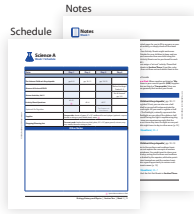
Instructor's Guide Quick Start

The BookShark™ Instructor's Guide (IG) is designed to make your educational experience as easy as possible. We have carefully organized the materials to help you and your students get the most out of the subjects covered. If you need help reading your schedule, see "How to Use the Schedule" in **Section Four**.

This IG includes a 36-week schedule, notes, assignments, readings, and other educational activities. For specific organizational tips, topics and skills addressed and other suggestions for the parent/teacher see **Section Three**. Here are some helpful features that you can expect from your IG.



Easy to use

Everything you need is located right after the schedule each week. If a note appears about a concept in a book, it's easy to find it right after the schedule based on the day the relevant reading is scheduled.

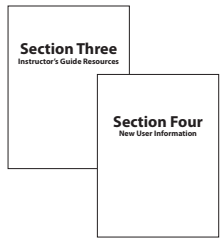
4-Day Schedule

Designed to save one day a week for music lessons, sports, field trips, co-ops, or other extra-curricular activities.

Notes

When relevant, you'll find notes about specific books to help you know why we've selected a particular resource and what we hope your students will learn from reading it. Keep an eye on these notes to also provide you with insights on more difficult concepts or content (look for "**Note:**").

Note: What are the two kinds of poisonous lizards? The book only lists one – the Gila monster (*Heloderma suspectum*) native to the southwestern United States. The other kind is known as a beaded lizard (*Heloderma horridum*) and is found in Mexico and Guatemala. [p. 35]

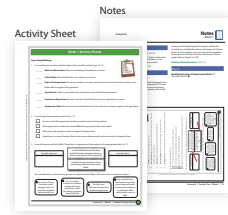


Instructor's Guide Resources and **New User Information**

Don't forget to familiarize yourself with some of the great helps in **Section Three** and **Section Four** so you'll know what's there and can turn to it when needed.

Activity Sheets and **Answer Keys**

Activity Sheets follow each week's notes and are customized for each lesson to emphasize important points in fun ways. They are designed with different skills and interests in mind. You may want to file them in a separate binder for your student's use. Corresponding Answer Keys have been included within your weekly Notes.



How to Use the Schedule

More notes with important information about specific books.

The [N] symbol provides you with a heads-up about difficult content. We tell you what to expect and often suggest how to talk about it with your students.

4-Day Schedule:

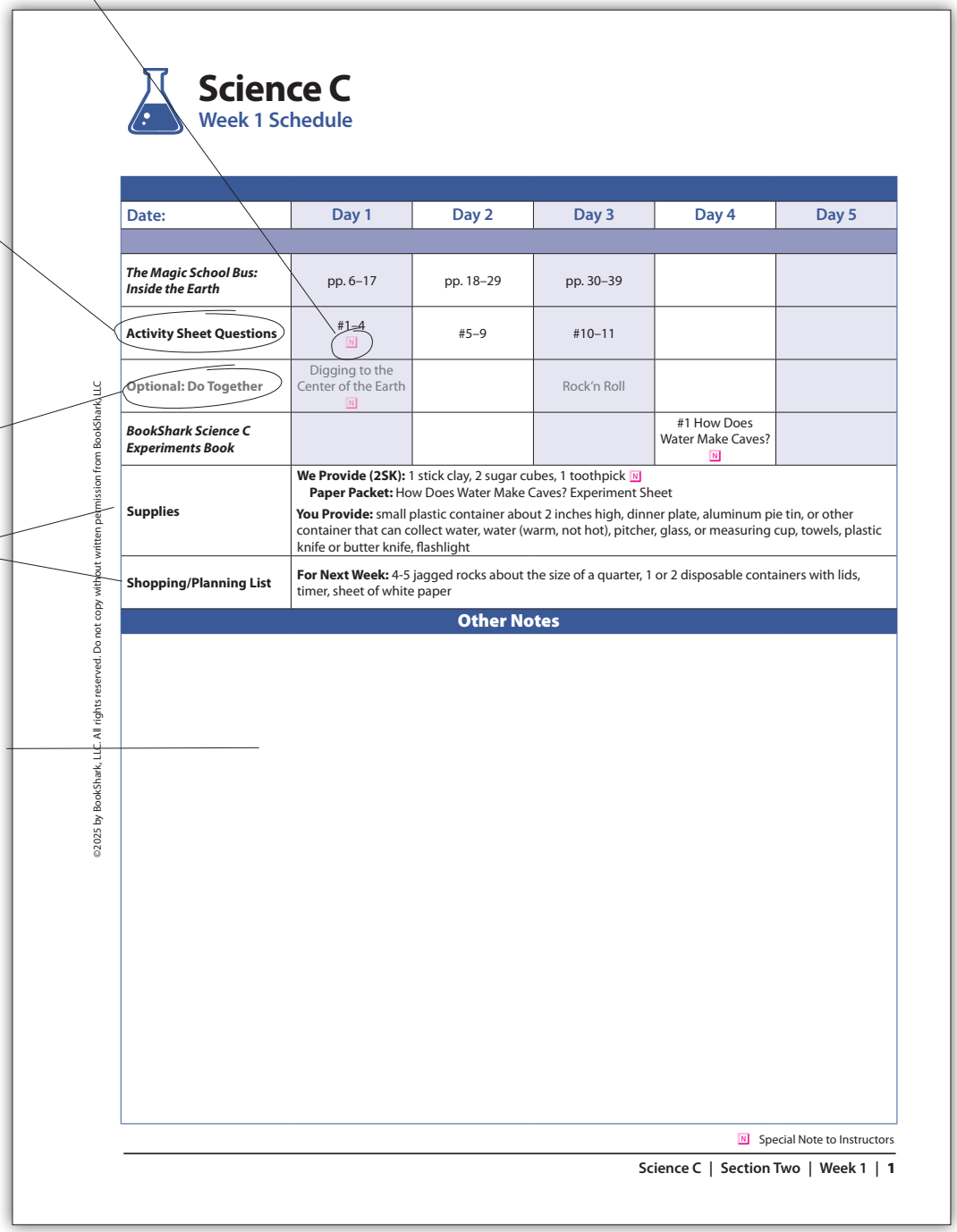
This entire schedule is for a 4-Day program. Designed to save one day a week for music lessons, sports, field trips, co-ops and other activities.

Find the Activity Sheets for students directly after the Notes. Students should complete only the questions assigned.

We schedule optional assignments to be used if desired.

Find all the supplies needed for this week as well as the supplies needed for next week here.

Additional space for writing extra assignments, activities, or notes.



Science C
Week 1 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
The Magic School Bus: Inside the Earth	pp. 6–17	pp. 18–29	pp. 30–39		
Activity Sheet Questions	~~#1–4~~ [N]	#5–9	#10–11		
Optional: Do Together	Digging to the Center of the Earth [N]		Rock'n Roll		
BookShark Science C Experiments Book				#1 How Does Water Make Caves? [N]	
Supplies	**We Provide (2SK):** 1 stick clay, 2 sugar cubes, 1 toothpick [N] **Paper Packet:** How Does Water Make Caves? Experiment Sheet **You Provide:** small plastic container about 2 inches high, dinner plate, aluminum pie tin, or other container that can collect water, water (warm, not hot), pitcher, glass, or measuring cup, towels, plastic knife or butter knife, flashlight				
Shopping/Planning List	**For Next Week:** 4-5 jagged rocks about the size of a quarter, 1 or 2 disposable containers with lids, timer, sheet of white paper				

Other Notes

[N] Special Note to Instructors

Science C | Section Two | Week 1 | 1

Science G
Week 1 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
Eyewitness: Universe	pp. 6–9	pp. 10–11, 16–17	pp. 18–19		
Explanatorium of the Earth			pp. 14–15		
Activity Sheet Questions	#1–3 N	#4–8	#9–15		
Optional: Do Together	How Big?	Live-Look			
BookShark Science G Experiments Book				#1 What Causes the Earth to Wobble?	
Supplies	**We provide: 6SK—** 3″x5″ index card, 72″ kite string, ½ stick clay N, wooden dowel rod, masking tape, plastic thumbtack, 11″ x 17″ white paper **Paper Packet:** What Causes the Earth to Wobble? Experiment Sheet **You provide:** cardboard box at least 11″ x 17″ on one side, hole punch, ruler, scissors, pencil, colored markers				
Shopping/Planning List	**For next week:** scissors, clear tape, colored pencils				

Other Notes

N Special Note to Teachers

Notes
Week 1

Day 1

Eyewitness: Universe | pp. 6–9

Where exactly is this somewhat mysterious, famous landmark on page 6? Stonehenge stands in England, about one hour and 45 minutes from London, on Salisbury Plain in Wiltshire.

Page 6 also mentions the Apollo astronauts of the 1960s and '70s who were the first to see the whole of the Earth from space during their journey to the moon. The National Aeronautics and Space Administration's (NASA) Apollo program included nine missions to the Moon from 1968 to 1972. Twenty-four astronauts participated in NASA's Apollo program. Twelve walked on the Moon. Twelve flew to the Moon without landing or having the opportunity for a moon walk.

Activity Sheet Questions | #1–3

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

You do not have to do every question on the Activity Sheets. Feel free to adjust and/or omit questions to meet the needs of your students. 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.

We have provided a variety of activities to interest and challenge your students. Feel free to let your students do those activities that they enjoy and simply talk through others.

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

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

Optional: Do Together | How Big?

Over the course of this program we will provide ideas for fun activities to do with your students each week. 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 students have been learning in a meaningful way.

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

Now that your students have had an introduction to the universe, help them get an idea of the relative sizes of objects in the solar system. Ask them to name 6-7 objects in the universe as you jot them down. Some examples from the book include planets, moons, the sun, galaxies, telescopes/space probes, and stars. Now ask them to think about the relative sizes of each of these objects. Discuss those that they can see with their naked eye and those that they cannot. Now work together to put the objects in order by size. Which are smallest? Which are biggest? As we are just beginning our study of astronomy, your students may not have all the answers today, but generally speaking, our list of objects would be organized as such (smallest to biggest): telescopes/space probes, moons, planets, the Sun and other stars, and galaxies.

Supplies

When supplies are listed as "**We provide**" they are included in your Science G Supplies Kit **(6SK)**. When supplies are listed as "**You provide**" they are materials you can generally find around your home. For example:

- aspirin
- sand
- liquid bleach
- curry powder
- baking soda

Please note that throughout this course, you will use several cups of sand. We recommend purchasing one bag of play sand early in the year to use throughout the course.

Most durable items will be used repeatedly, so clean them after use and store in a safe place. This includes clay, pipettes, toothpicks, test tubes, pony beads, paper clips, and corn kernels.

Note: Keep your clay, you will use the full stick throughout the year.

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.

Day 2

Eyewitness: Universe | pp. 10–11, 16–17

Pages 16–17 of today's reading refers to three telescopes. What do you imagine a person might do during his or her lifetime that would cause people to agree to name a telescope in his or her honor? Learn about these telescopes named after an astronomer, a businessman, and a government official who became the administrator of NASA.

Edwin Hubble, who lived from 1889–953, was an American astronomer. His work includes the discovery that there are galaxies that exist beyond The Milky Way.

William Myron Keck, who lived from 1880–1964, was an American businessman and philanthropist. He became the founder of Superior Oil Company (now part of ExxonMobil) and the founder of the W.M. Keck Foundation. Established in 1954, the foundation supported research in science, engineering, and medicine. The foundation provided $70 million dollars for the Keck 1 telescope in 1985. More contributions allowed for the development of Keck II, which started in 1991. These two telescopes, also known as the twin Keck telescopes, are pictured on p. 16.

James E. Webb, who lived from 1906–1992, was an American government official and the administrator of NASA during the Mercury, Gemini, and Apollo programs from 1961–1968. He had worked in Washington D.C. during the Roosevelt and Truman administrations. President John F. Kennedy appointed him to the position of administrator of NASA.

Activity Sheet Questions | #4–8

Optional: Do Together | Live-Look

Take some time today to explore photos taken by the Hubble Space Telescope and the James Webb Space Telescope (JWST). hubblesite.org includes several awe-inspiring photos taken by the Hubble Space Telescope and access to a "live-look" at what is being seen by the Hubble. webb.nasa.gov offers access to incredible photos taken by the JWST with explanations describing what is being viewed.

Day 3

Eyewitness: Universe | pp. 18–19

If you had the opportunity to name a planet, what name would you choose? The Romans looked to the stories of mythology for inspiration for their choices. In ancient Roman days, only five planets could be seen in the night sky.

- **Mercury**: named for the storied messenger of the gods
- **Venus**: for the Roman goddess of love and beauty
- **Mars**: for the Roman god of war
- **Jupiter**: for the king of the Roman gods
- **Saturn**: for the god of agriculture

The other "known" planet at the time was Earth, of course. Rather than being named for a Greek or Roman god, the name Earth comes from a word for the soil or the ground. Most languages have some word for Earth.

The earliest known telescope originated in the Netherlands in 1608. With this invention, the discovery of Uranus and Neptune became possible. The astronomer who discovered Uranus in 1781, first wanted to name the new planet after King George III. A German astronomer recommended the name Uranus. Unlike the five planets seen by the ancient Greeks and Romans, Uranus was named by more modern astronomers. They liked the idea of keeping with the mythological names used by their star-gazing peers from history, so they named Uranus after Ouranos, the Greek god of the sky. The name was not used widely until the 1800s.

Years later, the planet we know as Neptune was found in 1846 by a German astronomer with help from French and British astronomers. Some wanted to use the French astronomer's name, but once again, the planet got its name from mythology, from the Roman god of the sea.

In 1930, an astronomer from Kansas discovered what would become known as Pluto while studying the sky at an observatory in Arizona. Pluto was known as Planet X until a former librarian from the library at the University of Oxford was reading about the new discovery to his 11-year-old granddaughter during breakfast one morning. The grandfather asked the 11-year-old what she thought the planet should be named. She suggested the name Pluto, after the god of the underworld.

Pluto was considered a planet for 76 years. In 2006, a newly proposed definition of the word "planet" excluded Pluto, downgrading its status—returning the planetary count to eight.

Notes
Week 1

Changes in the definition were debated while others pointed to the mistake in ever trying to put definitive requirements on planets. Planetary scientists tend to look at the question differently than astronomers do. The debate continues onward.

Explanatorium of the Earth | pp. 14–15

Activity Sheet Questions | #9–15

Day 4

BookShark Science G Experiments Book | #1 What Causes the Earth to Wobble? ■

Week 1 Activity Sheets

Eyewitness: Universe

1. Fill in the blanks (not all of the words will be used): (pp. 6–7)

2,500	**universe**	**5,000**	**Earth**
astronomy	**Solar System**		**astrology**

People have studied the _____(universe)_____ for at least _____(5,000)_____ years through the science of _____(astronomy)_____.

2. Check all that are true: (pp. 6–7)

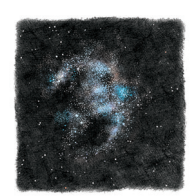
- ☐ We know all that there is to know about the universe.
- ☒ The universe is everything that exists today, in the past, and in the future.
- ☒ Stonehenge may have been used to mark the positions of the Sun and Moon during the year.
- ☐ Ptolemy believed the Sun was the center of the universe.

3. Match the astronomers to their contributions: (pp. 6–7)

Isaac Newton	Discovered that planets orbit the sun in ellipses, rather than circles.
Johannes Kepler	Plotted the distribution of stars and thought our galaxy was lens–shaped.
Edwin Hubble	Found that gravity was a force that kept planets in the Sun's orbit.
Nicolaus Copernicus	Discovered the Andromeda galaxy, the first galaxy outside the Milky Way.
William Herschel	Theorized a Sun–centered universe where planets make circular orbits around the Sun.

4. Check all the true statements about how the universe works: (pp. 10–11)

- ☒ It is made up of matter and energy (in the form of light and other radiation).
- ☒ Gravity is the force that holds the universe together.
- ☒ Magnetism is the force that makes objects attract or repel each other.
- ☐ The smaller the body, the greater its gravitational attraction.
- ☒ An atom is the basic unit of matter.



Week 1 Activity Sheets

5. Fill in the blanks (not all of the words will be used): (pp. 10–11)

negative	**matter**	**protons**	**electrons**
subatomic particles	**no**		**rotate**
nucleus	**neutrons**		**positive**
quarks	**orbit**		**molecules**

Atoms are made up of smaller _____(subatomic particles)_____. The three main particles are _____(protons)_____, _____(neutrons)_____, and _____(electrons)_____. Protons have a _____(positive)_____ charge and neutrons have _____(no)_____ charge and both are found inside an atom's _____(nucleus)_____. Electrons have a _____(negative)_____ charge and _____(orbit)_____ the nucleus. Protons and neutrons are made up of smaller particles called _____(quarks)_____.

6. Circle **True** or **False** : The many kinds of radiation differ in wavelength. Visible light is radiation that our eyes see as colors from violet to red. (pp. 10–11)

7. The first scientist to turn a telescope on the skies in 1609 was _____(Galileo Galilei)_____ (pp. 16–17)

8. Number the steps to describe how a light reflecting telescope works: (pp. 16–17)

- (2) Light hits a large, curved primary mirror that gathers and focuses light.
- (3) The light is reflected back along the telescope tube onto a flat secondary mirror.
- (4) The light is reflected into an eyepiece near the front of the tube.
- (1) Light rays from celestial bodies travel through the tube.

9. Number the order of the planets in the solar system, starting nearest to the Sun and moving outward: (pp. 18–19)

- (3) Earth
- (5) Jupiter
- (1) Mercury
- (6) Saturn
- (4) Mars
- (7) Uranus
- (2) Venus
- (8) Neptune

10. Circle **True** or **False** : The planets move in perfectly circular orbits around the Sun. (pp. 18–19)

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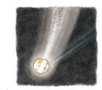
Week 1 Activity Sheets

11. Match the term to the definition: (pp. 18–19)



Comets	lumps of rocks and sometimes metal
Kuiper Belt	a world massive enough to pull itself into a spherical shape that orbits the sun
Asteroids	a region beyond Neptune filled with icy bodies
Moon	celestial bodies that orbit all the planets (except Mercury and Venus)
Planet	icy bodies that form a vast sphere called the Oort Cloud

Explanatorium of the Earth

12. Which four planets are balls of rock and metal? (pp. 14–15)

(Mercury) *(Venus)*

(Earth) *(Mars)*

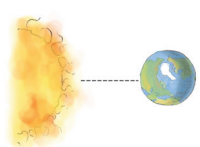
13. Which planets are giant spinning globes of hydrogen and helium? (pp. 14–15)

(Jupiter) *(Saturn)*

(Uranus) *(Neptune)*

14. How long does it take for light to travel from the sun's surface to the earth? (Circle the correct answer) (pp. 14–15)

eight minutes **365 days** **one month** **two years**

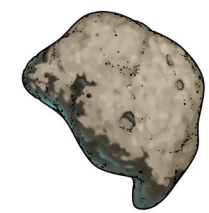


Week 1 Activity Sheets

15. Fill in the blanks (not all of the words will be used): (pp. 14–15)

Kuiper	**feet**	**meters**
miles	**Mercury**	**Jupiter**
Mars	**irregular**	**Earth**
asteroid		**regular**

Asteroids are giant rocks that can be a few *(feet)* long to hundreds of *(miles)* wide. They have *(irregular)* shapes and are found in the *(asteroid)* belt, between the orbits of *(Mars)* and *(Jupiter)*.



Week 1 Activity Sheets

Eyewitness: Universe

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2,500	**universe**	**5,000**	**Earth**
astronomy	**Solar System**		**astrology**

People have studied the _____ for at least _____ years through the science of _____.

2. Check all that are true: (pp. 6–7)

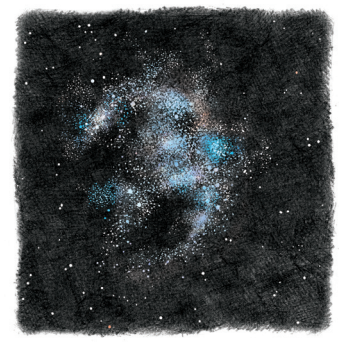
- ☐ We know all that there is to know about the universe.
- ☐ The universe is everything that exists today, in the past, and in the future.
- ☐ Stonehenge may have been used to mark the positions of the Sun and Moon during the year.
- ☐ Ptolemy believed the Sun was the center of the universe.

3. Match the astronomers to their contributions: (pp. 6–7)

Isaac Newton •	• Discovered that planets orbit the sun in ellipses, rather than circles.
Johannes Kepler •	• Plotted the distribution of stars and thought our galaxy was lens–shaped.
Edwin Hubble •	• Found that gravity was a force that kept planets in the Sun's orbit.
Nicolaus Copernicus •	• Discovered the Andromeda galaxy, the first galaxy outside the Milky Way.
William Herschel •	• Theorized a Sun–centered universe where planets make circular orbits around the Sun.

4. Check all the true statements about how the universe works: (pp. 10–11)

- ☐ It is made up of matter and energy (in the form of light and other radiation).
- ☐ Gravity is the force that holds the universe together.
- ☐ Magnetism is the force that makes objects attract or repel each other.
- ☐ The smaller the body, the greater its gravitational attraction.
- ☐ An atom is the basic unit of matter.



Week 1 Activity Sheets

5. Fill in the blanks (not all of the words will be used): (pp. 10–11)

negative	**matter**	**protons**	**electrons**
subatomic particles		**no**	**rotate**
nucleus		**neutrons**	**positive**
quarks		**orbit**	**molecules**

Atoms are made up of smaller _____ _____. The three main particles are _____, _____, and _____. Protons have a _____ charge and neutrons have _____charge and both are found inside an atom's _____. Electrons have a _____ charge and _____ the nucleus. Protons and neutrons are made up of smaller particles called _____ .

6. Circle **True** or **False** : The many kinds of radiation differ in wavelength. Visible light is radiation that our eyes see as colors from violet to red. (pp. 10–11)

7. The first scientist to turn a telescope on the skies in 1609 was _____ _____ (pp. 16–17)

8. Number the steps to describe how a light reflecting telescope works: (pp. 16–17)

_____ Light hits a large, curved primary mirror that gathers and focuses light.

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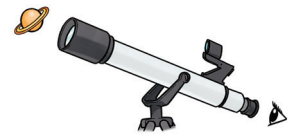


9. Number the order of the planets in the solar system, starting nearest to the Sun and moving outward: (pp. 18–19)

_____ Earth

_____ Jupiter

_____ Mercury

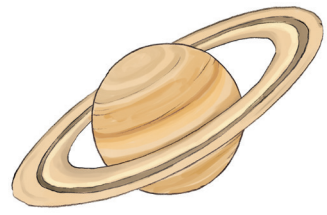
_____ Saturn

_____ Mars

_____ Uranus

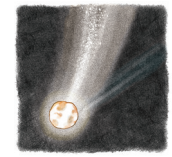
_____ Venus

_____ Neptune



10. Circle **True** or **False** : The planets move in perfectly circular orbits around the Sun. (pp. 18–19)

11. Match the term to the definition: (pp. 18–19)



Comets	•	•	lumps of rocks and sometimes metal
Kuiper Belt	•	•	a world massive enough to pull itself into a spherical shape that orbits the sun
Asteroids	•	•	a region beyond Neptune filled with icy bodies
Moon	•	•	celestial bodies that orbit all the planets (except Mercury and Venus)
Planet	•	•	icy bodies that form a vast sphere called the Oort Cloud

Explanatorium of the Earth

12. Which four planets are balls of rock and metal? (pp. 14–15)

_____ _____

_____ _____

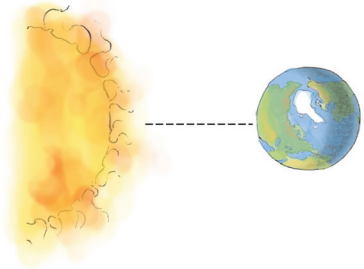
13. Which planets are giant spinning globes of hydrogen and helium? (pp. 14–15)

_____ _____

_____ _____

14. How long does it take for light to travel from the sun's surface to the earth? (Circle the correct answer) (pp. 14–15)

eight minutes **365 days** **one month** **two years**



Week 1 Activity Sheets

15. Fill in the blanks (not all of the words will be used): (pp. 14–15)

Kuiper	**feet**	**meters**
miles	**Mercury**	**Jupiter**
Mars	**irregular**	**Earth**
asteroid		**regular**

Asteroids are giant rocks that can be a few _____ long to hundreds of _____ wide. They have _____ shapes and are found in the _____ belt, between the orbits of _____ and _____.

Science G
Week 2 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
Eyewitness: Universe	pp. 20–21	pp. 22–23	pp. 24–27		
Explanatorium of the Earth	pp. 16–19	pp. 20–23			
Activity Sheet Questions	#1–6	#7–12	#13–15		
Optional: Do Together	A Season for All Time?	Battle of the Bulges			
BookShark Science G Experiments Book				#2 Why Do the Tides Change?	
Supplies	**We provide: 6SK—** brad (paper fastener), plastic thumbtack, ping pong ball, clay **Paper Packet:** Why Do the Tides Change? Experiment Sheet, Tide Model Cut-Outs **You provide:** scissors, clear tape, colored pencils				
Shopping/Planning List	**For next week:** scissors, ruler or tape measure with centimeters, yard stick or meter stick, a location with 3 meters (10 feet) of space, such as a wall, hallway, sidewalk, etc.				

Other Notes

Special Note to Teachers

Notes
Week 2

Day 1

Eyewitness: Universe | pp. 20–21

Under the heading "High-energy sun" in the middle of p. 21, we read about the way the Sun radiates ultraviolet rays. Both sunburns and tans are an indication that the Sun's rays have damaged the skin. Both are reactions to too much exposure to ultraviolet (UV) rays.

Factors that affect the UV radiation's intensity are the time of day, the season of the year, the latitude of your location (distance from the Equator), the cloud cover, and the ozone level.

Explanatorium of the Earth | pp. 16–19

Page 16 is packed with details of day and night. The rotation of Earth and its 23.5° tilt cause the difference in the amount of daylight hours in various places. Page 17 adds details about the Sun rising in the east and setting in the west. Leap year is explained in the section "Days and Years." A 2004 earthquake at the North Pole shortened a day by 2.7 microseconds! Did you know that rockets are launched near the Equator for extra speed? Different places on Earth move at different speeds because Earth is a sphere. Take in these details and see how many of our daily realities could easily escape our attention!

Activity Sheet Questions | #1–6

Optional: Do Together | A Season for All Time?

Do your students have a favorite season? Discuss with them why that season is their favorite. Do they love a certain activity associated with that season, like swimming or skiing? Or maybe they prefer a particular weather type? Talk with them about all the things that happen during that season, like holidays or other family traditions.

Now, discuss with your students what Earth's position in space is like during that season. Perhaps they can model the Earth's position using a flashlight or lamp and a ball, remembering that Earth is tilted on its axis while it rotates and orbits the Sun. Feel free to use the book to help with this demonstration. Another option would be to try to draw the Earth's position during that season in relation to the Sun.

Day 2

Eyewitness: Universe | pp. 22–23

After reading about the tug-of-war of tides described on pp. 22–23, talk through any safety precautions you have taken while at the beach. Do you have a favorite beach with resources for planning for these daily changes? If you have worked around the tides without communicating those details to your students, today is a great day to make your science learning coincide with practical knowledge that can help your students in a memorable way. Connect the dots between what you read today and any background experience or future plans.

Explanatorium of the Earth | pp. 20–23

Activity Sheet Questions | #7–12

Optional: Do Together | Battle of the Bulges

Who knew that the tides were so complicated? To help illustrate how tides work "globally," do some internet research and try to find a video on tidal bulges. This will make it easier to understand how those bulges work and how the Earth moves through those bulges over the course of a day. Did your students realize that this how tides work? Do they have a better sense of tides now? Can they explain how tides work to you?

Day 3

Eyewitness: Universe | pp. 24–27

Let's pretend an Olympic even was being held for the planets' orbits around the Sun. Use pp. 24–25 to answer the following questions:

- Which planet would win the race, and how long is its trip around the Sun? *(Mercury; 88 days)*
- Which planet would take last place, and how long does it take to orbit the Sun? *(Neptune; 165 years)*
- Which planet is so hostile that people could not even survive one minute there? *(Venus)*

Activity Sheet Questions | #13–15

Day 4

BookShark Science G Experiments Book | #2 Why Do the Tides Change? ■

Week 2 Activity Sheets

Eyewitness: Universe

1. Check all that are true about the Sun: (pp. 20–21)

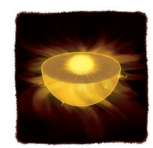
- [x] It is a star.
- [x] It is a great ball of incandescent gases.
- [ ] It has tiny sunspots that quickly come and go.
- [x] It is over 100 times wider than Earth.
- [x] A majority of our planet's ecosystem depends on it.

2. Fill in the blanks (not all of the words will be used): (pp. 20–21)

prominences	**planets**	**cooler**	**days**
moons	**warmer**	**weeks**	**dark patches**

Sunspots are _(dark patches)_ on the Sun, about 2700°F _(cooler)_ than the Sun's surface, that can persist for _(weeks)_ and grow to the size of _(planets)_.

3. Check all that are true about the corona: (pp. 20–21)



- [x] It is an atmosphere of gases surrounding the Sun.
- [ ] It is hotter than the Sun's core.
- [x] It gives off a steady stream of tiny, charged particles called the solar wind.
- [x] Solar wind from the corona hits Earth's magnetic field, which deflects most of it into space.
- [x] During a total eclipse, the Moon blocks the Sun's surface, allowing us to see the corona's white atmosphere which extends millions of miles into space.

Explanatorium of the Earth

4. Fill in the blanks (not all of the words will be used): (pp. 16–17)

eastward	**zero**		**westward**
24	**pole**		**axis**
23	**366.24**	**56**	**365**

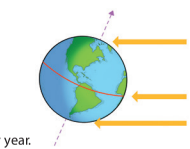
Earth rotates _(eastward)_ on an imaginary line called an _(axis)_. Because Earth's axis is tilted, sunlight hours vary from place to place, from as little as _(0)_ hours to _(24)_ hours a day. A day lasts 24 hours but the Earth takes _(23)_ hours, _(56)_ minutes, and 4 seconds to rotate once. Earth rotates _(366.24)_ times a year, even though there are only _(365)_ days.

Week 2 Activity Sheets

5. Why does the sky look blue during daylight hours? (pp. 16–17)

(sample answer: The Sun's light is scattered by Earth's air molecules. White light is a mix of all the colors of the rainbow, but since blue light scatters more easily than other colors, it makes the sky look blue.)

6. What causes different seasons on Earth? (pp. 18–19)



- [ ] The Earth gets closer to or further away from the Sun.
- [ ] The Moon's orbit around the Earth creates seasonal changes.
- [x] The Earth's axis of rotation is tilted at 23.5 degrees, causing the northern and southern hemispheres to lean towards the Sun at different times every year.
- [ ] The degree of heat and light from the Sun changes through the year

Eyewitness: Universe

7. What causes the Moon to shine? (pp. 22–23)

(The Moon has no light of its own but shines by reflecting light from the Sun.)

8. Circle the correct answer: Neil Armstrong and Buzz Aldrin are known for the following historical event: (pp. 22–23)

first people to walk on the Moon **the first people to develop a computer**

9. Mark the correct answer: Which phase is the Moon in when we cannot see it at night? (pp. 22–23)

- [x] New moon
- [ ] First quarter
- [ ] Last quarter
- [ ] Waxing gibbous

Week 2 Activity Sheets

Explanatorium of the Earth

10. Match the correct term to its description: (pp. 20–21)

Solar eclipse	When Earth casts a shadow on the Moon.
Lunar eclipse	When the Moon passes between the Earth and the Sun, blocking the Sun's light, and casting a shadow on the Earth.

11. Fill in the blanks (not all of the words will be used): (pp. 20–21)

Sun	**annular**	**total**	**brighter**
Moon	**closer**	**farther away**	**corona**
Earth		**wider**	**partial**

During a ___*(total)*___ solar eclipse, the _____*(Moon)*_____ completely blocks the Sun's light. The Sun and Moon appear to be the same size in our sky and align almost perfectly because the ____*(Sun)*____ is 400 times _____*(wider)*_____ than the moon, and 400 times _____*(farther away)*_____. The Sun's disk disappears, but the _____*(corona)*_____ becomes visible around the Moon.

12. Check all statements that are true about tides. (pp. 22–23)

- ☐ Spring tides are lower due to the Sun, Moon, and Earth lining up.
- ☒ The Moon's gravity pulls on Earth and creates tides.
- ☒ The Moon's gravitational pull is strong because it is close to the Earth.
- ☐ Earth's tides cause a trough in the ocean.
- ☒ A tidal bore occurs when tide waters flow into a river mouth.
- ☒ Earth experiences two high and low tides each day.

Week 2 Activity Sheets

Eyewitness: Universe

13. Circle **True** or **False** : Jupiter contains more matter than all the other planets put together. (pp. 24–25)

14. Circle the correct answer: The planets circle the Sun near a flat plane called …. (pp. 24–25)

the plane of the ecliptic **the plane of the rotation**

15. Mark the phrases that describe Mercury or Venus with an M or V: (pp. 26–27)

___*(M)*___ Small planet with a hard outer crust, rocky mantle, and iron core.

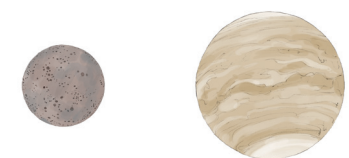
___*(M)*___ Has a very thin atmosphere.

___*(V)*___ Has a very dense atmosphere.

___*(V)*___ Same size as Earth but a hostile planet with high temperatures, carbon dioxide atmosphere, and sulfuric acid clouds.

___*(V)*___ Shaped by volcanoes which may still be active today.

___*(M)*___ Cratered landscape resulting from meteorites.



Week 2 Activity Sheets

Eyewitness: Universe

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prominences	**planets**	**cooler**	**days**
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Sunspots are _____on the Sun, about 2700°F _____ than the Sun's surface, that can persist for _____ and grow to the size of _____.

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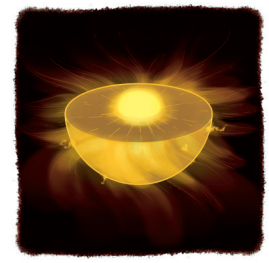

- ☐ It is an atmosphere of gases surrounding the Sun.
- ☐ It is hotter than the Sun's core.
- ☐ It gives off a steady stream of tiny, charged particles called the solar wind.
- ☐ Solar wind from the corona hits Earth's magnetic field, which deflects most of it into space.
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Explanatorium of the Earth

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23	**366.24**	**56**	**365**

Earth rotates _____ on an imaginary line called an _____. Because Earth's axis is tilted, sunlight hours vary from place to place, from as little as _____ hours to _____ hours a day. A day lasts 24 hours but the Earth takes _____ hours, _____ minutes, and 4 seconds to rotate once. Earth rotates _____ times a year, even though there are only _____ days.

Week 2 Activity Sheets

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_____

_____

_____

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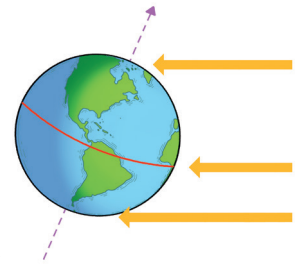

- ☐ The Earth gets closer to or further away from the Sun.
- ☐ The Moon's orbit around the Earth creates seasonal changes.
- ☐ The Earth's axis of rotation is tilted at 23.5 degrees, causing the northern and southern hemispheres to lean towards the Sun at different times every year.
- ☐ The degree of heat and light from the Sun changes through the year

Eyewitness: Universe

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Explanatorium of the Earth

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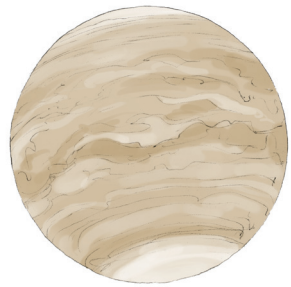
____ Same size as Earth but a hostile planet with high temperatures, carbon dioxide atmosphere, and sulfuric acid clouds.

____ Shaped by volcanoes which may still be active today.

____ Cratered landscape resulting from meteorites.



Science G
Week 3 Schedule

Date:	Day 1	Day 2	Day 3	Day 4	Day 5
Eyewitness: Universe	pp. 28–31	pp. 32–35	pp. 36–41		
Activity Sheet Questions	#1–4	#5–9	#10–15		
Optional: Do Together		Astronomic Mnemonic	Planetary Travel Agency		
BookShark Science G Experiments Book				#3 How Do Celestial Distances Compare?	
Supplies	**We provide: 6SK—** toothpicks, clay (1/2 stick), binder clips, masking tape **Paper Packet:** How Do Celestial Distances Compare? Experiment Sheet, Planet Labels Cut-Out Sheet **You provide:** scissors, ruler or tape measure with centimeters, yard stick or meter stick, a location with 3 meters (10 feet) of space, such as a wall, hallway, sidewalk, etc.				
Shopping/Planning List	**For next week:** permanent marker, ruler, helper				

Other Notes

Special Note to Teachers

Notes
Week 3

Day 1

Eyewitness: Universe | pp. 28–31

Please correct the date on p. 28 of your book in the Eyewitness box at the top of the page. Inge Lehmann's discovery was in 1936 rather than 1926.

The life of Inge Lehmann, the scientist who discovered Earth has a solid inner core, is full of fascinating details. Her parents were both born to prominent citizens in Denmark. Her father was a well-known psychologist while her mother was a housewife. She had one sister. Inge was inquisitive as a child, but she was often sick so that her parents tried to shield her from overexertion in her schoolwork. Inge, however, showed an early interest in mathematics and an early ability to understand at a level beyond what was typical for her age. One story tells of Inge at age 11 when she solved quadratic equations with older boys during what was supposed to be a social event.

Her school was started by the Jewish aunt of Neils Bohr, who was awarded the Nobel Prize for Physics in 1922. His aunt was named Hanna Adler. Adler was one of the first women to earn a master's degree in physics from the University of Copenhagen. She had visited the U.S. to learn about educational methods and practices. She returned to Denmark with enthusiasm and started a co-ed school where boys and girls were taught the same curriculum and extra-curricular activities without discrimination that was common in other schools of the time. The boys learned to cook and sew while the girls played football. During World War II, Adler was one of the Jewish citizens who was arrested in 1943 and held in a camp at 84 years of age. Dozens of her students, including Inge, wrote letters requesting her release. Thankfully, the requests of her students were granted!

Inge studied mathematics but was often bored with her classes and was disappointed in later experiences as a student and in her early career. After her early education with the novel approach to education in Hanna Adler's school, Inge was disappointed by the discriminations she found at university and in career opportunities. It took her over 10 years to finish her college degree.

As a teenager she experienced an earthquake while sitting with her family on a Sunday morning. It was not a strong earthquake, but they detected and discussed the movements. It was her only encounter with an earthquake until she worked as a seismologist two decades later. In her early career, she took a job in an insurance company in actuarial work before becoming an actuarial assistant at a university. This work helped her to hone her computational skills that would help in later achievements. She then began to study seismology with a professor who first explained to her that the make-up of Earth's core could be determined using data from earthquakes. Inge visited seismic stations in other countries, learning to analyze data. As she studied, she earned her master's degree at age 40.

She began to take leadership roles that required her to run seismographic observatories. She did research along with her job and made mathematical models to test her theories. After retiring from her job in her 60s, she took more time for her research, traveling to the U.S. and Canada for extended visits. She made discoveries and cited observations that have not been fully explained yet by scientists. Her work was more recognized in the U.S. where she was awarded doctorates and honors for her work. Inge wrote her last scientific article at age 99 and lived to the age of 104.

Activity Sheet Questions | #1–4

Day 2

Eyewitness: Universe | pp. 32–35

Activity Sheet Questions | #5–9

Optional: Do Together | Astronomic Mnemonic

As your students learn about each planet in our solar system, it may be useful to memorize their order in relation to the Sun. One fantastic memorization tool is a mnemonic device using the first letter of each word to make a sentence that is easy to remember. In the case of the order of the planets, the first letters of each are MVEMJSUN. The common mnemonic using these letters is **M**y **V**ery **E**ducated **M**other **J**ust **S**erved **U**s **N**achos, but challenge your students to have fun with this and come up with their own sentence that will help them remember the order of the planets. Perhaps **M**ike **V**ery **E**agerly **M**ade **J**elly **S**andwiches **U**ntil **N**oon?

Day 3

Eyewitness: Universe | pp. 36–41

In March of 1977, a team discovered the rings of Uranus. More rings were discovered in later years. Many years before 1977, back in 1789, William Herschel reported an observation of rings for this planet he had discovered. In 1781, Herschel (mentioned on p. 36 of today's reading) discovered the planet that would later be named Uranus. Though he discovered the planet, astronomers today disagree about whether he could have seen the rings. Years later, credit went to the team who discovered the rings in 1977. Do you think Herschel would have mentioned rings if they did not exist? Could they have possibly been brighter or in some way more visible when he was studying space? Either way, it is interesting to realize that scientists come to different conclusions about such matters!

Activity Sheet Questions | #10–15

Optional: Do Together | Planetary Travel Agency

Now that your students have learned about each planet, they are ready to plan a planetary voyage! Have your students choose their favorite planet other than Earth. Why is that planet their favorite? What can they tell you about that planet? How would they describe it? On a piece of paper, have them design a "travel brochure" for that planet. How would they encourage people to visit that planet? What special, if not realistic, equipment would they use to visit that planet? What would they see on their voyage? What would they do? Encourage them to use their imagination to entice travelers to visit their favorite planet!

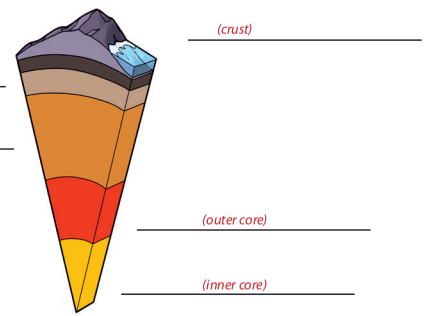
Day 4

BookShark Science G Experiments Book | #3 How Do Celestial Distances Compare? ■

Week 3 Activity Sheets

Eyewitness: Universe

1. Label the parts of the Earth's layered structure: (pp. 28–29)



(crust)

(outer mantle)

(inner mantle)

(outer core)

(inner core)

2. Oceans cover more than _____ % of Earth's surface: (pp. 28–29)

50 **60** **70** **80**

3. Fill in the blanks (not all of the words will be used): (pp. 28–29)

solar wind	**aurora**	**enigma**
trade winds	**magnetosphere**	**troposphere**

A protective barrier around the Earth called the _____*(magnetosphere)*_____ shields it from the Sun's radiation. Most of the _____*(solar wind)*_____ gets trapped by this barrier, but sometimes charged particles will pass through and create a beautiful light display called an _____*(aurora)*_____.

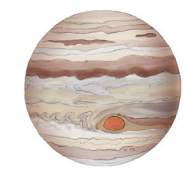
Week 3 Activity Sheets

4. Check all that are true about Mars: (pp. 30–31)

- [x] It is the most similar planet to Earth, but half the size, with seasons, an atmosphere, and polar ice caps.
- [ ] It has a protective magnetic field like Earth does.
- [x] Its surface has been explored more than any other planet besides Earth.
- [x] It has two small moons, Phobos and Deimos.
- [x] The largest of four volcanoes near its equator, Olympus Mons is almost three times higher than Mount Everest and has a crater 56 miles long.

5. Mark all the true statements of Jupiter: (pp. 32–33)

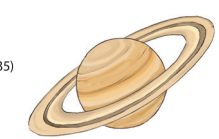
- [x] It is a gas giant, more massive than all the other planets put together.
- [x] Its hydrogen and helium atmosphere covers an ocean of liquid hydrogen.
- [x] It has been orbited by two space probes – *Galileo* in 1995 and *Juno* in 2016.
- [ ] It has a Great Red Spot which is a frozen iron lake.
- [x] Galileo Galilei was one of the first to see Jupiter's four largest moons.



6. Match the names of these moons to their description: (pp. 32–33)

Europa	Colorful moon covered with sulfur from its many volcanoes
Ganymede	Has an icy surface covered with craters
Io	The biggest moon in the solar system with icy surface
Callisto	Grooves and ridges crisscross its frozen surface which covers a deep ocean of water

7. Circle **True** or **False** : Saturn is mainly composed of hydrogen and helium with a rocky core, and is so light that it would float on water. (pp. 34–35)



Week 3 Activity Sheets

8. Fill in the blanks (not all of the words will be used): (pp. 34–35)

liquid	**sixth**	**tilted**	**clouds**
storms	**gases**	**straight**	**second**
high		**slow**	

Saturn is the ___(sixth)___ planet from the Sun and the ___(second)___ largest planet. Its axis is ___(tilted)___ so we see its rings at various angles while it orbits the sun. The bands in Saturn's atmosphere are streams of ___(gases)___ which travel at ___(high)___ speeds in opposite directions, creating ___(storms)___.

9. Match the name of these moons to their unique characteristics: (pp. 34–35)

Enceladus	the second largest moon in the solar system (after Ganymede) and bigger than Mercury, with cold conditions
Titan	has the brightest surface of any object in the solar system, and is covered in fresh snow

10. Circle the correct answer: Which astronomer discovered Uranus in 1781? (pp. 36–37)

Edwin Hubble **Carl Sagan** **(William Herschel)**

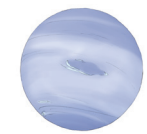
11. What causes some regions of Uranus to experience winter for up to 21 years during its orbit around the Sun? (pp. 36–37)

- ☐ Its many moons impact the level of sunlight it receives.
- ☒ Its axis is tipped over at an extreme angle of 98 degrees and it has a slow orbital speed around the sun (84 years).
- ☐ The methane atmosphere affects the seasons.
- ☐ The warm oceans beneath the cold gas atmosphere create extreme temperature changes.

Week 3 Activity Sheets

12. Fill in the blanks (not all of the words will be used): (pp. 36–37)

methane	**larger**	**Triton**	**billion**
storm	**clouds**	**million**	**nitrogen**
frozen	**smaller**		**geysers**



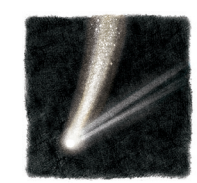
Neptune is 1 ___(billion)___ miles from Uranus, and slightly ___(smaller)___. Its atmosphere has bright ___(clouds)___ and dark ___(storm)___ regions. Neptune is bluer than Uranus because it contains more ___(methane)___. The largest of its 14 moons is ___(Triton)___ which is covered with ___(frozen)___ gases but has active ___(geysers)___ inside that spurt nitrogen gas and dust.

13. Match the term to its description: (pp. 38–39)

Meteorite	Smaller icy body that orbits the Sun on the edge of the solar system.
Meteor	A meteoroid that enters Earth's atmosphere and hits the ground.
Comet	A large rocky body that orbits the Sun.
Meteoroid	A meteoroid or "shooting star" that enters Earth's atmosphere and burns up before reaching the ground.
Asteroid	Small rocky chunks of asteroids or comets that travel through space.

14. Circle the correct answers to complete this statement: The largest asteroid is **Pluto** / **(Ceres)**. It is less than **(⅓)** / **¾** the size of the Earth's Moon. (pp. 38–39)

15. Check all that are true about comets: (pp. 40–41)



- ☒ They are huge chunks of icy debris on the edge of the solar system.
- ☒ They remain invisible until traveling closer to the Sun where they begin to glow, forming large heads and tails.
- ☒ Their tails can stretch for millions of miles.
- ☒ They orbit the Sun just like planets, but from any direction.
- ☒ Comet Hale–Bopp of 1997 is the brightest comet of recent decades.
- ☒ Most come from the Oort Cloud and Kuiper Belt.
- ☐ Comets are solid ice and firmly held together.

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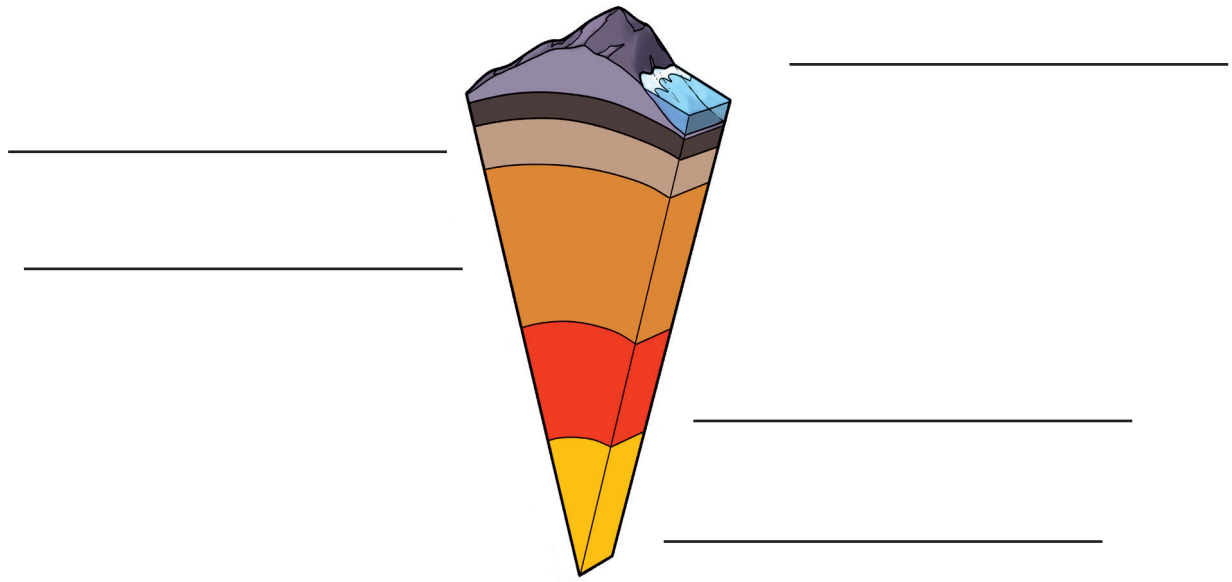
Week 3 Activity Sheets

Eyewitness: Universe

1. Label the parts of the Earth's layered structure: (pp. 28–29)



2. Oceans cover more than _____ % of Earth's surface: (pp. 28–29)

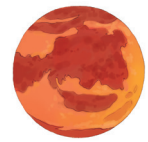
50 **60** **70** **80**

3. Fill in the blanks (not all of the words will be used): (pp. 28–29)

solar wind	**aurora**	**enigma**
trade winds	**magnetosphere**	**troposphere**

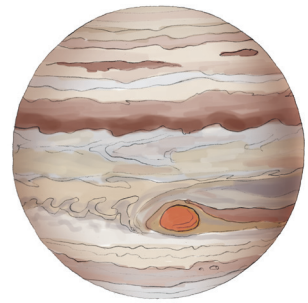
A protective barrier around the Earth called the _____ shields it from the Sun's radiation. Most of the _____ gets trapped by this barrier, but sometimes charged particles will pass through and create a beautiful light display called an _____.

4. Check all that are true about Mars: (pp. 30–31)



- ☐ It is the most similar planet to Earth, but half the size, with seasons, an atmosphere, and polar ice caps.
- ☐ It has a protective magnetic field like Earth does.
- ☐ Its surface has been explored more than any other planet besides Earth.
- ☐ It has two small moons, Phobos and Deimos.
- ☐ The largest of four volcanoes near its equator, Olympus Mons is almost three times higher than Mount Everest and has a crater 56 miles long.

5. Mark all the true statements of Jupiter: (pp. 32–33)

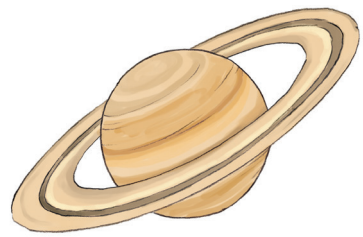


- ☐ It is a gas giant, more massive than all the other planets put together.
- ☐ Its hydrogen and helium atmosphere covers an ocean of liquid hydrogen.
- ☐ It has been orbited by two space probes – *Galileo* in 1995 and *Juno* in 2016.
- ☐ It has a Great Red Spot which is a frozen iron lake.
- ☐ Galileo Galilei was one of the first to see Jupiter's four largest moons.

6. Match the names of these moons to their description: (pp. 32–33)

Europa •	• Colorful moon covered with sulfur from its many volcanoes
Ganymede •	• Has an icy surface covered with craters
Io •	• The biggest moon in the solar system with icy surface
Callisto •	• Grooves and ridges crisscross its frozen surface which covers a deep ocean of water

7. Circle **True** or **False** : Saturn is mainly composed of hydrogen and helium with a rocky core, and is so light that it would float on water. (pp. 34–35)



8. Fill in the blanks (not all of the words will be used): (pp. 34–35)

liquid	**sixth**	**tilted**	**clouds**
storms	**gases**	**straight**	**second**
high		**slow**	

Saturn is the _____ planet from the Sun and the _____ largest planet. Its axis is _____ so we see its rings at various angles while it orbits the sun. The bands in Saturn's atmosphere are streams of _____ which travel at _____ speeds in opposite directions, creating _____.

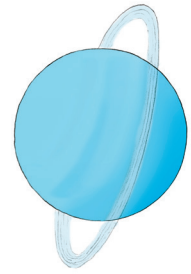
9. Match the name of these moons to their unique characteristics: (pp. 34–35)

Enceladus •	• the second largest moon in the solar system (after Ganymede) and bigger than Mercury, with cold conditions
Titan •	• has the brightest surface of any object in the solar system, and is covered in fresh snow

10. Circle the correct answer: Which astronomer discovered Uranus in 1781? (pp. 36–37)

Edwin Hubble **Carl Sagan** **William Herschel**

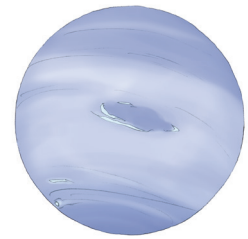
11. What causes some regions of Uranus to experience winter for up to 21 years during its orbit around the Sun? (pp. 36–37)



- ☐ Its many moons impact the level of sunlight it receives.
- ☐ Its axis is tipped over at an extreme angle of 98 degrees and it has a slow orbital speed around the sun (84 years).
- ☐ The methane atmosphere affects the seasons.
- ☐ The warm oceans beneath the cold gas atmosphere create extreme temperature changes.

12. Fill in the blanks (not all of the words will be used): (pp. 36–37)

methane	**larger**	**Triton**	**billion**
storm	**clouds**	**million**	**nitrogen**
frozen	**smaller**		**geysers**



Neptune is 1 _____ miles from Uranus, and slightly _____. Its atmosphere has bright _____ and dark _____ regions. Neptune is bluer than Uranus because it contains more _____. The largest of its 14 moons is _____ which is covered with _____ gases but has active _____ inside that spurt nitrogen gas and dust.

13. Match the term to its description: (pp. 38–39)

Meteorite •	• Smaller icy body that orbits the Sun on the edge of the solar system.
Meteor •	• A meteoroid that enters Earth's atmosphere and hits the ground.
Comet •	• A large rocky body that orbits the Sun.
Meteoroid •	• A meteoroid or "shooting star" that enters Earth's atmosphere and burns up before reaching the ground.
Asteroid •	• Small rocky chunks of asteroids or comets that travel through space.

14. Circle the correct answers to complete this statement: The largest asteroid is **Pluto** / **Ceres** . It is less than **⅓** / **¾** the size of the Earth's Moon. (pp. 38–39)

15. Check all that are true about comets: (pp. 40–41)

- ☐ They are huge chunks of icy debris on the edge of the solar system.
- ☐ They remain invisible until traveling closer to the Sun where they begin to glow, forming large heads and tails.
- ☐ Their tails can stretch for millions of miles.
- ☐ They orbit the Sun just like planets, but from any direction.
- ☐ Comet Hale–Bopp of 1997 is the brightest comet of recent decades.
- ☐ Most come from the Oort Cloud and Kuiper Belt.
- ☐ Comets are solid ice and firmly held together.