Objects in the Sky: Lunar Observations

OVERVIEW

Students will use their senses to make observations about the Moon and to think about what it might be like to visit and live there.

NYS Science Core Curriculum

PS 1.1a: The appearance of the Moon changing as it moves in a path around Earth to complete a single cycle.

BACKGROUND FOR EDUCATOR

The Moon is Earth's only known natural satellite. The Moon can be visible during a bright day because it's relatively close to Earth and it reflects sunlight. At this age level, students should make observations about the day and the night sky. For additional information about the Moon, go to:

- amnh.org/exhibitions/permanent/meteorites/impacts/moon.php
- science.nasa.gov/science-news/science-at-nasa/2006/30jan_smellofmoondust/

BEFORE YOUR VISIT

In these activities, students will practice observing the Moon by looking up in the sky or at photographs. They will discover that the Moon changes a little bit from day to day, and that the pattern repeats about every four weeks.

Activity: Where Was the Moon on Your Birthday?
Ask students to describe, draw, or play-act what the Moon can look like. Have students share their ideas. Ask students: What do you think the Moon looked like on the day you were born? *(Answers will vary.)*

Then go to the Moon Phase Images website (tycho.usno.navy.mil/vphase.html) and enter each student's birth date to see what the Moon looked like that day. (Or, you may wish to print out each birthday image prior to class.) Have students describe the shape of the Moon on their birthdays, and to record it in a drawing. Use their drawings to guide a discussion about how the Moon's appearance changes.

Plan how your students will explore *Beyond Planet Earth* using the Group Worksheets.

Students should work in groups of three to four, each facilitated by a teacher/parent chaperone as they explore the exhibition. If possible, distribute copies of the worksheets to chaperones beforehand, and review them to make sure everyone understands the activities.

Activity: Luna Stories
Read a story about the Moon to your students. (See the booklist for recommendations.) Then ask them to draw and share what they learned from the story.

DURING YOUR VISIT

Beyond Planet Earth: The Future of Space Exploration
3rd floor (45 minutes)
In the Introduction and Moon sections of the exhibition, students will use their senses to continue to learn about the Moon, and to begin to investigate some of the ideas scientists have about traveling there. Have the adult chaperones use the Group Worksheets to guide their students to make observations of the Moon and to record students' ideas of what it's like there. Remind the chaperones to encourage students to use their words to describe what they see, feel, smell, and think. Also have students make a drawing of the Moon landscape and let them choose something else in the exhibition to draw.

Rose Center for Earth and Space
1st floor (15 minutes)
Have students observe the metal Moon globe and Moon rock (located in the area between the Gottesman Hall of Planet Earth and the Heilbrunn Cosmic Pathway), as well as photographs of the Apollo Mission (located in the hallways surrounding the Rose Center). As they study these items, ask students to make observations and inferences about the surface of the Moon. Ask: What do you notice? *(Answers may include: There are lots of craters, craters within craters, some smooth sections.)* On the Moon globe, point out the far and near sides of the Moon. Ask students if they know which side is visible from Earth.

BACK IN THE CLASSROOM

Activity: Sharing Moon Observations & Findings
Have students draw the Moon and post their drawings. List the five senses on the board and have students share what they've learned about the Moon by using their senses. *(Answers may include: The smell of the Moon rocks; the texture of the Moon: smooth in some places, lots of craters, the lunar surface feels rough; there are no trees or houses or animals on the Moon; the Earth looks small from the Moon.)*

Activity: Luna Cartoons
Ask students to draw on what they learned during the trip to make a short cartoon about two kids going on the lunar elevator. What would they talk about on the way up? How would it feel? What would they see when they arrived? *(Answers will vary.)*

Activity: Moon Watch Flip book
amnh.org/ology/moon_flipbook
Use this activity to continue observing the Moon in the sky. Make observations for a month, and post observations and drawings on a calendar in the classroom.

RECOMMENDED BOOKS

If You Decide to Go to the Moon
Written by Faith McNulty and illustrated by Steven Kellogg
"If you decide to go to the Moon in your own rocket ship, read this book before you start." This book is a beautiful guide for a kid ready to take a fantasy trip into space.

Moonshot: The Flight of Apollo 11
Written and illustrated by Brian Floca
Clean, poetic narration of the Apollo 11 mission to the Moon. "But still ahead there is the Moon . . . Glowing and growing, it takes them in, it pulls them close."

One Giant Leap
Written by Robert Burleigh and illustrated by Mike Wimmer
Published in 2009, One Giant Leap commemorates the 40th anniversary of the moment when Neil Armstrong and Buzz Aldrin became the first humans to step onto the surface of the Moon.

The Magic School Bus Lost in the Solar System
Written by Joanna Cole and illustrated by Bruce Degen
All is going well for Miss Frizzle's field trip into the solar system, until an asteroid damages one of the bus's taillights! A fun romp all the way to the outer planets (and Pluto).

GROUP WORKSHEET

Grades K–2

Instructions for the adult facilitator: Today you and your group of students will explore the Moon in two sections of the exhibition: "Introduction" and "The Moon." Encourage students to use their words to describe what they see, feel, smell, and think. Use this worksheet to record students' ideas as they learn about the Moon.

Use our senses to learn about the Moon	Record student ideas
Introduction Section	
Look at the **astronaut gloves**. Describe what they look like.	
Smell what the **Moon dust** smelled like to the astronauts. What does it smell like to you? Do you like the smell	
Listen to the **astronauts talk** about landing on the Moon. What are they saying?	
Moon Section	
Touch the **tire** of the lunar vehicle (the square patch on the panel below the case). What does it feel like?	
Observe and **touch** the **landscape** of the Moon. Describe the surface.	
Look at the **lunar base camp model**. Describe what the base camp looks like.	
Imagine you're on the lunar base camp. What do you notice about Earth? (Look for it on the background behind the model.)	
Think about it: Would you live at the lunar base camp? Why or why not?	
Look up at the **lunar elevator model**. Describe what it looks like.	
Think about it: Would you ride up in the lunar elevator? Why or why not?	

BEYOND PLANET EARTH the future of space exploration

GROUP WORKSHEET

ANSWER KEY

Grades K–2

Instructions for the adult facilitator: Today you and your group of students will explore the Moon in two sections of the exhibition: "Introduction" and "The Moon." Encourage students to use their words to describe what they see, feel, smell, and think. Use this worksheet to record students' ideas as they learn about the Moon.

Use our senses to learn about the Moon	Record student ideas
Introduction Section	
Look at the **astronaut gloves**. Describe what they look like.	*(Answers may include: The gloves are made of rubber. They are thick and black.)*
Smell what the **Moon dust** smelled like to the astronauts. What does it smell like to you? Do you like the smell	*(Answers may include: It smells like something sweet and burnt, like fireworks. It smelled like spent gunpowder to the astronauts.)*
Listen to the **astronauts talk** about landing on the Moon. What are they saying?	*(Answers may include: The astronauts are talking about how beautiful it is to be here.)*
Moon Section	
Touch the **tire** of the lunar vehicle (the square patch on the panel below the case). What does it feel like?	*(Answers may include: The tire surface is made of metal, it feels hard and shiny.)*
Observe and **touch** the **landscape** of the Moon. Describe the surface.	*(Answers may include: The landscape looks rough, it's grey, it has lots of bumps and craters.)*
Look at the **lunar base camp model**. Describe what the base camp looks like.	*(Answers may include: There are lots of solar panels, expandable house with small windows, astronauts walking around, astronauts driving vehicles.)*
Imagine you're on the lunar base camp. What do you notice about Earth? (Look for it on the background behind the model.)	*(Answers may include: From the Moon, Earth appears in the sky really big; it is four times larger than the Sun.)*
Think about it: Would you live at the lunar base camp? Why or why not?	*(Answers will vary.)*
Look up at the **lunar elevator model**. Describe what it looks like.	*(Answers may include: It looks like a long rope or a swing attached to a metal frame box; a lunar-Jack's beanstalk.)*
Think about it: Would you ride up in the lunar elevator? Why or why not?	*(Answers will vary.)*

Beyond Planet Earth **• New York State Science Core Curriculum**

Elementary School

Standard	Major Understanding	History of Space Exploration	Moon	Near-Earth Asteroids	Mars	Outer Solar System and Beyond
Standard 4: The Physical Setting	1.1a Natural Cycles and patterns (Earth and Moon).	X	X			
	1.1c The Sun and other stars appear to move in a recognzable pattern both daily and seasonally.	X				
	5.1f Mechanical energy may cause change in motion through the application of force.			X		
Standard 4: The Living Environment	5.2g The health, growth, and development of organisms are affected by environmetal conditions such as the availability of food, air, water, space, shelter, heat and sunlight.		X		X	X
	6.1e An organism's patern of behavior is related to the nature of that organism's environment.				X	X
	7.1a Humans depend on their natural and constructed environments.		X		X	X

Middle School

Standard	Major Understanding	History of Space Exploration	Moon	Near-Earth Asteroids	Mars	Outer Solar System and Beyond
Standard 4: The Physical Setting	1.1c The Sun and the planets that revolve around it are the major bodies in the solar system. Other bodies include comets, moons, and asteroids.	X	X	X	X	X
	1.1e Most objects in the solar system have a regular and predictable motion	X		X		
	1.1g Moons are seen by reflected light. Our Moon orbits Earth, while Earth orbits the Sun.		X			
	4.1a The Sun is a major source of energy for the Earth. Other sources of energy include nuclear and geothermal energy.		X		X	X
	5.1 All Major Understandings (patterns of motion of objects)			X		
	5.2a Every object exerts gravitiational force on every other object.	X	X	X	X	
Standard 4: The Living Environment	5.1b An organism's overall body plan and its environment determine the wat that the organism carries out life processes.					X
	6.1c Matter is transferred from one organism to another and between organisms and their physical environment. Water, nitrogen, carbon dioxide, and oxygen are examples of substances cycled between the living and nonliving environment.				X	X
	7.2b The environment may be altered by the activities of organisms.				X	

High School

Standard	Major Understanding	History of Space Exploration	Moon	Near-Earth Asteroids	Mars	Outer Solar System and Beyond
The Physical Setting	1.1a most objects in our solar system are in regular and predictable motion.	X	X	X	X	
	1.1b Nine planets move around the Sun in nearly circular orbits.	X	X	X	X	X
	1.2c Our solar system formed five billion years ago from a giant cloud of gas and debris. Gravity caused the Earth and the other planets to become layered according to the density differences of ther materials.	X	X	X	X	X
	1.2d Asteroids, comets and meteors are componants of our solar system	X		X		
	1.2j Geologic activity can be reconstructed by observing sequences of rock types and fossils.				X	
The Living Environment	5.1a The energy for life comes primarily from the Sun.				X	X
	6.1d In any particular environment, the growth and surival of organisms depend on the physical conditions.	X	X		X	X