



SONLIGHT

Science G



INSTRUCTOR'S GUIDE



SONLIGHT

Thank you for downloading this sample of Sonlight's Science G Instructor's Guide (what we affectionately refer to as an IG). In order to give you a full perspective on our Instructor's Guides, this sample will include parts from every section that is included in the full IG.

Here's a quick overview of what you'll find in this sample.

- A Quick Start Guide **START HERE**
- A 3-week Schedule
- Activity Sheets and Parent Answer Keys
- A Scope and Sequence of topics and skills your children will be developing throughout the school year

SONLIGHT'S "SECRET" COMES DOWN TO THIS:

We believe most children respond more positively to great literature than they do to textbooks. To properly use this sample to teach your student, you will need the books that are scheduled in it. We include all the books you will need when you purchase a package from sonlight.com.

Curriculum experts develop each IG to ensure that you have everything you need for your homeschool day. Every IG offers a customizable homeschool schedule, complete lesson plans, pertinent activities, and thoughtful questions to aid your students' comprehension. It includes handy teaching tips and pointers so you can homeschool with confidence all year long.

If you need any help using or customizing our IGs, please reach out to our experienced homeschool advisors at sonlight.com/advisors.

We hope you enjoy using this sample. For even more information about Sonlight's IGs, please visit: sonlight.com/ig. It would be our pleasure to serve you as you begin your homeschool journey.

If you like what you see in this sample, visit sonlight.com/science to order your Science package.

Blessings!

Sarita Holzmann,
Co-founder and president
of Sonlight Curriculum

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Science (5-Day)

Geology, Physics, and Origins

By The Sonlight Team

*“The heavens declare the glory of God; the skies
proclaim the work of his hands.”*

Psalm 19:1 (NIV)

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“Do to others what you would have them do to you”
(Matthew 7:12).

“The worker is worth his keep” (Matthew 10:10).

Published by

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NOTE TO PURCHASER

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This guide is sold with the understanding that none of the Authors nor the Publisher is engaged in rendering educational services. Questions relevant to the specific educational or legal needs of the user should be addressed to practicing members of those professions.

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Printed in the United States of America.

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SCIENCE Instructor's Guides

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Special features of Sonlight's Science Instructor's Guides:

1 Complete, Ready-to-Use Lesson Plans

All your science books and experiments are fully scheduled for the entire year. No need to create your own plans.

2 Detailed Teaching Notes

Notes explain each assignment and activity, point out fun facts about your reading, and provide extra information about important topics so you get the most from your materials.

3 Organizational Tools to Help You Plan Ahead

See at a glance the supplies you need for experiments this week and the following week. Know what supplies you'll find in the Sonlight Science Kits, and which household items you'll want to have ready.

4 Weekly Assignments and Engaging Activities

Simple, engaging experiments coordinate with your reading and provide hands-on learning. Sonlight's Science kits provide the key supplies . . . so you actually do the experiments.

Many experiments are intriguing, yet simple, activities—such as exploring taste buds using basic ingredients like lemon juice and sugar. Again, no planning necessary!

Your children will relish the discoveries they make throughout the year. And you'll love that they are actively exploring Science, Technology, Engineering, Math (STEM) concepts, and making their learning stick.

Science A

Days 1–5: Date: _____ to _____

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36

Week 1

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
<i>Children's Encyclopedia</i>	pp. 8–9		pp. 10–11	pp. 12–13	pp. 14–15
Activity Sheet Questions	#1–2 [a]		#3–4	#5–7	#8–10
<i>Discover & Do Level K DVD</i>		"Before You Begin" Tracks #1–3			
<i>Science Activities, Vol. 2</i>		"Air All Around" pp. 2–3			
Do Together				The Seasons at Your House	

Supplies	You provide: sheets of paper, 8" x 10" cardboard for each player (optional: crayons, thread or string or yarn) bottle, bowl, water. [a]
Shopping/Planning List	For next week: feather from any bird, plate, 10" x 10" paper, pencil, scissors, crayons, needle, thread or string or yarn, two dish cloths, plastic bag, plate, salt, bowl, water, plastic wrap, sugar, food color, spoons, saucers, glass, plate, very warm water, long-necked bottle, deep bowl or bucket, large coin, ice cubes, plastic bag, rolling pin or hammer or rock, plastic bottle with cap.

Additional Subjects:

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Day 3 pp. 10–11

Do you own a globe? If not, you can also use a ball, such as a basketball or soccer ball, to demonstrate the concept of day and night. All you need is a globe or ball and a flashlight. The flashlight, naturally, represents the Sun. Shine the flashlight on one side of the globe or ball. The part of the world facing the light is experiencing day, while the other areas are experiencing night. But the world rotates, so as it turns, day turns to night on one part of the globe, while night turns to day in other areas. [p. 10]

Day 4 pp. 12–13

The book refers to the northern and southern hemispheres but does not explain the concepts of western and eastern hemispheres. You might want to show your children a world map, noting the northern and southern hemispheres, as divided by the equator, while also pointing out the western hemisphere (North and South America and the Pacific and Atlantic Oceans) and the eastern hemisphere (Europe, Africa, Asia, Australia). [p. 13]

Day 5 pp. 14–15

Occasionally, you'll notice short experiment suggestions such as "Make a rainbow" on page 15. Please consider these activities as optional.

Activity Sheet Questions

Day 1 #1–2

Note to Mom or Dad: Find each week's Activity Sheets immediately after the notes and answer the questions assigned on the schedule page. Each Activity Sheet has a corresponding Answer Key page at the end of each week's notes.

- You do not have to do every question on the Activity Sheets.
- Feel free to adjust and/or omit activities to meet the needs of your children.
- We cover the same concepts repeatedly throughout the

challenge your children. Feel free to let your children do those activities they enjoy and simply talk through others. We have provided space for you to fill in answers as your children respond verbally, or simply check off the items that you discuss.

Suggestion: your Activity Sheets might work more easily in a small binder for your children to keep and use as assigned. If you have more than one child using this program, extra Activity Sheets can be purchased for each child (Item #ASG1).

Occasionally we assign a "Cut-Out" activity. Please find these separate sheets in Section 3.

Discover & Do Level K DVD

Day 2 "Before you Begin" Tracks #1–3

We produced this fun and educational video so you and your children could watch "Professor Ike" perform each of the assigned experiments from *The Usborne Book of Science Activities, Vol. 2*. We recommend you gather your supplies, watch the DVD to see what to do, and then try each of these simple experiments yourself.

Or, if you prefer, you can do the experiment(s) on your own and then watch the DVD to see how it turned out on screen. You may want to mix and match to find out which works best. We hope this video makes your science experiments more enjoyable and more educational.

If your experiments don't happen exactly as you see in the video, it's OK! Watch the Outtakes in the Bonus section of the DVD and see how things didn't always happen perfectly for us, either.

Note: Please navigate your *Discover & Do Level K DVD* by using the DVD menu on your screen.

Science Activities, Volume 2

Day 2 "Air All Around" pp. 2–3

If you remember school science experiments as boring demonstrations without making much of a point, it's time for you and your children to try *The Usborne Book of Science Activities, Vol. 2*. Packed with simple activities and experi-

of the page. It is of your reading, in the book for

of, but the center is called the layers egg. The shell and the yolk is in egg and talk the "core," you'll cut the egg in the "Earth". Of an egg, but neither on the top

Parental Notes

Week 1 | 1

Instructor's Guides A-J also include:


5 Interactive Activity Sheets

Your Activity Sheets—with hundreds of activities, illustrations, charts, and pictures—help your children remember what they've learned. A variety of activity options coordinate with your students' science studies and draw on a range of skills and interests.

Activities progress with your children's abilities: from cutouts, matching, circle-the-answer, and dictation, to fill-in puzzles and sequencing analysis.

6 Complete Answer Keys

Separate Answer Keys mirror your Student Activity sheets for easy grading. No need to test—you have ongoing, reliable insight into your children's comprehension. ♦



Science A: Week 1 Activity Sheet

4. **Challenge:** Make the statement true. (Please find Cut-Out #1 in the Appendix.) (p. 10)

The Sun rises in the and sets in the .


5. Can you name the four seasons? (p. 12)

1) _____ 2) _____

3) _____ 4) _____

6. Use the map to help you answer. (Please find Cut-Out #2) (p. 13)

North America




South America


When it is summer in:

...it is winter in:


7. During which two seasons does the Earth tilt toward or away from the Sun? Circle them. (p. 13)




winter



spring



summer



fall

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Do Together

4 The Seasons at Your House

Using a large piece of poster board, draw a line down the middle in each direction so as to divide it into four equal parts. Label the upper left corner "Spring," the upper right corner "Summer," the lower left corner "Fall," and the lower right corner "Winter." Now ask your children to use crayons, markers, paint, colored pencils, etc. to draw a picture of what each of the seasons looks like where you live. As they draw, discuss the seasons and what's different about each one. Ask them to think about how a stranger who just flew in from halfway around the world would be able to tell what season it is at any particular time. What clues would he find? Have fun with this activity, as your children learn more about how the seasons change in your particular area. When they're done, proudly display their work of art on the refrigerator or a wall where everyone can see it.

Supplies

All You Provide

Note to Mom or Dad: When supplies are listed as "**We provide:**" they are materials found in your course-specific (ASK) Supplies Kit. When supplies are listed as "**You provide:**" they are materials you can generally find around your home. ■

1. How many continents does the Earth have? Count them. (p. 8)

(7)

On which continent do you live? (Answers will vary.)

2. Why is a day 24 hours long? (Put an X next to the correct answer.) (p. 8)

☒ because that's how long it takes for the Earth to spin once on its axis

☐ because that's how long it takes for the Earth to travel around the Sun

3. Discuss with Mom or Dad: Why is it daytime on only one side of the Earth at a time? (p. 10)

(As the Earth turns, only one side faces the Sun; one side of the Earth is in light while the other side is in shadow.)

4. Challenge: Make the statement true. (Please find Cut-Out #1 in the Appendix.) (p. 10)

The Sun rises in the East and sets in the West.

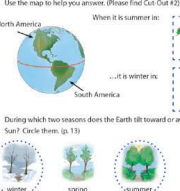
5. Can you name the four seasons? (p. 12)

1) spring 2) summer

3) fall 4) winter

6. Use the map to help you answer. (Please find Cut-Out #2) (p. 13)

North America




South America

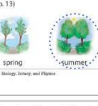
When it is summer in:

...it is winter in:


7. During which two seasons does the Earth tilt toward or away from the Sun? Circle them. (p. 13)




winter



spring



summer



fall

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Biology, Botany and Physics | 5-Day | Section Two | Week 1 | 3



“I am so thankful for Sonlight Science,” writes Janine B of Peoria, AZ. “The gentle overview of many topics in Science A has kept both of us engaged all year. I love that the materials are all provided in the Science Supply kit, so I’m not left scrambling for uncommon items on the morning of Experiment Day. Thank you, Sonlight, for making my job easy!” In this picture, Levi (7, Science A) learns about carbonation with the help of some raisins.

Welcome!

In Science G, you will learn about physics, chemistry, biology, and the philosophy of science. But primarily physics.

Sonlight Science programs include introductory studies in a range of experimental sciences. The main point of all the reading, activities, and (if you choose) experiments is to introduce your children to the scientific method and the joy of discovery.

We want children to be *introduced* to a lot of different subjects, *intrigued* by the concepts and ideas, and *enticed* to come back to the same themes again in the future. And so you will find we follow a spiral pattern of education, touching on certain topics repeatedly this year and again in future years.

This way, the basic *vocabulary* of science becomes ingrained not only in short-term, but also long-term memory. “Oh, yeah. I vaguely remember hearing about pistils and stamens earlier this year,” a child may say—late in the program. When the child studies biology again in future programs, the names and concepts will be vague, but recognizable, as the child gains deeper understanding. Please don’t expect mastery of the vocabulary at this age. That will come in time.

We want our children to *remember* what they have learned because they can’t help it; because they want to. We don’t want them merely to *memorize* what they are supposed to learn so they can pass a test.

The science experiments in this package, although not larger than life, work well.

As you do the experiments and demonstrate care in reading and following directions, recording data, and such, your children learn to follow your lead. An attitude of success—“Sure. We can do this!”—rubs off as well. These cannot be taught simply by reading books; they have to be modeled.

One quick note before you begin: The experiments also don’t coordinate with the other science reading. We have not found any single book that coordinates great information and exciting illustrations (as found in the majority of our science books) with great hands-on activities and experiments. We believe we have selected the best cluster of books for both interest and excitement, but know up front: the science reading will not match the experiments.

My Downloads

Find extra schedule pages, new user information (how to use a Sonlight guide) and further helpful information specific to the guide you have purchased from Sonlight on our website: www.sonlight.com. Go to Your Account and select the Downloads section to find all of the downloads for your guide.

Two science-related issues require some special attention. The first has to do with evolution, while the second relates to the age of the Earth.

Evolution

Some of the book selections in our science programs contain material supportive of evolution. Why do we include these books? First, we include them because the majority of the content in these resources is of high quality, offering visually and intellectually appealing material. Second, we don’t take an isolationist approach to knowledge. The subject of evolution is not something we want to teach children to avoid or put down without adequate understanding. Third, as the dominant perspective in contemporary science, evolution deserves mention and attention, even from those who disagree with its arguments. With that said, we do our best to provide balanced perspectives in relation to any potentially divisive content such as evolution.

When it comes to evolution, there are a few important points to keep in mind. In particular, differences between *macroevolution* and *microevolution* are crucial. These terms are sometimes used to clarify what is meant by evolution. *Macroevolutionists* accept evolution as the overarching explanation for all life, believing that evolution is responsible for significant changes in life forms such as a land-based mammal changing into an oceangoing mammal or dinosaurs allegedly evolving into birds. These supposed evolutionary changes are big, hence the term *macro*, meaning something very large in scale, is used in reference to this kind of evolution.

Microevolution, however, refers to small changes within different kinds of life. This approach grants the reality of changes within kinds such as birds or dogs. Obviously, there are many kinds and sizes of birds and dogs, but despite the variations, these creatures remain birds and dogs. As a result, someone can adhere to *microevolution* without granting all the beliefs of *macroevolutionists*, who tend to accept the basic underlying principles of Darwinian evolution.

Religious objections to evolution tend to stem from the accusation that *macroevolution* leaves God out of the picture, instead leaving the entire process of the emergence and development of life to chance and time. Of course, this means that evolution is undirected by any sort of intelligence, while Christianity, for instance, believes in the reality of the existence of God as Creator. In other words, one approach to evolution is based on a worldview known as *naturalism*, while another is based on *theism*.

Naturalism here does not refer to enjoying nature, as in being a naturalist, but to a worldview that denies the existence of anything beyond the material world. In other words, anything supernatural, such as the existence of God, is rejected by naturalists.

Theistic evolutionists accept the existence of God, but view Him as being active in the process of evolution. Christian theistic evolutionists may appeal to Scripture supporting God's active involvement in His creation (such as 1 Corinthians 8:6, Hebrews 1:3, etc.). In areas where a naturalist sees random processes and events, the theistic evolutionist argues that God is actively involved in directing matters.

Theism accepts that there is more to reality than the material world. There is a supernatural world and God exists as a personal being, active in His creation. By definition, naturalism excludes God. Christian theists who reject macroevolution and theistic evolution argue that God is Creator and Designer, having made all life without resorting to any macroevolutionary processes.

Scientific objections to *macroevolution* include, for instance, allegations that the fossil record lacks transitional forms, that genetic mutations are commonly harmful not helpful, and claims that life shows signs of intelligent design.

One goal we have at Sonlight is to present fair and balanced perspectives on issues, including science and evolution. As a result, some of the materials we choose to utilize will at times present evolutionary points of view, while other selections will not. As the parent, we encourage you to provide guidance for your children on these topics. In our assessment, it's better for your children to have some exposure to controversial topics at home, with intelligent and caring guidance, rather than have them be surprised by ideas they will eventually encounter anyway.

The Age of the Earth

Another issue that will come up in the course of studying science has to do with questions about the age of the Earth. Secular books in some of our science programs will at times refer to "millions" or "billions" of years. For Christians who hold to a young Earth perspective, believing the Earth may only be several thousand years old rather than billions, such phrasings pose a problem.

We suggest two solutions. First, whenever you encounter "millions" or "billions" in a science book, feel free to rephrase the sentences in question with phrases such as "a long time," "a very long time," or variations of this phrasing. Second, you may wish to state that although the book uses millions and billions of years, there are other perspectives on the age of the Earth and the age of the universe.

If your children ask why there is disagreement on the age of the Earth and/or universe, you can explain that not everyone interprets the data in the same way. In addition, not everyone employs the same research methods or believes in the same data. Young Earth creationists, for example, include their interpretation of the Bible as a primary source of data. Those who hold to an Old Earth tend either to ignore the Bible (if they are non-Christian) or interpret the biblical creation account in such a way that allows for an Old Earth without diminishing essential Christian doctrine. The Bible, from this Old Earth perspective, may be a supplementary witness regarding the question of the age of the Earth, but traditional interpretations

of it in reference to the age of the Earth need to remain open to reinterpretation.

You may also wish to add, "We aren't sure about how old the Earth is, but I happen to believe ..." Then state your position on the matter.

Our goal here is not to present a definitive position on the age of the Earth or to present nuanced arguments for each side in the debate, but to leave it to you, as parent, to discuss with your children as you see fit.

Discussion and disagreement about the age of the Earth leads to another important point: Is a particular view of the age of the Earth an essential Christian doctrine? Sometimes nonessential beliefs can lead to problems with essential beliefs, so this point needs to be approached carefully and thoughtfully. In general, however, we do well to follow the maxim, "In essentials unity, in nonessentials liberty, and in all things charity." In other words, we should foster Christian unity on essentials, rather than division about nonessentials.

Student Activity Sheets

After the notes for each week, you will find Activity Sheets to reinforce what you are teaching and also engage your student. The questions coordinate with what you are reading and each activity is assigned on the schedule page.

It is not necessary to complete every activity provided. These are merely suggestions and you, as the teacher, can determine which are best suited for your children. You will find a variety of activities included in the Activity Sheets that are designed to draw on different skills and interests.

We have also included corresponding Instructions and Answer Key pages for all activities. You may want to file the Activity Sheets in a separate binder for your student's use.

Note: If you might reuse your Instructor's Guide and Student Activity Sheets in the future (for a younger child, for instance), we strongly suggest that you purchase an extra set of Activity Sheets when you buy the Instructor's Guide. That way, when we update our Instructor's Guides you will have matching Activity Sheets when you need them. Please contact us if you are looking for Activity Sheets from the past.

Practical Suggestion for Experiments

Please be aware that some of your books may imply that an experiment will knock your socks off: the results will be "bigger than life." The reality, we've found, is rarely so exciting. Often what you should be looking for is a very small change. The experiments suggested in your books are basic ideas. Try them, improve them! If you figure something out that works better than the instructions in your book, please tell us! Some experiments work every time, some may take several tries. Even the most famous scientists have had to try the same (or similar) experiments over and over. If an experiment does not work the first time, please try again.

Supplementary Searches

We know that there are times throughout our curriculum when your children will want to learn more about a given subject. Use their enthusiasm and the resources you have available to learn more. Occasionally, we will provide internet search instructions for you to find more information. Please use caution and your own discretion as you look at different internet sites. We highly recommend that you look at the sites before allowing your children to browse on their own. We hope you find this helpful!

Corrections and Suggestions

At Sonlight Curriculum we are constantly working to improve our product development. We would love it if we could get you to help us with this process.

Whenever you find an error anywhere in one of our Instructor's Guides, please check our updates page for the latest information at www.sonlight.com/curriculum-updates.html. Report new information by sending a short e-mail to: IGcorrections@sonlight.com. It would be help-

ful if the subject line of your e-mail indicated where the problem is. For instance, "Science G/Section Two/Week 1/Schedule."

If, while going through our curriculum, you think of any way we could improve our product, please e-mail your suggestions to: IGsuggestions@sonlight.com. If you know of a different book we should use, if you think we should read a book we assign at a different point in the year, or if you have any other ideas, please let us know.

Summary

We hope that you enjoy your adventure this year and that it helps you learn more about the world we live in. If we can be of any assistance, please do not hesitate to e-mail us at main@sonlight.com, call us at (303) 730-6292, or better yet, join our Sonlight Connections Community (sonlight.com/connections), where you can chat with others who are going through this same program. You can ask questions, learn new ideas, share with others what you have learned, problem-solve, or just talk. Happy exploring!

Level G: Science

Days 1–5: Date: _____ to _____

Week Overview																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	

Week 1

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
What's Science All About?	pp. 94-101	pp. 102-105	pp. 106-107		pp. 108-109
Activity Sheet Questions	#1–3	#4–6	#7		#8–11
Chemically Active	See the list below for supplies you will need on Thursday [N]			pp. 3–6, Chap. 1, pp. 7–11 [N]	
Do Together					Hot or Cold?
Supplies	We provide: GSK—soap flake . You provide: 1 small red cabbage, grater, stainless steel or enamel saucepan, water, strainer, mixing bowl, measuring cup, large clean mayonnaise jar, teaspoon, white vinegar, cream of tartar, baking soda, chlorine bleach. [N]				
Shopping/Planning List	For next week: No items needed next week.				
Additional Subjects:					

What's Science All About?

Day 1	pp. 94–101
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The little sidebar on the bottom of page 99 has some interesting wording: “What about all those substances on alien planets?” Instead of the words “alien planets,” the authors could have simply said, “other planets.” The word “alien” can mean all kinds of things, but is most commonly associated with speculation about alien life (i.e. little green men or space aliens). [pp. 98–99]

Activity Sheet Questions

Day 1	#1–3
-------	------

Activity Sheet Questions

Activity Sheets are included after the notes and are assigned on each schedule page. Each Activity Sheet has a corresponding Answer Key page following these schedule pages.

You do not have to do every question on the Activity Sheets. Feel free to adjust and/or omit activities to meet the needs of your children. We cover the same concepts repeatedly throughout the year (and years to come!) to enable students to learn “naturally” through repetition and practice over time.

Any question marked **Challenge:** will be just that—a challenge for your children. While we believe the material covered in the challenge questions is worthwhile for your children to know, it may not be specifically explained

in their reading assignment. As always, if you think any question is too difficult for your children, please feel free to skip the question.

We have provided a variety of activities to interest and challenge your children. Feel free to let your children do those activities that they enjoy and simply talk through others. We have provided space for you to fill in answers as your children respond verbally, or simply check off the items that you discuss.

Remember: This program is designed for you to use to meet your children's needs. It is not meant to use you!

Suggestion: Your Activity Sheets might work more easily in a small binder for your children to keep and use as assigned. If you have more than one child using this program, extra Activity Sheets can be purchased for each child (Item #GSG1).

Chemically Active

Day
4

pp. 3–6, Chapter 1 pp. 7–11

Note to Mom or Dad: Many of the experiments this year will involve using the stove or a flame. Some may involve supplies that are poisonous, inflammable, or harmful to skin, eyes, or clothing. Some substances may produce irritating fumes and should only be used in well-ventilated areas. Have your children start the habit of washing their hands carefully after using the supplies.

An adult should always be present. Follow the experiment directions in *Chemically Active* closely, and have your children carefully read all labels to respect any warnings.

We use this book all year long to introduce you and your children to the world of chemistry.

Do Together

Each week throughout Science G, we will provide ideas for fun activities to do with your children. In general, we will try to make the activities actually “active”: performing additional research on a particular topic, watching a video, playing a game, getting outside, or some other type of “hands-on” activity that seeks to apply what your children have been learning in a meaningful way.

Take our ideas for what they are—mere suggestions—and don't feel burdened by them. If your children don't want to do a particular activity or have a different, better idea, by all means ditch ours and go with theirs!

Day
5

Hot or Cold?

Ask your children if they can tell the difference between something that is hot and something that is cold. What did they say? Of course! In reality, though, our bodies can sometimes fool us. Our senses are not always as accurate as we might think.

To convince your children of this fact, do a simple experiment with them. You'll need three large bowls, cold water, warm water, and hot water (just make sure it's not too hot). Ask your children to put one hand in the bowl of cold water and one hand in the bowl of hot water. Can they tell the difference? Sure!

But what about the bowl of warm water? Ask them to remove their hands from the bowls of cold and hot water and place them both in the bowl of warm water. Although both hands are now in the same temperature water (warm), do their hands tell them the same thing? No way! The hand that was in cold water will tell them the water is hot, while the hand that was in hot water will tell them the water is cold.

Explain that this is one example of how our senses can fool us. To get accurate temperatures, we must rely on special tools, such as thermometers. If they enjoyed this little experiment, let them try it on a friend or relative. Let them explain the phenomenon to their subject as they conduct the experiment.

Supplies

When supplies are listed as “**We provide:**” they are materials found in your Science G Supplies Kit (**GSK**). When supplies are listed as “**You provide:**” they are materials you can generally find around your home.

Shipping Restrictions

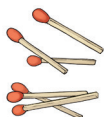
Due to strict import regulations, it is illegal to ship biological matter to certain countries (including New Zealand and Australia). If you requested your science supplies to be shipped to a country with such restrictions, we have removed that kit from your order and reduced your charge accordingly. ■

Science G: Week 1 Activity Sheet



What's Science All About?

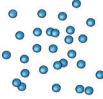


1. Summarize what chemists study. (p. 98) *(They study substances—what they are, what they can do, what's inside them and how they can change.)*
2. What was the biggest problem with early matches? (p. 100) *(They caught fire too easily.)*
3. How is Teflon® unique as a substance? (p. 101) *(It doesn't become sticky when it gets hot.)*
4. The smallest particle that can have the properties of an element is called what? (p. 104) *(an atom)*
Atoms that stick together in groups of two or more are called *(molecules)*.
5. Oxygen gas is an element because... (pp. 104–105) *(It is a substance made from only one type of atom.)*
6. Do reactions always happen when you mix substances together? Explain. (p. 105) *(No, substances can also mix without reacting or bonding together, in which case they are called a mixture rather than a chemical compound.)*



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Science G: Week 1 Activity Sheet



8. Compare the molecules in the pictures below, then label each as either **solid**, **liquid** or **gas**. (p. 108)
-  (gas)  (solid)  (liquid)
9. What is the difference between the three states of matter? (p. 108)
(how much particles in the substance are moving around and how tightly packed together they are)
10. How does temperature affect the three states of matter? (p. 108) *(Temperature helps determine how much energy molecules have. The more energy molecules have, the less tightly they pack together, so molecules in a liquid have more energy (and are warmer) than those in a solid, and the same comparison is true for molecules in a gas compared to a liquid.)*

11. Solve the puzzle using the terms in the box. (pp. 108–109)

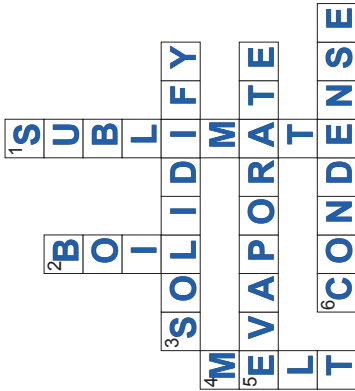
condense	boil	solidify
evaporate	melt	sublimate

Across

- 3) to change state from a liquid to a solid
5) to change state from a liquid to a gas
6) to change state from a gas to a liquid

Down

- 1) to change state directly from a gas to a solid, or from a solid to a gas
2) the agitated state of a liquid when it is at the temperature where it changes from a liquid to a gas
4) to change state from a solid to a liquid

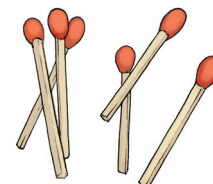




What's Science All About?

1. Summarize what chemists study. (p. 98) _____

2. What was the biggest problem with early matches? (p. 100) _____



3. How is Teflon® unique as a substance? (p. 101) _____

4. The smallest particle that can have the properties of an element is called what? (p. 104) _____

Atoms that stick together in groups of two or more are called _____.

5. Oxygen gas is an element because... (pp. 104–105) _____

6. Do reactions always happen when you mix substances together? Explain. (p. 105) _____

7. **Challenge!** Draw an "X" in the appropriate column to classify each substance as a mixture, element, or a compound.

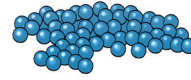
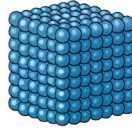
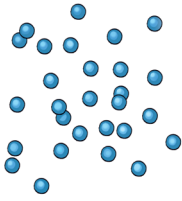
Feel free to use the Periodic Table of Elements on pp. 124–125 if you get stuck. (pp. 106–107)

	Mixture	Compound	Element
hydrogen			
water			
table salt (sodium chloride)			
granola			
nitrogen			
hydrogen peroxide			



Science G: Week 1 Activity Sheet

8. Compare the molecules in the pictures below, then label each as either **solid**, **liquid** or **gas**. (p. 108)



9. What is the difference between the three states of matter? (p. 108)

10. How does temperature affect the three states of matter? (p. 108)

11. Solve the puzzle using the terms in the box. (pp. 108–109)

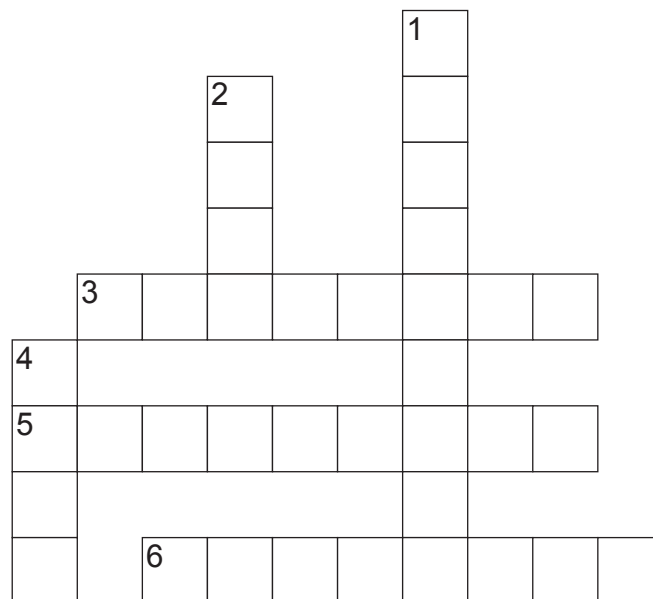
condense	boil	solidify
evaporate	melt	sublimate

Across

- 3) to change state from a liquid to a solid
5) to change state from a liquid to a gas
6) to change state from a gas to a liquid

Down

- 1) to change state directly from a gas to a solid, or from a solid to a gas
2) the agitated state of a liquid when it is at the temperature where it changes from a liquid to a gas
4) to change state from a solid to a liquid



Level G: Science

Days 6–10: Date: _____ to _____

Week Overview																																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36

Week 2					
Date:	Day 6	Day 7	Day 8	Day 9	Day 10
<i>What's Science All About?</i>	pp. 110-111	pp. 112-113	pp. 114-115		pp. 116-117
Activity Sheet Questions	#1	# 2–6	#7–8		#9
<i>Chemically Active</i>				Chap. 6 pp. 101–105	
Do Together	Changing States				
Supplies	No experiment this week.				
Shopping/Planning List	For next week: No items needed next week.				
<i>Additional Subjects:</i>					

Do Together

Day
6

Changing States

Reinforce what your children learned about the various states of matter this week by testing them out with water. First, ask them to grab a glass of water. Let them examine it. Ask them to tell you about it. What state is it in?

Now ask them how to turn it into a solid. How would they do that? Will they need to cool it or heat it? Help them turn their glass of water into a solid by pouring it in an ice cube tray to freeze.

While you're waiting for the water to freeze, discuss how to turn it into a gas. Again, how would your children turn this liquid water into a gas? Help them pour some water into a pan to heat on the stove. How long does it take before the water reaches the appropriate temperature to turn into a gas?

Ask your children to describe the water in its gaseous form. How is it similar to the liquid form? How is it different? As soon as the water you put in the freezer has frozen, ask your children to examine it in the same way. Ask the same questions. What is their favorite form of water? Liquid to drink or swim in? Frozen to make their drinks cooler on a hot day? Why? ■



Science G: Week 2 Activity Sheet

What's Science All About?

1. Why does pressure affect a substance's current state? (p. 110) *(pressure can determine how free a substance's molecules are to move around, so changes in pressure can sometimes cause a change of state, even if there hasn't been a change in temperature)*



2. Describe some of the physical properties of pure water. (p. 112)
(Possible: It is a liquid at room temperature; its freezing point is 0°C, and it boils at 100°C. It is clear, pours easily, has no noticeable odor...)

3. How do chemical properties differ from physical properties? (p. 112)
(Physical properties primarily describe what a substance is like on its own; chemical properties describe what a substance can do. Physical properties can be found using simple tests, but the only way to test a chemical property is to make a chemical reaction happen.)

4. How is baking a cake an example of a chemical reaction? (p. 112)
(The new substance looks and feels different from the mixture and can no longer be separated into the original ingredients)



5. Why won't tap water boil at 100°C? (p. 113) *(Because it is impure—it contains small amounts of chlorine which is added to kill bacteria.)*

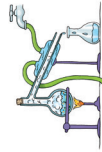
6. **Challenge!** When you dissolve sugar in water at room temperature, there will come a time when the sugar stops dissolving—no matter how long you stir. At this point, we say the solution is saturated—the water has been loaded to capacity. Based on your reading, can you think of a way to get more sugar to dissolve? (p. 113)
(Heat the water—the hotter water gets, the easier it becomes to dissolve things in it)



Science G: Week 2 Activity Sheet

7. Describe a method you might use to separate a mixture of... (pp. 114–115)
 ... gravel and water: *(let the water stand and allow the gravel to sink to the bottom—or use a strainer to strain off the water)*

... iron filings and baby powder: *(use a magnet to pull out the iron filings)*



... salt and water: *(distill it: boil the mixture—the water will evaporate away from the salt)*

8. Why is it possible to separate substances in a mixture? (p. 114–115)
(because the properties of substances in a mixture stay the same after they have been mixed, so you can use their properties to help you separate them)

9. Briefly describe each separation technique. (pp. 115–117)

Distillation: *(purifying substances using boiling points: since different substances boil at different temperatures, chemists can boil a solution and capture and cool the gas as it condenses again to separate substances)*

(Paper) Chromatography: *(a solvent is absorbed along the length of a piece of paper. Some solutes spread farther apart than others depending on how strongly they stick to the paper)*

Centrifugation: *(Chemists will place solutions of substances with different densities in tubes and then into a centrifuge. The centrifuge spins around really fast which forces the densest solutes toward the bottom of the tube.)*



What's Science All About?

1. Why does pressure affect a substance's current state? (p. 110) _____

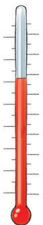
2. Describe some of the physical properties of pure water. (p. 112)



3. How do chemical properties differ from physical properties? (p. 112)

4. How is baking a cake an example of a chemical reaction? (p. 112)

5. Why won't tap water boil at 100°C? (p. 113) _____



6. **Challenge!** When you dissolve sugar in water at room temperature, there will come a time when the sugar stops dissolving—no matter how long you stir. At this point, we say the solution is saturated—the water has been loaded to capacity. Based on your reading, can you think of a way to get more sugar to dissolve? (p. 113)



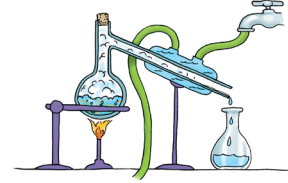
Science G: Week 2 Activity Sheet

7. Describe a method you might use to separate a mixture of... (pp. 114–115)

... gravel and water: _____

... iron filings and baby powder: _____

... salt and water: _____



8. Why is it possible to separate substances in a mixture? (p. 114–115)

9. Briefly describe each separation technique. (pp. 115–117)

Distillation: _____

(Paper) Chromatography: _____

Centrifugation: _____

Level G: Science

Days 11–15: **Date:** _____ **to** _____

Week Overview																																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36

Week 3

Date:	Day 11	Day 12	Day 13	Day 14	Day 15
<i>What's Science All About?</i>	pp. 118-119	pp. 120-123	pp. 124-125		pp. 126-127
Activity Sheet Questions	#1–2	#3–5	#6–9		#10–12
<i>Chemically Active</i>				Chap. 6 pp. 114–120	
Do Together	Electrolysis	Periodic Table of Elements			
Supplies	No experimnet this week.				
Shopping/Planning List	For next week: No items needed next week.				
<i>Additional Subjects:</i>					

What's Science All About?

Day
11

pp. 118–119

“What is the world made of?” is an interesting question, but science is limited on related questions. For instance, where did everything come from to begin with? Is matter eternal? Did it come into being at some specific point? If so, where did it come from? If the Big Bang theory is true, then everything that physically makes up our universe sprang out of an initial singularity. But where did the material come from and what caused the Big Bang? Within Christian theism, God is not merely a craftsman who shapes pre-existing matter, but a creator who originated the material in the first place. [p. 119]

Do Together

Day
11

Electrolysis

Take what your children learned about electrolysis today one step further. Since you probably do not want to try electrolysis by yourself at home, use your favorite search engine and search the phrase, “Electrolysis of water.” We recommend finding a video with a good demonstration.

Did they realize that electrolysis of water could be used to break down water into hydrogen and oxygen atoms, thereby providing the basic building blocks of a possible alternative fuel? How might these elements (and their potential energy) be converted or otherwise used as a power source? Do they think they might someday drive a hydrogen-powered vehicle? Why or why not? What might the benefits be? Are there any particular drawbacks?

Use this time to discuss the importance of developing alternative sources of energy. What, if any, alternative energy sources can be found near your home? Are any of them being utilized today? If so, which ones?

As your children continue their journey through the world of chemistry, they will hear a lot about different elements, which are the basic building blocks of all substances on Earth. Use the Internet to find a copy of the periodic table of elements that you can print for your children to study or spend some time poring over the one in your book.

Which of the elements are they familiar with? How many have they never heard of? What do they notice about the structure and organization of the table? Which elements are similar? Which elements are gases? Metals? Which ones are radioactive?

Let your children pick out a few elements to study in greater depth. Use the Internet to find more information about their selected elements. Which elements can you find samples of around the house? Hint: You should be able to find some oxygen, hydrogen (combined with oxygen to form water!), gold, silver, copper, etc. What elements are the rarest? Which ones are most valuable? Most dangerous? ■

Science G: Week 3 Activity Sheet



What's Science All About?

1. How does a chemical reaction differ from a mixture? (pp. 105, 114-118)

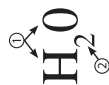
Chemical Reaction	Mixture
(bonds between atoms are broken and rearranged to form new compounds; chemical compounds have different properties from those of the elements they contain)	(components are still separable; components still have the same properties as they did when they were separate)

2. Briefly describe the electrolysis process. (p. 118) *(a compound is melted or dissolved in a solvent to make an electrolyte. Then, chemists pass an electric current through it, causing the compound to break apart.)*

3. Why do substances have different properties? (p. 121) *(because they are made of different kinds of atoms, which behave differently from other kinds of atoms)*

4. Describe what a scientist can determine from each part of this substance's symbol. (p. 123)

- 1) *(The letters describe the elements that form each molecule in a substance. This substance is made from two elements—hydrogen and oxygen.)*
- 2) *(The subscript numbers help describe the ratio of atoms in each molecule of this substance. In this substance, there are two hydrogen atoms for every oxygen atom.)*



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Science G: Week 3 Activity Sheet

5. **Challenge!** Can you write out the scientific names of these compounds? First write the number of atoms per molecule for each element in the compound. Then use the prefixes in the box to help you write their scientific names. Note: For these examples, the second word will end in the suffix "-ide". (p. 123)

mono- = 1	di- = 2	tri- = 3	tetra- = 4	penta- = 5
hexa- = 6	hepta- = 7	octa- = 8	nona- = 9	deca- = 10

CO	(1) carbon	(1) oxygen	NaCl	(1) sodium	(1) chlorine
Name:	carbon monoxide		Name:	sodium chloride	
CO ₂	(1) carbon	(2) oxygen	CCl ₄	(1) carbon	(4) chlorine
Name:	carbon dioxide		Name:	carbon tetrachloride	

6. An element's atomic number is equal to... (p. 124)

- ☐ the number of protons in each shell.
- ☒ the number of protons in the nucleus.
- ☐ the number of neutrons in the nucleus.
- ☐ the number of electrons in an atom.

7. How is the Periodic Table currently laid out? (pp. 124-125) *(in order of atomic number [the number of protons in the atom], with the element with the lowest atomic number in the upper left hand corner; elements that behave similarly are in vertical columns)*

8. Label the parts of the element from the Periodic Table below. Then fill in the missing information for the other three elements. (pp. 124-125)

Diagram showing the structure of an element box with labels:

- Symbol of the element: He
- Atomic number: 2
- Mass number: 4

Three element boxes to be labeled:

- Box 1: 42, Mo, (96)
- Box 2: 11, (Na), 23
- Box 3: (83), (Bi), 209



Science G: Week 3 Activity Sheet

Identify each of the above elements. (See their name below the symbol.) Write their names below.

(He: helium) (Mo: molybdenum) (Na: Sodium) (Bi: bismuth)

9. Circle the elements to show your answer. Then complete each statement. (pp. 124–125)

Which two elements are in the same group?

Li C Ne Cl Si

Elements in the same group or column usually... *(have similar properties; have the same number of electrons in their outermost shells)*

Which two elements are in the same period?

K Mg C Ni Xe

Elements in the same period have the same... *(number of shells)*

10. Match the categories of metal to the characteristics that best describe them. (pp. 126–127)

reactive metals	share some properties with metals and share some properties with non-metals
poor metals	are softer and easier to melt than other metals
transition metals	don't conduct heat or electricity well
metalloids	are hard to find in their pure forms
non metals	can be combined with other metals to create alloys

11. What is organic chemistry? (p. 127) *(the study of chemical compounds containing carbon; scientists used to believe that these compounds could only be found in living organisms)*

12. In what way are neon, argon (and mercury), krypton and xenon useful? (p. 127)
(They produce a colored light when an electric current passes through them.)



What's Science All About?

1. How does a chemical reaction differ from a mixture? (pp. 105, 114–118)

Chemical Reaction	Mixture

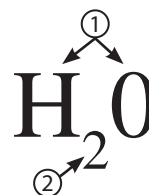
2. Briefly describe the electrolysis process. (p. 118) _____

3. Why do substances have different properties? (p. 121) _____

4. Describe what a scientist can determine from each part of this substance's symbol. (p. 123)

1) _____

2) _____





Science G: Week 3 Activity Sheet

5. **Challenge!** Can you write out the scientific names of these compounds? First write the number of atoms per molecule for each element in the compound. Then use the prefixes in the box to help you write their scientific names. Note: for these examples, the second word will end in the suffix “-ide”. (p. 123)

mono- = 1	di- = 2	tri- = 3	tetra- = 4	penta- = 5
hexa- = 6	hepta- = 7	octa- = 8	nona- = 9	deca- = 10

CO ____ carbon ____ oxygen Name: <u>carbon monoxide</u>	NaCl ____ sodium ____ chlorine Name: _____
CO ₂ ____ carbon ____ oxygen Name: _____	CCl ₄ ____ carbon ____ chlorine Name: _____

6. An element’s atomic number is equal to... (p. 124)

☐

the number of protons in each shell.

☐

the number of protons in the nucleus.

☐

the number of neutrons in the nucleus.

☐

the number of electrons in an atom.

7. How is the Periodic Table currently laid out? (pp. 124–125) _____

8. Label the parts of the element from the Periodic Table below. Then fill in the missing information for the other three elements. (pp. 124–125)

_____ →

2

He

4

← _____

← _____

42

Mo

11

23

209



Identify each of the above elements. (See their name below the symbol.) Write their names below.

9. Circle the elements to show your answer. Then complete each statement. (pp. 124–125)

Which two elements are in the same group?

Li

C

Ne

Cl

Si

Elements in the same group or column usually... _____

Which two elements are in the same period?

K

Mg

C

Ni

Xe

Elements in the same period have the same... _____

10. Match the categories of metal to the characteristics that best describe them. (pp. 126–127)

reactive metals	•	• share some properties with metals and share some properties with non-metals
poor metals	•	• are softer and easier to melt than other metals
transition metals	•	• don't conduct heat or electricity well
metalloids	•	• are hard to find in their pure forms
non metals	•	• can be combined with other metals to create alloys

11. What is organic chemistry? (p. 127) _____

12. In what way are neon, argon (and mercury), krypton and xenon useful? (p. 127)

Science G—Weekly Subject List

Week Subject

1	substances/properties/how the world changes/atoms/molecules/compound/mixture/reaction/states: solid, liquid, gas/melting point
2	air pressure/Boyle/physical and chemical properties/separation techniques: distillation, chromatography, centrifuge
3	separation techniques: electrolysis/how things work/proton/neutrons/electrons/periodic table/metal/metalloid/non metals/noble/organic chemistry
4	elements/compounds/how shells work/ shells: ionic bonding and covalent bonding/pooling electrons/ions/covalent/crystals/nuclear reactions/radioactive
5	history of atoms/how things happen/reactions/endothermic/exothermic/activation energy/catalysts/balancing equations/sample reactions
6	reaction types: trading places and breakdown/oxidation/reduction/combustion/acid/base/salt/ph scale/acid indicator/soap/weak bases
7	reactions/polymers/carbon/DNA/carbon dating/metal properties/alloys/steel/reactivity/gases
8	non-metal samples/chemical curiosities/how to discover what a substance is/chemical universe/elements from stars
9	rocks/types/greenhouse gas/animal/plant chemistry/body: food/hormones/bacteria/chemistry history/into to physics/beginning of atoms/Rutherford
10	protons/positive charge/quarks/gluons/feel force/speed/velocity/acceleration/mass/momentum/force types/friction
11	Newton's laws/inertia/work/machines: pulley, wheel, lever/gravity/weight/mass/force/air resistance
12	center of gravity/pressure/problems with pressure/volume/density/displacement/energy/energy types/energy transfer
13	fossil fuels/alternative fuels/power/thermal/condense/temperature vs. heat/conduction/radiation
14	wave/medium/oscillation/transverse/electromagnetic spectrum/light/colors/reflection/angle of incidence
15	total internal reflection/refraction/lenses/hearing/frequency/echoes/sonar/light vs sound/electrifying/large/static/attract
16	electric current/terminals/electrolyte/volts/circuit/series/current/how to draw/magnetic force/field/lines/magnet earth/electromagnetism
17	space/stars/sun/orbits/season/moon/year/solar system/comets/physics history/Biology: about life/jobs and inventions/seven processes/classification/animal kingdom
18	vertebrates/plant kingdom/animal vs plant cells/organs/organisms/cell division/mitosis/virus/protists/bacteria/microbes/medicines
19	skeleton/muscles/joints/nervous system/senses/digestion/respiration/circulation/reproduction/genetics
20	animal movement and life/plants parts/leaves/plants reproduce/spores/clones/ecology/habitat/ice/keystone species
21	food chain/web/pyramid/climate change/earth/maps/season/day-night/inside earth/crust
22	rock types/resources/metals/building materials/fossil fuels/energy/volcanoes/volcano variations/hot springs/volcanic islands/monitoring volcanoes
23	earthquakes/how earthquakes happen/earthquake safety/tsunamis/atmosphere/air and ocean currents/cycles/global warming
24	world climates/rainforests/tropic grasslands/monsoons/tropic deserts/mediterranean climate/temperate/polar
25	mountains/changing climate/weather/water and clouds/thunderstorms/windstorms/floods and droughts/freezing and boiling

continued on next page

Week Subject

26	strange weather/forecasts/plants/animals/ecosystems/people and ecosystems/population/farming
27	farm methods/soil/care for soil/layers of soil/weathering/erosion/rivers/river erosion/use of rivers
28	water underground/glaciers/sea edge/seas and oceans/use of oceans/map keys/general science information
29	origin of life/spontaneous generation/acquired characteristics
30	natural selection/mutations/whale origins/odds
31	similarities (homology)/parsimony/fossil record/Darwin
32	fossil record (invertebrate/fish/bats)/Cambrian Explosion
33	fossil record (pinnipeds/flying reptiles/dinosaurs)/evolution of whale controversy
34	fossil record (birds/Archaeopteryx)
35	fossil record (birds/feathered dinosaurs)
36	fossil record (flowering plants)/DNA formation/protein formation/amino acid formation/evolution controversy



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