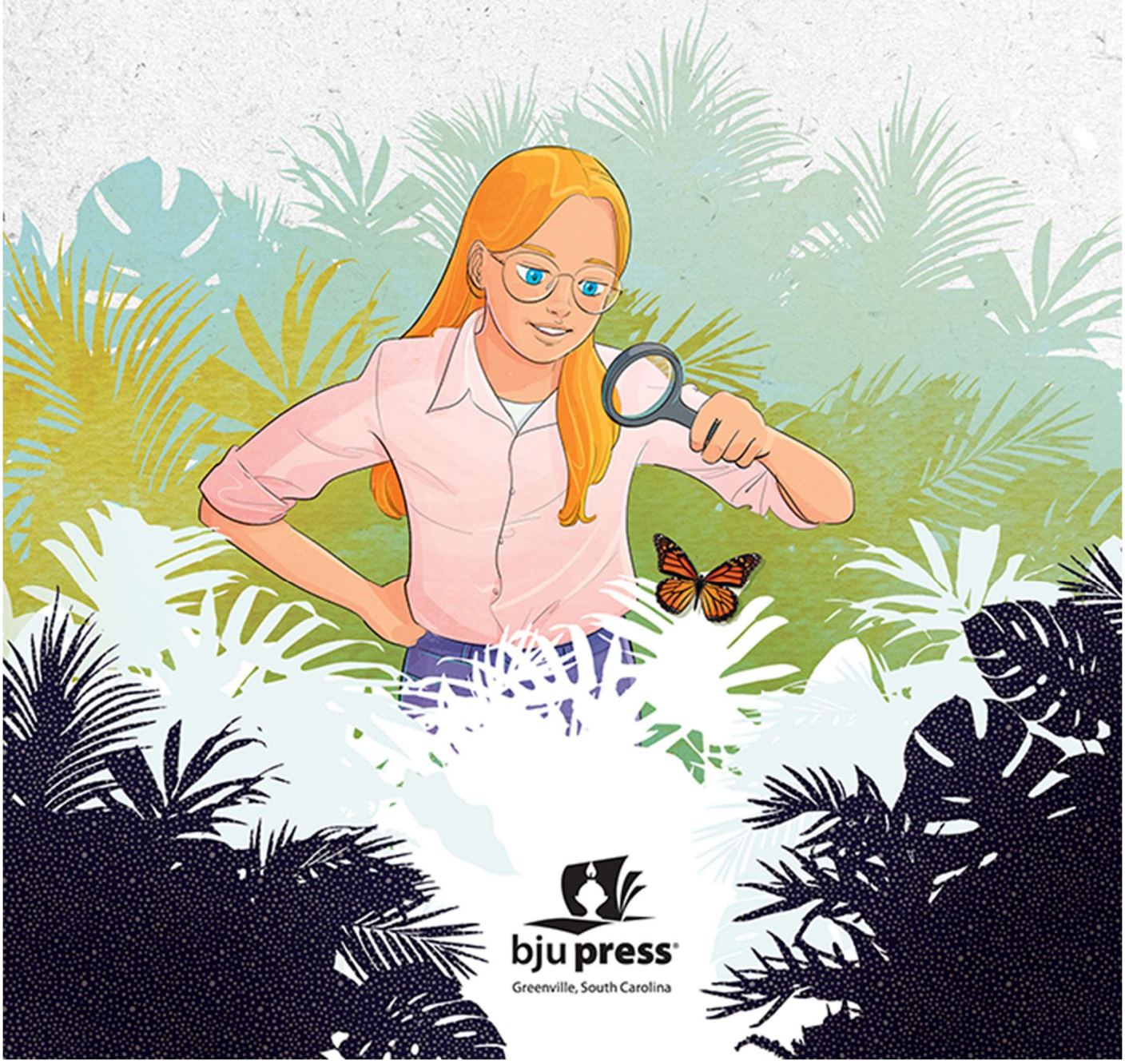
exploring SCIENCE

FIFTH EDITION



bju press
Greenville, South Carolina

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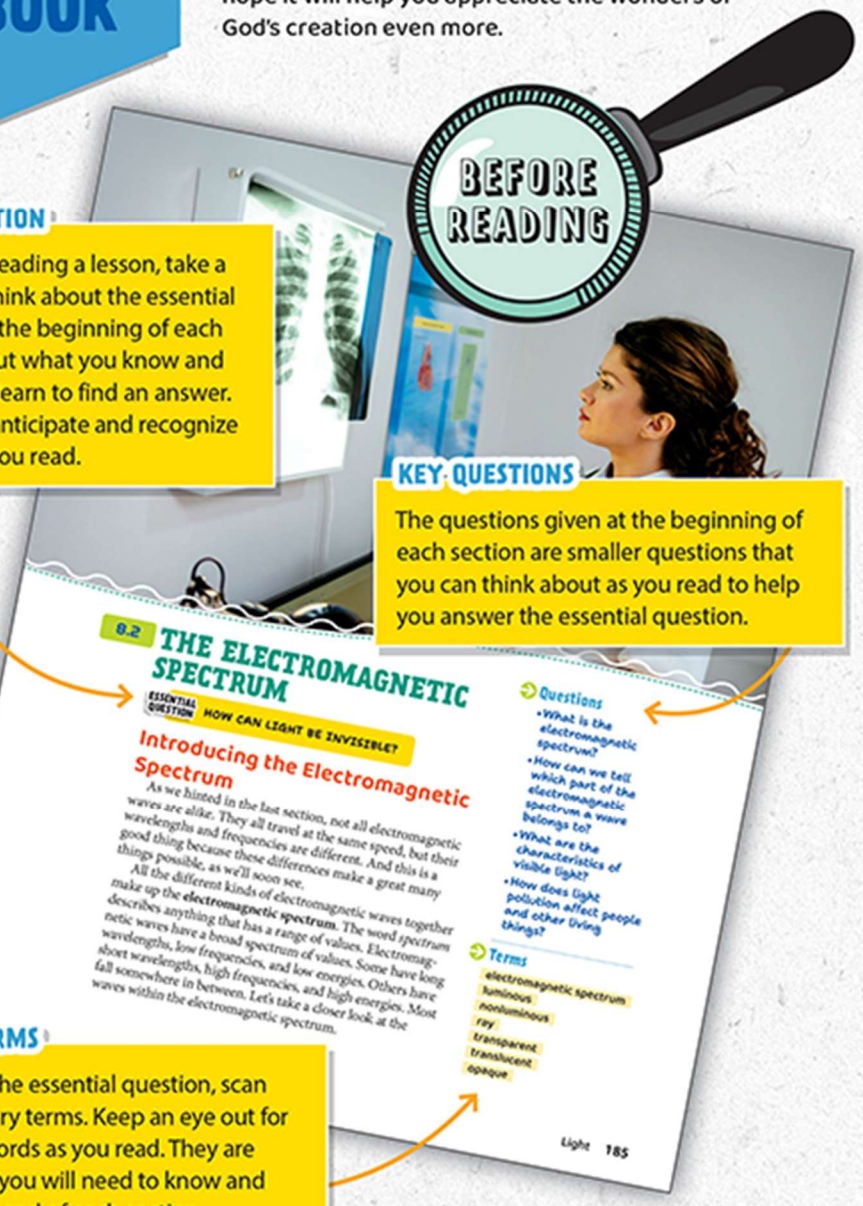
USING YOUR TEXTBOOK

This textbook is just for you! We've designed it to help you learn. Flip through the following pages to see its features. We believe these will help you succeed in science. In the back of the book you will see other features, including a glossary and index. We've designed this textbook with you in mind. We hope it will help you appreciate the wonders of God's creation even more.



ESSENTIAL QUESTION

Before you begin reading a lesson, take a few moments to think about the essential question found at the beginning of each section. Think about what you know and what you need to learn to find an answer. This will help you anticipate and recognize the key points as you read.

KEY QUESTIONS

The questions given at the beginning of each section are smaller questions that you can think about as you read to help you answer the essential question.

VOCABULARY TERMS

After considering the essential question, scan the list of vocabulary terms. Keep an eye out for these boldfaced words as you read. They are the key terms that you will need to know and understand by the end of each section.

DURING READING

Boldface Terms

Vocabulary terms are printed in **boldface**. They are accompanied by a definition when they first occur in a lesson. You will find all these terms in the glossary at the back of the book.

Italicized Terms

The *italicized terms* are terms that will be defined later or are other important terms that have been italicized for emphasis.

MINI LABS

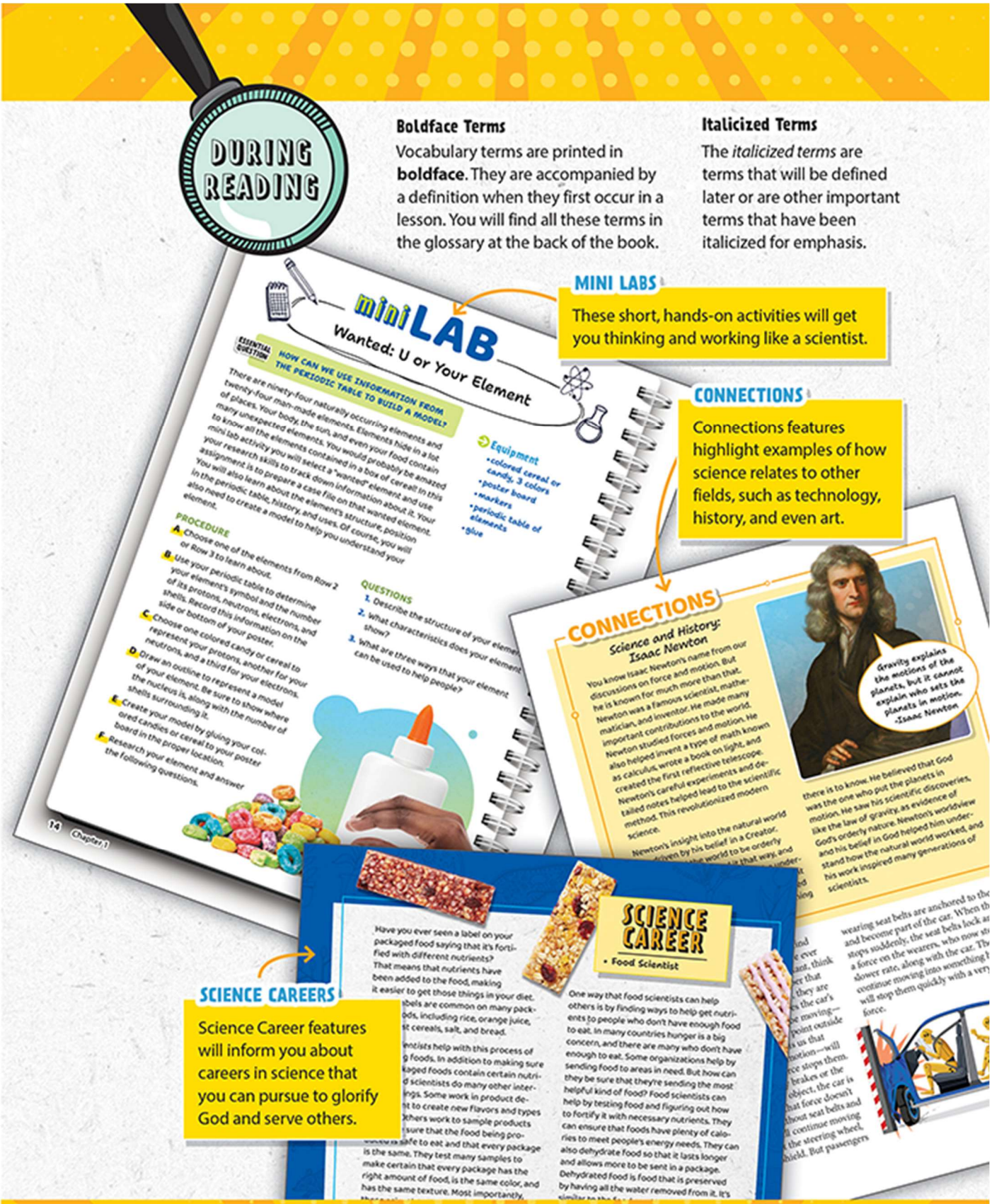
These short, hands-on activities will get you thinking and working like a scientist.

CONNECTIONS

Connections features highlight examples of how science relates to other fields, such as technology, history, and even art.

SCIENCE CAREERS

Science Career features will inform you about careers in science that you can pursue to glorify God and serve others.



ETHICS

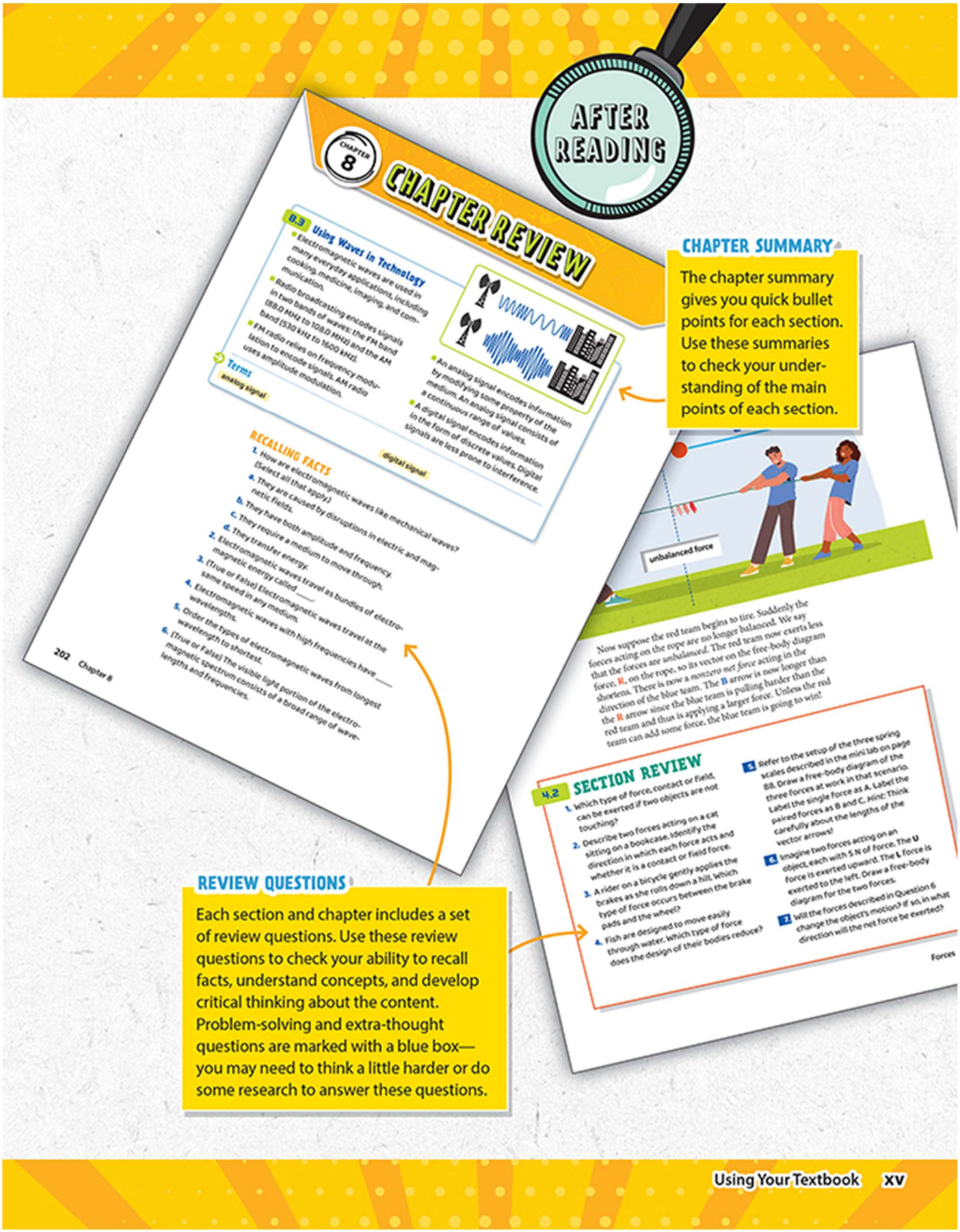
The work of science is bristling with ethical issues. Through the Ethics features you will learn a biblical model of ethical decision-making. You will also have opportunities to practice using it in considering real-world issues.

WORLDVIEW INVESTIGATIONS

These investigations help you think through controversial areas of science through the lens of Scripture.

CASE STUDIES

Case Studies give you a chance to investigate specific areas of science to apply what you have learned in a chapter.


AFTER READING
CHAPTER 8
CHAPTER REVIEW
8.3 Using Waves in Technology
Electromagnetic waves are used in many everyday applications, including cooking, medicine, imaging, and communication.
Radio broadcasting encodes signals in two bands of waves: the FM band (88.0 MHz to 108.0 MHz) and the AM band (530 kHz to 1600 kHz).
FM radio relies on frequency modulation to encode signals. AM radio uses amplitude modulation.
An analog signal encodes information by modifying some property of the medium. An analog signal consists of a continuous range of values.
A digital signal encodes information in the form of discrete values. Digital signals are less prone to interference.
Terms
analog signal
digital signal
RECALLING FACTS
1. How are electromagnetic waves like mechanical waves? (Select all that apply)
a. They are caused by disruptions in electric and magnetic fields.
b. They have both amplitude and frequency.
c. They require a medium to move through.
d. They transfer energy.
2. Electromagnetic waves travel as bundles of electromagnetic energy called ____.
3. (True or False) Electromagnetic waves travel at the same speed in any medium.
4. Electromagnetic waves with high frequencies have ____ wavelengths.
5. Order the types of electromagnetic waves from longest wavelength to shortest.
6. (True or False) The visible light portion of the electromagnetic spectrum consists of a broad range of wavelengths and frequencies.
202 Chapter 8
CHAPTER SUMMARY
The chapter summary gives you quick bullet points for each section. Use these summaries to check your understanding of the main points of each section.
unbalanced force
Now suppose the red team begins to tire. Suddenly the forces acting on the rope are no longer balanced. We say that the forces are unbalanced. The red team now exerts less force, R, on the rope, so its vector on the free-body diagram shortens. There is now a nonzero net force acting in the direction of the blue team. The B arrow is now longer than the R arrow since the blue team is pulling harder than the red team and thus is applying a larger force. Unless the red team can add some force, the blue team is going to win!
4.2 SECTION REVIEW
1. Which type of force, contact or field, can be exerted if two objects are not touching?
2. Describe two forces acting on a cat sitting on a bookcase. Identify the direction in which each force acts and whether it is a contact or field force.
3. A rider on a bicycle gently applies the brakes as she rolls down a hill. Which type of force occurs between the brake pads and the wheel?
4. Fish are designed to move easily through water. Which type of force does the design of their bodies reduce?
5. Refer to the setup of the three spring scales described in the mini lab on page 88. Draw a free-body diagram of the three forces at work in that scenario. Label the single force as A. Label the paired forces as B and C. Hint: Think carefully about the lengths of the vector arrows!
6. Imagine two forces acting on an object, each with 5 N of force. The U force is exerted upward. The L force is exerted to the left. Draw a free-body diagram for the two forces.
7. Will the forces described in Question 6 change the object's motion? If so, in what direction will the net force be exerted?
Forces
REVIEW QUESTIONS
Each section and chapter includes a set of review questions. Use these review questions to check your ability to recall facts, understand concepts, and develop critical thinking about the content. Problem-solving and extra-thought questions are marked with a blue box—you may need to think a little harder or do some research to answer these questions.