Title/Author: *The Moon, Eye on the Universe* by Niki Walker

Suggested Time to Spend: 10 Days (Recommendation: one session per day, at least 20 minutes per day)

Common Core grade-level ELA/Literacy Standards: RI.1.1, RI.1.2, RI.1.3, RI.1.4, RI.1.5, RI.1.6, RI.1.7; W.1.2, W.1.8; SL.1.1, SL.1.2, SL.1.4; L.1.1, L.1.2

Lesson Objective:

Students will listen to an informational text read aloud and use literacy skills (reading, writing, discussion, and listening) to understand more about the moon.

Teacher Instructions

**Before the Lesson**

1. Read the Big Ideas and Key Understandings and the Synopsis below. **Please do not read this to the students**. This is a description to help you prepare to teach the book and be clear about what you want your children to take away from the work.

Big Ideas/Key Understandings/Focusing Question

What does the author want us to know about the moon? The moon is a mystery, but it impacts life on Earth.

How does the author use diagrams to help you gain information? The author uses diagrams and pictures to help the reader understand the vocabulary and theories about the moon.

Synopsis

People have always been curious about the moon. Myths and legends have been made up to explain what the Moon is, how and why its shape changes, and why it appears in different parts of the sky on different nights. After extensive studies, scientists can now describe the characteristics and trace the history of man's exploration of earth's nearest neighbor.

1. Read the entire book, adding your own insights to the understandings identified. Also note the stopping points for the text-inspired questions and activities. *Hint: you may want to copy the questions vocabulary words and activities over onto sticky notes so they can be stuck to the right pages for each chapter’s questions and vocabulary work. In addition prepare any other materials (e.g.: handouts, chart paper, markers) necessary for activities and tasks also related to each chapter.*

The Lesson – Questions, Activities, Vocabulary, and Tasks

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| **Questions/Activities/Vocabulary/Tasks** | **Expected Outcome or Response (for each)** |
| **FIRST READING:**  Read aloud the book, *The Moon, Eye on the Universe* with minimal interruptions. Stop to provide word meanings or to clarify only when you know the majority of your students will be confused. | The goal here is for students to enjoy the book, both writing and pictures, and to experience it as a whole. |
| **SECOND READING:**  **Meet the Moon**  **Reread pages 4-5**  The author provides the reader with a lot of information about the moon. Provide at least one detail that the author wants us to know about the moon in this first chapter.  The moon is a **natural satellite** that orbits the earth. How fast does it move around the earth? Is that fast or slow? Explain how you know whether it is fast or slow. Turn and talk to your neighbor.  **Activity:**   * Prior to the activity, teacher should make a sign that children can hang from their neck to represent the sun, moon, earth, etc. * Explain that the **solar system** is made up of the sun, moon, planets and other heavenly bodies that orbit the sun. Call on a few students to represent the sun, moon, and Earth and guide them in a physical demonstration of how they **orbit** the sun. * Then, have the moon make an **elliptical** movement around the earth. * Give several students an opportunity to act this out. | * The author wants us to know that no one knows the exact materials of which our moon is made, or why it changes shape or locations. * Scientists believe that the surface of the moon is made up of **basalt**. (hard, dense, dark volcanic rock) * The moon is our nearest neighbor in space, about 239,000 miles from Earth.   The moon moves at a speed of 2,300 miles (3,683 km) per hour. That is very fast. |
| **How the Moon Was “Born”**  **Reread pages 6-7**  What does the author want us to know about how the moon formed?  Explain why the author uses sub-headings on pages 6 – 7. How does this help the reader?  What is the **fission** theory? Give examples from the text that describe this theory.    How is the giant impact theory different from the other ideas on how the moon was “born”? | No one knows for certain how the moon formed, so the author explains four different theories/ideas that scientists came up with about how the moon was formed. The four theories are: Solidifying Clouds Theory; The Fission Theory; The Gravitational Theory; The Giant Impact Theory.  The author uses sub-headings to help the reader understand and differentiate the 4 theories of how the moon was born or formed, because no one knows for certain how the moon was formed.  The fission theory suggests that when the Earth was still forming it was soft like pudding. It spun so fast that it started to bulge and a part of it flew off. That part hardened and became known as the moon.  The giant impact theory is the one that most scientists accept today. It is the only one that can explain why the Moon is made up of materials similar to those in Earth’s outer layer. |
| **What is it like on the Moon?**  **Reread pages 8-9**  Why is the sun unbearably bright on the moon?  Describe how the atmosphere acts as a shield and a blanket. Turn and talk to your neighbor.  **Activity:**   * The author tells us that the moon does not have an **atmosphere**. How does not having an **atmosphere** make the moon a dead world? Turn and talk to your neighbor. Use evidence from the text to support your answers. * Record student answers on chart paper. | The reason that the sun is so bright on the moon is because it does not have an **atmosphere** to act as a shield against the sun, as the Earth does.  Earth’s atmosphere is made up of a few different gases including oxygen that animals need to breathe and carbon dioxide that plants need. The Earth’s sky is the top layer of the atmosphere. It’s like a blanket because it stops the heat from leaving the Earth and the atmosphere also acts as a shield because it protects us from the Sun’s harmful rays.    **Activity:**   |  |  | | --- | --- | | Earth  (Atmosphere) | Moon  (Dead World) | | * air, water * blue dome * noisy * shield from the sun * **Gravity** (objects have weight) | * no air or water * starry blackness * quiet * no shield from the sun, HOT * No Gravity (1/6th of the weight) | |
| **The lunar landscape**  **Reread pages 10-11**  What does the surface of the moon look and feel like? Use evidence from the text to explain. | The surface of the moon is gray and brown. It is very dusty and feels like powder or sand. From far away, the moon looks like there is a face on it. These are actually bright and shadowy spots that are created by different features of the moon. |
| **Craters and maria**  **Reread pages 12-13**  How is a maria different from a crater?  Why was the maria named "by mistake"? | Marias are deeper than craters and look darker on the moon's surface. Maria were formed by meteorites that crashed so hard they also cracked the rocky surface of them moon that they caused lava to ooze out and fill them up.  The astronomer who first noticed them thought he was looking at seas of water and maria is the Latin word for seas. |
| **The Moon’s Movements**  **Reread pages 14-15**  Why does the author refer to the moon as a "busy body"? | The author refers to the moon as a busy body because it is always in motion, it revolves around Earth and it also rotates. |
| **Going through phases**  **Reread pages 16-17**  The text states that the Moon does not make its own light, describe what moonlight is.  Why is the Moon unable to make its own light like stars do?  Explain the reason that the Moon is compared to a giant reflector.  How did people keep track of time in ancient times and create a lunar calendar?  If you are looking at the different phases of the Moon and see the waning crescent, what can you conclude about the lunar cycle? | Moonlight is sunlight that has been reflected, or bounced off the Moon’s surface.  The Moon does not make light because it is mainly made of rock.  The Moon is compared to a giant reflector because we do not see the Moon unless sunlight bounces off of it.  In ancient times, people watched the phases of the Moon to keep track of time. By watching the phases of the Moon the people were able to create a lunar calendar.  The lunar cycle is about to end or about to begin. (either answer would be right) |
| **Lunar eclipses**  **Reread pages 18-19**  What happens when the sun shines on objects in space?  Explain how a lunar eclipse happens.  How many lunar eclipses are there in a year and how long do they last?  Look at the diagram on the top right of page 18, why can only people living on half of the earth see a lunar eclipse?  During an eclipse, where is the Earth located?  What happens when the sunlight passes through the Earth’s atmosphere during an eclipse?  On page 19, why did the author give the bottom paragraph the title **Big Red**? | When the sun shines on objects in space it cast shadows just as things do on earth.  A lunar eclipse happens when the Moon moves into Earth’s shadow and the shadow darkens the Moon.    There are about two to three lunar eclipses each year and they last up to four hours.  A lunar eclipse can only be seen on a clear night. The people that are on the dark side of the Earth will see the lunar eclipse which helps the reader understand that it means the night time.  During an eclipse, the earth is located between the Sun and the Moon.  The atmosphere bends the sunlight separating it into different colors.  The author gave this paragraph the title Big Red because the whole paragraph describes how the red light is the only one that can reach the Moon. |
| **Blocking out the sun**  **Reread pages 20-21**  What are the three types of solar eclipses?  After discussing the diagram on the right top of page 19, what can be inferred about the effects of a solar eclipse?  What is the size of the Sun in comparison to the Moon?  Why is the Moon’s orbit around Earth elliptical and not circular? | The three types of solar eclipses are partial, total, and annular.  It can be dangerous to your eyes if you look at it.  The Sun is 400 times the size of the Moon.  If its orbit were circular, the Moon would always be the same distance from the Earth. Its oval orbit takes the Moon farther from Earth at different times than at others. |
| **High tide, low tide**  **Reread pages 22-23**  Explain the difference between **high tide** and **low tide**.  In this chapter the author tells us how gravity affects oceans and lakes. Water levels rise and fall every day.   * Display the picture on page 23 under the document camera. * Turn and talk to your neighbor about what you notice on the picture. * Chart student responses. See sample chart.   **Activity**   * Students form a circle in a large area. This could be in the classroom, on a lawn, or if necessary, on the playground. * Students sit crossed-legged with hands holding the next person’s elbows to form a strong circle. * One person is the moon and moves around the outside of the circle. The circle represents the waters of the earth. As the moon passes behind the students (water), the waters bulge (lean) toward the moon, and then into the center as the moon passes. As the moon moves, the students that are opposite the moon lean away from the moon (this represents water bulging out on the opposite side of the earth) and then they lean into the center as the moon passes. * Have the moon stop, and let the class see where the high tides are (next to the moon and at the opposite side of the circle). Then the moon continues to circle. Have the moon stop at several points in the circle and let the class see where the high and low tides are in relation to the orbit of the moon. (Low tide will be at the sides halfway between the high tide bulges.) * The moon can then circle the earth several times so the rhythm of the passing of the moon and the bulging of the waters is experienced by the class. Before ten minutes are up, student should have a feel for how the moon affects the tides.   Wrap up today’s discussion by having students participate in a **Quick Write** about their understanding of high and low tide on paper to be displayed. | Water levels rise and fall every day. These different water levels are called high tides and low tides.   |  |  | | --- | --- | | **High Tide** | **Low Tide** | | Only see grass | See a wall | | Floatie is on water | Floatie not on water | | Water is up to the deck | Water is below the deck |   Sample Quick Write about their understanding of high and low tide on manila paper to be displayed.  **Sample Quick Write**  Water levels rise and fall every day.  These different water levels are called high tides and low tides.  As the moon moves around Earth, its gravity pulls the water in our oceans and causes tides. The water in oceans and lakes rises during high tides and lowers during low tides. |
| **Exploring the Moon**  **Reread pages 24-27**  What did the United States and the former Soviet Union launch into space? Why?  What did the spacecraft do once in space?  How did NASA decide where Apollo should land?  How did people around the world know that Americans had landed on the moon?  Who was the first person to step on the moon?  How much time did the astronauts spend on the moon?  **Activity**  As a class list the items astronauts wear and the reason they wear these items. Chart your answers with the class. | The United States and the Soviet Union launched spacecrafts called probes into space. They launched the probes to gather information to help scientists prepare to land astronauts on the moon.  The spacecraft took pictures and collected moon dust.  NASA used images from the probes to make a map and used that to decide the most interesting places for astronauts to land.  People around the world knew that Americans had landed on the moon because they were able to watch the trip on television.  The first person to step on the moon was Neil Armstrong.  The astronauts spent two hours on the moon.   |  |  | | --- | --- | | What do astronauts wear? | Why do they wear this? | | * Special suits * Oxygen Tanks (objects have weight) | * To protect them from the sun * To protect them from the dangerous rays * To provide pressure to keep their blood from boiling. * To breathe | |
| **Full-moon facts**  **Reread page 30**  Why does a full moon look larger near the horizon than when it is high in the sky?  How often can you see a full moon?  Is it possible for a full moon to appear more than once a month? Use details from the text to defend your answer. | The difference in size is only an optical illusion. The moon looks larger near the horizon because it is closer to things we can compare it to in size. Is this true?  You can see a full moon each month.  Yes, every two-and-a-half years, there are two full moons in a month. The second one is called a blue moon. |

Final Days with the Book - Culminating Task

(Note to Teacher: Consider providing 2 days to complete the culminating task.)

* *Using pictures and complete sentences, explain how the moon impacts life on Earth. Be sure to use correct capitalization, punctuation, and grammar. Also, include vocabulary words from the text when it makes sense. Be prepared to share and justify your thinking.*
* Criteria for Culminating Task:
  + A Proficient Response: The response shows a clear understanding that the moon impacts life on Earth. The response includes; that the phases of the moon impact what we can see from Earth, the position of the moon can block the sun causing an eclipse, and the moon controls the level of water in oceans and seas. The student is able to use, connect and explain vocabulary words: *phase, eclipse* and *tide.* The response includes pictures and labels that enhance the description.
  + An Advanced Response: The response shows a clear understanding that the moon impacts life on Earth and the student is able to use advanced detail and explanations beyond the expectations of the grade level. In addition to the usage of vocabulary listed above, the student is able to accurately explain how the phases of the moon impact what we can see from earth, how the position of the moon can cause an eclipse, and how the gravitational pull of the moon affects the tide.

Vocabulary

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| **Vocabulary words by section of the book** |
| **Meet the Moon**  P. 4 - satellite – A natural or artificial object that travels around a planet or moon  P. 4 - orbit – The path taken by a natural or artificial satellite in space; (v) to travel around a planet or star  P. 4 - basalt – Hard, dense, dark volcanic rock  P. 4 - ellipse/elliptical – An oval shape  P. 4 - solar system – The Sun, all the planets, their moons, and other heavenly bodies that orbit the Sun.  P. 4 – Myth - a story that was told in an ancient culture to explain a practice, belief, or natural occurrence  P. 4 – Legend -  a story from the past that is believed by many people but cannot be proved to be true |
| **How the Moon was “born”**  P. 6 - theory – A guess or judgment made to explain why something happens  P. 6 - fission – The splitting of a nucleus, or center, of an atom  P. 7 - gravity – The force that pulls people toward the center of a planet or moon |
| **What is it like on the Moon?**  P. 8 - atmosphere – The gases that surround a planet.  P.8 - shield - a large piece of metal, wood, etc., carried by someone |
| **The lunar landscape**  P. 10 - meteorite – a chunk of stone or metallic matter that has fallen to Earth from space  P. 10 - rille] – A groove on the Moon’s surface that scientists believe was formed by lava  P. 10 - crater] – A hole in the moon’s surface  P. 10 - maria] – The latin word for seas; dark craters on the Moon’s surface that were once thought to be water  P. 11 - lava] – Hot, melted rock that reaches the Earth’s surface through a crack or volcano. |
| **Craters and maria**  P. 12 - friction – The rubbing of one object or surface against another |
| **The Moon’s movements**  P. 14 - orbit/revolve – to turn  P. 14 - rotate – to spin |
| **Going through phases**  P. 16 - reflect – To throw back light rays, heat, or sounds that strike a surface; the Moon reflects the Sun’s rays  P. 16 - phase – A stage of development  P. 17 - gibbous – The phase of the Moon when more than it’s half is illuminated  P. 17 - waning – To decrease, or seem to decrease in size, as the Moon does when it passes from full Moon to new Moon  P. 17 - waxing – To grow, or seem to grow larger, as the Moon does when it passes from new moon to full moon |
| **Lunar eclipses**  P. 18 - eclipse – The darkening of the sun or moon when light coming from the sun is blocked  P. 19 - umbra – The completely dark part of a shadow cast by the Earth or Moon during an eclipse  P. 19 - penumbra – The lighter, outer edge of Earth’s shadow |
| **Blocking out the sun**  p. 20 - partial – of or relating to a part rather than the whole **:** not general or total  p. 20 - annular eclipse – an eclipse in which a thin outer ring of the sun's disk is not covered by the smaller dark disk of the moon  p. 20 - elliptical – shaped like a flattened circle  p. 20 – permanently - forever |
| **High tide, low tide**  P. 22 - tide – The change in the level of water in the oceans and seas on Earth, caused by gravity of the Sun and Moon  p. 22 - attracts- to pull toward one another |
| **Exploring the Moon**  P. 24 - NASA – National Aeronautics and Space Administration; the agency in charge of the U.S. exploration of space  P. 24 - probe – A robot carried into space by a scientific spacecraft that sends back information about moons, planets and other objects in the solar system  P. 24 - astronaut – A person who has been trained to fly aboard spacecraft.  P. 27 - lunar rover – A vehicle designed to carry two people on the surface of the moon |
| **Full-moon facts**  P.30 - optical illusion – An image that fools the eye into believing it is real |

Fun Extension Activities for this book and other useful Resources

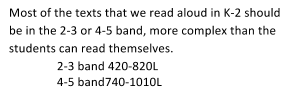
See Page 28 and 29 of *The Moon* for more details on the following activities:

* Using the information that students have learned about a lunar and solar eclipse, have them make a lunar and solar eclipse using 2 styrofoam balls, 2 straws, plasticine, a box lid, a desk lamp and a ruler.
* After reading page 9, have students show the phases of the moon using a bright desk lamp and a large ball. Name the phases as they appear on the ball.

**What Makes This Book Complex?**

1. **Quantitative Measure**

Go to <http://www.lexile.com/> and enter the title of your book in the Quick Book Search in the upper right of home page. Most texts will have a Lexile measure in this database.



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1. **Qualitative Features**

Consider the four dimensions of text complexity below. For each dimension\*, note specific examples from the text that make it more or less complex.

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| What does the author want us to know about the Moon? The Moon is a mystery, but it impacts life on Earth.  How does the author use diagrams to help you gain information? The author uses diagrams and pictures to help the reader understand the vocabulary and theories about the moon.  **Meaning/Purpose** | Pictures and small diagrams are used tohelp the reader better understand the text.  **Structure** |
| **Language**  Easy to understand with several opportunities to learn new scientific terms and theories | **Knowledge Demands**  Knowledge background about the solar system |

1. **Reader and Task Considerations**

What will challenge my students most in this text? What supports can I provide?

*The theoretical knowledge and new vocabulary will be challenging. Throughout reading, provide opportunities to discuss new vocabulary and use illustrations to help clarify text complexity. Give students time to review the pictures and to ask questions throughout the read aloud. Also, provide as many hands-on opportunities as possible to help students understand concepts about space that are being discussed.*

How will this text help my students build knowledge about the world?

*Students will listen to and discuss facts about the moon and perhaps spark an interest in learning more about the solar system.*

1. **Grade level**

What grade does this book best belong in? 1st grade