

INTRODUCTION



This book is available at three reading levels, as indicated by the one, two, or three dots beside the Science A-Z logo on the front cover.

This guide offers general instructions that can be used with any or all of the multilevel books. When appropriate, tips are provided for modifying the instruction for a specific level. The dots in this guide indicate elements of the instruction that are only applicable to certain book levels.

- can only be used with low level
- can only be used with middle level
- can only be used with high level
- |• can be used with low and middle levels
- |•• can be used with middle and high levels
- |••• can be used with all three levels

Each book is available for printing or projecting and is also available as an eBook for students to access on [Kids A-Z](#). The *Nonfiction Books* and their accompanying quizzes are available in both English and Spanish.

BOOK SUMMARY

The book *Mixing Matter* explains that matter is anything that takes up space and has weight. Matter can be broken down into atoms and molecules. An atom—the smallest piece of an element—may combine with other atoms of the same type or with atoms of other elements. When atoms combine, they form molecules. Molecules containing atoms of two or more different elements are called *compounds*.

When substances mix, they may undergo physical or chemical changes. Physical changes include changing states or becoming a mixture. It is possible to change back and forth between states of matter or to separate the individual substances in a mixture without changing the chemical composition of a substance. However, substances that combine and form chemical bonds cannot be easily separated; they create a new substance with new properties. The fact that matter can be combined and mixed in many ways creates the great variety of matter in our world.

Labeled photographs and diagrams support the text.

BEFORE
READING

Preview the book title, cover, and table of contents with students. Ask them to predict what the book will be about. Invite students to preview the remainder of the book, looking at the images, captions, and special features as well as the section heads and the glossary. Encourage them to use this information to continually make and revise their predictions while reading.

Vocabulary

Instruction for the unit's vocabulary terms can be found in the *Unit Guide*. It defines core and other key science terms and suggests resources you can use to teach vocabulary before, during, or after the reading.

These terms are found in the glossary. Certain terms are only found in certain book levels, as noted.



atom	bond	chemical change
chemical reaction	compound	concentration
electron	element	formula :
matter	mixture	molecule
neutron	nucleus	physical change
proton	saturation	solution
suspension		

Reading Strategy

Visualize

Explain to students that good readers often visualize, or create pictures in their mind, as they read. As students read this book, they may be able to visualize what atoms and molecules look like. They may also visualize examples of mixtures besides those mentioned in the book. What kinds of mixtures do students come across every day? Ask them to share their ideas. They will soon realize that mixed-up matter is all around us!

Think-aloud: *Whenever I read a book, I often pause to create a picture or make a movie in my mind of what the author is describing. Doing this helps me keep track of everything I have read and makes the reading more enjoyable. I know that good readers do this when they read, so I am going to visualize what is being described in this book as I read.*

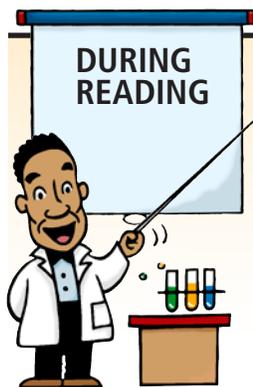
Model visualizing as students read about atoms (pp. 7–9). Based on this explanation of atoms, have them each create a model of an atom—in their mind or on paper—that shows protons, neutrons, and electrons in relation to one another.



Download and print the *Visualize Graphic Organizer*. Have students choose a new term or concept from the book to visualize, such as compounds, mixtures, solutions, or suspensions. They can draw a picture of it in the camera box and then write a sentence about it in the space below. Encourage students to continue visualizing as they read about other terms, concepts, and processes.

TIP The *Graphic Organizer* can also be used with each of the *Quick Reads* or other unit resources.

As students read, they should use other reading strategies in addition to visualizing.



The book begins by explaining that everything is made of matter and that materials can be combined in different ways to form new things. After students read this section, you may want to check for understanding by having them pick out objects in the classroom and determine whether the objects are made of one type of matter or a combination of materials.

Review the key science terms in each section before students read. Encourage students to read one section at a time and then discuss in pairs, in groups, or as a class what they read. (See *Discussion Questions*.)

Students can read the special features of the book to build on the concepts within each section. Some vocabulary terms can be reinforced in these features.

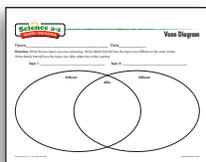
Comprehension Skill Focus

Compare and Contrast

Explain to students that one way to understand what they read in a book is to think about how topics are alike and different. Create a large T-chart on the board or on butcher paper. Label the left column *Alike* and the right column *Different*. Model how to fill in a T-chart to compare something familiar to students, such as foods, fairy tales, or articles of clothing.

Now have individual students, pairs, or small groups create a similar T-chart on paper to compare atoms and molecules after reading the corresponding sections of the book. Above the chart, have students write a title, such as *Comparing Atoms and Molecules* or *Atoms vs. Molecules*. As before, the left column should be labeled *Alike* and the right column *Different*. Have students complete their chart by listing similarities and differences between atoms and molecules.

After completing the T-chart, invite students to present their work to the class. Review how comparing and contrasting helped them understand and reinforce what they read.



Download and print the *Venn Diagram Graphic Organizer*. Have individuals, pairs, or groups compare and contrast *chemical changes* and *physical changes*. If a fact is only true of chemical changes, it should only be written in the left oval. If a fact is only true of physical changes, it should only be written in the right oval. If a fact is true of both, it should be written in the center, where the ovals overlap.

TIP The *Graphic Organizer* can also be used with each of the *Quick Reads* or other unit resources.

As students read, they should use other comprehension skills in addition to comparing and contrasting.

Discussion Questions



Use the *Discussion Cards* during or after reading. The cards are structured so they can be used for whole-group discussion or assigned to individuals, pairs, or groups. Choose the activity that best serves your purposes. It may be helpful to allow students to use their book and completed *Graphic Organizer(s)* as they try to answer the questions. Here are some suggested activities:

- Divide the class into groups and have each group discuss the questions from a section of the book. Then have groups report their responses to the class.
- Have all groups discuss all the questions and then discuss the similarities and differences among the groups' answers.
- Place discussion cards at centers and have groups talk about or write their responses as they rotate through them.
- Have each student choose a card and write an answer on the back. Collect the cards and review them with the whole class.
- Assign certain questions to groups or individuals for homework.

Each question can be answered with certain book levels, as noted with dots in the upper left corner. You may want all students to think about all the questions, even if their book level is not noted on certain cards. The book section or topic most closely related to the question appears on each card. Question types are noted in parentheses.

All questions can be answered with all three book levels except where noted.

Introduction

- What materials make up some of the items you see around you? (applying)
- Are most of the items around you made of a single kind of material or more than one? (understanding)

- Can you think of anything that isn't made of matter? (analyzing)

Elements

- How would you describe what an *element* is? (understanding)
- What is one substance that is made of only one element? (applying)
- What is one substance that is made of more than one element? (applying)
- How do elements get their symbols? (understanding)

Atoms

- What are the particles that make up an atom? (remembering)
- What is the smallest part of an iron bar? (applying)
- Which is *heavier*, an atom with two protons and two neutrons or an atom with two protons and four neutrons? (analyzing)
- How would you construct a model of an atom? (creating)
- How would the world be different if the only elements actually were earth, air, fire, and water, as once believed? (evaluating)

Combining Matter

- Which of the three kinds of atomic particles is involved in the bonding of atoms? (remembering)
- What happens during a chemical reaction? (understanding)

- What is a *molecule*? (remembering)
- Which is an example of a molecule: Au, O₂, or C? (understanding)
- How many carbon and how many oxygen atoms bond in a carbon dioxide (CO₂) molecule? (applying)
- Why is a water (H₂O) molecule considered to be a *compound*? (understanding)
- Which is an example of a compound: O₂, O₃, or CO₂? (understanding)
- How can compounds differ from the separate elements that make them up? (analyzing)

Changing Matter

- What is the difference between a physical and a chemical change? (understanding)
- Is tarnish forming on a silver plate a physical change or a chemical change? (applying)
- Is condensation of water from vapor to liquid a physical change or a chemical change? (applying)
- Would you be more concerned about something you consider precious going through a physical or a chemical change? Why? (evaluating)

Mixing Matter

- Why are mixtures examples of physical changes? (analyzing)

- What are some mixtures other than those mentioned in the book? (applying)
- How can you identify the different substances that make up a mixture? (understanding)
- How would you separate the different substances in soil? (creating)

Mixing Solids and Liquids

- What do the words *dissolve* and *solution* have in common? Are their meanings related? (analyzing)
- In scientific terms, why does lemonade get sweeter as you add more sugar? (understanding)
- What happens when too much of a solid, such as salt, is added to a liquid? (remembering)
- How can two boxes of cereal with the same volume have different weights? (applying)
- What might happen if any of the properties of a volleyball changed? (analyzing)

- If you sprinkled ground pepper on top of water, would you have a mixture, a solution, or a suspension? (understanding)
- How would you separate the different substances in a bowl of chocolate-chip ice cream? (creating)

Mixing Liquids

- Why isn't a mixture of oil and water a solution? (understanding)
- What are two results that can happen when liquids are mixed? Give an example of each. (remembering/applying)

Conclusion

- Why do you think scientists refer to atoms as the *building blocks of matter*? (evaluating)
- Would you want to study chemicals and the ways they interact when mixed? Why or why not? (evaluating)



AFTER READING

Encourage students to reread the book.

Reflect on the Reading Strategy: *Visualize*

Review the reading strategy of visualizing. Invite students to share how this strategy helped them understand what they read.

Enduring Understanding

In this book, students have read about the building blocks of matter and the ways matter can change and combine. Discuss the following with students:

- *How might an understanding of matter and the ways it can change and combine keep you safe?*

Home Project

Have students work with their family to record examples of mixtures and chemical reactions they come across in a single day. They may find that such examples are all around them. They should list examples and briefly write about each of them. For example, students might explain what substances make up a mixture. For substances that underwent a chemical change, encourage students to research the materials that were combined. They might try using the tables in their book to help describe some of the substances they find:

- pp. 18–19
- pp. 17–18

Assess

Download and print the appropriate reading level and language of the *Book Quiz* or have the student take the eQuiz on **Kids A-Z**.

Use the *Nonfiction Retelling Rubric* to assess understanding.

Quick Check: For individual or group assessment, have students respond orally or in writing to the following question:

- *What are the smallest particles that make up matter, and what are some ways that matter can combine?*

