TEACHER GUIDE

3rd–8th Grade

Includes Student Worksheets

Science

- Weekly Lesson Schedule
- Student Activity Sheets
- Quizzes & Final Exams
- Answer Key

GOD'S DESIGN®

Chemistry & Ecology

Properties of Matter | **Properties of Ecosystems** | **Properties of Atoms & Molecules**

MASTERBOOKS CURRICULUM

Debbie & Richard Lawrence

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God's Design: Chemistry & Ecology

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Welcome to GOD'S DESIGN®

CHEMISTRY & ECOLOGY

God's Design for Chemistry & Ecology has been designed for use in teaching chemistry and ecology to elementary and middle school students. It is divided into three sections: *Properties of Matter*, *Properties of Atoms and Molecules*, and *Properties of Ecosystems.* Each has 35 lessons including a final project that ties all of the lessons together.

In addition to the lessons, special features in each include biographical information on interesting people as well as fun facts to make the subject more fun.

Although this is a complete curriculum, the information included here is just a beginning, so please feel free to add to each lesson as you see fit. A resource guide is included in the appendices to help you find additional information and resources. A list of supplies needed is included at the beginning of each lesson, while a master list of all supplies needed for the course can be found in the appendices.

Answer keys for all review questions, worksheets, quizzes, and the final exam are included here.

If you wish to get through all of *Chemistry & Ecology* in one year, you should plan on covering approximately four lessons per week. The time required for each lesson varies depending on how much additional information you want to include, but you can plan on about 45 minutes per lesson.

If you wish to cover the material in more depth, you may add additional information and take a longer period of time to cover all the material or you could choose to do only one or two of the sections as a unit study.

Why Teach Chemistry & Ecology?

Maybe you hate science or you just hate teaching it. Maybe you love science but don't quite know how to teach it to your children. Maybe science just doesn't seem as important as some of those other subjects you need to teach. Maybe you need a little motivation. If any of these descriptions fit you, then please consider the following.

God is the Master Creator of everything. His handiwork is all around us. Our great Creator put in place all of the laws of physics, biology, and chemistry. These laws were put here for us to see His wisdom and power. In science, we see the hand of God at work more than in any other subject. Romans 1:20 says, "For since the creation of the world His invisible attributes are clearly seen, being understood by the things that are made, even His eternal power and Godhead, so that they [men] are without excuse." We need to help our children see God as Creator of the world around them

so they will be able to recognize God and follow Him.

The study of chemistry helps us understand and appreciate the amazing way everything God created works together. The study of atoms and molecules and how different substances react with each other reveals an amazing design, even at the smallest level of life. Understanding the carbon, nitrogen, and water cycles helps our children see that God has a plan to keep everything working together. Learning about ecosystems reveals God's genius in nature.

It's fun to teach chemistry and ecology! It's interesting too. The elements of chemistry are all around us. Children naturally like to combine things to see what will happen. You just need to direct their curiosity.

Finally, teaching chemistry is easy. You won't have to try to find strange materials for experiments or do dangerous things to learn about chemistry. Chemistry is as close as your kitchen or your own body, and ecosystems are just outside your door.

How Do I Teach Science?

In order to teach any subject you need to understand how people learn. People learn in different ways. Most people, and children in particular, have a dominant or preferred learning style in which they absorb and retain information more easily.

If a student's dominant style is:

Auditory He needs not only to hear the information but he needs to hear himself say it. This child needs oral presentation as well as oral drill and repetition.
Visual She needs things she can see. This child responds well to flashcards, pictures, charts, models, etc.
Kinesthetic He needs active participation. This child remembers best through games, hands-on activities, experiments, and field trips.

Also, some people are more relational while others are more analytical. The relational student needs to know why this subject is important, and how it will affect him personally. The analytical student, however, wants just the facts.

If you are trying to teach more than one student, you will probably have to deal with more than one learning style. Therefore, you need to present your lessons in several different ways so that each student can grasp and retain the information.

Grades 3–8

The first part of each lesson should be completed by all upper elementary and junior high students. This is the main part of the lesson containing a reading section, a hands-on activity that reinforces the ideas in the reading section (blue box), and a review section that provides review questions and application questions.

Grades 6–8

In addition, for middle school/junior high age students, we provide a "Challenge" section that contains more challenging material as well as additional activities and projects for older students (green box).

We have included periodic biographies to help your students appreciate the great men and women who have gone before us in the field of science.

We suggest a threefold approach to each lesson:

Introduce the topic

We give a brief description of the facts. Frequently you will want to add more information than the essentials given in this book. In addition to reading this section aloud (or having older children read it on their own), you may wish to do one or more of the following:

- Read a related book with your students.
- Write things down to help your visual learners.
- Give some history of the subject. We provide some historical sketches to help you, but you may want to add more.
- Ask questions to get your students thinking about the subject.

Make observations and do experiments

- Hands-on projects are suggested for each lesson. This part of each lesson may require help from the teacher.
- Have your students perform the activity by themselves whenever possible.

Review

- The "What did we learn?" section has review questions.
- The "Taking it further" section encourages students to:
  - Draw conclusions
  - Make applications of what was learned
  - Add extended information to what was covered in the lesson
- The "FUN FACT" section adds fun or interesting information.

By teaching all three parts of the lesson, you will be presenting the material in a way that children with any learning style can both relate to and remember.

Also, this approach relates directly to the scientific method and will help your students think more scientifically. The *scientific method* is just a way to examine a subject logically and learn from it. Briefly, the steps of the scientific method are:

1. Learn about a topic.
2. Ask a question.
3. Make a hypothesis (a good guess).
4. Design an experiment to test your hypothesis.
5. Observe the experiment and collect data.
6. Draw conclusions. (Does the data support your hypothesis?)

Note: It's okay to have a "wrong hypothesis." That's how we learn. Be sure to help your students understand why they sometimes get a different result than expected.

Our lessons will help your students begin to approach problems in a logical, scientific way.

How Do I Teach Creation vs. Evolution?

We are constantly bombarded by evolutionary ideas about the earth in books, movies, museums, and even commercials. These raise many questions: What is the big bang? How old is the earth? Do fossils show evolution to be true? Was there really a worldwide flood? When did dinosaurs live? Was there an ice age? How can we teach our children the truth about the origins of the earth? The Bible answers these questions, and this book accepts the historical accuracy of the Bible as written. We believe this is the only way we can teach our children to trust that everything God says is true.

There are five common views of the origins of life and the age of the earth:

Historical biblical account	Progressive creation	Gap theory	Theistic evolution	Naturalistic evolution
Each day of creation in Genesis is a normal day of about 24 hours in length, in which God created everything that exists. The earth is only thousands of years old, as determined by the genealogies in the Bible.	The idea that God created various creatures to replace other creatures that died out over millions of years. Each of the days in Genesis represents a long period of time (day-age view), and the earth is billions of years old.	The idea that there was a long, long time between what happened in Genesis 1:1 and what happened in Genesis 1:2. During this time, the "fossil record" was supposed to have formed, and millions of years of earth history supposedly passed.	The idea that God used the process of evolution over millions of years (involving struggle and death) to bring about what we see today.	The view that there is no God, and evolution of all life forms happened by purely naturalistic processes over billions of years.

Any theory that tries to combine the evolutionary time frame with creation presupposes that death entered the world before Adam sinned, which contradicts what God has said in His Word. The view that the earth (and its "fossil record") is hundreds of millions of years old damages the gospel message. God's completed creation was "very good" at the end of the sixth day (Genesis 1:31). Death entered this perfect paradise *after* Adam disobeyed God's command. It was the punishment for Adam's sin (Genesis 2:16–17, 3:19; Romans 5:12–19). Thorns appeared when God cursed the ground because of Adam's sin (Genesis 3:18).

The first animal death occurred when God killed at least one animal, shedding its blood, to make clothes for Adam and Eve (Genesis 3:21). If the earth's "fossil record" (filled with death, disease, and thorns) formed over millions of years before Adam appeared (and before he sinned), then death no longer would be the penalty for sin. Death, the "last enemy" (1 Corinthians 15:26), diseases (such as cancer), and thorns would instead be part of the original creation that God labeled "very good." No, it is clear that the "fossil record" formed some time *after* Adam sinned—not many millions of years before. Most fossils were formed as a result of the worldwide Genesis Flood.

When viewed from a biblical perspective, the scientific evidence clearly supports a recent creation by God, and not naturalistic evolution and millions of years. The volume of evidence supporting the biblical creation account is substantial and cannot be adequately covered in this book. If you would like more information on this topic, please see the resource guide in the appendices. To help get you started, just a few examples of evidence supporting biblical creation are given on the following pages.

Evolutionary Myth: Life evolved from non-life when chemicals randomly combined together to produce amino acids and then proteins that produced living cells.

The Truth: The chemical requirements for DNA and proteins to line up just right to create life could not have happened through purely natural processes. The process of converting DNA information into proteins requires at least 75 different protein molecules. But each and every one of these 75 proteins must be synthesized in the first place by the process in which they themselves are involved. How could the process begin without the presence of all the necessary proteins? Could all 75 proteins have arisen by chance in just the right place at just the right time? Dr. Gary Parker says this is like the chicken and the egg problem. The obvious conclusion is that both the DNA and proteins must have been functional from the beginning, otherwise life could not exist. The best explanation for the existence of these proteins and DNA is that God created them.

Gary Parker, *Creation: Facts of Life* (Master Books, 2006), pp. 20–43.

Evolutionary Myth: Stanley Miller created life in a test tube, thus demonstrating that the early earth had the conditions necessary for life to begin.

The Truth: Although Miller was able to create amino acids from raw chemicals in his famous experiment, he did not create anything close to life or even the ingredients of life. There are four main problems with Miller's experiment. First, he left out oxygen because he knew that oxygen corrodes and destroys amino acids very quickly. However, rocks found in every layer of the earth indicate that oxygen has always been a part of the earth's atmosphere. Second, Miller included ammonia gas and methane gas. Ammonia gas would not have been present in any large quantities because it would have been dissolved in the oceans. And there is no indication in any of the rock layers that methane has ever been a part of the earth's atmosphere. Third, Miller used a spark of electricity to cause the amino acids to form, simulating lightning. However, this spark more quickly destroyed the amino acids than built them up, so to keep the amino acids from being destroyed, Miller used specially designed equipment to siphon off the amino acids before they could be destroyed. This is not what would have happened in nature. And finally, although Miller did produce amino acids, they were not the kinds of amino acids that are needed for life as we know it. Most of the acids were ones that actually break down proteins, not build them up.

Mike Riddle, "Can Natural Processes Explain the Origin of Life?" in *The New Answers Book 2*, Ken Ham, ed. (Master Books, 2008). See also www.answersingenesis.org/go/origin.

Evolutionary Myth: Living creatures are just a collection of chemicals.

The Truth: It is true that cells are made of specific chemicals. However, a dead animal is made of the same chemicals as it was when it was living, but it cannot become alive again. What makes the chemicals into a living creature is the result of the organization of the substances, not just the substances themselves. Dr. Parker again uses an example. An airplane is made up of millions of non-flying parts; however, it can fly because of the design and organization of those parts. Similarly, plants and animals are alive because God created the chemicals in a specific way for them to be able to live. A collection of all the right parts is not life.

Evolutionary Myth: Chemical evidence points to an earth that is billions of years old.

The Truth: Much of the chemical evidence actually points to a young earth. For example, radioactive decay in the earth's crust produces helium atoms that rise to the surface and enter the atmosphere. Assuming that the rate of helium production has always been constant (an evolutionary assumption), the maximum age for the atmosphere could only be 2 million years.[1] This is much younger than the 4+ billion years claimed by evolutionists. And there are many ideas that could explain the presence of helium that would indicate a much younger age than 2 million years. Similarly, salt accumulates in the ocean over time. Evolutionists claim that life evolved in a salty ocean 3–4 billion years ago. If this were true and the salt has continued to accumulate over billions of years, the ocean would be too salty for anything to live in by now. Using the most conservative possible values (those that would give the oldest possible age for the oceans), scientists have calculated that the ocean must be less than 62 million years. That number is based on the assumption that nothing has affected the rate at which the salt is accumulating. However, the Genesis Flood would have drastically altered the amount of salt in the ocean, dissolving much sodium from land rocks.[2] Thus, the chemical evidence does not support an earth that is billions of years old.

[1] Don DeYoung, *Thousands…not billions* (Master Books, 2005).
[2] John D. Morris, *The Young Earth* (Master Books, 2007), pp. 83–87. See also www.answersingenesis.org/go/salty.

Despite the claims of many scientists, if you examine the evidence objectively, it is obvious that evolution and millions of years have not been proven. You can be confident that if you teach that what the Bible says is true, you won't go wrong. Instill in your student a confidence in the truth of the Bible in all areas. If scientific thought seems to contradict the Bible, realize that scientists often make mistakes, but God does not lie. At one time scientists believed that the earth was the center of the universe, that living things could spring from non-living things, and that blood-letting was good for the body. All of these were believed to be scientific facts but have since been disproved, but the Word of God remains true. If we use modern "science" to interpret the Bible, what will happen to our faith in God's Word when scientists change their theories yet again?

Integrating the Seven C's

The Seven C's is a framework in which all of history, and the future to come, can be placed. As we go through our daily routines we may not understand how the details of life connect with the truth that we find in the Bible. This is also the case for students. When discussing the importance of the Bible you may find yourself telling students that the Bible is relevant in everyday activities. But how do we help the younger generation see that? The Seven C's are intended to help.

The Seven C's can be used to develop a biblical worldview in students, young or old. Much more than entertaining stories and religious teachings, the Bible has real connections to our everyday life. It may be hard, at first, to see how many connections there are, but with practice, the daily relevance of God's Word will come alive. Let's look at the Seven C's of History and how each can be connected to what the students are learning.

Creation

God perfectly created the heavens, the earth, and all that is in them in six normal-length days around 6,000 years ago.

This teaching is foundational to a biblical worldview and can be put into the context of any subject. In science, the amazing design that we see in nature—whether in the veins of a leaf or the complexity of your hand—is all the handiwork of God. Virtually all of the lessons in *God's Design for Science* can be related to God's creation of the heavens and earth.

Other contexts include:

Natural laws—any discussion of a law of nature naturally leads to God's creative power.

DNA and information—the information in every living thing was created by God's supreme intelligence.

Mathematics—the laws of mathematics reflect the order of the Creator.

Biological diversity—the distinct kinds of animals that we see were created during the Creation Week, not as products of evolution.

Art—the creativity of man is demonstrated through various art forms.

History—all time scales can be compared to the biblical time scale extending back about 6,000 years.

Ecology—God has called mankind to act as stewards over His creation.

Corruption

After God completed His perfect creation, Adam disobeyed God by eating the forbidden fruit. As a result, sin and death entered the world, and the world has been in decay since that time. This point is evident throughout the world that we live in. The struggle for survival in animals, the death of loved ones, and the violence all around us are all examples of the corrupting influence of sin.

Other contexts include:

Genetics—the mutations that lead to diseases, cancer, and variation within populations are the result of corruption.

Biological relationships—predators and parasites result from corruption.

History—wars and struggles between mankind, exemplified in the account of Cain and Abel, are a result of sin.

Catastrophe

God was grieved by the wickedness of mankind and judged this wickedness with a global Flood. The Flood covered the entire surface of the earth and killed all air-breathing creatures that were not aboard the Ark. The eight people and the animals aboard the Ark replenished the earth after God delivered them from the catastrophe.

The catastrophe described in the Bible would naturally leave behind much evidence. The studies of geology and of the biological diversity of animals on the planet are two of the most obvious applications of this event. Much of scientific understanding is based on how a scientist views the events of the Genesis Flood.

Other contexts include:

Biological diversity—all of the birds, mammals, and other air-breathing animals have populated the earth from the original kinds which left the Ark.

Geology—the layers of sedimentary rock seen in roadcuts, canyons, and other geologic features are testaments to the global Flood.

Geography—features like mountains, valleys, and plains were formed as the floodwaters receded.

Physics—rainbows are a perennial sign of God's faithfulness and His pledge to never flood the entire earth again.

Fossils—most fossils are a result of the Flood rapidly burying plants and animals.

Plate tectonics—the rapid movement of the earth's plates likely accompanied the Flood.

Global warming/Ice Age—both of these items are likely a result of the activity of the Flood. The warming we are experiencing today has been present since the peak of the Ice Age (with variations over time).

Confusion

God commanded Noah and his descendants to spread across the earth. The refusal to obey this command and the building of the tower at Babel caused God to judge this sin. The common language of the people was confused and they spread across the globe as groups with a common language. All people are truly of "one blood" as descendants of Noah and, originally, Adam.

The confusion of the languages led people to scatter across the globe. As people settled in new areas, the traits they carried with them became concentrated in those populations. Traits like dark skin were beneficial in the tropics while other traits benefited populations in northern climates, and distinct people groups, not races, developed.

Other contexts include:

Genetics—the study of human DNA has shown that there is little difference in the genetic makeup of the so-called "races."

Languages—there are about seventy language groups from which all modern languages have developed.

Archaeology—the presence of common building structures, like pyramids, around the world confirms the biblical account.

Literature—recorded and oral records tell of similar events relating to the Flood and the dispersion at Babel.

Christ

God did not leave mankind without a way to be redeemed from its sinful state. The Law was given to Moses to show how far away man is from God's standard of perfection. Rather than the sacrifices, which only covered sins, people needed a Savior to take away their sin. This was accomplished when Jesus Christ came to earth to live a perfect life and, by that obedience, was able to be the sacrifice to satisfy God's wrath for all who believe.

The deity of Christ and the amazing plan that was set forth before the foundation of the earth is the core of Christian doctrine. The earthly life of Jesus was the fulfillment of many prophecies and confirms the truthfulness of the Bible. His miracles and presence in human form demonstrate that God is both intimately concerned with His creation and able to control it in an absolute way.

Other contexts include:

Psychology—popular secular psychology teaches of the inherent goodness of man, but Christ has lived the only perfect life. Mankind needs a Savior to redeem it from its unrighteousness.

Biology—Christ's virgin birth demonstrates God's sovereignty over nature.

Physics—turning the water into wine and feeding the five thousand demonstrate Christ's deity and His sovereignty over nature.

History—time is marked (in the western world) based on the birth of Christ despite current efforts to change the meaning.

Art—much art is based on the life of Christ and many of the masters are known for these depictions, whether on canvas or in music.

Cross

Because God is perfectly just and holy, He must punish sin. The sinless life of Jesus Christ was offered as a substitutionary sacrifice for all of those who will repent and put their faith in the Savior. After His death on the Cross, He defeated death by rising on the third day and is now seated at the right hand of God.

The events surrounding the crucifixion and resurrection have a most significant place in the life of Christians. Though there is no way to scientifically prove the resurrection, there is likewise no way to prove the stories of evolutionary history. These are matters of faith founded in the truth of God's Word and His character. The eyewitness testimony of over 500 people and the written Word of God provide the basis for our belief.

Other contexts include:

Biology—the biological details of the crucifixion can be studied alongside the anatomy of the human body.

History—the use of crucifixion as a method of punishment was short-lived in historical terms and not known at the time it was prophesied.

Art—the crucifixion and resurrection have inspired many wonderful works of art.

Consummation

God, in His great mercy, has promised that He will restore the earth to its original state—a world without death, suffering, war, and disease. The corruption introduced by Adam's sin will be removed. Those who have repented and put their trust in the completed work of Christ on the Cross will experience life in this new heaven and earth. We will be able to enjoy and worship God forever in a perfect place.

This future event is a little more difficult to connect with academic subjects. However, the hope of a life in God's presence and in the absence of sin can be inserted in discussions of human conflict, disease, suffering, and sin in general.

Other contexts include:

History—in discussions of war or human conflict the coming age offers hope.

Biology—the violent struggle for life seen in the predator-prey relationships will no longer taint the earth.

Medicine—while we struggle to find cures for diseases and alleviate the suffering of those enduring the effects of the Curse, we ultimately place our hope in the healing that will come in the eternal state.

The preceding examples are given to provide ideas for integrating the Seven C's of History into a broad range of curriculum activities. The first seven lessons of this curriculum cover the Seven C's and will establish a solid understanding of the true history, and future, of the universe. Full lesson plans, activities, and student resources are provided in AiG's *Answers for Kids* curriculum set if you wish to focus on the Seven C's.

Even if you use other curricula, you can still incorporate the Seven C's teaching into those. Using this approach will help students make firm connections between biblical events and every aspect of the world around them, and they will begin to develop a truly biblical worldview and not just add pieces of the Bible to what they learn in "the real world."

First Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
First Semester-First Quarter					
Week 1	Day 1	Properties of Matter Unit 1: Experimental Science Read Lesson 1: Introduction to Experimental Science Pages 14-16 • *God's Design: Chemistry & Ecology* • (GDCE) Complete Worksheet • Pages 25-26 • *Teacher Guide* • (TG)			
	Day 2	Read Lesson 2: The Scientific Method • Pages 17-20 • (GDCE) Complete Worksheet • Pages 27-29 • (TG)			
	Day 3	Read Lesson 3: Tools of Science • Pages 21-23• (GDCE) Complete Worksheet • Pages 31-34 • (TG)			
	Day 4	Read Special Feature: Lord Kelvin • Pages 24-25 • (GDCE)			
	Day 5				
Week 2	Day 6	Read Lesson 4: The Metric System • Pages 26-29 • (GDCE) Complete Worksheet • Pages 35-36 • (TG)			
	Day 7	Complete **Properties of Matter Quiz 1** (Lessons 1-4) Pages 339-340 • (TG)			
	Day 8	Properties of Matter Unit 2: Measuring Matter Read Lesson 5: Mass vs. Weight • Pages 31-33 • (GDCE) Complete Worksheets • Pages 37-39 • (TG)			
	Day 9	Read Lesson 6: Conservation of Mass • Pages 34-36 • (GDCE) Complete Worksheet • Pages 41-42 • (TG)			
	Day 10				
Week 3	Day 11	Read Lesson 7: Volume • Pages 37-39 • (GDCE) Complete Worksheet • Pages 43-44 • (TG)			
	Day 12	Read Lesson 8: Density • Pages 40-41 • (GDCE) Complete Worksheet • Pages 45-47 • (TG)			
	Day 13	Read Lesson 9: Buoyancy • Pages 42-44 • (GDCE) Complete Worksheet • Pages 49-50 • (TG)			
	Day 14	Read Special Feature: James Clerk Maxwell • Page 45 • (GDCE)			
	Day 15				
Week 4	Day 16	Complete **Properties of Matter Quiz 2** (Lessons 5-9) Pages 341-342 • (TG)			
	Day 17	Properties of Matter Unit 3: States of Matter Read Lesson 10: Physical & Chemical Properties Pages 47-48 • (GDCE) Complete Worksheet • Pages 51-52 • (TG)			
	Day 18	Read Lesson 11: States of Matter • Pages 49-52 • (GDCE) Complete Worksheet • Pages 53-54 • (TG)			
	Day 19	Read Lesson 12: Solids • Pages 53-55 • (GDCE) Complete Worksheet • Pages 55-56 • (TG)			
	Day 20				

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 21	Read Lesson 13: Liquids • Pages 56-58 • (GDCE) Complete Worksheet • Pages 57-58 • (TG)			
	Day 22	Read Lesson 14: Gases • Pages 59-61 • (GDCE) Complete Worksheet • Pages 59-60 • (TG)			
	Day 23	Read Lesson 15: Gas Laws • Pages 62-64 • (GDCE) Complete Worksheet • Pages 61-62 • (TG)			
	Day 24	Read Special Feature: Robert Boyle • Page 65 • (GDCE)			
	Day 25				
Week 6	Day 26	Complete **Properties of Matter Quiz 3** (Lessons 10-15) Pages 343-344 • (TG)			
	Day 27	Properties of Matter Unit 4: Classifying Matter Read Lesson 16: Elements • Pages 67-70 • (GDCE) Complete Worksheet • Pages 63-64 • (TG)			
	Day 28	Read Special Feature: William Prout • Pages 71-72 • (GDCE)			
	Day 29	Read Lesson 17: Compounds • Pages 73-75 • (GDCE) Complete Worksheet • Pages 65-66 • (TG)			
	Day 30				
Week 7	Day 31	Read Lesson 18: Water • Pages 76-78 • (GDCE) Complete Worksheet • Pages 67-69 • (TG)			
	Day 32	Read Lesson 19: Mixtures • Pages 79-81 • (GDCE) Complete Worksheet • Pages 71-72 • (TG)			
	Day 33	Read Lesson 20: Air • Pages 82-84 • (GDCE) Complete Worksheet • Pages 73-74 • (TG)			
	Day 34	Read Lesson 21: Milk & Cream • Pages 85-88 • (GDCE) Complete Worksheet • Pages 75-76 • (TG)			
	Day 35				
Week 8	Day 36	Complete **Properties of Matter Quiz 4** (Lessons 16-21) Pages 345-346 • (TG)			
	Day 37	Properties of Matter Unit 5: Solutions Read Lesson 22: Solutions • Pages 90-91 • (GDCE) Complete Worksheet • Pages 77-80 • (TG)			
	Day 38	Read Lesson 23: Suspensions • Pages 92-94 • (GDCE) Complete Worksheet • Pages 81-82 • (TG)			
	Day 39	Read Lesson 24: Solubility • Pages 95-97 • (GDCE) Complete Worksheet • Pages 83-85 • (TG)			
	Day 40				
Week 9	Day 41	Read Lesson 25: Soft Drinks • Pages 98-100 • (GDCE) Complete Worksheet • Pages 87-88 • (TG)			
	Day 42	Read Lesson 26: Concentration • Pages 101-103 • (GDCE) Complete Worksheet • Pages 89-91 • (TG)			
	Day 43	Read Lesson 27: Seawater • Pages 104-106 • (GDCE) Complete Worksheet • Pages 93-94 • (TG)			
	Day 44	Read Special Feature: Desalination of Water • Page 107 • (GDCE)			
	Day 45				

Date	Day	Assignment	Due Date	✓	Grade
First Semester-Second Quarter					
Week 1	Day 46	Read Lesson 28: Water Treatment • Pages 108-110 • (GDCE) Complete Worksheet • Pages 95-96 • (TG)			
	Day 47	Complete **Properties of Matter Quiz 5** (Lessons 22-28) Pages 347-348 • (TG)			
	Day 48	Properties of Matter Unit 6: Food Chemistry Read Lesson 29: Food Chemistry • Pages 112-113 • (GDCE) Complete Worksheet • Pages 97-98 • (TG)			
	Day 49	Read Special Feature: Genetically Modified Foods Pages 114-115 • (GDCE)			
	Day 50				
Week 2	Day 51	Read Lesson 30: Chemical Analysis of Food Pages 116-118 • (GDCE) Complete Worksheet • Pages 99-104 • (TG)			
	Day 52	Read Lesson 31: Flavors • Pages 119-121 • (GDCE) Complete Worksheet • Pages 105-106 • (TG)			
	Day 53	Read Special Feature: Chocolate & Vanilla • Pages 122-123 • (GDCE)			
	Day 54	Read Lesson 32: Additives • Pages 124-126 • (GDCE) Complete Worksheet • Pages 107-109 • (TG)			
	Day 55				
Week 3	Day 56	Read Lesson 33: Bread • Pages 127-129 • (GDCE) Complete Worksheet • Pages 111-113 • (TG)			
	Day 57	Read Special Feature: Bread through the Centuries Pages 130-131 • (GDCE)			
	Day 58	Read Lesson 34: Identification of Unknown Substances: Final Project • Pages 132-133 • (GDCE) Complete Worksheet • Pages 115-118 • (TG)			
	Day 59	Complete **Properties of Matter Quiz 6** (Lessons 29-33) Pages 349-350 • (TG)			
	Day 60	Read Lesson 35: Conclusion • Pages 134-135 • (GDCE) Complete Worksheet • Page 119 • (TG)			
Week 4	Day 61	Complete **Properties of Matter Final Exam** (Lessons 1-34) Pages 351-353 • (TG)			
	Day 62	Properties of Ecosystems Unit 1: Introduction to Ecosystems Read Lesson 1: What Is an Ecosystem? • Pages 142-144 • (GDCE) Complete Worksheet • Pages 123-126 • (TG)			
	Day 63	Read Special Feature: Garden of Eden • Pages 145-146 • (GDCE)			
	Day 64	Read Lesson 2: Niches • Pages 147-149 • (GDCE) Complete Worksheet • Pages 127-128 • (TG)			
	Day 65				

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 66	Read Lesson 3: Food Chains • Pages 150-152 • (GDCE) Complete Worksheet • Pages 129-130 • (TG)			
	Day 67	Read Lesson 4: Scavengers & Decomposers • Pages 153-155 • (GDCE) Complete Worksheet • Pages 131-132 • (TG)			
	Day 68	Read Lesson 5: Relationships among Living Things Pages 156-158 • (GDCE) Complete Worksheet • Pages 133-135 • (TG)			
	Day 69	Read Lesson 6: Oxygen & Water Cycles • Pages 159-161 • (GDCE) Complete Worksheet • Pages 137-138 • (TG)			
	Day 70				
Week 6	Day 71	Complete **Properties of Ecosystems Quiz 1** (Lessons 1-6) Pages 357-358 • (TG)			
	Day 72	Properties of Ecosystems Unit 2: Grasslands & Forests Read Lesson 7: Biomes around the World • Pages 163-166 • (GDCE) Complete Worksheet • Pages 139-142 • (TG)			
	Day 73	Read Special Feature: Alexander von Humboldt Pages 167-168 • (GDCE)			
	Day 74	Read Lesson 8: Grasslands • Pages 169-172 • (GDCE) Complete Worksheet • Pages 143-146 • (TG)			
	Day 75				
Week 7	Day 76	Read Lesson 9: Forests • Pages 173-175 • (GDCE) Complete Worksheet • Pages 147-149 • (TG)			
	Day 77	Read Lesson 10: Temperate Forests • Pages 176-178 • (GDCE) Complete Worksheet • Pages 151-156 • (TG)			
	Day 78	Read Lesson 11: Tropical Rainforests • Pages 179-181 • (GDCE) Complete Worksheet • Pages 157-158 • (TG)			
	Day 79	Complete **Properties of Ecosystems Quiz 2** (Lessons 7-11) Pages 359-360 • (TG)			
	Day 80				
Week 8	Day 81	Properties of Ecosystems Unit 3: Aquatic Ecosystems Read Lesson 12: The Ocean • Pages 183-186 • (GDCE) Complete Worksheet • Pages 159-161 • (TG)			
	Day 82	Read Lesson 13: Coral Reefs • Pages 187-189 • (GDCE) Complete Worksheet • Pages 163-164 • (TG)			
	Day 83	Read Lesson 14: Beaches • Pages 190-192 • (GDCE) Complete Worksheet • Pages 165-167 • (TG)			
	Day 84	Read Lesson 15: Estuaries • Pages 193-195 • (GDCE) Complete Worksheet • Pages 169-171 • (TG)			
	Day 85				
Week 9	Day 86	Read Lesson 16: Lakes & Ponds • Pages 196-198 • (GDCE) Complete Worksheet • Pages 173-177 • (TG)			
	Day 87	Read Lesson 17: Rivers & Streams • Pages 199-200 • (GDCE) Complete Worksheets • Pages 179-183 • (TG)			
	Day 88	Read Special Feature: The Amazon River • Pages 201-202 • (GDCE)			
	Day 89	Complete **Properties of Ecosystems Quiz 3** (Lessons 12-17) Pages 361-362 • (TG)			
	Day 90				
		Mid-Term Grade			

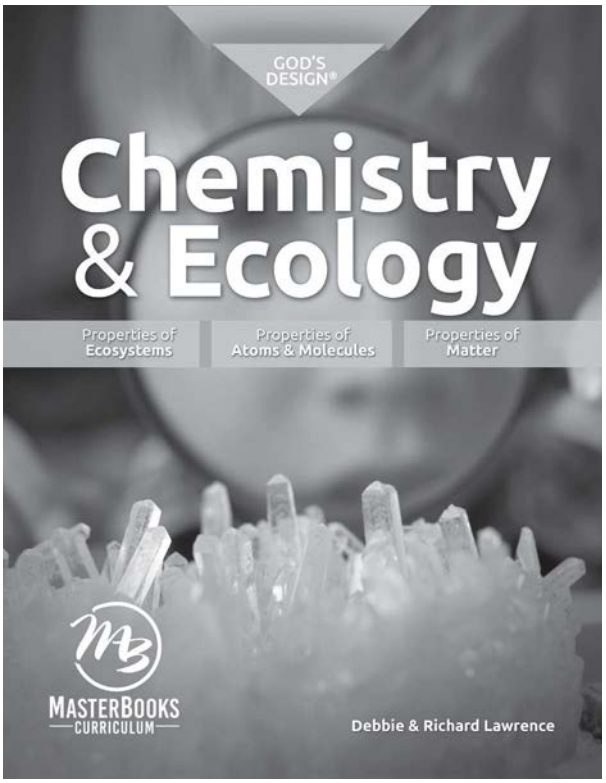
Second Semester Suggested Daily Schedule

Date	Day	Assignment	Due Date	✓	Grade
		Second Semester-Third Quarter			
Week 1	Day 91	Properties of Ecosystems Unit 4: Extreme Ecosystems Read Lesson 18: Tundra • Pages 204-207 • (GDCE) Complete Worksheet • Pages 185-187 • (TG)			
	Day 92	Read Special Feature: Robert Peary Pages 208-209 • (GDCE)			
	Day 93	Read Lesson 19: Deserts • Pages 210-213 • (GDCE) Complete Worksheet • Pages 189-191 • (TG)			
	Day 94	Read Lesson 20: Oases • Pages 214-216 • (GDCE) Complete Worksheets • Pages 193-194 • (TG)			
	Day 95				
Week 2	Day 96	Read Lesson 21: Mountains • Pages 217-220 • (GDCE) Complete Worksheets • Pages 195-197 • (TG)			
	Day 97	Read Lesson 22: Chaparral • Pages 221-223 • (GDCE) Complete Worksheets • Pages 199-201 • (TG)			
	Day 98	Read Lesson 23: Caves • Pages 224-227 • (GDCE) Complete Worksheets • Pages 203-205 • (TG)			
	Day 99	Complete **Properties of Ecosystems Quiz 4** (Lessons 18-23) Pages 363-364 • (TG)			
	Day 100				
Week 3	Day 101	Properties of Ecosystems Unit 5: Animal Behaviors Read Lesson 24: Seasonal Behaviors • Pages 229-232 • (GDCE) Complete Worksheets • Pages 207-208 • (TG)			
	Day 102	Read Lesson 25: Animal Defenses • Pages 233-235 • (GDCE) Complete Worksheets • Pages 209-210 • (TG)			
	Day 103	Read Lesson 26: Adaption • Pages 236-238 • (GDCE) Complete Worksheets • Pages 211-212 • (TG)			
	Day 104	Read Lesson 27: Balance of Nature • Pages 239-242 • (GDCE) Complete Worksheets • Pages 213-215 • (TG)			
	Day 105				
Week 4	Day 106	Read Special Feature: Eugene P. Odum • Page 243 • (GDCE)			
	Day 107	Complete **Properties of Ecosystems Quiz 5** (Lessons 24-27) Pages 365-366 • (TG)			
	Day 108	Properties of Ecosystems Unit 6: Ecology & Conservation Read Lesson 28: Man's Impact on the Environment Pages 245-247 • (GDCE) Complete Worksheet • Pages 217-218 • (TG)			
	Day 109	Read Lesson 29: Endangered Species • Pages 248-251 • (GDCE) Complete Worksheet • Pages 219-220 • (TG)			
	Day 110				

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 111	Read Special Feature: Theodore Roosevelt Pages 252-253 • (GDCE)			
	Day 112	Read Lesson 30: Pollution • Pages 254-257 • (GDCE) Complete Worksheet • Pages 221-223 • (TG)			
	Day 113	Read Lesson 31: Acid Rain • Pages 258-260 • (GDCE) Complete Worksheet • Pages 225-226 • (TG)			
	Day 114	Read Lesson 32: Global Warming • Pages 261-264 • (GDCE) Complete Worksheet • Pages 227-230 • (TG)			
	Day 115				
Week 6	Day 116	Read Lesson 33: What can you do? • Pages 265-267 • (GDCE) Complete Worksheet • Pages 231-233 • (TG)			
	Day 117	Read Lesson 34: Reviewing Ecosystems: Final Project Page 268 • (GDCE) Complete Worksheet • Page 235 • (TG)			
	Day 118	Complete **Properties of Ecosystems Quiz 6** (Lessons 28-33) Pages 367-368 • (TG)			
	Day 119	Read Lesson 35: Conclusion • Page 269 • (GDCE) Complete Worksheet • Page 237 • (TG)			
	Day 120				
Week 7	Day 121	Complete **Properties of Ecosystems Final Exam** (Lessons 1-34) Pages 369-373 • (TG)			
	Day 122	Properties of Atoms & Molecules Unit 1: Atoms & Molecules Read Lesson 1: Introduction to Chemistry Pages 278-279 • (GDCE) Complete Worksheet • Pages 241-242 • (TG)			
	Day 123	Read Lesson 2: Atoms • Pages 280-282 • (GDCE) Complete Worksheet • Pages 243-246 • (TG)			
	Day 124	Read Lesson 3: Atomic Mass • Pages 283-284 • (GDCE) Complete Worksheet • Pages 247-250 • (TG)			
	Day 125				
Week 8	Day 126	Read Special Feature: Madame Curie • Pages 285-286 • (GDCE)			
	Day 127	Read Lesson 4: Molecules • Pages 287-289 • (GDCE) Complete Worksheet • Pages 251-254 • (TG)			
	Day 128	Complete **Properties of Atoms & Molecules Quiz 1** (Lessons 1-4) • Pages 377-378 • (TG)			
	Day 129	Properties of Atoms & Molecules Unit 2: Elements Read Lesson 5: Periodic Table of the Elements Pages 291-294 • (GDCE) Complete Worksheets • Pages 255-256 • (TG)			
	Day 130				
Week 9	Day 131	Read Special Feature: Development of the Periodic Table Page 295 (GDCE)			
	Day 132	Read Lesson 6: Metals • Pages 296-298 • (GDCE) Complete Worksheet • Pages 257-258 • (TG)			
	Day 133	Read Lesson 7: Nonmetals • Pages 299-301 • (GDCE) Complete Worksheet • Pages 259-260 • (TG)			
	Day 134	Read Lesson 8: Hydrogen • Pages 302-304 • (GDCE) Complete Worksheet • Pages 261-262 • (TG)			
	Day 135				

Date	Day	Assignment	Due Date	✓	Grade
Second Semester-Fourth Quarter					
Week 1	Day 136	Read Lesson 9: Carbon • Pages 305-307 • (GDCE) Complete Worksheet • Pages 263-264 • (TG)			
	Day 137	Read Lesson 10: Oxygen • Pages 308-310 • (GDCE) Complete Worksheet • Pages 265-266 • (TG)			
	Day 138	Complete **Properties of Atoms & Molecules Quiz 2** (Lessons 5-10) • Pages 379-380 • (TG)			
	Day 139	Properties of Atoms & Molecules Unit 3: Bonding Read Lesson 11: Ionic Bonding • Pages 312-315 • (GDCE) Complete Worksheet • Pages 267-269 • (TG)			
	Day 140				
Week 2	Day 141	Read Lesson 12: Covalent Bonding • Pages 316-318 • (GDCE) Complete Worksheet • Pages 271-273 • (TG)			
	Day 142	Read Lesson 13: Metallic Bonding • Pages 319-320 • (GDCE) Complete Worksheet • Pages 275-276 • (TG)			
	Day 143	Read Lesson 14: Mining & Metal Alloys Pages 321-323 • (GDCE) Complete Worksheets • Pages 277-278 • (TG)			
	Day 144	Read Special Feature: Charles Martin Hall Pages 324-325 • (GDCE)			
	Day 145				
Week 3	Day 146	Read Lesson 15: Crystals • Pages 326-329 • (GDCE) Complete Worksheet • Pages 279-280 • (TG)			
	Day 147	Read Lesson 16: Ceramics • Pages 330-332 • (GDCE) Complete Worksheets • Pages 281-282 • (TG)			
	Day 148	Complete **Properties of Atoms & Molecules Quiz 3** (Lessons 11-16) • Pages 381-382 • (TG)			
	Day 149	Properties of Atoms & Molecules Unit 4: Chemical Reactions Read Lesson 17: Chemical Reactions • Pages 334-337 • (GDCE) Complete Worksheets • Pages 283-285 • (TG)			
	Day 150				
Week 4	Day 151	Read Lesson 18: Chemical Equations • Pages 338-340 • (GDCE) Complete Worksheets • Pages 287-289 • (TG)			
	Day 152	Read Lesson 19: Catalysts • Pages 341-343 • (GDCE) Complete Worksheet • Pages 291-292 • (TG)			
	Day 153	Read Lesson 20: Endothermic & Exothermic Reactions Pages 344-346 • (GDCE) Complete Worksheets • Pages 293-295 • (TG)			
	Day 154	Complete **Properties of Atoms & Molecules Quiz 4** (Lessons 17-20) • Pages 383-384 • (TG)			
	Day 155	Properties of Atoms & Molecules Unit 5: Acids & Bases Read Lesson 21: Chemical Analysis • Pages 348-350 • (GDCE) Complete Worksheets • Pages 297-298 • (TG)			

Date	Day	Assignment	Due Date	✓	Grade
Week 5	Day 156	Read Lesson 22: Acids • Pages 351-353 • (GDCE) Complete Worksheets • Pages 299-300 • (TG)			
	Day 157	Read Lesson 23: Bases • Pages 354-356 • (GDCE) Complete Worksheets • Pages 301-302 • (TG)			
	Day 158	Read Lesson 24: Salts • Pages 357-359 • (GDCE) Complete Worksheets • Pages 303-305 • (TG)			
	Day 159	Read Special Feature: Batteries • Pages 360-361 • (GDCE)			
	Day 160				
Week 6	Day 161	Complete **Properties of Atoms & Molecules Quiz 5** (Lessons 21-24) • Pages 385-386 • (TG)			
	Day 162	Properties of Atoms & Molecules Unit 6: Biochemistry Read Lesson 25: Biochemistry • Pages 363-366 • (GDCE) Complete Worksheets • Pages 307-309 • (TG)			
	Day 163	Read Lesson 26: Decomposers • Pages 367-369 • (GDCE) Complete Worksheets • Pages 311-313 • (TG)			
	Day 164	Read Lesson 27: Chemicals in Farming • Pages 370-372 • (GDCE) Complete Worksheet • Pages 315-316 • (TG)			
	Day 165				
Week 7	Day 166	Read Lesson 28: Medicines • Pages 373-375 • (GDCE) Complete Worksheets • Pages 317-318 • (TG) • Read Special Feature: Alexander Fleming • Pages 376-377 • (GDCE)			
	Day 167	Complete **Properties of Atoms & Molecules Quiz 6** (Lessons 25-28) • Pages 387-388 • (TG)			
	Day 168	Properties of Atoms & Molecules Unit 7: Applications of Chemistry • Read Lesson 29: Perfumes • Pages 379-381 • (GDCE) Complete Worksheet • Pages 319-320 • (TG)			
	Day 169	Read Lesson 30: Rubber • Pages 382-385 • (GDCE) Complete Worksheet • Pages 321-322 • (TG)			
	Day 170				
Week 8	Day 171	Read Special Feature: Charles Goodyear Pages 386-387 • (GDCE)			
	Day 172	Read Lesson 31: Plastics • Pages 388-390 • (GDCE) Complete Worksheets • Pages 323-325 • (TG)			
	Day 173	Read Lesson 32: Fireworks • Pages 391-393 • (GDCE) Complete Worksheet • Pages 327-328 • (TG)			
	Day 174	Read Lesson 33: Rocket Fuel • Pages 394-396 • (GDCE) Complete Worksheet • Pages 329-330 • (TG)			
	Day 175				
Week 9	Day 176	Read Lesson 34: Fun with Chemistry: Final Project Pages 397-399 • (GDCE) Complete Worksheet • Pages 331-333 • (TG)			
	Day 177	Complete **Properties of Atoms & Molecules Quiz 7** (Lessons 29-33) • Pages 389-390 • (TG)			
	Day 178	Read Lesson 35: Conclusion • Page 400 • (GDCE) Complete Worksheet • Page 335 • (TG)			
	Day 179	Complete **Properties of Atoms & Molecules Final Exam** (Lessons 1-34) • Pages 391-393 • (TG)			
	Day 180				
		Final Grade			



Matter Worksheets

for Use with

Properties of Matter

(*God's Design: Chemistry & Ecology*)

1 Introduction to Experimental Science

Learning about matter

Supply list – Chemistry is fun

- ☐ Wooden spoon
- ☐ Metal spoon
- ☐ Plastic ruler
- ☐ Pencil
- ☐ Butter knife
- ☐ Large cup hot water
- ☐ Butter
- ☐ Stopwatch
- ☐ Copy of "Conducting Heat Experiment" Worksheet

Chemistry is fun

1. Did the butter melt fastest on the item you expected to conduct the heat the best?

2. Which items actually conducted heat the best? Which ones conducted heat the slowest?

Operational science vs. origins science

Note: Challenge topics can be discussed or answered orally. Or, the student can write his/her answer.

Explain to your teacher the difference between operational science vs. origins science.

What did we learn?

1. What is matter?

2. What do chemists study?

3. What is an experiment?

Taking it further

1. Why is it important to study chemistry?

2. What are two things you need to know before conducting an experiment?

Name _____ Date_____

Conducting Heat Experiment Worksheet

Which items listed on the chart below do you think will conduct heat the fastest? Write your hypothesis below and then perform the experiment in your student manual.

Hypothesis

I think the order for the conductivity of the items will be:

_____ (Fastest heat conductor)

_____

_____

_____

_____ (Slowest heat conductor)

Observations

Item	Time to melt butter
Metal spoon	
Wooden spoon	
Plastic ruler	
Pencil	
Butter knife	

Conclusions

The actual order for the conductivity of the items was:

_____ (Fastest heat conductor)

_____

_____

_____

_____ (Slowest heat conductor)

2 The Scientific Method

How do scientists do it?

Supply list – Using the scientific method

- ☐ 3 empty plastic bottles
- ☐ Masking tape
- ☐ Yeast
- ☐ Marker
- ☐ Sugar
- ☐ Molasses
- ☐ 3 identical balloons
- ☐ Thermometer
- ☐ Measuring cup and spoons
- ☐ Warm water
- ☐ Cloth tape measure or string
- ☐ Copy of "Scientific Method" Worksheet

Design your own experiment

Describe the experiment you designed either on your own or with one of the suggested topics. Show your teacher the data sheet where you recorded data from this experiment, how you are controlling your variables, and the conclusion for your experiment.

What did we learn?

1. What is the overall job of a scientist?

2. What are some areas that cannot be studied by science?

3. What are the five steps of the scientific method?

Taking it further

1. Why was it necessary to have bottle number 1 in the experiment?

2. What other sweeteners could you try in your experiment?

3. What sweeteners were used in the bread at your house?

4. Why do you think that sweetener was used?

Name _____ Date_____

Scientific Method Worksheet

Write your hypothesis below and then perform the experiment in your student manual.

Hypothesis

Do you think sugar or molasses will produce the most gas? _____

Circumference of Balloon

Time	Bottle 1 (no sweetener)	Bottle 2 (sugar)	Bottle 3 (molasses)

Which balloon had the most gas after 1 hour? _____

Did the bottle with your chosen sweetener produce the most gas? _____

Did this support your hypothesis? _____

Which sweetener would you use to make your bread? _____

Why might someone choose to use a sweetener that does not produce the most gas? _____

_____

3 Tools of Science

Using the right tool for the job

Supply list – Learning to use your tools

☐ Thermometer

☐ Masking tape

☐ Liquid measuring cup

☐ Marker

☐ Small box

☐ Tennis ball

☐ 2 cups

☐ Metric ruler or meter stick

☐ Digital stop watch

☐ Copy of "Scientific Tools" Worksheet

Supplies for Challenge (if available) – Magnifying objects

☐ Microscope

☐ Prepared slides

☐ Telescope

What did we learn?

1. What is the main thing a scientist does as he/she studies the physical world?

2. What are the two types of observations that a scientist can make?

3. What is the main problem with qualitative observation?

4. What are some scientific tools used for quantitative observations?

Taking it further

1. What qualitative observations might you make when observing the experiment in lesson 1?

2. What quantitative observations might you make when observing the experiment in lesson 1?

Name _____ Date_____

Scientific Tools Worksheet

Test 1

Use masking tape and a marker to label two cups as Cup 1 and Cup 2. Fill Cup 1 with hot tap water and Cup 2 with cold tap water.

Qualitative observations

Use your five senses to describe the water in each cup.

Cup 1: _____

Cup 2: _____

Quantitative measurement

Use a thermometer to measure the temperature of the water in each cup.

The temperature is:

Cup 1: Cup 2:

Test 2

Determine which cup has more water in it.

Qualitative observations

Which cup appears to have more water in it? _____

Quantitative measurement

Pour the contents of Cup 1 into a liquid measuring cup and record the amount of water below. Empty the measuring cup and repeat for Cup 2.

Amount of water in Cup 1:

Amount of water in Cup 2:

Which cup had the most water in it? _____

How much more water did it have? _____

Test 3

Observe a small box.

Qualitative observations

Describe the size, shape, texture, and color of the box.

_____

Quantitative measurement

Use a ruler or meter stick to measure the box.

Length: Height: Width:

Test 4

Hold a tennis ball at waist height and drop it. Next, hold the tennis ball as high as you can reach and drop it. From which height did the ball reach the ground the fastest?

Qualitative observations

Describe how long it took the ball to fall each time.

From waist high: From high up:

Quantitative measurement

Repeat the experiment using a digital stop watch to measure the length of time it takes for the ball to reach the ground after it is released.

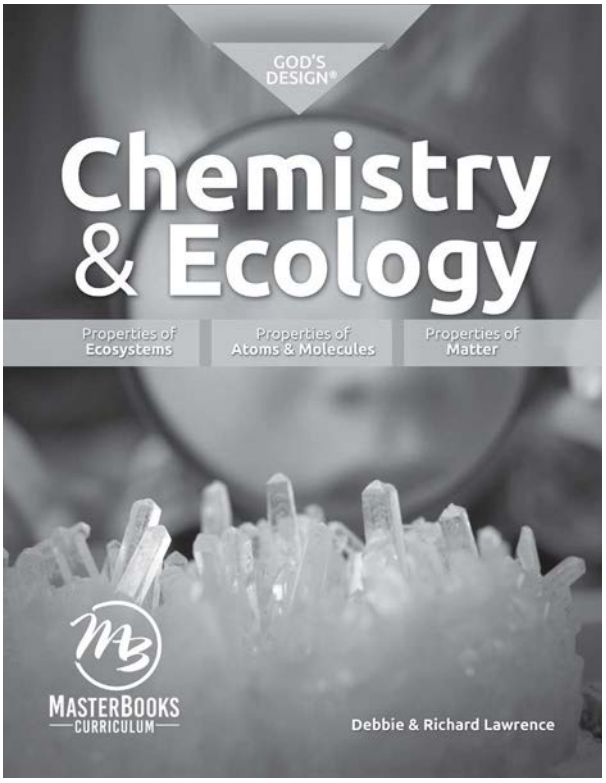
From waist high: From high up:

Conclusions

Which type of measurements gave you a more accurate answer? _____

Which type of measurements do you think are more useful? _____

Is it always necessary to make quantitative measurements? _____



Worksheet Answer Keys

for Use with

God's Design: Chemistry & Ecology

Properties of Matter Worksheet Answer Keys

1. Introduction to Experimental Science

What did we learn?

1. What is matter? **Anything that has mass and takes up space.**
2. What do chemists study? **They study the way matter reacts with other matter and the environment.**
3. What is an experiment? **A controlled test.**

Taking it further

1. Why is it important to study chemistry? **Chemistry is important to every other area of science.**
2. What are two things you need to know before conducting an experiment? **The purpose and what you expect to happen.**

2. The Scientific Method

What did we learn?

1. What is the overall job of a scientist? **To systematically study the physical world.**
2. What are some areas that cannot be studied by science? **Morality, religion, philosophy, history.**
3. What are the five steps of the scientific method? **Learn or observe, ask a question, make a hypothesis, design and perform a test, check the results, and draw conclusions.**

Taking it further

1. Why was it necessary to have bottle number 1 in the experiment? **Bottle 1 had only water and yeast. This is called a control. It shows how much gas was produced without a sweetener, so you can tell exactly how much gas was caused by adding the sugar and molasses in the other bottles.**
2. What other sweeteners could you try in your experiment? **Honey, corn syrup, fruit juice.**
3. What sweeteners were used in the bread at your house? **Look at the ingredients list on the package if you do not bake your own bread. Possible answers are sugar, corn syrup, and honey.**
4. Why do you think that sweetener was used? **Reasons vary, but amount of gas produced, cost, color, and taste are all important factors in why companies use the ingredients they do.**

Scientific Method Worksheet

Taste, color, and texture are all affected by the sweetener used, so even if molasses produces the most gas, you may not like the way it makes your bread taste or look.

3. Tools of Science

What did we learn?

1. What is the main thing a scientist does as she studies the physical world? **Makes observations.**
2. What are the two types of observations that a scientist can make? **Qualitative observations are ones made by the 5 senses without numerical data. Quantitative measurements or observations are made using instruments that generate numerical or other objective data.**
3. What is the main problem with qualitative observations? **The observations may vary from person to person because we each perceive things differently.**
4. What are some scientific tools used for quantitative observations? **Balance, graduated cylinder, thermometer, meter stick, spectrometer, etc.**

Taking it further

1. What qualitative observations might you make when observing the experiment in lesson 1? **You might observe that the metal spoon is hotter than a wooden spoon or that butter begins to melt faster or slower on certain items.**
2. What quantitative observations might you make when observing the experiment in lesson 1? **You might measure the temperature of the water and the temperature of each item. You did measure the length of time it took for the butter to begin to melt on each item. You could also measure the length of time it takes for the butter to completely melt on each item.**

Scientific Tools Worksheet

Answers to "Conclusion" questions: Quantitative measurements are more accurate. In general, quantitative measurements are more useful; however, this depends on what you are trying to accomplish. It is not always necessary to make quantitative measurements. You may only need to know if something is warm or melted without having to measure its temperature, for example.

4. The Metric System

What did we learn?

1. What are some units used to measure length in the Old English/American measuring system? **Inch, foot, yard, mile, rod, hand, span.**
2. What is the unit used to measure length in the metric system? **Meter.**
3. What metric unit is used for measuring mass? **Gram.**
4. What metric unit is used for measuring liquid volume? **Liter.**
5. Why do scientists use the metric system instead of another measuring system? **It is easy to convert from one unit to another, and it is based on only a few basic units. In fact, liters and grams are actually based on the meter. For example, the liter is actually the volume of a cube that is .1 x .1 x .1 meters, and a gram is the mass of 1/1000 of a liter, or one cubic centimeter, of water.**

Taking it further

1. What metric unit would be best to use to measure the distance across a room? **Meters would be the best unit.**
2. What metric unit would you use to measure the distance from one town to another? **The distance would be a very large number if you used meters, so kilometers would be a better choice.**
3. What metric unit would you use to measure the width of a hair? **This is much smaller than a meter, so a millimeter or micrometer would be a better choice.**

5. Mass vs. Weight

What did we learn?

1. What is the difference between mass and weight? **Mass is the amount of material there is in an object, and weight is how much gravity pulls down on an object.**
2. How do you measure mass? **By using a balance to compare an object to a known mass.**
3. How do you measure weight? **By using a spring scale that is marked for known weights.**

Taking it further

1. What would your weight be in outer space? **Nearly zero because there is very little gravity in space.**
2. What would your mass be in outer space? **The same as it is on earth.**
3. Name a place in the universe where you might go to increase your weight without changing your mass. **Any of the larger planets such as Jupiter or Saturn. Of course, you cannot really go there and you could not survive there if you could, but the gravity is much higher there than on earth, so you would weigh much more there.**

Challenge: Mass & Weight Units Worksheet

1. **_Weight_**	5. **_Weight_**	9. **_Mass_**
2. **_Mass_**	6. **_Mass_**	10. **_Mass_**
3. **_Mass_**	7. **_Weight_**	11. **_Mass_**
4. **_Weight_**	8. **_Mass_**	12. **_Weight_**

6. Conservation of Mass

What did we learn?

1. What is the law of conservation of mass? **Matter cannot be created nor destroyed. It can change form, but it does not go away.**
2. How is the mass of water changed when it turns to ice? **It does not change.**

Taking it further

1. If you start with 10 grams of water and you boil it until there is no water left in the pan, what happened to the water? **The 10 grams of water turned into 10 grams of steam and entered the air, but it did not disappear or go away.**
2. Why is the law of conservation of mass important to understanding the beginning of the world? **It shows that matter cannot create itself or be created by anything in nature. Therefore, it had to be created by something outside of nature. We know from the Bible that all matter was created by God.**

Challenge: Conservation of Mass Worksheet

The mass of the bottle, liquid, and paper is less after the reaction because some of the matter turned into gas and escaped from the bottle. The missing mass is in the CO_2 molecules. Mass should not change when using the balloon, but if it does, it is likely that some gas escaped around the edge of the balloon.

Properties of Matter Master Supply List

The following table lists all the supplies used for *God's Design for Chemistry & Ecology: Properties of Matter* activities. You will need to look up the individual lessons in the student book to obtain the specific details for the individual activities (such as quantity, color, etc.). The letter *c* denotes that the lesson number refers to the challenge activity. Common supplies such as colored pencils, construction paper, markers, scissors, tape, etc., are not listed.

Supplies needed (see lessons for details)	**Lesson**
☐ Alum (in spice section)	28
☐ Baking soda	6c, 10, 17, 20, 22c, 24c, 25, 29, 34
☐ Balloon (helium-filled, optional)	9c
☐ Balloons (latex)	2, 6c, 15, 35
☐ Battery (6-volt)	17
☐ Bean seeds	18c
☐ Block (wooden)	12
☐ Bottle (plastic ½-gallon or 1-liter)	15c, 20
☐ Box (small)	3, 7
☐ Bread	30, 33c
☐ Cake mix	23c
☐ Candle	20, 35
☐ Charcoal briquettes	28
☐ Cinnamon	25
☐ Club soda	25
☐ Coffee filter	19
☐ Corn syrup	25
☐ Cornstarch	34
☐ Cotton balls	28
☐ Cups (clear)	3, 9, 22, 22c, 24, 26c, 28
☐ Cups (paper)	5, 6
☐ Dish soap	13, 15c, 22c
☐ Eggs	23, 23c, 27
☐ Eraser	8c

Supplies needed (see lessons for details)	**Lesson**
☐ Flour	30, 33
☐ Food coloring	25
☐ Funnel	19
☐ Goggles	28
☐ Golf ball	8
☐ Hammer	28
☐ Hand lotion	13
☐ Hand mirror	11
☐ Hole punch	5
☐ Honey	12, 13
☐ Ice tray	11
☐ Iodine	30, 34
☐ Jar (with lid)	11c, 17, 20, 21
☐ Jigsaw puzzle	16
☐ Lemon juice	10, 23, 25, 32
☐ Life Savers candies (roll)	22, 31
☐ Marbles	8c, 9c
☐ Margarine	1, 33
☐ Meter stick/metric ruler	1, 3, 4, 5, 7
☐ Microscope and slides (optional)	3c
☐ Milk (not skim)	21c, 26, 31, 33
☐ Milk jug (1-gallon)	15
☐ Modeling clay	9, 9c
☐ Molasses	2
☐ Mustard (dry)	23
☐ Oil (spray)	33
☐ Oil (vegetable)	9,13, 23, 22c, 30, 34
☐ Orange juice	19, 25
☐ Paper bag (brown)	30
☐ Paper clips	4, 5, 8
☐ Paprika	23
☐ Peanut butter	30
☐ Pennies	5, 8
☐ Perfume	14c

Supplies needed (see lessons for details)	**Lesson**
☐ Ping-pong ball	8
☐ Plastic bottles (empty 2-liter)	2, 6c, 18c, 28
☐ Plastic tub	9
☐ Plastic zipper bags	22, 26, 28, 33c
☐ Popcorn	9
☐ Potassium salt (in spice section)	22c, 24c
☐ Potato or tortilla chips	30
☐ Potting soil	18c
☐ Powdered sugar	34
☐ Pudding mix (instant)	31
☐ Rocks	12, 28
☐ Rolling pin	22
☐ Rubber band	5
☐ Rubbing alcohol	9, 34
☐ Salt	10, 22c, 23, 24c, 26, 26c, 27, 33
☐ Sand	28
☐ Scale (gram)	6c
☐ Silly Putty	12
☐ Soft drink (canned, diet & regular)	24, 25c
☐ Soil	28
☐ Spices (ginger root, mint leaves, cinnamon sticks, all spice, cloves, peppermint oil, almond extract, etc.)	25

Supplies needed (see lessons for details)	**Lesson**
☐ Spoon (metal)	1, 6, 8c, 12
☐ Spoon (wooden)	1
☐ Stopwatch	1, 3, 26c
☐ Straw	27
☐ String	5, 18c
☐ Sugar	2, 21, 22c, 24c, 25, 26, 33
☐ Sugar cubes	6
☐ Tape (masking)	2, 3, 5
☐ Tape measure (cloth)	2, 15c
☐ Telescope (optional)	3c
☐ Tennis ball	3, 7c, 14
☐ Thermometer	2, 3, 26c
☐ Vanilla extract	21, 25, 26
☐ Vinegar	6c, 20, 21c,23, 34
☐ Whipped cream (spray can)	21
☐ Whipping cream (liquid)	21
☐ Wire (copper)	17
☐ Wrenches (or other metal objects)	9
☐ Yeast	2, 33

Properties of Ecosystems Master Supply List

The following table lists all the supplies used for *God's Design for Chemistry & Ecology: Properties of Ecosystems* activities. You will need to look up the individual lessons in the student book to obtain the specific details for the individual activities (such as quantity, color, etc.). The letter *c* denotes that the lesson number refers to the challenge activity. Common supplies such as colored pencils, construction paper, markers, scissors, tape, etc., are not listed.

Supplies needed (see lessons for details)	**Lesson**
☐ 1-gallon plastic zipper bag	32c
☐ 2-liter soda bottle	32c
☐ 3-ring binder	2
☐ Bag (produce)	19
☐ Baking soda	32c
☐ Box (small)	18 , 23
☐ Cotton balls	18, 21
☐ Cups (clear)	15, 16
☐ Dividers (folder)	2
☐ Earthworms	2
☐ Eyedropper	15, 27
☐ Field guide to flowering plants	8
☐ Food coloring	12, 15
☐ Gloves (leather and cotton)	18
☐ Gloves (rubber)	30
☐ Goggles	14
☐ Grass and other plants	6, 8, 8c, 21, 23, 27, 31
☐ Hammer	14
☐ Ice	18
☐ Jar (with lid)	2, 6, 27, 32
☐ Leaves	20, 21
☐ Magnifying glass	1, 5, 14
☐ Meter stick/metric ruler	1, 8
☐ Microscope and slides (optional)	27
☐ Modeling clay	13, 30c

Supplies needed (see lessons for details)	**Lesson**
☐ Newspaper	8, 21, 30, 30c
☐ Oats	2
☐ Page protectors/sheet protectors	8, 30c
☐ Paint	21
☐ pH testing paper (optional)	27
☐ Photos of animals	18, 25
☐ Plastic zipper bags	14, 20
☐ Pots and pans	12, 27
☐ Potting soil	6
☐ Rocks	14
☐ Safety goggles	14
☐ Salt	15, 16
☐ Sand	2, 14
☐ Scale (bathroom)	30
☐ Seashells	14
☐ Soil	2, 6
☐ Spray bottles	31
☐ String	1
☐ Sunscreen lotion	30c
☐ Tagboard/card stock/poster board	7c, 8, 20c, 25, 32c
☐ Thermometer	16, 32
☐ Tissue paper or quilt batting	18
☐ Vinegar	31, 32c
☐ Water (distilled)	27
☐ World atlas	1c, 7, 17

Properties of Atoms & Molecules Master Supply List

The following table lists all the supplies used for *God's Design for Chemistry & Ecology: Properties of Atoms & Molecules* activities. You will need to look up the individual lessons in the student book to obtain the specific details for the individual activities (such as quantity, color, etc.). The letter *c* denotes that the lesson number refers to the challenge activity. Common supplies such as colored pencils, construction paper, markers, scissors, tape, etc., are not listed.

Supplies needed (see lessons for details)	**Lesson**
☐ Alka-Seltzer	17c, 20c
☐ Ammonia (clear)	23, 23c
☐ Antacid tablets or liquid	23
☐ Baking soda	1, 12c, 17, 23, 24
☐ Balloons (latex)	30, 33
☐ Banana	26c
☐ Battery (9-volt)	12c
☐ Bible	35
☐ Borax	31c, 32c
☐ Bread	28
☐ Cabbage (red/purple)	21
☐ Candle	9, 10, 17
☐ Copper sulfate (available at swimming pool supply store)	32c
☐ Cornstarch	31c
☐ Cups (clear)	17c
☐ Cups (foam)	20c
☐ Cups (paper)	12c
☐ Diaper (disposable)	34
☐ Dish soap	10c, 23, 34
☐ Dry ice	10
☐ Eggs	7, 20
☐ Epsom salt	15, 32c
☐ Eyedropper	34
☐ Flashlight with battery	6
☐ Food coloring	34
☐ Garlic powder	28
☐ Gelatin	25c
☐ Geode (optional)	15
☐ Ginger ale	28
☐ Glitter	32
☐ Gloves (leather and cotton)	10
☐ Grass and other plants	27
☐ Hydrogen peroxide	19
☐ Jar (with lid)	17, 20, 22c, 29
☐ Lemon juice	19, 22
☐ Margarine	8, 28
☐ Marshmallows (mini, colored)	11, 12, 13
☐ Matches	9, 10, 17
☐ Mentos candies	1c
☐ Milk (not skim)	22, 34
☐ Modeling clay	15c, 17
☐ Oil (olive)	12c
☐ Oil (vegetable)	8
☐ Paper clips	22c
☐ Paper towels	34
☐ Peanut butter	8
☐ Pennies	22c
☐ Pineapple juice (fresh, not frozen)	25c
☐ Pinecones	32c
☐ Plant food	27
☐ Plaster of Paris	15c
☐ Plastic zipper bags	26c, 34
☐ Plate (ceramic)	9
☐ Polymer clay (Femo, Sculpey, etc.)	16
☐ Potassium salt (in spice section)	32c
☐ Potato	19
☐ Rubber band	30

Supplies needed (see lessons for details)	**Lesson**
☐ Rubbing alcohol	29
☐ Salt	12c, 15, 22c, 32c
☐ Silver object (tarnished)	14
☐ Silver polish/tarnish remover	14
☐ Soft drink (lemon lime)	22
☐ Soft drink (diet 2-liter bottle)	1c
☐ Spices (ginger root, mint leaves, cinnamon sticks, allspice, cloves, peppermint oil, almond extract, etc.)	29, 29c
☐ Starch (liquid)	34
☐ Steel wool without soap	10c, 20
☐ Stopwatch	17c, 20c
☐ Straw	33

Supplies needed (see lessons for details)	**Lesson**
☐ String	33
☐ Sugar	12c
☐ Swabs	24
☐ Tape (electrical or duct)	6, 33
☐ Test tubes	10c
☐ Thermometer	20
☐ Toothpaste (with fluoride)	7, 23
☐ Toothpicks	1c, 11, 12, 13
☐ Vinegar	1, 7, 17, 20, 22, 23c, 24, 25c
☐ Water (distilled)	12c, 23c
☐ Wire (copper)	6, 12c
☐ Yeast	26c