Understanding God's World

Fifth Edition

abeka

SCIENCE / HEALTH SERIES

Learn to apply scientific principles. such as the scientific method and God's laws in nature, and observe the LIVING parts and NONLIVING parts of the world around you as you explore the world through the pages of Understanding God's World.

To Teachers and Parents

Students will gain a greater interest in science through reading facts about the world around them. By discovering, learning, and understanding science which presents God as the Master Designer of the universe, students will gain a deeper reverence for God while developing a biblical worldview. Students will better understand basic science concepts while building their critical thinking skills through Observe to Understand, Jr. Scientist Lab Activities, and Try This! hands-on activities and demonstrations. Diagrams, Comprehension Checks, Terms boxes, and Chapter Concepts Review sections are designed to prepare students for written evaluation.

Understanding God's World
Fifth Edition

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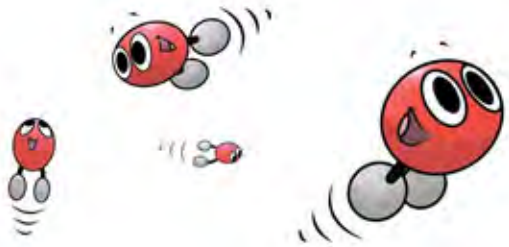

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Pronunciation Key

Symbol • Example		Symbol • Example	
ā	āte	ŏ	nŏt
â	dâre	oi	boil
ă	făt	o͞o	fo͞od
ä	fäther	o͝o	bo͝ok
ə	ago (ə·gō′)	ou	out
ē	ēven	th	thin
ĕ	ĕgg	t͟h	t͟here
ə (ər)	pondər	t͡ū	pict͡ure
ī	īce	ū	ūnit
ĭ	ĭt	û	hûrt
ō	ōver	ŭ	ŭp
ô	côrd, taught, saw	zh	measure

In the beginning was the Word, and the Word was with God, and the Word was God. The same was in the beginning with God. All things were made by Him; and without Him was not any thing made that was made. John 1:1–3

Understanding the Scientific Process

Chapter 1

TERMS

technology: science put to practical use

scientific method: orderly, step-by-step process in which scientists work

hypothesis: a sensible guess; a reasonable prediction

experiment: a procedure designed to answer a question and to test a hypothesis

data: a collection of facts

conclusion: a decision based on evidence

1.1 Using the Scientific Method

No matter where you go in God's world, you will see the evidence of His handiwork.

- ✓ Systems of energy and motion that work exactly as God planned
- ✓ Forests and fields that produce an abundance of plants
- ✓ Thriving plant and animal communities found all over the earth
- ✓ Oceans of life-giving water and an atmosphere that protects life
- ✓ A landscape of mountains, hills, and valleys
- ✓ The heavens that declare God's glory

All of creation shows us that God's world was miraculously designed and created. As we take the time to understand God's world, we are filled with awe and gratitude to our Maker—the Lord of all creation.

God rules and reigns over creation because He designed and created it. He had a special plan for everything He made. Would you like to understand more about God's world? Throughout this science book, you will learn to understand God's world and the way it works.

What Science Is

Science *is the careful study of the wonders of the universe. A* **scientist** *is a person who works to understand more about the universe.* What an enormous job that could be! Could any person understand all of creation? No, even the greatest scientists understand only a small part of God's world.

Our human minds cannot comprehend all of the wisdom of God. Yet God has given people the privilege to observe and study His creation. God created us with curious minds that are able to learn more about Him and His world. He has given us the ability to enjoy His world and use it wisely.

Why We Study Science

One reason we study science is to help others. Many scientists have worked for years trying to find ways to help people. They have thought of ways to prevent or cure disease. Some scientists have designed and invented ways to keep people safe.

We use science in our daily lives. Devices and machines can make hard jobs easier. When *science is put to practical use*, it is called **technology**. Much of technology benefits mankind.

With the use of science through technology, doctors can diagnose patients more accurately. Farmers can produce better crops for food. People can make wise choices to keep their bodies healthy. Designers can make buildings and vehicles that help keep people safe. The best scientific achievements benefit others.

We also study science because it glorifies God. When God created the universe, He did so with wise design and logical order. Understanding more about the order and design God used to create the world shows us some of God's characteristics, such as His perfection, wisdom, power, authority, goodness, creativity, care, mercy, and love.

> *For the invisible things of Him from the creation of the world are clearly seen, being understood by the things that are made.* Romans 1:20

Some people do not believe the universe was created because they do not believe in the Creator. Instead of recognizing the miraculous design of a created universe, they believe that the universe has evolved, or formed gradually, over millions of years. This belief is called evolution.

Believing God's Word is the foundation of a Christian's faith. Over and over again, true science supports what the Bible says—that God created the world. Creation scientists have the special job of carefully investigating God's world to glorify Him.

> *Through faith we understand that the worlds were framed by the word of God, so that things which are seen were not made of things which do appear.* Hebrews 11:3

TERMS

magnetism: the attracting and repelling force created by a magnetic field

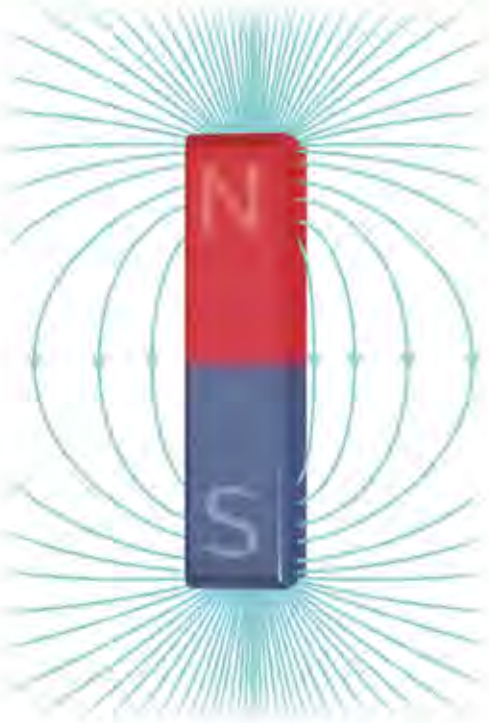
polarity: having two opposite sides that work differently

electromagnet: a device that generates electromagnetic force

3.4 Electromagnetic Forces

Magnetism *is a force that can both attract* (pull) *and repel* (push). A magnet works because of its magnetic field. You cannot see a magnetic field just by looking at a magnet, but there are ways to observe its effects.

A magnet has polarity. **Polarity** means *the magnet has two opposite sides, or poles, that work differently.* Every magnet has a north pole and a south pole. The force of a magnet flows from the north pole to the south pole, creating a magnetic field. That is why *the magnet's force is strongest at its poles and weakest in its center.* No one has ever been able to separate the poles of a magnet. Even if you cut a magnet in two, each piece will always have a north pole and a south pole.



Electromagnetism

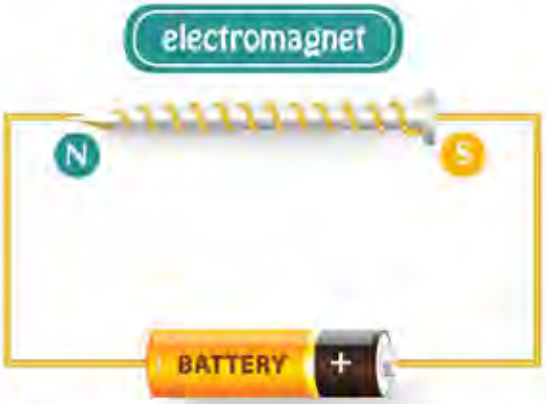
If electrical energy and magnetic force are combined, a stronger force can be made in an electrical current.

We remember that atoms have electrical charges. An atom is balanced because it has a positive nucleus and negative electrons. But what happens if a negative electron is pulled away from its positive nucleus? The atom is no longer balanced. These unbalanced charges can attract and repel like a magnet, causing an electromagnetic force.

Friction is a type of electromagnetic force. Remember, friction causes atoms to gain or lose electrons. Rubbing your hair on a balloon is one example; rubbing your feet on carpet is another. You recognize this as static electricity, but because static electricity can both attract and repel, it is also called an electromagnetic force.

The Use of an Electromagnet

An **electromagnet** *is a device that can generate electromagnetic force* because of its coiled wire, metal core, and source of electricity. A coiled wire generates a stronger magnetic field than a straight wire does. An electromagnet can attract and repel just like a natural magnet, but it is often stronger and can be turned on and off. This makes it very useful.



Try This! Make an electromagnet.

Materials needed:

- ✓ 1 yard 18-gauge bell wire
- ✓ 3″ iron bolt with 1 nut and 2 washers
- ✓ 6-volt battery
- ✓ metal paper clips

1. Slide one washer onto the bolt, head side down. Tightly wrap the wire around the bolt, being sure to leave at least six inches of wire free on both ends. Place the remaining washer and nut on the other end to secure the wires.
2. Wrap one end of the wire to one end of the battery. Touch the free end of the wire to the other battery pole with one hand while touching the bolt tip to the paper clips.
3. Lift the nail while observing the paper clips. (If the bolt starts to feel warm, take the free wire away from the end of the battery to prevent the wires from becoming too hot.)

When electricity flows through a metal wire, its current makes the wire act like a magnet. The paper clips were attracted to the nail because coiled wires have a stronger magnetic field than straight wires.

The Telegraph: The telegraph was designed with an electromagnet. The coiled wire became magnetized when electricity flowed through it. This gave the telegraph its ability to transmit messages in Morse Code. A pen or pencil attached to the telegraph would write dots and dashes onto a long strip of paper. The telegraph operator could interpret the dots and dashes as letters. Some operators became so good at listening to the telegraph's noises that they did not even need to look at the paper strip. They could listen to the sounds of dots and dashes and write down the telegram on paper.

Because there are much better ways to send and receive messages today, most people who use Morse Code use it just for fun. They are sometimes called ham radio operators because they use special ham radio equipment. During natural disasters, such as hurricanes and earthquakes, ham radio operators often help with communication when power lines or cellphone towers are down.

If you have the right equipment and are able to pass a special test, you can earn an amateur radio license through the American Radio Relay League.

Chapter 7 Concepts Review

1 Basic Geology Concepts 7.1–7.3

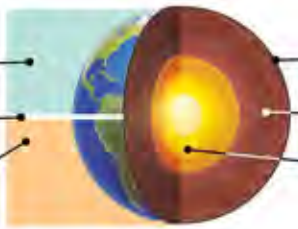
A. Remember

Short Answer: *Write the correct answer in the blank.*

1. What does a geologist study? _____

2. Name two kinds of geological events that are believed to be caused by plate activity. _____

Identify: *Label the diagram of the globe and the earth's layers below; then circle the name of the earth's layer that contains magma.*



3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

B. Think Like a Scientist

Short Answer: *Write the correct answer in the blank.*

9. Which layer of the earth has the highest temperature? _____

10. Is the earth covered with a greater percentage of water or land? _____

_____

11. Where could you predict an earthquake to happen? _____

_____

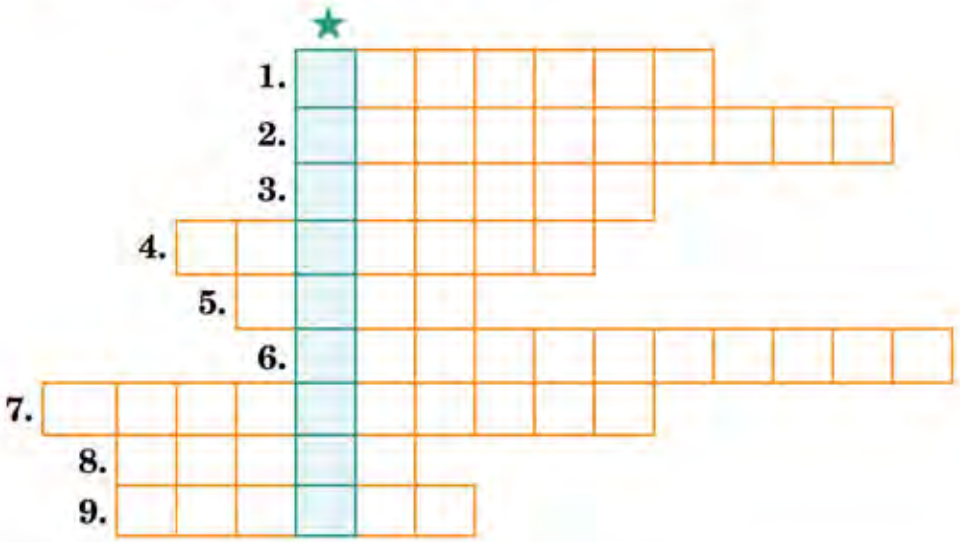
12. Name a type of landform. _____

13. Which type of mountain chain was probably made when softer, forming rock folded up together as crustal plates moved? _____

_____

C. Fun with Terms

Puzzle: *Fill in the answers to find the word in the starred column.*



continents	**earthquake**	**mantle**
core	**geology**	**oceans**
crust	**groundwater**	**volcano**

1. the study of the earth and its structure
2. a trembling or shaking in the earth's crust
3. the earth's largest bodies of water
4. a place in the earth's crust where magma can erupt as lava
5. the innermost part of the earth
6. water found beneath the earth's surface which supplies wells and springs
7. the largest land masses that rise out of the oceans
8. a solid layer of rock beneath the soil; made of two kinds—oceanic and continental
9. the layer of the earth beneath the crust

★ a scientist who studies the earth