Teaching Alternator Books™

Key Questions in Physical Science

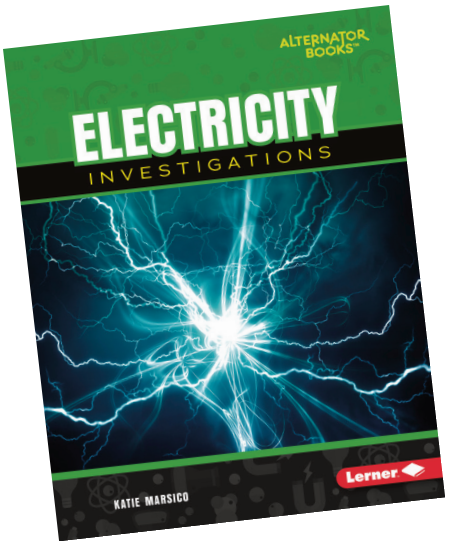
ALTERNATOR BOOKS™

Interest levels: Grades 3–6

Reading levels: Grades 4–5

Titles in this series:

Electricity Investigations
Energy Investigations
Forces and Motion Investigations
Magnetism Investigations
Sound and Light Waves Investigations
States of Matter Investigations



Reading Standards

Common Core State Standards

CCSS.ELA-Literacy.RI.5.1: Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-Literacy.RI.5.2: Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

CCSS.ELA-Literacy.RI.5.3: Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

CCSS.ELA-Literacy.RI.5.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS.ELA-Literacy.RI.5.5: Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.

CCSS.ELA-Literacy.RI.5.7: Draw on information from multiple print or digital sources, demonstrating the ability to locate and answer to a question quickly or to solve a problem efficiently.

CCSS.ELA-Literacy.RI.5.8: Explain how the author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

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LernerClassroom™
ISBN 978-1-5124-9791-5

Alternator Books™ — Key Questions in Physical Science

Electricity Investigations

ALTERNATOR BOOKS™

Reading levels: Grades 4–5

Subject: Science

Materials

- a book for each student
- chalkboard or dry-erase board
- dictionaries
- *Electricity Investigations* Activity handout (optional)
- pens, pencils, dry-erase markers

Reading Standards

- **CCSS.ELA-Literacy.RI.5.1:** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
- **CCSS.ELA-Literacy.RI.5.3:** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **CCSS.ELA-Literacy.RI.5.4:** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
- **CCSS.ELA-Literacy.RI.5.5:** Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.

Targeted Reading Strategy

Cause and effect.

Academic vocabulary: alternating, coils, electrical shock, energy, illuminate matter, observed, parallel, probe, repel, investigations, electricity, transformers, generators, electromagnetism

High-frequency words: developed, throughout, increasing, travels, enough, surrounding, extremely, produce, suggested, operated, parallel, energy

Before Reading

Build Background Knowledge

- Ask students what they know about electricity and how we get it. Ask them if they know who the inventor was and when electricity was invented. Have students share any other information they know about electricity; for example, what are some things that electricity is used for, how is electricity passed from one thing to another, are there different types of electricity, etc.? Make a list of the information that the students share.
- Give students their copy of the book. Show them the front and back covers and read the title. Have students discuss what they see on the covers. Have students share what type of book this is—genre, text type, fiction, nonfiction, etc.—and then have them discuss what it might be about.
- Show students the title page. Discuss the information on this page (title of book, author's name, illustrator's name).
- Preview the table of contents on page 3 of their book. Remind students that the table of contents gives readers an overview of the book. Ask students to look at the chapter titles and other information on the page and ask them what they expect to read about in the book from looking at this information (accept all reasonable answers).
- Have students preview the rest of the book looking at the photographs, captions, and other text features. Show students the glossary at the back of the book and have them tell you its purpose if they can; if not, explain the purpose.

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- Remind students of the strategies they can use to work out words they don't know. For example, they can use what they know about letter and sound correspondence to figure out a word. They can look at base words, prefixes, and suffixes. They can also use the context to work out meanings of unfamiliar words.
  - Remind students that they should always check whether a word makes sense by rereading it in the sentence.

Skill Introduction

- Discuss cause and effect relationships. Explain that a cause is an event that makes something happen, and the effect is what happens because of, or as a result of, the event. For example, the dog will bark if he is hungry. The dog being hungry is the cause and it barking is the effect.

Think-aloud: *When I read, I stop to figure out causes and effects to help me understand what I read. Sometimes there can be more than one cause that leads to an effect. In other cases, there may be one cause that leads to one effect, and still other times there may be one cause leading to several effects. For example, I read in chapter 1 that Benjamin Franklin proved that lightning had an electrical charge. So, the metal key served as a conductor when lightning struck and sparks flew. The metal key being the conductor is the cause and the lightning striking and sparks flying are the events that were caused.*

- Remind students that one way to find cause and effect relationships are to look for clue words such as *so, because, as a result, since,* and *for these reasons*. Chart these words or put them on the board for students and explain that sometimes they will see these words in the text they are reading. Have students finish these sentence starters for practice:
  - The students had a fundraiser because _____. (Accept all reasonable answers; for example, the baseball team needed to raise money.)
  - As a result, _____. (ex: the baseball team received new uniforms)
- Ask students what the cause and the effect is in each sentence and what the clue words are. Explain that sometimes sentences will not have clue words in them but there can still be a cause and effect.

During Reading

Check for Understanding

- Have students read through page 16 (you may want to place a sticky note there) reminding them to look for information about what electricity is and how currents are created. Fast finishers can reread until everyone is finished. Students should be reading silently or quietly to themselves so everyone can read at their own pace.
- Model targeted skill: Cause and effect.
- Explain that sometimes there can be more than one cause and effect relationship which is called a chain effect.
  - Cause ⟶ effect/cause ⟶ effect

Think-aloud: *I have learned that cause and effect relationships are important to understand when reading. I understand that the cause is an event that makes something else happen and that the event that happens is called the effect. I also figured out that effects can become causes of new events. This is called a cause and effect chain. Before, we talked about the baseball team having a fundraiser. The effect of the fundraiser was that the baseball team bought new uniforms with the money raised. So the fundraiser was both an effect and a cause because the team wanted to raise money and because they bought new uniforms. For example, in chapter 12 learned that a battery uses chemical reactions so electricity is made. As a result, flashlights and watches have electrical power.*

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- Have students add a sticky note to any page where there is a word they do not understand or cannot pronounce. Encourage students to use strategies they have learned to read each word and figure out its meaning.
- Have students read the remainder of the book and remind them to look for cause and effect relationships as they read.
  - Explain to students they will fill out a cause and effect worksheet when finished reading the book.

After Reading

Response to Text

- Ask students what words they marked in their books and go over them to build comprehension and to provide strategies on how they can read these words using context clues and decoding strategies.
- Discuss with students how identifying cause and effect relationships helped them better understand the text and why certain events took place in the story.

Think-aloud: *After reading the book, I better understood the content because I was able to think about what I was learning and how one event can cause something else to occur. Thinking about electricity and understanding how it effects other things makes me understand the process better. The cause and effect chain was very apparent in the ideas of electricity from the beginning stages to lighting up towns and cities.*

- Have students share what they have learned. Allow time for questions on cause and effect and ask students to give some oral examples from the text.
- Explain that they will work with partners to write down some causeand effect relationships from the text.

Word Work

- Introduce the academic vocabulary words. Pass out enough index cards to each student for the number of vocabulary words there are. Have students divide the index card into four sections with a pencil and number them. Have them write the word in the middle of the card and put a circle around it.
- Have students write down each of the vocabulary words on an index card. Explain that each of these words can be found in the book and that understanding what they mean will help in their reading comprehension. Students can work in pairs or in small groups. Have each pair or group of students discuss what they think each word means. Then have each student in the group write what they think the first word on the list means in the first section on their card using prior knowledge. Have them draw a picture in the second section of the card.
- Demonstrate how to use a dictionary for those that may need reminding. Use the word *alternating* as an example because it has a suffix. Remind students that when looking up words in a dictionary, they will be in alphabetical order, and that they use a dictionary to find the meaning of a word. Also, remind them that when a word has a suffix on the end of it, they will need to only look for the root word, which would be alternate. Have the students locate the word *alternate* in their dictionary and then write the real meaning on the third section of their card.
- Show the students the glossary at the back of the book and explain that the glossary is similar to the dictionary but has only a few words from the book. Explain that the glossary also only has one definition for each word where a dictionary has more than one definition for each word depending on how the word is used. Tell students they will have to find the definition that makes the most sense according to how the word is used in the glossary if it is there or how it is used in the book from the context clues.
- Lastly, find the word in the book and write the sentence it is used in. Also, write the page number that the word was found on—do this in the last section.

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Extension Activity

- Have students decide on creating an electricity project of their choice. They can do a research project, create an electrical board, demonstrate how a batter works, show how electricity works through various devices etc. Here are a list of ideas they can choose from:
  - Demonstrate and research how fast electricity moves.
  - Experiment with different electricity circuits.
  - Explain which has the bigger impact on the lifespan of a light bulb: the amount of times it is turned on and off or the length of time it is on.
  - Demonstrate whether or not electrical devices drain power when plugged in but not switched on.
  - Prove which type of battery lasts the longest.
  - Prove which materials conduct electricity the best.
  - Demonstrate how much electricity a television uses when on standby mode.
  - Generate electricity from an everyday activity.
  - What are some precautions to take when using electricity?
  - Decide if fruits and vegetables can be used to transfer electricity.
  - Prove the most energy efficient heating methods.
  - Compare various light bulbs for cost, energy consumptions, heat output, brightness, length of time they last, etc.
  - Explain and demonstrate the difference between AC and DC currents.
  - Demonstrate and tell what materials produce the most static electricity and why.
  - Build an electrical circuit that sets off an alarm if something is tripped (use your imagination).
  - Make your own compass.
  - What would happen if there weren't any magnetic field on Earth?
  - Build an electrical circuit with a working switch and explain how you did it.
  - Explain the characteristics of a magnetic field.
- Students can decide how they would like to present their work depending on their project. Some may choose to create a hands-on electrical circuit, some may use a story board and hands-on project, some may choose to create a PowerPoint, etc. Allow and encourage the creative juices to flow.

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Name: _____

Electricity Investigations Activity

In each box, write about the electricity investigations you learned about and find at least two events from each of the four chapters that show cause and effect. The cause is the event that makes something happen and the effect is what happens as a result of the event. Think about the examples provided in class.

Causes	Effects
Chapter 1: 1. 2.	Chapter 1: 1. 2.
Chapter 2: 1. 2.	Chapter 2: 1. 2.
Chapter 3: 1. 2.	Chapter 3: 1. 2.
Chapter 4: 1. 2.	Chapter 4: 1. 2.

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Alternator Books™ — Key Questions in Physical Science

Energy Investigations

ALTERNATOR BOOKS™

Reading levels: Grades 4–5

Subject: Science

Materials

- a book for each student
- chalkboard or dry-erase board
- dictionaries
- *Energy Investigations* Activity handout (optional)
- pens, pencils, dry-erase markers

Reading Standards

- **CCSS.ELA-Literacy.RI.5.1:** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
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Targeted Reading Strategy

Make inferences/draw conclusions.

Academic vocabulary: carbon dioxide, conserved, digestive system, electromagnetic radiation, geothermal energy hydropower, reflectors, renewable energy, turbines, potential energy, kinetic energy, nutrients, atmosphere

High-frequency words: research, conclusion, testing, temperatures, extreme, surface, process, release, pressure, reaction, appear, performed, visible

Before Reading

Build Background Knowledge

- Ask students to tell what they know about energy: how it is made and what it is? Have students discuss with small groups and then have them share their answers with the class.
- Give students their copy of the book. Show them the front and back covers and read the title. Have students discuss what they see on the covers. Have students share what type of book this is—genre, text type, fiction, nonfiction, etc.—and then have them discuss what it might be about.
- Show students the title page. Discuss the information on this page (title of book, author's name, illustrator's name).
- Preview the table of contents on page 3 of their book. Remind students that the table of contents gives readers an overview of the book. Ask students to look at the chapter titles and other information on the page and ask them what they expect to read about in the book from looking at this information (accept all reasonable answers).
- Have students preview the rest of the book, looking at the photographs, captions, and other text features. Show students the glossary at the back of the book and have them tell you its purpose if they can; if not, explain the purpose.

Skill Introduction

- Write the following words on the board or on chart paper: *waves, sandy shores, people swimming*. Read the words and tell students that these are details or pieces of information about a place. Ask the students if they can guess what place was described (ocean beach). Have students explain how they came to figure out their answer.
- Explain to students that they used two important pieces of information to figure out the answer:
  - details which were read to them
  - prior knowledge about subject

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Think-aloud: *As I read, I will make inferences, or draw conclusions using the details from the text plus what I already know about the subject. When I draw conclusions, I do not actually make drawings or pictures; I mean that I figure out the meaning of the text without the author actually saying what he/she means. For example, what kind of day is it? If warm, you begin to sweat or you may get sunburn. Think about what you know about the weather, temperature, and when you can get sunburned. Think about what kind of energy would do that and use the details provided to make an educated guess.*

- Write this chart on the board or on chart paper for the students to see:
  - Details in the text + What I already know = My inference or conclusion

During Reading

Check for Understanding

- Have students read through page 13 (you may want to place a sticky note there) reminding them to use inferencing to make connections and understand what they read. Fast finishers can reread until everyone is finished. Students should be reading silently or quietly to themselves so everyone can read at their own pace.
- Model targeted skill: Make inferences/draw conclusions.

Think-aloud: *Drawing conclusions has helped me better understand the ideas behind learning about the various forms of energy. On page 11, there is a picture of the sun radiating off the water. Looking at this picture, I can almost feel the warmth of the sun, and I know from experience that the sun gives off energy in the form of light and heat. Listen carefully as I read out loud the "Early Energy Discoveries." Pay attention to the details as I read this paragraph and underline them if needed. Explain why you think people wanted to know about whether the sun's energy could be used to power machines or not. Why would this be important for the Earth? (Accept reasonable answers and explain that using the details provided and using what the students already know allows students to draw conclusions).*

- Pass out the activity handout.
- Have students add a sticky note to any page where there is a word they do not understand or cannot pronounce. Encourage students to use strategies they have learned to read each word and figure out its meaning.
- Have students read the remainder of the book and remind them to use the details and what they already know to draw conclusions or make inferences.

After Reading

Response to Text

- Ask students what words they marked in their books and go over them to build comprehension and to provide strategies on how they can read these words using context clues and decoding strategies.
- Ask students to share with others what they learned about energy and what conclusions they were able to draw from their reading and from what they already knew about the subject.

Think-aloud: *We know that not all information in a book is stated directly and that drawing conclusions/making inferences allows us to understand ideas in the text on a deeper level. I know that after reading this book, we can infer that energy is all around us and that we get it from many sources.*

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· Have students work with a partner to complete the activity handout using the text.

Word Work

· Create a phonic boggle board game.
  – Have students make as many words as they can using the words from the chart. The letters must be adjoining in anyway as long as they all connect with no separations. They could be connected in a box or with two letters vertically and two horizontally. Words must be at least 3 letters long. Here is an example; you can use this board or create another one. Have students record their words on another sheet of paper.

U	N	A	G	W
I	S	R	E	O
A	H	E	N	P
T	A	G	R	A
O	M	Y	N	W

  > Example words to make: PAW, GAS (there are many words to go with the book's theme; there are some 4 and 5 letter words as well)

Extension Activity

· Learning about energy can be lots of fun. To demonstrate potential kinetic energy, create ping pong shooters with the class. When the balloons are stretched, they have potential energy; when they are released, they have kinetic energy, which they transfer to the ping pong balls. This energy transfers to the ping pong balls and is what shoots them across the room.
· Materials: (enough for 1 per student)
  – plastic cups
  – balloons
  – ping pong balls
· How to Make:
  – Cut the bottom ⅓ off of a plastic cup (the heavier cups work better: restaurant style, movie theater, or from a sports venue, etc.). Have an adult make the cut because a utility knife or a heavy pair of scissors works best.
  – Next, tie a balloon together so that there is no air in it.
  – Then cut the top off of the balloon.
  – Stretch the balloon around the mouth end of the cup.
  – Place the ping pong ball inside the open end of the cup.
  – To shoot the ping pong ball, pull on the knot end of the balloon and let go (be sure not to aim at anyone).
  – Have students measure how far their ping pong ball will travel. Mark each child's ball with their initials and mark a line on the floor to stand behind with masking tape. Have students each take turns shooting their ping pong balls and marking the floor with tape and their initials. Then measure how far they traveled with a yardstick or meter stick.
  – Decide what other objects students can use to shoot such as pom poms, erasers, unifix cubes, pieces of chalk, pen caps, jelly beans, marshmallows (large and small), etc.
  – Have students take notes as they observe and predict and infer which objects will travel the furthest, the least distance, etc.

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Name:_____

Energy Investigations Activity

Use clues from the text and from what you already know to draw conclusions about the learning. Try and come up with as many different inferences you can as you read about energy. Record the story clues, what you know, and the conclusions in the boxes.

Story Clues +	What I Know =	Conclusion

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Alternator Books™ — Key Questions in Physical Science

Forces and Motion Investigations

ALTERNATOR BOOKS™

Reading levels: Grades 4–5

Subject: Science

Materials

- a book for each student
- chalkboard or dry-erase board
- dictionaries
- *Forces and Motion Investigations* Activity handout (optional)
- pens, pencils, dry-erase markers

Reading Standards

- **CCSS.ELA-Literacy.RI.5.2:** Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
- **CCSS.ELA-Literacy.RI.5.4:** Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
- **CCSS.ELA-Literacy.RI.5.8:** Explain how the author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

Targeted Reading Strategy

Asking and answering questions.

Academic vocabulary: acceleration, air resistance, attraction, evidence, friction, gravity, mass, orbit, resists, universe, velocity, motion, forces

High-frequency words: quickly, questions, achieve, balanced, increases, travels, direction, distance, between

Before Reading

Build Background Knowledge

- Ask students if they know what makes things move. Ask them if they know how things are kept on Earth—why don't they float around? What holds everything here but not in space?
- Have students turn to the person to their right and share some responses. Then have them think about the best describing words to answer the questions above.
- Give students their copy of the book. Show them the front and back covers and read the title. Have students discuss what they see on the covers. Have students share what type of book this is—genre, text type, fiction, nonfiction, etc.—and then have them discuss what it might be about.
- Ask various students to share key words with the class and create a list on chart paper that can be used to describe forces and motion. These words will be used later while asking and answering questions.
- Show students the title page. Discuss the information on this page (title of book, author's name, illustrator's name).
- Preview the table of contents on page 3 of their book. Remind students that the table of contents gives readers an overview of the book. Ask students to look at the chapter titles and other information on the page and ask them what they expect to read about in the book from looking at this information (accept all reasonable answers).
- Have students preview the rest of the book looking at the photographs, captions, and other text features. Show students the glossary at the back of the book and have them tell you its purpose if they can; if not, explain the purpose.

Skill Introduction

- Explain to students that engaged readers ask questions before and during reading and look for answers to those questions as they read. Point out that asking and answering questions helps readers understand and remember what they read.

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Think-aloud: *The picture on the cover shows an athlete with cleats on and a soccer ball in the air. His foot is up so he looks like he just kicked the ball and the ball is now in motion through the air. I know the book will have something to do with motion and forces. I don't know much about how either of these works, so I turned to the table of contents to give myself some ideas about what this book will teach me. As I read the topics, I thought of some questions such as: what are some other things to learn about these topics? How do things move? How come the moon doesn't float away? As I read, I will look for the answers to these questions and any other new questions that I can think of.*

- Write the questions from the think-aloud on chart paper or on the board.
- Have students review the table of contents and pages 4 and 5 with a partner and discuss any other questions they might have.
- Ask for volunteers to share a question each with the rest of the class and while they do so, record their questions on the board or chart paper with pictures and underline any key words.
- Have students add a sticky note to any page where there is a word they do not understand or cannot pronounce. Encourage students to use strategies they have learned to read each word and figure out its meaning.
- Have students read the remainder of the book and remind them to think about questions they can ask as they read.

During Reading

Check for Understanding

- Have students read through page 17 (you may want to place a sticky note there) reminding them to look for information about motion and forces that will help them ask and answer questions about the text. Fast finishers can reread until everyone is finished. Students should be reading silently or quietly to themselves so everyone can read at their own pace.
- Model targeted skill: Asking and answering questions.

Think-aloud: *Earlier, I thought of questions I had before reading. I wanted to know how things not only move but stay in the air or travel from place to place without falling off the Earth. What are forces and how do they help things move? While I was reading, I learned that motion starts with a push and a pull of something which is caused by different kinds of forces. Did you know that friction is a type of force that demonstrates when objects touch and magnetism is a type of force demonstrating the kind of force when objects don't touch? After reading this far, I begin to think of some new questions such as how do objects stay in motion? I understand that gravity holds objects to the ground through gravity's pull, but how does it affect objects set in motion? As I continue reading, I will search for the answers to these new questions. Also, sometimes our first questions aren't answered right away; if that happens, we need to continue reading and search as we read the rest of the book. Sometimes, we even have to use outside resources to find the answers to our questions.*

- Write down the answers to any of the questions that were answered on the board or on the chart paper that were started earlier. Ask students to share an answered question they may have had.
- Have students discuss with a partner 2 or 3 more questions they have about pages 18–27 of the book. The students can do a quick review picture walk if needed.
- Have students mark a question mark or place a sticky note in their book beside any word they do not understand or cannot pronounce. Encourage them to use the strategies they have learned to read each word and figure out its meaning. This can be discussed after the book is read.

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After Reading

Response to Text

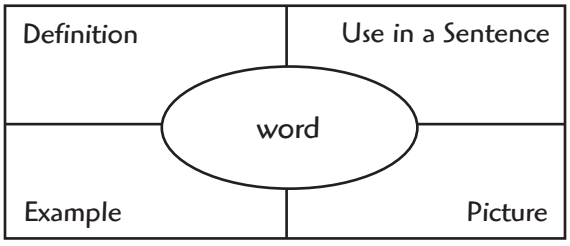
- Ask students what words they marked in their books and go over them to build comprehension and to provide strategies on how they can read these words using context clues and decoding strategies.

> **Think-aloud:** *Now that I have finished the book, I have all the answers from the reading that the book will give me for my questions. I finally learned that forces and motion work together. Forces are what makes all kinds of motion possible. There are many different kinds of forces such as: push and pull, gravitational, air resistance, etc. Think about whether or not the book answered all of your questions. If it didn't, one strategy is to use outside resources to find the answers to the other questions you may still have.*

- Have students finish filling out their asking and answering questions handout.

Word Work

- Play academic four square.
  - Have each student use the words from the academic vocabulary list to complete different four squares. Students can draw the four square on a piece of paper or you can create a four square template and photcopy for the students.



Extension Activity

- Have students pair up and read different versions of the *Three Little Pigs* or the *True Story of the Three Little Pigs.*
- Then have them create their own version of a pig's house using pretzel sticks, clay, popsicle sticks, foil, toothpicks, construction paper, mini-marshmallows, gum drops, straws, etc.
- Pair students so that they can brainstorm ideas together.
- Each team needs to construct a house using some or all of the materials provided. They will not be allowed to use any other materials. No glue, or fasteners, etc.
- The teacher will decide on how much time the students will have to construct the home. Each team will have the same amount of time and will choose from the same materials. The teacher can decide if the teams should be allowed to choose a particular number of materials or if they can choose to use all of the materials. This will be explained before the experiment begins.
- Students will have time to discuss with their partner how they would like to build their house. They may sketch the house, decide on materials being used, and decide on the look of the house. They may not test it out beforehand.
- Once the students have all their materials and the timer is set, students will be told how much time they're allotted; the teacher will set the timer. Students will be given a 5 minute warning time before ending time is near.
- When the timer is up, the teacher will try to use force (wind) to blow the house down. The final force will be a hair dryer. The team that has a house still standing at the end wins!
- Have each team tell what materials they used and why.
- Have fun!

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Name: _____

Forces and Motion Investigations Activity

Have students fill in the boxes before, during, and after reading.

	Question	Answer
Before Reading		
During Reading		
After Reading		

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Magnetism Investigations

ALTERNATOR BOOKS™

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Subject: Science

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Reading Standards

- **CCSS.ELA-Literacy.RI.5.3:** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **CCSS.ELA-Literacy.RI.5.8:** Explain how the author uses reasons and evidence to support particular points in a text, identifying which reasons and evidence support which point(s).

Targeted Reading Strategy

Fact or opinion.

Academic vocabulary: compass, magnetism, evidence, scientists, theories, magnetite, lodestone, protons, neutrons, electrons, magnetic field, domain, molten, radiation, friction

High-frequency words: everywhere, direction, opposite, temporary, align, removed, distances, immediately, demonstration, incredible, guides

Before Reading

Build Background Knowledge

- Ask students to tell the difference between fiction and nonfiction text. Remind students that as they read, they need to evaluate the information they are reading. Explain that one way to do this is to discriminate between what is fact and what is opinion.
- Have students turn to the person next to them and tell them one fact about the person and then one opinion (remind them opinions must be positive). Each person will have a turn to tell a fact and an opinion about the other person.
- Then on the board or on chart paper, create a fact and opinion chart that resembles the individual worksheets students will be working on. As a class, share the facts that were learned about each of the students, and then share some of the opinions. Discuss the differences between a fact and an opinion.
- Facts are statements that can be proven true and opinions are what someone thinks, feels or believes about something.
- Give students their copy of the book. Show them the front and back covers and read the title. Have students discuss what they see on the covers. Have students share what type of book this is—genre, text type, fiction, nonfiction, etc.—and then have them discuss what it might be about.
- Show students the title page. Discuss the information on this page (title of book, author's name, illustrator's name).
- Preview the table of contents on page 3 of their book. Remind students that the table of contents gives readers an overview of the book. Ask students to look at the chapter titles and other information on the page and ask them what they expect to read about in the book from looking at this information (accept all reasonable answers).
- Have students preview the rest of the book looking at the photographs, captions, and other text features. Show students the glossary at the back of the book and have them tell you its purpose if they can; if not, explain the purpose.

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Magnetism Investigations

ALTERNATOR BOOKS™

Skill Introduction

- Have students read to find out the magnetism investigations. Explain to students they will need to look for evidence in the book to prove what are the facts and what may be opinions, myths, legends, or stories that are passed down by others.

> **Think-aloud:** *It is important to think about whether the statements you are reading are facts or opinions by the author or by others as you read nonfiction text. Why do you think an author might include opinions in nonfiction text? (Accept all reasonable answers). Authors include this information to share their thoughts about the subject, to discuss different ways of thinking about a topic and to share legends, myths, or stories that may be passed down from generations. When I read, I look for evidence that proves whether a statement can be proven. If it can, I know the statement is a fact. For example, on page 7 of your books the author tells us that magnetite is a mineral that is a type of magnet. Is this a fact or opinion? Yes, it is a fact because it has been proven. Scientists have been able to figure out that natural magnets are stones, which are called lodestones and that the stones attracted iron. As scientists learned about magnets, they tested different materials to find out what materials were attracted to them and what materials weren't. Some scientists believed that diamonds would make a compass point north and that garlic made lodestones weaker; these were opinions because these theoriescould not be proven by scientific fact. We can read more about this on page 8 in our books.*

- Set the purpose by telling students that as they read; they need to think about what statements are facts and what may be opinions in the text. Explain that hypotheses in science are good guesses; they are not proven, so they are opinions, not actual facts. Have them record their answers on the facts and opinions T chart reproducible that is being handed out.

During Reading

Check for Understanding

- Have students read through page 13 (you may want to place a sticky note there) reminding them to look for facts and opinions about magnetism. Fast finishers can reread until everyone is finished. Students should be reading silently or quietly to themselves so everyone can read at their own pace.
- Model targeted skill: Fact or opinion.
- Have students review chapters 1 and 2 with the partner they worked with from earlier. Then have them talk about some details to determine facts and opinions from both chapters. Be sure that students use evidence from the text to support their ideas.

> **Think-aloud:** *As I read, I made sure to pay attention to scientific ideas as these are good indicators that the statement can be proven and is a fact. I know that facts can be researched by others to find out information about it in books, magazines, websites or other outside sources. I know that opinions tell how a person thinks or feels and that people do not prove opinions but decide if they agree or disagree with them. Some words to help me decide if something is an opinion are: best, fun, worst, like, should, shouldn't, good, etc. These are clue words and when I see them, or words like them, I usually have a pretty good feeling that the author is telling me their opinion about the topic and not a proven fact.*

- Have the students write down one fact from chapter 1 and one fact from chapter 2 to begin and then an opinion from one of the chapters on the worksheet provided. Have students share opinions they have about magnetism. Remind them that opinions are personal beliefs or feelings and they are based on the learning; they are something that others can agree or disagree with.

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- Have students add a sticky note to any page where there is a word they do not understand or cannot pronounce. Encourage students to use strategies they have learned to read each word and figure out its meaning.
- Have students read the remainder of the book and remind them to look for facts and opinions as they read.

After Reading

Response to Text

- Ask students what words they marked in their books and go over them to build comprehension and to provide strategies on how they can read these words using context clues and decoding strategies.
- Write the following statement on the board: *Scientists think that migrating animals can somehow sense Earth's magnetic field (page 16)*. Discuss with students whether this statement is a fact or an opinion (opinion). Emphasize that this is an opinion because another person may not feel the same way. There is no direct evidence of this—scientists are making an educated guess based on experiments they have conducted and theories they have studied. They have not yet been able to prove their theory yet. Some other words that are used to determine opinions are: *think, possibly, worst, best, most, fewest, all,* etc.

Think-aloud: *I know that when I read a nonfiction book, I need to think about the information that the author writes about. One way to think about the information provided is to determine which information is fact and which information is opinion. As I read about magnetism, I know that much of the information is factual. The author provided scientific evidence that demonstrates proven facts about the topic. I know that identifying facts and opinions can help me make decisions about what I read. When I read facts, I can check that they are true; when I read opinions, I can decide whether or not I agree or disagree with it.*

Word Work

- Play a make and break word game.
- How many words can you make using your academic vocabulary words or your high-frequency words?
- Each player should copy down one of the words on a sheet of paper. Have students sit across from an opponent. Teacher should set the timer for 5 minutes.
- Then have students write down as many new words as they can using the big word. They can only use one letter each time unless there is more than one of the same letters in the word. For example if the word has 2 –e's in it, the players can make a word using both –e's. However, they could not make a word with 3 –e's in it.
- The teacher may want to allow students to use magnetic letters to manipulate for each word when they make them. See which player can come up with the most words and score the most points using the same initial word.
  - Points are awarded as follows:
    - > 2 letter words = 1 point
    - > 3 letter words = 2 points
    - > 4 letter words = 3 points
    - > 5 + letter words = 5 points
- When the timer goes off, have each player read their words and have the opponent check that they are spelled correctly. If each player cannot read a word they created, or if it is not spelled correctly, the word does not count. The player with the most points wins that round; it does not matter how many words are made but how many points each player gets.
- Play as many rounds as time allows using different words from the lists. Each time, the teacher will reset the timer for 5 minutes.
- At the end of the final time, the player with the most points from each team is redeemed the winner.

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- If time allows have winners play winners and have a consolation round of the losing player playing the losing player.
- Have fun!

Extension Activity

- Make your own magnetic slime.
- Materials:
  - liquid starch (sta-flo liquid starch)
  - elmer's glue
  - iron oxide powder
  - disposable bowls for mixing slime or glass bowl container
  - craft sticks or spoons to mix
  - neodymium (rare earth) magnet (regular magnets won't be strong enough)
- How to Make:
  - Pour ¼ cup liquid starch into a bowl. Add 2 tablespoons of iron powder and stir until mixed well.
  - Add ¼ cup white school glue and mix; keep stirring until it mixes together.
  - Take slime out of bowl and continue mixing with hands. Squish with hands several times until well mixed. There may be some liquid left at bottom of bowl; that is fine, it is not part of the slime.
  - If hands turn black from mixing wash right away with soap and water or wear gloves when mixing with hands.
  - Put slime on a paper towel to get rid of any excess liquid. The finished slime will not make hands black, but the extra liquid will. Once the slime is 'dry' it will be ready to play with.
  - The neodymium magnets are very strong and should be kept away from all electronics including cell phones and computers. Also, make sure no one puts them in their mouth as if swallowed it could be very dangerous.
  - Always make sure when working with magnets there is adult supervision. This is not for young children!

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Name: _____

Magnetism Investigations Activity

List two facts and opinions from each chapter in each of the rows. Explain your thinking in the 'Why?' box.

	Fact	Opinion	Why?
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

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Alternator Books™ — Key Questions in Physical Science

Sound and Light Waves Investigations

ALTERNATOR BOOKS™

Reading levels: Grades 4–5

Subject: Science

Materials

- a book for each student
- chalkboard or dry-erase board
- dictionaries
- *Sound and Light Waves Investigation* Activity handout (optional)
- pens, pencils, dry-erase markers

Reading Standards

- **CCSS.ELA-Literacy.RI.5.1:** Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.
- **CCSS.ELA-Literacy.RI.5.2:** Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
- **CCSS.ELA-Literacy.RI.5.3:** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

Targeted Reading Strategy

Identify the main idea and details of the text.

Academic vocabulary: amplitude, compress, electromagnetic radiation, frequency, friction, longitudinal wave, medium, molecule, pressure, transverse wave, wavelength, meteorologist, vibrating, Doppler effect

High-frequency words: inquiry, studied, produced, compared, different, energy, properties, separated, slightly, measure, guitar, ambulance

Before Reading

Build Background Knowledge

- Make a three column chart on the board or on chart paper for the class to see. Label the chart 'Clothing' and ask students to tell you about different types of clothing that people wear. Ask students to tell about three different types of clothing that can be worn. Then ask students why people need these different types of clothing.
- Use the graphic organizer to record student answers; for example, mittens keep our hands warm, sneakers are used for running, shorts are used to stay cool, bathing suits are used to swim, etc.
- Explain that the main idea is what the topic is mostly about—clothing and the details are the ideas that support the main idea.
- Give students their copy of the book. Show them the front and back covers and read the title. Have students discuss what they see on the covers. Have students share what type of book this is—genre, text type, fiction, nonfiction, etc.—and then have them discuss what it might be about.
- Show students the title page. Discuss the information on this page (title of book, author's name, illustrator's name).
- Preview the table of contents on page 3 of their book. Remind students that the table of contents gives readers an overview of the book. Ask students to look at the chapter titles and other information on the page and ask them what they expect to read about in the book from looking at this information (accept all reasonable answers).
- Have students preview the rest of the book looking at the photographs, captions, and other text features. Show students the glossary at the back of the book and have them tell you its purpose if they can; if not, explain the purpose.

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Sound and Light Waves Investigations

ALTERNATOR BOOKS™

Skill Introduction

- Explain to students that as they read the book *Sound and Light Wave Investigations* they need to make connections with what they already know about the topic to help them read and understand the text and new information.

> **Think-aloud:** *As I preview and then read this book, I am going to think about what I know about sound and light and use that to make connections with the new information. When we created the graphic organizer about clothing earlier, we decided that the main idea might be that people wear clothing for different reasons. The details would be the types of clothing worn because they tell about the main idea. When I read books, I make sure to look and read the chapter titles and headings of the paragraphs to help me understand what the main idea will be about. Then I think about the ideas that support the main idea. The main idea is what the chapter or section is mostly about. Many times, the name of the chapter or section will give us this information or at least give us a big clue into what the section is mostly about. The extra information in the chapters or sections that help explain the main idea are the supporting details.*

During Reading

Check for Understanding

- Have students read through page 14 (you may want to place a sticky note there) reminding them to look for information to help them fill out their handouts. Fast finishers can reread until everyone is finished. Students should be reading silently or quietly to themselves so everyone can read at their own pace.
- Model targeted skill: Identify the main idea and details of the text.

> **Think-aloud:** *As I read, I make sure to read each chapter title and to use the text features to figure out the main idea and supporting details for that chapter. However, because chapters tend to be long, I also do the same for each heading that there is in the chapter. I then think about what I already know about the topic so I can connect prior knowledge with new knowledge as this helps organize my thoughts. In the first chapter, "How Does Light travel," I can deduct that I will be learning about the way light travels in the form of energy. I use what I know from the chapter title, from previewing the chapter, and from prior knowledge. As I find supporting details, I will underline them as this will help me remember them for later when we write them down on our worksheet. Remember, an author tells us a lot of information in a chapter but we are looking for the details that support the main idea.*

- Have students finish reading the book. Remind them to continue to underline the important information from each chapter as they read to help organize thoughts in search of the main idea and supporting details.
- Have students sticky note a question mark next to any word they do not understand or cannot pronounce. Remind and encourage them to use reading strategies to figure out how to read tricky and unknown words and figure out its meaning.

After Reading

Response to Text

- Ask students what words they marked in their books and go over them to build comprehension and to provide strategies on how they can read these words using context clues and decoding strategies.

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- Review with the students that the main idea is the most important part of the chapter or section the writer wants the reader to know and the heading or titles often give clues to the main ideas. Remind students that finding supporting details helps them understand and remember what they read.

Think-aloud: *Let's look at chapter 3. Who can tell me the main idea? Yes, the main idea of the chapter is where colors come from. What clues helped you decide that the main idea is about color. Can you find one detail in this chapter to support the main idea? (Accept all reasonable answers.)*

- Tell students they are going to fill out the main idea and supporting details worksheet. They can work with a partner if they choose and then the class will review it together.

Word Work

- Review nouns and proper nouns.
- Review with students that a noun is a word that names a person, place, or thing. Write the following sentence on the board: *In the early nineteenth century, British doctor Thomas Young used his observations of transverse waves in water to help him determine how light traveled.* Ask students to identify all the nouns in the sentence.
- Ask students why *British* and *Thomas Young* are capitalized. Explain these are proper nouns and that these nouns name specific persons or places because they are names, which are to be capitalized.
- Write the word *doctor* on the board or on chart paper. Tell students that this word is a regular noun because it tells about a person but does not tell a specific person's name and is not being used as a title in this sentence. Ask students to point to the proper noun in the sentence that refers to the name of the doctor. Explain that the word *doctor* is a regular noun and the name *Thomas Young* is a proper noun because it is the name of a person. Have the students notice that proper nouns need to be capitalized.
  - Have students look at the academic vocabulary words and the high frequency words to see if there are any nouns and proper nouns. Have students share what they are and write them on the board or chart paper explaining the difference and what makes a word a noun or a proper noun.
- Students will be asked to reread page 26 independently. Then they will copy the chart for nouns and proper nouns. Have students write down all the proper nouns they find from that page. Then have them write down the regular nouns and tell if it is a person, place, or thing next to the word.
- For example:

Proper Nouns	Nouns
September	Soldier (person)

Extension Activity

- Try some sound and light experiments.
  - Have students work in small groups and decide if they want to work on a sound or light project.
  - Once the type of project is confirmed, have the group decide what project they will do.
  - Some ideas are: demonstrating how sound is made, refraction and light experiments, musical jars, the science of sound, making music with water, demonstrating how light travels, high and low pitch sounds, homemade light box, homemade flashlight, speed of light with a chocolate bar, sound wave experiments, etc.
  - Have students work on projects together to demonstrate how these experiments work.
  - Students will have to present work so they need to decide how they will present.
  - Each student in the group needs to participate.

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Name: _____

Sound and Light Investigations Activity

Tell the main idea of each chapter and give at least supporting details.

Main Idea: How Does Light Travel?	1. 2. 3.
Main Idea: How Does Sound Travel?	1. 2. 3.
Main Idea: Where Do Colors Come From?	1. 2. 3.
Main Idea: What Makes Different Sounds?	1. 2. 3.
Main Idea: What Happens To A Siren's Sound?	1. 2. 3.

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Alternator Books™ — Key Questions in Physical Science

States of Matter Investigations

ALTERNATOR BOOKS™

Reading levels: Grades 4–5

Subject: Science

Materials

- a book for each student
- chalkboard or dry-erase board
- dictionaries
- *States of Matter Investigations* Activity handout (optional)
- pens, pencils, dry-erase markers

Reading Standards

- **CCSS.ELA-Literacy.RI.5.2:** Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.
- **CCSS.ELA-Literacy.RI.5.3:** Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
- **CCSS.ELA-Literacy.RI.5.7:** Draw on information from multiple print or digital sources, demonstrating the ability to locate and answer to a question quickly or to solve a problem efficiently.

Targeted Reading Strategy

Using text features to find information in a nonfiction book.

Academic vocabulary: atom, chemical reaction, combustion, magma, mass, melting point, mercury, molecule, matter, absorbs, observing, particle, evaporation

High-frequency words: temperature, surface, substances, changes, removing, different, immediately, problem, thought, concluded, several

Before Reading

Build Background Knowledge

- Give students their copy of the book. Show them the front and back covers and read the title. Have students discuss what they see on the covers. Have students share what type of book this is—genre, text type, fiction, nonfiction, etc.—and then have them discuss what it might be about.
- Show students the title page. Discuss the information on this page (title of book, author's name, illustrator's name).
- Preview the table of contents on page 3 of their book. Remind students that the table of contents gives readers an overview of the book. Ask students to look at the chapter titles and other information on the page and ask them what they expect to read bout in the book from looking at this information (accept all reasonable answers).
- Have students preview the rest of the book looking at the photographs, captions, and other text features. Show students the glossary at the back of the book and have them tell you its purpose if they can; if not, explain the purpose.

Skill Introduction

- Tell students that nonfiction books give important information. Nonfiction books are organized with text features so information can be found easily and quickly.

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Think-aloud: *I know that nonfiction books have specific features that help me as I am reading. For example, the title tells me what the book will be about, but the table of contents gives me more information such as main topics that will be discussed. Who can tell me the names of some of the chapters in this book? On what page can I start reading about "How Fire Changes Wood?" The table of contents is such an important text feature in a nonfiction book. Not only does it tell us where we can find specific information, but it tells us the main topics for the information on those pages. This is helpful when we are looking for specific information. When we read nonfiction books, we do not always need to read the entire book, and we do not always need to read in a certain order depending on our purpose. If we are reading to only learn about what happens when a volcano erupts, where would we begin reading? (Give time for students to answer). Yes, that is correct, we would begin on page 26. We might have to use other sources for more information, but this would be a good start.*

- Can anyone tell me other text features that nonfiction books have? Review other text features including: title page, headings (p.8), glossary (p. 30), diagrams (p. 15), experiment (p. 28), captions (p. 4), images (p. 9), further information (p. 31), bold printed words (p. 17), and index (p. 32).
  – As you are reading today, I want you to be on the lookout for all of these text features.

During Reading

Check for Understanding

- Have students read through page 15 (you may want to place a sticky note there) reminding them to look for text features that help students understand information that the author wants them to learn about the states of matter. Fast finishers can reread until everyone is finished. Students should be reading silently or quietly to themselves so everyone can read at their own pace.
- Model targeted skill: Using text features to find information in a nonfiction book.

Think-aloud: *I placed a sticky note at the bottom of page 4. Let's turn to page 4. Do you see the black rectangle at the bottom of the page? The black rectangle is a special text feature called a caption that tells important information about the photograph. It explains that matter is all around us and that there are three forms of matter: solid, liquid and gas. Without that caption, it may be difficult for the reader to decipher what exactly is happening in the photograph. Yes, we see a picture of a person about to dive into a pool; however, thinking about matter, we now realize that the diving board is a slide, the air he is breathing in before taking the dive is a gas, and the pool water he is about to dive into is a liquid. The photograph clearly is an example of all three states of matter. I also put a sticky note on page 15 because there is a diagram showing how water changes when heat is added to it. If you look closely at the diagram, an ice cube begins in the solid state; when heat is added to it, it becomes water as the molecules move faster. The heat changes the state of matter. As more heat is added to the liquid, it becomes gas or steam. Think about boiling water on a stove. If you leave the water boiling for too long, it will eventually evaporate or disappear as it continues to turn into steam, a gas. The diagram helps readers visualize the words the author is trying to explain and get across. This helps readers better understand the text.*

- Have students finish reading the book. Remind them to look for text features that help them better understand important information from each chapter as they read.
- Have students add a sticky note to any page where there is a word they do not understand or cannot pronounce. Encourage students to use strategies they have learned to read each word and figure out its meaning.

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After Reading

Response to Text

- Did you discover any new information about the states of matter? Let students discuss orally what they learned. Monitor their comprehension based on their answers. Ask them to identify evidence from the text to support their answers.
- Ask students what words they marked in their books and go over them to build comprehension and to provide strategies on how they can read these words using context clues and decoding strategies.

Think-aloud: *I learned so many facts from the text features in the book. On page 11, I read the caption that tells and shows how ice in a drink, a solid, will melt from the heat of the sun. The ice will turn to liquid because the molecules begin moving faster. If more heat is added to the liquid, the molecules will continue to move even faster, causing the liquid to once again change into a gas. If the temperatures got cold again, the molecules would slow down and the liquid would turn back into ice, a solid once again. Think about the winter time when it rains or snows. In the daytime, the snow or rain may turn to liquid if the sun melts it because of the warm air. However, once the sun goes down and temperatures drop again, the water that melted refreezes and turns into solid ice again. This is where we get the term black ice because the water on the streets has refroze.I t looks wet but is actually frozen and can be very dangerous for cars and pedestrians. Using text features helps organize thoughts and gives the readers many visuals to put photographs, meaning, and better understanding to the facts presented in the text.*

- Ask students to identify other information they learned by using the text features. Accept all reasonable answers.
  - Fill out the text features handout.

Word Work

- Play a vocabulary game.
  - Have students draw a picture of each vocabulary word (academic and high-frequency) on index cards. Then have them write the words on a separate card.
  - Play a matching game by shuffling the picture cards and the written word cards together.
  - Place all cards face down. Play with 2-4 people.
  - First player must choose two cards and try to match the picture and vocabulary word.
  - If it is a match, the player must read the word correctly and give the definition before they can make the match. If the player cannot do that, the player must place them back in the pile. If the player makes the match, reads the word, and tells what it means from looking at the picture, they keep the cards and take another turn. The first person to get the most pairs of cards wins.
  - When finished, give each student a ziplock bag to keep their pack of cards in. Students can use cards throughout the day when they finish work early or can use at home to help learn words.

Extension Activity

- Make some root beer floats.
- Be sure that no one in the class is allergic to any of the ingredients and get permission from parents prior to doing science experiment with the students.
- Materials:
  - large, clear plastic cups (16 oz.)
  - vanilla ice cream
  - root beer

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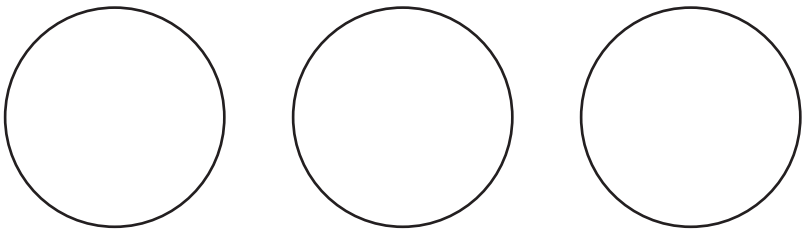
- ice cream scooper
- napkins
- straws

· How to Make:

- Pour root beer into cup.
- Add a scoop of vanilla ice cream.

· Think about these questions as you make your float and observe your float before drinking.

- What state of matter is each part of the root beer float?
  - > Cup?_____
  - > Ice Cream?_____
  - > Root beer? _____
  - > Foam?_____
- Draw what happens to the molecules in each state of matter:



Solid Liquid Gas

- What happened when the ice cream was put into the root beer? Why do you think this happened?
- What happens when something melts? The state of matter changes from a _____ to a _____ and the molecules move _____.
- What happens when a _____ is refroze? The molecules _____ down. This causes them to _____ and the state of matter changes from a _____ to a _____.
- Can a solid turn into a gas? Explain how.

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Name: _____

States of Matter Investigations Activity

Use the book to answer the text feature clues.

Text Feature clue . . .	Answer
What is the title? Where can you find this?	_____ _____
Turn to page 5. What are the words in the black box called?	_____ _____
What page can you find how a fire extinguisher works? What text feature did you use to find this?	_____ _____
What is the labeled picture on page 25 called? What is the picture showing?	_____ _____
What does the heading on page 12 say?	_____ _____
Where can I find the meaning of the word mercury? What is the meaning?	_____ _____
If I wanted to read about how heat melts ice, what pages would I read? What did you use to find this information?	_____ _____

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