



God Made **THE WORLD**

Science/Worldview | 5-7 Grade

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Generations
PASSING ON THE FAITH

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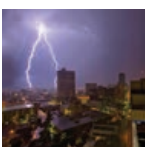
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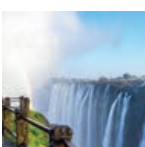
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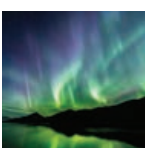
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Haifoss Waterfall, Iceland

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Introduction

FOR THE PARENT AND TEACHER



This course is intended to produce a paradigm shift in the way the present generation of Christian children understand science. Differing worldviews will inevitably yield radically different approaches to science. Methods of study, purposes of study, and the content of study will vary greatly depending on one's presuppositions and beliefs. A biblical worldview perspective of science will always place God at the center. God is personal, and He is the source of all creation. His fingerprints are seen everywhere throughout this wide world. All knowledge of His creation will inevitably, constantly reveal His power and glory unless great pains are taken to willfully and continually suppress these.

God's attributes shine brilliantly in His created world. Thus, the reader will find this text always delighting in the revelation of God's genius, wisdom, power, and goodness everywhere manifest in creation. Science provides us a perfect opportunity to maximize on the great purpose for all of life. Indeed, the purpose of science is to enjoy God in the context of His creation and to praise Him for His marvelous works!

The study of science is deeply personal because it is revelatory of the personality of God. The pieces of His creation are not random accidents in a

chance universe! They are the careful design of a personal, loving, wise, and all-powerful Creator! This knowledge should inspire the student to become fully engaged while rejoicing, delighting, praising God, and thanking Him for the awesomeness and manifold blessings of His creation!

Throughout this course, we glory in the incomparable wisdom of God! With effervescent delight, we inform the student of the bounds of human knowledge in respect to the atom, nature's forces, the nature of light, black holes, and a hundred other mysteries of the universe. We are not afraid to say that we can't explain this or that. We cheerfully inform the student that the greatest scientists in the world cannot begin to comprehend the deep mysteries of God's wisdom in His creation. We fall on our faces in awe-filled worship! This is the only way to avoid the academic pride, scientific hubris, and lack of the fear of God that has ruined science and education in our humanist age.

This course also provides extensive devotional reading from Scripture throughout its text, for all Christian education must retain the Word of God as "a frontlet" before our eyes and our children's eyes (Deut. 6:7-9). We offer many opportunities for prayer and the singing of praise. These elements are core to a Christian view of science. As the teacher/parent disciples the child in the study of God's creation, we hope and pray that the student will form a Godward view of science and all of life.

If education is to be truly effective, the student must be constantly informed of the vital importance and objective of the study. Hardly a page of text should go by without the student realizing the high significance and purpose of what he is studying. For the Christian, the purpose of science is absolutely clear. Studying God's works in creation should lead us to praise and worship Him and to take proper dominion as good stewards over God's world. We glory in His nature and His works, and we seek to fulfill our role in ruling over the natural world (as the Lord commanded man to do at the beginning).

Perpetually spewing out disconnected and purposeless facts to be gathered into a child's brain does little for retention. However, if a clear integration of praise and life application is found on every page, the material will be much better retained. When science instruction is given meaning and purpose on every page of text and in every minute of the class, the student will be much more likely to retain the material and apply it in a meaningful way in his life.

The “Do” sections contained at the end of each chapter are not intended to serve as typical “laboratory” experiences or hypothetical exercises. Rather, they are intended to serve as real-life application of the science conveyed in each chapter. We want the students to actually practice the science they learn for the real benefit of their family, their community, and their personal economy. Although many of the practical projects suggested are simple and easy, we would recommend taking on only one *major* project for the academic year. Teacher and parent involvement is highly recommended for these projects.

For 5-7 grade students, Generations here introduces a biblical worldview into basic astronomy, chemistry, and physics in the most winsome way possible. Captured in this introduction to science are the most amazing facts and the most interesting facets of God's creation. Efforts are made to explain difficult concepts at a 10-12-year-old level without losing the substance of the scientific meaning. Our goal is to create a work in which not a single paragraph is uninteresting, vague, or overly complex.

This text introduces naturally occurring, providential events such as earthquakes, volcanoes, tornadoes, and hurricanes. Yet the goal is always to point the student back to our sovereign God in right reverence and worship. Then we offer helpful, relevant, and interesting life (and spiritual) applications for each disastrous scenario—preparing each young student to respond rightly in faith, wisdom, and faithful stewardship to these awe-inspiring acts of God.

Tian Shan Mountain Range, Asia





Chapter 1

GOD'S WORKS ARE AWE-INSPIRING!



The works of the LORD are great, studied by all who have pleasure in them. (Psalm 111:2)

An ant crawls across a great work of art. The beautiful painting hangs in an art museum in Paris, France. The people who have come to the museum to see the art are amazed at the works of art. But the ant doesn't consider the beauty of the art, nor does he think about the artist who painted the piece. He does not appreciate the great work and he is definitely not amazed by it.

When you look around at God's world, do you act like the ant in the art museum? Do you observe God's amazing creation, and fail to enjoy it? Do you stand back in awe and amazement at the great work of art that God has produced?

God made this world, and He takes care of His world. What you see all around you are the works of God. He made all of this. The works of God are not very great for those who will not study them. Some people are bored when they study the creation because they are not delighting in them. First, we must study God's world. Because we love God and we can see His handiwork all around us, we will delight in all of it.

Now, we shall study God's world and delight in it throughout this book. We do love God, and we want to learn more about Him and His wonderful works. We want to see His hand in this world.



Logs in a Pine Forest

The study of God's world takes time. If we are interested in all that He has done, we will take the time to study them. These investigations also call for focus. We cannot be easily distracted with other things. You will not see the beauty of God's creation, or the complex nature of it, or the many features of it, unless you study it for a long time.

Some children study their science lessons just so they will pass the test. Or, they study science because their mothers told them to. They are not very interested in God's amazing world. But that is not the way that we will study the creation. We will study it, until we see the wonder of it. Then, we will praise God for it.

This is My Father's World

The earth is the LORD's, and all its fullness, the world and those who dwell therein. For He has founded it upon the seas, and established it upon the waters. (Psalm 24:1-2)

God made the world. He made everything on this earth, and everything in the sky. He lightened up our whole world with the sun and the moon. He created oceans, lakes, rivers, mountains, water, air, oil, sandstone, and dirt—plenty of materials to take care of us on this earth. He gave us plenty of wood so we could build things for our own use. Man

builds houses. He makes tables and chairs, but God makes the wood from which man builds things. The wood is called **raw material**. God made all the raw material in the universe. This is called “God’s work of creation.”

God made all the materials you see around you. Take a look at yourself. Look at your hands and feet. God made your hands so you can pick up things quite easily. He made your eyes so that you can see the things that you are picking up. He made your mind so you can think about what you are going to pick up next. The

most complicated and the most wonderful creation in this world is man—you, your family, and your friends.

God makes life—plant, animal, and human life. He brings new life into the world when babies are born.

The Days of Creation

In the beginning God created the heavens and the earth. (Genesis 1:1)

The first chapter in Genesis tells us how God created the world and



View of Earth from the Moon

everything within it in six days.

Creation Day 1 (Genesis 1:1-5)

God created the heavens and the earth. The heavens mean space outside of the material earth. The earth is the globe with some sort of matter.

Creation Day 2 (Genesis 1:6-8)

God created the sky with clouds and moisture in the air.

Creation Day 3 (Genesis 1:9-13)

God created dry land and the oceans. God made all plant life.

Creation Day 4 (Genesis 1:14-19)

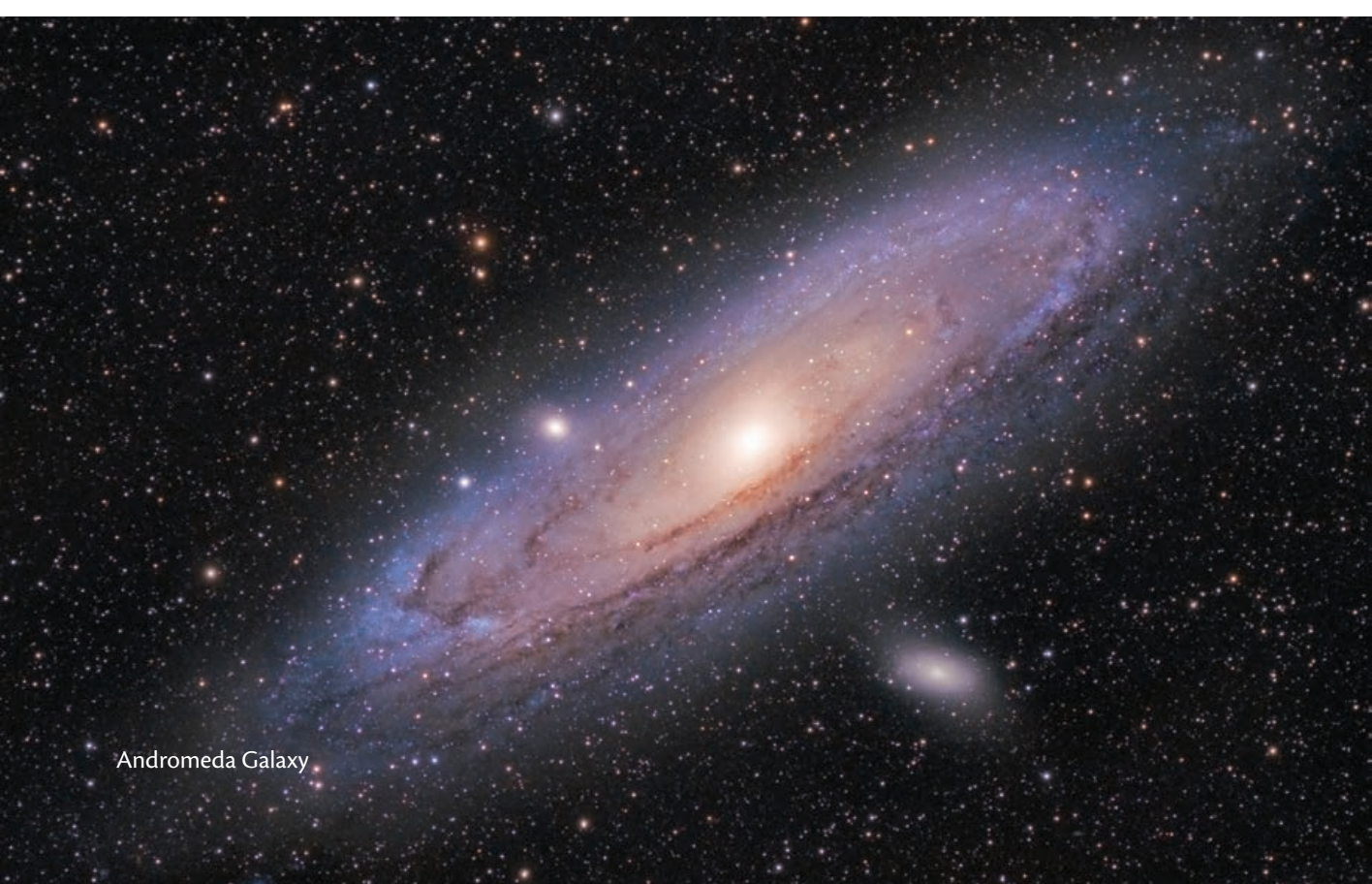
God created the moon, the sun, and the stars in the sky.

Creation Day 5 (Genesis 1:20-23)

God made fish, birds, and flying insects. He gave these animals the ability to reproduce (or have babies).

Creation Day 6 (Genesis 1:24-31)

God created all the animals that live on dry land. And finally, God made man in His own image.



Andromeda Galaxy

In this study, we will look at the non-living things which God made during the first four days of creation.

God's Creation is More Amazing Every Year We Study It

Praise the LORD!

Praise the LORD from the heavens;

Praise Him in the heights!

Praise Him, all His angels;

Praise Him, all His hosts!

Praise Him, sun and moon;

Praise Him, all you stars of light!

Praise Him, you heavens of heavens,

And you waters above the heavens!

Let them praise the name of the LORD,

For He commanded and they were created.

He also established them forever and ever;

He made a decree which shall not pass away.

(Psalm 148:1-6)

What can we say about all of these things God has made? We find that so much of this world is beautiful. We find that His creation is useful. As we study God's creation, we learn that it is very complicated. Some **scientists** have studied the human body for sixty years, and they still do not understand it very



Milky Way Galaxy

well. Over thousands of years, men have studied the human body, but there is still so much more to learn. This means that God is very smart. He is all wise.

It took a long time for man to learn about the universe. A Greek scientist named Democritus suggested that the stars in the night sky might be thousands of suns making up a galaxy. This we know as the Milky Way. Two other galaxies separate from the Milky Way were discovered around 1000 AD, fully 5,000 years after God created the world. By 1920, **astronomers** thought the universe was only 30,000 light years across. Still at this time these modern scientists thought there was only one galaxy in the sky—our

Milky Way.¹ After the development of radio telescopes and other instruments, scientists have learned much more about the universe. Now, they say that the universe is millions of times larger than they thought it was 100 years ago. You can only see about 2,500 stars from our galaxy by your own eyes. Scientists tell us they have found between 100 and 300 billion stars in the Milky Way. By 1960, astronomers had found 30,000 galaxies. But now they tell us there are between 100 billion and 1 trillion galaxies in the sky.

We have learned that the universe is far bigger, far more awe-inspiring than we thought it was 100 years ago. Sadly, many astronomers do not give God the glory anymore. They have learned so much more about God's awesome universe, but they do not praise Him. In a survey done with these astronomers, 71% of them say that they do not believe in God. Among the general public in America, only 17% would say that they do not believe in God.²

Everything belongs to God. He lends His materials to us for a while. We want to

use them for good purposes. He wants us to take good care of His world. He wants us to make helpful things out of the things which He has made. Sometimes, people who own businesses will hire men to take care of the business for them. These are called **stewards**. God has appointed us as stewards to take care of His world.

God's Works of Providence

For by [the LORD Jesus] all things were created that are in heaven and that are on earth, visible and invisible, whether thrones or dominions or principalities or powers. All things were created through Him and for Him. And He is before all things, and in Him all things consist. (Colossians 1:16-17)



About 6,000 years ago, God created the world in six days. He made the earth, the oceans, the sun, moon, and stars, the plants, animals, and humans. He made it all out of nothing. We make chairs and tables out of wood, but God made the whole world out of nothing. This shows the amazing power and wisdom of God.

Now, God did not create the world and leave it alone. He is still very involved with this world. He takes care of this world by what we call “God’s Works of **Providence**.” God brings about changes in His creation. About 4,500 years ago, He brought a worldwide flood that changed the whole surface of the world. The mountains and the valleys, the rivers and the plains were formed by the worldwide flood.

When you blow on a lighted match, you cause a little wind to blow out the flame. God causes the winds to blow all around the earth. He brings big storms and earthquakes. When you throw dice on a game board, God causes the dice to turn over a certain number of times.

He determines the roll of the dice, whether the outcome is a two or a six.

God is in control of everything that happens in the world. When a sparrow falls to the ground, God has made sure



Noah's Ark and the Worldwide Flood

that it happens. He takes care of every part of His creation. Everything turns out exactly the way He wants it to be.

The lot is cast into the lap, but its every decision is from the LORD. (Proverbs 16:33)

Are not two sparrows sold for a copper coin? And not one of them falls to the ground apart from your Father's will. But the very hairs of your head are all numbered. Do not fear therefore; you are of more value than many sparrows. (Matthew 10:29-31)

Most importantly, God takes care of us. He makes sure that enough rain falls

on the fields each year to provide food for 7 billion people in the world. He is especially careful to watch out for His own children—those who do His will and love His Son.

Why God Made the World

For of Him and through Him and to Him are all things, to whom be glory forever. Amen. (Romans 11:36)

The twenty-four elders fall down before Him who sits on the throne and worship Him who lives forever and ever, and cast their crowns

**before the throne, saying:
“You are worthy, O LORD,
To receive glory and honor and power;
For You created all things,
And by Your will they exist and were created.”
(Revelation 4:10-11)**

Why did God make you and all things? God made the world for His own glory. Everything is for His glory. Everything that happens in the world will display God’s glory.

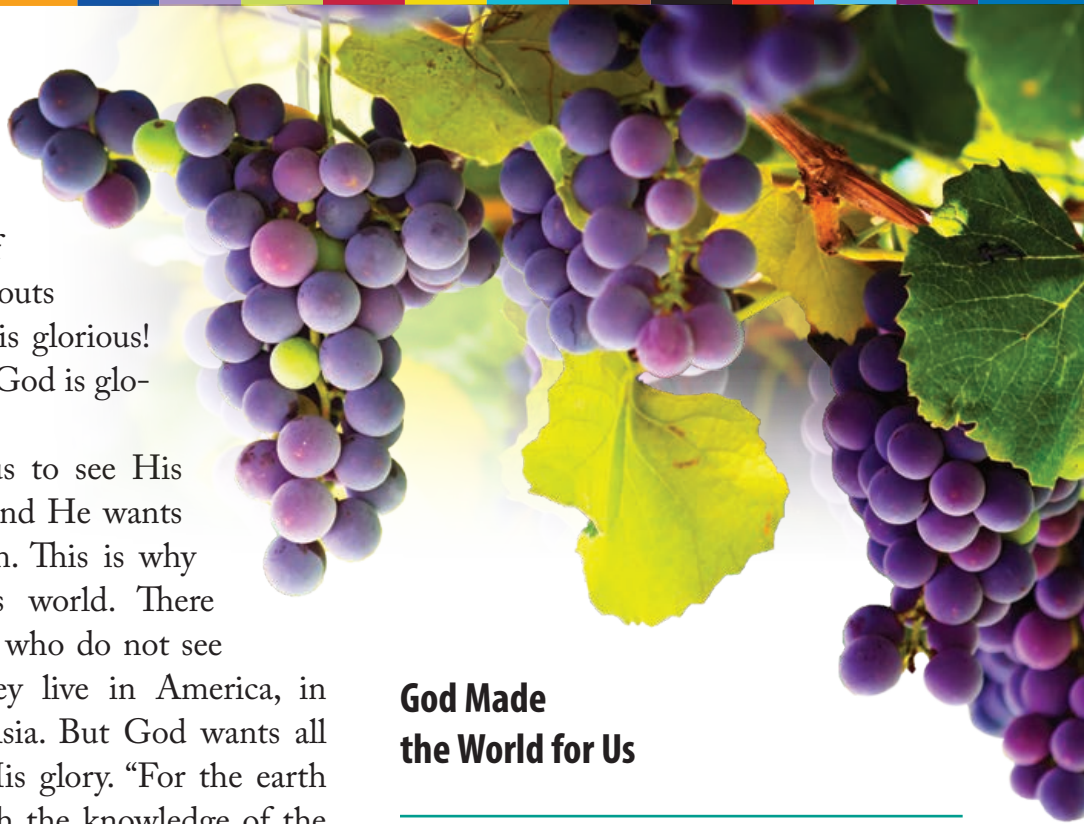
Psalms 19 says that the “heavens declare the glory of God and the firmament shows His handiwork.” All of



God's creation speaks to us. It is teaching us about God. All of God's creation shouts out to us, "God is glorious! God is glorious! God is glorious!"

God wants us to see His glorious works, and He wants us to praise Him. This is why we study God's world. There are many people who do not see God's glory. They live in America, in Africa, and in Asia. But God wants all peoples to see His glory. "For the earth will be filled with the knowledge of the glory of the LORD, as the waters cover the sea" (Habakkuk 2:14).

Why do you study God's world? Of course, it is to give God the glory for it. We see the great power of God, who made the strong, warm sun. We see the wisdom of God who created the beautiful butterfly to fly so gracefully through the air. We see the goodness of God in all the plants that yield food for us to eat. Then, we thank Him for all of that. We sing songs of praise to Him because He deserves our praise.



God Made the World for Us

And God said, "See, I have given you every herb that yields seed which is on the face of all the earth, and every tree whose fruit yields seed; to you it shall be for food."
(Genesis 1:29)

[The LORD] causes the grass to grow for the cattle,
And vegetation for the service of man,
That he may bring forth food from the earth,
And wine that makes glad the heart of man,
Oil to make his face shine,
And bread which strengthens man's heart.
(Psalm 104:14-15)

God also made the world for man's use. He gave us plants and trees for our enjoyment and for food. He wants us to build things out of the trees, dirt, and rocks. He wants us to make medicine out of the plants. He wants us to make grape juice out of grapes, and orange juice out of oranges. He wants us to make glass out of sand. Then, He wants us to give Him thanks for all of these good things.

You will soon discover that the creation is very complicated, especially as you study the tiniest parts that make up the world. We can learn more and more about all the things our Creator has made. This is what God wants us to do. We cannot take just one look at God's creation and then figure it all out. We have to study it carefully. We must apply our minds to this task. Some call this **science**. We describe God's world. We identify certain differences between the various things God makes, and we give them all names. We notice that the wind causes the trees, the branches, the leaves, and the grass of the field to sway and jiggle. By watching these things, we learn about the cause (the wind) and the effect (the movement of the leaves). God wants us to study His world. It is a very honorable thing to do so.

**"It is the glory of God to conceal a matter,
but the honor of kings to find it out."
(Proverbs 25:2)**

How to Be a Good Scientist

**The words of Agur the son of Jakeh. . .
Surely I am more stupid than any man,
And do not have the understanding of a man.
I neither learned wisdom
Nor have knowledge of the Holy One.
Who has ascended into heaven, or
descended?
Who has gathered the wind in His fists?
Who has bound the waters in a garment?
Who has established all the ends of the earth?
What is His name, and what is His Son's name,
If you know? (Proverbs 30:1,2-4)**

Old Agur, the man who recorded these words in Proverbs 30, was a good scientist. He records things he has learned about the world and wisdom. From this man, we learn the most important mark of a good scientist.

1. **Be humble.** First of all, as we study God's world, we must be very humble.

Sometimes, smart people will become proud of what they know. But this must never be the case for us. In comparison to God, we are very stupid. We do not know very much. We must not brag about what we know. God never makes mistakes, but we often do make mistakes. We are often wrong in our thinking. We only know a small part of what there is to know.

2. **Open your eyes and look at something for a long time.** Look at different parts of what you are looking

at. Try to get a closer look at it. Use a magnifying glass or a microscope. Use a telescope to look at things very far away. Take things apart if you can, and look at each piece.

3. **Write down or draw out what you see.** Describe it. What is its color? What is its shape? Use names to identify the different things that you see. What is its function? How does it work?
4. **Make guesses and draw conclusions.** Remember, you cannot be sure of your



first guesses. Do not become proud of what you have learned.

5. **Test your guesses.** Be willing to change your mind when you discover that you were wrong about some of the guesses you made.

The best scientist is the one who is humble and fears the Lord. He is curious. He explores the world with an excited anticipation. He is never tired of seeing the beauty and the amazing design in

God's world. He is always praising God, the great Creator of all these things. ■

**I will bless the LORD at all times;
His praise shall continually be in my mouth.
My soul shall make its boast in the LORD;
The humble shall hear of it and be glad.
Oh, magnify the LORD with me,
And let us exalt His name together.
(Psalm 34:1-3)**



Pray

- Thank God for all that He has created. Look around you and find five things that He has created and praise Him for them.
- Pray that God would open your eyes to see the wonders of His creation.
- Pray that you will find great delight in this study, that you would look forward to exploring God's world.

Sing

Doxology

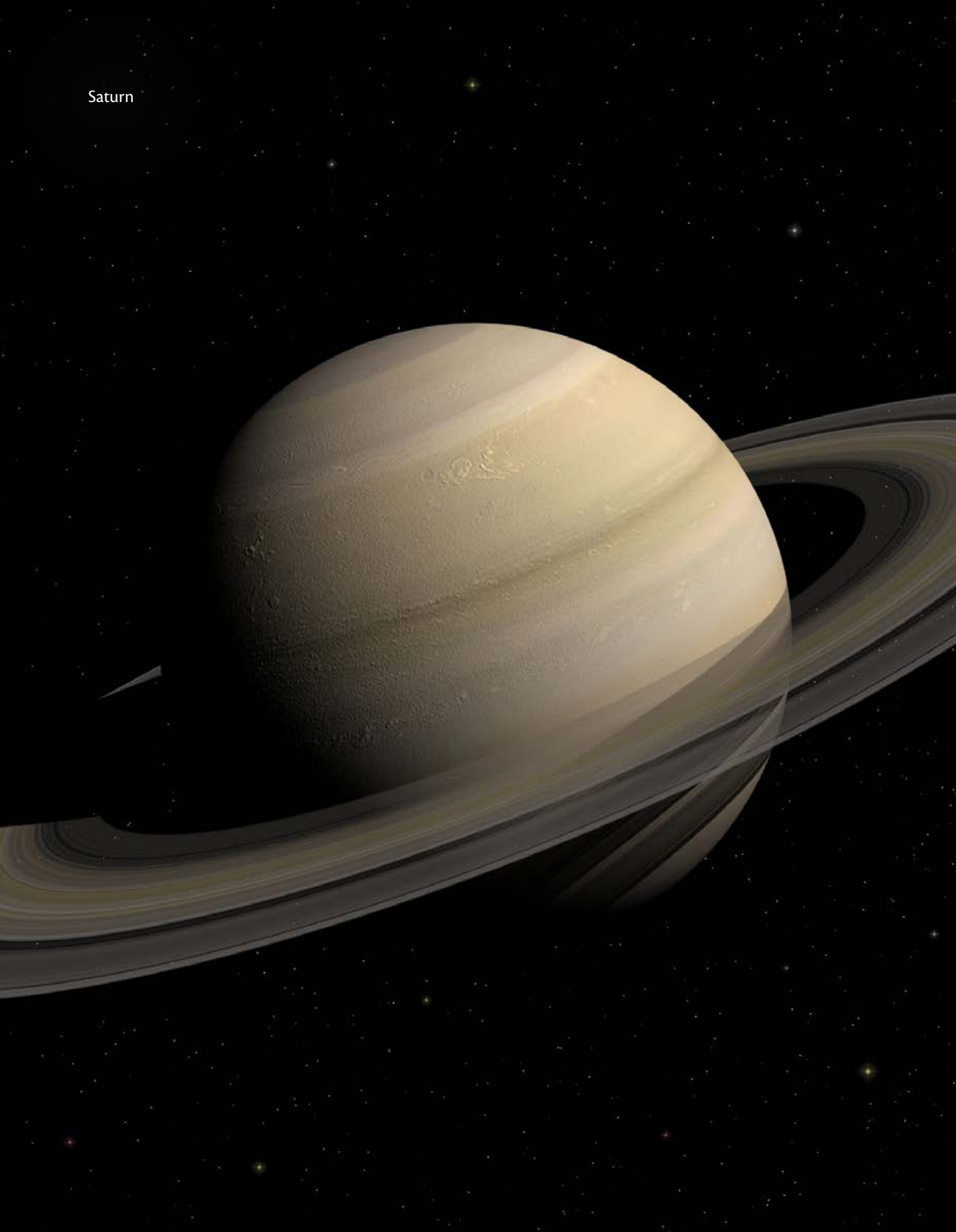
Praise God, from whom all blessings flow;
Praise Him, all creatures here below;
Praise Him above, ye heav'nly host;
Praise Father, Son, and Holy Ghost!

If you do not know the hymn, you may listen to a version of the hymn on the Internet, with supervision, and sing along with it.

Watch

To watch the recommended videos for this chapter, go to generations.org/GodMadeTheWorld and scroll down until you find the video links for Chapter 1. Our editors have been careful to avoid films with references to evolution. However, we would still encourage parents or teachers to provide oversight for all internet usage. These videos may not give God the glory for His amazing creative work, so the student and parent/teacher should respond to these insights with prayer and praise.

Saturn





Chapter 2

GOD MADE GLORIOUS SIGHTS



The heavens declare the glory of God; and the firmament shows His handiwork. Day unto day utters speech, and night unto night reveals knowledge. There is no speech nor language where their voice is not heard. Their line has gone out through all the earth, and their words to the end of the world. (Psalm 19:1-3)

On the fourth day of creation, God made the sun, the moon, and the stars. The sun sits right in the middle of what we call our “solar system,” and the earth revolves around the sun. He probably made the other planets which revolve around the sun on the same day. These planets are gigantic bodies of mass, made up of gases, rock, silicon, iron and other metals. Men have taken rocket ships to our moon since 1959, and man’s first visit to the moon happened on July 20, 1969. This manned

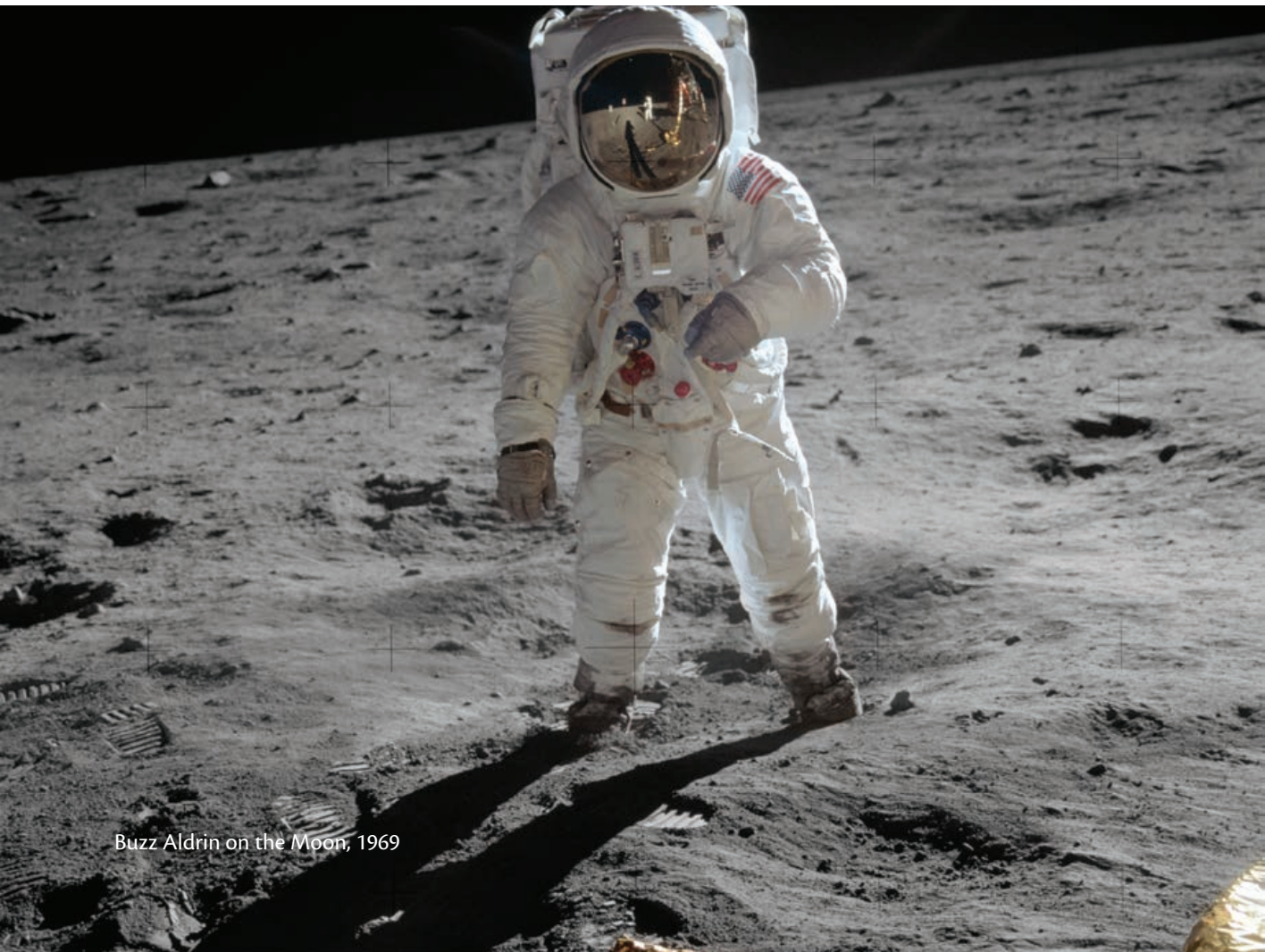
Heavenly Bodies	Spacecraft Landings
The Earth’s Moon	47 times since 1959
Venus	15 times since 1966
Mars	14 times since 1971
Mercury	One crash landing in 2015
Saturn’s Moon Titan	One landing in 2005

flight to the moon was called Apollo 11, with the crew of Americans named Neil Armstrong, Michael Collins, and Edwin E. Aldrin, Jr. As of 2020, man has been able to land on the planets and moons listed in the chart on the previous page.

For 6,000 years, man could see some of the planets close to the earth as just tiny lights glimmering in the sky. It has only been in the last sixty years that man has

verified the existence of these heavenly bodies by visiting them and sending back video recordings. Our earth is huge. But now, scientists have verified that there are even larger planets than ours, hundreds of millions of miles from earth.

Scientists have learned one thing by many hundreds of years of investigations. God made a huge universe. We still do not know the size of this very big universe.



Buzz Aldrin on the Moon, 1969

Our Creator God made one gigantic sun for us. He made all of the stars to shine brightly throughout the entire universe. They shine with immense power. The size of the universe and its powerful energy is truly spectacular. It is overwhelming to think about it. And all of this gives us only a tiny peak into the immense, all-powerful energy of God Himself. All praise be to God for His great, unlimited power and might!

Therefore David blessed the LORD before all the assembly; and David said:
“Blessed are You, LORD God of Israel, our Father, forever and ever.
Yours, O LORD, is the greatness,
The power and the glory,
The victory and the majesty;
For all that is in heaven and in earth is Yours;
Yours is the kingdom, O LORD,
And You are exalted as head over all.
Both riches and honor come from You,
And You reign over all.
In Your hand is power and might;
In Your hand it is to make great
And to give strength to all.”
(1 Chronicles 29:10-12)

How Big is God’s Universe?

This is a big question. The simple answer is that we don’t know. We cannot see to the end of it, even with the best telescopes. The size of the universe is a mystery that only God knows. He Himself is infinitely more immense than the universe itself, and the universe He created is a testimony to His infinity. We are humbled. We are in awe of God, as we look in wonder at the sheer hugeness of His universe!

Scientists have guessed that the universe is 28 billion **light-years** from one end to the other. Some believe that the universe is 250 times larger than that, or about 7 trillion light-years from end to end. How big is a light-year? That’s the distance light will travel in a year, and light travels very fast—286,000 miles per second. If you were to climb into a rocket and travel at 286,000 miles per second or 1,030,000,000 miles per hour, it would take you a year to travel one light-year.

Let’s put this another way. Let us say that the whole earth is just one little dot. The first star (which would be our sun) would be 3,673 feet away from us.

A **galaxy** is a collection of billions of stars, tons of dust, and gases that hang



together in one area of the universe by a force called **gravity**. We live in a galaxy called the **Milky Way**. Our sun is only one star in that Milky Way, out of 250 billion stars (or suns).

Our earth is pretty big—about 8,000 miles wide. But suppose the earth were just a little dot on this page. Our sun would be 3,673 feet away from us. But, the edge of the Milky Way Galaxy would be 1,320,000,000 miles away from us.

The sun is about 92,000,000 miles from the earth. If you were to climb into a rocket ship and travel at 70 miles per

hour, it would take 150 years for you to arrive at the sun. Our best rocket ship can travel at 430,000 miles per hour. At this rate, you could get from New York City around the world to Beijing in one minute, or you could get to the moon in half an hour. But it would take you 210 hours in that rocket ship to make it to the sun. It would take 5,300 years to get to the next star. If you kept riding on the rocket ship, it would take 45 million years to get to the edge of the Milky Way Galaxy. That means, it is highly doubtful that humans will ever make it to another solar system.

In the foreseeable future of this world, man will never explore any other planets outside of this solar system. Should the end of the world come within the next thousand years, humans will never make it to another solar system. God created the earth for us, and He did not intend for us to live anywhere else (Psalm 115:16).

Now, our Milky Way is only one galaxy in a very large universe of at least 100 billion galaxies. Riding in our rocket ship at 430,000 mph, it would take 42 trillion years to reach as far as we can see of the outer reaches of the universe.

How big is this universe in reference to little you? If a pilot were to fly in an airplane over your town, it would be very hard to see you. You would be a tiny dot in your front yard.

Your whole city is a tiny dot on the map of the country where you live. Your country is only a tiny piece of the earth.

The earth is only a tiny dot from the vantage point of the sun. The earth could not be seen from the sun (our closest star) without a telescope.

From the edge of the Milky Way Galaxy, our sun is only a tiny dot which could not be seen in the mass of stars in our solar system.

Our solar system is only a tiny dot in the universe, almost impossible to see without a telescope from another galaxy. Now, how big are you in this universe?

**When I consider Your heavens, the work of
Your fingers,
The moon and the stars, which You have
ordained,
What is man that You are mindful of him,
And the son of man that You visit him?
(Psalm 8:3-4)**

Where We Live

We live about 92,000,000 miles away from the sun in the Milky Way Galaxy. We live on the planet earth, which is one of eight planets in our solar system. All of the planets in our solar system revolve around the sun. We call this a **solar system**, because the sun is the center of it, and the sun provides heat and light for the planets.

The **planets** in our solar system that we know about are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. Pluto is a Dwarf Planet, and so it is not included in the list of full-fledged planets. However, scientists believe there

is one more gigantic planet somewhere far out in our solar system, called **Planet X**.

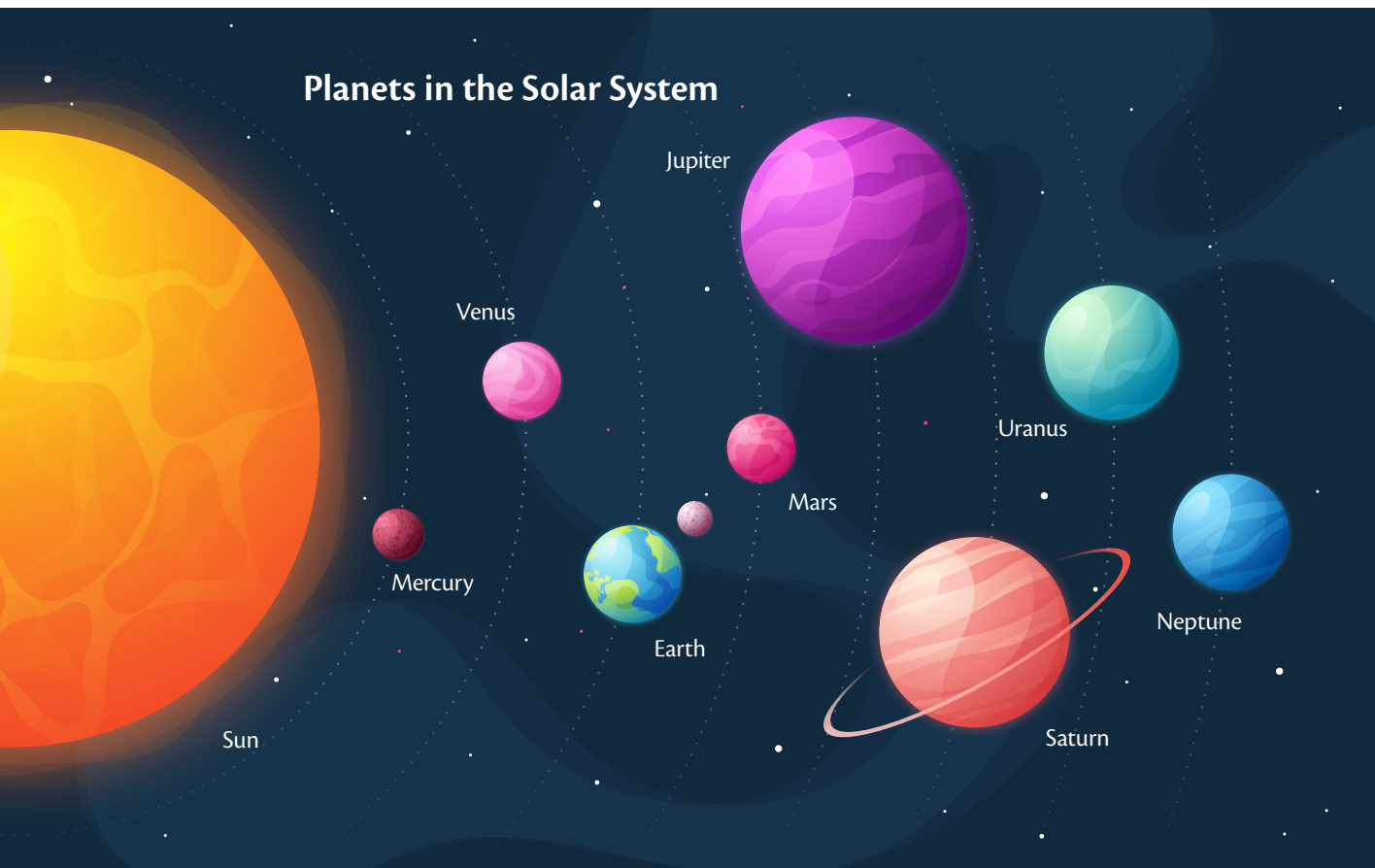
The planets which are closest to the sun are very hot, and the planets farther away from the sun are very cold. All planets rotate on an axis and revolve around the sun. The length of day depends on how long it takes for the planet to spin 360 degrees on an imaginary axis. The earth spins like a top, and people standing on the equator are spinning at 1000 miles per hour! Because God keeps the earth spinning at a constant rate, people don't even realize they are moving that fast. If

it came to a sudden stop, then everybody, your pets, your house, and your car would be flung out into the atmosphere.

The length of year for each planet depends on how long it takes for it to revolve around the sun.

The location of the planets is measured by the distance of the earth to the sun. So Jupiter is over four times further from the sun than the earth is from the sun.

What would it be like to work for 700 hours, and then take a 700 hour rest at night on Mercury? You would be all tired out after working 700 hours in a row!



Planet	Length of Day	Length of Year	Average Temperature	Proportionate Distance from Sun
Mercury	1,408 hrs	88 days	867 °F (464 °C)	.3
Venus	5,832 hrs	225 days	333 °F (167 °C)	.7
Earth	24 hrs	365 days	59 °F (15 °C)	1.0
Mars	25 hrs	687 days	-85 °F (-65 °C)	1.3
Jupiter	10 hrs	12 years	-166 °F (-110 °C)	4.4
Saturn	11 hrs	30 years	-220 °F (-140 °C)	9
Uranus	17 hrs	84 years	-319 °F (-195 °C)	19
Neptune	16 hrs	165 years	-328 °F (-200 °C)	45
Dwarf Planets	Length of Day	Length of Year	Average Temperature	Proportionate Distance from Sun
Ceres	9 hrs	4 years	-159 °F (-106 °C)	2.7
Pluto	153 hrs	248 years	-378 °F (-228 °C)	49
Haumea	4 hrs	285 years	-400 °F (-240 °C)	50+
Makemake	8 hrs	309 years	-405 °F (-243 °C)	50+
Eris	8 hrs	557 years	-414 °F (-248 °C)	50+

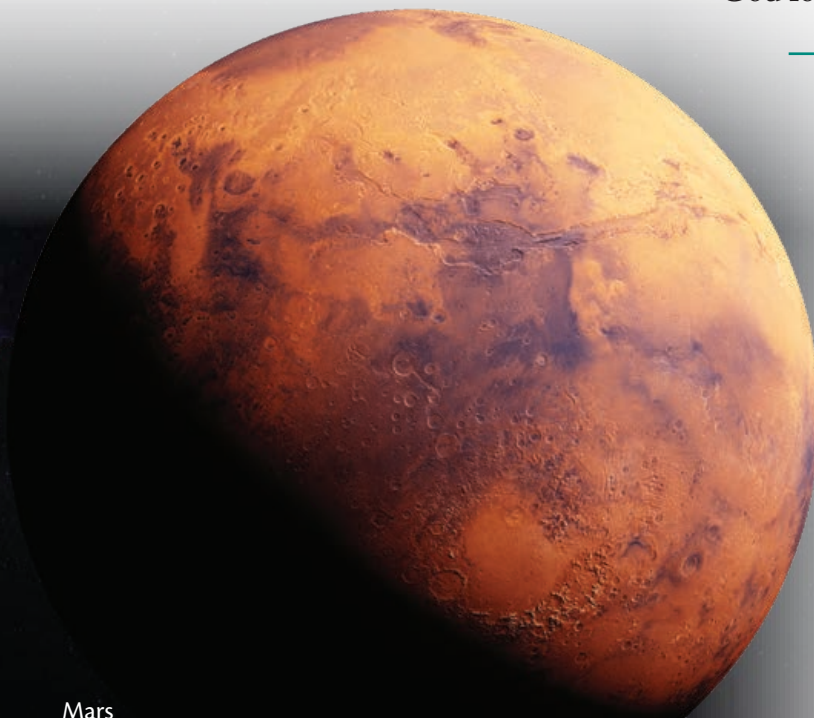
Would you want to go through a 343 day fall and winter on Mars? The average temperature of 333 °F (167 °C) on Venus would be way too hot for human life. How would like to live in an oven at 333 °F (167 °C) every day?

There are so many different reasons why this planet is the perfect location for us. It's neither too hot or too cold for growing things. A full 32% of the earth's surface grows vegetation. There is sufficient water, neither too much or too little—plenty of room for billions of people to live and to grow food. The earth's surface includes plate tectonics

that regulates the temperature for us. The earth is just the right size to maintain just enough atmosphere that it doesn't get too hot for us. There's a lot of debris in space, including asteroids which could get pulled into the earth's gravity and create huge explosions on the earth. But our "big brother" planet Jupiter collects a large amount of this debris for us, keeping us safe. In fact, a huge asteroid belt between Jupiter and earth contains about two million asteroids from 0.6 to 293 miles in diameter/width. A 60-mile-wide asteroid would destroy all life on earth.

God made a planet for us that would be just the right place for life. Let us praise God for His goodness to man!

**For thus says the LORD,
Who created the heavens,
Who is God, Who formed the
earth and made it,
Who has established it,
Who did not create it in
vain, Who formed it to be
inhabited:
"I am the LORD, and
there is no other."
(Isaiah 45:18)**



Mars

How Big and Powerful Are the Stars?

For all the gods of the
peoples are idols,
But the Lord made the heavens.
(Psalm 96:5)

Our sun is an average-sized star, about 864,000 miles wide. That is much bigger than the earth, which is only about 8,000 miles wide. If the earth were the size of a golf ball, the sun would be the size of a large bus.

The sun burns as a gigantic nuclear energy plant. Hydrogen atoms are compressed and fused together in an explosion called **nuclear fusion**. In the process, helium is created. These gases heat up. Atoms break apart into charged particles turning the gas into plasma. The surface of the sun is about 10,850 °F (6000 °C), but temperatures soar to 15,000,000 °C at its core. The hottest fires on earth burn at 5,400 °F (3000 °C). Imagine one trillion nuclear bombs exploding every second!

The sun is burning 8 billion tons of solar material every second. So it is getting smaller all the time, but there is a lot up there to burn. Don't be concerned that the sun will run out of fuel any time soon. Your fireplace runs out of logs after a few hours, and the fire goes out. But God has created the stars with a lot of fuel, so they can burn for a very long time. Scientists guess that the sun can burn for another 8 billion years.

The largest star found so far is the Canis Majoris. If the earth were the size of a golf ball, Canis Majoris would be the size of Mount Everest. Suppose that you were to walk around the whole earth, exploring every square mile. It would take 6,000 years for you to visit every square



mile of this earth. But if you were to explore every part of Canis Majoris by foot, it would take you 10,000,000,000,000,000 years to do it. And that's just one star. Astronomers are people who study the stars. These scientists estimate that there are 1,000,000,000,000,000,000,000,000 stars in the universe. It would take you a very long time to explore all of those stars, and the planets that revolve around them.

God made all of this. God is still infinitely bigger than that whole universe,

and He is more powerful than all of the powerful stars that burn in the heavens.

Our God is infinitely bigger, stronger, and more glorious than everything He has made. No power comes close to being stronger than God. He is way, way more powerful than everything He has made.

God made the earth, the sun, the moon, and all of the stars. He is more powerful than all the things He has made. Sometimes, we think that we are very strong. But, compare God's power

to man's strength. The strongest man on earth can lift 1,100 pounds up to his hips. That is about the weight of a 20 inch rock. The earth and the stars are much, much bigger than that! The strongest man in the world is very, very weak compared to God.

Praise the LORD!

**For it is good to sing praises to our God;
For it is pleasant, and praise is beautiful. . .
He counts the number of the stars;
He calls them all by name.
Great is our LORD, and mighty in power;
His understanding is infinite.
(Psalm 147:1,4-5)**

From Psalm 147 we learn that the Lord doesn't lose track of any of His stars. He calls them all by name. Imagine keeping track of 1,000,000,000,000,000,000,000 stars every day, all day long! This reveals God's intelligence, His attentiveness, and His power over all things. All we can say is, "God is amazing!" Indeed, He is worthy of our grandest thoughts and our loudest shouts of praise.

Can You See the Stars and Planets?

Looking up into the night sky, you can see a few thousand of stars and a few

planets. The planets appear brighter and bigger because they are much closer to us. However, the light from the planets is not generated from the planets. Those lights are only the reflection of our sun upon these giant masses in space. So the planets appear to be light and bright, when you look at them in the night sky. The sun is only shining on the planets.

However, stars do emit light, because, like our sun, they are gigantic burning balls of fire in space. Unlike planets, the stars appear to twinkle. When starlight breaks through the layers of the earth's atmosphere, the light beams shift angles slightly. Second by second, the light appears to come from a slightly different location as it works its way through the atmosphere.



Sunlight Lightens Planets

God's Fireworks

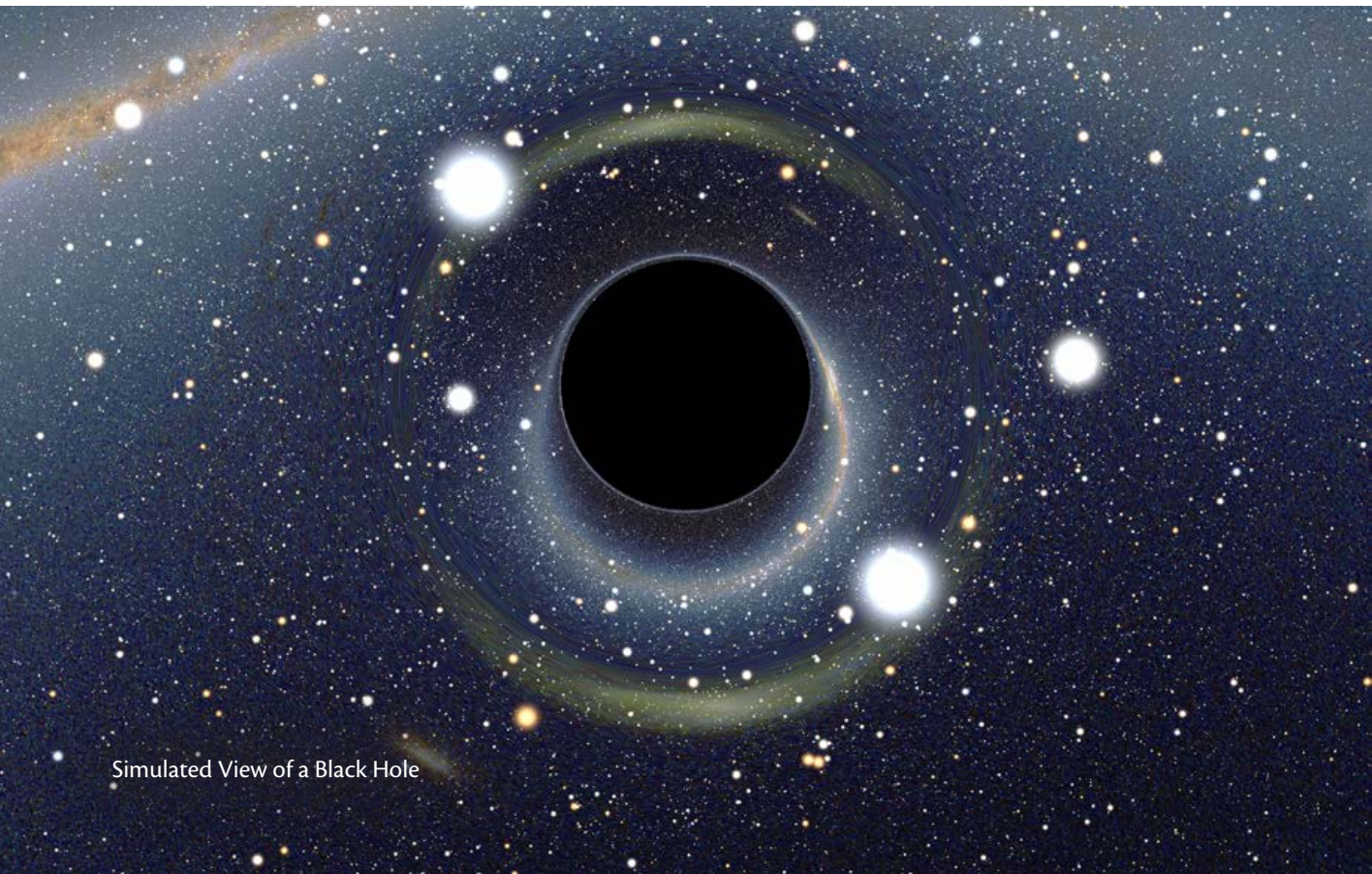
People like to use spectacular fireworks displays to celebrate holidays. Maybe you have seen these bright colors exploding in the air. These are little explosions that are produced by man. These firecrackers are sort of powerful. But God's explosions are far more spectacular and powerful.

Sometimes our Creator God will make stars to explode. When this happens, they produce more energy in a second than our sun would produce burning for 10 billion years. These are called **supernovas**

or **hyper-novas**. If a hyper-nova were to explode in the Milky Way Galaxy close to where we live, night-time would appear like day for a while. The star explosion would create that much light, even though the star was thousands of light years away from us. The light would gradually fade over a couple of weeks.

These are more demonstrations of God's amazing power!

The shockwaves that come out of the explosion can create new stars. The remnant material of the old star spreads



Simulated View of a Black Hole

out, at first very quickly, almost at the speed of light. Using powerful telescopes, we can see the burning particles spreading out very far.

Sometimes the inner core of the old exploded star turns into a black hole. Imagine a huge giant taking the whole earth in his hands and scrunching and squeezing it all down into a very small marble. That's what it takes to make a black hole. This is called a star **implosion** as the star mass collapses in on itself. Because there is a huge amount of heavy mass in a very small area, a gigantic gravitational force is created. Like a humongous vacuum cleaner, the black holes will suck all the mass floating around and the light emanating from stars in the vicinity into its core. The black holes themselves cannot produce light. Nothing can escape from a black hole.

Nebulae

Then the LORD answered Job out of the whirlwind, and said:

"Where were you when I laid the foundations of the earth?

Tell Me, if you have understanding.

Who determined its measurements?

Surely you know!

Or who stretched the line upon it?
To what were its foundations fastened?
Or who laid its cornerstone,
When the morning stars sang together,
And all the sons of God shouted for joy?
(Job 38:1, 5-7)

For thousands of years, man could not see much of the beauty of the universe. Only God could see the beauty of the Nebulae. Now, with telescopes we can see these amazing displays of God's fireworks in the sky!

The **nebula** is a cloud of dust and gas, coming out of an aging or exploded

star. The most famous Nebulae include the Butterfly, the Intricate Crab, the Splendor of Orion, Helix, Double Helix, Red Cosmic Square, Stingray, Red Spider, Hourglass, Tarantula, Cat's Eye, Ant, and the Boomerang.

The largest nebula light show in the universe as far as we can tell is the Tarantula. This incredible display of God's wisdom, beauty, and power is 1,000 light years across. That would be about 6,000,000,000,000,000 miles across. How would you like to paint a beautiful mural that size? Surely, God does His artwork in a very big way! You can see this nebula without the aid of a telescope.

Hypergiant Stars

God is light, and in Him is no darkness at all.
(1 John 1:5)

Our wondrous Creator also made **hypergiant stars**. These are huge stars which are just about ready to blow up. It might take a star thousands of years to prepare for an explosion. You might think of a star as a log burning in the fireplace. When it has burned the inside core up so that the outside burns hotter and faster,



Great Nebula Surrounding Eta Carinae

and the smoke particles blow off faster and faster. These hypergiant stars burn very hot and bright and as time goes by they lose mass faster and faster.

Truly, these lights declare the glory of God, and the holiness of God in the bright shining of an ineffable, blinding light. The Pistol Star shines at 10 million times the brightness of our own sun. You would never want to look into our sun directly. If you did so, you would probably go blind. What would happen if the Pistol Star took the place of our sun? Surely, the earth would burn up instantly.

Quasars

That you keep this commandment without spot, blameless until our LORD Jesus Christ's appearing, which He will manifest in His own time, He who is the blessed and only Potentate, the King of kings and LORD of Lords, who alone has immortality, dwelling in unapproachable light, whom no man has seen or can see, to whom be honor and everlasting power. Amen.

(1 Timothy 6:14-16)

Yet, there is still another much more powerful and brighter object than the hypergiant star shining in space. This is known as a **quasar**. Scientists can only guess what makes them shine so brightly.

Galaxies are often centered around a large black hole. Around the black hole is sometimes found a quasar. So far, astronomers have identified 200,000 of these spectacular celestial displays. Deep in the constellation of Virgo, you can see the quasar 3C-273. This tremendous energy source shines at a brightness four trillion times the brightness of the sun. This one light source shines brighter than one hundred galaxies the size of our Milky Way!

Imagine four trillion of our suns in the sky, or one hundred of our Milky Way galaxies stuffed into one quasar all shining down on you! That's a lot of energy and light! That would burn up the whole earth in a micro-second! Once again, we get a picture of God who is light. He creates all of these exceedingly bright lights in the heavens. And in Him is no darkness at all.

**God came from Teman,
The Holy One from Mount Paran. Selah
His glory covered the heavens,**

**And the earth was full of His praise.
His brightness was like the light;
He had rays flashing from His hand,
And there His power was hidden.
(Habakkuk 3:3-4)**

Extraterrestrial Cyclones

Our Creator God has placed storms on some of the other planets in our solar system. These are big storms, spectacular storms, very, very powerful storms. The planet Saturn sports a “Great White Spot” storm that erupts now and then and that is the size of the earth. Wind speeds run at 330 mph (530 kmph). Sheets of



Great White Spot on Saturn

lightening about as wide as the earth itself flash almost continuously for a spectacular light show! Jupiter's storm appears as an eye. This storm is larger than the whole earth, and it has been going on for over 400 years. Compare that to storms on earth that only last one or two days.

The winds in Jupiter's great storm blow at 275 mph (430 kmph). What would happen to your house, if winds would blow at 275 miles per hour continuously? The hardest wind gust occurring during a storm on earth was clocked at 212 miles per hour (340 kmph) on August 30, 2008 in Cuba. The strongest tornado in history blew at 302 mph (486 kmph) in Bridge Creek Oklahoma. It destroyed over 8,000 homes and killed 36 people. It was the most dangerous tornado in recorded history. Now, imagine that tornado covering the whole world for 400 years. Everybody would be killed and every house would be flattened in ten seconds!

God's power is shown, and His glory is seen in these amazing storms! We are so thankful that He keeps them at a distance so that human life can be preserved here on earth.

Why does the Lord order a great storm on Jupiter or Saturn? Of course, this is a demonstration of His great power. These



Clouds of Jupiter

storms would destroy all of life on earth, if God were to bring them here.

Why God Made the Sun and Moon

Then God said, "Let there be lights in the firmament of the heavens to divide the day from the night; and let them be for signs and seasons, and for days and years; and let them be for lights in the firmament of the heavens to give light on the earth;" and it was so. Then God made two great lights: the greater light to rule the day, and the lesser light to rule the night. He made the stars also. (Genesis 1:14-16)

GOD MADE THE WORLD

Our God made the sun, the moon, and the stars to shine His power and glory. But, here in Genesis 1 we find more purposes for this creation. The sun provides light by day, and the moon offers light by night.

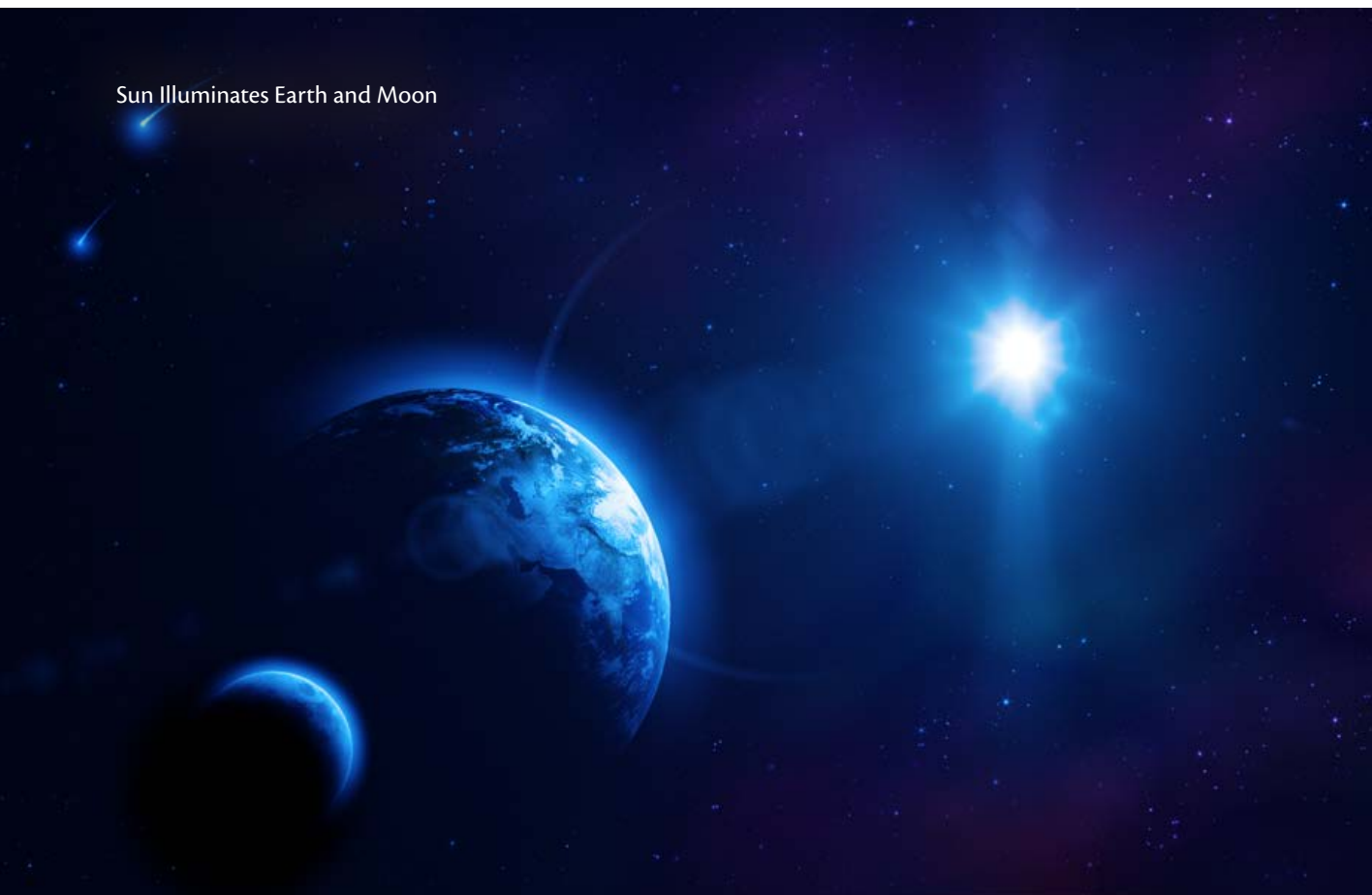
God created the earth to revolve around the sun. He gave us a moon which travels around the earth. And He has the earth rotate or spin on its axis over a 24-hour period.

At any given moment, the sun is shining on half of our ball-like earth. The

other half of the earth is facing away from the sun, and so it is dark on that side. Since the earth rotates on its axis over 24 hours, this provides about twelve hours of light and about twelve hours of darkness for most of the earth. When China and India are facing the sun, the United States and Mexico are facing away from the sun. When it is daytime in China and India, it will be night-time in Mexico and the United States.

The moon is an amazing creation of God to provide light at nighttime. The

Sun Illuminates Earth and Moon



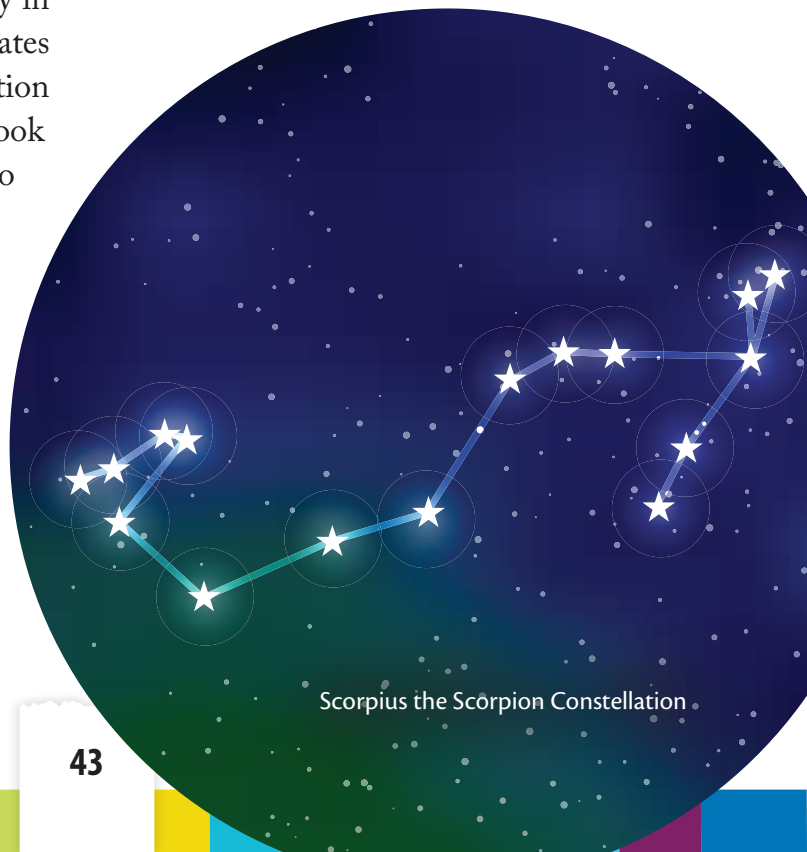
moon is 400 times smaller than the sun (in diameter), but it is also 400 times closer. That makes the moon about the same size as the sun from our vantage point. Consider also that the moon stabilizes the earth's position. Without the moon, scientists believe the earth would flop around as far as 85 degrees (compared to its ordinary 22.1-24.5 degrees). There would be wildly varying climates everywhere around the world. Africa, Europe, North America, China, and elsewhere would turn into the North Pole for long periods of time.

The Purpose of Stars

The stars and the sun basically stay in the same positions. But, as the earth rotates and revolves around the sun, the location of stars (and familiar groups of stars) look like they are moving. If you were to look at the sky tonight and tomorrow night, your favorite star (or group of stars) would be in pretty much the same place at 8:00 pm. But, as the months go by these stars would change position from your point of view. That's because the earth is changing its position month by month as it revolves around our star, the sun.

Also, the stars seen by children living in Australia or Brazil (in the Southern Hemisphere) are different than the stars seen by children living in the Northern Hemisphere (in Canada or Japan). When children in the Southern Hemisphere are looking up into the sky, they are looking the opposite direction of those who are looking up in the Northern Hemisphere.

Certain familiar groups of stars are called **constellations**. If you live in America, you will see the following constellations throughout the year. These constellations form a map in the sky, and over the years they were very helpful for explorers and sea travelers.



Scorpius the Scorpion Constellation

They could figure out where they were by the location of the stars. If sailors were on the open seas, they could tell which way was north, by searching for the North Star. If the North Star was straight ahead, they knew that East was to the right, and West was to the left.

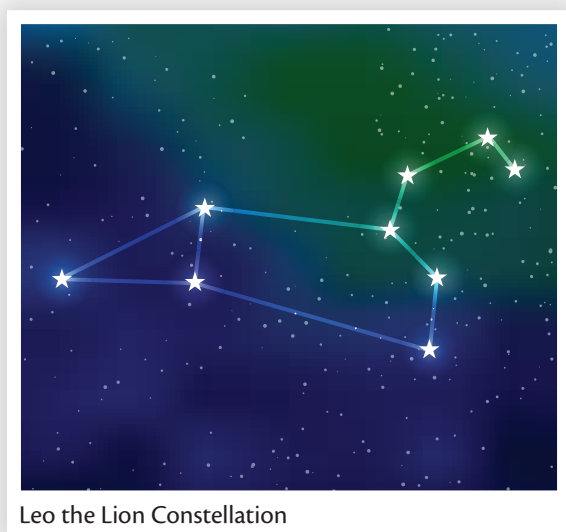
Constellations Seen in the Northern Hemisphere

Month	Constellation
December, January, February	Orion the Hunter
March, April, May	Leo the Lion
June, July, August	Scorpius the Scorpion
September, October, November	Aquarius the Water Carrier

The largest constellations seen in the Southern Hemisphere are Hydra, Virgo, Cetus, Eridanus, Aquarius, and Ophiuchus.

God Made Seasons

Our earth has an imaginary line running around the widest part of it called the **equator**. Although people living near



the equator experience rainy seasons and dry seasons, they do not have the long summer days or short winter days of those who live in Australia, England, China, or the United States. Our friends at the equator enjoy 12-hour days and 12-hour nights all year long.

The earth revolves around the sun on an **elliptical** (not quite round) path. The sunshine is not quite directed at the middle or the equator. Some parts of the year, we are closer to the sun than at other times, but that is not what gives us the seasons of spring, summer, fall, and winter. Otherwise those on the equator would also experience the seasons, and they do not.

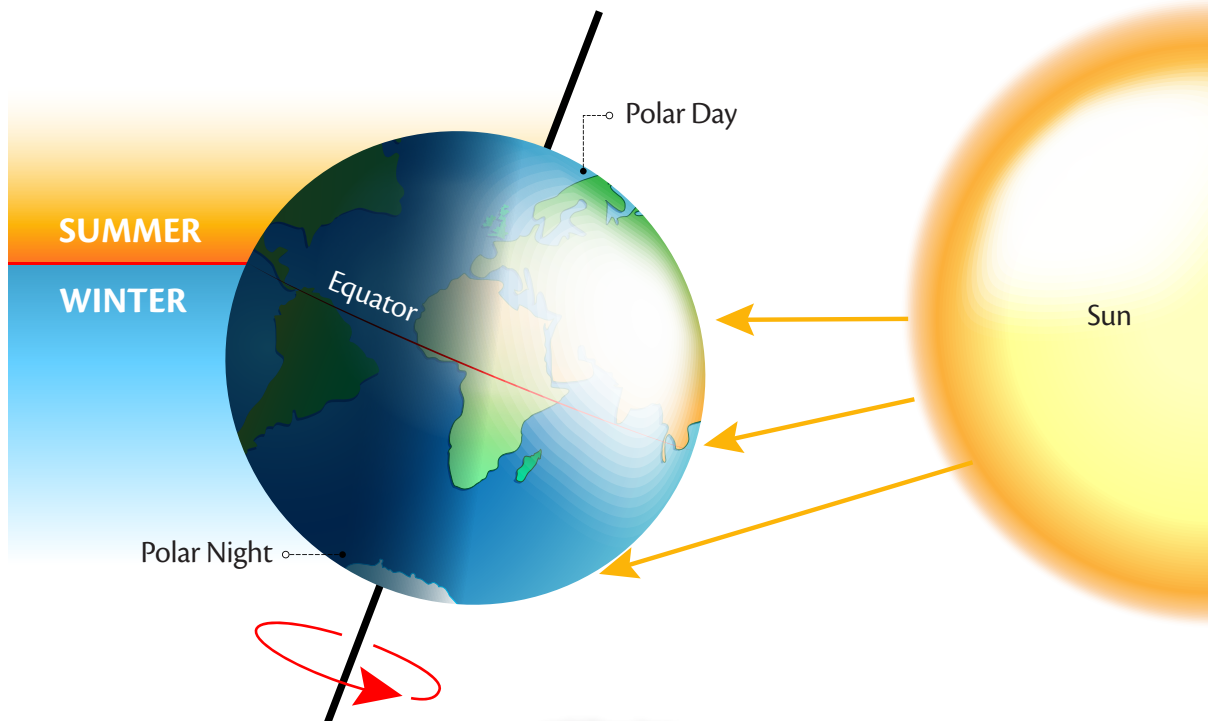
The reason for the seasons is that the

earth is tilted. What if you twisted your back, and you walked around the house slightly bent? About half the year, the northern part of the earth tilts away from the sun as it travels around the sun. That's winter time. The other half of the year, the northern part of the earth tilts towards the sun. That's summer time. Whichever hemisphere (north or south) is tilted toward the sun is the side which receives more direct heat and light.

If you live in the Northern Hemisphere, in the month of December, do you see that sun straight up in the sky at noon time? Of course not. In the month of June, you will

see the sun almost straight up in the sky at noon time. Whichever hemisphere is tilted toward the sun receives more direct light and heat, and it gets more daylight hours. When it is summer time in the Northern Hemisphere, while the sun is high in the sky, the Southern Hemisphere is not getting as much sun. It will be winter in the Southern Hemisphere while it is summer in the Northern Hemisphere.

The **spring equinox** and the **fall equinox** happens when both hemispheres are receiving equal amounts of sunlight during the day and darkness during the night. A little boy living 1000 miles north



of the equator receives equal hours of daylight and darkness as a little girl living 1000 miles south of the equator. The spring equinox for the child living in China is called the fall equinox for the child living in Australia. That's because March 21st is the first day of spring in China, but it is the first day of fall in Australia.

Seasons are a gift from God. He gives us warm seasons to help the crops in the fields to grow over about six months. Then

the fields will rest for six months during the winter.

In ancient times, it wasn't too hard to figure out the length of a day. You would simply measure the time it took from sunrise on one day to sunrise the next day.

It was a little more difficult to figure out the length of a year. There are two accurate ways to determine the length of the year. First, you can figure out the number of days it takes to go from one Spring Equinox to the next Spring Equinox. The other way is to carefully analyze the location of a constellation

Sydney, Australia in the
Springtime (in November)



The Great Wall of China in the Fall



at 8:00 pm, and then count the number of days, hours, and minutes it takes until the next time that constellation arrives at the same point. You have to be sure that you are standing in the same place and looking in the same direction when you take the reading.

This was the only way to establish calendars, schedules, dates, and times. God made the sun and the stars so that we could lay out times and seasons. This would help farmers know when to plant seeds, and it would help us all show up on time for church on Sunday.

**You visit the earth and water it,
You greatly enrich it;
The river of God is full of water;
You provide their grain,
For so You have prepared it.
You water its ridges abundantly,
You settle its furrows;
You make it soft with showers,
You bless its growth.
You crown the year with Your goodness,
And Your paths drip with abundance.
(Psalm 65:9-11)**

The Phases of the Moon

There are several things you need to know about the moon. Amazingly, God created the moon to rotate and revolve at the same time, such that everybody on Earth can only see one side of the moon. From Earth, we can never see what is known as the “dark side of the moon.”

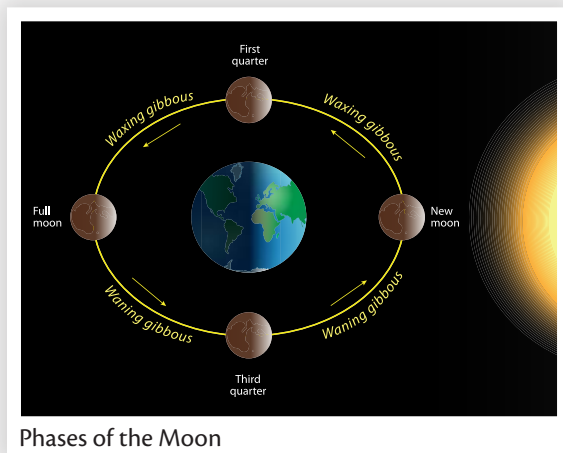
Throughout the 27.3 days that the moon is traveling around the earth, we watch the moon go through **phases**. Remember that the sun is always shining on the moon—one half of the moon. The **new moon** occurs when the moon is between the earth and the sun. You can see in the illustration that the sun is shining on the side of the moon that is facing away from us (which turns out to be what we call the “dark side.”). The

full moon occurs when the sun shines on the side of the moon that is facing us. When the moon is full, you know that the moon has rotated to the other side of the earth and is furthest away from the sun in its travel. At the first quarter and third quarter, we can only see half of the moon on which the sun is shining.

The moon moves eastward about 12 degrees each day as it circles the earth.

Eclipses

Now from the sixth hour until the ninth hour there was darkness over all the land. And about the ninth hour Jesus cried out with a loud voice, saying, “Eli, Eli, lama sabachthani?” that is, “My God, My God, why have You forsaken Me?” (Matthew 27:45-46)



An eclipse happens when one celestial body moves in front of another, temporarily blocking our view of it. Because the moon and the sun are the two really big celestial bodies that we can see from earth, it's pretty obvious when the moon is obscured (lunar eclipse), or the sun is obscured (solar eclipse). When the sun is blocked by the moon in the middle of the day, suddenly everything gets darker.



The **solar eclipse** happens when the moon passes in front of the sun.

The **lunar eclipse** happens when the moon passes through the earth's shadow.

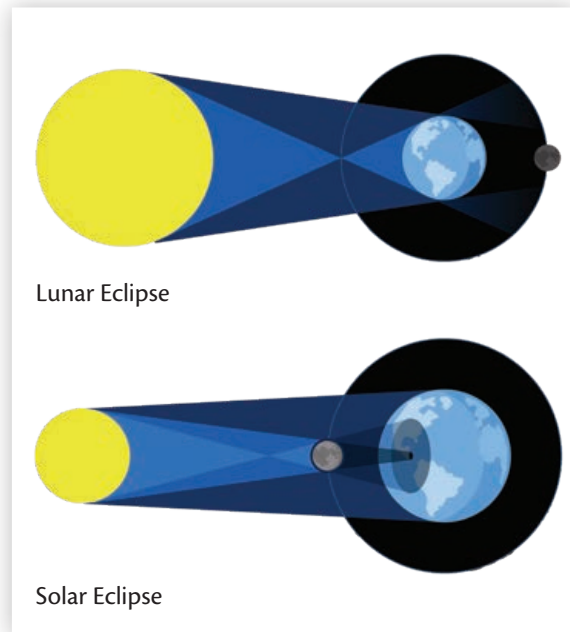
These eclipses appear as total, annular, hybrid, or partial. A partial eclipse occurs when the moon covers only one part of the sun. An annular eclipse occurs when the moon covers the sun, but a ring of light still appears around the moon. A total eclipse produces a darkness (like night-time at noon) for about seven minutes in a 100 mile wide strip over a distance of about 10,000 miles. The hybrid is a combination

of a total and an annular eclipse.

When Jesus died on the cross for our sins, darkness came upon the city of Jerusalem for three hours. This would have been 60 times more severe than any total eclipse that has ever occurred in the history of the world. Of course, God is able to perform a powerful miracle involving the largest celestial bodies in our solar system. However, the greatest miracle of all came three days later when God the Father raised Jesus from the dead.

The next total solar eclipses, visible from many nations around the world, will be:

Date for Eclipse	Areas of the World Where Visible
April 8, 2024	Mexico and the United States
August 2, 2027	Spain and North Africa
July 22, 2028	Australia and New Zealand
November 25, 2030	South Africa
March 30, 2033	Russia, Alaska



What Keeps Everything Going

Then Joshua spoke to the LORD in the day when the LORD delivered up the Amorites before the children of Israel, and he said in the sight of Israel:

**"Sun, stand still over Gibeon;
And Moon, in the Valley of Aijalon."
So the sun stood still,
And the moon stopped,
Till the people had revenge
Upon their enemies."**

**Is this not written in the Book of Jasher? So
the sun stood still in the midst of heaven,
and did not hasten to go down for about**

**a whole day. And there has been no day
like that, before it or after it, that the LORD
heeded the voice of a man; for the LORD
fought for Israel. (Joshua 10:12-14)**

During this battle with the Amorites about 3,400 years ago, Joshua asked the Lord to keep the sun still in the sky for a whole day. Evidently, the earth kept still for at least twelve extra hours, because God made sure it would happen.

For the next 3,400 years the earth has gone back to spinning around every 24 hours. The moon keeps revolving around

the earth every 27.3 days. The earth keeps revolving around the sun once a year. What is it that keeps everything moving? Of course, it is God who keeps everything moving. Everything holds together by the power of Jesus Christ, according to Colossians 1:17: “In Him all things consist.”

It turns out that God uses regular, consistent forces in the universe to keep things going. God does not run the world in some chaotic or random fashion. He doesn’t make summer eleven months long one year, and then make it one month long the next year. He doesn’t make the earth turn in 24 hours one day, and then speed up the globe so that the next day is only 18 hours long. God is wise and kind to us, so we can plan our days and years. He gave Noah this promise in Genesis 8:

Then Noah built an altar to the LORD, and took of every clean animal and of every clean bird, and offered burnt offerings on the altar. And the LORD smelled a soothing aroma. Then the LORD said in His heart, “I will never again curse the ground for man’s sake, although the imagination of man’s heart is evil from his youth; nor will I again destroy every living thing as I have done.

**“While the earth remains,
Seedtime and harvest,
Cold and heat,
Winter and summer,
And day and night
Shall not cease.” (Genesis 8:20-22)**

Gravity

God has made four mysterious, wonderful forces in nature. They are called:

1. Gravity
2. Electromagnetism
3. Strong Nuclear Force
4. Weak Nuclear Force

These are the forces that keep everything together. Without these forces, everything would fall apart. The earth and the moon would just float away, and there would be no order in the world. These are the forces that keep the universe running smoothly, always under the hand of God. In this chapter, we will only address the wonderful force of **gravity**.

When a child puts his glass of milk next to his elbow on the table, what usually happens next? Of course, his elbow hits the milk. Then, what happens? Does the glass of milk just sit there in the air right next



the
table? Oh
no! The glass
falls to the
ground with a
clatter, and milk spills
everywhere! Why does the glass fall to the
ground? Did somebody throw the glass
on the ground? We usually say that the
glass falls to the ground. Actually, there
was a mysterious, unseen force that pulled
it to the ground very quickly.

What if this force did not exist? Of
course, everything would be floating in
the air. If there was no force, nothing
would fall to the earth. The waters would
not flow in the riverbeds. All the dirt and
rocks would float up into the air, and
God's creation would be a big mess.

Praise God for His provision of this
wonderful force called gravity! Indeed, it
is the Lord Jesus Christ who holds the
world together, and He does it by the

Word of His power. This is
what we read in Hebrews 1:

**God, who at various times and in
various ways spoke in time past to the
fathers by the prophets, has in these last
days spoken to us by His Son, whom He
has appointed heir of all things, through
whom also He made the worlds; who being
the brightness of His glory and the express
image of His person, and upholding all
things by the word of His power, when He
had by Himself purged our sins, sat down
at the right hand of the Majesty on high.
(Hebrews 1:1-3)**

Every physical thing around you has
a tiny force of gravity within it that pulls
other things toward it. Even little things
like pens, books, and cups have this
mysterious force hidden inside of them.
However, you notice these pens and
books do not move towards each other.
That is because that gravitational force
is still way too small. However, really big
masses, big things like the earth and the
moon, have a big force which pull smaller
things towards them.

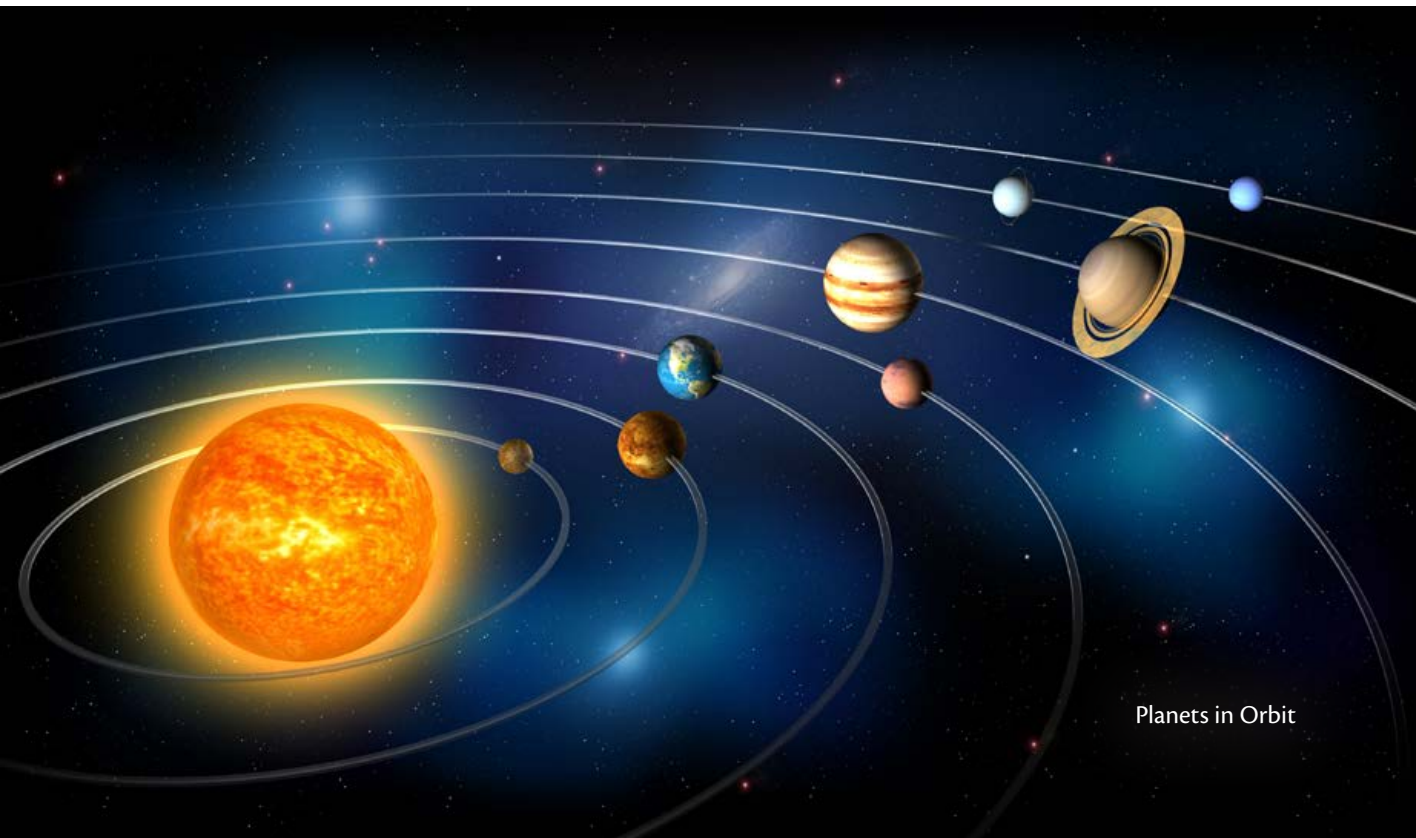
The sun pulls the earth towards it.
The earth pulls the moon towards itself.

Imagine a gigantic rope pulling the moon towards the earth. Or think of a tether ball game where the ball moves in a circular path around the pole. But then, you ask, "Why doesn't the moon just smash into the earth? Or why doesn't the earth get sucked into the sun?" Of course, that would be very bad. The whole earth would get burned up and none of us would survive. At the beginning, the Lord gave the earth a push. He didn't push the earth towards the sun or away from the sun. He pushed the earth in a direction perpendicular to the sun, at about 67,100 miles per hour. Nothing would slow

the earth down, because it was plowing through empty space. There was no wind to slow it down. However, the earth cannot keep going into space because that mysterious gravitational force pulls it toward the sun. So the earth keeps moving in a perpendicular direction, and the sun keeps pulling it towards itself. Gravity produces what is known as **centripetal force**, enabling the earth to continue its revolution around the sun year after year.

So the planets travel around the sun in this way. And the moon travels around the earth this way.

Tie a string to something heavy and



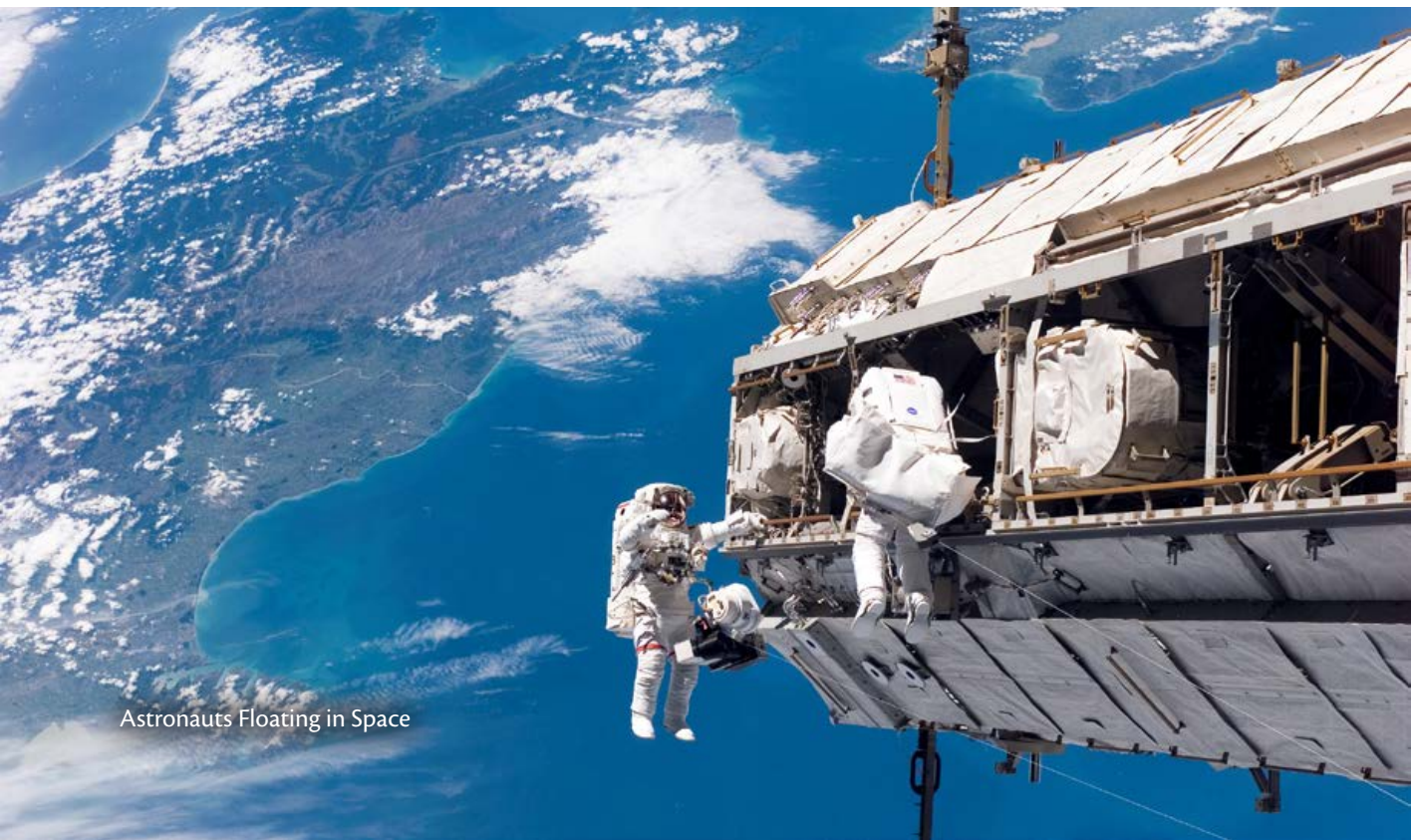
Planets in Orbit

swing it around your head. You can feel the force of the heavy object trying to pull away from you. It takes a force to keep it from flying away. If you let it go, that heavy object would fly far away from you. Thanks be to God our Creator for gravity. This force keeps the earth from flying away into outer space. The force of gravity from the sun that is pulling on all the planets, keeps the planets from flying away into outer space. So, for over 6,000 years the planets continue to revolve around the sun, still moving at pretty much the same speed. As long as the planets keep revolving at the same speed that God gave

them at the beginning, the length of a year on earth will remain about 365 days.

Everything pulls on everything else on earth and throughout space. Everything is pulling and pulling. Little objects have a tiny pull force. Big objects like the sun have a really big pull force. The further you are from the center of a big object, the weaker the pull will be on you.

How much gravitational pull do we feel from the sun, the moon, and the other planets? Standing on the earth, you can feel the earth pulling yourself down. When you drop a ball or anything, there is a force that yanks the ball down to the



Astronauts Floating in Space

earth. This gravitation force produces an acceleration on the object dropped. Acceleration is what makes something go faster and faster.

If you fall off of a six-inch (15 cm) rock, you probably won't get hurt. That is because you are not going very fast when you hit the ground. It isn't a big deal to fall off of a six-inch rock. But, if you fell off of a rock that was six feet high, you would probably get hurt, because you are going much faster by the time you hit the ground. If you fell off of a 60 foot (18 m) high cliff, you would probably die, because you would be going very fast when you hit the ground. The gravitational force produces an acceleration on your body, that makes you go faster and faster as you fall.

We measure gravitational force in pounds/ounces or Newtons pound-force or ounce-force. The force that the gravity of the earth tugs on an apple when you drop it, it is only about 6.5 ounces (1.8 Newtons).

Some of the planets are smaller than ours, so you would weigh quite a bit less there. You would feel very light on Mars or Pluto, and you could jump much higher than you could on earth. Other planets like Jupiter are larger than ours, in which case you would weigh quite a bit more. This is

because the gravitational force is stronger on larger heavenly bodies like Jupiter or Saturn. The force of the earth's gravity on a 100-pound child would be 100 pounds. The force of the earth's gravity on a 200-pound man would be 200 pounds.

You can't really feel the moon or the sun tugging on you. But the following table compares these tugs. How strong is the gravitation pull provided by the sun, the moon, and the other planets.

The Moon, the Sun, and the Big Planets Tug On You

Mass	Percent of Earth's Gravity	Force on 100 Pound Child
The Moon	0.35%	0.35 lbs
The Sun	0.06%	0.06 lbs
Venus	0.0001%	.0001 lbs
Jupiter	0.000005%	.000005 lbs

Now you can see that the moon has a much stronger pull on us than the sun, but it is not nearly as strong as the earth's pull. The moon is much smaller than the sun, but it is much closer to the earth.

Remember, if you ride on the fastest rocket ship, you can get to the moon in 30 minutes. It would take you 210 hours to make it to the sun. So the gravitational force from the sun is much weaker than the moon, because it is so far away.

The planets are much smaller than the sun, and they are very far away. So we can hardly feel the tug from these planets on the earth.

Remember that the force of gravity from the earth keeps the waters sticking to the earth. These waters don't float away into space. However, the moon is also tugging on these waters. The moon's gravitational force is smaller than the earth's force of gravity. But, when the moon's gravitational force puts a little tug on the ocean waters, these waters actually move a little bit, this way and that way. The moon's gravitational force is what produces the tides in the oceans around the world.

The following table shows how much a boy would weigh on other planets or celestial bodies in our solar system. If he weighs 100 pounds (in earth weight), what would he weigh (in earth weight) on other planets?

Planet or Celestial Body	Weight of Boy Weighing 100 lbs (in earth pounds)
Sun	2,793 lbs
Moon	22 lbs
Mercury	38 lbs
Venus	91 lbs
Earth	100 lbs
Mars	38 lbs
Jupiter	234 lbs
Saturn	106 lbs
Uranus	92 lbs
Neptune	119 lbs
Pluto	9 lbs

If you were to travel to the moon and walk around on its surface, you would feel very light. A 100-pound child would weigh about 22 pounds on the moon.



Walking on the Moon (Elements Furnished by NASA)

The average person could jump ten feet into the air on the moon, and it would take about four seconds to come back down to the ground. A person would feel very heavy walking on the sun or on Jupiter. It would be very hard for him to jump up, as it is hard to jump when you are carrying 100 pounds of potatoes here on the earth. He would probably have a really hard time getting out of bed if he were living on the sun, because he would feel so heavy. Imagine feeling like you weigh almost 2,800 pounds! That would be like a small car sitting on your chest.

Now you can see the powerful force God made—the force called **gravity**.

What is this mysterious force called gravity? Nothing can shield you from this force. If you are anywhere near the earth, you will always fall back towards the earth, because the earth's gravity pulls you into it. Nobody really knows what produces this amazing force, except we know that the hand of God is behind it.

Isaac Newton may have been the greatest scientific mind of all time. He believed in God, the Creator. At the end of his life, he had to admit:

I do not know what I may seem to the world, but as to myself, I seem to have been only like a boy playing on the seashore. . . now and then finding a smoother pebble or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me.¹ (Isaac Newton)

What Does All of This Mean to You?

**Are not two sparrows sold for a copper coin?
And not one of them falls to the ground
apart from your Father's will.
But the very hairs of your head are all
numbered.**

**Do not fear therefore; you are of more value
than many sparrows. (Matthew 10:29-31)**

If Jesus holds the whole world together, and if God is all powerful, what does this mean for you? It means you must never be afraid of anything in the world. You must not fear men or sharks. You should only fear God.

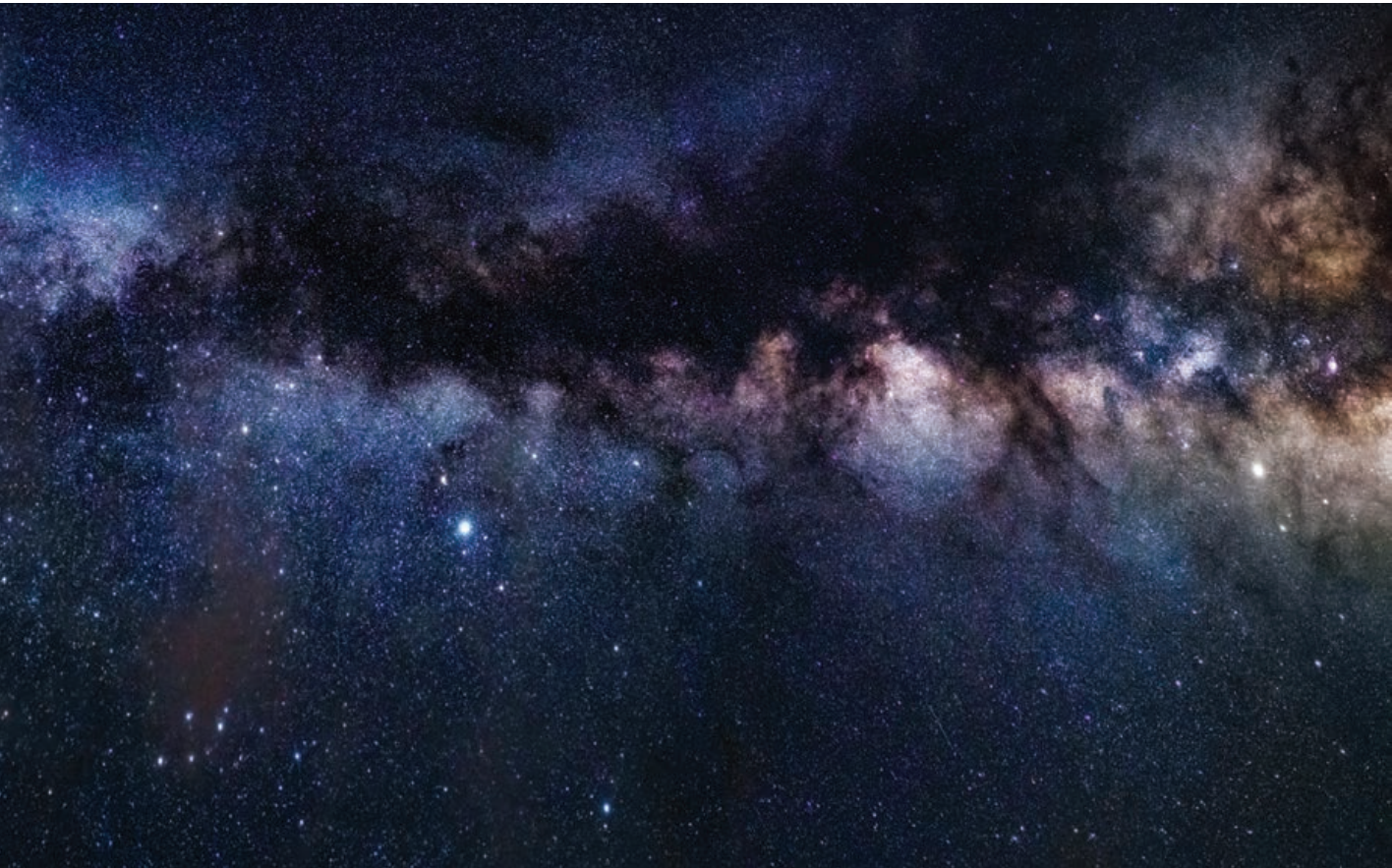
As you look at the great and mighty mountains, oceans, and stars all around you, how should you think of the Creator? Let us put it very simply...God is far bigger and far stronger than everything He has

made. As the children's song goes, "My God is so big, so strong and so mighty, there's nothing my God cannot do."

Yet, the most important lesson we take from all of this is that God can help us in our troubles. If God is that big and powerful, then He can help us when we are in trouble. He can save us from the bad things we do, and death itself.

He is always worthy to be praised. Scientists are often very proud when they learn something about God's universe. But God is far wiser than they are, for He created the universe! People love to praise

other people for how smart they are, for their strength, or for the things they have accomplished. But God is worthy of all the praise, for He is the source of all good things. He created the human mind with the ability to learn things. He created this very complex world. He gives men their strength. He provides the great resources of light, energy, life, food, and water. All we do is receive these gifts and turn them into other forms that are useful to man. We are not very impressive, but God is endlessly amazing in His power, wisdom, and goodness! Amen. ■



Pray

- Praise God for His truly awesome power! Praise Him for our powerful sun!
- Thank Him that the sun keeps spinning around in 24 hours every day. Thank Him for the seasons, for the tilting of the earth and the revolving of the earth around the sun.
- Thank Him for gravity. And praise Him for His sovereign power that keeps the whole world held together!
- Praise Him for the sun and the moon! Praise Him for the mighty stars, the great galaxies, the brightest quasars, and the gorgeous displays of Nebulae!
- Thank God that He pays attention to little us. What is man that God is mindful of us? Thank God that He sent His Son to visit us, and to save us from sin and death.

Sing

How Great Thou Art

O LORD my God, when I in awesome wonder,
Consider all the works Thy hands have made;
I see the stars, I hear the rolling thunder,
Thy power throughout the universe displayed.

Chorus:

Then sings my soul, my Savior God, to Thee,
How great Thou art! How great Thou art!
Then sings my soul, My Savior God, to Thee,
How great Thou art! How great Thou art!

When through the woods, and forest glades I wander,
And hear the birds sing sweetly in the trees.
When I look down, from lofty mountain grandeur
And hear the brook, and feel the gentle breeze.

And when I think, that God, His Son not sparing;
Sent Him to die, I scarce can take it in;
That on the cross, my burden gladly bearing,
He bled and died to take away my sin.

When Christ shall come, with shout of acclamation,
And take me home, what joy shall fill my heart.
Then shall I bow, in humble adoration,
And there proclaim, “My God, how great Thou art!”

If you do not know the hymn, you may listen to a version of the hymn on the Internet, with supervision, and sing along with it.

Watch

To watch the recommended videos for this chapter, go to generations.org/GodMadeTheWorld and scroll down until you find the video links for Chapter 2. Our editors have been careful to avoid films with references to evolution. However, we would still encourage parents or teachers to provide oversight for all internet usage. These videos may not give God the glory for His amazing creative work, so the student and parent/teacher should respond to these insights with prayer and praise.