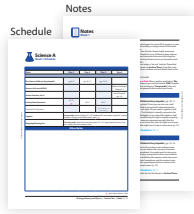
Instructor's Guide Quick Start

The BookShark™ Instructor's Guide (IG) is designed to make your educational experience as easy as possible. We have carefully organized the materials to help you and your students get the most out of the subjects covered. If you need help reading your schedule, see "How to Use the Schedule" in **Section Four**.

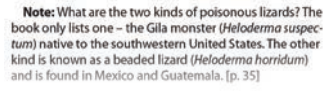
This IG includes a 36-week schedule, notes, assignments, readings, and other educational activities. For specific organizational tips, topics and skills addressed and other suggestions for the parent/teacher see **Section Three**. Here are some helpful features that you can expect from your IG.

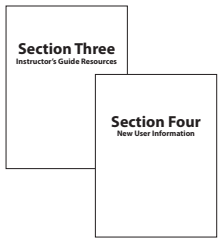


Easy to use
Everything you need is located right after the schedule each week. If a note appears about a concept in a book, it's easy to find it right after the schedule based on the day the relevant reading is scheduled.

4-Day Schedule
Designed to save one day a week for music lessons, sports, field trips, co-ops, or other extra-curricular activities.

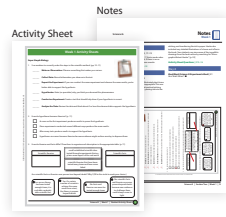
Notes
When relevant, you'll find notes about specific books to help you know why we've selected a particular resource and what we hope your students will learn from reading it. Keep an eye on these notes to also provide you with insights on more difficult concepts or content (look for "**Note:**").


Note: What are the two kinds of poisonous lizards? The book only lists one – the Gila monster (*Heloderma suspectum*) native to the southwestern United States. The other kind is known as a beaded lizard (*Heloderma horridum*) and is found in Mexico and Guatemala. [p. 35]



Instructor's Guide Resources and **New User Information**
Don't forget to familiarize yourself with some of the great helps in **Section Three** and **Section Four** so you'll know what's there and can turn to it when needed.

Activity Sheets and **Answer Keys**
Activity Sheets follow each week's notes and are customized for each lesson to emphasize important points in fun ways. They are designed with different skills and interests in mind. You may want to file them in a separate binder for your student's use. Corresponding Answer Keys have been included within your weekly Notes.



How to Use the Schedule

More notes with important information about specific books.

The N symbol provides you with a heads-up about difficult content. We tell you what to expect and often suggest how to talk about it with your students.

4-Day Schedule:

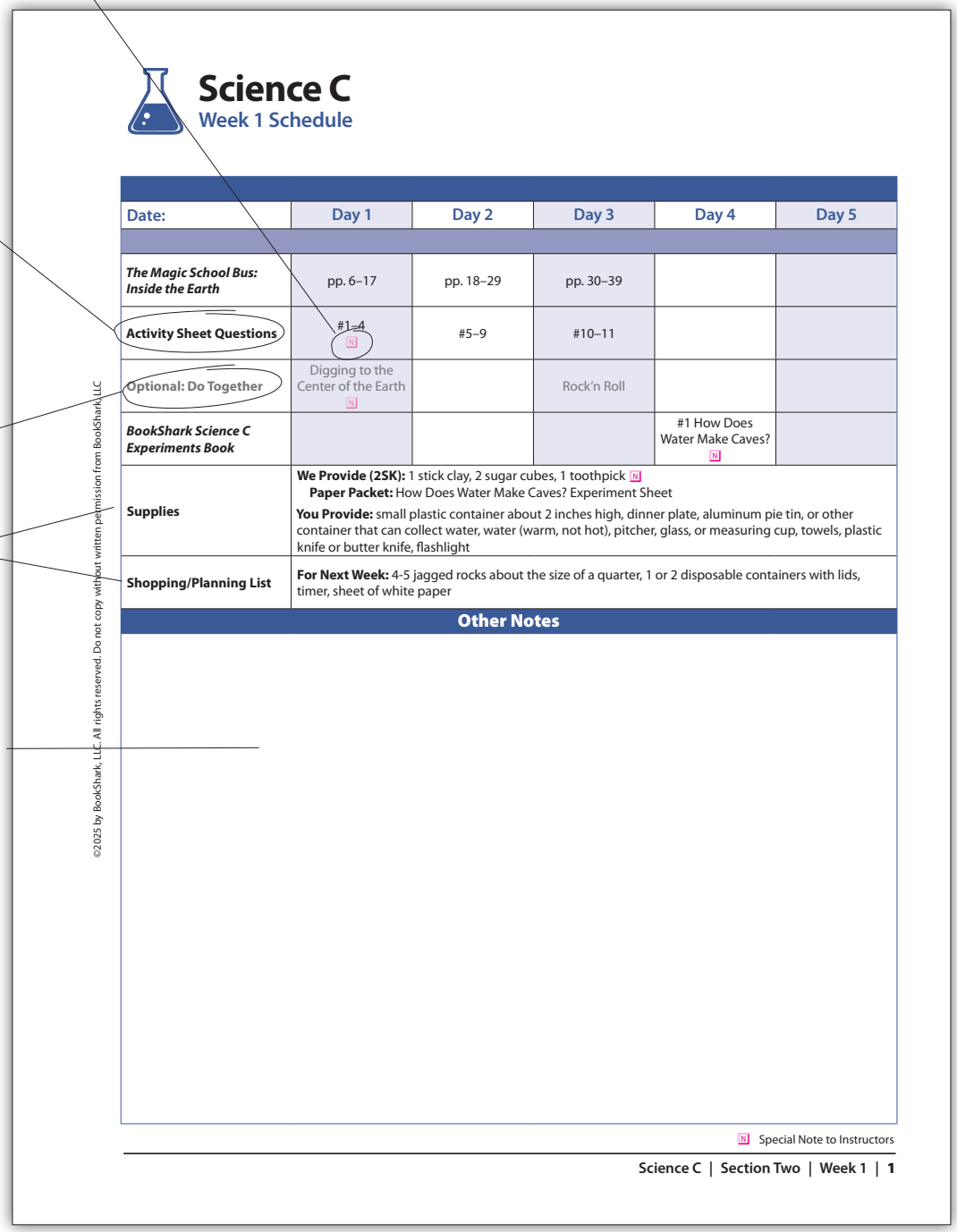
This entire schedule is for a 4-Day program. Designed to save one day a week for music lessons, sports, field trips, co-ops and other activities.

Find the Activity Sheets for students directly after the Notes. Students should complete only the questions assigned.

We schedule optional assignments to be used if desired.

Find all the supplies needed for this week as well as the supplies needed for next week here.

Additional space for writing extra assignments, activities, or notes.



Science C
Week 1 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
The Magic School Bus: Inside the Earth	pp. 6–17	pp. 18–29	pp. 30–39		
Activity Sheet Questions	~~#1–4~~ N	#5–9	#10–11		
Optional: Do Together	Digging to the Center of the Earth N		Rock'n Roll		
BookShark Science C Experiments Book				#1 How Does Water Make Caves? N	
Supplies	**We Provide (2SK):** 1 stick clay, 2 sugar cubes, 1 toothpick N **Paper Packet:** How Does Water Make Caves? Experiment Sheet **You Provide:** small plastic container about 2 inches high, dinner plate, aluminum pie tin, or other container that can collect water, water (warm, not hot), pitcher, glass, or measuring cup, towels, plastic knife or butter knife, flashlight				
Shopping/Planning List	**For Next Week:** 4-5 jagged rocks about the size of a quarter, 1 or 2 disposable containers with lids, timer, sheet of white paper				

Other Notes

N Special Note to Instructors

Science C | Section Two | Week 1 | 1

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Science I
Week 1 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
Chemistry: Investigate the Matter That Makes Up Your World	pp. 2–4 (at break), 12–13	pp. 14–15	pp. 16–18		
Super Simple Physics	p. 237	pp. 238–239			
Activity Sheet Questions	#1–3 N	#4–7	#8–9		
Optional: Do Together	Relevant Chemistry		Newbies on the Periodic Table		
BookShark Science I Experiments Book				#1: What Makes an Atom an Atom?	
Supplies	**We provide: 8SK**— 1/4 stick yellow clay, 1/3 stick blue clay, 1/3 stick red clay, 2m uncoated copper wire, 1m yarn, masking tape **Paper Packet**: What Makes an Atom and Atom? Experiment Sheet **You provide:** wire cutters, ruler				
Shopping/Planning List	**For next week:** plastic bead, penny, small pebble, paper towel, red food coloring, kitchen scale, ruler, flashlight, tall clear glass or container to hold 2-3 cups, colored pencils, ½ cup of at least 5 liquids of different viscosity (rubbing alcohol, cooking oil, dish soap, corn syrup, molasses, syrup or honey, water, etc.) optional: 6 glass cups or jars, optional: masking tape and marker				

Other Notes

N Special Note to Teachers

Notes
Week 1

Day 1

Chemistry: Investigate the Matter That Makes Up Your World | pp. 2–4 (at break), 12–13

Super Simple Physics | p. 237

Activity Sheet Questions | #1–3

Activity Sheet Questions

Activity Sheets are included after each week of notes and are assigned on the corresponding schedule page. Each Activity Sheet has a corresponding Answer Key page following these note pages.

You do not have to do every question on the Activity Sheets. Feel free to adjust and/or omit questions to meet the needs of your students. We cover the same concepts repeatedly throughout the year (and years to come!) to enable students to learn "naturally" through repetition and practice over time.

We have provided a variety of activities to interest and challenge your students. Feel free to let your students do those activities that they enjoy and simply talk through others.

Remember: This program is designed for you to use to meet your students' needs. It is not meant to use you! **Suggestion:** Your Activity Sheets might work more easily in a small binder for your students to keep and use as assigned. If you have more than one student using this program, extra Activity Sheets can be purchased for each student.

Supplies

When supplies are listed as "**We provide**" they are included in your Science I Supplies Kit **(8SK)**. When supplies are listed as "**You provide**" they are materials you can generally find around your home. For example:

- aspirin
- liquid bleach
- curry powder
- baking soda

Most durable items will be used repeatedly, so clean them after use and store in a safe place. This includes clay, pipettes, toothpicks, test tubes, pony beads, paper clips, and corn kernels.

Optional: Do Together | Relevant Chemistry

Each week throughout Science I, we will provide ideas for fun activities to do with your students. In general, we will try to make the activities actually "active": performing additional research on a particular topic, watching a video, playing a game, getting outside, or some other type of "hands-on" activity that seeks to apply what your students have been learning in a meaningful way.

Take our ideas for what they are—mere suggestions—and don't feel burdened by them. If your students don't want to do a particular activity or have a different, better idea, by all means ditch ours and go with theirs! Have fun!

Before delving into the details of protons, neutrons, electrons, ions, anions, and cations, take a little time to explore the idea from p. 2 of *Chemistry: Investigate the Matter That Makes Up Your Life* that chemistry is everywhere and is used to make things we want and need. Together with your students, make a quick list of four physical objects your students need and four things your students want. An example list of needs: food, soap, shelter (a home), and water. Examples of wants could include chocolate, a cell phone, art supplies such as paint or pottery, and a skateboard. From the lists, choose ONE object and search to see what you might learn about its chemistry in a quick search. Ex: "chemistry of soap" or "chemistry of chocolate." If their interest extends beyond a quick search, they may continue to learn more in their free time. Don't get bogged down in lengthy research at this point, scan to learn something new that will get your students thinking about how chemistry relates to some preferred topics. [pp. 2-4]

Day 2

Chemistry: Investigate the Matter That Makes Up Your World | pp. 14–15

Super Simple Physics | pp. 238–329

Activity Sheet Questions | #4–7

Day 3

Chemistry: Investigate the Matter That Makes Up Your World | pp. 16–18

Point your students to the larger periodic table on p. 17. Hydrogen, the element on the top left of the periodic table, may be more familiar than some on the list. Do your students know the origin of the name hydrogen? Ask them to guess whether the word comes from Latin or Greek roots (Greek). French scientist, Antoine Lavoisier, named it *hydrogène*, the French word for hydrogen based on the Greek roots that mean water-maker or creator of water. Other elements have names related to a property of the element, a place, a person, mythology, a mineral, or an astronomical body. See if they can spot the element named for scientist Albert Einstein and the element named in honor of Marie and Pierre Curie. If they need a hint, both are in yellow on the last row.

Behind the basic, organized list, the Periodic Table involves stories throughout history and across geography. The element names come from about a dozen different languages and the elements themselves appeared in locations throughout the world. Some elements on the table originated in a lab and are man-made. While some have been known since ancient history, one element was created as recently as 2009. Tennessine, named for the state of Tennessee, was announced in 2010. Tennessine is numbered 117. As you will notice on p. 17, Tennessine (TS) was previously listed as ununseptium unknown (UUS). [pp. 16-18]

Activity Sheet Questions | #8–9

Optional: Do Together | Newbies on the Periodic Table

Use the QR codes on p. 16 of *Chemistry: Investigate the Matter That Makes Up Your World* to search together for more information about the periodic table's history. Be sure to cover surrounding codes before scanning each one so that one code is visible when scanning with a tablet or phone. Each URL is listed in the QR Code Glossary at the top of p. 116. Please note the four elements 113, 115, 117, and 118 listed as "unknown" on pp. 17 and 117. The last QR code on p. 16 links to a video for every element in the periodic table, including these four elements that were given names in recent years. [pp. 16-18]

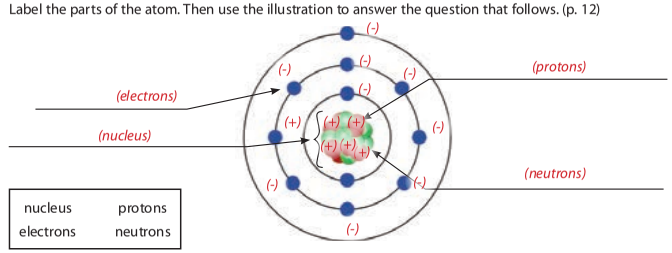
Day 4

BookShark Science I Experiments Book | #1
What Makes an Atom an Atom? ■

Week 1 Activity Sheets

Chemistry

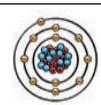
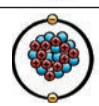
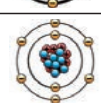
1. Label the parts of the atom. Then use the illustration to answer the question that follows. (p. 12)



nucleus	protons
electrons	neutrons

The red and blue particles in the illustration above are protons and electrons, which carry either a positive or negative charge. Use a (+) sign to label the positive charges and a (-) sign to label the negative charges.

2. Carefully examine the atom diagrams in the table. Count the number of protons and electrons in each. Then state whether the atom carries no charge, or if it is positively or negatively charged. If the atom is charged, identify if the atom is an anion or a cation. (p. 13)

	Charged?	If charged: anion or cation?
H 1 	☐ positive ☐ negative ☒ no charge	☐ anion ☐ cation
Na 11 	☒ positive ☐ negative ☐ no charge	☐ anion ☒ cation
Cl 17 	☐ positive ☒ negative ☐ no charge	☒ anion ☐ cation
O 8 	☐ positive ☐ negative ☒ no charge	☐ anion ☐ cation

Hint: anions carry a + / (–) charge, and cations carry a (+) / – charge.

Week 1 Activity Sheets

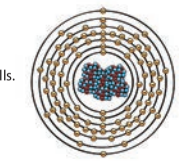
Super Simple Physics

3. Identify the charge each part of an atom caries. (p. 237)

proton	(+)	–	no charge
neutron	+	–	(no charge)
electron	+	(–)	no charge

Chemistry

DID YOU KNOW? Energy levels are also called electron shells.



4. An element is: (p. 15)

- ☐ when two atoms bind together to create a new substance
- ☒ something made of only one type of atom that cannot be broken down into a simpler substance
- ☐ earth, water, air, or fire
- ☐ any particle you can see under a microscope

Super Simple Physics

5. Draw lines to make the statements true. (p. 238)

An atom's atomic number…	…the number of protons and neutrons in an atom.
An atom's mass number is…	…the number of protons in an atom.

6. Circle and use the correct terms in the box to complete the following. You will not use all the terms. (p. 238)

protons	neutrons	electrons	isotopes

Atoms of the same element always have the same number of (**protons**) / **electrons** in the nucleus, but the number of **protons** / (**electrons**) may vary. _(Isotopes)_ are forms of an element with different mass numbers, which occur because the number of _(neutrons)_ in an atom may vary.

Week 1 Activity Sheets

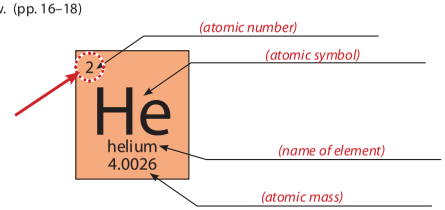
7. Interpret the isotope symbols. Identify the number of protons and neutrons in each. (p. 238)

$^{11}_{5}$B	mass number: _(11)_	number of protons: _(5)_ number of neutrons: _(6)_
$^{37}_{17}$Cl	mass number: _(37)_	number of protons: _(17)_ number of neutrons: _(20)_
$^{52}_{24}$Cr	mass number: _(52)_	number of protons: _(24)_ number of neutrons: _(28)_
$^{56}_{26}$Fe	mass number: _(56)_	number of protons: _(26)_ number of neutrons: _(30)_

Chemistry

8. Use the terms in the box to label the information in the sample square from the Periodic Table of Elements. Then answer the questions that follow. (pp. 16–18)

atomic mass
name of element
atomic number
atomic symbol



a. Circle the information in the sample square that tells you the number of protons an atom of that element has.

b. Can the Periodic Table tell you the number of electrons in a neutral atom? (If so, draw an arrow to that information in the illustration.) Why?

- ○ Yes, the number at the bottom shows the number of electrons.
- ☒ Yes, neutral atoms have the same number of protons and electrons so the atomic number works for both.
- ○ No, the Periodic Table lists only the number of protons.
- ○ No, the Periodic Table lists only the number of neutrons.

Week 1 Activity Sheets

9. Find the element sulfur in the Periodic Table. Use the questions to help you decipher key information about a neutral sulfur atom. Then use the information to draw an accurate diagram model of a sulfur atom. (p. 17)

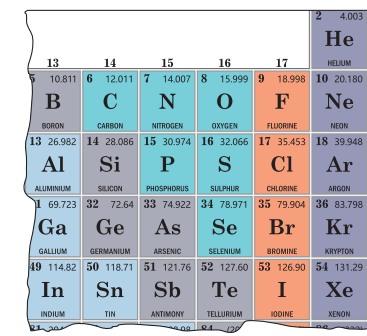
Number of protons: _(16)_

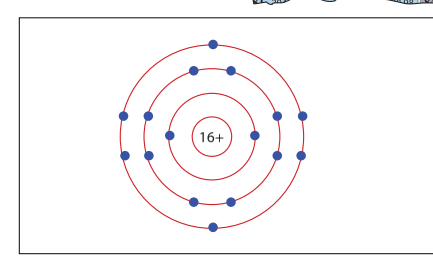
Number of electrons: _(16)_

Number of energy levels: _(3)_

Number of electrons per energy level:

Levels	Possible: 2 x n^2	In Sulfur
1	2	(2)
2	8	(8)
3	18	(6)
4	32	(0)





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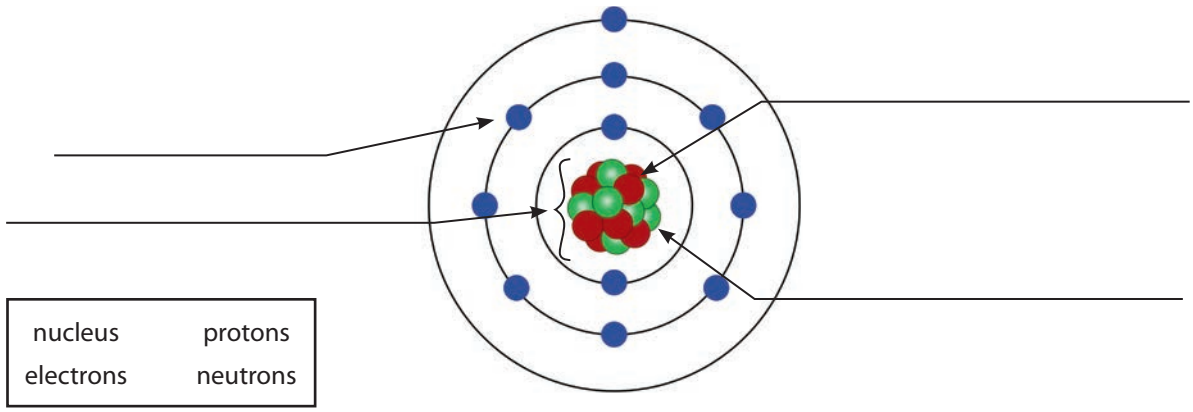
Week 1 Activity Sheets

Chemistry

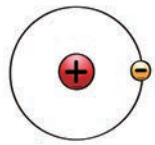
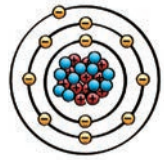
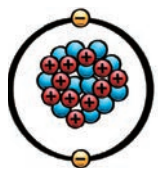
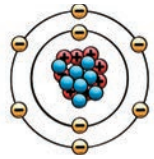
1. Label the parts of the atom. Then use the illustration to answer the question that follows. (p. 12)



nucleus	protons
electrons	neutrons

The red and blue particles in the illustration above are protons and electrons, which carry either a positive or negative charge. Use a (+) sign to label the positive charges and a (-) sign to label the negative charges.

2. Carefully examine the atom diagrams in the table. Count the number of protons and electrons in each. Then state whether the atom carries no charge, or if it is positively or negatively charged. If the atom is charged, identify if the atom is an anion or a cation. (p. 13)

	Charged?	If charged: anion or cation?
H 1 	☐ positive ☐ negative ☐ no charge	☐ anion ☐ cation
Na 11 	☐ positive ☐ negative ☐ no charge	☐ anion ☐ cation
Cl 17 	☐ positive ☐ negative ☐ no charge	☐ anion ☐ cation
O 8 	☐ positive ☐ negative ☐ no charge	☐ anion ☐ cation

Hint: anions carry a **+** / **–** charge, and cations carry a **+** / **–** charge.

Week 1 Activity Sheets

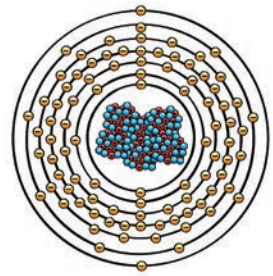
Super Simple Physics

3. Identify the charge each part of an atom caries. (p. 237)

proton	+	–	no charge
neutron	+	–	no charge
electron	+	–	no charge

Chemistry

DID YOU KNOW? Energy levels are also called electron shells.



4. An element is: (p. 15)

- ☐ when two atoms bind together to create a new substance
- ☐ something made of only one type of atom that cannot be broken down into a simpler substance
- ☐ earth, water, air, or fire
- ☐ any particle you can see under a microscope

Super Simple Physics

5. Draw lines to make the statements true. (p. 238)

An atom's atomic number…	•	•	…the number of protons and neutrons in an atom.
An atom's mass number is…	•	•	…the number of protons in an atom.

6. Circle and use the correct terms in the box to complete the following. You will not use all the terms. (p. 238)

protons	neutrons	electrons	isotopes

Atoms of the same element always have the same number of **protons** / **electrons** in the nucleus, but the number of **protons** / **electrons** may vary. _____ are forms of an element with different mass numbers, which occur because the number of _____ in an atom may vary.

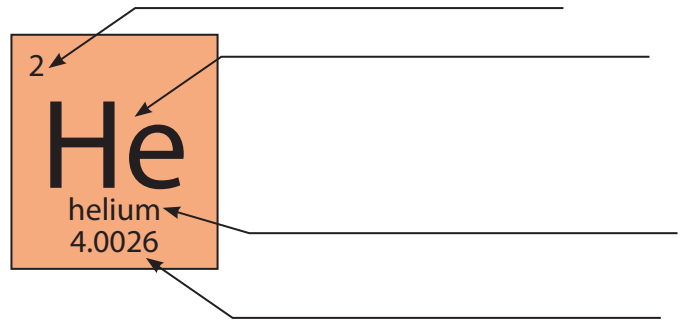
7. Interpret the isotope symbols. Identify the number of protons and neutrons in each. (p. 238)

$^{11}_{5}$B	mass number: _____	number of protons: _____ number of neutrons: _____
$^{37}_{17}$Cl	mass number: _____	number of protons: _____ number of neutrons: _____
$^{52}_{24}$Cr	mass number: _____	number of protons: _____ number of neutrons: _____
$^{56}_{26}$Fe	mass number: _____	number of protons: _____ number of neutrons: _____

Chemistry

8. Use the terms in the box to label the information in the sample square from the Periodic Table of Elements. Then answer the questions that follow. (pp. 16–18)

atomic mass
name of element
atomic number
atomic symbol



a. Circle the information in the sample square that tells you the number of protons an atom of that element has.

b. Can the Periodic Table tell you the number of electrons in a neutral atom? (If so, draw an arrow to that information in the illustration.) Why?

- ○ Yes, the number at the bottom shows the number of electrons.
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9. Find the element sulfur in the Periodic Table. Use the questions to help you decipher key information about a neutral sulfur atom. Then use the information to draw an accurate diagram model of a sulfur atom. (p. 17)

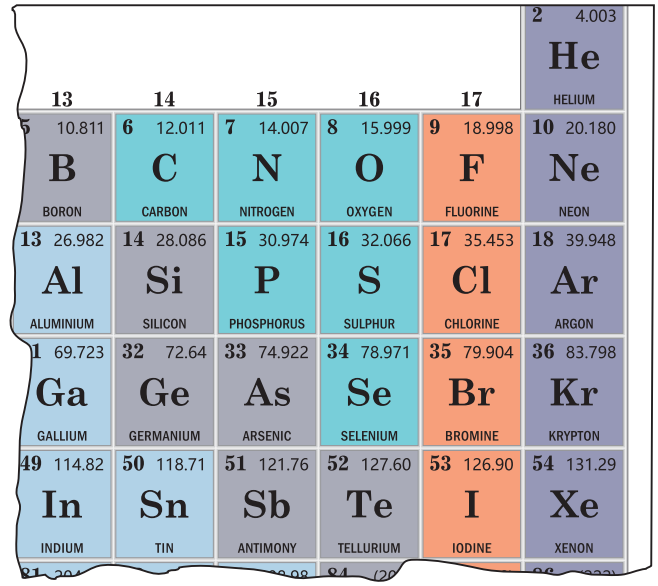
Number of protons: _____

Number of electrons: _____

Number of energy levels: _____

Number of electrons per energy level:

Levels	Possible: $2 \times n^2$	In Sulfur
1	2	
2	8	
3	18	
4	32	



Science I
Week 2 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
Chemistry: Investigate the Matter That Makes Up Your World	bottom of pp. 18–20	pp. 24–28	p. 29		
Super Simple Physics			pp. 212–214		
Activity Sheet Questions	#1–3	#4–5	#6–10		
Optional: Do Together	Is It a Metal?		States of Matter		
BookShark Science I Experiments Book				#2: Why Does an Object Sink or Float in Different Liquids?	
Supplies	**We provide: 8SK**— toothpick, Styrofoam packing peanut, corn kernel, rubber band, marble, clay (any color, ½ inch ball), paperclip, dice **Paper Packet**: Why Does an Object Sink or Float in Different Liquids? Experiment Sheet **You provide:** plastic bead, penny, small pebble, paper towel, red food coloring, kitchen scale, ruler, flashlight, tall clear glass or container to hold 2-3 cups, colored pencils, ½ cup of at least 5 liquids of different viscosity (rubbing alcohol, cooking oil, dish soap, corn syrup, molasses, syrup or honey, water, etc.) optional: 6 glass cups or jars, optional: masking tape and marker				
Shopping/Planning List	**For next week:** olive oil, milk, molasses, salt, heat-safe glass measuring cup or a metal double boiler, freezer, stove, potholders, water, an adult helper, a very small pot (32 oz capacity or smaller), optional: paper towel				

Other Notes

Special Note to Teachers

Notes
Week 2

Day 1

Chemistry: Investigate the Matter That Makes Up Your World | bottom of pp. 18–20

Your book jumps into discussing metals, nonmetals, and metalloids mostly in relation to their location on the table, but your students may benefit from a little concrete information on the subject. Do they know how many metals are listed on the periodic table? Most of them! Out of 118, more than 75% of the elements are classified as metals. The specific number differs, depending on how they are defined, but most elements are classified as metals. [pp. 18-20]

Some common properties of metals:

- Appear shiny in pure forms.
- Exist as solids at room temperature (except for mercury, which is a liquid element).
- Good conductors of heat and electricity.
- Can bend without breaking.
- Have high melting points.

Activity Sheet Questions | #1–3

Optional: Do Together | Is It a Metal?

The elements on the periodic table make up the world around us. Today your students learned about metals and nonmetals. Take some time today to identify metals and nonmetals around your house. Things to look for might be aluminum foil, silicone cooking spoons, or an iron nail. Ask your students if they think these items are the pure form of the elements on the periodic table? Or do these items merely use a blend of elements?

Day 2

Chemistry: Investigate the Matter That Makes Up Your World | pp. 24–28

Scientists researching the movement of electrons around the nucleus of an atom now believe that they once misunderstood the path of electrons and their movement around the nucleus. (p. 14) Consult the timeline on p. vii and find the dates that are important in the study of electrons. (1898, 1911, 1913) Read about the developments on those dates. The first usage of the term "electron cloud" occurred during the 1920s. The electron cloud theory was further developed throughout the 1930s and 1940s. [pp. 24–25]

Activity Sheet Questions | #4–5

Day 3

Chemistry: Investigate the Matter That Makes Up Your World | p. 29

Does the Kinetic Molecular Theory of gases [p. 29] sound complicated? Check out a short animation that explains the theory in an engaging way. Use your favorite search engine to find "The Kinetic Molecular Theory (Animation)" by "Scámarca Productions" on YouTube. [p. 29]

Super Simple Physics | pp. 212–214

Perhaps you learned this in elementary school. Solid water is less dense than liquid water. This is different than most solids, which are denser than their liquid form. Ice, the solid form of water, can float on big bodies of water because it is less dense. This is great news for the fish who can continue swimming around in the winter rather than becoming a fish-cicle. [p. 212]

Activity Sheet Questions | #6–10

Optional: Do Together | States of Matter

Reinforce what your students learned about the different states of matter today. Ask your students what the three states of matter are (solid, liquid, gas).

Have your students choose two or three different liquids you have around the house. Examples: water, juice, coffee, milk, tea, etc. Observe the liquids. What do your students notice? Pour the liquids into containers and place in the freezer. Let the liquid sit for an hour or two until it becomes solid. Take time to observe the solids.

While the liquid freezes, choose one more liquid and pour it in a sauce pot. Place the pot on the stove and heat the liquid until it begins to boil. When the liquid boils, observe the gas (or steam) that has formed.

Day 4

BookShark Science I Experiments Book | #2 Why Does an Object Sink or Float in Different Liquids? ■

Week 2 Activity Sheets

Chemistry

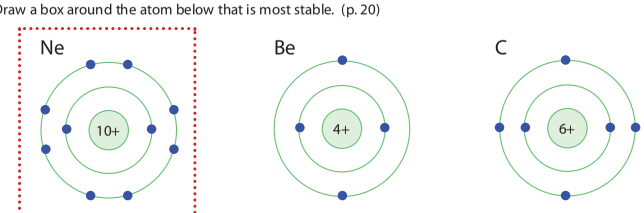
1. Atoms of the same element that have different atomic masses are called: (pp. 19–20)

ions **isotopes** **illusions** **indifferent**

This occurs because the atoms have a different number of:

protons **electrons** **neutrons** **nuclei**

2. Draw a box around the atom below that is most stable. (p. 20)



3. Circle all that are true to clarify the following. (p. 20)

A stable atom has a **complete** / **incomplete** outer energy level with a **full** / **partial** set of **6** / **8** / **10** electrons. Atoms become more stable by gaining or losing electrons when they **bond with** / **absorb** other atoms.

Week 2 Activity Sheets

4. Use an **S** for solid, **L** for liquid and **G** for gas to label the statements that describe the characteristics of solids, liquids, and gases. (pp. 25–28)

Shape and Volume

__S__ 1) have a fixed shape and volume

__L__ 2) do not hold their shape; they flow to the shape of their container

__G__ 3) do not have a definite volume or shape; they fill up their entire container

Molecular Arrangement

__S__ 4) atoms and molecules are tightly packed together

__G__ 5) molecules spread out to fill a container of any size or shape

__L__ 6) the top is a relatively flat surface because gravity pulls on it and flattens its surface

Attraction

__S__ 7) molecules are strongly attracted to each other and stay in a specific structure or arrangement

__G__ 8) attractions between molecules are much weaker so they spread out a lot more

__L__ 9) molecules are constantly in motion because attractions between its molecules are not as strong as in a solid

Movement

__G__ 10) molecules move freely past each other

__L__ 11) even though attractions between molecules are stronger, they can move past each other which is why this can easily change its shape

__S__ 12) molecules vibrate in place and don't move past each other

Special Features

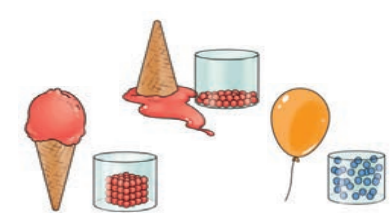
__L__ 13) hard to compress because molecules are somewhat closely packed together

__G__ 14) are less dense and can be compressed

__S__ 15) some are arranged as crystals

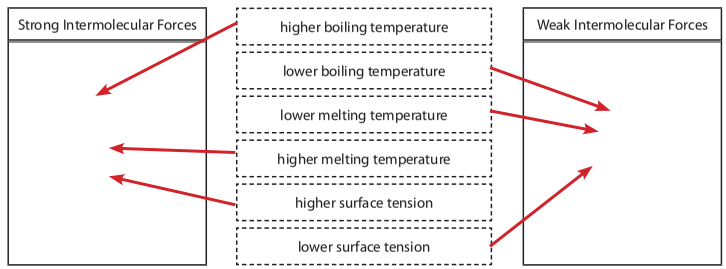
__G__ 16) arrangement of molecules allows substances in this state to mix freely with other substances

__G__ 17) are often invisible and odorless



Week 2 Activity Sheets

5. Draw lines from each statement to the appropriate box to describe the difference between stronger and weaker intermolecular forces in liquids. (p. 27)



6. Use the terms in the box and circle to complete the following. (p. 29)

temperature	infinitely small	moving	intermolecular forces

Kinetic Molecular Theory suggests that in an ideal gas:

a. The particles in a gas are _____*(infinitely small)*_____ and constantly, randomly _____*(moving)*_____.

b. Gas molecules do not experience _____*(intermolecular forces)*_____.

c. Kinetic energy (or movement energy) of a gas depends on its _____*(temperature)*_____. The **higher** / **lower** the temperature, the faster its particles move, which generates **more** / **less** energy.

d. When gas molecules bump into each other they transfer kinetic energy **perfectly** / **poorly**, so **a lot of** / **no** energy is lost.

Super Simple Physics

7. When matter changes state, it changes: (p. 213)

chemically **physically** **both**

…because no _____ take place.

chemical reactions **physical changes**

Week 2 Activity Sheets

8. Match the terms to their definitions. (p. 213)

melt	a liquid becomes a solid
freeze	a solid becomes a liquid
deposition	a gas becomes a liquid
sublimation	a liquid becomes a gas
boil	a solid becomes a gas without first becoming a liquid
condense	gas becomes a solid without first becoming a liquid

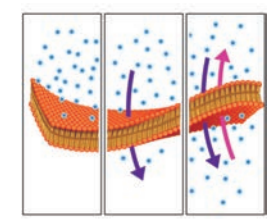
9. In (choose 2) **solids** / **liquids** / **gases**, particles constantly move, which explains why **solids** / **fluids** mix. (p. 214)

10. Use the terms in the box to label the statements to define the two types of particle motion. (p. 214)

Brownian motion	diffusion

_____*(diffusion)*_____: constant particle movement causes particles to spread from areas of high concentration to areas of low concentration.

_____*(Brownian motion)*_____: the random jiggling motion of small specks of matter, caused by other fast-moving particles.



Week 2 Activity Sheets

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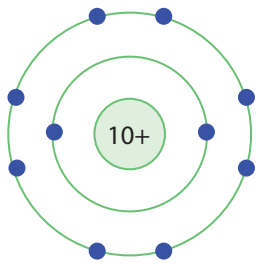

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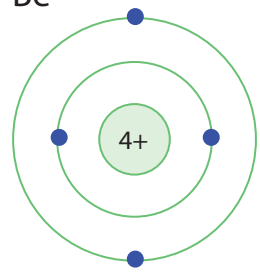
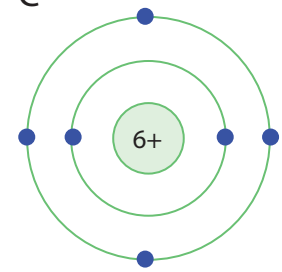


C



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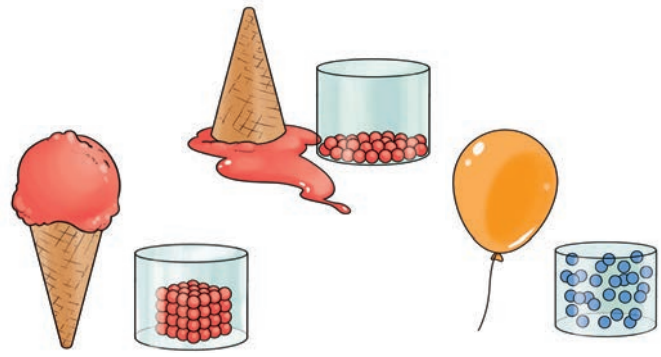

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Strong Intermolecular Forces		Weak Intermolecular Forces
	higher boiling temperature	
	lower boiling temperature	
	lower melting temperature	
	higher melting temperature	
	higher surface tension	
	lower surface tension	

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a. The particles in a gas are _____ and constantly, randomly _____.

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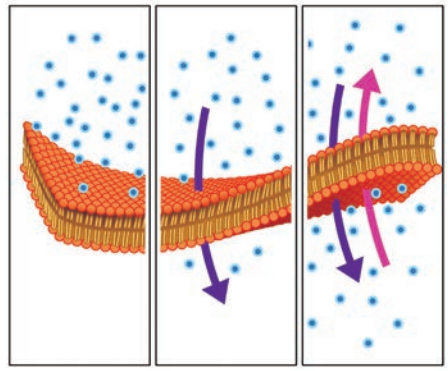


Science I
Week 3 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
Super Simple Physics	pp. 215–217				
Chemistry: Investigate the Matter That Makes Up Your World		pp. 40–41	pp. 42–44		
Activity Sheet Questions	#1–4	#5–7	#8–11		
Optional: Do Together	Is It Dense?		Observing Changes		
BookShark Science I Experiments Book			N	#3: How Does Heat Energy Affect Different Substances?	
Supplies	**We provide: 8SK**— 4 small plastic cups, thermometer, skewer, small wax tea candle **Paper Packet**: How Does Heat Energy Affect Different Substances? Experiment Sheet **You provide:** olive oil, milk, molasses, salt, heat-safe glass measuring cup or a metal double boiler, freezer, stove, potholders, water, an adult helper, a very small pot (32 oz capacity or smaller), optional: paper towel				
Shopping/Planning List	**For next week:** 16 oz bottled water, empty thin cut-able plastic container (like a butter or sour cream container), small stove pot, metal spoon, stove, tongs, freezer, adult partner, optional: knife (or screwdriver or ice pick), optional: scissors				

Other Notes

N Special Note to Teachers

Notes
Week 3

Day 1

Super Simple Physics | pp. 215–217

Civil engineers are responsible for designing the expansion joints mentioned at the bottom of the sidebar. Weather changes affect everything from bridges to car batteries and sidewalks. Throughout your day, look for any solutions to thermal expansion visible on sidewalks, bridges, and roads in your community or if you've recently traveled, check your vacation pictures to see if you notice any civil engineering in plain view! Researchers are looking into ways that 3-D printing could be used to find a material that does not respond to heat changes that require expansion joints. [pp. 215–217]

Activity Sheet Questions | #1–4

Optional: Do Together | Is It Dense?

Reinforce what your students learned about density today. Remember, density makes a solid object heavier than a solid object that is less dense. Pick a few solid objects from around the house that are roughly the same size (or volume) and compare their densities. Which is denser, a pencil or a plastic straw? What about a roll of toilet paper or a soup can? Get creative and have fun.

Day 2

Chemistry: Investigate the Matter That Makes Up Your World | pp. 40–41

Look ahead to Week 22 to see further information about kinetic energy. [pp. 40-41]

Activity Sheet Questions | #5–7

Day 3

Chemistry: Investigate the Matter That Makes Up Your World | pp. 42–44

Activity Sheet Questions | #8–11

Optional: Do Together | Observing Changes

Use the QR code on p. 44 of *Chemistry: Investigate the Matter That Makes Your World* to see dry ice experiments. Then, work together to try the activity on p. 45. Gather clear, plastic cups of all varieties—short, wide-rimmed, and tall narrow-rimmed cups. Try the activity on p. 45 to see a demonstration of evaporation and condensation. Use caution when heating the water for this activity.

BookShark Science I Experiments Book

Note: Make sure you have a space in your freezer where everything can sit flat and undisturbed for a few hours. Prepare and place the 4 small plastic cups (milk, salt water, molasses, olive oil) to sit in the freezer overnight. (See steps 1-3 in Activity 1 for instructions to prepare the liquids the night before).

Day 4

BookShark Science I Experiments Book | #3 How Does Heat Energy Affect Different Substances? ■

Week 3 Activity Sheets

Super Simple Physics

1. Why does a substance expand as its temperature rises? (p. 215)

- ☐ each particle swells and gets larger when it absorbs heat
- ☒ its particles move faster which causes the substance to take up more space
- ☐ heat makes the electron shells get larger, so each atom takes up more space
- ☐ particles of heat move into the substance and add mass

2. Use the terms in the box to label each definition. (p. 216)

density	mass	volume

(mass): a measure of the amount of matter that makes up an object; usually measured in grams (g) or kilograms (kg).

(volume): the amount of space an object takes up; measured in cubic meters (m^3) or cubic centimeters (cm^3).

(density): the mass of a substance in a certain volume; measured in kg/m^3 or g/cm^3.

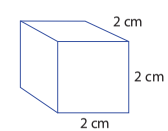
3. The density of an object depends on which **two** aspects? (p. 216)

- ○ the amount of space an object takes up the greater the space, the greater the density
- ○ the number of particles in an object
- ☒ the mass of its particles
- ☒ how closely packed the object's particles are

Week 3 Activity Sheets

4. Calculate or measure the volume and density of each object. (p. 217)

Volume=Length x Width x Height:



(2) cm X *(2)* cm X *(2)* cm = *(8)* cm^3

If the mass of the cube is 24g, what is its density?

$D = \frac{M}{V} = \frac{(24g)}{(8cm^3)} = (3g/cm^3)$

If the mass of the crown is 28g, what is its density?

$D = \frac{M}{V} = \frac{(28g)}{(7cm^3)} = (4g/cm^3)$

Chemistry

5. Moving objects have _____ energy, or motion energy. (p. 40)

electrical **chemical** **potential** **kinetic**

6. The particles of an object with a higher temperature also have:

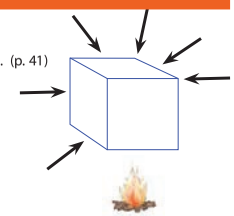
- ☒ greater kinetic energy…
- ☐ less kinetic energy…
- ☐ less volume…
- ☐ greater density…

…because when you measure temperature, you are measuring the average _____ of that substance's atoms.

kinetic energy **potential energy** **electrical energy** **density**

Week 3 Activity Sheets

7. When pressure around a substance increases, its melting point [↑] [↓]. (p. 41)



8. Which liquids will evaporate more quickly? (p. 42)

- [X] a liquid with a weaker attraction between molecules
- [ ] a liquid in a closed container
- [X] a liquid in an open container that allows for more surface area
- [X] a warmer liquid
- [ ] a cold liquid
- [ ] a liquid with a strong attraction between its molecules

DID YOU KNOW? Boiling water bubbles because the water is hot enough that its molecules turn into gas—or water vapor—inside the liquid.

9. Draw arrows between the states to show how matter will change given each condition. (p. 43)

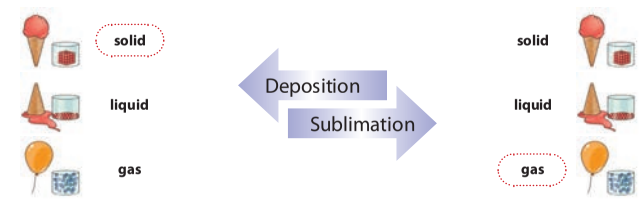
If you…	…matter will change states in which direction?
increase temperature or add energy:	solid → liquid → gas
decrease temperature or take away energy	solid ← liquid ← gas

Week 3 Activity Sheets

10. Match the terms to describe each example measurement. (p. 43)

Yuong measures and marks 4 feet on the floor with a new measuring tape twice, but his marks don't begin and end in the same spot.	inaccurate and imprecise
Colleen reads the temperature of boiling water as 98°C on the same thermometer three times. (Water boils at 100°C.)	imprecise, therefore inaccurate
Jonathan reads the temperature of boiling water on the same thermometer as 98°C, 100.2°C and 100°C.	accurate and precise
Brianna measures the temperature of boiling water three times as 100°C.	inaccurate, but precise

11. Deposition and sublimation is the change between which two states? Circle one term on each side. (p. 44)



Week 3 Activity Sheets

Super Simple Physics

1. Why does a substance expand as its temperature rises? (p. 215)

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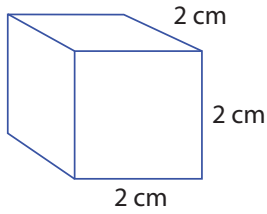
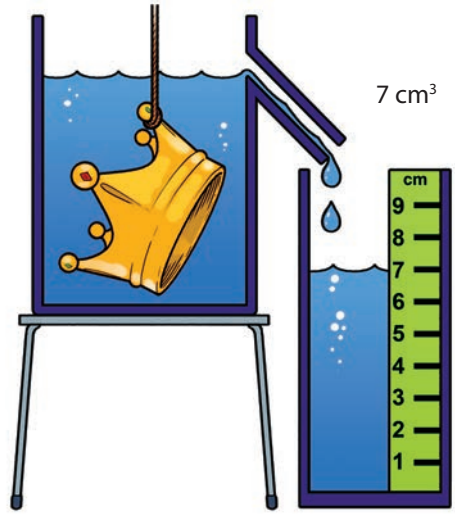
- ○ how closely packed the object's particles are

4. Calculate or measure the volume and density of each object. (p. 217)

Volume=Length x Width x Height:



_____ cm X _____ cm X _____ cm = _____ cm³



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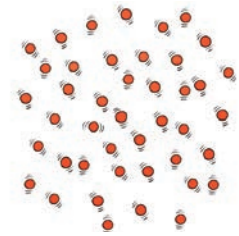

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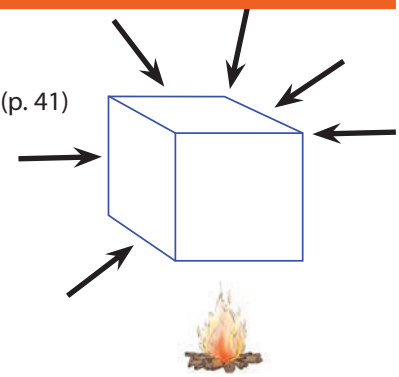

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