

What Is Astronomy?

“The heavens are telling of the glory of God; and their expanse is declaring the work of His hands.”

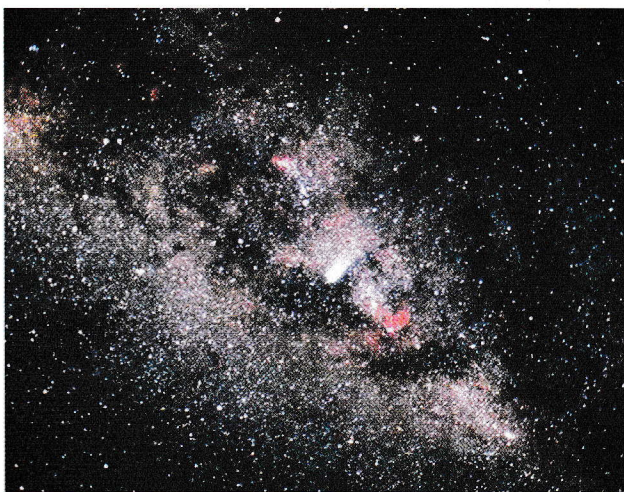
Psalm 19:1

The Bible calls everything up in space “the heavens.” Everything up in the heavens is God’s; it all belongs to Him, and it was all made by Him and for Him. The more we learn about all that is up in outer space, the more amazed we become at how perfectly God created the **universe** (you’ nuh vurs), which is the earth, planets, sun, stars, and everything in space. The universe really does show us how sensational God is, and when you are finished with this book, you will be even more amazed than you are right now.

The study of the universe is called astronomy (uh strahn’ uh me). The word “*aster*” means “*star*,” while “*onomy*” means “*knowledge of*.” The word astronomy, then, means “knowledge of the stars.” Many years ago, the only word used for every object in outer space was aster, or star. In other words, every light in the night sky was called a star. We still use the word astronomy to talk about the study of everything in space, even though the way we use it means more than just studying the stars. An astronomer is someone whose job is to study the stars, the planets, and everything out in space. You are going to be an amateur (which means beginner) astronomer this year, because you will be studying the universe as you take this course.



Have you ever been out in the country at night? You can see more stars in the sky out there because you are far from the lights of the city. Even people who live many miles away from a big city still cannot see all the stars in the night sky because of the city lights in the distance. On a clear night in the country, you can see many thousands of stars up in the sky. It’s truly a miraculous sight. When the Bible was written, people could see more of the stars than we can now because there were no bright lights to drown out the lights in the sky. When people looked in the sky and saw how enormous the heavens were and how bright the stars covering every inch of it were, they knew that the Creator of the world was marvelous and mighty.



This is a picture of comet Halley (the bright spot near the center of the picture) with the stars of the Milky Way in the background. You will learn about comets and the Milky Way later on in the course.

Why Did God Create the Universe?

The first chapter of the book of Genesis tells us that the heavens and the earth were created in six days. God took a great deal of care with the earth before He created other things. In the first three days, God created the oceans, mountains, plants, and trees. Then, on the fourth day (before He made any animal on earth), He made the stars and planets in the sky. Genesis 1:14-15 tells us, "Then God said, 'Let there be lights in the expanse of the heavens to separate the day from the night, and let them be for signs and for seasons and for days and years; and let them be for lights in the expanse of the heavens to give light on the earth.' And it was so."

There are many reasons God made the universe. God made the stars and the moon to give us light at night and to give us a calendar and signs. Scientists have also learned that the planets, stars, and many other things in space help to keep life going on the earth. All of these things glorify God because only God could have made these things the perfect way they are made.

Calendar

God made the planets, moons, and stars in the sky so that we could tell time, know the timing of the seasons, and count the days and years.

Many years ago, before people had calendars and clocks, they told the time of day by the position of their shadow on the ground. They also knew when a month had passed by the shape of the moon in the sky. There is a monument in England called **Stonehenge**. Many believe that ancient people used it to tell when spring had arrived. They judged the season by the position of the sun in relation to the large stones that make up the monument. Knowing what day spring began helped them to time the planting and harvesting of crops.

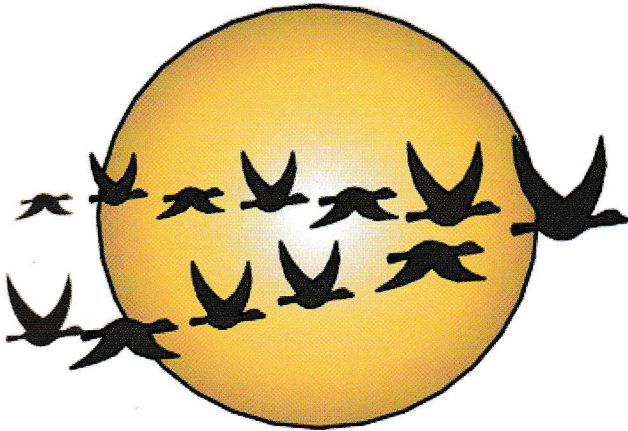


This is a picture of Stonehenge, an ancient monument in southern England. We are not sure what its purpose was, but many historians think that it was an ancient structure used to track the seasons.

The patterns of stars in the sky are called **constellations** (kahn' stuh lay' shuns). Ancient people also knew which constellations would be in the sky in each season of the year -- winter, spring, summer, or fall. They also used the constellations to mark what year it was and how many years had passed since an event. Many years ago, then, before we had calendars in our homes, the stars were the only calendar.

Years ago sailors did not have compasses as they do now, so the stars helped them to know which direction to sail. Now sailors use compasses. A compass is a device that has a needle that always points north. You always know what direction you are going if you have a compass, but you can also know which direction you are going if you know where the constellations are.

God's plan for the lights in the sky does not only include mankind. Scientists have learned that some birds know to fly south for the winter by the constellations. The birds must fly, or migrate, south for the winter. Otherwise, they would not have enough to eat, and sometimes they would get too cold. God made a very special way for birds to know when and how to fly south. He created within them a special gift we call **instinct** (in' stinkt). One instinct that God has given birds tells them to look at the constellations to know when to migrate south for the winter and when to migrate back north for the summer. It also tells them how to use the constellations to know *which direction* they must fly. This is why birds often fly at night when they migrate. When birds are not migrating, they usually sleep at night.



God's Signs

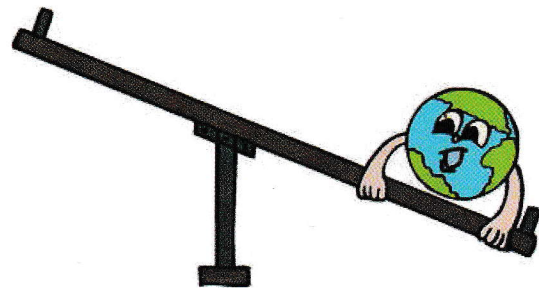
God placed a star over the city of Bethlehem when Jesus was born. This was a sign that the Savior had come. The sign was so powerful that when wise men from a distant land saw the star, they traveled to Bethlehem to see the baby Jesus. Some Christians believe that the constellations also once served to tell the story of our Savior. They believe that God placed constellations in the sky that originally told the story of Jesus, who would be born of a virgin, would die, and then would rise again. You see, in ancient times, not very many people were able to read. It is possible that they used the constellations as "pictures" which would remind them of what God was going to do one day by sending Jesus to die for all our sins. You will learn more about this interesting idea later on in the course. Even if this idea is true, we do not need the constellations to tell the story of Jesus anymore. After all, we now have God's Word in the Bible.



Stars and Planets

Not everything you see in the sky that looks like a star is actually a star. The two brightest objects in the night sky (besides the moon), for example, are planets. Several other planets can be seen in the night sky as well, and to the untrained eye, they all look like stars. However, a trained eye can tell the difference. Stars appear to twinkle in the sky, but planets do not twinkle. That is one way to tell if you are seeing a star or a planet. There are also stars that appear to move rapidly across the sky and then disappear. We call them “shooting stars.” They are not stars at all. They are meteors (mee’ tee orz). You will learn about all of these things later on in this course.

The planets help to fasten the earth in place. They keep the earth from moving too far away from the sun or too close to it. In other words, the planets make our world steady. The Bible told us thousands of years ago that God “established the earth upon its foundations, so that it will never totter forever and ever” (Psalm 104:5). Have you ever seen something on the playground called a teeter-totter? It is sometimes called a seesaw. To “totter” means to “sway and wobble.” The earth would definitely totter if the planets were not exactly where they are. You see, the sun pulls on the earth with a force called **gravity**. This force holds the earth in its orbit around the sun. However, the earth’s orbit would totter if it were not for some of the other planets. They also pull on the earth with gravity, and this “smooths out” the motion of the earth as it travels around the sun. Yes, indeed, the earth would wobble and shake in its motion around the sun if God had not put the other planets where they are. How wonderful that God made the planets up in the sky to help the earth stay right in the perfect place where God put it. The earth is a very important planet to God, and He made sure that nothing Satan could bring about would destroy it.



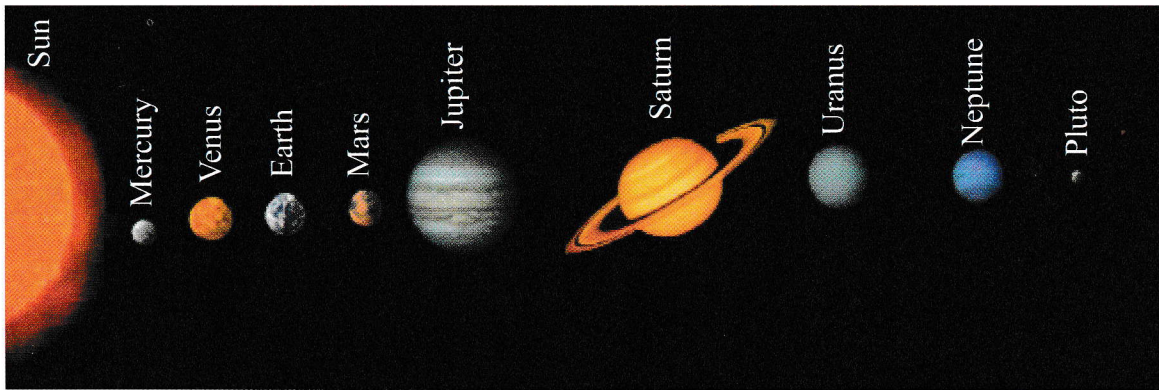
We can see now that God has a lot of very special reasons for making the stars and planets. I’m sure there are many more that we do not even know, but we can be sure that everything was done just perfectly according His plan. What a wise and wonderful God He is!

Solar System

Our solar system is the sun and all the planets that travel around the sun. God placed all the planets in their positions and planned it so that they are all held in place by gravity. Gravity is an invisible force that pulls objects towards each other. When we drop something, it doesn’t really fall; it gets pulled down to the earth by gravity. Instead of saying, “it fell,” it would be more scientifically correct to say, “It was pulled to the earth.” All the planets and their moons have gravity. Heavier planets have more gravity than lighter planets. The sun, the heaviest thing in our whole solar system,

has the most gravity of all. God placed the planets and sent them to circle around the sun at the perfect distance. If the planet Mercury (mur' kyur ree) were very much closer to the sun, or if the sun were very much heavier, Mercury would get pulled right into the sun. Instead, it stays exactly where God put it, because it has been placed at the right distance from the sun and because the sun is not too heavy. The pull that planets (and other objects) have on each other is called **gravitational pull**. The sun, earth, and all of the planets have gravitational pull. The earth has a gravitational pull on the moon, which keeps the moon right where it is. The moon has a gravitational pull on the earth, which makes the oceans bulge up toward it as it passes by. The sun has gravitational pull that keeps the planets in their places in the solar system.

There are nine planets that we know of in our solar system: Mercury, Venus (vee' nus), earth, Mars, Jupiter, Saturn, Uranus (yur' uh nuhs), Neptune (nep' toon) and Pluto. This is also the order in which they travel around the sun, as shown below:



This is a drawing that represents our solar system. Only part of the sun is shown, but each planet is shown along with where it is in relation to the sun. As you can see, Mercury is closest to the sun, while Pluto is farthest from the sun. Although the relative sizes of the planets are correct, the sun's size is not. It should be much larger. The distance between the planets is not correct, either.

The way that many people remember the planets and their order is by making a mnemonic (nih mahn' ik) phrase. In a mnemonic phrase, the first letter of each planet is made into a different word that makes a sentence. Look at this example:

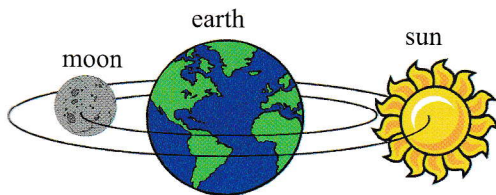
Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
My	Very	Early	Morning	Just	Started	Under	Nancy's	Pancakes

Notice that the word underneath each planet begins with the first letter of the planet's name. The sentence that those words make helps you remember the order of the planets. That is a silly sentence, "My very early morning just started under Nancy's pancakes," but the first letter of each word in that sentence helps you remember the order of the planets. At the end of this lesson, you will make your own mnemonic phrase to help you remember the order of the planets.

Can you explain what you have learned so far in your own words?

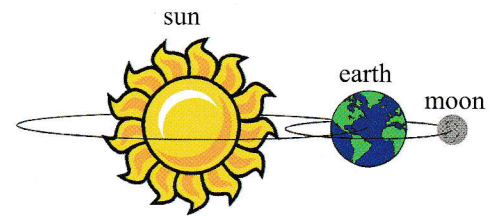
Astronomers, Astronauts, and Satellites

There were many people in history that helped us understand astronomy better. Way back in the year 1510, a man named **Nicolas** (nik' oh lus) **Copernicus** (koh pur' nih kus) had the unusual and amazing idea that the earth revolved around the sun. At that time, everyone thought that all the stars and planets revolved around the earth.



In Copernicus's time, everyone thought that the earth was the center of the solar system and that all of the planets and the sun revolved around the earth.

OR

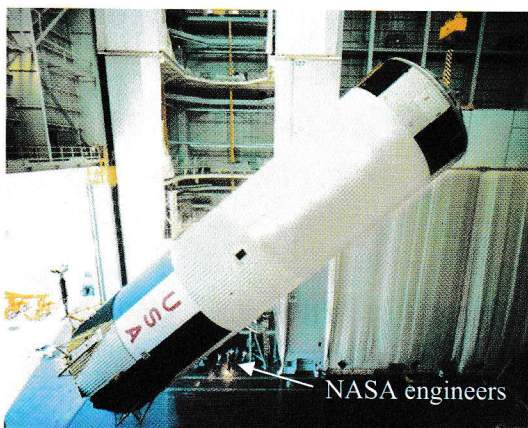


Copernicus thought that a more elegant arrangement of the solar system would be for the sun to be at the center and for the planets to revolve around the sun.

We now know that Copernicus was correct, even though most people during his time did not believe him.

Galileo (gal ih lay' oh) **Galilei** (gal ih lay') was an astronomer who believed Copernicus. He taught us to use telescopes to study the planets and stars, and many of the observations that he made helped scientists understand that Copernicus was right about the sun being at the center of our solar system. Galileo was able to learn a lot of things about our solar system through the wonderful telescopes he built.

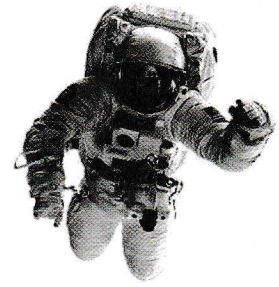
Today, a lot of astronomers work for **NASA**. NASA is America's space program, and it stands



This is a picture of the Saturn V rocket being assembled by NASA engineers. The "V" in "Saturn V" is the Roman Number "5," which refers to the number of engines in the rocket's first stage.

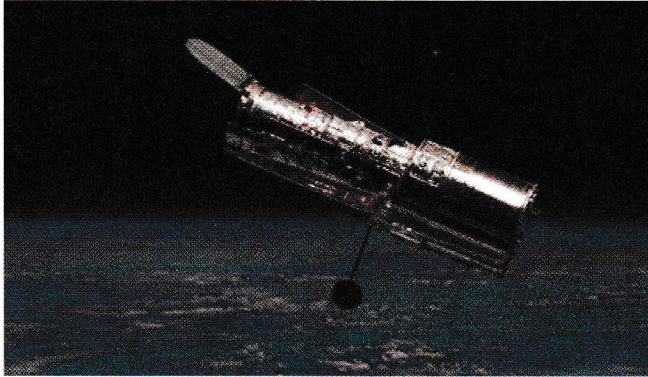
for "National Aeronautics and Space Administration." If you want to be an astronomer when you grow up, you might want to work for NASA. NASA is also the organization that sends people and spaceships to space. If you like to build things and make inventions, you could be a NASA engineer. NASA engineers build spaceships, telescopes, robots, and many other useful things for space exploration. The picture on the left shows a rocket being built by NASA engineers. See how tiny the engineers at the bottom of the picture are? That gives you an idea of how big the rocket is.

If you became an astronaut, you will probably work for NASA. An astronaut is someone who is trained to travel in a spaceship into outer space. He or she uses a special spacesuit to explore outer space. Maybe one day you will be an astronaut and go to some of the places we will study in this course! Many astronomers, engineers, and scientists work for NASA.



This is a picture of an astronaut in a space suit.

Have you ever looked through a telescope? You can see a long way off when you do. You will see many pictures that come from telescopes as you study this course. There is an enormous telescope floating up in space that



This is a picture of the Hubble Space Telescope in orbit around the earth.

sends pictures back down here to earth. It is called the **Hubble Space Telescope**. Even though a telescope will make a planet look like it is much closer, most planets can be seen without a telescope if you know where to look. You can even see satellites. A satellite is an object up in space that travels in circles around another object. The moon is a satellite of the earth because it travels in a circle around the earth. So when you are looking up in the sky, you can say, "Oh look! I see a satellite!" as you point at the moon.

An artificial satellite is something that is made by man and sent into space to float around the earth. "Artificial" means "not natural;" something that is made by human hands. Only God makes natural satellites. There are thousands of artificial satellites that people have sent up to travel around the earth. They do many jobs. Some can look closely at any part of the world and take pictures for others to see. Some can put a lot more channels on your TV. Some can look at planets and stars far away. Some watch the weather and take pictures so the weatherman can tell us if it is going to rain. Artificial satellites are very important. If you look up into the sky at night and see a small point of light (like a star) that is moving across the sky, you are probably looking at a satellite.

Can you tell someone what you have learned about astronomy so far? Remember to include what astronomy means and what gravity is. By telling someone what you learned, you "lock" it into your brain and will remember it longer.

What Do You Remember?

Why did God create the stars and planets? What are the names of the planets? What is the name of America's space program? What does NASA do? Do you remember the name of the astronomer who first said that the earth revolves around the sun? What about the name of the astronomer who learned how to study space with a telescope?