

multi-age format
WONDERS *of* CREATION

THE NEW

ASTRONOMY

BOOK

DANNY R. FAULKNER

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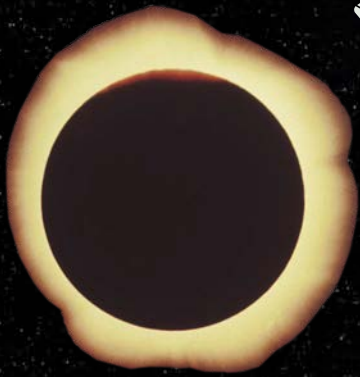
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Dedication

To my good friend, Huey Mills,
who has faithfully dedicated
much of his life to the Christian
education of children.

**Our best-selling
Wonders of Creation Series
is getting even better!**

The series is being developed with an enhanced educational format and integrated with a unique color-coded, multi-skill level design to allow ease of teaching the content to three distinct levels.

How to use this book

The New Astronomy Book has been developed with three skill levels in mind. These can be utilized for the classroom, independent study, or homeschool setting and also be customized per the abilities of the student.

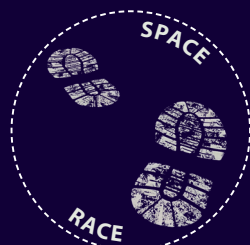
> Level 1

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It is recommended that every reader examine the text on the off-white background, as this is the basic skill level information related to the material. More proficient students and those with increased interest in the subject matter can then proceed to the more advanced concept levels. Additionally, the most advanced readers, after having read through all levels of the material, can use the upper-level material as a springboard for independent research and other educational assignments (research papers, oral reports, presentations, imaginative projects, etc.).

Whether using the material as a unit study, part of a curriculum, simply a book of interest, or even a reference book for other materials, *The New Astronomy Book* will engage students with amazing visuals and facilitate learning through helpful charts and diagrams where needed. As always, whether discussing futuristic missions or current understanding of the universe and its many features, God's place as Creator is honored within this informative study.



Look in the pages of the history of the race to space and the people who have influenced the world.

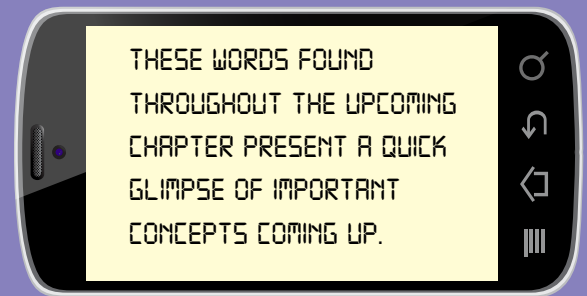
Level One

- Text on off-white background
- The basic level is presented for younger readers and includes the Wonder Why segments and visuals that capture student attention.



Level Two

- Text on purple background
- This middle level delves deeper into issues related to the universe, utilizing the Mission Log (words to know) to assist with vocabulary development and comprehension.



Level Three

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- This upper level incorporates more advanced concepts and theories related to all subject matter included in the text, as well as unique information that will inspire additional research or learning about advancements in space studies or man-led activities.



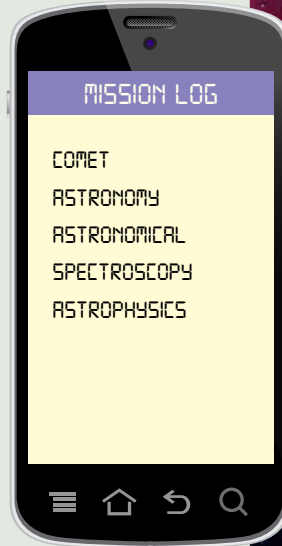
In the beginning God created the heavens and the earth.

Introduction

> Level 1

> Level 2

> Level 3



What is Astronomy? Astronomy is the study of heavenly bodies, things outside of the earth. Of course, this includes the sun, moon, and stars. We know from Genesis 1:14–19 that God made the sun, moon, and stars on day 4 of the creation week. Five of the planets appear as bright stars to the naked eye, so God probably made them on day 4 as well.

In fact, any objects giving off light in the sky would have been considered stars to ancient people. An example of this would be comets. The word “comet” comes from a Latin word meaning “hairy,” because ancient people thought that comets were hairy stars.

With the invention of the telescope four centuries ago, astronomers began to find many objects too faint to be seen with the eye alone. Some of these were clouds of gas and dust, while others were clusters of stars, and yet others were galaxies — huge collections of stars containing billions of stars. Biblically, we know that God made all of these on day 4.

One of the purposes for astronomical bodies that God ordained is the telling of time and using calendars (Genesis 1:14).

Indeed, the day, month, and year are defined in terms of the apparent motions of astronomical bodies. For much of history, astronomy primarily had this function, and so astronomers spent most of their time recording the movements of astronomical bodies for this purpose. Unfortunately, the God-given purposes for the astronomical bodies was soon perverted, as people began to worship the planets and stars rather than the Creator (Romans 1:25).

Men began to think that the sun, moon, and planets were gods, and so they thought that the motions of those bodies affected our lives. This developed into the religion of astrology. The religion of astrology is very different from the science of astronomy. Many people think that astrology is harmless fun, but God is not pleased with astrology or astrologers. Deuteronomy 4:19 forbids astrology, and Isaiah 47:13–14 pronounces judgment on astrologers.



*Can you bind the cluster of the Pleiades,
Or loose the belt of Orion?*

The invention of the telescope revolutionized astronomy, for it allowed far more detailed study than what was possible with the eyes alone. As telescopes improved, astronomers developed new instruments and new techniques, such as photography and spectroscopy. About a century ago, astronomers began to apply modern physics to the study of astronomy. They coined a new term, astrophysics, to describe this. Astrophysics has allowed us to discover far more about astronomical bodies than ever before.



The space program has played a key role in the great advancement of astronomy. Men have visited one other world, the moon. We have sent unmanned spacecraft to every planet to study them and their satellites, or moons. The earth's atmosphere hinders our view of astronomical bodies, so telescopes placed above the earth's atmosphere have greatly expanded our knowledge of astronomy.

Unfortunately, as we have increased our knowledge of the astronomical world, it seems that many people have lost sight of what is important. As Psalm 19:1 tells us, the heavens declare God's glory. That is one of the purposes of astronomical bodies. The study of astronomy ought to cause our hearts and minds to turn to Him who made the stars. The author of this book hopes that by reading this book you will dwell on the Creator and not solely upon the creature.



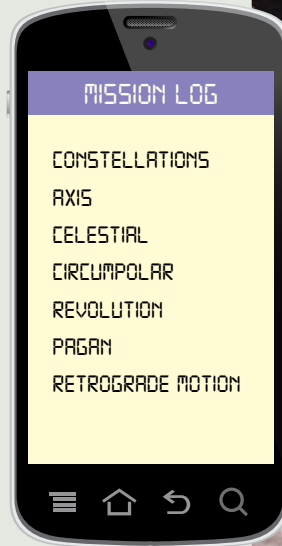
What's in a word like "comet"? *The American Heritage® Dictionary of the English Language* shares this word history: "Comets have been feared throughout much of human history, and even in our own time their goings and comings receive great attention. Perhaps a comet might seem less awesome if we realized that our name for it is based on a figurative resemblance between it and humans. This figurative name is recorded first in the works of Aristotle, in which he uses *komē*, the Greek word for "hair of the head," to mean "luminous tail of a comet." Aristotle then uses the derived word *komētēs*, "wearing long hair," as a noun meaning "comet." The Greek word was adopted into Latin as *comētēs*, which was refashioned in Late Latin and given the form *comēta*, furnishing Old English with *comēta*, the earliest English ancestor of our word *comet*."¹

The Night Sky

> Level 1

> Level 2

> Level 3



Probably the most obvious astronomical bodies are the stars. On a very clear, dark night, you can see thousands of stars, though the bright lights of cities may make this difficult. As you look at the sky, the stars naturally seem to group together into patterns. Ancient people saw this, and they began to give names to these patterns, and even to some individual stars. Some of the patterns faintly resemble people and animals, so ancient people named many of the patterns for various creatures. For instance, one group of stars resembles a bear, so we call it the “big bear.” These patterns are called constellations.

If you watch the stars for an hour or two, you will notice that some stars rise in the east, while other stars set in the west. The sun follows the same sort of motion each day. You probably know that the earth’s rotation on its axis causes the sun to move across the sky.

If you guessed that the earth’s rotation also causes stars to move across the night sky, you would be correct.

If you watch the motion of the stars carefully, you will notice something different from the sun’s motion.

Toward the north, the stars do not rise or set. Instead, they move counterclockwise in a circle around the sky. Near the center of that circle is one star, the North Star (or Polaris). The earth’s rotation axis points almost directly at the North Star, so as the earth rotates, the North Star does not appear to move. Actually, the North Star does move in a small circle, because it is not exactly at the north celestial pole, the point at which the earth’s rotation axis points. The North Star and stars near it are always in the sky, neither rising nor setting. These are circumpolar (meaning “around the pole”) stars.

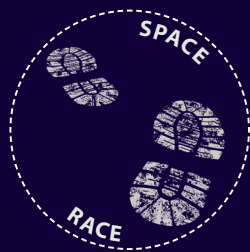
What we have just described is true only in the Northern Hemisphere. If you happen to live in the Southern Hemisphere, things will be a bit different. Circumpolar stars will be in the southern sky, and they appear to move clockwise around the south celestial pole. There is no bright star near the south celestial pole, so there is no pole star in the Southern Hemisphere.



The heavens declare the glory of God; And the firmament shows His handiwork.

If you go out the next few evenings, you will notice that the stars are in about the same part of the sky at the same time on previous evenings. That is, the stars look the same from one night to the next. The stars will shift slightly to the west each night, but it takes a week or two before you may notice that. However, over a month or two, the stars will shift enough to the west that some stars that you saw previously now are no longer visible. As stars disappear in the west, other stars replace them in the east. This shift is due to our annual revolution around the sun. This causes the constellations to change from season to season. For instance, in the Northern Hemisphere, Orion is a winter constellation, but Scorpius is a summer constellation. In the Southern Hemisphere, the reverse is true.

Seeing Stars While the stars that you see each night change and the stars change each season, the stars maintain their relationships to one another, and they always return in their seasons. Many ancient pagan cultures taught that the changing stars caused the seasons to change. Job 38:31–33 mentions Orion and other constellations. This chapter in the Old Testament also discusses seasonal changes. But unlike pagan cultures, the Book of Job gives credit to God for both changing stars and seasons. Job may be the oldest book in the Bible. We don't know when Job lived, but he might have lived 4,000 years ago. Yet, when Job looked at Orion, he saw about what we see today when we look at Orion. In a sense, this gives us a direct connection to Job. More importantly, it ought to give us a direct connection to the God who made both the stars and us.



Rockets Race to the Red Planet!

Plans are already underway in Russia to construct a super-rocket for manned flights in order to beat the United States to Mars by 2030. The rockets are being engineered to lift 120 tonnes (132 tons) in order to rival NASA's new SLS rocket program (artist concept, right), which has test flights planned for 2017. There are also reports that Russia plans to establish a lunar base on the moon for long-term missions and study.²



What are NEOs? NEOs, or Near Earth Objects, are comets and asteroids that are close to our planet, and in being so close may pose a potential threat. Researchers and teams with NASA have been studying NEOs for years, trying to document their paths and potential impact to our planet. On May 3, 2014, an asteroid the size of a bus managed to get closer to Earth than even our planet's moon, having only been detected a few days before on April 28th. While many of the largest NEOs have been documented, smaller asteroids and comets are not always easily seen.³



We don't know who invented the constellations. Many of their names have transferred from culture to culture. We get our constellations from the ancient Greeks, who in turn got them from the ancient Egyptians. The ancient Egyptians got their constellations from the ancient Babylonians, though it isn't clear where the Babylonians got their constellations. It appears that they likely originated at about 35° latitude north around 2300 B.C. This is very close to the biblical location and date of the Tower of Babel. It makes sense that the constellations originated about that time and then spread around the world as the people dispersed after God's judgment at the Tower of Babel. Further evidence of this is that many cultures around the world have similar constellations. For instance, the big bear is common to the ancient Near East, tribes of northern Europe, and native North Americans.

We don't know what the purpose of the constellations originally was. The names and meanings probably are garbled. There is an idea that God originated the constellations, or that Adam or his son, Seth, invented them.

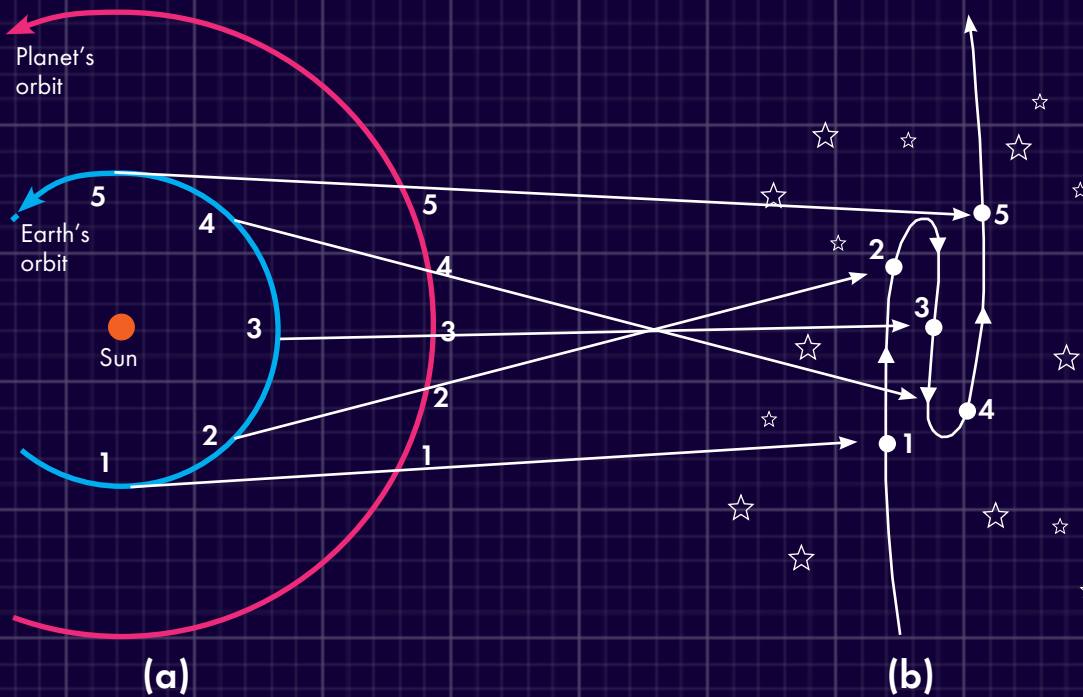
The supposed purpose of this was to teach the gospel before there was the Bible. However, there are many problems with this theory.

While the stars remained fixed, seven bright objects don't. From night to night the moon travels eastward among the stars. It takes one month to complete one cycle around the earth. This results from the moon's orbit around the earth. In a similar manner, the sun appears to move from west to east through the stars. However, the sun's motion is much slower, taking one year to trek once around the sky with respect to the stars. Of course, this is due to the earth's revolution around the sun. (Rotation is circular motion around an axis that passes through the center of a body, while revolution is circular motion around another body.)

This is the reason why the stars that we see change from season to season. Five planets appear as bright stars in our sky. They are Mercury, Venus, Mars, Jupiter, and Saturn. Being so bright, the ancients knew these planets, and they named them. Uranus and Neptune generally are too faint to see with the naked eye, so they weren't discovered until after the invention of the telescope.



Retrograde Motion The planets normally move eastward through the stars as the sun and moon do. This is the combined motion of the earth in its orbit and the orbit of each planet. However, a planet occasionally appears to move in reverse, that is, they sometimes move east to west among the stars. Astronomers call this retrograde motion. What causes retrograde motion? In the case of superior planets, those with orbits larger than the earth's, retrograde motion happens when the earth passes the planet while the earth moves more quickly along its smaller orbit. A similar thing happens when you pass another car on the highway. While passing, the other car appears to move backward, even though it is moving forward the entire time. The inferior planets are Mercury and Venus. They have orbits smaller than the earth's. We see them retrograde when they pass us moving more quickly in their orbits. As we shall see, the ancient Greeks had some difficulty explaining retrograde motion.



On this illustration (a), the pink line points of 1 to 5 correspond with the position of the object each time it is viewed from the five points on the blue line, representing points of viewing from Earth. Notice the difference in size of the orbit represented by the line. Notice how from points 1 to 2 the planet appears to move forward, but between points 3 and 4 it appears to move backward. By the time the planet reaches point 5, it appears to be moving forward again. The apparent backward motion between points 3 and 4 is retrograde motion.

