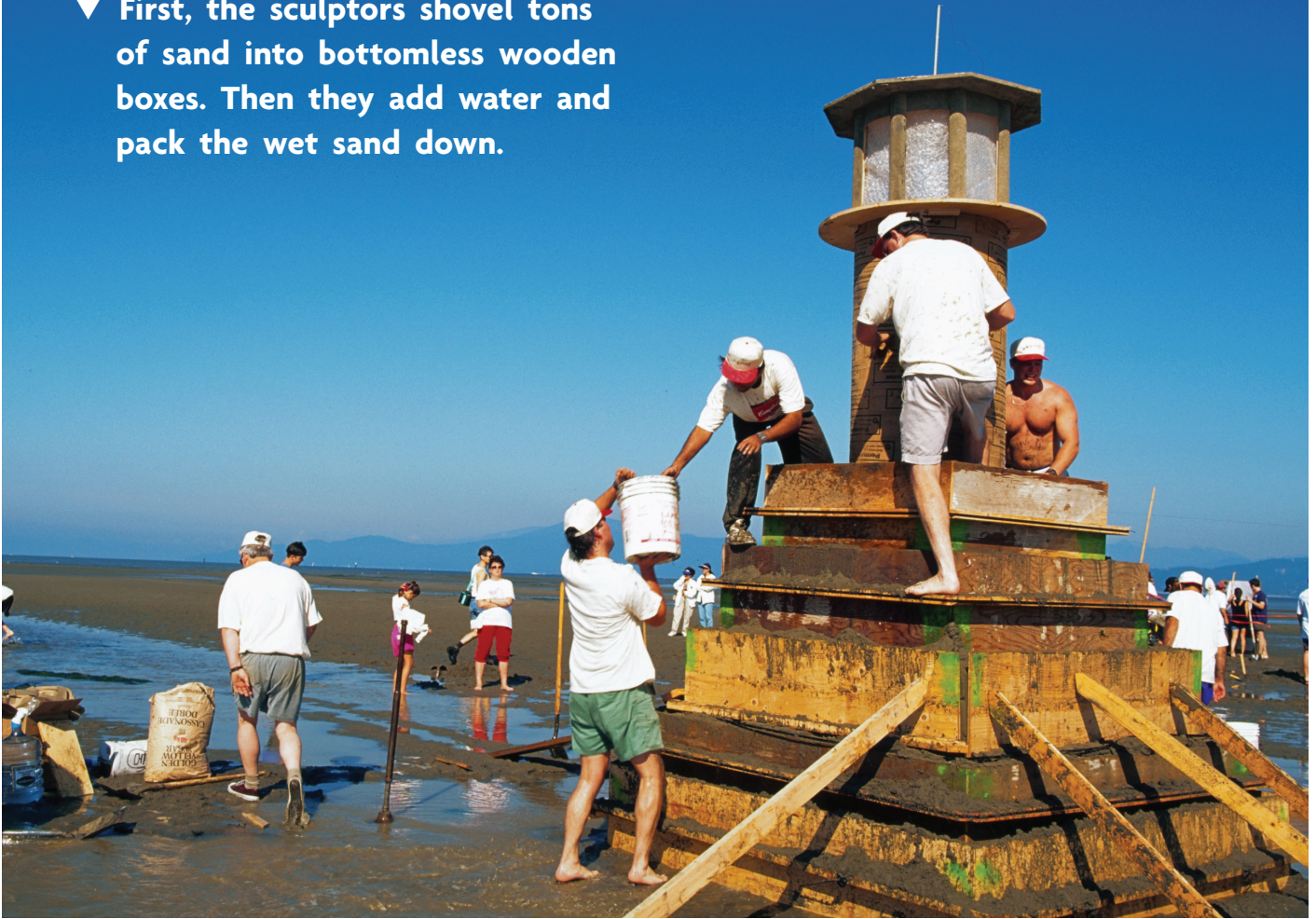


▲ It takes skill, talent, hard work, and about four days to construct a sand sculpture like this one.

Notes

- 2 For some people, sand castles are more than just fun at the beach. They're a way to create art and make money. Sand sculptors enter competitions to win big prizes. When they compete, they use the same simple items as you do—shovels, molds, sand, and water. But their knowledge of science, construction, and art results in some amazing creations.

▼ First, the sculptors shovel tons of sand into bottomless wooden boxes. Then they add water and pack the wet sand down.



Notes

- 3 Here's where the science comes in. By themselves, dry grains of sand are slippery, so they cannot stick together. But water changes everything. That's because water creates tiny "bridges" that hold the grains of sand together. Sand sculptors know just how much water to add. Using too much or too little will cause their creations to crumble.

Notes

- 4 The sculptors work quickly to stack their blocks of hard, wet sand. They smooth the sand and shape it using their hands and scrapers. They carve every detail with fine tools. Finally, a stunning work of art appears—for a little while, anyway. When the sand dries out, even the winning sculptures will fall apart.

▼ Some sand artists work in teams, but this sculptor prefers to work by herself.



World's Best Glass Art

- 1 Artists use many different materials to make art. Some use paint. Some use wood or stone. But there is an artist who uses glass. His name is Dale Chihuly (chih-HOO-lee). He is one of the world's best glass artists.
- 2 The first thing you'll notice about Dale's art is the size. Instead of inches, he works in feet. Some of his artworks can fill a room. They are often a museum's most popular pieces. One of Dale's most famous art pieces is called *Fireworks of Glass*. It is forty-three feet tall! Dale gave this piece to a children's museum in Indiana. Dale has always wanted to change people's ideas of what can be made from glass. His art pieces contain many parts, colors, and shapes.
- 3 How does Dale make his art? He is an expert at blowing glass. First he heats sand and a few other materials. After that, he blows into the hot, liquid mixture to shape the glass. It takes a long time to make one small bowl. It can take months to make one of Dale's bigger art pieces. Dale's talent has amazed people all over the world.

BuildReflectWrite

Build Knowledge

Based on this week's reading, explain how people change matter to make origami and sand sculptures.

Changing Matter	
Origami	
Sand Sculpture	

Reflect

How can something old become new?

Based on this week's texts, write new ideas and questions you have about the essential question.

Research and Write

In this unit, you learned about how people can change the size, shape, and states of matter to make things. Which property of matter do you think is most important? Why? In a short essay, state your opinion and provide one or more reasons to support it.

Choose Your Topic

This week, conduct a pre-search to identify a property of matter your class would like to research. Construct guiding questions that will help you focus your research on the information you will need to write your short essay.

Remember
to annotate
as you read.

Notes

A Solar-Powered Solution

- 1 Snow can cover roads and make it dangerous to travel. When this happens, schools and businesses often have to close. Scott Brusaw, an electrical engineer, has been working on a solution. It would make snow on roads disappear by melting it!
- 2 Brusaw is making a solar-powered roadway with solar cells that get warm as the sun hits them. The stored heat melts any snow or ice that falls onto the road. This makes winter travel safer.
- 3 Brusaw's invention will help cities save money by not having to buy snow removal equipment, such as plows. Do you know one disadvantage of this technology? Students may no longer have snow days!



That's Cool!

- 1 You know what happens to water when the temperature gets cold enough. The water changes to a solid called *ice*. We can use that fact to make a cool treat!
- 2 Here's what you do. Add half a cup of milk to a plastic bag that has a good seal. Next, add a quarter cup of sugar and a few drops of vanilla extract, chocolate powder, or any other flavor you like. Now securely seal the bag. In a larger, gallon-size plastic bag, add two cups of ice and half a cup of salt. Put the smaller bag into the larger bag and seal it. Shake the bags for about five minutes or until the liquid has changed to a solid. Then open the bag and enjoy your ice cream!



Remember
to annotate
as you read.

Notes

Changing Matter

by Jay Brewster

Introduction

- 1 Matter is anything that takes up space. Everything in the world is made of matter. There are three kinds of matter: solid, liquid, and gas.
- 2 All matter has properties, such as a size and a shape. Some properties can change. In addition, one kind of matter can sometimes change into another kind of matter. A *kind* of matter is also called a *state* of matter.



solid



liquid



gas

Notes

- 3 Hold up a glass that has liquid in it. You are holding all three kinds of matter! The glass itself is an example of solid matter. The drink is an example of liquid matter. The space in the glass that is not filled with water is filled with air. Air is a mixture of gases and is therefore an example of gas matter.



How Can Matter Change Size?

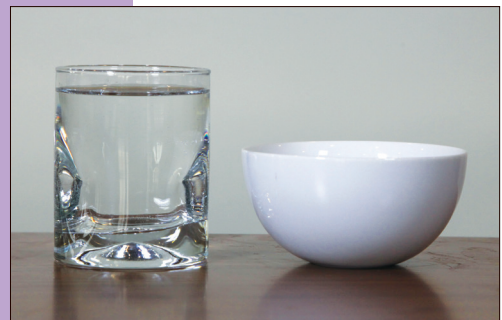
- 4 Every solid, liquid, or gas has a certain size. You can change the size of matter. Here is one example. Suppose you have a carrot. A carrot is a solid piece of matter. You can change the size of the carrot by asking an adult to help you cut it into several small pieces or by shredding it.



- 5 You can change the size of a liquid, too. Take a glass with water and pour half into another glass. You have just as much water as you did before, but there is less of it in the first glass than there was before. You have changed the size of the liquid by dividing it.

How Can Matter Change Shape?

- 6 Shape is another property of matter that can be changed. Suppose you still have a glass with water in it. Get a bowl and pour the water into the bowl. By transferring the water from one container to another, you have changed its shape.



- 7 Gas can change its shape, too. How can we tell if it can if we are not able to see gas? Put a straw into a glass of milk and blow air into the straw. You will see bubbles moving around in the milk. Those bubbles are filled with air. Remember, air is a mixture of gases. By blowing into the milk, you made the gases in the glass move and change shape.





Changing States of Matter

- 8 When matter undergoes a severe change in temperature, it can change from one state of matter into another.
- 9 Water can exist in all three states of matter. When water is very cold, it freezes and becomes ice. Frozen water or ice is solid matter that can have different shapes. For instance, it can be shaped like an icicle or an ice cube. Ice can change in size, too. You can chip away at a block of ice to turn it into smaller pieces of ice.

Notes

- 10 For ice to change from a solid back into a liquid, it needs to be heated up. The ice will melt and it will be flowing water again.
- 11 How can liquid water be transformed into a gas? It needs to be heated. For example, when water in a pot on the stove starts to boil, it starts to bubble. Steam starts to rise from the pot. Steam is liquid water that has turned into a gas.





▲ Everything in the world is matter—even you!

Notes

Conclusion

- 12 There are three different kinds of matter that make up our world. You can see solid and liquid matter everywhere. Even though you cannot see most kinds of gas matter, they are there, too. All matter has properties, including size and shape. You can change some properties of matter. Some matter can even change from one kind of matter into another.

Sand Becomes Glass!

Dear Grandma,

- 1 My class went on a field trip. We had been studying how water turns into ice when it gets cold. The ice turns back into water when it gets hot. Did you know that sand can turn into glass? It can if it's hit by lightning!
- 2 On our field trip we went inside a glass-making factory. It was very warm in there, but no lightning! We watched as one person made a glass bowl. The man used sand and a few other ingredients, like soda lime. No, that's not something you drink. He also used bits of old and recycled glass. It's better to reuse glass instead of throwing it away.
- 3 The man kept heating, cooling, and then reheating the mixture. It was unsafe for us to get too close. At first, the mixture was orange-red. You could pour it like milk. Then he took some and blew into it using a long tube called a blowpipe. As it cooled, he shaped and reshaped the glass until it was the correct size. Oh, how fun it was! I want to return some day.

Love,

Amy

BuildReflectWrite

Build Knowledge

Summarize what you learned from reading “Changing Matter.”

How can you change the shape of matter?	How are liquids and solids alike?	What conclusions can you draw about the states of matter?

Reflect

How can something old become new?

Based on this week’s texts, write new ideas and questions you have about the essential question.

Research and Write

In this unit, you learned about how people can change the size, shape, and states of matter to make things. Which property of matter do you think is most important? Why? In a short essay, state your opinion and provide one or more reasons to support it.

Conduct Research

Use your guiding questions to conduct research this week. Gather information from at least three sources, including both print and online sources. Use your sources to plan your short essay.

Remember
to annotate
as you read.

Notes

Old Faithful

- 1 A geyser shoots through Earth's surface. Why? Rain and snow trickle through cracks in an uneven rocky area. The water hits an underground magma (MAG-muh) chamber (an underground pool that catches this hot rock) that is intensely hot. The boiling water rises, creating extreme pressure. As the water nears the surface, it is so hot, it changes to steam. The steam erupts, or shoots out, of the vent.
- 2 Yellowstone National Park is located mostly in the U.S. state of Wyoming. It is home to over 500 geysers. The most famous is Old Faithful, which erupts every hour or so. It has been known to shoot steam as high as 180 feet!



Driftwood Art

- 1 If you walk along a beach, you may find pieces of wood washed ashore. They may have come from trees that fell into the ocean. These pieces of wood are called driftwood. They get tossed around and reshaped by wind, water, and sand.
- 2 Some of the pieces of wood have unusual, graceful shapes. A British sculptor, Heather Jansch, uses driftwood to create life-size horses! From land to sea, driftwood can become a natural work of art.



Remember
to annotate
as you read.

Notes

How Mount Rushmore Was Made

by Kira Freed

1 Imagine that you're a sculptor—a person who makes art by molding or carving some type of matter. Will you use clay, stone, metal, or wood? An artist named Gutzon Borglum used a mountain!

2 Mount Rushmore is the art that Borglum created. It is one of the largest sculptures in the world. The sculpture has the faces of four United States presidents. They are George Washington, Thomas Jefferson, Theodore Roosevelt, and Abraham Lincoln. The carvings stand for almost the first 150 years of the United States.



▲ **Gutzon Borglum (1867–1941) was from Idaho.**

**Mount Rushmore
National Memorial****Notes**

- 3 This sculpture is on a rock cliff in South Dakota. Borglum carved the presidents' faces very large so people could see them from far away. Each face is sixty feet tall—as tall as a six-story building! Washington's nose is twenty feet tall. Each eye is eleven feet wide. How did Borglum get the job of carving such a huge piece of art?

The Idea for Mount Rushmore

- 4 A man named Doane Robinson wanted people to visit South Dakota and see its beauty. Robinson knew that he needed a special attraction. He had heard of Borglum's work as a sculptor. He invited Borglum to South Dakota.

5 Borglum went to South Dakota in 1924. The two men visited a group of jagged peaks. Robinson wanted Borglum to create his art there. But the rock was not strong enough for a sculpture. Borglum returned the next year. When he saw Mount Rushmore, he knew it was the perfect place for his art. The mountain was tall enough to see from far away. The rock looked strong enough to carve. Because the mountain faced southeast, it would receive morning sunlight.

6 Borglum, his son, and a small group of men climbed the mile-high Mount Rushmore in 1925. At the top, they looked out over miles of mountains and plains. Borglum wanted to create an important sculpture for this special place. He wanted the world to know about some great Americans. He wanted to honor “American achievement.” He decided to carve four presidents on the mountain.

◀ **Mount Rushmore
before the
project began**



▲ Borglum's models helped him figure out sizes, shapes, and how the faces would best fit on the mountain.

Notes

Getting Ready to Carve

7 Borglum started by making drawings of the presidents. Then he used the drawings to make plaster models. After Borglum finished the models, he was ready to start carving. But he still didn't know for sure that the rock was strong enough. Rain and wind had pounded the mountain for millions of years. The surface had many little cracks. Would it break when carved? Borglum would need to start carving to find out.

- 8 The biggest question was who would pay for the work? The people of South Dakota liked the idea of the project. However, they didn't have enough money. The project had to be put on hold many times. Help came from several government officials. Over time, they arranged for the United States to pay for most of the work.

Carving the Mountain

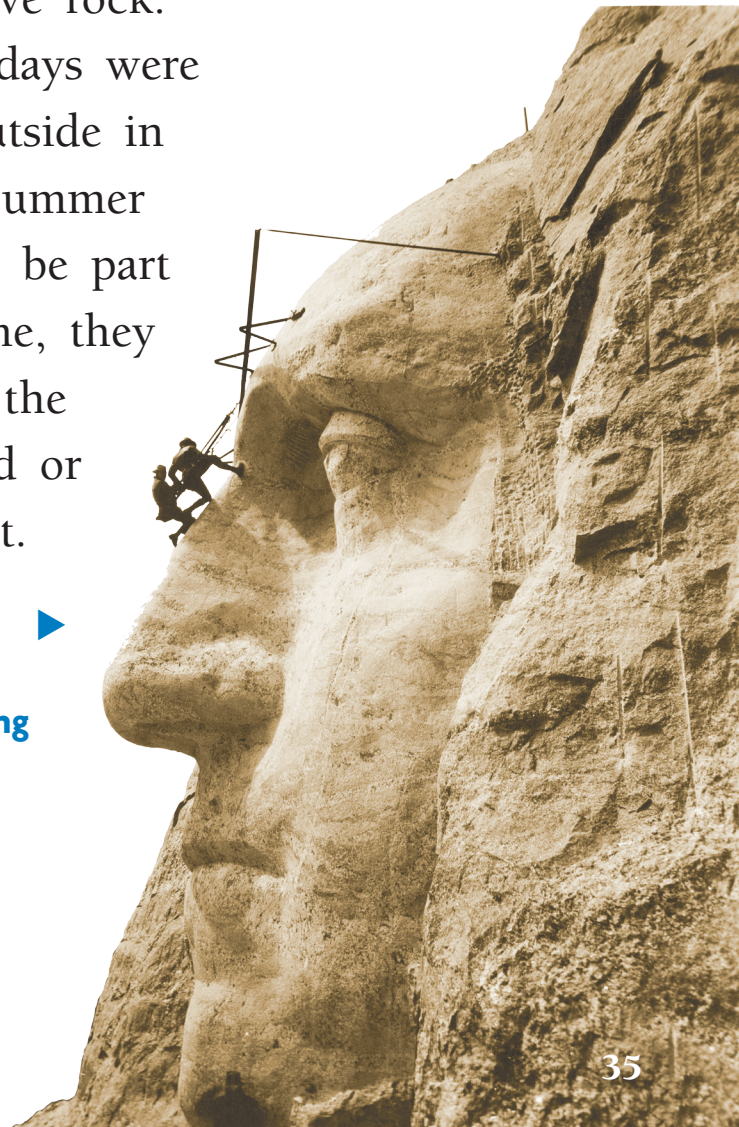
- 9 Borglum didn't carve Mount Rushmore himself. He was in charge of the crew who did most of the work. Workers had to climb hundreds of stairs each day. Then they sat on swings that hung from the top of the mountain. They used heavy drills to make holes in the rock. They put dynamite into the holes to blast away the outer rock.
- 10 As they worked, Borglum learned that most of the rock was strong enough to carve. However, he had to change plans several times when he found areas of weak rock. It could split and ruin the design.

Notes

11 After the outer rock was gone, workers were close to the rock surface that would remain. They had to be more careful with this rock. They used hand tools to shape it. Then Borglum himself worked on the rock. His artistry made the presidents look more alive.

12 Nearly 400 men and women worked on Mount Rushmore. The workers were not artists—many were ranchers, miners, or lumbermen. When the project began, Borglum taught them how to carve rock. The work was difficult, and the days were long. It was not easy to work outside in the cold, wind, rain, snow, and summer heat. The workers were proud to be part of an important project. Over time, they became a strong team. Although the work was dangerous, no one died or was badly hurt during the project.

Workers wore harnesses attached to cables to prevent them from falling as they carved Mount Rushmore. ►





Notes

- 13 Washington's head was finished in 1930. Jefferson's was completed in 1936, and Lincoln's in 1937. Finally, in 1939, Roosevelt's head was done. Borglum wanted to carve down to their waists, but he died before that happened. His son put the finishing touches on the faces and added hair. He left the chests unfinished because the money had run out.
- 14 The Mount Rushmore sculpture took fourteen years to complete. Work began in 1927 and ended in 1941. During that time, workers removed almost half a million tons of rock. The project cost almost one million dollars. Today, it would have cost ten times that.

Visiting Mount Rushmore

15 Mount Rushmore is a national memorial. Almost three million people visit the sculpture each year. More than fifty million people have seen it since Washington's head was finished in 1930. The sculpture has been successful in bringing more visitors to South Dakota. People come to see the beautiful land and trees. They come to honor four presidents and more than the first hundred years of a proud nation. They also come to view an amazing sculpture carved high on a mountain.



Beautiful Ice Cities

- 1 In a city, some buildings are made of steel. Others are made of brick or stone. But have you ever seen a city made of ice?
- 2 Each year in China, there is a big winter festival. They make a city out of ice and snow. The clear, smooth surfaces of the buildings are nothing but frozen water. There are also snow slides, snow mazes, and even snow dinosaurs. Although ice is colorless, the city is beautiful! Many people visit this wonderful place, but you must be careful. Within minutes of entering the city, you could be slipping and sliding.
- 3 The United States also has a big winter festival. It is held in Saint Paul, Minnesota. Many people think getting too much snow is painful. But the people of Saint Paul decided to have fun with their snow. They make a big ice castle. It might not be colorful, but it is dazzling in the winter sun. When it gets dark, the castle is lit up by many-colored lights. Amazing!
- 4 Maybe this winter, you can make something useful out of ice and snow. But take a picture. Soon it will melt away!

BuildReflectWrite

Build Knowledge

Based on your reading, jot down four interesting facts you learned about the Mount Rushmore sculpture.

Mount Rushmore	
What did Mount Rushmore look like before the project began?	How did Borglum prepare to carve Mount Rushmore?
Why was it difficult for the workers to carve Mount Rushmore?	What facts from the text support that Mount Rushmore is a national treasure?

Reflect

How can something old become new?

Based on this week's texts, write new ideas and questions you have about the essential question.

Research and Write

In this unit, you learned about how people can change the size, shape, and states of matter to make things. Which property of matter do you think is most important? Why? In a short essay, state your opinion and provide one or more reasons to support it.

Write Your Opinion Essay

Use your research results to draft, revise, and edit your short essay.

Support for Collaborative Conversation

Discussion Prompts

Share a new idea or opinion . . .

I think that _____.

I notice that _____.

My opinion is _____.

An important event was when _____.

Gain the floor . . .

I would like to add _____.

Excuse me for interrupting, but _____.

That made me think of _____.

Build on a peer's idea or opinion . . .

I also think that _____.

In addition, _____.

Another idea is _____.

Express agreement with a peer's idea . . .

I agree with [Name] because _____.

I agree that _____.

I think that is important because _____.

Respectfully express disagreement . . .

I disagree with [Name] because _____.

I understand your point of view, but I think _____.

Have you considered that _____?

Ask a clarifying question . . .

What did you mean when you said _____?

Are you saying that _____?

Can you explain what you mean by _____?

Clarify for others . . .

I meant that _____.

I am trying to say that _____.

Group Roles

Discussion Facilitator:

Your role is to guide the group discussion and make sure that everyone has the chance to participate.

Scribe:

Your job is to record the ideas and comments your group members share.

Timekeeper:

You will keep track of how much time has passed and help keep the discussion moving along.

Encourager:

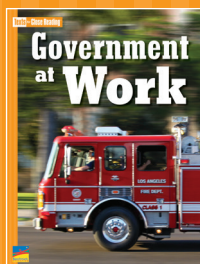
Your role is to motivate and support your group members.

Making Meaning with Words

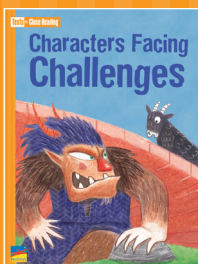
Word	My Definition	My Sentence
ancient (p. 7)		
attraction (p. 31)		
construct (p. 11)		
jagged (p. 32)		
mixture (p. 14)		
peaks (p. 32)		
ruin (p. 34)		
severe (p. 23)		
transferring (p. 21)		
transformed (p. 9)		

Build Knowledge Across 10 Topic Strands

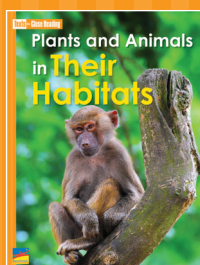
Government and Citizenship



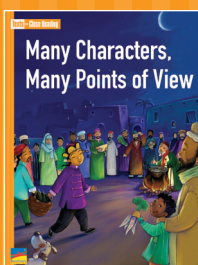
Character



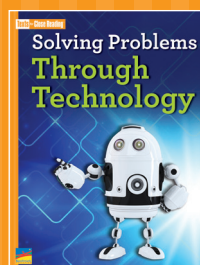
Life Science



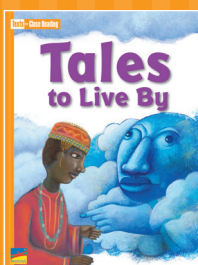
Point of View



Technology and Society



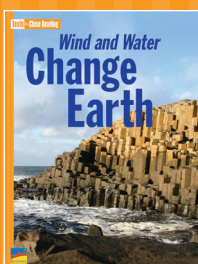
Theme



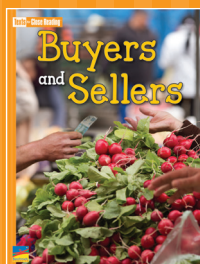
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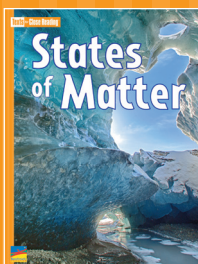
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