

Grade 5 Science

Unit 1: Investigating Matter

13 lessons and a unit quiz. Use this pack with the **Investigating 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
☐	Lesson 1: Introduction to Matter	—	AP 1.1
☐	Lesson 2: Properties of Matter	PDF pages 7–12	AP 2.1
☐	Lesson 3: Applying Properties of Matter	PDF pages 13–16	AP 3.1, AP 3.2, AP 3.3
☐	Lesson 4: Particles of Matter	—	AP 4.1, AP 4.2
☐	Lesson 5: Too Small to Be Seen	PDF pages 17–24	AP 5.1
☐	Lesson 6: Ice to Water and Back	—	AP 6.1, AP 6.2
☐	Lesson 7: How Matter Changes	PDF pages 25–32	AP 7.1
☐	Lesson 8: Changing the Type of Matter	—	AP 8.1
☐	Lesson 9: Matter Can Change Chemically	PDF pages 33–38	AP 9.1, AP 9.2, AP 9.3
☐	Lesson 10: Investigating Chemical Change	—	AP 10.1
☐	Lesson 11: The Language of Chemistry	PDF pages 39–44	AP 11.1
☐	Lesson 12: Comparing Models of Different Molecules	—	AP 12.1
☐	Lesson 13: Matter Review Game	—	—
☐	Unit review and assessment	—	AP UR.1, AP UR.2, AP UR.3
☐	Words quiz	—	—

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

Lesson 1: Introduction to Matter

THE BIG QUESTION

What is matter?

Words to know

- **matter** — anything that has mass and takes up space
- **property** — a quality, trait, or detail used to describe something
- **evidence** — information that helps answer a question, support a claim, or solve a problem
- **mass** — the amount of matter in an object
- **measure** — to compare an amount of something to a known quantity
- **observe** — to inspect or notice something
- **volume** — the amount of space an object occupies
- **weight** — the pull of gravity on an object's mass

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 26–33: the steps, materials and timing for this lesson.

Talk it over

1. Which kind of matter do you think would provide the best building material for a bridge? Why?
2. Which one do you think would provide the best building material for a tall office building? Why?
3. Which one do you think would provide the best building material for a canoe? Why?

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 1.1: Observing Matter — Teacher Guide PDF page 117

Lesson 2: Properties of Matter

THE BIG QUESTION

What properties can I use to describe matter?

Words to know

- **matter** — anything that has mass and takes up space
- **property** — a quality, trait, or detail used to describe something
- **evidence** — information that helps answer a question, support a claim, or solve a problem
- **mass** — the amount of matter in an object
- **measure** — to compare an amount of something to a known quantity
- **observe** — to inspect or notice something
- **volume** — the amount of space an object occupies
- **weight** — the pull of gravity on an object's mass

Teacher's lesson plan

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

Read

Read Student Reader, Chapter 1: “Properties of Matter”: PDF pages 7–12. Look at the pictures and maps together.

Talk it over

1. medium-sized container Activity Page What's the Matter?
2. What happens to the rock when it is placed in the water?
3. What happens to the balloon when it is placed in the water?
4. What other objects do you know that float? That sink?
5. What is buoyancy?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: What properties can I use to describe matter?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 2.1: What's the Matter? — Teacher Guide PDF page 118

Lesson 3: Applying Properties of Matter

THE BIG QUESTION

How can I use properties as evidence to identify matter?

Words to know

- **solution** — a way to solve a problem

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 42–53: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 2: “Applying Properties of Matter”: PDF pages 13–16. Look at the pictures and maps together.

Talk it over

1. How were the scratch marks different in the demonstration?
2. What evidence does this provide about the materials?
3. What happened at Station 1 when you placed the magnet over the different wires?
4. What happened at Station 2 when you placed the conductivity tester in the cup with Powder 2?
5. What happened at Station 2 when you placed the conductivity tester in the cup with Powder 3?
6. What can we predict will happen if our scientific idea that there is a force that pulls things down is accurate?
7. What are the three states of matter?
8. How can these states help identify matter?
9. Can matter change state?
10. Which state of matter is your bedroom wall?
11. Which state of matter should the solution be in when it enters the hole?
12. What state of matter should the solution become after it is placed in the hole?
13. How did knowing the properties of matter help solve the problem of the hole in the wall?
14. What are other ways that engineers can use the properties of matter to solve problems?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How can I use properties as evidence to identify matter?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 3.1: Identifying Matter: Investigation Guide — Teacher Guide PDF page 119
- Activity Page 3.2: Identifying Matter: Conclusions from Evidence — Teacher Guide PDF pages 122–123
- Activity Page 3.3: Identifying Matter: Investigation Wrap-Up—Solving a Problem — Teacher Guide PDF page 124

Lesson 4: Particles of Matter

THE BIG QUESTION

What evidence suggests that matter is made of smaller particles?

Words to know

- **matter** — anything that has mass and takes up space
- **particles** — tiny pieces of matter that are too small to be seen
- **expand** — to grow bigger
- **dissolve** — to separate and spread out particles of matter into another substance
- **evaporate** — to change form from liquid to gas

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 55–63: the steps, materials and timing for this lesson.

Talk it over

1. How would you describe the sugar cubes before they went into the water?
2. What happened to the sugar cubes after they went into the water?
3. Where did the sugar go? Is there still sugar in the water? How do you know?
4. What is one way that you could prove that there is still sugar in the water?
5. Is this still sugar? How do you know?
6. Is this sugar still made up of the same things as the cube?
7. If someone didn't see me crush these cubes, how could you prove (or disprove) that this is still sugar?
8. What happened to the sugar in the water?
9. Did the sugar disappear faster when it was in a cube or when it was crushed into granules? How could we investigate this to prove your idea?
10. What happened to the ice cubes on the hot plate?
11. What is different about the ice cubes after they have melted?
12. Were the ice cubes water before they melted? How could you prove this to be true?
13. How could you investigate this phenomenon to explain your answer?
14. What happened to the water in the heated beaker?
15. What happens to the water when it evaporates?
16. What is different about the water after it evaporates?
17. When the sugar was mixed with the water, did the sugar disappear? Was it still part of the water?

18. Could you see the sugar before it was added to the water?
19. Could you see the sugar after it mixed into the water?
20. How do you know the sugar was still in the water?
21. Why can't you see the sugar in the water?
22. Considering all three demonstrations, what do your observations suggest to you about the nature of matter?
23. How does the water change?
24. Does the water still have the same particles?
25. How do you know that particles are in the water?
26. What happens to the particles when the water evaporates?
27. How is this example similar to the demonstration at the beginning of class?
28. What is common to all matter?
29. If a particle is too small to be seen, does it mean it isn't there?
30. Do particles take up space? What evidence can you use to support your answer?

Answers are at the back of this pack.

Check for understanding

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

Activity pages

- Activity Page 4.1: Observation Sheet — Teacher Guide PDF page 125
- Activity Page 4.2: Check — Teacher Guide PDF page 126

Lesson 5: Too Small to Be Seen

THE BIG QUESTION

How do models help to explain that matter is made of small particles?

Words to know

- **evidence** — information that helps answer a question, support a claim, or solve a problem
- **models** — pictures, symbols, or physical examples that help explain something that we cannot directly observe
- **particles** — tiny pieces of matter that are too small to be seen
- **expand** — to grow bigger
- **dissolve** — to separate and spread out particles of matter into another substance
- **evaporate** — to change form from liquid to gas

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 64–70: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 3: “Too Small to Be Seen”: PDF pages 17–24. Look at the pictures and maps together.

Talk it over

1. What is making the second bag inflate?
2. What evidence can you point out that proves matter has moved from one place to another?
3. What happens to the water as it heats up?
4. What effect does this have on the matter in the beaker?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How do models help to explain that matter is made of small particles?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 5.1: Balloon Model — Teacher Guide PDF page 127

Lesson 6: Ice to Water and Back

THE BIG QUESTION

How can one type of matter change?

Words to know

- **matter** — anything that has mass and takes up space
- **evidence** — information that helps answer a question, support a claim, or solve a problem
- **physical change** — a change that occurs when matter changes form (shape, size) but no new type of matter is formed
- **states of matter** — the different physical forms of matter
- **gas** — matter with indefinite volume and shape, in which the particles move around freely and expand to fill any container
- **liquid** — matter with definite volume but indefinite shape, in which the particles move around each other freely but do not expand to fill any container
- **solid** — matter with definite shape and volume, in which the particles are rigidly arranged in place
- **conserve** — to maintain a constant quantity
- **phase** — the state of matter

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 72-77: the steps, materials and timing for this lesson.

Talk it over

1. What was the purpose of this investigation?
2. What happened to the water in terms of states of matter on Day 1?
3. What happened to the weight of the water on Day 1?
4. What happened to the matter on Day 2?
5. What happened to the weight of the matter on Day 2?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: How can one type of matter change?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 6.1: Ice and Water Investigation (Day 1) — Teacher Guide PDF pages 128-129

- Activity Page 6.2: Ice and Water Investigation (Day 2) — Teacher Guide PDF pages 130–132

Lesson 7: How Matter Changes

THE BIG QUESTION

Does the amount of matter change during a physical change?

Words to know

- **physical change** — a change that occurs when matter changes form (shape, size) but no new type of matter is formed
- **states of matter** — the different physical forms of matter
- **gas** — matter with indefinite volume and shape, in which the particles move around freely and expand to fill any container
- **liquid** — matter with definite volume but indefinite shape, in which the particles move around each other freely but do not expand to fill any container
- **solid** — matter with definite shape and volume, in which the particles are rigidly arranged in place
- **condense** — to change state from gas to liquid
- **conserve** — to maintain a constant quantity

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 78–81: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 4: “How Matter Changes”: PDF pages 25–32. Look at the pictures and maps together.

Check for understanding

- Answer the Big Question in a sentence or two: Does the amount of matter change during a physical change?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 7.1: Matter Conservation — Teacher Guide PDF pages 133–134

Lesson 8: Changing the Type of Matter

THE BIG QUESTION

How can combining matter form a new substance?

Words to know

- **matter** — anything that has mass and takes up space
- **data** — recordable details or measurements design process n. a plan that is used to find and develop solutions to a problem
- **chemical change** — the result when two or more types of matter interact to form a new type of matter
- **change** — to become different
- **chemical reaction** — the process of chemical change
- **interact** — to act upon and affect one another
- **investigate** — to examine something in order to learn more about it
- **substance** — a type of matter that is the same throughout

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 83–87: the steps, materials and timing for this lesson.

Check for understanding

- Answer the Big Question in a sentence or two: How can combining matter form a new substance?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 8.1: Chemical Changes Observation Sheet — Teacher Guide PDF pages 135–136

Lesson 9: Matter Can Change Chemically

THE BIG QUESTION

Why do some interactions of matter result in new substances?

Words to know

- **mixture** — a combination of different types of matter that can usually be separated back into its original parts
- **chemical** — a specific type of matter made of particles of the same type
- **chemical change** — the result when two or more types of matter interact to form a new type of matter
- **precipitate** — a solid formed from a chemical change
- **change** — to become different
- **interact** — to act upon and affect one another

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 88–94: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 5: “Matter Can Change Chemically”: PDF pages 33–38. Look at the pictures and maps together.

Talk it over

1. scissors Activity Pages What Kind of Change Will Happen?
2. How do you know?
3. What changes do you observe?
4. Is a new type of matter formed? How do you know?
5. What type of changes have you seen so far with the steel wool?
6. Did this match your predictions, or did something unexpected happen?
7. Do you think new matter was formed by adding the acetic acid to the steel wool? Why or why not?
8. How have the two pieces of steel wool changed?
9. What type of change is this an example of?
10. Was matter gained or lost in the chemical change?
11. How would you describe the properties of this matter before and after it is combined?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: Why do some interactions of matter result in new substances?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 9.1: What Kind of Change Will Happen? — Teacher Guide PDF page 137
- Activity Page 9.2: Chemical Changes Finder — Teacher Guide PDF page 138
- Activity Page 9.3: Check — Teacher Guide PDF page 139

Lesson 10: Investigating Chemical Change

THE BIG QUESTION

Does the amount of matter change during a chemical change?

Words to know

- **mixture** — a combination of different types of matter that can usually be separated back into its original parts
- **chemical** — a specific type of matter made of particles of the same type
- **chemical change** — the result when two or more types of matter interact to form a new type of matter
- **precipitate** — a solid formed from a chemical change
- **change** — to become different
- **interact** — to act upon and affect one another

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 95–98: the steps, materials and timing for this lesson.

Talk it over

1. Last time you mixed baking soda and vinegar, what type of system was that?
2. What made it that type of system?
3. This investigation will use a sealed bag. What type of system does that make?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: Does the amount of matter change during a chemical change?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 10.1: Investigating Chemical Change — Teacher Guide PDF pages 140–142

Lesson 11: The Language of Chemistry

THE BIG QUESTION

What are atoms, elements, and molecules?

Words to know

- **atom** — a small particle of chemical matter
- **chemistry** — the science of what matter is made of and how matter changes
- **element** — a substance made of a single type of atom
- **bond** — a connection that holds atoms together
- **molecule** — a substance made of one or more kinds of atoms joined together by chemical bonds

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 100–105: the steps, materials and timing for this lesson.

Read

Read Student Reader, Chapter 6: “The Language of Chemistry”: PDF pages 39–44. Look at the pictures and maps together.

Talk it over

1. index cards for student vocabulary deck (5 per student) Ch. 6 Activity Page AP 11.1 Activity Page What Is Matter Made Of?
2. As students finish the Core Vocabulary task, collect their completed What Is Matter Made Of?

Answers are at the back of this pack.

Check for understanding

- Answer the Big Question in a sentence or two: What are atoms, elements, and molecules?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 11.1: What Is Matter Made Of? — Teacher Guide PDF page 143

Lesson 12: Comparing Models of Different Molecules

THE BIG QUESTION

How are molecules of different matter similar and different?

Words to know

- **matter** — anything that has mass and takes up space
- **atom** — a small particle of chemical matter
- **element** — a substance made of a single type of atom
- **bond** — a connection that holds atoms together
- **molecule** — a substance made of one or more kinds of atoms joined together by chemical bonds

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 106–108: the steps, materials and timing for this lesson.

Check for understanding

- Answer the Big Question in a sentence or two: How are molecules of different matter similar and different?
- Use one of today's words in a sentence of your own.

Activity pages

- Activity Page 12.1: Comparing Molecules — Teacher Guide PDF pages 144–145

Lesson 13: Matter Review Game

THE BIG QUESTION

What have I learned about matter?

Words to know

- **matter** — anything that has mass and takes up space
- **property** — a quality, trait, or detail used to describe something
- **data** — recordable details or measurements design process n. a plan that is used to find and develop solutions to a problem
- **solution** — a way to solve a problem
- **evidence** — information that helps answer a question, support a claim, or solve a problem
- **models** — pictures, symbols, or physical examples that help explain something that we cannot directly observe
- **particles** — tiny pieces of matter that are too small to be seen
- **expand** — to grow bigger
- **dissolve** — to separate and spread out particles of matter into another substance
- **evaporate** — to change form from liquid to gas
- **physical change** — a change that occurs when matter changes form (shape, size) but no new type of matter is formed
- **states of matter** — the different physical forms of matter
- **gas** — matter with indefinite volume and shape, in which the particles move around freely and expand to fill any container
- **liquid** — matter with definite volume but indefinite shape, in which the particles move around each other freely but do not expand to fill any container
- **solid** — matter with definite shape and volume, in which the particles are rigidly arranged in place
- **condense** — to change state from gas to liquid
- **conserve** — to maintain a constant quantity
- **mixture** — a combination of different types of matter that can usually be separated back into its original parts
- **chemical** — a specific type of matter made of particles of the same type
- **chemical change** — the result when two or more types of matter interact to form a new type of matter
- **precipitate** — a solid formed from a chemical change
- **atom** — a small particle of chemical matter
- **chemistry** — the science of what matter is made of and how matter changes

- **element** — a substance made of a single type of atom
- **bond** — a connection that holds atoms together
- **molecule** — a substance made of one or more kinds of atoms joined together by chemical bonds
- **substance** — a type of matter that is the same throughout

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 109–114: the steps, materials and timing for this lesson.

Check for understanding

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

UNIT REVIEW

Unit review and assessment

- Unit Assessment (print for your student): Teacher Guide PDF pages 150–156
- How to mark it (for the teacher): Teacher Guide PDF pages 161–162
- Activity page answer key (for the teacher): Teacher Guide PDF pages 157–160
- Activity Page UR.1: Matter Review Game — Teacher Guide PDF page 146
- Activity Page UR.2: Matter Vocabulary Crossword Puzzle — Teacher Guide PDF page 147
- Activity Page UR.3: Matter Vocabulary Review — Teacher Guide PDF page 149

WORDS QUIZ

Investigating Matter

Name: _____ Date: _____

Circle the letter of the best answer.

1. Which word means “matter with definite volume but indefinite shape, in which the particles move around each other freely but do not expand to fill any container”?

- a) matter
- b) liquid
- c) evaporate
- d) evidence

2. Which word means “anything that has mass and takes up space”?

- a) matter
- b) physical change
- c) states of matter
- d) liquid

3. Which word means “a small particle of chemical matter”?

- a) molecule
- b) atom
- c) liquid
- d) data

4. Which word means “matter with indefinite volume and shape, in which the particles move around freely and expand to fill any container”?

- a) element
- b) evaporate
- c) gas
- d) chemistry

5. Which word means “to separate and spread out particles of matter into another substance”?

- a) dissolve
- b) data
- c) conserve
- d) property

6. Which word means “recordable details or measurements design process n. a plan that is used to find and develop solutions to a problem”?

- a) mixture
- b) data
- c) molecule
- d) gas

- 7.** Which word means “pictures, symbols, or physical examples that help explain something that we cannot directly observe”?
- a) atom
 - b) solution
 - c) models
 - d) evidence
- 8.** Which word means “a specific type of matter made of particles of the same type”?
- a) gas
 - b) particles
 - c) chemical
 - d) chemical change
- 9.** Which word means “a connection that holds atoms together”?
- a) particles
 - b) dissolve
 - c) bond
 - d) evaporate
- 10.** Which word means “a substance made of a single type of atom”?
- a) states of matter
 - b) chemistry
 - c) solid
 - d) element
- 11.** Which word means “to change state from gas to liquid”?
- a) mixture
 - b) condense
 - c) property
 - d) bond
- 12.** Which word means “matter with definite shape and volume, in which the particles are rigidly arranged in place”?
- a) expand
 - b) solid
 - c) gas
 - d) bond

Answers

Lesson 1: Introduction to Matter

1. **Which kind of matter do you think would provide the best building material for a bridge? Why?**

Possible answer: Concrete would make the best bridge because it is durable and strong.

2. **Which one do you think would provide the best building material for a tall office building? Why?**

Possible answer: Metal such as steel would make the best tall building because it can be formed into beams that can be bolted together in endless combinations.

3. **Which one do you think would provide the best building material for a canoe? Why?**

Possible answer: Wood would make the best canoe because it can be shaped to keep water out and float.

Lesson 2: Properties of Matter

1. **medium-sized container Activity Page What's the Matter?**

AP 2.1

2. **What happens to the rock when it is placed in the water?**

It sinks.

3. **What happens to the balloon when it is placed in the water?**

It floats.

4. **What other objects do you know that float? That sink?**

Sample answers: Ice cubes and ducks float. Coins sink.

5. **What is buoyancy?**

How can you tell whether an object is buoyant?

Lesson 3: Applying Properties of Matter

1. **How were the scratch marks different in the demonstration?**

They were different colors, and some left scratches in the tile.

2. **What evidence does this provide about the materials?**

It provides evidence that they have different hardnesses.

3. **What happened at Station 1 when you placed the magnet over the different wires?**

The magnet attracted the paper clip but not the other wire.

4. **What happened at Station 2 when you placed the conductivity tester in the cup with Powder 2?**

The tester showed that electricity moved through it easily.

5. **What happened at Station 2 when you placed the conductivity tester in the cup with Powder 3?**

The tester showed that electricity did not move through it as easily.

6. **What can we predict will happen if our scientific idea that there is a force that pulls things down is accurate?**

The ball will fall down toward the center of Earth.

7. **What are the three states of matter?**

Solid, liquid, and gas

8. **How can these states help identify matter?**

Some properties of matter—such as hardness, buoyancy, and so on—have to do with their state. Examples might include the fact that ice floats but many other kinds of solids sink in water or that a substance's melting point can be used to help distinguish it from other kinds of matter.

9. **Can matter change state?**

Yes

10. **Which state of matter is your bedroom wall?**

Solid

11. **Which state of matter should the solution be in when it enters the hole?**

The matter is pasty or doughy. It is neither fully liquid nor solid.

12. **What state of matter should the solution become after it is placed in the hole?**

Solid

13. **How did knowing the properties of matter help solve the problem of the hole in the wall?**

Sample answer: It helped identify the right material to fix the hole.

14. **What are other ways that engineers can use the properties of matter to solve problems?**

Whenever devices need to be strong, flexible, lightweight, waterproof, and so on, there are materials that have the right properties to build them that way.

Lesson 4: Particles of Matter

1. **How would you describe the sugar cubes before they went into the water?**

Solid, white, square, dry

2. **What happened to the sugar cubes after they went into the water?**

They sank and began to crumble apart.

3. **Where did the sugar go? Is there still sugar in the water? How do you know?**

The sugar stayed in the water. I could see it gradually dissolve.

4. **What is one way that you could prove that there is still sugar in the water?**

You could evaporate the water and see what is left in the beaker.

5. **Is this still sugar? How do you know?**

Nothing was added to or removed from the “system” inside the bag.

6. **Is this sugar still made up of the same things as the cube?**
Yes
7. **If someone didn't see me crush these cubes, how could you prove (or disprove) that this is still sugar?**
By examining its properties
8. **What happened to the sugar in the water?**
It dissolved, or broke apart into tiny pieces and spread out.
9. **Did the sugar disappear faster when it was in a cube or when it was crushed into granules? How could we investigate this to prove your idea?**
The sugar probably dissolves faster when it is crumbled. We could time the process to find out.
10. **What happened to the ice cubes on the hot plate?**
They melted.
11. **What is different about the ice cubes after they have melted?**
They changed from solid to liquid.
12. **Were the ice cubes water before they melted? How could you prove this to be true?**
Yes, I could refreeze the water back into ice.
13. **How could you investigate this phenomenon to explain your answer?**
Weigh the beaker several times during the process
14. **What happened to the water in the heated beaker?**
It changed into an invisible gas.
15. **What happens to the water when it evaporates?**
It disperses into the surrounding air.
16. **What is different about the water after it evaporates?**
It is gas instead of liquid.
17. **When the sugar was mixed with the water, did the sugar disappear? Was it still part of the water?**
The sugar was not visible, but it was still in the water, spread throughout.
18. **Could you see the sugar before it was added to the water?**
Yes
19. **Could you see the sugar after it mixed into the water?**
For a short time, yes, but then, no
20. **How do you know the sugar was still in the water?**
We did nothing to separate the sugar from the water. It had to remain there.
21. **Why can't you see the sugar in the water?**
It dissolved.
22. **Considering all three demonstrations, what do your observations suggest to you about the nature of matter?**
It is made of smaller particles. These particles are too small to be seen individually.

23. **How does the water change?**
It changes state.
24. **Does the water still have the same particles?**
Yes
25. **How do you know that particles are in the water?**
The water still exists. It just spreads out into particles too small to be seen.
26. **What happens to the particles when the water evaporates?**
They disperse into the surrounding air.
27. **How is this example similar to the demonstration at the beginning of class?**
It shows matter becoming no longer visible.
28. **What is common to all matter?**
It is all made of tiny particles.
29. **If a particle is too small to be seen, does it mean it isn't there?**
All matter is made up of tiny particles too small to be seen.
30. **Do particles take up space? What evidence can you use to support your answer?**
Particles take up space. When you fill a balloon with air, the air takes up space in the balloon.

Lesson 5: Too Small to Be Seen

1. **What is making the second bag inflate?**
Air being forced out of the first bag
2. **What evidence can you point out that proves matter has moved from one place to another?**
One bag is inflated when the other is not. Something that takes up space [air] clearly moves from one bag to the other.
3. **What happens to the water as it heats up?**
It starts moving.
4. **What effect does this have on the matter in the beaker?**
The matter starts to break up into smaller and smaller pieces. The matter also starts to move around.

Lesson 6: Ice to Water and Back

1. **What was the purpose of this investigation?**
See Know the Standards on the following page.
2. **What happened to the water in terms of states of matter on Day 1?**
They changed as we melted the ice and froze the water.
3. **What happened to the weight of the water on Day 1?**
It stayed the same regardless of the state of matter.
4. **What happened to the matter on Day 2?**
It foamed up when we mixed the chemicals together.

5. **What happened to the weight of the matter on Day 2?**

It changed as the chemicals reacted.

Lesson 9: Matter Can Change Chemically

1. **scissors Activity Pages What Kind of Change Will Happen?**

AP 9.1

2. **How do you know?**

A change occurs when they interact.

3. **What changes do you observe?**

The reaction may show a color change or the formation of a precipitate.

4. **Is a new type of matter formed? How do you know?**

Color changes are an indicator that new matter has formed due to a chemical change.

5. **What type of changes have you seen so far with the steel wool?**

It is changing color.

6. **Did this match your predictions, or did something unexpected happen?**

Answers will vary depending on predictions.

7. **Do you think new matter was formed by adding the acetic acid to the steel wool? Why or why not?**

Yes, the color change provides evidence.

8. **How have the two pieces of steel wool changed?**

The wet steel wool is rusting. The dry steel wool looks the same.

9. **What type of change is this an example of?**

The rusting steel wool is evidence of a chemical change.

10. **Was matter gained or lost in the chemical change?**

Neither; there is the same amount, but it has changed into other matter, such as rust and gas.

11. **How would you describe the properties of this matter before and after it is combined?**

Do you think the liquid in the dropper is the same as the liquid in the tube? (no)

Lesson 10: Investigating Chemical Change

1. **Last time you mixed baking soda and vinegar, what type of system was that?**

An open system

2. **What made it that type of system?**

The gas from the chemical change could escape from the cup.

3. **This investigation will use a sealed bag. What type of system does that make?**

A closed system

Lesson 11: The Language of Chemistry

1. **index cards for student vocabulary deck (5 per student) Ch. 6 Activity Page AP 11.1 Activity Page What Is Matter Made Of?**
AP 11.1
2. **As students finish the Core Vocabulary task, collect their completed What Is Matter Made Of?**
AP 11.1

Unit quiz key

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