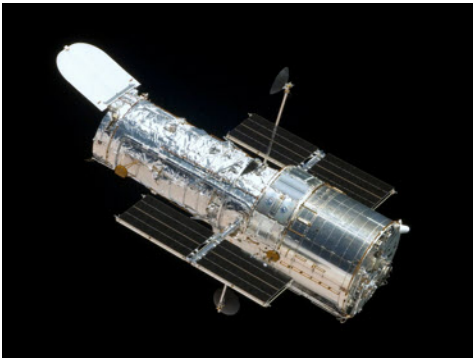




Week 2

Feb. 15, 2012

## Knowledge Quest : The Hubble & Beyond- God's Wonders in the Heavens



Watching the night sky can be so much fun- gazing at the moon, locating the different stars and constellations, and even seeing a meteor or "shooting star" now and then. The heavens speak to us of God's awesome power and majesty.

But, beyond what the human eye and our small telescopes can see, is a great big universe filled

with amazing wonders! With the invention of large telescopes which can see far into space, scientists have discovered more and more of God's wondrous creation. But many of the most fascinating wonders were never recorded for all to see until the invention of a very special telescope called the Hubble Space Telescope (pictured above).

Unlike telescopes on the Earth's surface, the Hubble Space Telescope is located about 350 miles above the Earth- out in space. About the size of a school bus, zooming through space, the Hubble makes a complete circle around the Earth every 97 minutes. It moves at the speed of about five miles per second. That's fast enough to travel across the United States in about 10 minutes. Wow! As it travels, Hubble's mirror captures light and directs it into several science instruments on board. These instruments process information and pictures created from the light it captures and send them back to Earth.

Baby and giant stars, galaxies, nebulas and more- all these amazing wonders are ours to see. Looking at pictures of these fantastic sights, we get an even deeper understanding of just how *miraculous* the universe is. And it becomes more evident just how *awesome* and *powerful God* is! After all, the Bible tells us that *He* created the heavens and *everything* out in the vastness of space!

In our last lesson, we learned a little about stars and how they form constellations. A *star* is a huge sphere (or ball) of very hot, glowing gas. Stars are scattered throughout the universe and are often found in large clusters called *galaxies*. A *galaxy* is a huge collection of stars, dust and gas. Galaxies usually contain several million to over a trillion stars and can range in size from a few thousand to several hundred thousand light-years across. Wow, that's huge! In fact, considering a light year is 5,880,000,000,000 miles across (that's



## Character Challenge:

**Discernment- being able to sharply perceive or judge**  
(Proverbs 2:1-5; Proverbs 3:1-18; John 7:24)

**Observance- being watchful, paying attention, obedient**  
(Proverbs 8:34; Matthew 25:44-46; Matthew 26:41; 1 Corinthians 16:13)



five trillion, eight hundred and eighty billion), we can't even comprehend how enormous a galaxy that size is!

Scientists estimate there are hundreds of billions of galaxies in the universe. Galaxies come in many different sizes, shapes and degrees of brightness. Like stars, they are found alone, in pairs, or in larger groups called clusters. Pictured on the lower right of page 1 is a magnificent *spiral galaxy*.

Among the other spectacular wonders in the universe are *nebulas*. A *nebula* is a cloud of gas and dust in space. The word *nebula* comes from the Latin word for "cloud". Some *nebulas* are regions where new stars are being formed, while others are the remains of dead or dying stars. The nebula photo here on the left shows a brilliant "light echo" as it lights up stellar dust around a red Supergiant Star.

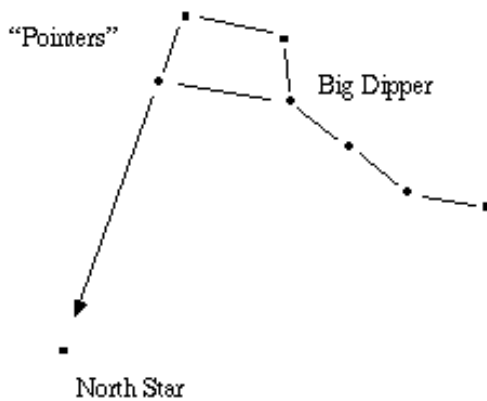
With the Hubble telescope we are able to see stars, galaxies and nebulas in the vast regions of space. By capturing light from varying distances, the Hubble enables us to view some of these objects even as they were forming in the distant past- closer to the time when God created them. Isn't that amazing! Astronomers use the speed of light to measure how far away things are in space. They use a unit called the *light-year*. A light-year is the distance that light can travel in one year, or about 5,880,000,000,000 miles.

We know that light travels at a speed of 186,000 miles per second in empty space. That's about seven times around the Earth in one second! Now that's fast! Using the speed of light as a measurement, scientists have estimated the nearest star to us is about 4.3 light-years away. Our galaxy, the Milky Way, is about 100,000 light-years across, which means that light takes that long to travel from one end to the other. And the nearest large galaxy, Andromeda, is 2.3 million light-years away. Amazing! Our minds can't even comprehend just how massive God's magnificent universe is. But the Hubble telescope has helped us to better understand His awesome power as Creator God!

## Did you know?

You can use the stars to tell directions at night. The North Star, or Polaris, is usually 1-2 degrees east or west of true north.

## Fun Tip about the "Big Dipper":



You can find the North Star by lining up the two stars that form the outer edge of the *Big Dipper*. The *Big Dipper* is a group of stars within the constellation *Ursa Major* (Great Bear).

### Finding the North Star:

1. Locate the Big Dipper in the northern sky.
2. As shown in the diagram, locate the two "Pointer" stars that form the outer edge of the Big Dipper.
3. Draw an imaginary line straight through the two stars of the dipper's edge and out beyond it. The line will point very close to the North Star. Congratulations, you now know how to find the North Star!

## Bible Quest : Story of the Magi- Ancient Navigators

## Scripture Memory Challenge:



(Matthew 2:1-16)

Long ago, ancient people used the stars to navigate as they traveled from one place to another. Often this was by foot, on horse back, or by caravan. The word *navigate* means “to set a course”.

The Magi were among such ancient travelers. They were very wise and powerful men who lived in Biblical times. In fact, the Bible tells a story of how the Magi followed a very special star to locate the baby Jesus some time after His birth. You might remember hearing stories of the “wise men” at Christmas time. Well, that’s exactly *who* the Magi were.

**Nehemiah 9:6: “You alone are the LORD. You made the heavens, even the highest heavens, and all their starry host...” (NIV)**

They were very wise men who were skilled at many things. Among these was studying the stars. The Magi were very wealthy and even brought kings to power with their riches and influence. Hundreds of years earlier, prophets of God had foretold the birth of baby Jesus, the Christ child—one who would be born “King of the Jews”. Though the Magi were not Jews but men who came from the East, they somehow knew of Jesus’ birth. Having journeyed a great distance for many months, the Bible tells us they arrived in Bethlehem and found baby Jesus with his mother and father. They bowed down and worshipped Him and gave Him costly gifts of gold, frankincense, and myrrh.

### Did you know?

**In the Old Testament, the prophet Daniel was chief governor over the Magi for King Nebuchadnezzar.**

The Bible doesn’t actually say how many Magi arrived to worship Jesus. But most stories tell of three wise men (or Magi). This is probably because the Bible mentions three kinds of gifts they brought to Jesus. History tells us there may have been more, maybe even many Magi, who traveled on horseback with large caravans of servants, animals, supplies, and great riches. Their gifts to Jesus, the Christ child, were probably worth more than we realize. The Bible tells us that Jesus and His parents, Mary and Joseph, were able to flee to Egypt to escape King Herod. Herod was a selfish and ruthless king who ruled over the Jews at that time. He wanted to take no chances that another king would take his throne. So he ordered all the baby boys two years old and younger to be killed. The gold the Magi gave to Jesus probably made it possible for Mary, Joseph and little Jesus to escape and travel to Egypt, as well as start a new life there.

For thousands of years, navigators like the Magi used the stars to chart their courses, as they traveled from place to place. Because the stars move across the night sky in set patterns throughout the days and months, navigators could chart them and use their courses to gauge time and distances. They learned to map their locations and use them for direction. Because the Magi were very familiar with the stars in God’s heavens, they were keenly aware when a special star appeared in the night sky. God placed this special star there to guide them and others to the place where His Son, Jesus Christ, would be born. Jesus was the “Coming Light” the constellation Orion had been a sign for. Through *Him*, God brought *salvation* and *Light* to the whole world!



## Activity Challenge: Making & Using a Star Clock

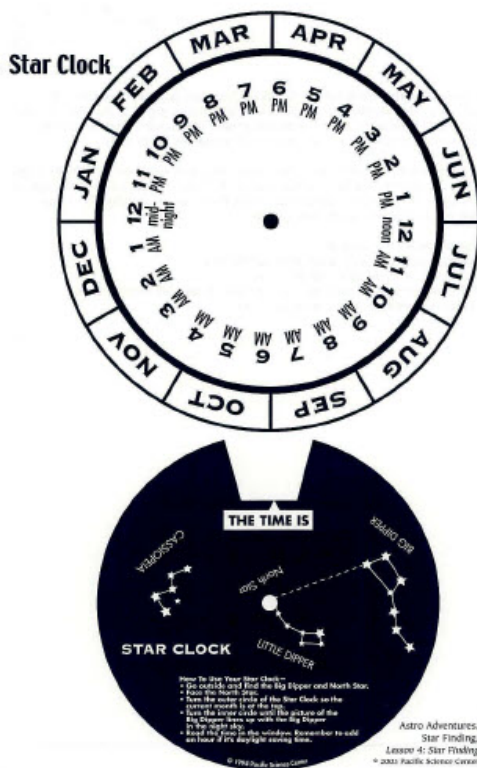
Our daytime understanding of time is based on the movement and position of the Sun. But did you know that you can use the stars to tell time at night? It's easy using the Star Clock described here.

### Materials:

- Printed Star Clock

### Instructions:

The Star Clock is a simple, easy-to-make aid that lets you tell time using the stars. The two parts for the Star Clock are sized to fit on a single letter-size sheet of paper. Print out the sheet, cut out the parts, and then join them as shown in the photo above using a paper fastener. If desired, you can glue each circle to construction paper or thin cardboard to add stiffness. That's it!



Once it's dark, go outside and face north, holding the Star Clock so the current month is at the top of the outer circle. Now turn the black disk until the small picture of the Big Dipper matches the real Big Dipper's position in the sky. The current time will appear in the cutout. Note: If daylight-saving (summer) time is in effect, you'll need to add one hour to the indicated time.

You can also use your Star Clock to determine where the Dippers and Cassiopeia will be in the sky at a specific time, say, 9 p.m. Make sure the current month is at the top, and then turn the black disk so that the indicated time is 9 p.m.

Also, by turning both disks together (so that the time you've picked stays the same), you'll be able to see how the Big Dipper appears in the sky at that time throughout the year. It's highest in the sky, perched directly above Polaris, in early evening during May and June. But during November and December, the Dipper is down low and may be too near the horizon (or below it) to be seen. So, instead, look for Cassiopeia's W high up.

Be sure that you're facing north when using the Star Clock. If you're unsure where north is, simply note where the Sun sets and then turn to your right — now you're looking north, more or less.

Developed by the Pacific Science Center, the Star Clock is one of many excellent activities for the whole family found in Astro Adventures, a space-science curriculum for grade-school students. © Dennis Schatz and Paul Allan of Astro Adventures.