SUMMARY
This book explores light energy and sound energy. It is designed to encourage students to compare the similarities and differences between the two, and to show how they affect our lives. Light and sound are forms of energy. Unlike matter, light and sound do not take up space or have mass. One important difference is that light does not require a medium to travel through, but sound does.

Chapter 1 deals with the properties of light and how light interacts with materials.
Chapter 2 explores the properties of sound and how sound interacts with materials.
Chapter 3 deals with how light and sound are used to make our lives better as well as the associated problems.

INTRODUCING THE BOOK
• Show students the cover of the book. Draw their attention to the title and the visual. Read the title aloud. Ask them what they think the book might be about. Ask them to predict what they might learn from the book. Predicting
• Ask students to suggest things they know of that produce light and sound. Put important words from this conversation on a word wall. Add important words about light and sound to the word wall as you work through the book. Consider posting key words in the first languages of your students, as well as in English. You could also post cognates. Activating prior knowledge, Building vocabulary
• Look at the Contents page. Match the chapter titles and subtitles with the visuals. Ask students what they think each chapter is going to be about. Activating prior knowledge
• Have students complete the first two columns of a KWL Chart to record what they know and want to know about Light and Sound. Ask them to update their charts at the end of each chapter. Activating prior knowledge
• Before reading each chapter, review the Key Terms and glossary words (in magenta) to help students become familiar with important words and concepts. Help English language learners (ELLs) find translations and cognates in their first languages or pair them up with students who speak the same first language. Using science terminology, Building vocabulary
• Ask students to identify additional sources of light and sound in the room or on a walk through the school or community. Identifying

CHAPTER 1
LIGHT (PAGES 6 – 7)
BEFORE READING
• Ask students what they know about the words “natural” and “artificial.” Write the Big Idea on the board. Put a T-chart on the board with the headings “natural” and “artificial.” Give some examples supported by visuals such
as live flower/plastic flower, live grass/Astroturf, and ice on a pond/ice in an arena, and list them on the chart. Ask students to suggest other examples. **Building vocabulary**

**DURING READING**
- Draw students’ attention to the chapter title and make sure they understand that this is the most important title. Then draw their attention to the headings. Explain the Big Idea and help students connect it to the text. **Using text features**
- Introduce the content vocabulary and encourage students to point to each labelled part of the visual as you read the page aloud. Consider doing a Think Aloud as you read. **Building vocabulary**

**AFTER READING**
- Ask students to identify each object labelled as a source of natural light or artificial light. **Identifying**
- These pages could be used to do a cloze activity. **Building vocabulary**

**Possible answers to the questions on page 9**
**Building vocabulary, Thinking critically**
A1. Natural sources of light: lightning, forest fire, jellyfish, or sun. Students may give other answers.
A2. We have artificial sources of light because sometimes we need light when there is no natural source of light.

**EMITTING OR REFLECTING LIGHT (PAGES 8 – 9)**

**BEFORE READING**
- Show students an emitter of light such as a flashlight and a reflector of light such as a mirror. Emphasize the meaning of the words “emit” and “reflect” using the flashlight and mirror to demonstrate. Ask students if there are words in their first languages that look like “emit” or “reflect.” Post cognates on the word wall. **Using science terminology**

**DURING READING**
- Introduce the content vocabulary and encourage students to point to each labelled part of the visual as you read the page aloud. **Building vocabulary**
- Ask questions such as the following with the class filling in the underlined answers: **Q. What does the sun make? A. The sun makes light. Q. What is another way of saying “The sun makes light”? A. The sun emits light. Using science terminology**

**AFTER READING**
- Help students understand that they classify whenever they sort items into classes, just like they are sorted into classes at school. You may want to explain that properties are how something looks or acts and that we classify things by properties that are the same or different. Ask students to classify the students in the class by gender. They could make a T-chart on the board with the headings “girls” and “boys” and write in the number of each or classify objects by characteristics using a **Making Comparisons** chart. **Using Science terminology, classifying**

**Possible answers to the questions on page 10**
**Using Science terminology, Building vocabulary**
A1. Light can travel through transparent materials and translucent materials.
A2. Light does not go through an opaque material.
Conduct **Activity 1: Test Light and Materials** on page 11 to reinforce the idea that materials can be transparent, opaque, or translucent. The bigger the variety of materials that can be tested the better. Dim the lights so students can make more accurate observations. **Observing, Classifying, Using science terminology, Thinking critically**

**Analyze & Reflect**
A1. It was easy to decide for some materials. For some materials, it was hard to decide if all of the light was passing through.
A2. It was easy to decide for some materials, but it was hard to decide for materials that are almost transparent.

**MOVEMENT OF LIGHT (PAGES 12 – 13)**

**BEFORE READING**
* Study the diagram at the top of page 12. As you say each word aloud, ask students to begin at the source of light and trace the arrows for “reflected,” “transmitted,” “absorbed,” and “refracted.” Add these words to the word wall. Ask students if there are words in their first languages that look like these words. Add cognates to the word wall. **Building vocabulary, Using science terminology**

**DURING READING**
* Introduce the content vocabulary and encourage students to point to each labelled part of the visual as you read. **Building vocabulary**
* Draw students’ attention to the images that support the text. **Using text features**

**AFTER READING**
* Students may need extra practise with classification. You could write the names of the things that are classified in the chapter on sticky notes and ask students to classify them on a chart using headings such as “transparent,” “opaque,” and “translucent.” **Classifying**

Conduct **Activity 2: Reflect and Refract Light** on page 13 to reinforce the idea that objects can reflect or refract light. Flashlights that shine a thinner, more intense beam of light work best. Students should notice that the pencil looks bent. This is because light is refracted each time it travels from one medium to another so from air (gas) to water (liquid). **Observing, Classifying, Using science terminology, Thinking critically**

**Analyze & Reflect**
A1. When light is reflected, it bounces off the object.  
A2. When light is refracted, it bends.  
A3. Students should talk about how the spoon looks bent when it is viewed from the side of the glass. Help them to understand that it is the light refracting (bending) that makes this happen.

**SOUND (PAGES 14 – 15)**

**BEFORE READING**
* Review students’ understanding of the words “natural” and “artificial.” Write the Big Idea on the board. Review the T-chart the class made about “light.” Explain that there are also natural and artificial sources of sound. Put a new T-chart on the board with the title “Sound” and the headings “natural” and “artificial.” Give some examples of natural sounds, supported by visuals or sounds, such as a baby crying. Then some artificial sounds such as an alarm clock. Ask students to suggest other examples. **Activating prior knowledge, Classifying**

**DURING READING**
* Draw students’ attention to the chapter title and make sure they understand that this is the most important title. Then draw their attention to the headings “Natural Sources of Sound” and “Artificial Sources of Sound.” **Using text features**
* Ask students to examine the visuals and read the pages silently. Then read the text aloud with students pointing to each visual as you read. **Building vocabulary**

**AFTER READING**
* Ask students to identify each object that emits sound and reproduce the sound with their voices. **Building vocabulary**
* These pages could be used to do a cloze activity. **Using science terminology**

Possible answers to the questions on page 15
**Connecting text to self, Thinking critically**
A1. Answers will vary. Draw similarities between students’ favourite natural sounds.
A2. Answers will vary. Draw similarities between students’ favourite artificial sounds, and discuss how they are different from their favourite natural sounds.

**SOUND VIBRATIONS (PAGES 16 – 17)**

**BEFORE READING**
* Write the Big Idea on the board and read it aloud. Activate student thinking by acting out “vibrates” with your hands. Ask students to put their hands gently on their throats as they hum to feel the vibration. **Building vocabulary, Observing**

**DURING READING**
* Introduce the content vocabulary and encourage students to point to each labelled part of the visual as you read the pages aloud. Draw students’ attention to the numbered text and make sure they understand the correlation to the visual. **Building vocabulary, Using text features**
• Point out each example of sound waves travelling and read the text aloud. Emphasize the medium each sound is travelling through (solid, liquid, gas). Building vocabulary

AFTER READING
• Ask students what words should be added to the word wall. Building vocabulary
• Consider conducting Activity 3: Make a Cup Phone to reinforce the connection between sounds, vibrations, and how sound travels.

Possible answers to the questions on page 17
Building vocabulary, Using science terminology
A2. Sound travels in waves.

SOUND AND MATERIALS (PAGES 18 – 19)

BEFORE READING
• Write the Big Idea on the board and read it aloud. Remind students about how light interacts with materials. Light can be reflected, absorbed, transmitted, or refracted. Show them these words on the word wall. Building vocabulary, Using science terminology
• Read aloud the FYI about echoes. Ensure that students understand what the words “echo” and “reflect” mean. If possible, find a place to demonstrate echoes such as in a gym or someplace outside. Building vocabulary

DURING READING
• Encourage students to trace each arrow with their fingers as you read the text aloud. Ensure that they understand that the arrows suggest the meaning of each word. Point out each example of sound waves travelling and emphasize the material it is interacting with. Building vocabulary, Using science terminology

AFTER READING
• Have students use skipping ropes to make models of the different waves. They can move a skipping rope that is lying on the floor up and down or make stationary waves. If they make stationary waves, encourage them to label their waves as representing loud sounds, quiet sounds, high sounds, or low sounds. Making models
• Students could work in small groups to make lists of sounds that are loud, quiet, high, or low. Using science terminology, Building vocabulary

Possible answers to the questions on page 18
Building vocabulary, Using science terminology, Connecting text to self
A1. The cloth curtain absorbs sound.
A2. Students may have heard an echo in the outdoors or in an underground parking garage. An echo occurs when a hard material reflects the sound.

Possible answers to the questions on page 19
Building vocabulary, Using science terminology
A1. The sound is different in each jar because there is a different amount of water and that changes the vibrations.

A2. Sound is travelling through the string. Sound waves are being transmitted through the string.

Analyze & Reflect
A1. Listen for students’ reasons and point out similarities and differences in their results. Work toward a conclusion about which materials worked best.
A2. Sound is travelling through the string. Sound waves are being transmitted through the string.

DIFFERENT SOUNDS (PAGES 20 – 21)

BEFORE READING
• Write the Big Idea on the board and read it aloud. Demonstrate different sounds such as crumpling paper or scrapping a chair across the floor. Ask students to describe each sound. Activating prior knowledge, Describing

DURING READING
• Introduce the content vocabulary and match each word to its photograph. Building vocabulary
• Emphasize the size and shape of each wave. Ask students to trace the waves with their fingers as you read the descriptions aloud. Using science terminology

AFTER READING
• Have students use skipping ropes to make models of the different waves. They can move a skipping rope that is lying on the floor up and down or make stationary waves. If they make stationary waves, encourage them to label their waves as representing loud sounds, quiet sounds, high sounds, or low sounds. Making models
• Students could work in small groups to make lists of sounds that are loud, quiet, high, or low. Using science terminology, Building vocabulary

Possible answers to the questions on page 20
Building vocabulary, Using science terminology
A1. Big vibrations make loud sounds.
A2. Slow vibrations make low sounds.

Conduct Activity 4: Test Pitch on page 21 to reinforce the idea that sound is created by vibrations and that different vibrations create different sounds. If you do not have enough equipment for multiple small groups, this experiment could be set up as a station, with students visiting it over the next few days. Experimenting, Observing, Thinking critically

Analyze & Reflect
A1. The sound is different in each jar because there is a different amount of water and that changes the vibrations.
A2. The harder you tap the jar, the louder the sound. The gentler you tap the jar, the quieter the sound. Big sound waves make loud sounds and small sound waves make quiet sounds.

CHAPTER 3
USING LIGHT & SOUND (PAGES 22 – 23)

BEFORE READING

• Write the Big Idea on the board and read it aloud. Ask students how they use light energy and sound energy. Identifying

• Make a mind map of words and pictures that show what students know about light and sound. Ask students to contribute words and/or pictures to the mind map. Activating prior knowledge, Building vocabulary

DURING READING

• Draw students’ attention to the chapter title and make sure they understand that this is the most important title. Emphasize connections to their own lives and experiences. Using text features, Connecting text to self

• Encourage students to point to each labelled part of the visual as you read aloud. Ask them which visuals show combinations of light and sound. Building vocabulary

AFTER READING

• You may want to show students a performance of Inuit throat singing which can be found on the Internet. Connecting text to world

Possible answers to the questions on page 21

Building vocabulary, Using science terminology

A1. Photos showing light being used include baby monitor, laser eye surgery, movie theatre.

A2. Photos showing sound being used include smoke alarm, Inuit throat singers, sound signal, movie theatre.

PROBLEMS WITH LIGHT (PAGES 24 – 25)

BEFORE READING

• Write the Big Idea on the board and read it aloud. Ask students for problems light can cause. Record their ideas on chart paper. Post it on the wall. Thinking critically, Identifying

DURING READING

• Ask students to skim and scan the pages to find other problems light can cause. Add these to the chart paper list. Skimming and scanning

• Introduce the content vocabulary and encourage students to point to each labelled visual as you read aloud. When reading about protecting yourself from sound, encourage students to follow the arrows that connect the visuals. Building vocabulary

AFTER READING

• Ask students why it is important to protect our ears from loud sounds. Ask students to identify one way they will try to protect their ears from sound in the future. Identifying

• Encourage students to compare the problems with sound to the problems with light. Talk about which problems are more serious and whether light or sounds cause more important problems. Thinking critically, Determining importance

Possible answers to the questions on page 27

Identifying, Evaluating, Connecting text to self

A1. Draw students’ attention to similarities in the noises they do not like.

A2. The photos show people protecting their ears with ear muffs, earplugs, and turning down the volume. Ask students if they have used any of these methods to protect their ears.
Conduct Activity 5: Find Out About Jobs on page 28 to encourage students to explore careers and determine which ones require knowledge of sound and/or light. Encourage students to think about other jobs they may be interested in and which of those jobs might require knowledge of sound and/or light. Observing, Inferring, Connecting text to world, Connecting text to self

Analyze & Reflect
A1. Students will choose different jobs that they would like best.
A2. Encourage students to write detailed reasons for why they would like the job.

Conduct Activity 6: Listen for Noise Pollution on page 29 to encourage students to become more aware of noise pollution. The blindfold (or closing their eyes) may help them focus on listening. Observing, Identifying, Questioning, Evaluating

Analyze & Reflect
A1. Students may have more noises listed under “with blindfold.” If so, ask them why.
A2. Discuss differences in opinion regarding which sounds are noise pollution and why this might be.

CONNECTIONS (PAGES 30 – 31)
THINK LIKE A SCIENTIST
Students use what they have learned about sound to design and build a musical instrument. Use the visuals to discuss different instruments and how they make sounds. Students may choose to copy one of the instruments or invent a new instrument. Problem solving, Experimenting

COMMUNICATE
1. Students may require sentence starters to communicate about their designs.
   “My instrument makes a sound by…”
   Communicating, Using science terminology
2. Match students with a partner to demonstrate their instruments to one another. Communicating, Presenting

VOCABULARY
1. Students may require scaffolding to choose their dictionary words. You might also provide them with a chart to fill in. Building vocabulary, Using science terminology
2. You could have two students work together to make their lists of science words and everyday words. Encourage use of first language for beginner ELLs. Building vocabulary, Using science terminology

REVIEW
Assign pairs of students different questions. They can practise by discussing the answer with each other, before giving the answer to the class. If possible, pair students who speak the same first language for discussion and then have them report in English.

Possible Answers to the Review Questions
A1. Artificial source of light: light bulb, fire works, candle, or light stick
A2. Objects that make light: firefly, lightning, light bulb, or light sticks
A3. Problems that light can cause: light can keep people up at night, use up electricity, or attract birds to buildings
A4. How to protect yourself from the sun: use sunscreen, wear sunglasses or a hat, or sit in the shade
A5. Vibrations make sounds.
A6. When sound is reflected, it bounces off a surface.
A7. Sounds can make loud noises that bother some people.
A8. You can protect yourself from sound by wearing earmuffs, earplugs, or turning down the volume
## CAUSE AND EFFECT

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# K-W-L Chart

**Topic:**

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PLANNING MY RESEARCH

1. The purpose of my research is ...

2. The main question I want to answer using my research is ...

3. I plan to use these resources to do my research ...

4. This is how I will decide if a source is reliable ...

5. I think the following resources will be the most helpful ...