

How to Prepare a Unit Study

What is a unit study?

A unit study is taking one topic, in this case Creation astronomy, and interrelating all the other subjects into a unified teaching approach. In other words, while studying the topic of Creation astronomy, the children will *read* astronomy books and research materials, *write* assignments relating to what they've read, *spell* words they may have had difficulty reading or writing, *learn* vocabulary words dealing with astronomy, do *math problems* based on scientific principles, read and research *historical periods* relating to astronomy and time periods in which noteworthy evolutionists or Creation scientists lived, study *geographical locations* of scientific discoveries and Biblical events (i.e. what does the original Greek and Hebrew translation of the Constellations tell us?), create *art works* dealing with the constellations (such as drawing constellations depicting the original Greek and Hebrew definitions) and for *music* play instruments that make sounds similar to those in nature. In other words, all the subjects will relate to the main topic. (The authors suggest you supplement grammar, phonics and math with other programs, where age appropriate.)

Does a unit study cover all of the topics I need to teach in every grade?

Yes and no! It depends on the grade level of your child and what your goals are for your home school. Many children know all they need to know for kindergarten by the time they are pre-schoolers. Thus, the kindergarten year is left free to implement unit studies on many different topics. Often, as the child progresses, because of all the reading research, projects and experimentation that he does, his learning will surpass what is generally considered "normal" for his grade level. Still, if you are concerned about standardized testing, the authors recommend you use these study guides as supplements to your core curriculum. However, in many cases, when homeschool students who have been taught with the unit study approach take a standardized test, they score in the 90+ percentile.

How do I begin planning?

The best place to start is with a calendar, paper, pencil and the *Teaching Outline* in the study guide. We have provided lesson plans for you. Use these or the blank one provided and pencil in your own ideas. Write out a rough outline of the points you want to cover. You may use the ones provided in each of the three grade levels or you may utilize them as starters in creating your own outline. Reading the Teaching Outline will familiarize you with the topic. As you write your outline or points you want to cover, leave room for additions; i.e. you may run across a book or topic that you want to include. Decide how long you want to spend studying the topic. What months are you considering? Is this time before a major holiday? If so, you may want to do a shorter unit. Is it the beginning of school, summer, or other longer period of time? If so, you may wish to do a more complicated unit or spend more time digging deeper into the topic you choose. Decide what subjects you want to incorporate and what days you will do each. For example, you can spend every day reading, writing, doing grammar and math, but perhaps science experimentation and history will only be done three out of five days. You may prefer a Mon.-Wed.-Fri. / Tues.-Thurs. type of routine, or if you take Fridays off, your schedule might be Mon.- Wed. / Tues.-Thurs. (See scheduling on page seven.) Remember, it's up to you.

How do I begin using the Creation Study Guides?

It doesn't take much time to plan, especially with our study guides. We've done much of the planning and research for you with an outline for each grade level and a *Teaching Outline* for referencing technical material. The grade level teaching outlines are geared for each of

three levels; K-3, 4-8 and 9-12. They are not as extensive as the Teaching Outline in the front of the book and younger grades will study less content than older students. The Teaching Outline is specifically geared for the parent, or older student, as preparation for understanding the topic. It will give you the necessary information and background necessary to teach the unit. We encourage you to read portions aloud to younger children and have older children read them alone or with you.

Plan to spend approximately six to eight weeks for this study. We have provided lesson plans which are sketched out for you with ideas for each week. You may take as long as you wish. (We feel this is an excellent preparation to counter secular materials where it is almost impossible to avoid the evolutionary viewpoint.)

If you have older and younger children, try to find a middle ground as a starting place. Look through the activities and suggested assignments. Check off the ones that interest you in each subject area and pencil into the provide lesson plans. Decide which supplemental books you will need and plan on obtaining them. Interlibrary loans are able to obtain books from private as well as public libraries. We don't suggest you use every book we recommend. We usually list a greater number of books than necessary so that if you can't obtain one particular book you may be able to find another. Use topic related books when you can not obtain the ones we recommend.

How do I test to find out if my children have learned what I am teaching with the unit approach?

We have found that working closely with our children tells us all we need to know about what they know and don't know. By reading materials orally and then verbally questioning them, we know what needs review and what doesn't. They do many hands on activities that reinforce previously read materials. For example, in *Creation Science: A Study Guide to Creation!* there is a discussion on evolutionary principles. One of the points made is how evolution violates the second law of thermodynamics. That in itself sounds very dry and scholarly, yet a follow-up activity presented after the discussion is the "Entropy" experiment which is a very visual way to reinforce what they have learned. If the children can explain it to you, then you know they understand the concept. After reading all this, if you feel the need to create tests to find out what they know, feel free to do so! You could easily generate oral tests for the little ones, and essay questions for the older ones. One of the great things about homeschooling is the freedom to teach as you wish.

What about co-oping?

Co-oping is teaching a unit study with another family (or several families) and taking time once a week, or more, to work together on projects, experiments or activities for the entire day. Each family focuses on the unit materials at home during the week, and the co-op is a way of reinforcing the subjects taught at home. This unit lends itself well to co-ops. There are many experiments that would be fun to do as a group. Still, they can be done just as easily with a single family. The choice is up to you.

Try not to get bogged down and become a slave to a schedule (recipe for disaster!). While Jill was living in Washington state, a friend of hers was doing a unit on Washington state history. They traveled all over the state visiting historical sites. After a boat ride to see the Orcas migrating, they were so intrigued, they visited the Sea-aquarium and beaches, etc. Soon they realized they were no longer doing a unit on history but one on marine biology. That's they way unit studies should flow. Get ready to have a great time, and better yet, teach in a way that makes great memories that are remembered year after year after year...

Scheduling and Planning

For those of you who would like help planning a schedule for this study, I have drawn up some thumbnail sketches below to use as a basis for planning. Please use these loosely and feel free to add or delete anything you wish. Notice I have not included times. This is intentional, as there is no way I can know what will work for you and your family. The next page contains a blank weekly lesson plan sheet. Before each grade level you will find weekly lesson plans if you wish for a more planned chart.

Schedule A:

Monday	Tuesday	Wednesday	Thursday	Friday
Bible/Prayer	Bible/Prayer	Bible/Prayer	Bible/Prayer	Bible/Prayer
Suggested reading	Language Arts activities	Suggested reading	Language Arts activities	Suggested reading
Vocabulary/ Spelling and Grammar	Math reinforcements	Vocabulary/ Spelling and Grammar	Math reinforcements	Vocabulary/ Spelling and Grammar
Science activities	Geography/History	Science activities	Geography/History	Science activities
Art	Music	Art	Music	Art

Schedule B:

Monday	Tuesday	Wednesday	Thursday	Friday
Bible/Prayer	Bible/Prayer	Bible/Prayer	Bible/Prayer	Bible/Prayer
Suggested reading	Math reinforcements	Suggested reading	Math reinforcements	Suggested reading
Language Arts activities	Vocabulary/ Spelling and Grammar	Language Arts activities	Vocabulary/ Spelling and Grammar	Language Arts activities
Geography/History	Science activities	Geography/History	Science activities	Geography/History
Finish activities	Music	Finish activities	Art	Finish activities

Schedule C:

Monday	Tuesday	Wednesday	Thursday	Friday
Bible/Prayer	Bible/Prayer	Bible/Prayer	Bible/Prayer	Bible/Prayer
Math textbook	Math textbook	Math textbook	Math textbook	Math textbook
Reading/Phonics program	Reading/Phonics program	Reading/Phonics program	Reading/Phonics program	Reading/Phonics program
Suggested reading	Math reinforcements	Suggested reading	Math reinforcements	Suggested reading
Language Arts activities	Vocabulary/ Spelling and Grammar	Language Arts activities	Vocabulary/ Spelling and Grammar	Language Arts activities
Science activities	Geography/History	Science activities	Geography/History	Science activities
Music	Art	Music	Art	Music

Lesson Plans

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Subject	Monday	Tuesday	Wednesday	Thursday	Friday
Bible/Religion Studies					
Astronomy Teaching Outline					
Reading Selection					
Vocab/Spell/ Grammar Language Arts					
Math Reinforcement					
Science Activities and Experiments					
Geography/History Ideas					
Art/Music					

LA= Language Arts
TS= Teacher Selection

CR= Creation Resource

Teaching Outline

I. THE SCIENTIFIC STUDY OF ASTRONOMY

The Ancient Astronomers — The Oldest Scientists

Astronomy is the oldest science with a history of thousands of years. Ancient astronomers were drawing phases of the moon thousands of years ago. Caves in Spain have been found that contain paintings of the changes in the phases of the moon. In various parts of Europe, stones have been set up as astronomical observatories, the most famous being the one at Stonehenge. The arches of these stone observatories mark the rising and setting of the sun and the moon and determine the seasons by the movement through these arches. Long before the invention of the telescope, astronomers were diligently studying the night skies. The earliest records are on some 3000-year-old Babylonian clay tablets used to record the movements of the sun, moon and planets. Some of these clay tablets were precise astronomical tables used to accurately determine the eclipses of the sun and moon.

The Greeks — The ancient Greeks thought that the earth was flat. Around 500 B.C. a mathematician named Pythagoras had a theory that the earth was a sphere and the stars were in a sphere around the earth. He also thought that the earth traveled around a central fire once a day. Aristotle and Ptolemy both thought that the earth was at the center of the universe and that everything else revolved around it.

Nicolaus Copernicus (1473-1543) — Copernicus was a Polish astronomer who was the first to explain that the planets moved around the sun in circular orbits. He is known as the Father of Modern Astronomy. His discoveries were all made without the aid of a telescope! Copernicus published his findings May 24, 1543.

Tycho Brahe (1546-1601) — Brahe was a Danish astronomer who worked under the King of Denmark and was able to make detailed records of the movements of the stars and planets. Even though he believed that the earth was at the center of the universe, he was able to provide tables of planetary motion and the position of 777 fixed stars. He hired Johannes Kepler as his assistant a year before he died. (The New Book Of Knowledge, s.v. "Astronomy")

Johannes Kepler (1571-1630) — Kepler benefited from working under Tycho Brahe and he improved Copernicus's idea of planetary motion. He discovered that the planets orbited the sun in elliptical orbits rather than circular ones, and he came up with the Laws of Planetary Motion. Being a Christian and a mathematician, Kepler believed that God used mathematics to design the universe with its orderliness and precision.

Galileo Galilei (1564-1642) — When Galileo heard of the invention of the telescope, then called a spyglass, he wanted one to help him with his study of astronomy,

so he built one. With his telescope he discovered that Jupiter had moons and that Venus went through phases and therefore had to revolve around the sun. He noticed spots on the sun that appeared to move from day to day, and that led him to the conclusion that the sun was turning on its axis.

Isaac Newton (1642-1727) — An English scientist, mathematician and astronomer, Newton invented the first reflecting telescope. Through mathematics, Kepler came up with the law of universal gravitation to explain the orbits of the planets around the sun. He also proved mathematically that Kepler's laws of planetary motion were correct. (*The New Book Of Knowledge*, s.v. "Astronomy")

Modern Observers — Astronomers set up a brightness scale to assign stars a relative brightness called apparent magnitude. This scale is called the Pogson Scale where lower numbers indicate brighter stars and higher numbers indicate fainter stars. Our sun has a magnitude of 4.8 on this scale, and Sirius, one of our brightest stars, has a magnitude of -1.46. In order to calculate the absolute magnitude of the stars we would have to know the distance to them. (*Bliss 1991*)

Big Bang Theory — Modern Astronomers

The Big Bang Theory came about because man, in his sinful nature, had to find a way to explain the marvels and complexities of the universe without any Divine intervention. To admit the abrupt appearance of the universe, created out of nothing, by Special Design, would be the same as admitting that there was a God. Not wanting to believe there is a Creator, man came up with an explanation of the origin of the entire universe through natural physical laws. The problem with that is that the laws cannot always explain everything and one is left with the question of where the original matter came from, and how and why it exploded.

An Explanation — This theory of the origin of the universe states that all the matter in the universe was once condensed into an infinitely small dot that contained an infinite amount of mass and energy. This dot exploded (no explanation for the explosion is ever given) and the explosion formed all the chemical elements. By some unknown process, protons and neutrons were able to come together to form nuclei, and then by some other unknown process, these new nuclei were able to combine with the appropriate number of electrons. This explosion threw matter out into space for millions and billions of years. At some point, gravity became an effective force (no explanation is given for why particles of matter would start to attract together rather than continue to expand out into space) and matter began to clump into primordial swirling gases. These clouds of swirling gases formed the first protogalaxies which were cold and dark and without stars. From these *cold* protogalaxies came the galaxies: clusters of stars which are *very hot*, burning stellar objects. It is of interest to note that not all scientists agree with the Big Bang Theory, and many have never agreed with it at all.

Some History — In the 1920s, Edwin Hubble discovered that distant stars apparently had their light waves lengthened or shifted toward the red end of the spectrum.

This is what we now call the red-shift. Hubble interpreted this red-shift to mean that the stars were moving away from earth, and this moving away was responsible for lengthening of the light waves. Therefore, he concluded that the universe was expanding. He established a value known as the Hubble constant (which has never been agreed upon by astronomers and has never been constant). This constant is the ratio of how fast the galaxies are flying apart and how far away they are from earth. It is expressed in terms of kilometers per second per megaparsec of distance. David Branch, an astrophysicist from the University of Oklahoma says that there are these two loopholes in the constant; "...what's the right distance and what's the right speed." (Lemonick 1995)

Since 1921 the Lithium content of many old stars has been found to contradict the predictions of the Big Bang Theory. As one of the light elements, being number three on the periodic table, it should be present in greater abundance.

In 1931, Abbe' Lamaitre put forth a theory that the universe originated as a single particle of vast energy and near-zero radius called the 'primeval atom'. No explanation was given as to where the energy came from.

In the 1940s Hubble caused quite a stir when he announced that the universe was only two billion years old. Geologists, of course, believed that the earth itself was over twice that old.

In 1946 scientists working on the Manhattan Project postulated that a universal explosion lasting a few seconds could have produced all the elements we see today. This lost favor with other scientists, however, a decade later, when it could not explain how light elements could come together to form the heavy elements.

In 1948 Sir Fred Hoyle and a group of others were studying how to account for the excess of hydrogen in the universe. They came up with the 'steady-state theory' which suggests that matter first appeared in masses of hydrogen gas that exist in space where there are few stars, and that new matter is being created continuously. This is contrary to the First Law of Thermodynamics which states that energy, which is related to matter, cannot be created or destroyed.

In 1965 Robert Dicke and others discovered that the universe had a background temperature of three degrees Kelvin (that is three degrees above absolute zero). This was interpreted as the after glow of an initial explosion. There was no explanation as to why it would be a consistent temperature and not warmer toward the point of the supposed initial explosion.

In 1965 Sir Fred Hoyle did some mathematical calculations that 'proved' that a Big Bang would produce only light elements. This was widely accepted as the 'proof' of the Big Bang Theory. This was later proven false.

In the 1970s Astronomer William G. Tiff showed that red-shifts tend to occur at regular intervals and are evenly dispersed, like the rungs of a ladder, not smoothed out and even as would be expected if the universe were expanding. No one has ever seen the universe expanding; it is merely assumed as an interpretation of the red-shift. Many astronomers and physicists are beginning to wonder what the red-shifts really mean.

In the 1980s astronomical calculations showed that the detected matter in the universe is only 1% of the amount required to produce the gravitational attraction needed to form all the galaxies and clusters of galaxies, (even given vast amounts of

Creation Astronomy

Grades K-3

Objective: To study astronomy from a Biblical perspective through observation, comparison, research, and experiments.

Topics to study: The universe and how it began: Genesis vs. big bang theory, astronomers, lightyears, our solar system, stars, and constellations.

Outline

I. The Scientific Study of Astronomy

- A. Ancient Astronomers
 - 1. Copernicus
 - 2. Kepler
 - 3. Galileo
 - 4. Newton
- B. Big Bang Theory
 - 1. Explanation
 - 2. History
- C. Problems with the Big Bang
 - 1. Galaxy Clusters
 - 2. Comets
 - 3. Warm Planets
 - 4. The Sun
 - 5. The Moon
- D. Speed of Light
- E. Solar System

II. The Biblical Study of Astronomy

- A. The Heavens Declare the Glory
 - 1. The Milky Way
 - 2. Observing the Stars
- B. Gospel Message in the Stars
 - 1. Virgo
 - 2. Libra
 - 3. Scorpio
 - 4. Sagittarius
 - 5. Capricornus
 - 6. Aquarius
 - 7. Pisces
 - 8. Aries
 - 9. Taurus
 - 10. Gemini
 - 11. Cancer
 - 12. Leo

Lesson Plans

<i>Ancient Astronomers</i>

Subject	Monday	Tuesday	Wednesday	Thursday	Friday
Bible/Religion Studies	TS				
Astronomy Teaching Outline	Ancient Astronomers				
Reading Selection	AR	CR	AR	CR	AR
Vocab/Spell/ Grammar Language Arts	Assign 5-20 words from list or reading		Write or dictate sentences using words	Use sentences for parts of speech	Dictate or write paper on being an astronomer
Math Reinforcement		Choose K-3			
Science Activities and Experiments	Choose K-3		Choose K-3		
Geography/History Ideas		Locate Europe on World Map Name Continents		Ancient Explorers chart directions	
Art/Music		Sing Selected songs		Choose Art Activity	
Math: TS					
Reading Program: TS					

LA= Language Arts
TS= Teacher Selection

CR= Creation Resource: Read Selected Books from resource list or others
AR= Astronomy Resource: Other books that fit the topic

Vocabulary/Spelling and Grammar Ideas

K-3

Use the vocabulary words as spelling words. Here are some activities to help you incorporate the vocabulary words into your unit study.

- ◇ Have children use the words in sentences to show the meaning. Younger children can use the words in sentences or stories. They can dictate them to an adult or older child who can write the sentences for them. Then have them “read” their sentences.
- ◇ Have young children (K) pick out letters of the alphabet that they need to learn. Write the vocabulary words in large bold print on an erasable surface, or on paper. Have them circle the letter they are learning. (All the A’s, B’s, C’s, etc.) Be sure to add your own *basic* words to the list!
- ◇ Choose one or two of the children’s “best” sentences and have them recopy them using their neatest handwriting. (Give them a model to copy if they are just learning to print or write.)
- ◇ Use the sentences the child has written to label the parts of speech. Use colored pencils or markers for this activity. Color code each part of speech as follows:

Language Arts Ideas

K-3

These suggestions may help you with incorporating language arts into your unit study.

- ◇ Read *The Magic School Bus Journey to Space*. Have your children pretend they are students in Miss Fizzle's class. What would they do or say on each page? Have them draw pictures of themselves and write down their comments. Read the book again including their comments! (Do the same activity with any other book of interest.)

- ◇ Tape record the above activity with the additional dialogue and sound effects.

- ◇ Choose a paragraph from one of the books you are reading on astronomy. Write this paragraph neatly and have the children copy it. Dictate the paragraph to older children once they have learned to spell the words. Have them check their own papers. (This may need to be practiced more than once.)

- ◇ Use different constellations and the original meanings of their names. Inventing as many creative descriptions as possible, take turns describing a constellation and have the others guess which constellation it is. For example, for *Virgo*, "This constellation represents the Mother of Jesus. It is at the beginning of the Hebrew Zodiac

Math Reinforcement Ideas

- ◇ Have the children organize the planets from smallest to largest. Is this the true order in which they are found?

- ◇ Have the children categorize stars according to traits: super giant (very large and bright star), white dwarfs (almost burned out and dim), yellow giant (bright yellow star), etc. They can plot the results on a bar graph. (See *Voyage to the Stars* on reading list)

- ◇ “Count” the days of Creation. Compare them to our calendar. Do the days of Creation fit with the days of the week?

- ◇ Write down the number of miles from the Earth to the Sun. How many zeros are in the number? Can anyone walk that far? Why not? Walk one mile. How long did it take? How long does it take by car? Compare the various times.

- ◇ What is the distance light can travel in one year? Write down this number. How many zeros are there? What is the place value of each of the various digits?

Science Activities and Experiments

K-3

Doing science activities and experiments is lots of fun! Using the scientific method makes it easier to understand. The **scientific method** is a procedure used to do an experiment in an organized fashion. The point of the scientific method is to solve a problem or further investigate an observation. (See page 2) Once you ask the question make sure the children give you their **hypothesis** (or “guess” for the younger children). This is what they think will happen. If they have no idea, read or observe to further research the question. The children can write (or draw) their experiment using the scientific method. **Parental supervision necessary! Always use caution when doing any science projects or experiments. Never look at the sun!**

- ◇ Make a magnet. Stroke a large needle in one direction for several minutes on a bar or horseshoe magnet. Float the needle in a shallow container (margarine tub works well) of water. Which way does the needle point? The Earth has a strong magnetic field. You can show this by using a compass or anything that has been magnetized. Why doesn't the needle sink? (It does not break the surface tension of the water; this has nothing to do with the magnetic field!)

- ◇ Find out which way is North without a compass. Place a stick in the ground in an open space where the sun is shining. Place a large piece of paper, poster board or newsprint rolls (large rolls may be purchased

Geography/History

Ideas

K-3

- ◇ Make a large world map using large sheets of paper (computer paper taped together works well). Many newspaper companies sell newspaper remnant rolls for a minimal charge (\$1.00). Use pieces of yarn to outline the continents. Star places where early astronomers lived.
- ◇ Using the above map, locate and mark places where astronomy observation laboratories or telescopes are set up today. Why were these locations chosen?
- ◇ Study and read about the different astronomers and scientists that made major discoveries. Talk about their contributions. You can do a mini-play; pretend you are the scientist telling another person about a great discovery. Perhaps you are the first person the scientist told about his discovery. Tell how he acted, and whether he was excited. Do this with several people.
- ◇ How did early discoveries (such as the fact that the planets revolve around the sun) affect the thoughts of the day? Why were people affected?
- ◇ How was gravity discovered? Is this a true story? (*Telescope Power*)

Art/Music

K-3

Music

- ◇ Sing along with *Wee Sing Around the Campfire* (cassette with book)

- ◇ Write your own words using the Gospel message in the stars and set them to the tunes of the songs in *Wee Sing around the Campfire* or other familiar tunes.

- ◇ Sing “Twinkle, Twinkle, Little Star”. Which star (or stars) in the sky do you think the song is talking about?

- ◇ Play your choice of music and “twirl” around the “sun” the way the planets and moons do. One child can be the sun spinning clockwise and the others Venus and Neptune spinning counter-clockwise and traveling backwards!

Art

- ◇ Go on an *evening* nature hike and take a drawing tablet with you. Draw the things that you see on your walk. Try to find the best place to view stars. Keep a nature drawing book. Research each drawing with a nature book and label the pictures. (Bring a star chart with you!)

- ◇ Make different constellations out of clay dough (or anything else you

Creation Astronomy

Grades 4-8

Objective: To study astronomy from a Biblical perspective through observation, comparison, research and experiments.

Topics to Study: The universe and how it began, Genesis vs. big bang theory, astronomers, speed of light, solar system, stars, constellations, and the Gospel message in the stars.

I. Scientific Study of Astronomy

- A. Ancient Astronomers
 - 1. Greeks
 - 2. Copernicus
 - 3. Brahe
 - 4. Kepler
 - 5. Galileo
 - 6. Newton
- B. Big Bang Theory
 - 1. Explanation
 - 2. History
- C. Problems for the Big Bang Theory
 - 1. Galaxy Clusters
 - 2. Spiral Arms
 - 3. Comets
 - 4. Warm Planets
 - 5. The Sun
 - 6. The Moon
- D. The Speed of Light
 - 1. The Speed of Light Today
 - 2. The Speed of Light and the Six Days of Creation
- E. Solar System

II. Biblical Study of Astronomy

- A. The Heavens Declare the Glory
 - 1. The Milky Way
 - 2. Observing the Stars
- B. Gospel Message in the Stars
 - 1. Virgo
 - 2. Libra
 - 3. Scorpio
 - 4. Sagittarius
 - 5. Capricornus
 - 6. Aquarius
 - 7. Pisces
 - 8. Aries
 - 9. Taurus
 - 10. Gemini
 - 11. Cancer
 - 12. Leo

Lesson Plans

Astronomers

Subject	Monday	Tuesday	Wednesday	Thursday	Friday
Bible/Religion Studies	TS				
Astronomy Teaching Outline Ancient Astronomers	Ancient Astronomers	Ancient Astronomers			
Reading Selection	TS				
Vocab/Spell/ Grammar Language Arts	Assign 10-30 words from list or reading		Find articles in newspaper relating to astronomy		Review vocabulary
Math Reinforcement		What is a light year?			
Science Activities and Experiments	Ancient Astronomer Tables		Continue charting		TS
Geography/History Ideas		Research astronomers		Study geographical locations of Astronomers	
Art/Music		Music: Sounds in space		Use vocabulary words for word art	
Math: TS					
Literature					

LA= Language Arts
TS= Teacher Selection

CR= Creation Resource: Read Selected Books from resource list or others
AR= Astronomy Resource: Other books that fit the topic

Vocabulary/ Spelling and Grammar Ideas

4-8

Use vocabulary and spelling words interchangeably in the following activities:

- ◇ Use the words in sentences showing their meaning. Use the sentences the child has written to study the parts of speech. Continue the list below with any of the parts of speech you are currently studying. For example:

Underline a noun once.

Underline a verb twice.

Put a squiggly line under an adjective.

Put two squiggly lines under an adverb.

Put a box around a preposition.

Circle a pronoun with a "P" above it.

Highlight direct and indirect objects.

- ◇ Use colored pencils or markers for the grammar activity, assigning a color to each of the parts of speech.
- ◇ Choose the "best" sentences (usage) and have the children practice their handwriting skills by copying them.

Language Arts Ideas

4-8

- ◇ Begin an open-ended story and take turns adding to the story orally in a group. (This is especially fun with a group of different-aged children). For example: “It had always been my dream to be on a space-shuttle mission. As I checked the instrument panel which contained a computer display, I still couldn’t believe I had actually been chosen from thousands of students. There were two students and six adults on board; my job was to monitor the computer screen which was focused on the constellation Orion. It worked automatically, taking pictures as our space ship hurtled through the sky. All of a sudden...!”

- ◇ Use the above story with different variations. The constellation can be any of the ones you are studying; you can change the mission of the trip, or even the fact that the main character is a student.

- ◇ Use a paragraph from one of the books you are reading on astronomy to give dictation. Check for proper spelling and punctuation.

- ◇ Use the star chart in the back of this book and write a version of the Gospel in the stars for younger children, be sure to illustrate your book.

Math Reinforcement Ideas

4-8

- ◇ What are some mathematical facts relating to the planets? (For example, the earth spins around once every twenty-four hours.) Chart these figures.

- ◇ What is a light-year? What distances in space are measured in light-years? Convert the light-year measurements to miles and AU (Astronomical Units).

- ◇ Make a chart of the planets and compare their diameters, mass, density and time it takes to orbit the sun.

- ◇ Measure the diameter of the moon. The next time a full moon appears use a tape measure, hold it at arm's length and measure the width of the moon. (You may need some help in doing this). Repeat this in one hour. Did your measurements change?

- ◇ Study the principles of a parallax. (An apparent shift in position of a star against the background of space.) A small shift indicates a star is further away, a larger shift indicates a star is closer. This can be used to calculate distances of stars using geometry. (*How the Universe Works*)

Science Activities and Experiments

4-8

A good understanding of the scientific method is a must at this grade level! For an overview of the scientific method see the introduction page vi. Remember to formulate your question and hypothesis before you begin the experiment! At this age give the children flexibility to experiment. If they have an idea of something they want to try, give them the time to do it. It is helpful if they write out their procedures using the scientific method sheets (see page 167). In the event that they invent something, they will be able to duplicate the experiment!! **Always use caution when doing any science projects and experiments. Parental supervision necessary! Remember: Never look at the sun!**

- ◇ Measure solar energy. You will need several Styrofoam cups, black ink, red, blue, and green food coloring, water and a thermometer. Mix each food coloring and ink in a cup with approx. 50 ml. of water that is several degrees cooler than the outside air. Record the temperature. Place each cup in the sun and tilt it until the sun's rays shine into the cup. Make sure there are not any shadows. Record the time you turn the cup toward the sun. Leave the cups in the sun until the temperature (after stirring) reaches far above the temperature it was when you began. Record the temperature. Place cups in a shady place. When the temperature goes down, record the time that has elapsed. What was the change in temperature? How long was the water in the sunlight? To measure the area of water exposed to

Geography and History Ideas

4-8

- ◇ Study astronomers and other early scientists. Choose one astronomer and learn as much as possible about him. Pretend you are his apprentice. What did you find or discover? What was it like living in the ____ century? What was the favorite food, activity, or musician of the day?
- ◇ Map out the places where the scientists lived. Where was the most concentrated number of scientists found? Why?
- ◇ What obstacles did early scientists encounter? Were people willing to believe all of their claims? Why or why not? How were some of these scientists paid to continue their research?
- ◇ Find the southern and northern hemispheres on a globe. List the countries that are found in each of the hemispheres. Make a chart of the constellations that can be seen from the northern hemisphere and a chart of the constellations that can be seen from the southern hemisphere. Compare the two charts. Does one hemisphere see more constellations than the other? What unique feature is in both hemispheres? (Cross constellations are found in both, the Swan [Cygnus] in the north, and the Southern Cross [Crux] in the south!)

Creation Astronomy

Grades 9-12

Objective: To study astronomy from a Biblical perspective through observation, comparison, research, and experiments

Topics of Study: Genesis vs. Big Bang Theory, early astronomers, lightyears, our solar system, stars, constellations and the Gospel message in the stars.

I. The Scientific Study of Astronomy

- A. The Ancient Astronomers
 - 1. The Greeks
 - 2. Nicholas Copernicus
 - 3. Tycho Brahe
 - 4. Johannes Kepler
 - 5. Galileo Galilei
 - 6. Isaac Newton
- B. The Big Bang Theory
 - 1. An Explanation
 - 2. Some History
- C. Problems for the Big Bang Theory
 - 1. Galaxy Clusters
 - 2. Spiral Arms
 - 3. Comets
 - 4. Accretion Disks
 - 5. Lumpy Rings
 - 6. Warm Planets
 - 7. Venus
 - 8. The Sun
 - 9. The Moon
 - 10. The Trapezium of Orion
- D. The Speed of Light
 - 1. The Speed of Light Today
 - 2. The Speed of Light and the Six Days of Creation
 - 3. Evolutionists Address Their Problems
- E. The Solar System
 - 1. Sun, Moon
 - 2. Earth and Planets

II. The Biblical Study of Astronomy

- A. The Heavens Declare the Glory
 - 1. The Milky Way

Lesson Plans

Ancient Astronomers

Subject	Monday	Tuesday	Wednesday	Thursday	Friday
Bible/Religion Studies	TS				
Astronomy Teaching Outline Ancient Astronomers	Ancient Astronomers		Ancient Astronomers	Modern Astronomers	
Reading Selection	TS				
Vocab/Spell/ Grammar Language Arts	Assign 20-30 words from list or reading		Use words in sentences Research Astronomer		Study origins and meanings of vocabulary words
Math Reinforcement		Study Metric system and why it is used		Measure the diameter of the moon	
Science Activities and Experiments	Observe moon and stars for a month and chart them		Draw the constellations		Which constellation are seen in winter and summer
Geography/History Ideas		Study history of Astronomy		Write biography of different astronomers	
Art/Music		Draw constellations you see in the evening			
Math: TS					
Literature TS					

LA= Language Arts
TS= Teacher Selection

CR= Creation Resource: Read Selected Books from resource list or others
AR= Astronomy Resource: Other books that fit the topic

Vocabulary/Spelling List

9-12

These words are to be used as a base for your vocabulary and spelling list. If the words are unknown, have the child research them either in a dictionary, science dictionary, or encyclopedia.

aberration, optical	dark line spectra	luminosity	relative motion
absolute magnitude	diffraction grating	main sequence star	relative position
absolute zero	electromagnetic	mare	right ascension
absorption spectra	radiation/spectrum	Messier numbers	scattering
Andromeda galaxy	escape velocity	military clock	Schmidt telescope
apparent magnitude	extrapolate	nadir	setting circles
asterism	Greek alphabet	neutron star	solar prominences
astrophysics	gyrocompass	nova star	spectroanalysis
bright light spectra	helium	optical sensors	spectra
calcium	Horsehead Nebula	parsec	spectral lines
Cassegrain telescope	Hubble space	penumbra	spectrograph
catadioptric telescope	telescope	perigee	terminator
celestial equator	hydrogen	photon	thermonuclear reaction
cepheid variable	hyperbolic	photosphere	transit
circumpolar	infrared radiation	Pogson scale	troposphere
constellation	ionosphere	proper motion	Van Allen Radiation
classical cepheids	Kelvin	radiation	Belt
clock drive		rectangular coordinates	variable star

Vocabulary/ Spelling and Grammar Ideas 9-12

- ◇ Use the vocabulary and spelling words interchangeably in the following activities.
- ◇ A pre-test of spelling and vocabulary is a good indication of the words children already know. Dictate the words orally, or by audio cassette, and let them spell the words and write a brief definition.
- ◇ Have children look up the words (that they do not know) in a dictionary, science dictionary or encyclopedia and write the words and a brief definition of each. Then have them write the words in complete sentences using as many parts of speech as they can think of. Have them use a thesaurus.
- ◇ Use the sentences to label and diagram the parts of speech. Refer to a language book, if necessary.
- ◇ Test to see that they know the definitions of the vocabulary words. Use different formats: oral test, multiple choice, true or false, etc.
- ◇ Study the origins of the vocabulary words. What languages do they originate from? Were their original meanings the same as their meanings today? (You may not be able to find this information in a

Language Arts Ideas 9-12

- ◇ Research different astronomers. Pick an astronomer of interest. Write a biographical sketch of this person's life. What type of education was necessary for his degree? How many years of school, etc.? What was sacrificed (family, time, religion) in the quest for knowledge?
- ◇ Do the same activity as an autobiography. Another variation is to add fictionalized accounts.
- ◇ Write poetry, using different styles, about one of the constellations using the Gospel message in the stars approach.
- ◇ Use a paragraph from a book you are reading for dictation. Check for proper spelling, punctuation, and form.
- ◇ Research current day astronomers in the space industry (NASA). What type of education is necessary? What is the advantage/disadvantage of working with large industry?
- ◇ What is a junior astronomer? What type of equipment is necessary? What types of careers are available to someone who decides to go into the field of astronomy?

Math Reinforcement Ideas 9-12

- ◇ Learn about the metric system. Why is this used in scientific experimentation?
- ◇ Make a chart of metric equivalents, using inches, feet, yards, and miles converted to centimeters, meters, and kilometers. Also convert cups and gallons to liters and milliliters. Change ounces and pounds to grams and kilograms.
- ◇ What is the difference between a word equation and a symbol equation? How are these used in scientific experimentation?
- ◇ Study the angles of light which hit the earth and affect the season's temperature. (See Science experiment section) What geometric angles are used? What are the degrees of the angles?
- ◇ Measure the sun's diameter. (**Never look directly in the sun**) Tape two pieces of white poster board to two ends of a yardstick. Poke a small pin hole in the card on the top of the yardstick. Light rays from the sun will pass through the pinhole and make an image of the sun on the card at the bottom. Measure this image. Make a ratio of the diameter of this image to the length of the yardstick and the diameter of the sun to 93,000,000 miles. (*Projects in Space Science*)

Science Activities and Experiments

9-12

Remember to never, never look at the sun! See introduction page vi for scientific method information and page 167 for scientific method copy sheets.

- ◇ Discover the properties of gravity. Drop a ball several times from different heights (one foot, one yard, two yards, from a balcony, etc.) Measure the time by counting (or using a stopwatch). Does the ball fall at a steady speed under the force of gravity? Does it accelerate?

- ◇ When observing the stars in the evening you should cover your flashlight with red cellophane or paint the lens with red nail polish. Why is this important? What effect does the white light have on your eyes and your viewing of objects in the dark? (Why is red light used at night in submarines?)

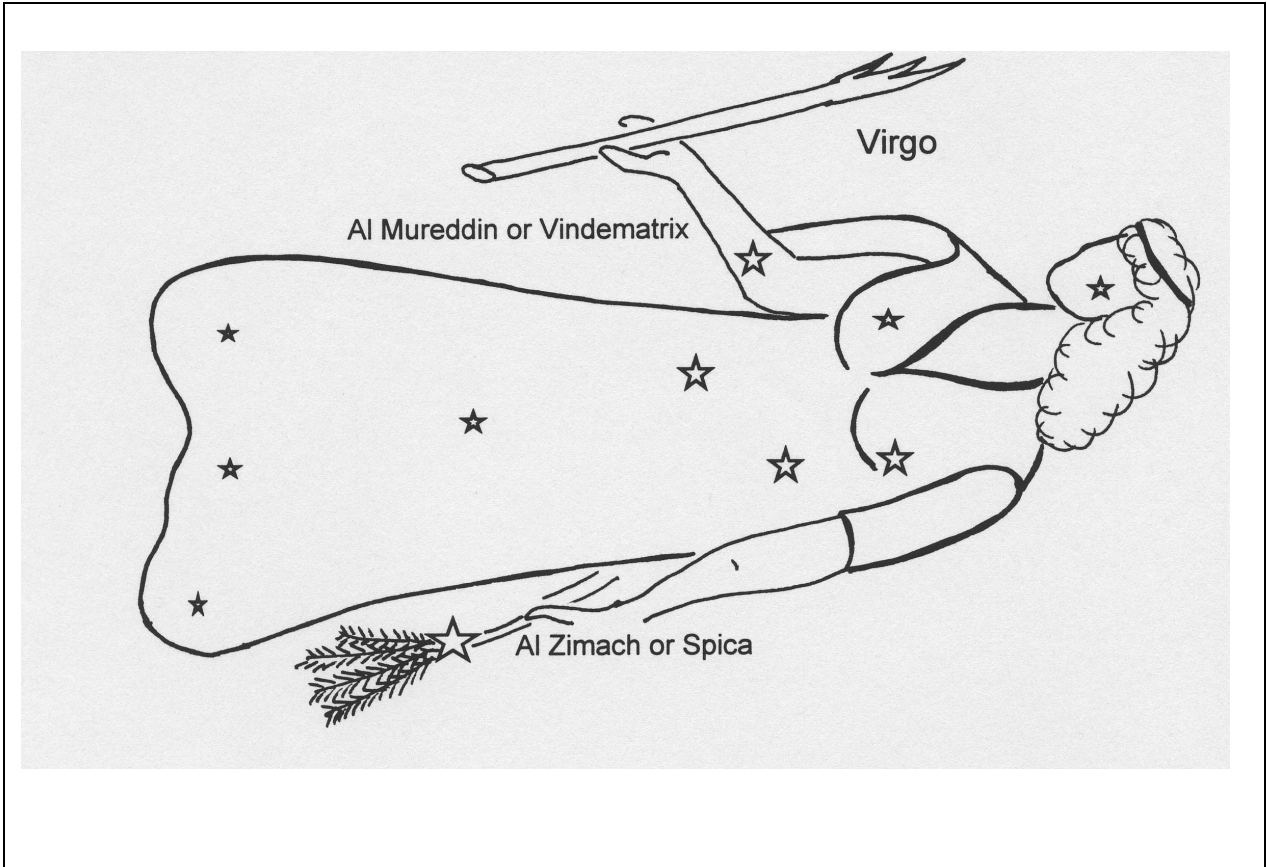
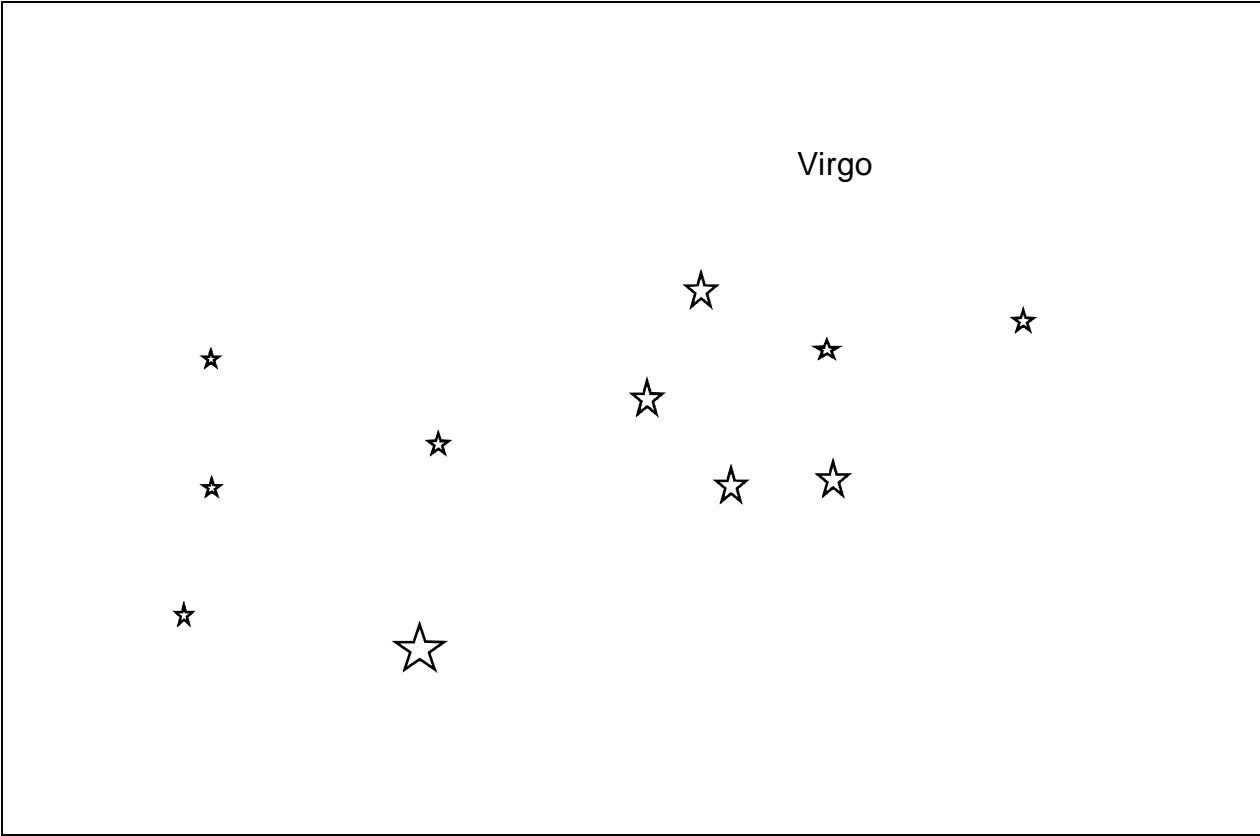
- ◇ Variation: Devise an experiment using a flashlight without a red cellophane covered lens, and one with. Use your family (or other willing volunteers) and survey the difference in what they can see using the different lights.

- ◇ Make a rocket! There are many good rocket kits in science magazines, nature stores, and toy stores. Better yet, research, design and build your own! Find out who first invented rockets, and what war rocket was developed into the Saturn V moon-launcher. What was the first reusable space vehicle? What is an impulse engine?

Geography and History Ideas

9-12

- ◇ Study the history of astronomy. Note the different beliefs through the ages. When did their (scientists) beliefs begin to change? What was happening in the world? How did the scientific beliefs change the thinking at the time? Compare the seventeenth through twentieth centuries.
- ◇ Study and read about different astronomers and scientists throughout history. Write a biographical sketch.
- ◇ Map where the astronomers lived. What do you notice about where they lived? Did the geographical location affect their discoveries?
- ◇ Compare the early findings about the origins of the universe through the centuries. Use a chart and list the changes in belief as they began to be stated publicly. What was happening in history during this time?
- ◇ Find out who was the first man in space and the name of his spacecraft. Who was the first American astronaut and the name of his spacecraft? List subsequent space flights and the astronauts involved. Variation: Was man the first to fly in space?



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Constellation star chart drawings by Jill Whitlock

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All scripture quotations are taken from The NIV Bible, Copyright 1983, Zondervan Bible Publishers.

This book is dedicated to the child in everyone who loves to lie on a
blanket and look at the stars...

Psalm 19:1-3

“The heavens declare the glory of God; the skies proclaim the work of His hands.
Day after day they pour forth speech; night after night they display knowledge.
There is no speech or language where their voice is not heard.”

Let's Do A Creation Astronomy Unit!

The study of the stars, or astronomy, is a very fascinating one. The exciting aspect of this unit is the story of the Gospel message in the stars. The original names of constellations, their meanings, and the Greek and Latin translations will be revealed. You will be amazed at the story as it unfolds showing the glory of God! You will easily spot the sections that Jill, the scientist, and Felice, the educator, have written! A special note: it was difficult to find Creation based astronomy books; therefore reading the Teaching Outline becomes of major importance. It will arm you with the facts from a Creationist's perspective to counteract the evolutionary claims found in many books.

Astronomy is the study of *space* and *the stars*. It is the study of *the sun, stars, constellations, and our galaxy*. In order for a scientific theory to be *valid*, it must be proven or disproven by testing or measuring. This is not possible with many of the theories or assumptions scientists have come up with to support claims about our universe. This book looks at science from a Creation standpoint. The stars were created in the distant past; scientists can at best only theorize as to their origin. Therefore, I consider faith to be an issue whether you believe in Creation or evolution. (For a study that features the origins of the earth, see *Creation Science: A Study Guide to Creation!*) In researching astronomy, you will find that various television shows, videos, books, articles, and computer programs almost exclusively deal with evolution.

This Astronomy study includes a *Teaching Outline*. It also includes an *outline for each grade level*. It is helpful to read the teaching outline to gain an insight into the material you will be presenting. We will explore the different *scientists*, and a *history of Astronomy*, along with the names of the original 48 *Constellations*. In order to get the most from this unit study, it is important to have a firm, basic understanding of Creation science, especially in the older grades, where an understanding of origins is desirable when comparing the two theories of origin (Creation and evolution).

To make this study useful to teachers of multi-aged children, it has been divided into three graded levels. The divisions are *K-3, 4-8, and 9-12*. These are only guidelines. Feel free to pull information from any of the grade levels that you wish.

Another feature is *subject area* divisions following the study outlines to give you some ideas on how to incorporate *reading, vocabulary, spelling, grammar, language arts, math reinforcements, geography, history, science activities and experiments, art, and music*. I have noticed that many astronomy books duplicate each other in experiments and ideas. I have included the *ideas* I have found to be the most helpful. Many of the *games* and *activities* are original and have been played by the children in science workshops I have given and at home. Some are old favorites revised a little to fit the occasion! Most *books* listed in the resource section are readily available, and there is also a guide to *astronomy videos, cassettes, and computer programs*. I have included a *materials list* and *field trip guide*. I have also included pages you may copy containing the *scientific method* to assist you with your experiments.

An important point in this science unit study is a correct execution of the *scientific method*. The *scientific method* is a procedure used to do an experiment in an organized fashion. *The point of the scientific method is to solve a problem or further investigate an observation*. The steps of the scientific method are *asking a question, researching, forming an educated guess as to what the conclusion will be, doing the experiment, observing the results, and stating a conclusion*. Ideally the conclusion should be the answer to the original question, but alas, things being what they are, this is not always the case!

When teaching a new scientific concept, make sure you have your children tell you in their own words what they have just learned. For example, let's say you are teaching them about the speed of light. (It is important to remember to tie in experiments and activities to the topics you are learning.) You may want to do an experiment showing that light "appears" instantly; to do this you may turn a flashlight on to demonstrate your point. Be sure to ask questions such as, "Does light travel quickly? How do you know?" They should be able to tell you, "Yes, light travels quickly because when the flashlight was turned on the light was there instantly." This is a quick check to make sure they are following the concept and not getting side-tracked by the fun!

Science is always fun, but astronomy has been a favorite of mine for years. It is especially exciting and challenging to see how the stars were meant to tell about the Gospel! It's time to wait until evening, unroll a blanket, get out the binoculars, lie back and study God's Creation. Have fun learning about astronomy!

Felice Gerwitz