Christian Kids Explore

Physics

Robert W. Ridlon, Jr.
Elizabeth J. Ridlon

Christian Kids Explore Physics, 2nd Edition
By Robert W. Ridlon, Jr., and Elizabeth J. Ridlon
A part of the Christian Kids Explore series

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A NOTE FROM THE AUTHORS

Exploring physics can be an exciting adventure, just like exploring some mysterious ancient ruins. Physics, like other sciences, gives us a glimpse into the wonders of God's creation.

Don't Be Afraid!

The sciences in general have a reputation of being an almost out-of-reach specialty that is only for a few "special" people. Much of that reputation comes from the unfamiliar words, rules, tools, and procedures that define it. Although physics isn't simple, we believe that it can be made easy to understand.

Don't Be Intimidated!

We learn new and complicated things every day—from computer programs and games to new moves in a sport to a new song on a musical instrument. We are always learning. Physics is no different—it takes time and perseverance.

Physics Can Be Fun and Exciting!

Just like getting to know music, sports, or even a new board game, we will learn some terms and some rules. Each of our lessons develops a physics concept that will build confidence. Kids and parents can explore and develop a firm and lasting foundation for the future.

We hope you will be encouraged by these words from Proverbs: "Trust in the Lord with all your heart and lean not on your own understanding; in all your ways acknowledge him and he will make your paths straight." (Proverbs 3:5-6)

Robert W. Ridlon, Jr.
Elizabeth J. Ridlon

HOW TO USE THIS BOOK

This book contains 30 lessons. Each lesson is designed to be completed in one week. If you teach science twice weekly, allow for about 60 to 90 minutes each day. Some of the lessons may seem a little more challenging than others. Less-advanced students may have some difficulty with fully comprehending all the material in these few challenging lessons. Don't worry! It is quite satisfactory if the student can learn just the foundational concepts that are represented by the *Review It* questions at the end of the lesson. Don't rush! You may need to read the lesson slowly and more than once. If some words are too difficult, use a dictionary or other source to help clarify meanings. This work will pay off when it's time for the upper-level classes or when other challenges come along that require perseverance.

Step by Step

Lesson Activities

The following are the activities for completing each lesson and unit:

Preparation

Each unit begins with a short introduction about the material covered in the unit lessons and provides a list of unit objectives, vocabulary words, and a list of materials needed for that unit. You may want to write the unit objectives on a piece of paper and keep it handy. Referring to the objectives will help give you confidence that the student is getting something from the material.

Teaching Time

Each lesson presents a topic that builds an understanding of some aspect of physics. The older or more advanced students themselves can read the lesson material. For very young or less-advanced students, it is a good idea to read the lesson in advance and then explain it at their level. The student should be on the lookout for the vocabulary words that are identified in the unit introduction. Also, encourage the student to take notes to help remember important ideas.

Review It

Do the review exercises. After the teaching time, each lesson has five *Review It* fill-in-the-blank exercises. The key to ensuring that the student is ready for the *Hands-On Time* activity and the next lesson is to have the student complete the fill-in-the-blank exercises. These are almost always exact quotes from the lesson and, therefore, the answers will be unambiguous. Once these are filled in, they should be an encouragement that some very important principles of physics have been learned. The answer key for these *Review It* questions is in an appendix.

Hands-On Time

This is the fun stuff. Each lesson ends with a *Hands-On Time* activity. These activities have a twofold purpose: (1) They reinforce some of the concepts from the lessons; and in many cases, (2) they will offer a chance for the student to experience being a physicist.

Coloring Pages

There is one coloring page per unit, and all of these, plus a coloring version of the cover illustration, are found after the glossary. These coloring pages may be photocopied. Children of all ages will enjoy these beautiful drawings.

Think About It

This is a critical thinking exercise regarding the results of the *Hands-On Time* activity. It isn't absolutely necessary to do, but it offers students the opportunity to respond to questions that require some creative thought. This exercise might also be an alternative to the coloring page for the older student.

Unit Wrap-Up

At the end of each unit, there is an opportunity for the student to show what he or she has learned. The questions are in a multiple-choice format and are taken from the lesson review exercises. So, a great way to prepare is to go over each review exercise for the lessons in that unit. The answer key for these *Unit Wrap-Ups* is in an appendix.

What's Important?

Building a Foundation

The important thing to keep in mind is that God is at the center of everything—including the study of physics. The more-advanced or older student may get more from the book than a younger or less-advanced student. It might be good to repeat this course every other year. Build a foundation. Things learned early will last a lifetime, so do your best. Have fun and learn!

Unit six

Electricity and Magnetism

Both electricity and magnetism are things we probably take for granted. Just about everything we do involves some sort of electricity. The way electricity is made, the way it is delivered for our use, and the way it provides energy are all quite interesting from a physics point of view. Besides being able to stick to the refrigerator door, magnets also exhibit very interesting and mysterious behavior. In fact, we will see in this unit that magnets and electricity are partners. In Unit Six, we will explore the mystery of electricity, the way electric current moves, and how magnets work.

Additional Notes

Upon completing Unit Six, the student should understand:

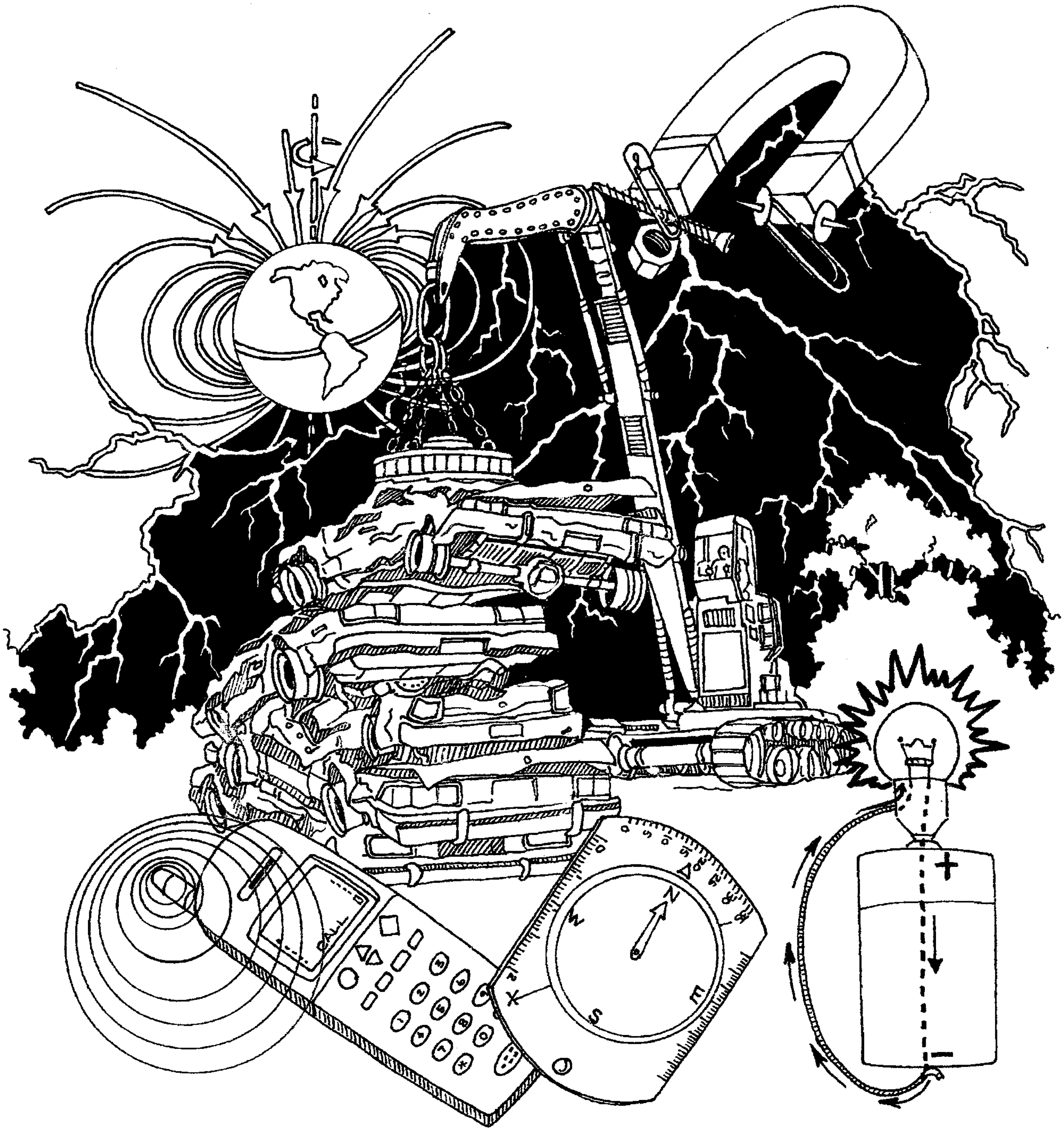
- The concept of electrons and charge
- Electric potential
- Electric current
- The concept of magnetism
- The earth's magnetic field
- The compass

Unit Six Vocabulary Words

- amperage
- compass
- electrical conductor
- electrical insulator
- electric potential energy
- electric current
- electricity
- magnet
- magnetic field
- magnetism
- volt
- voltage

Materials Needed for This Unit

- pencil
- bar or horseshoe magnet
- small magnet
- sewing needle
- small amount of butter or margarine
- cereal-size bowl



Lesson 29

MAGNETISM

Teaching Time:

Getting Attracted to Magnetism

Do you have any magnets on your refrigerator holding pictures or, maybe, some notes? Have you ever played with a magnet, picking up various objects? If you've ever thought about how magnets work, you might think it's mysterious. In fact, magnets are sort of mysterious. In this lesson, we will explore a little about what magnets are and how they work.

Scripture

Praise Him for His powerful acts; praise Him for His abundant greatness.

(Psalm 150:2)

Name It!

magnetism
The characteristics exhibited by certain materials to attract certain other materials and to create a special field, called a magnetic field, around them.

magnet
An object that will attract or repel other magnets and also attract certain other types of matter.

What Is Magnetism?

Magnetism simply means the characteristics exhibited by certain materials to attract certain other materials and to create a special field, called a magnetic field, around them. An object that is a **magnet** will attract other magnets and also attract certain other types of matter. This is because the **magnetic field** around the magnet is a force field. There is a force exerted that pulls

Name It!

magnetic field
A special force field created by certain materials that enables them to attract or repel certain other materials.

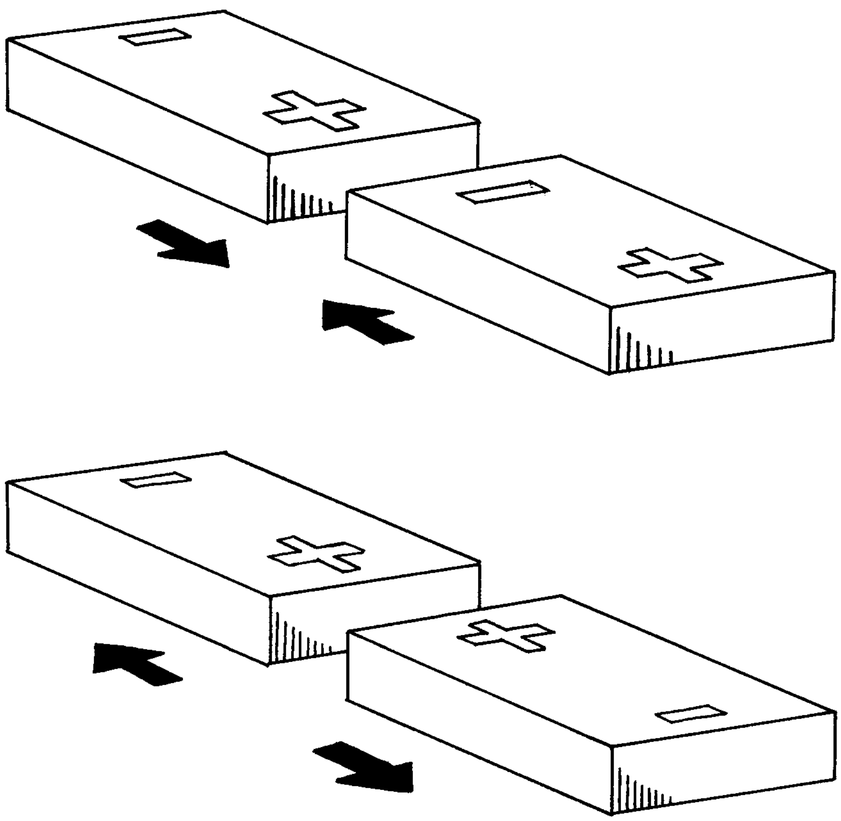
objects into this field. If you have ever played with a magnet, you also know that one end of a magnet will attract one end of another magnet. If you turn the magnet around, it actually pushes the other magnet away. The force of the magnetic field also pushes. If you remember Lesson 10 on force, you recall that that was the definition of force—it pushes or pulls. So, what are magnets and why do they have this kind of force available to them?

Magnets

There are two kinds of magnets: a temporary magnet and a permanent magnet. Temporary magnets act the same as permanent ones. The main difference is that electric current is used to create the magnetic field in a temporary magnet. A permanent magnet has magnetic properties because of the way its atomic particles behave.

A permanent magnet is made of some type of metal, usually iron. Iron is made of iron atoms. Inside these atoms are electrons that are always moving around the nucleus. Usually these electrons are moving in a random way—that is, with no particular direction. When something is a magnet or is magnetized, the majority of the electrons in the magnet move in one direction. This creates a magnetic force. Remember that when there are more electrons than protons, there is a negative electrical charge. However, in the case of magnets, the number of electrons doesn't change—only the direction in which they are spinning. So, a field is created. There are two ends to every magnet. One end is called the north pole of the magnet. The other end is called the south pole of the magnet. Because of the way the electrons are spinning, the force fields of the north poles always attract those of the south poles. Also, the like poles always repel or push each other away (south poles repel south poles and north poles repel north poles; see the illustration on page 313). So, how do magnets pick up other objects?

Not every type of matter is a magnet. Normally the electrons in a particular material are not spinning in one direction. However, in some cases, these materials can still be attracted by a magnetic field. In other words, a magnet can pick them up. For example, a magnet can pick up a nail made of iron. When that happens, the iron nail becomes a weak magnet itself. There are only three types of matter that become a magnet. We have already mentioned iron. The other two are cobalt and nickel. Magnets actually occur in nature in the form of a type of iron called lodestone. Rubbing the iron nail with a magnet will cause the electrons in the iron nail to spin in one direction more permanently, thus creating another magnet.



Additional Notes

Additional Notes

Uses of Magnets

Besides being fun and useful for sticking things on the refrigerator, magnets have many other important uses. We mentioned one when we talked about electricity in the previous lesson. The magnetic field can be used to cause electrons to move in a wire, and that is how generators make electricity. Magnets are also used to guide the stream of electrons that are fired at the television screen to make the picture (see Lesson 21). Another use of magnetism is in computer disks. The information is stored by arranging small magnetic particles on the disks. The arrangement of the particles can be read back to retrieve the information. Very large magnets can also carry heavy weights and lift objects that are attracted by the magnetic force.

Review It

Additional Notes

1. Magnetism simply means the characteristics exhibited by certain materials to attract certain other materials and to create a special field, called a ______________________ field, around them.
2. A permanent magnet is made of some type of metal, usually iron, with the majority of its ______________________ moving in one direction.
3. One end of a magnet is called the ______________________ pole of the magnet and the other end is called the ______________________ pole of the magnet.
4. The magnetic field can be used to cause electrons to move in a wire, and that is how generators make ______________________.
5. ______________________ are also used to guide the stream of electrons that are fired at a television screen to make the picture.

Additional Notes

Hands-On Time:

What Can a Magnet Attract?

Generally, magnets are able to magnetize or attract only matter that has the ability to become a magnet itself. This includes iron or other material that contains iron. In this Hands-On Time, you will discover some of the types of matter that are attracted by magnetic force and some that are not.

Equipment Needed

- bar magnet or horseshoe magnet
- pencil

Activity

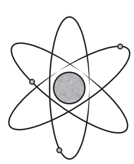
Using a magnet, test the materials listed in the Magnet Test Table on page 317 and decide whether or not the items can be attracted by magnetism.

Magnet Test Table	
Material	**Picked Up by Magnet or Not**
Nail	
Toothpick	
Paper cup	
Penny	
Nickel	
Metal thumbtack	
Potato chip	
Paperclip	
Other	

Think About It

1. What do the objects that can be picked up with a magnet have in common?

2. What do the objects that cannot be picked up with a magnet have in common?



Discovery Zone

The Greeks knew about the magnetic properties of naturally occurring lodestone as early as 500 B.C. They named it magnetis lithos *(translated: the stone of Magnesia). Magnesia was a region in eastern Turkey where the stones were first found.*

Lesson 30

EARTH'S MAGNETIC FIELD

Teaching Time:

Don't Forget Your Compass

Have you ever used a compass? If you have, you know that the compass points to the north part of Earth. Is there something in the north that makes the compass point that way? The answer to that will be discovered in this lesson.

The Compass

Explorers, hikers, and even airplane pilots use compasses to help them navigate from place to place. The **compass** is actually made of a magnetic needle mounted in a way that allows it to move in a complete circle. If there is any other magnetic force around, the needle will turn toward it. Like any other magnet, the compass needle has a north pole and a south pole. The north pole of a magnet will always be attracted to a magnetic south pole. If another magnet is brought close to a compass, it

Scripture

Whether a tree falls to the south or the north, the place where the tree falls, there it will lie.
(Ecclesiastes 11:3b)

Name It!

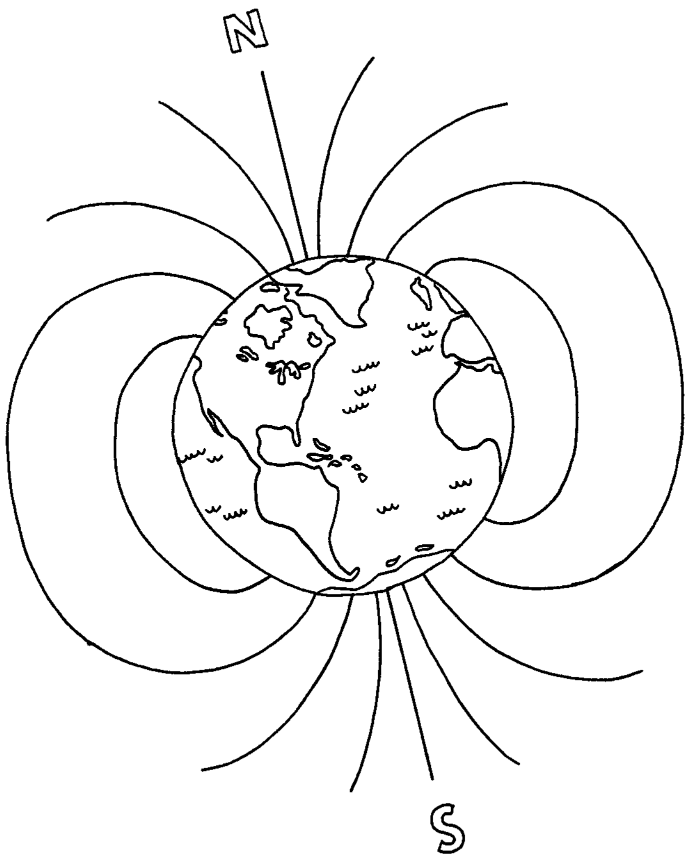
compass
A device made of a magnetic needle mounted in a way that allows it to move in a complete circle. If there is any other magnetic force around, the compass needle will turn toward it. Used to determine direction because its needle orients toward the north pole of the earth.

Additional Notes

will point its north pole toward the other magnet's south pole. So, why does the compass point to the north, when no other magnets are around? Let's find out.

The Earth Is a Giant Magnet

Earth itself is a giant magnet. Measurements of its magnetic field indicate that something inside the earth is acting as a giant bar magnet with a magnetic north pole and a magnetic south pole. However, scientists know that the inside of the earth is largely liquid metal. Just how the magnetic field is made is the subject of much research today. One theory is that there is an electric current flowing in the liquid metal that generates the magnetic field. One way or another, the magnetic field exists—just look at your compass.



Additional Notes

The Compass and the Earth's Magnetic Field

Now it's time for a little confusion! The top part of the earth is called the north, and that is where the earth's north pole is. Likewise, the south part of the earth is called the south, and that is where the earth's south pole is. We know that with magnets, opposite poles attract (north is attracted to south). So, why does the north pole of the compass needle point to the north pole of the earth? The answer is that the north pole of the earth is where the magnetic south pole is located. The same is true of the earth's south pole: that is where the magnetic north pole is. Now you know something that many others don't know.

Additional Notes

Review It

1. The ____________________ is actually made of a magnetic needle mounted in a way that allows it to move in a complete circle; it has a north pole and a south pole.
2. The north pole of a ____________________ will always be attracted to a magnetic south pole.
3. Earth itself is a giant ____________________.
4. The top part of the ____________________ is called the north, and that is where the earth's north pole is. Likewise, the south part of the ____________________ is called the south, and that is where the earth's south pole is.
5. The north pole of the earth is where its ____________________ south pole is located.

Additional Notes

Hands-On Time:

Make a Compass

It's easy to make a compass. Using a magnet, we can magnetize a sewing needle. A small amount of butter coating will enable the needle to float in a bowl of water. The needle will orient itself so that it is pointing exactly north.

Equipment Needed

- small magnet
- sewing needle
- small amount of butter or margarine
- cereal-size bowl
- water

Activity

1. Fill the cereal-size bowl with water.

2. Using the magnet, stroke the sewing needle in one direction (from one end to the other) three or four times, using only the north pole of the magnet.

3. Coat the needle with a little butter.

4. Gently place the needle lengthwise on the surface of the water (you may need to attempt this a couple of times until you can get it floating).

Discovery Zone

The first compass was made and used in China more than 2,000 years ago.

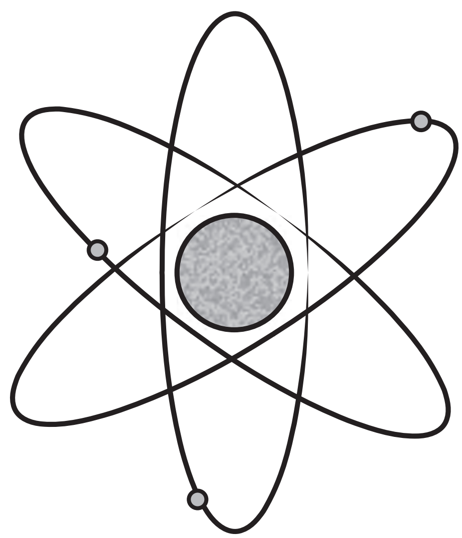
5. Watch the needle orient itself so that it points north.

6. You can verify the direction using another compass, if you like. Be sure the compasses are at least 2 feet apart.

Think About It

1. Did the activity work?

2. Which end of the sewing needle pointed north and which pointed south? How could you figure it out?



appendix A

BOOK AND RESOURCE LIST

by Kelsey Buchanan

All books suitable for grades 3–8 unless otherwise noted.

Physics Reference Books

Dictionary of Science: Combined Volume: Biology/Chemistry/Physics (Usborne Publishing Ltd, 1992; ISBN: 0860209903, 384 pp.).

Encyclopedia of Science by DK Publishing (Dorling Kindersley, 2006; ISBN: 0756622204, 448 pp.).

Exploring Creation with Physics by Dr. Jay Wile (Apologia Educational Ministries, Inc., 2003; ISBN: 1932012427, 589 pp.). Grades 9–Adult.

Exploring the World of Physics by John Hudson Tiner (Master Books, 2006; ISBN: 9780890514665, 160 pp.). Grades 9–Adult.

Eyewitness Visual Dictionary of Physics by DK Publishing (Dorling Kindersley, 1995; ISBN: 0789402394, 64 pp.).

Fun with Physics by Susan McGrath (National Geographic Society, 2000; ISBN: 0870445766, 104 pp.).

Marshall Brain's How Stuff Works by Marshall Brain (Wiley, 2001; ISBN: 0764565184, 320 pp.).

Marshall Brain's More How Stuff Works by Marshall Brain (Wiley, 2002; ISBN: 076456711X, 320 pp.).

The New Way Things Work by David Macaulay (Houghton Mifflin/Walter Lorraine Books, 1998; ISBN: 0395938473, 400 pp.). Grades 1–Adult.

Sound (Early Bird Physics) by Sally M. Walker (Lerner Publications, 2005; ISBN: 0822526344, 48 pp.). Grades 3–8.

Sound and Vibration (Fundamental Physics) by Gerard Cheshire (Smart Apple Media, 2006; ISBN: 1583409971, 64 pp.). Grades 3–8.

Lesson 26: Music

Music (Eyewitness Books) by DK Publishing (Dorling Kindersley, 2004; ISBN: 0756607094, 72 pp.). Grades 3–12.

Rubber-Band Banjos and a Java Jive Bass: Projects and Activities on the Science of Music and Sound by Alex Sabbeth (Jossey-Bass, 1997; ISBN: 0471156752, 112 pp.). Grades 3–8.

Unit Six — Electricity and Magnetism

Electricity and Magnetism by Peter Adamczyk and Paul-Francis Law (E.D.C. Publishing, 1994; ISBN: 0746009941, 32 pp.). Grades 3–8.

Electricity and Magnetism (Fundamental Physics) by Gerard Cheshire (Smart Apple Media, 2006; ISBN: 1583409947, 64 pp.). Grades 3–8.

Waves: Principles of Light, Electricity, and Magnetism (Secrets of the Universe) by Paul Fleisher (Lerner Publications, 2001; ISBN: 0822529874, 63 pp.). Grades 3–8.

Lesson 27: Electricity

Electricity by Sally M. Walker (Lerner Publications, 2005; ISBN: 082252919X, 48 pp.).

Electricity (Eyewitness Books) by Steve Parker and Laura Buller (Dorling Kindersley, 2005; ISBN: 0756613884, 72 pp.). Grades 3–12.

Electronics (Eyewitness Books) by Roger Bridgman and Jack Challoner (Dorling Kindersley, 2000; ISBN: 0789455986, 64 pp.). Grades 3–12.

The Magic School Bus and the Electric Field Trip by Joanna Cole (Scholastic, 1999; ISBN: 0590446835, 48 pp.). PreK–Grade 8.

Lesson 28: Electric Current

How Ben Franklin Stole the Lightning by Rosalyn Schanzer (HarperCollins, 2002; ISBN: 0688169937, 40 pp.). K–Grade 6.

Lesson 29: Magnetism

Magnetism (Early Bird Physics) by Sally M. Walker (Lerner Publications, 2005; ISBN: 0822529327, 48 pp.).

Magnetism (Elementary Physics) by Ben Morgan (Blackbirch Press, 2003; ISBN: 1410301982, 24 pp.).

Lesson 30: Earth's Magnetic Field

Earth: Our Planet in Space by Seymour Simon (Simon & Schuster Children's Publishing, 2003; ISBN: 0689835620, 32 pp.). Grades 3–8.

Important Physicists

General Biographies

The Great Physicists from Galileo to Einstein by George Gamow (Dover Publications, 1988; ISBN: 0486257673, 338 pp.). Adult.

The Inventors: Nobel Prizes in Chemistry, Physics, and Medicine by Nathan Aaseng (Lerner Publishing Group, 1988; ISBN: 0822506513, 80 pp.).

Janice VanCleave's Scientists Through the Ages by Janice VanCleave (Jossey-Bass, 2003; ISBN: 0471252220, 128 pp.).

The Magic School Bus and the Science Fair Expedition by Joanna Cole (Scholastic, 2006; ISBN: 0590108247, 56 pp.). PreK–Grade 8.

Physics: The People Behind the Science by Katherine E. Cullen, PhD. (Facts on File, 2005; ISBN: 0816054630, 192 pp.). Grades 6–12.

The Picture History of Great Inventors by Gillian Clements (Frances Lincoln, 2005; ISBN: 1845074394, 80 pp.).

Scientists and Their Discoveries by Christine Hatt (Franklin Watts, 2001; ISBN: 0531146146, 62 pp.).

Specific Physicists

Ampère, André

The Great Physicists from Galileo to Einstein by George Gamow (Dover Publications, 1988; ISBN: 0486257673, 338 pp.). Adult.

Archimedes

Archimedes and the Door to Science by Jeanne Bendick (Bethlehem Books, 1995; ISBN: 1883937124, 160 pp.).

Aristotle

Aristotle by Jim Whiting (Mitchell Lane Publishers, 2006; ISBN: 1584155086, 48 pp.).

Aristotle and Scientific Thought by Steve Parker (Chelsea House Publications, 1994; ISBN: 0791030059, 32 pp.).

Aristotle: Philosopher and Scientist by Margaret Jean Anderson and Karen F. Stephenson (Enslow, 2004; ISBN: 0766020967, 112 pp.).

appendix B

"REVIEW IT" ANSWER KEY

Lesson 1

1. When we study science, we get to know more about **God** and appreciate His power and greatness.
2. When studying **physics**, we are learning about matter and energy.
3. Material things are those that we can see or touch. In physics, we call these material things **matter**.
4. **Energy** includes electricity, heat, light, and even sound and can be stored in matter and used to do work.
5. One special area of study in physics is the way matter and energy behave together. This behavior in physics is called **mechanics**.

Lesson 2

1. **Speed** is a measure of how fast an object is traveling from a starting point to an ending point.
2. When talking about measuring, dimensions include **length**, **width**, and **height**.
3. Distance is a measurement taken between two **points**, referred to as a starting point and a finishing point.
4. Temperature is a measure of how **hot** or **cold** something is.
5. **Weight** is a measure of how heavy (or light) something is.

Lesson 28

1. **Conductors** are types of matter in which the electrons move out of their atoms very easily. Examples are copper and aluminum.
2. Types of matter in which electrons do not move out of their atoms very easily are called **insulators**. Examples are wood, plastic, and glass.
3. To get electrons (electricity) flowing, there needs to be a continuous production of electric potential energy, which is done through a special machine called a **generator**.
4. The number of **electrons** that flow through a conductor is measured as the amperage.
5. Electricity generators create **voltage**, which is the electric potential energy.

Lesson 29

1. Magnetism simply means the characteristics exhibited by certain materials to attract certain other materials and to create a special field, called a **magnetic** field, around them.
2. A permanent magnet is made of some type of metal, usually iron, with the majority of its **electrons** moving in one direction.
3. One end of a magnet is called the **north** pole of the magnet and the other end is called the **south** pole of the magnet.
4. The magnetic field can be used to cause electrons to move in a wire, and that is how generators make **electricity**.
5. **Magnets** are also used to guide the stream of electrons that are fired at a television screen to make the picture.

Lesson 30

1. The **compass** is actually made of a magnetic needle mounted in a way that allows it to move in a complete circle; it has a north pole and a south pole.
2. The north pole of a **magnet** will always be attracted to a magnetic south pole.
3. Earth itself is a giant **magnet**.
4. The top part of the **earth** is called the north, and that is where the earth's north pole is. Likewise, the south part of the **earth** is called the south, and that is where the earth's south pole is.
5. The north pole of the earth is where its **magnetic** south pole is located.

ABOUT THE AUTHORS

Robert W. Ridlon, Jr., is a consultant for a systems development firm and an adjunct faculty member at Southwestern Illinois College, teaching courses in information systems theory. He earned a bachelor of arts degree in biological sciences from Indiana University and a master of science degree in information resource management from the Air Force Institute of Technology.

Elizabeth J. Ridlon is an adjunct faculty member at Southwestern Illinois College where she teaches biological sciences. She earned a bachelor of science degree in microbiology from Indiana University, a master of arts degree in biology from the University of Nebraska, and a secondary teaching certificate from Southern Illinois University.

The Ridlons are involved members of their church and committed to God's message of Truth. They have one son, Robert (in graduate school); a daughter-in-law, Crystal; and two grandsons. The Ridlons have visited and explored 17 countries on four continents and have written two creation science books, as well as *Christian Kids Explore Chemistry*

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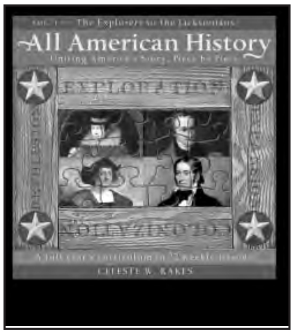

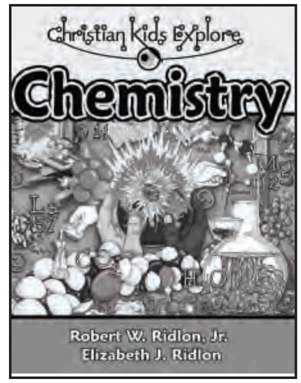

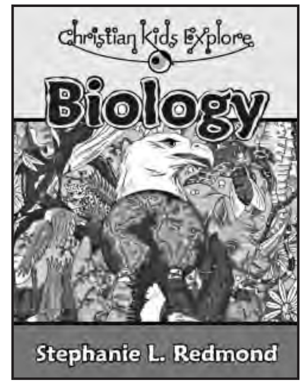

All American History Volumes I and II by Celeste W. Rakes

Containing hundreds of images and dozens of maps, All American History is a complete year's curriculum for students in fifth grade–high school when combined with the Student Activity Book and Teacher's Guide (yet adaptable for younger and older students).

There are 32 weekly lessons, and each lesson contains three sections examining the atmosphere in which the event occurred, the event itself, and the impact this event had on the future of America.

- Student Activity Book
- Teacher's Guide
- Student Reader

The Mystery of History Volumes I, II, and III by Linda Hobar

This award-winning series provides a historically accurate, Bible-centered approach to learning world history. The completely chronological lessons shed new light on who walked the earth when, as well as on where important Bible figures fit into secular history. All Ages.

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- Volume II: The Early Church & the Middle Ages
- Volume III: The Renaissance, Reformation, and Growth of Nations

Christian Kids Explore Science Series

Christian Kids Explore Biology by Stephanie Redmond

One of Cathy Duffy's 100 Top Picks! Elementary biology that is both classical and hands-on. Conversational style and organized layout makes teaching a pleasure. 1st–6th.

Christian Kids Explore Earth & Space by Stephanie Redmond

Another exciting book in this award-winning series! Author Stephanie Redmond is back with more great lessons, activities, and ideas. 1st–6th.

Christian Kids Explore Chemistry by Robert W. Ridlon, Jr., and Elizabeth J. Ridlon

Another great book in this award-winning series! Authors Robert and Elizabeth Ridlon team up for 30 lessons, unit wrap ups, and even coloring pages all about the fascinating world of chemistry. 4th–8th.

Christian Kids Explore Physics by Robert W. Ridlon, Jr. and Elizabeth J. Ridlon

The universe that we live in is the result of God's thoughtful design and careful building. Physics gives us a glimpse into the materials, laws, and structures of that universe. 4th–8th.

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