

Grade 2 Science

Unit 1: Properties of Matter

14 lessons and a unit quiz. Use this pack with the **Properties of Matter Student Reader** (print it, or download it once from the course) to teach the whole unit without the internet.

What is in this pack

- A lesson plan for each chapter: the Big Question, words to know, which pages to read, questions to talk over and the activity pages.
- The unit quiz, ready to print.
- Answers for the teacher at the back: every discussion question and the quiz key.

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Lesson schedule

Two or three lessons a week, about 30 minutes each. Tick each one off as you go.

	Lesson	Reader pages	Activity pages
☐	Getting started: Meet the Big Question	PDF pages 6–9	—
☐	Lesson 1.1: What Is in Our Backpacks?	PDF pages 22–25	AP 1.1.1
☐	Lesson 1.2: Matter Takes Up Space	PDF pages 10–21	AP 1.2.1
☐	Lesson 1.3: How Do We Describe Things?	—	AP 1.3.1
☐	Lesson 1.4: Temperature and Matter	—	AP 1.4.1
☐	Lesson 1.5: Lesson 1 Roundup: Sorting and Grouping Matter	—	AP 1.5.1
☐	Lesson 2.1: A Melty Mess	PDF pages 26–37	AP 2.1.1, AP 2.1.2
☐	Lesson 2.2: Changing the Temperature of Water	—	AP 2.2.1
☐	Lesson 2.3: Lesson 2 Roundup: Investigating Changes to Matter	—	AP 2.3.1, AP 2.3.2
☐	Lesson 3.1: How Materials Hold Water	—	AP 3.1.1
☐	Lesson 3.2: Lesson 3 Roundup: What Properties Make Materials Useful?	—	AP 3.2.1, AP 3.2.2, AP 3.2.3, AP 3.2.4, AP 3.2.5, AP 3.2.6
☐	Lesson 4.1: Pieces and Parts	PDF pages 38–43	AP 4.1.1
☐	Lesson 4.2: What Are the Parts of a Ballpoint Pen?	—	AP 4.2.1, AP 4.2.2
☐	Lesson 4.3: Lesson 4 Roundup: Build It Up, Take It Down	PDF pages 44–54	AP 4.3.1
☐	Unit review and assessment	—	AP UO.1
☐	Words quiz	—	—

Page numbers are the PDF page numbers of the Student Reader file, so they match what your PDF reader shows.

Getting started: Meet the Big Question

THE BIG QUESTION

How are containers matched to the stuff they contain?

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 25–33: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 1: “Where Did the Salt Go?”: PDF pages 6–9. Look at the pictures and maps together.

Talk it over

1. Then she headed outside into the rain. 3 Ask students the following questions:
LITERAL—What do you see on the television in the background?
2. She would check the weather again in a few hours. 4 Ask students the following questions: LITERAL—What kind of container is the salt kept in?
3. INFERENTIAL—Do you think it is a good idea to put the salt into the paper bag?
4. Maya wondered how this could have happened! 5 LITERAL—What happened to the paper bag?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How are containers matched to the stuff they contain?

Lesson 1.1: What Is in Our Backpacks?

THE BIG QUESTION

What Is in Our Backpacks?

Words to know

- **example** — a sample of something that shows what the whole is like
- **waterproof** — describing materials that do not absorb water nor allow it to pass through them

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 34–41: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 4: “You Can Measure Matter”: PDF pages 22–25. Look at the pictures and maps together.

Talk it over

1. Ask students Who has ever used a backpack?
2. Ask students What would happen to my cake if I did that?
3. Ask students What would happen if I poured my juice into the container of fruit instead of keeping it in its own container?
4. Ask students What sort of characteristics should Maya's container have?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: What Is in Our Backpacks?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 1.1.1: Container Scavenger Hunt — Teacher Guide PDF page 203

Lesson 1.2: Matter Takes Up Space

THE BIG QUESTION

What is matter?

Words to know

- **observe** — to watch something and notice details about it (observation, n. the process of noticing details or a specific detail that is noticed)
- **sort** — to separate, arrange, and group items based on their properties or characteristics

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 42–62: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapters 2–3: “What Is Matter?” and “What Are the Different Kinds of Matter?”: PDF pages 10–21. Look at the pictures and maps together.

Talk it over

1. This will eventually lead students to the idea that certain containers are made to hold certain things. • Ask students What types of containers might work best to hold Maya's salt?
2. Ask students What did we learn and notice about containers?
3. Ask students What do containers look like?
4. What is a container that you can carry?
5. Ask students Why are containers important?
6. So are people and clothes. 7 Ask students the following question for each picture: LITERAL—What matter do you see in the picture?
7. INFERENTIAL—Why might it be important to know about matter?
8. What else do you see in the picture that is matter?
9. Do we take up space?
10. However, space can apply to something as simple and small as a container or something as large as the universe. 44 PROPERTIES OF MATTER Ask students What does this mean?
11. Ask students What else is a solid?
12. Ask students What else is a liquid?
13. Ask students Does this mean that air takes up space?
14. Ask students If it takes up space, is air matter, even if you cannot see it?
15. A book is a solid. 11 LITERAL—What do the objects have in common?

16. And the bottom?
17. Ask students the following questions: INFERENTIAL—How do you know that the bubbles have gas in them?
18. Ask students How can knowing about matter help you if you work at a container company?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: What is matter?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 1.2.1: Sort the Matter — Teacher Guide PDF page 204

Lesson 1.3: How Do We Describe Things?

THE BIG QUESTION

How Do We Describe Things?

Words to know

- **describe** — to express details about something

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 63–74: the steps, materials and timing for this lesson.

Talk it over

1. Ask students What are some types of cookies that you know?
2. Have connecting cubes or base-ten blocks for students to use, if needed. (See Know the Standards 8 and 9.) Ask students What would happen if I just poured all the milk onto the scale and it wasn't in the cup?
3. Ask students Would I be able to get a correct measurement of the milk?
4. Ask students How can knowing about the properties of solids, liquids, or gases help you if you work at a container company?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How Do We Describe Things?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 1.3.1: Properties of Matter Lab Sheet — Teacher Guide PDF pages 205–207

Lesson 1.4: Temperature and Matter

THE BIG QUESTION

How do temperature changes affect matter?

Words to know

- **change** — to become different; to make something different (n. a difference from something's former condition)
- **volume** — how much space matter takes up

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 75–85: the steps, materials and timing for this lesson.

Talk it over

1. Does it keep its shape?
2. Ask students Can anyone guess what can change the properties of matter?
3. Ask students Do you think chocolate chips are solids, liquids, or gases?
4. Ask students What do you notice about the chocolate chips?
5. Or did they change?
6. Ask students What did they change into?
7. Ask students What changed them?
8. Would it make the chocolate hard again?
9. LITERAL—What are the people in the picture using to measure the dog?
10. A scale tells you how light or heavy something is. 19 LITERAL—Can you measure a carrot with a ruler?
11. You can buy milk in pints, quarts, half-gallons, and gallons. 20 LITERAL—Can you use a container to measure a liquid?
12. Which is the smallest?
13. Why or why not?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do temperature changes affect matter?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 1.4.1: Venn Diagram — Teacher Guide PDF page 208

Lesson 1.5: Lesson 1 Roundup: Sorting and Grouping Matter

THE BIG QUESTION

How do we group different materials?

Words to know

- **classify** — to arrange things in a group based on shared qualities
- **investigate** — to observe and study something to collect information
- **observe** — to watch something and notice details about it (observation, n. the process of noticing details or a specific detail that is noticed)

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 86–92: the steps, materials and timing for this lesson.

Talk it over

1. Ask students What kinds of properties did we talk about?
2. Ask students How can knowing about the properties of materials help you make good containers?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do we group different materials?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 1.5.1: Investigate It — Teacher Guide PDF pages 209–213

Lesson 2.1: A Melty Mess

THE BIG QUESTION

How does heating and cooling matter affect how things are stored in containers?

Words to know

- **compare** — to examine characteristics of two things for similarities, particularly looking for similarities
- **container** — an object used to hold other objects or materials
- **useful** — describing something that can be used for a specific purpose

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 93–106: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapters 5–6: “Matter Has Properties” and “Heating and Cooling Matter”: PDF pages 26–37. Look at the pictures and maps together.

Talk it over

1. Temperature is an important factor when it comes to designing containers that hold temperature-sensitive materials. • Ask students What observable properties changed with Maya's salt?
2. LITERAL—What are some ways you can describe this snowman?
3. LESSON 2.1 | A MELTY MESS 95 Ask students the following questions: LITERAL—Can you measure the temperature of the snowman?
4. LITERAL—How is measuring with a thermometer a way to tell about the snowman's properties?
5. What is the purpose of the windows being made of glass?
6. Ask students How did the ice cream change?
7. Ask students Why did this change take place?
8. Ask students Does this mean that melted ice cream can be saved?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How does heating and cooling matter affect how things are stored in containers?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 2.1.1: Ice Cream Portrait — Teacher Guide PDF page 214
- Activity Page 2.1.2: Temperature Testers — Teacher Guide PDF page 215

Lesson 2.2: Changing the Temperature of Water

THE BIG QUESTION

How does temperature affect the three states of water?

Words to know

- **observe** — to watch something and notice details about it (observation, n. the process of noticing details or a specific detail that is noticed)

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 107–112: the steps, materials and timing for this lesson.

Talk it over

1. chalk or dry-erase markers (1 per group) Activity Page How Hot or Cold?
2. Have students stay in their pairs, and distribute How Hot or Cold?
3. Ask students How can we tell the temperature of water?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How does temperature affect the three states of water?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 2.2.1: How Hot or Cold? — Teacher Guide PDF page 216

Lesson 2.3: Lesson 2 Roundup: Investigating Changes to Matter

THE BIG QUESTION

Can changes to matter caused by heating or cooling be reversed?

Words to know

- **change** — to become different; to make something different (n. a difference from something's former condition)
- **cooling** — the process of lowering temperature
- **description** — an expression of the details that characterize a thing
- **heating** — the the process of raising or rising temperature

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 113–129: the steps, materials and timing for this lesson.

Talk it over

1. internet access and the means to project images/video for whole-class viewing
Student Book, Chapter 6 “Heating and Cooling Matter” Ch. 6 Activity Pages Activity Pages What Does the Heat Do?
2. Distribute What Does the Heat Do?
3. Then turn students' attention to the predictions they made earlier. (See Know the Standards 2.) Ask students Did the material change the way you thought it would?
4. It snows when the temperature of the air is cold enough. 26 LITERAL—Which materials are solid?
5. What will happen to the icebergs if they become warmer?
6. How is heat making a change?
7. They form when cold air changes the liquid water that drips from the roof. 30 LITERAL—What makes the water go from liquid to solid, like ice cubes and icicles?
8. Ask students, Do we want materials like ice cream to change because of the heat?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: Can changes to matter caused by heating or cooling be reversed?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 2.3.1: What Does the Heat Do? — Teacher Guide PDF page 217
- Activity Page 2.3.2: Cool It Down — Teacher Guide PDF page 218

Lesson 3.1: How Materials Hold Water

THE BIG QUESTION

How Materials Hold Water 126 3.2 What Properties Make Materials Useful?

Words to know

- **absorbency** — the property of being able to absorb a gas or liquid
- **absorption** — the process of one thing taking in another substance, typically a liquid
- **gas** — matter that does not have a shape or a fixed volume and that spreads out to take the shape of whatever container it is in
- **liquid** — matter that does not have its own shape but retains its volume
- **solid** — matter that keeps its own size and shape without a container

Teacher’s lesson plan

Follow the Teacher Guide, PDF pages 130–141: the steps, materials and timing for this lesson.

Talk it over

1. Ask students Do you think the rock was able to help me clean up the spilled milk?
2. Ask students How do you know?
3. Make sure all students agree. (See Know the Standards 3.) • Circle back to the scenario about the spilled cereal milk. (See Know the Standards 5.) Ask students So which material should I have used to clean up the spilled milk?
4. LESSON 3.1 | HOW MATERIALS HOLD WATER 133 LITERAL—What does it mean if a change is reversible?
5. They are kept in the container. • Ask students What properties does the glass jar have that make it a good choice to use as a snow globe?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How Materials Hold Water
. . . . 126 3.2 What Properties Make Materials Useful?
- Use one of today’s words in a sentence of your own.

Activity pages

- Activity Page 3.1.1: Race to Move Water — Teacher Guide PDF page 219

Lesson 3.2: Lesson 3 Roundup: What Properties Make Materials Useful?

THE BIG QUESTION

How can we tell which materials have the properties that make them useful for certain jobs?

Words to know

- **data** — information that is observed or measured and recorded
- **evidence** — a detail that supports a claim or helps prove an idea is true
- **thermal conductivity** — a material's ability to conduct heat

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 142-157: the steps, materials and timing for this lesson.

Talk it over

1. 140 Distribute How Porous Am I?
2. Distribute Can It Crack the Candy?
3. Distribute How Strong Am I?
4. Distribute Which Texture Is Best?
5. How do you know?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How can we tell which materials have the properties that make them useful for certain jobs?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 3.2.1: How Porous Am I? — Teacher Guide PDF page 220
- Activity Page 3.2.2: 100-Gram Challenge — Teacher Guide PDF page 221
- Activity Page 3.2.3: Can It Crack the Candy? — Teacher Guide PDF page 222
- Activity Page 3.2.4: How Strong Am I? — Teacher Guide PDF page 223
- Activity Page 3.2.5: Which Texture Is Best? — Teacher Guide PDF page 224
- Activity Page 3.2.6: Let's Heat It Up! — Teacher Guide PDF page 225

Lesson 4.1: Pieces and Parts

THE BIG QUESTION

What are the pieces and parts that make up objects?

Words to know

- **component** — a part that combines with other parts to make up a larger whole

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 158–165: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 7: “What Can We Make from Matter?”: PDF pages 38–43. Look at the pictures and maps together.

Check for understanding

- Answer the Big Question in a sentence or two: What are the pieces and parts that make up objects?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 4.1.1: Pieces and Parts Scavenger Hunt — Teacher Guide PDF page 226

Lesson 4.2: What Are the Parts of a Ballpoint Pen?

THE BIG QUESTION

What Are the Parts of a Ballpoint Pen?

Words to know

- **component** — a part that combines with other parts to make up a larger whole

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 166–179: the steps, materials and timing for this lesson.

Talk it over

1. How does the shape help the pen do its job?
2. What is the longest part of the pen made of?
3. Would it still work if the clip were made of something soft, like cotton?
4. Which part of the pen helps the button pop back up?
5. Or something absorbent?
6. LITERAL—What do these pictures have in common?
7. EVALUATIVE—Why do you think it is important for forks to be made of metal and not cotton?
8. The ball works great for kickball! 35 LITERAL—Why is rubber a good material for the ball?
9. Why do you think this is?
10. They help the object work the way it is supposed to. leather metal rubber metal and plastic air 37 INFERENTIAL—What would happen if the tires were square instead of round?
11. This allows our skin to stretch and grow. (See Know the Standards 8.) Ask students What would happen if our skin were made up of hard bone?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: What Are the Parts of a Ballpoint Pen?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 4.2.1: Ballpoint Pen Diagram — Teacher Guide PDF pages 227–228
- Activity Page 4.2.2: Parts That Make Up a House — Teacher Guide PDF page 229

Lesson 4.3: Lesson 4 Roundup: Build It Up, Take It Down

THE BIG QUESTION

How can we make new objects out of the pieces from something else?

Words to know

- **component** — a part that combines with other parts to make up a larger whole

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 180–200: the steps, materials and timing for this lesson.

Read

Read Student Book, Chapter 8: “Science in Action”: PDF pages 44–54. Look at the pictures and maps together.

Talk it over

1. glue Activity Page What Can We Make?
2. Distribute What Can We Make?
3. LITERAL—What happens to salt when it gets wet?
4. UNIT SUPPLEMENT | SCIENCE IN ACTION: MEETING A MATERIALS SCIENTIST 189
LITERAL—What happens to plastic after it is thrown away?
5. LITERAL—How did Mendeleev display the elements?
6. INFERENTIAL—Why do you think Mendeleev grouped types of matter together according to their properties on his periodic table?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How can we make new objects out of the pieces from something else?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 4.3.1: What Can We Make? — Teacher Guide PDF page 230

UNIT REVIEW

Unit review and assessment

- Activity page answer key (for the teacher): Teacher Guide PDF pages 231-233
- Activity Page UO.1 — Teacher Guide PDF page 202

WORDS QUIZ

Properties of Matter

Name: _____ Date: _____

Circle the letter of the best answer.

1. Which word means “to observe and study something to collect information”?
 - a) absorbent
 - b) investigate
 - c) thermometer
 - d) prediction
2. Which word means “matter that does not have its own shape but retains its volume”?
 - a) change
 - b) liquid
 - c) waterproof
 - d) prediction
3. Which word means “an instrument that measures temperature”?
 - a) matter
 - b) waterproof
 - c) description
 - d) thermometer
4. Which word means “matter that does not have a shape or a fixed volume and that spreads out to take the shape of whatever container it is in”?
 - a) gas
 - b) absorption
 - c) liquid
 - d) thermal conductivity
5. Which word means “measure of how hot or cold something is”?
 - a) pieces and parts
 - b) temperature
 - c) container
 - d) waterproof
6. Which word means “having very tiny holes or spaces that liquid and air can pass into or through”?
 - a) observe
 - b) change
 - c) porous
 - d) useful

- 7.** Which word means “matter that keeps its own size and shape without a container”?
- a) data
 - b) investigate
 - c) solid
 - d) hardness
- 8.** Which word means “a sample of something that shows what the whole is like”?
- a) investigate
 - b) materials
 - c) volume
 - d) example
- 9.** Which word means “to arrange things in a group based on shared qualities”?
- a) investigate
 - b) absorb
 - c) classify
 - d) container
- 10.** Which word means “describing something that can be used for a specific purpose”?
- a) compare
 - b) useful
 - c) description
 - d) strength
- 11.** Which word means “the condition of being strong and able to withstand a great amount of force”?
- a) example
 - b) strength
 - c) compare
 - d) change
- 12.** Which word means “a part that combines with other parts to make up a larger whole”?
- a) porous
 - b) heating
 - c) component
 - d) example

Answers

Getting started: Meet the Big Question

1. **Then she headed outside into the rain. 3 Ask students the following questions: LITERAL—What do you see on the television in the background?**
A weather report SUPPORT—Point out that the weather report on the television shows cold temperatures and wintry precipitation (rain or snow). INFERENTIAL—Why might someone want to know what the weather will be?
2. **She would check the weather again in a few hours. 4 Ask students the following questions: LITERAL—What kind of container is the salt kept in?**
A container that is big; a container that is plastic; a container that is deep
LITERAL—What kind of container is Maya putting the salt into?
3. **INFERENTIAL—Do you think it is a good idea to put the salt into the paper bag?**
Yes, because it will hold the salt; no, because the salt came from a different kind of container
4. **Maya wondered how this could have happened! 5 LITERAL—What happened to the paper bag?**
It got wet. It got ruined. It turned to mush. SUPPORT—Point out that the water from the rain soaked through the paper bag. That got all the salt wet. When salt mixes with water, the water dissolves the salt. This is the reason there is not very much salt left.
LITERAL—What made the bag turn to mush?

Lesson 1.1: What Is in Our Backpacks?

1. **Ask students Who has ever used a backpack?**
All, or nearly all, students should raise their hands.
2. **Ask students What would happen to my cake if I did that?**
It might get smashed. It could start to smell like the sandwich.
3. **Ask students What would happen if I poured my juice into the container of fruit instead of keeping it in its own container?**
All of the fruit would get wet. You wouldn't really be able to drink it.
4. **Ask students What sort of characteristics should Maya's container have?**
Maya's container should keep water from mixing with the salt.

Lesson 1.2: Matter Takes Up Space

1. **This will eventually lead students to the idea that certain containers are made to hold certain things. • Ask students What types of containers might work best to hold Maya's salt?**
Containers that repel water might work best.
2. **Ask students What did we learn and notice about containers?**
Containers hold stuff.

3. **Ask students What do containers look like?**
They can look different or the same. They can be big or small.
4. **What is a container that you can carry?**
Yes, our backpacks (or lunch boxes)
5. **Ask students Why are containers important?**
They keep our things from spilling out. They help us store things.
6. **So are people and clothes. 7 Ask students the following question for each picture: LITERAL—What matter do you see in the picture?**
Hands, sand, a tree, grass, a feather, rocks/boulders, people
7. **INFERENTIAL—Why might it be important to know about matter?**
Someone might want to know how much space something takes up.
8. **What else do you see in the picture that is matter?**
Person, snow, trees, road, coat
9. **Do we take up space?**
Accept all answers.
10. **However, space can apply to something as simple and small as a container or something as large as the universe. 44 PROPERTIES OF MATTER Ask students What does this mean?**
People take up space. People are matter.
11. **Ask students What else is a solid?**
Basketballs, notebooks, lunch boxes, tables
12. **Ask students What else is a liquid?**
Milk, juice, rain, swimming pool water, oceans, lakes Differentiation
13. **Ask students Does this mean that air takes up space?**
Yes
14. **Ask students If it takes up space, is air matter, even if you cannot see it?**
Yes
15. **A book is a solid. 11 LITERAL—What do the objects have in common?**
They all keep their shape. They are all hard. CORE VOCABULARY—Explain that a solid is matter that has its own shape. Its shape stays the same when it is inside a container or outside a container. SUPPORT—Demonstrate for students the idea of a solid object keeping its shape. Use any object on your desk as an example. Place that object inside a container, and show students how the object still looks the same and hasn't changed its shape.
16. **And the bottom?**
Red, rubbery, round, spongy
17. **Ask students the following questions: INFERENTIAL—How do you know that the bubbles have gas in them?**
We see the shape of the bubbles. They must be full of something. INFERENTIAL—How do know that gas is coming out of the volcano?

18. **Ask students How can knowing about matter help you if you work at a container company?**

I can figure out what types of containers to put things in. Some containers will not hold in liquid or gas.

Lesson 1.3: How Do We Describe Things?

1. **Ask students What are some types of cookies that you know?**

Chocolate chip, oatmeal, peanut butter, and so on

2. **Have connecting cubes or base-ten blocks for students to use, if needed. (See Know the Standards 8 and 9.) Ask students What would happen if I just poured all the milk onto the scale and it wasn't in the cup?**

The milk would spill everywhere.

3. **Ask students Would I be able to get a correct measurement of the milk?**
No

4. **Ask students How can knowing about the properties of solids, liquids, or gases help you if you work at a container company?**

We can make containers that work well for different kinds of matter based on their properties.

Lesson 1.4: Temperature and Matter

1. **Does it keep its shape?**

The flour moves around in the container. It can move up the sides or down into the middle. It keeps its shape. 70

2. **Ask students Can anyone guess what can change the properties of matter?**
Temperature Differentiation

3. **Ask students Do you think chocolate chips are solids, liquids, or gases?**
Solids

4. **Ask students What do you notice about the chocolate chips?**
They are melting.

5. **Or did they change?**
They changed.

6. **Ask students What did they change into?**
A liquid

7. **Ask students What changed them?**

The heat; the hot plate; the temperature CORE VOCABULARY—Confirm for students that the thing that changed the property of matter was the act of heating it, which increased its temperature. Explain that the heat from the hot plate melted the chocolate. This turned the chocolate from a solid to a liquid.

8. **Would it make the chocolate hard again?**
Yes

9. **LITERAL—What are the people in the picture using to measure the dog?**
Measuring tape **INFERENTIAL—Why can't they use a ruler to measure it?**

10. **A scale tells you how light or heavy something is. 19 LITERAL—Can you measure a carrot with a ruler?**

Yes, it is a solid that holds its shape. INFERENTIAL—Why would someone want to measure an object's length or width?

11. **You can buy milk in pints, quarts, half-gallons, and gallons. 20 LITERAL—Can you use a container to measure a liquid?**

Yes Explain that volume is how much space matter takes up. Explain that there are many ways to describe volume of liquids. These include words like pint and gallon. For instance, a pint holds a smaller volume than a gallon. A milliliter is a smaller volume than a liter. SUPPORT—Show students real-life examples of different-sized containers. The containers can be full or empty, but read the volumes so that students can visualize the difference between a pint, quart, half-gallon, and full gallon.

12. **Which is the smallest?**

The gallon, which is the plastic jug, has the largest volume. The pint, which is the cardboard carton, has the smallest volume. INFERENTIAL—Why might someone want to know the volume of a liquid?

13. **Why or why not?**

No, because the gas would escape from the container LESSON 1.4 | TEMPERATURE AND MATTER

Lesson 1.5: Lesson 1 Roundup: Sorting and Grouping Matter

1. **Ask students What kinds of properties did we talk about?**

Hardness, texture, shape, size, color, and changes or no changes when put into containers

2. **Ask students How can knowing about the properties of materials help you make good containers?**

Containers must be able to hold materials. Materials have different properties. Containers must be well suited for those properties.

Lesson 2.1: A Melty Mess

1. **Temperature is an important factor when it comes to designing containers that hold temperature-sensitive materials. • Ask students What observable properties changed with Maya's salt?**

The bag got wet and turned soft. The salt dissolved with the water into a solution.

2. **LITERAL—What are some ways you can describe this snowman?**

The snowman is cold.

3. **LESSON 2.1 | A MELTY MESS 95 Ask students the following questions: LITERAL—Can you measure the temperature of the snowman?**

Yes LITERAL—What can measuring the temperature of the snowman tell you?

4. **LITERAL—How is measuring with a thermometer a way to tell about the snowman's properties?**

Measuring with a thermometer will tell the temperature of the snowman. Page 23

5. **What is the purpose of the windows being made of glass?**
It lets us see out of the window. LITERAL—This glue is sticky. Why is that important?
6. **Ask students How did the ice cream change?**
It became hard; it froze; it became colder. DCI PS1.B CCC 2
7. **Ask students Why did this change take place?**
It was put in a place with a very cold temperature.
8. **Ask students Does this mean that melted ice cream can be saved?**
Yes

Lesson 2.2: Changing the Temperature of Water

1. **chalk or dry-erase markers (1 per group) Activity Page How Hot or Cold?**
AP 2.2.1
2. **Have students stay in their pairs, and distribute How Hot or Cold?**
AP 2.2.1
3. **Ask students How can we tell the temperature of water?**
Measure it with a thermometer. SUPPORT—If necessary, remind students that water is matter, and that it can exist as a solid, liquid, or gas.

Lesson 2.3: Lesson 2 Roundup: Investigating Changes to Matter

1. **internet access and the means to project images/video for whole-class viewing Student Book, Chapter 6 “Heating and Cooling Matter” Ch. 6 Activity Pages Activity Pages What Does the Heat Do?**
AP 2.3.1
2. **Distribute What Does the Heat Do?**
AP 2.3.1
3. **Then turn students’ attention to the predictions they made earlier. (See Know the Standards 2.) Ask students Did the material change the way you thought it would?**
Yes/no
4. **It snows when the temperature of the air is cold enough. 26 LITERAL—Which materials are solid?**
The tree, the car, the snow, the street, and the houses are solids. CORE VOCABULARY—Explain that a temperature is a measure of heat. SUPPORT—Clarify for students that temperature is not a measurement that characterizes only how warm or hot something is. Temperature also tells how cold something is, like water or the air outside.
5. **What will happen to the icebergs if they become warmer?**
The icebergs will melt; they will turn back to liquid water.
6. **How is heat making a change?**
Heat is warming up the water. The water is turning into water vapor. It is going from a liquid to a gas. Page 29

7. **They form when cold air changes the liquid water that drips from the roof. 30 LITERAL—What makes the water go from liquid to solid, like ice cubes and icicles?**

Cooling the water EVALUATIVE—Where else have you seen examples of this happening?

8. **Ask students, Do we want materials like ice cream to change because of the heat?**

No 122

Lesson 3.1: How Materials Hold Water

1. **Ask students Do you think the rock was able to help me clean up the spilled milk?**

No

2. **Ask students How do you know?**

The milk moves in the bowl away from the rock. The rock cannot soak up the milk.

3. **Make sure all students agree. (See Know the Standards 3.) • Circle back to the scenario about the spilled cereal milk. (See Know the Standards 5.) Ask students So which material should I have used to clean up the spilled milk?**

Paper towels, sponges, washcloths

4. **LESSON 3.1 | HOW MATERIALS HOLD WATER 133 LITERAL—What does it mean if a change is reversible?**

It means something can change back to how it was before. EVALUATIVE—What type of container do you think you should use for water in solid and liquid states?

5. **They are kept in the container. • Ask students What properties does the glass jar have that make it a good choice to use as a snow globe?**

The jar is hard; the jar is see-through; the jar does not let the liquid leak out.

Lesson 3.2: Lesson 3 Roundup: What Properties Make Materials Useful?

1. **140 Distribute How Porous Am I?**

AP 3.2.1

2. **Distribute Can It Crack the Candy?**

AP 3.2.3

3. **Distribute How Strong Am I?**

AP 3.2.4

4. **Distribute Which Texture Is Best?**

AP 3.2.5

5. **How do you know?**

The rock was the hardest. We know because it could crack the hard candy.

Lesson 4.2: What Are the Parts of a Ballpoint Pen?

1. **How does the shape help the pen do its job?**

The pen is a rounded shape. This shape makes it easy for people to hold the pen. (If there is a grip:) Where do you grip the pen? What is that area made of?

2. **What is the longest part of the pen made of?**
The longest part is plastic.
3. **Would it still work if the clip were made of something soft, like cotton?**
The clip is metal. It lets us connect the pen to our binder.
4. **Which part of the pen helps the button pop back up?**
Spring What is the spring made of?
5. **Or something absorbent?**
The ink would leak out of something porous. The ink would be soaked up by something absorbent. What shape is the ball part of the pen? Why does this property help the pen work?
6. **LITERAL—What do these pictures have in common?**
They all show objects that are useful.
7. **EVALUATIVE—Why do you think it is important for forks to be made of metal and not cotton?**
Metal is strong. Metal is hard. Metal is not porous. Metal does not absorb liquid. A cotton fork would absorb the liquid in food. It is not hard, so it would not hold a stiff shape. 166
8. **The ball works great for kickball! 35 LITERAL—Why is rubber a good material for the ball?**
It makes the ball kickable. INFERENTIAL—What do you think would happen if someone wanted to play kickball with a glass ball? Or a ball made of paper?
9. **Why do you think this is?**
You can see through glass. Glass is hard. Glass is strong. INFERENTIAL—Why do you think someone would want to see into a fish tank?
10. **They help the object work the way it is supposed to. leather metal rubber metal and plastic air 37 INFERENTIAL—What would happen if the tires were square instead of round?**
The tires would not be able to roll on the ground to move the tricycle. Square tires wouldn't go anywhere. Shape is an important property.
11. **This allows our skin to stretch and grow. (See Know the Standards 8.) Ask students What would happen if our skin were made up of hard bone?**
It wouldn't be able to stretch and grow. It would be too hard. Then ask students What would happen if our bones were made of skin?

Lesson 4.3: Lesson 4 Roundup: Build It Up, Take It Down

1. **glue Activity Page What Can We Make?**
AP 4.3.1
2. **Distribute What Can We Make?**
AP 4.3.1
3. **LITERAL—What happens to salt when it gets wet?**
It breaks down into very small bits.

4. **UNIT SUPPLEMENT | SCIENCE IN ACTION: MEETING A MATERIALS SCIENTIST**
189 LITERAL—What happens to plastic after it is thrown away?
It stays in a landfill for a very long time. LITERAL—What does Dr. Zhou want to design?
5. **LITERAL—How did Mendeleev display the elements?**
He showed them in a table of rows (side to side) and columns (top to bottom).
INFERENTIAL—Why can it be helpful to organize a long list of things in a table like this?
6. **INFERENTIAL—Why do you think Mendeleev grouped types of matter together according to their properties on his periodic table?**
Grouping things can help you study them and how they are alike.

Unit quiz key

1. b 2. b 3. d 4. a 5. b 6. c 7. c 8. d 9. c 10. b 11. b 12. c