Astronomy

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Why would God make such a big universe?

The universe is big to us, but it isn't big to God! He is so powerful that it wasn't hard for Him to make the universe very big. The stars and planets bring God's glory and they give us a lot to investigate and explore.

Read Psalm 8

How and when the universe began

The Bible tells us how the universe began. Genesis tells us that God created 'the heavens and the earth, (Gen. 1:1) But God waited until Day 4 to create the sun, moon and stars.

Genesis calls the sun 'the greatest light', the moon 'the lesser light', and doesn't say much about the stars. That's because a lot of people used to worship the lights in the sky. So God wanted to make it clear that they were created objects, not things to be worshiped.

People have always wondered how the universe began. Some ancient people had stories about how the earth was formed from a war between false gods. Today, some scientists tell us that everything began with a 'big bang' billions of years ago. But how do we knowhow the universe really began? God tells us in the Bible how He created the world. Only the Creator can give us a true account of how He made everything.

The universe began before people were around to see it, so God gives us the only possible eyewitness account. Because He was there, and he created the universe, He can tell us how He did it. And God tells us in the very first book of the Bible, that He created the universe in six days and rested on the seventh day.

A day is a day!

Some people want to make the Bible fir the 'big bang' idea, so they say that maybe 'six days' means 'six long periods of time'. But we know that when the creation account in Genesis says 'day', it means 'day'! When God gave Israel the 10 Commandments in Exodus 20, He told the Israelites to work for six days and rest for one, because that's how He created the world! God didn't rest on the seventh day because He was tired, but so that we would have a good pattern to follow.

The Big Bang

Many scientists do not believe the Genesis creation account. Instead, they think that the universe began in a 'big bang'. They think the universe began as a tiny point that we could see – everything that would eventually make up the universe – was contained in this very small dot. Then somehow this small dot exploded and the universe grew out of this dot, faster even than the speed light travels. But no one knows how such a thing could happen.

Scientists who believe the universe started this was, believe that the big bang involved a lot of energy, which made everything hot. The theory is, that as the universe slowly cooled down, the elements that form stars came together. The stars were like big furnaces that created the planets.

But people who read the bible know there is no way for the first elements to naturally come together to form stars by themselves. God had to create the stars and planets *miraculously*.

Was Jesus there in the beginning?

The Bible tells us that Jesus was there at the very starts of the universe with the Father. God created the world through His Son, who is called the Word. The Holy Spirit was also there, giving life to the living creatures, including human beings.

Read John 1.

Twinkling stars

In Genesis 15:5 God told Abraham to look up and count the stars, if he could. He was really making the point to Abraham that his descendants would be more than he could count – just like the stars. Until modern days we didn't realize how *many* more stars there were the we could count, but in 1995, astronomers took a powerful telescope and aimed it at a tiny point in the sky. They magnified the image from the telescope and that picture is called the Hubble Deep Field. They found that there are galaxies as far out as we can see, and probably much farther. There are around 100 billion galaxies visible with that instrument, each with around 100 billion stars on average.

Why so many stars?

The Bible tells us that God created the stars on Day 4 of the Creation Week. Many ancient people thought that they were for telling the future, but God tells us in Genesis why He created them: to help us tell time and the seasons (Genesis 1:14-18). He also created the stars to show how powerful and big He is; even though there are more than we can count, it wasn't hard for Him (Genesis 1:16). We can't even count the stars, but the Bible says God knows each by name (Psalm 147:4-5).

Huge variety of stars

The Apostle Paul wrote, "star differs from star in glory (1 Corinthians 15:41). Stars are very different from each other. The star we are most familiar with is our sun. It is a type of star called a *yellow dwarf.* (Its true colour is white, but the scattering of light by the atmosphere can make it look yellow.)

Stars big and small

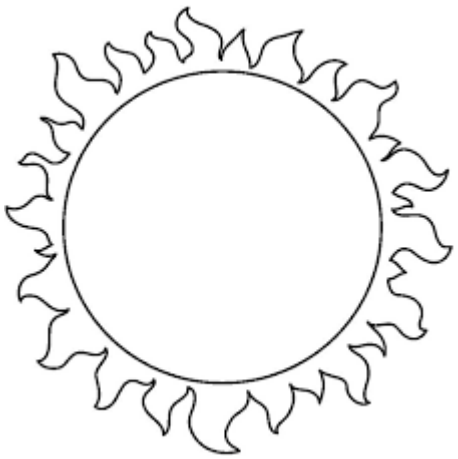
Most stars are much smaller than the sun, but some are much larger.

The smallest and lightest stars, called *red dwarfs*, are only a tenth as massive as the sun and can't be seen without a telescope. *Red giants* are stars that are much bigger and brighter

than the sun, although they are not as hot. The biggest, called a *red 'hypergiant'* is about 2,600 times wider than the sun.

The most massive, *blue giants,* are over 100 times as massive as the sun.

The Sun



The sun literally lights up the day! This star provides us with light as well as heat. It also powers green plants, allowing them to make their own food. Animals and people eat plants for food. Without the sun there would be no light, heat of food.

Modern astronomers now know that the sun is about 150 million km (93 million miles) away from the earth. It is so huge that 1.3 million Earths could fit inside it.

The sun is remarkable by the standards of stars. It is very stable and has been for thousands of years. Every few years the sun sends out a major flare that can interfere with city power grids. However, living creatures are not harmed. Other stars can send out flares that can be millions of times more powerful. That would kill all life on earth. Fortunately, these stars are so far away that they haven't the slightest chance of hurting us.

The sun's incredible power

It's hard to imagine how powerful the sun is. Its light is so strong that you should not look at it directly, even through sunglasses. And *never, ever* look at it through binoculars or a telescope!

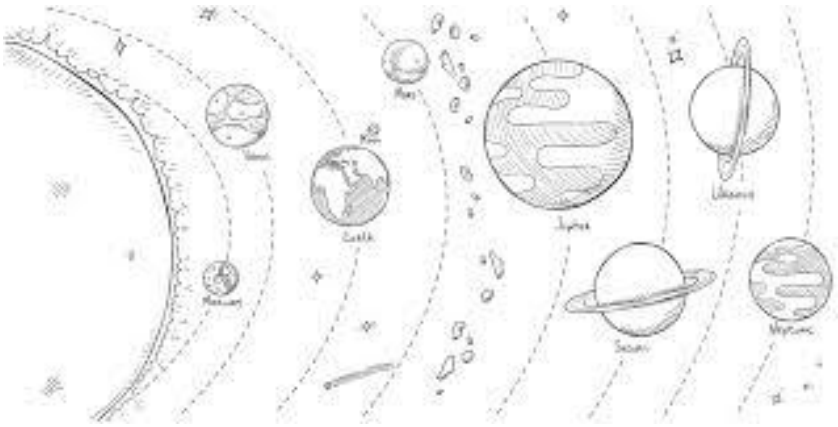
We measure power in watts (W). A bright lightbulb can use 100W of electrical power. One trillion watts is a terawatt (TW). The total electrical power used by all people on Earth comes to about 15TW.

The sun's total power is about 400 trillion TW. But only about 200,000 TW reaches the earth. And only about half of that reaches the surface. This means that every square metre of Earth's surface receives an average of 160 W during the day. We are just the right distance from the sun to receive just the right amount of power. Not too much, and not too little.

The sun also produces a stream of very fast electrically charged particles called the *solar wind*. The Voyager 2 space probe recently discovered that the solar wind acts as a 'shield'. Without it, cosmic rays would harm life on Earth.

The sun at the centre at the universe

Long ago people thought that the Earth was the centre of our solar system. Because of the sun's huge size, an early scientist called Aristarchus proposed that it was at the centre of our solar system. But most astronomers and scientists disagreed, because they couldn't work out how the earth could move. In fact, this wasn't really solved until almost 2000 years later. This was the work of the brilliant creation scientist, Sir Isaac Newton. His revolutionary laws of motion showed how and why the earth could orbit the sun.



Creation question: If God made the sun on Day 4, how were days 1 to 3 measured? The Bible tells us that God created the sun as 'the greater light to rule the day'. This was on Day 4 of the Creation week, (Genesis 1:14-19). But how could there have been days before the sun?

Answer: Genesis also teaches that on the day God created the earth He also created light (Day 1). This light did not come from the sun. It was light from God Himself, because God is light. All you need for day and night is a rotating earth and light shining on to it from one direction. You don't need a sun for this.

Psalm 74:16 Yours is the day, yours also the night; you have established the heavenly lights and the sun.

1 John 1:5 This is the message we have heard from Him and announce to you, that God is Light, and in Him there is no darkness at all.

The Moon

What is the moon?

The moon is a giant ball of rock, about a quarter the size of the earth.

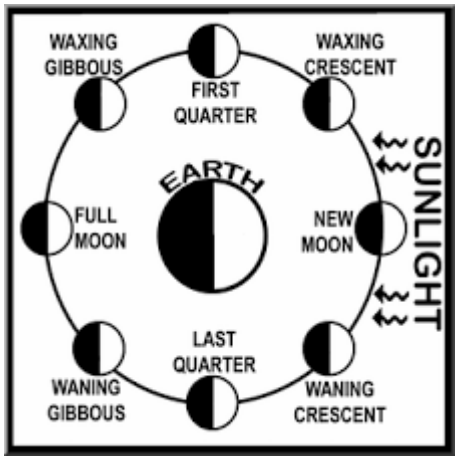
The Bible calls the moon 'the lesser light'. It doesn't say how the moon is lit, but for thousands of years people have known that the moon doesn't have any light of its own. Rather, it is lit by the sun. Only the half facing the sun is lit.

Genesis tells us that God created the moon on the same day as the sun, Day 4. He created them to be for 'signs and seasons'. The moon cycles through its phases every 29 ½ days. Based on this, ancient people divided the year into months. ('Months' is a word relating to 'moon'.) This helped people measure the time between the different seasons. This was important so they could plant their crops at the best time. But 12 moon cycles is only about 354 days, while it takes 365 ½ days for the earth to circle the sun. So the months of our calendar have added days to make up the difference.

Phases of the moon

The moon's apparent shape changes regularly, and these different shapes are called phases. As the moon goes around the earth, we see different portions of the lit part. If the earth is almost between the sun and the moon, we can see the entire lit half. We call the a 'full moon'. When the moon is nearly between the earth and the sun, we can't see much of the lit side. All we see is a thin crescent shape. We call that a 'new moon'. When the moon is half-way between new and full, it looks like a half circle.

When the moon's lit part is getting bigger, we call this *waxing*. When the lit part is getting smaller, we call this *waning*.



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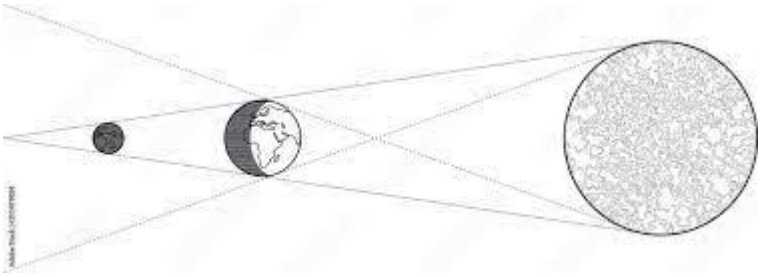
Tides

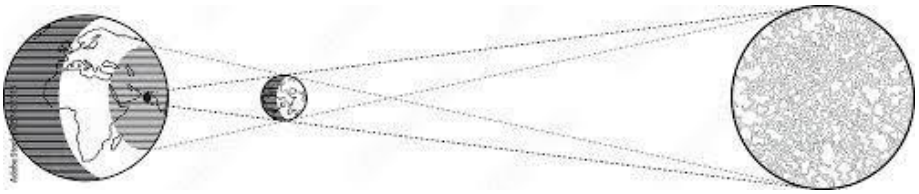
The moon is also responsible for tides. The tides go in and out (rise and fall) about twice a day. These tides help to keep bays and estuaries clean. The moon's gravity pulls more strongly on the parts of the earth closer to the earth than the parts further from the moon. It is more noticeable over the oceans because they are liquid and can flow. The tidal forces make the oceans bulge. As the earth rotates once a day, the bulges move on the earth, so people near the ocean observe high and low tides.

Eclipses

Sometimes during the full moon, the earth blocks sunlight from reaching the moon. This is called a *lunar eclipse*. The sun is 400 times bigger and 400 times further away than the moon. This means that sometimes the moon can almost exactly block the sun. This is called a *total eclipse*.



Lunar eclipse



Solar eclipse

Travelling to the moon

The moon is 384, 404 km (239,000 miles) away. Yet from 1969 – 1972, 12 men walked on the moon. They travelled (in six trips) on the Saturn V rocket, the fastest and most powerful machine that had ever been built. Its speed reached 39,400 km/h (24,500 mph). But it still took four days to get there!

The moon is desolate – there is no air, water or life. The astronauts couldn't stay there for more than a few days. They needed to fly back to the earth, which God designed for life.

Rocky planets

Besides the sun, the largest objects in our solar system are the eight planets that revolve around the sun. Astronomers group these planets by what they are chiefly composed of:

- Rocky planets
- Gas giants
- Ice giants

The rocky planets are the closest to the sun, the smallest, the densest and the hottest.

They are **Mercury, Venus, Earth and Mars.**

Mercury

Mercury is the closest planet to the sun, and also the smallest of the eight planets. It spins three times on its axis for every two revolutions around the sun, or three Mercury days for two Mercury years. This means that there is a huge temperature difference between the 'day' side and 'night' side. The side that faces the sun is 430 degrees C, but the side that faces away from the sun is minus 170 degrees C.

Another reason that Mercury has such huge temperature differences is that Mercury is too small to have an atmosphere.

Venus

Venus is often called the 'morning star' or 'evening star' due to how bright it appears in the sky. It is the brightest natural object in our solar system after the sun and moon, but it is only visible withing 3 hours of our sunrise and sunset.

Venus is very similar to the earth in size. However its comparison is very different. In fact, the composition of Venus's atmosphere and surface are similar to how people described Hell in early times. Venus's atmosphere has 93 times the pressure of ours, and is 96.5% carbon dioxide, (not suitable for supporting life). Its surface is hot enough to glow red and melt lead. This means that no organic molecules required for life could ever survive. It is covered with thick clouds that reflect 76% of the sunlight, which is what makes it look so bright. Venus has high mountains and deep valleys.

Bible verse: I, Jesus, have sent my angel to testify to you about these things for the churches. I am the root and the descendent of David, the bright and morning star (Revelation 22:16).

Just as the morning star (Venus) is brighter than all the other stars, Jesus is supreme over everything in creation – because He is God!

Mars

Mars is reddish because of iron oxide. It is further away from the sun than the earth, so is a dry, freezing planet.

Mars has the largest volcano in the solar system, Olympus Mons, which is 27 km high. Mars also has the largest canyon in the solar system, Valles Marineris, which is over 9 times longer than the Grand Canyon.

Some claimed that Mars had life, because one astronomer claimed to have observed long 'straight channels' on the surface. Could these have been made by aliens? However later, astronomers, as well as high-definition pictures of Mars, have shown that these were only optical illusions.

Could life survive on any of the rocky planets?

When we look at the rocky planets, we can appreciate how unique the earth is in supporting life. Mercury is too small and too close to the sun for life. Venus is too poisonous. Mars is too

cold and dry. Only Earth is the right distance from the sun, with enough water and an atmosphere that is composed of the right elements.

The rocky planets clearly show that God specially designed Earth to be a good home for human beings!