# MISSION MOON GEOLOGY

**5E Lesson Plan for Mission Moon Geology**

**Central Focus:** Students will explore the geology of the moon, lowlands, highlands, sides of the moon, the elevational changes utilizing the map key, and distance between the moon and Earth.

**Content Standard(s):**

**North Carolina Essential Standards**

- NC 6.E.1 Understand the Earth/moon/sun system, and the properties, structures and predictable motions of celestial bodies in the Universe.
- NC 6.E.1.2 Explain why Earth sustains life while other planets do not base on their properties (including types of surface, atmosphere and gravitational force) and location to the Sun.
- NC 6.E.1.3 Summarize space exploration and the understandings gained from them.

**Next Generation Science Standards**

- MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

**Overview:**

Students will explore the Geology of the moon, maria (lowlands), highlands, basalt lava, far and near sides on the moon. Students will also utilize the elevation key located on the Map and determine elevational differences located in the North and South polar regions of the moon. They will determine the distance between the moon and Earth. This engagement can be done as a stand-alone engagement or with the following engagements developed by Wingate University (Mission Cratering, Mission Apollo, Mission Aerospace Professional, and Mission Space Timeline) that are designed to work as rotational stations. The students engaging in this mission would be moving back and forth from the North and South Pole images to the elevation key chart (see rotational missions map below).

**Materials:**

- The Giant Moon Map™
- Lunar Pro Globe
- The book *Welcome to Moon* by Dyson & Cousins
- Wingate Mission Moon Geology Artifact
- Moon Geology Diagram
- Moon sides Diagram

**Prior Academic Knowledge and Conceptions:**

- Understand ratio concepts and use ratio reasoning to solve problems.
- Understand the concept of a ratio and use ratio language to:
    - Describe a ratio as a multiplicative relationship between two quantities.

# MISSION MOON GEOLOGY

**Lesson objective(s):**

- Explain why Earth sustains life while the moon and other planets do not base on their properties (including types of surface, atmosphere, and gravitational force)
- Recognize different areas of the Moon based on geological characteristics
- Explain why the Moon does not have weathering and erosion like Earth
- Summarize space exploration and the understandings gained from them
- Utilize a key to determine elevation
- Calculate the distance of the moon from Earth

**Differentiation strategies to meet diverse learner needs:**

- Consult with English Language Learners to make sure directions are understood
- Highlight use of pictures to connect with content
- Strategic partnering when needed

**ENGAGEMENT**

Students will explore information about the moon in relation to our solar system and Earth along with geology of the moon by reading designated pages of *Welcome to Moon* by Dyson & Cousins. They will follow directions and answer prompts in Section A of the Wingate Mission Moon Geology Artifact.

**EXPLORATION**

Students will observe the Maria and Highlands moon diagram and the near and far sides of the moon diagram provided. Each student will explore the moon's geology and elevational changes by holding and feeling the Lunar Pro Moon Model. They will answer prompts in Section B and C of the Wingate Mission Moon Geology Artifact.

Students will then further explore the elevational changes by relocating next to the elevation key and observing the color changes depending on the elevation. Students will read and complete prompts in Section D of the Wingate Mission Moon Geology Artifact and when engagement is completed the teacher will check if the students properly located acceptable elevations as designated by the artifact.

Students will calculate the distance the moon is from the Earth. They will observe how many Earths away and moons away the moon is by utilizing that section of the map above the timeline and answering prompts in Section E of Wingate Mission Moon Geology Artifact.

**EXPLANATION**

Discuss with the students how the Maria are dark in color due to the basalt lava (similar to what we have on Earth on Ocean floors and from shield volcanoes like in Hawaii); have students' connect that the Maria has lower elevation and the basalt lava flows down to low elevation spots, the Highlands are generally at "higher" elevation. Discuss with the students how the elevation of zero is based on average elevation not sea level as it is on Earth. Encourage students to look at the moon at night and observe that they see the same

side of the moon. Discuss how the time it takes the moon to spin once on its axis equals the time it takes the moon to orbit the Earth once; therefore, the same side of the moon faces Earth.

**ELABORATION**

Since we are planning on colonizing the moon soon, ask the students to choose a location on the moon to land that they think would be most successful and safe. Then ask students where on the moon they would consider building a colony. Prompt students to state why they chose the landing and living locations based on geological features, elevation, and safety.

**EVALUATION**

Students will respond to the Mission Moon Geology Artifact prompts. We suggest students verbally respond to the engagement by: reflecting on what they observed; what do the blue and grey colors represent; how does lack of atmosphere or lack weathering and erosion affect the elevation (i.e., does it change over time); what is the composition of the dark portions of the moon especially in the Maria (basalt lava); how far away is the moon from Earth; and where and why they chose their locations of landing and colonizing. If performing the Wingate Engagements in concert, the students should relate the lack of atmosphere affects/promotes the preservation of craters and Neil Armstrong's footprint.

**Written by:**

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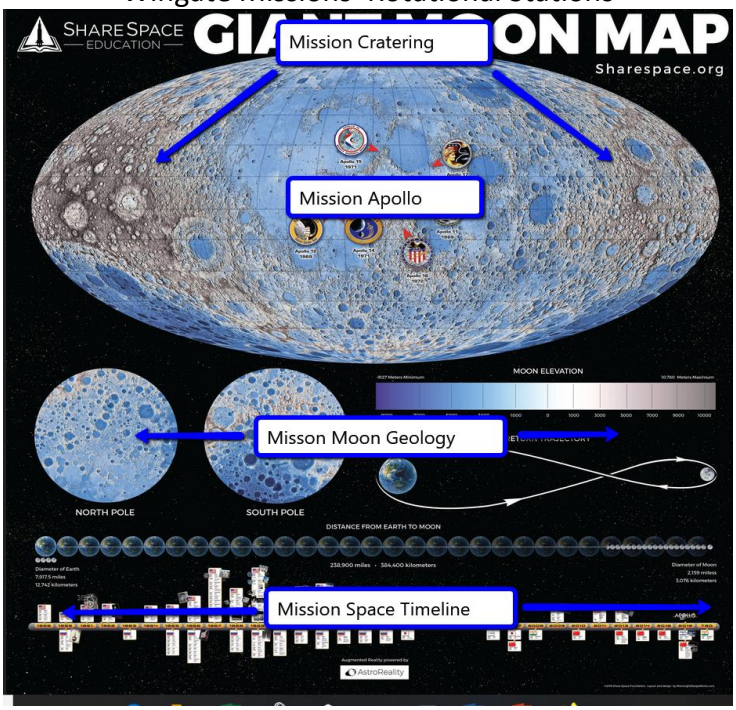
Wingate Missions' Rotational Stations




We suggest positioning the Mission Aerospace Professional station just off the Map when utilizing all five engagements in concert.

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**Student Name:** _____

**A.** Read pages 6-11 of *Welcome to the Moon* and then answer the following questions.

1. How old do scientists estimate the solar system is?

_____

2. What percent of the moon's mass is its core? How about Earth?

_____

3. Apollo 14 found the oldest rock on the moon, how old was that rock?

_____

4. What is magma?

_____

5. What is regolith?

_____

**B.** Locate the two Earth's Moon sheets placed on Map. Read about Maria and Highlands and look at the two sides of the moon.

1. Which side of the Moon has more Highlands? Circle the correct answer.

   Near or Far

2. What are Maria (Mare, singular) composed (made) of?

_____

3. If the Basalt Lava flows to the Lowlands. Where would the lowest elevation be?

   Circle the correct answer. Highlands or Maria

**C. First**, get the physical moon model and locate where the Maria and Highlands are. **Then** circle where you found the Maria and Highlands on the moon below

**D.** North and South poles of the moon.

**Step 1: Position yourself** up in front of the north and south poles on the Moon Map.

**Step 2:** Adjacent (next) to the south pole is a chart showing the elevations of the moon. Go there and notice how **different colors stand for different elevations.**

**Step 3:** Return back to the north and south pole area.

1. Locate the deepest crater on the North pole. When you find the deepest crater, take the X and place it on top of it.

2. Locate a point on the South pole that has high elevation. When you find the highest elevation, take the O and place it one top of it

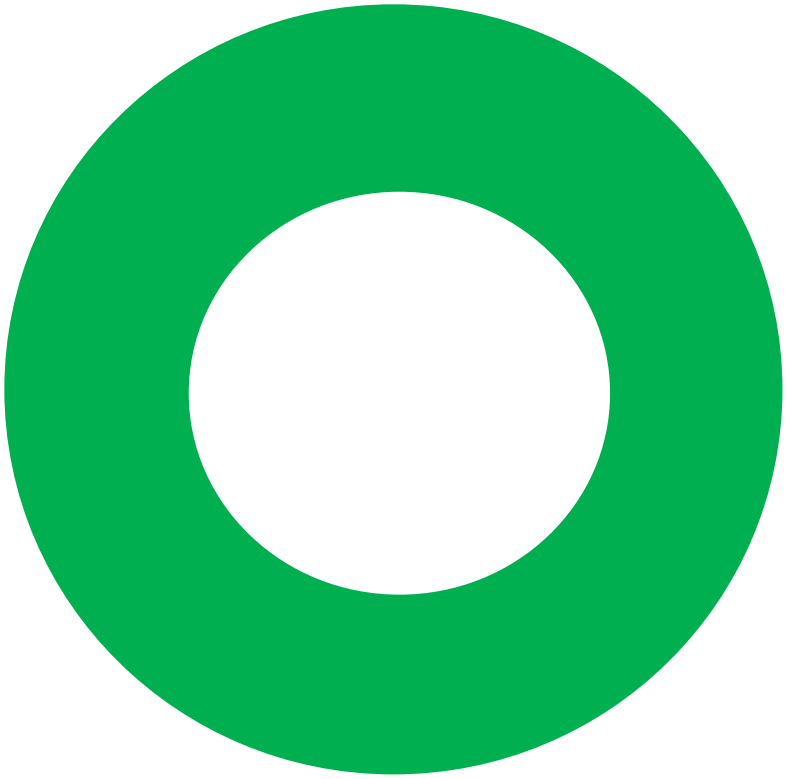
3. Raise your hand and an Instructor will come over to show them where you placed the X and O

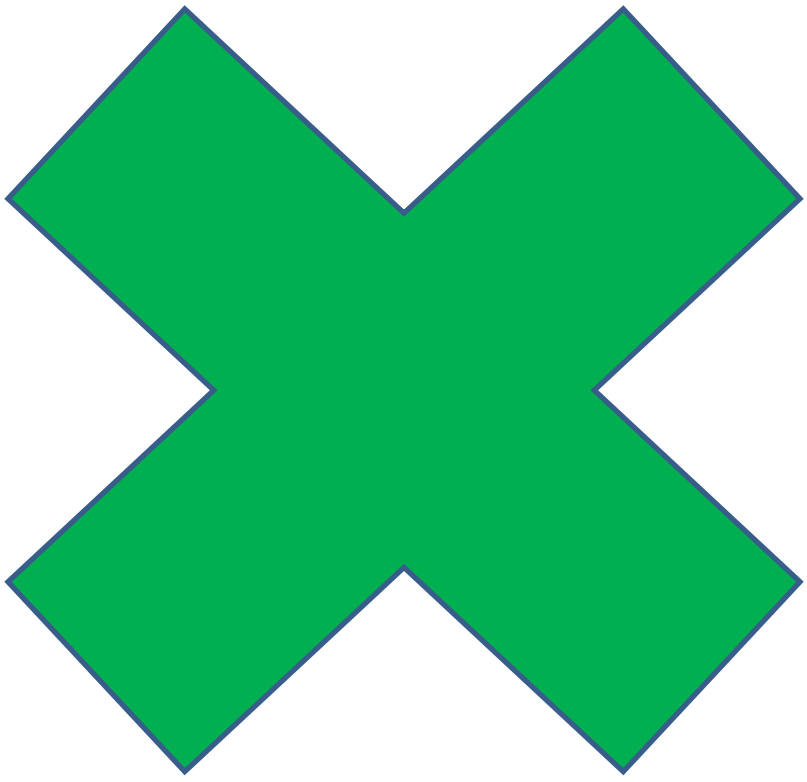
**E. Distance from the Earth to the moon.** See map section above timeline and below North and South poles.

1. Approximately, how many moons fit into the diameter of the Earth?
   Circle correct answer. 1 2 3 4 5

2. How many Earth's away is the moon? Count how many Earth's are shown.
   Circle correct answer. 28 29 30 31 32

3. How many moon's way is the moon from Earth? Show Calculation below.

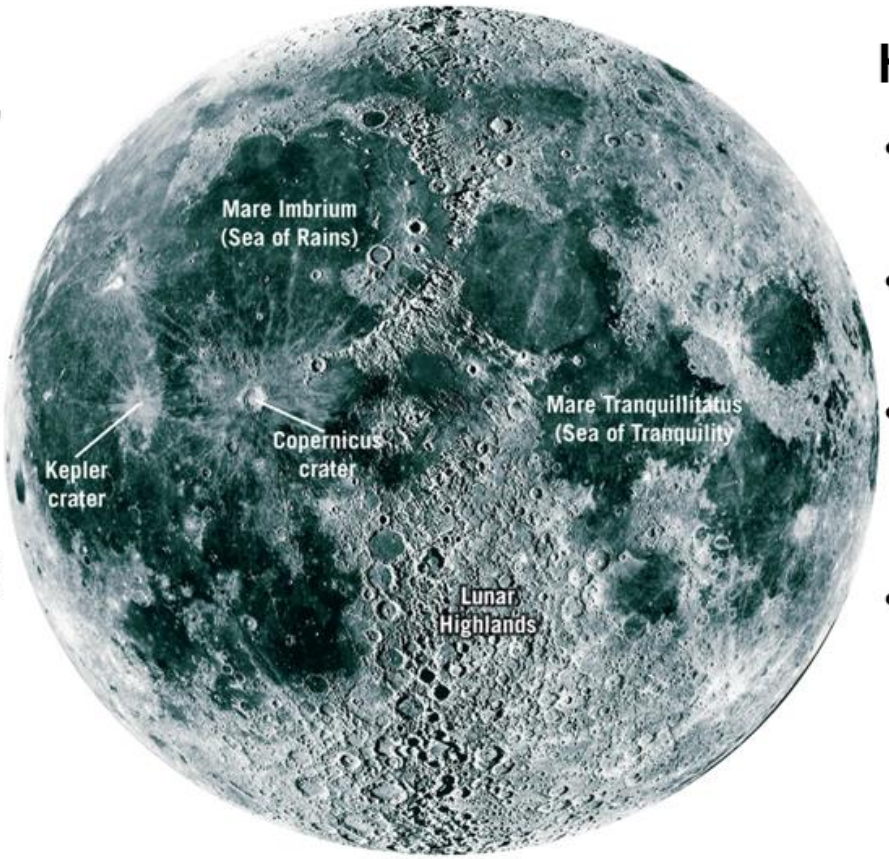




# Earth's Moon

## Maria

- Latin for "sea"
- Dark regions
- Originated from **Basalt Lava** flooding the surface
- Lava flows into the round craters (**Lowlands**) and solidifies




## Highlands

- Bright, densely cratered areas
- Make up most of the Moon
- Make up all of the "back" side of the Moon
- Older than maria

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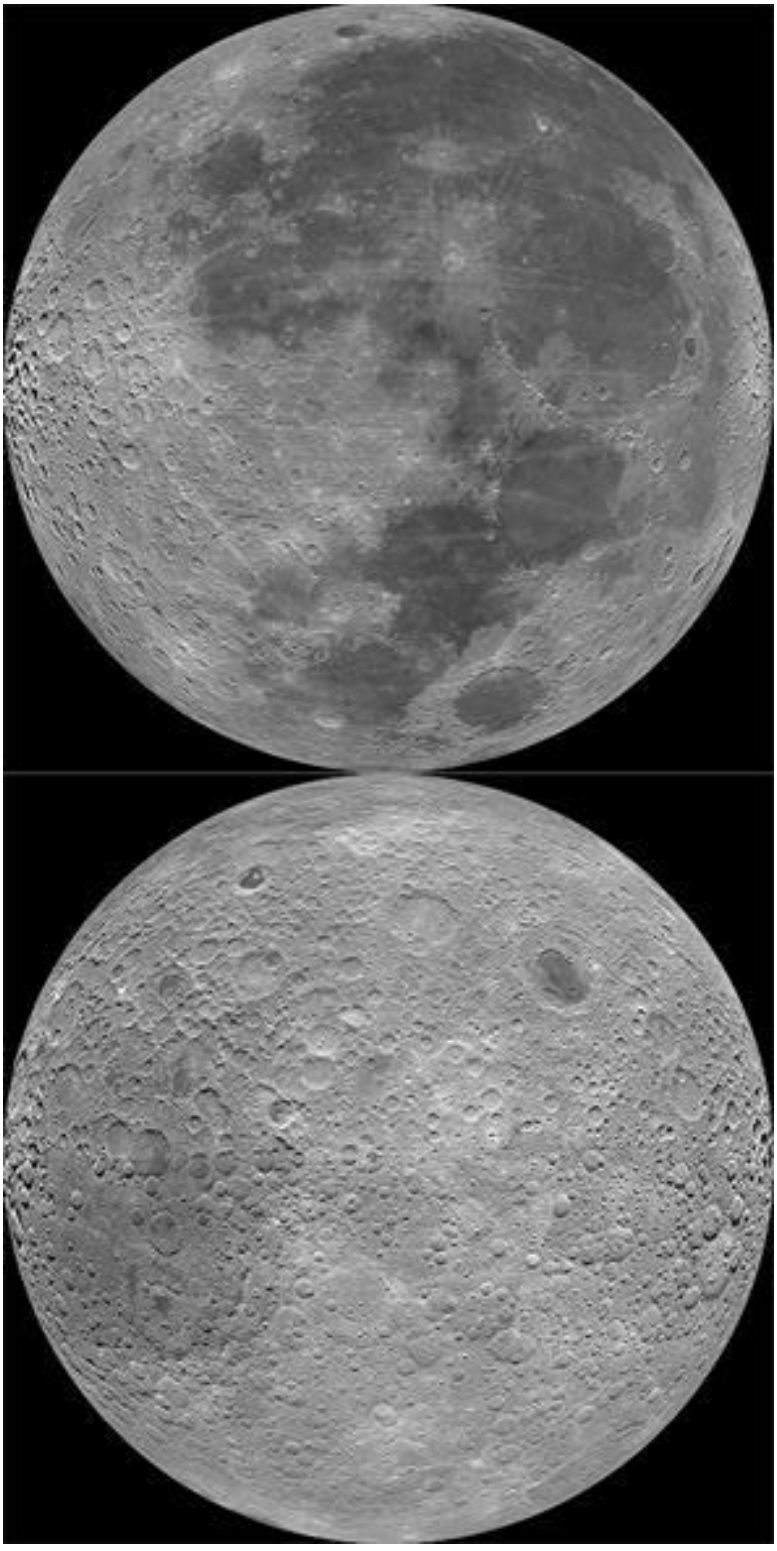
Near side



Far side

Photo by NASA/GSFC/Arizona State University