



Astronomy—What's the BIG Deal?

Genesis 1:1 says, "In the beginning, God created the heavens and the earth." We've already studied much about the earth that He created for us, from what is under our feet, to the atmosphere directly above our heads, but what are "the heavens" mentioned in this verse about Creation? In this case, "the heavens" basically means everything else that exists beyond the earth. He created it ALL! Which brings us to our final area of study in the earth sciences, astronomy. **Astronomy** is the study of everything in the universe beyond earth's atmosphere and the scientists who study it are called **astronomers**. The universe includes the sun, moon, stars, planets, galaxies, dust clouds, meteors, comets, asteroids, mysterious matter, energy, light, time, and so much more! So astronomy is a pretty BIG deal when you consider just how massive the universe is and all that is in it. With every science subject I study and teach, I become more and more firmly convinced that ALL fields of science intertwine and work together to clearly point to one GRAND Intelligent Design for our universe. However, the field of astronomy makes this even more crystal clear! The universe and everything in it is too big, too orderly, too perfectly balanced, too perfectly spaced apart, too perfectly set in motion, and too perfectly set up to support life on earth to say that it all began without a Creator, but from a random Big Bang explosion from a tiny ball of matter that came out of nowhere, blasting everything as we know it eventually into existence! I think you will see this clearly for yourself as we study the fundamentals of astronomy.

Two Main Branches of Astronomy

How big is the universe and where does it end? Scientists DON'T KNOW. There is a lot about the universe that they don't know and they openly admit it. It is just too big and unreachable, but as technology advances, they are able to discover more and more as the years go by. The universe is ALL that exists both on earth and beyond, but the study of the universe is seemingly limited to what we can actually see and observe in any direction. This is called the **observable universe or observational astronomy**. Anything beyond what we can directly observe is considered theoretical astronomy.

Theoretical astronomy uses the data from observational astronomy, computer models, the laws of physics, and mathematical calculations to make predictions about what is beyond the observable.

THE LIGHT YEAR—A Mind Blowing Measurement!

You know the famous line from the Buzz Lightyear character in Toy Story, "To infinity and beyond!" But what you may not realize is that there is meaning behind his name and catch phrase. Many scientists believe that the universe might be infinite, or never ending. To measure distances in something as vast as the universe, scientists needed a special unit of measurement so their eyes would not go crossed dealing with so many zeros! Since light is the fastest thing known to man, it was decided to use the distance that light could travel in one year (or light year) to measure the mind-blowing distances in space. One light year is equal to 5, 878, 499, 818, 000 miles, meaning that in one year, light can travel almost 6 trillion miles. One light year is a lot easier to write than a number with thirteen digits! Let's look at it in big numbers! Scientists believe that our observable universe is 93 billion light years across. To calculate the actual number of miles across, multiply 93 billion by the number of miles in one light year...

$93,000,000,000 \times 5,878,786,100,000 = 5,467,470,000,000,000,000,000$ miles across our universe!

That is approximately 5 and a half **Septillion** miles of observable universe that would take you 93 billion years to cross IF you were traveling at the speed of light! Are you feeling small yet? Just wait!

GALAXIES

Whether you are a Star Wars fan or not, I am sure you have heard the famous line, "In a galaxy, far, far away...". Although Star Wars is speaking of a fictional galaxy, it is believed that there are actually billions upon billions of actual galaxies within our monstrous universe! A galaxy is a collection of gas, dust, dark matter, and billions of stars. It is all held together by gravity. You've learned that gravity holds lots of things together...it's like God's glue! It is also believed that the largest galaxies all have black holes at the center of them and that galaxies interact with each other, colliding and merging.

Thanks to a special telescope called the Hubble Space Telescope launched in 1990, we have actual pictures of other galaxies that helped to estimate how many there are and to learn that they come in all shapes and sizes. There are three main galaxy shapes: spiral, elliptical, and irregular. Spiral galaxies are some of the brightest in the universe and look like a pinwheel. Elliptical galaxies are the largest and most common, looking like stretched out circles or ellipses. Irregular galaxies don't fit into any of the other categories because they don't have a common shape...they are "irregular."

THE MILKY WAY—The Galaxy We Call Home

Out of the billions of galaxies within our universe we live in just ONE of them. ONE out of billions!! The spiral-shaped galaxy that we call home is called the Milky Way. It got its name because of its milky white color that can be seen streaked across the sky on a clear night, away from the lights of a city. But wait! How can we SEE the Milky Way galaxy if we are IN the Milky Way galaxy?? That is an excellent question! The answer is NOT that we have a picture of our entire galaxy as a whole. That, at least so far, is an impossibility! The reason is that our galaxy is too big to travel OUT of to be able to get a picture from an outside view, so all we have are pictures of parts of our galaxy taken from the inside that we have pieced together to get an idea of what it looks like. No human can live long enough, nor a space craft last long enough to make the trip out of the galaxy to get an outside view. We do have a full picture view of our nearest galaxy neighbor, Andromeda, but that is because we are on the outside looking at it in the distance.

So, just how big is our galaxy? Our entire solar system, with the massive sun and eight revolving planets, fits within just one tiny part, of one arm, of our spiral galaxy. There are over 200 billion stars and billions of other planets beyond our own solar system. Scientists now believe that the Milky Way galaxy is 200,000 light years in length. If we calculated this in miles it would be 12,000,000,000,000,000,000 or 12 quintillion miles! This means that IF you were to travel from one end of our galaxy to the other, it would take you 200,000 years IF you were traveling at the speed of light. However, if you were to take the ultimate road trip in a car traveling at 60 mph, from one end of the Milky Way galaxy to the other, it would take you TWO TRILLION years! Can you imagine how many times you would be saying, "Are we there yet?"

Now, how small do you feel? If your mind is completely blown away by the massive size of our universe and our galaxy, then my job is done! Well, almost, because I have one more thought that you need to consider. If it blows your mind to think about how big our universe really is, just think about how GREAT and MIGHTY is our God to have created it all! Our God truly is an AWE-some God!