

 NATIONAL
GEOGRAPHIC
KIDS

EDUCATOR'S GUIDE



Visit us at nationalgeographic.com/books/librarians-and-educators • Follow us on @NGKidsBks



ACTIVITY 1: LUNAR FIELD TRIP

OBJECTIVE: Integrate information from print and digital sources.

Time to study the moon! What does it look like? How do we know? Read pages 6-7 about the Apollo Program. Also read pages 40-53 about lunar landscape features. Pay special attention to the captions and photos. Take notes on the moon's topography. Look around the moon yourself at <https://www.google.com/moon/>. Select an Apollo mission to zoom in on. Closely study the NASA photos. Record the lunar features you notice from looking at the moon's surface and at the photos from the Apollo mission. Summarize the information you have learned from the text and the digital images. Make sure your notes include details on the different types of lunar surface features, how these features were created, and facts about your Apollo mission. Present your summary information to a partner who studied a different Apollo mission. After both of you have shared, notice and comment on the similarities and differences in what you both presented from the text and the digital images.

EXTENSION: Make the moon! Follow the directions on pages 58-59 to create your own 3D lunar landscape. Try to replicate some of the features that the Apollo astronauts observed on the moon!

STANDARDS:

CCSS.ELA-LITERACY.RI.5.2 Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

CCSS.ELA-LITERACY.RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS.ELA-LITERACY.RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

CCSS.ELA-LITERACY.SL.5.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

CCSS.ELA-LITERACY.SL.5.1.A Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.

CCSS.ELA-LITERACY.SL.5.1.C Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.

CCSS.ELA-LITERACY.SL.5.2 Summarize a written text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

CCSS.ELA-LITERACY.SL.5.4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

CCSS.ELA-LITERACY.RI.6.2 Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.

CCSS.ELA-LITERACY.RI.6.3 Analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes).

CCSS.ELA-LITERACY.RI.6.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.

CCSS.ELA-LITERACY.RI.6.7 Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

1 After a major smooch involving Earth and a Mars-size object, the moon condensed out of earthy dust rings roughly 4.5 billion years ago.

2 As the moon cooled, the surface solidified into a solid crust. More violent changes were about to take place.

3 Roughly 4.5 billion years ago, a gargantuan-size asteroid about 125 miles (200 km) in diameter slammed into the far side of the moon, creating the South Pole-Aitken Basin. Some 1,600 miles (2,500 km) in diameter and 8 miles (13 km) deep, it forms one of the largest known impact craters in the solar system.

4 About 4.1 to 3.8 billion years ago, something, perhaps the movements of the outer planets, caused rocky debris to fly in toward the sun. This rubble pounded the surface of the moon.

5 About one billion years ago, the last of the large asteroid impacts ended. The moon's near side—the side facing Earth—broke out into volcanic activity, sending vast oceans of molten lava out over the lowland areas.

6 Today, the moon's surface is a record of its formation. The lava beds were mistaken by early observers as seas because they look blue in the daytime sky here on Earth. They named them maria—the Latin name for "lunar seas." Many people claim to see different images in these dark patches. Some envision the Woman in the Moon carrying a bundle on her back, or the face of the Man in the Moon. Others say they see two frog sisters or even a rabbit! Gaze at the moon next time when it is full. What do you see?

7 Less than a billion years ago, many of the smaller and intermediate-size craters that we see today were formed by impacts with the moon's surface. The younger craters have starlike ray patterns radiating out from their centers. These ray patterns were created when an impact caused light-colored rock lying under the moon's surface to blast out and then gently settle back down onto the surface.

THE EVOLUTION OF THE MOON

IN ITS INFANCY, our new moon was just a collection of bits of rock. Captured by Earth's newly expanded gravitational field, the debris spread out into a delicate ring structure. It would have looked a lot like Saturn's rings.

For the next few million years, the debris orbiting Earth continued to collide and weld together, steadily growing to form our moon. When the moon's spin on its axis slowed down to equal the speed it orbits around Earth, the moon cooled into an oblong, or lemon shape, with the two pointy ends directed toward and away from Earth. From Earth, the angle we see the moon at is deceiving. To us it appears perfectly round, like a big cosmic ball.

The next few billion years brought more impacts, followed by volcanic activity that gushed dark molten lava onto the side of the moon facing Earth. Finally, the moon's surface cooled and became the way it looks today.

Earth is a planet and the moon is a satellite that orbits Earth. About one-quarter the size of Earth, our moon has no oxygen atmosphere or flowing water on its surface to support life.



CCSS.ELA-LITERACY.SL.6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-LITERACY.SL.6.1.A Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.

CCSS.ELA-LITERACY.SL.6.1.C Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.

CCSS.ELA-LITERACY.SL.6.2 Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

CCSS.ELA-LITERACY.SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

ACTIVITY 2: SOLAR ECLIPSES - FACT VS. MYTH

OBJECTIVE: Read with purpose and demonstrate an understanding of central ideas in the text.

Read pages 18-19 about moon myths from around the world. Many of the myths described solar eclipses where the sun disappears from Earth's view. Read pages 34-35 to find out the facts behind solar eclipses. Make sure to note the captions and photos. Watch a video from National Geographic, Solar Eclipse 101, that explains solar eclipses in more detail ([click here](#)). Write a brief one-page report summarizing all the information you now know about solar eclipses! Include a description of how solar eclipses occur and detail different types of eclipses.

EXTENSION: Reflect on the ancient myths about the moon from around the world! Conclude your paper by briefly describing your own imagined moon myth and why you created it.

STANDARDS:

CCSS.ELA-LITERACY.RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.5.2 Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

CCSS.ELA-LITERACY.RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS.ELA-LITERACY.RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

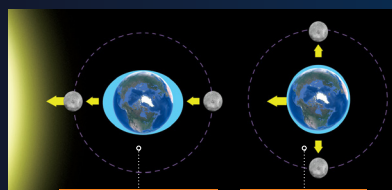
CCSS.ELA-LITERACY.W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-LITERACY.W.5.2.A Introduce a topic clearly, provide a general observation and focus, and group-related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

CCSS.ELA-LITERACY.W.5.2.B Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

WHEN THE TIDE COMES IN

SPRING TIDES AND NEAP TIDES



The highest and lowest tides are known as spring tides. They occur when the sun, moon, and Earth are in a straight line.

Neap tides are not very high or low. They occur when the sun and moon form a 90-degree angle.

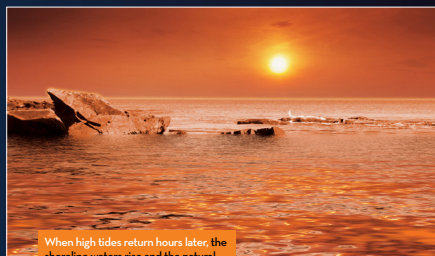
The moon AFFECTS EARTH in DRAMATIC WAYS.

IN ADDITION TO ILLUMINATING THE NIGHT SKY, the moon also affects Earth in more dramatic ways. Combined with Earth's rotation, the gravitational pull of the moon and sun on Earth causes landmasses located near the Equator to bulge! Though you likely won't notice—the change is much too small to see. We're more familiar with the sun's and moon's effects on our oceans. Their combined gravitational forces cause the oceans' daily rise and fall. We refer to these time periods as high and low tides.

Typically, high and low tides occur twice in a 24-hour period. In open oceans, the average range of tidal change is about three feet (1 m) in height. Coastal tidal ranges can vary significantly depending on the shape of the shoreline, the ocean bottom, and the volume of water located directly offshore. For example, in the Mediterranean Sea, where coastal shorelines are very shallow, we won't find much difference in the height of tides. Thousands of miles away, the world's most dramatic and largest tidal range occurs in the Bay of Fundy in Canada. In just six hours, the water levels here can drop and rise a staggering



At low tides, hardy sea life is exposed to the air for a few hours. Clinging to the rocks, sea stars, anemones, and other sea creatures await the return of the higher tides.



When high tides return hours later, the shoreline waters rise and the natural underwater environment is restored.

50 feet (15 m) in height. How can the tides there vary so much? It has to do with the shape of the bay. First, the tide goes out, exposing the sandy ocean bottom. A few hours later, rising waters pushed together by the funnel-shaped bay charge back in. This results in the extreme changes in water height. Twice a day, the bay fills and empties—literally hundreds of billions of tons of water circulate during each cycle. This is more water than the flow in all of the world's freshwater rivers combined!

Predicting changes in tides is important for a variety of people, from sports enthusiasts to commercial fishers, whose livelihoods depend on the ocean. Large ships navigating through shallow ports or intercoastal waterways need to plan their schedules. Luckily, tides follow predictable patterns, and tide tables reliably provide this critical information. There are a few times of

year, though, when tides behave differently. When the sun, moon, and Earth are all aligned, tides do something pretty neat. On one side of Earth, the moon's strong gravitational force pulls at the oceans, causing the water to surge outward, toward the moon. At the same time, on the opposite side of Earth, the sun tugs on Earth's water, causing it to surge toward the sun. When this happens, scientists call it a spring tide because the waters seem to spring away from Earth. You can see spring tides in action on the coast of California. Here, extreme high and low tidal changes can approach seven feet (2.1 m) during spring tides, compared to only about 2.5 feet (0.8 m) during the rest of the year.

Other times, when the sun, Earth, and moon are at right angles to each other, the gravitational forces are spread out, resulting in much smaller shifts in water levels. These are called neap tides.



CCSS.ELA-LITERACY.W.5.2.C Link ideas within and across categories of information using words, phrases, and clauses (e.g., in contrast, especially).

CCSS.ELA-LITERACY.W.5.2.D Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS.ELA-LITERACY.W.5.2.E Provide a concluding statement or section related to the information or explanation presented.

CCSS.ELA-LITERACY.W.5.3 Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

CCSS.ELA-LITERACY.W.5.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.

CCSS.ELA-LITERACY.W.5.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

CCSS.ELA-LITERACY.RI.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

CCSS.ELA-LITERACY.RI.6.2 Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.

CCSS.ELA-LITERACY.RI.6.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.

CCSS.ELA-LITERACY.RI.6.7 Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

CCSS.ELA-LITERACY.W.6.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

CCSS.ELA-LITERACY.W.6.2.A Introduce a topic; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

CCSS.ELA-LITERACY.W.6.2.B Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.

CCSS.ELA-LITERACY.W.6.2.C Use appropriate transitions to clarify the relationships among ideas and concepts.

CCSS.ELA-LITERACY.W.6.2.D Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS.ELA-LITERACY.W.6.2.E Establish and maintain a formal style.

CCSS.ELA-LITERACY.W.6.2.F Provide a concluding statement or section that follows from the information or explanation presented.

CCSS.ELA-LITERACY.W.6.3 Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well-structured event sequences.

CCSS.ELA-LITERACY.W.6.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-LITERACY.W.6.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

... SEEING THE SIGHTS

GRIMALDI

The crater Grimaldi may be one of the strangest areas to explore on the moon. The dark shade of the floor contrasts with the brighter surrounding walls, making it an easy target to observe. This walled plain covers an area of 14,000 square miles (22,531 sq km), making it almost the size of the U.S. states of Vermont, Delaware, and Rhode Island combined. Here astronomers have glimpsed strange flashes of light or orange-and-green-tinted vapor glowing dimly, and occasional fuzzy patches of fog may materialize above this ancient lava floor. Sensitive instruments aboard orbiting lunar spacecraft have also spotted areas where carbon dioxide gas is leaking out from inside the moon, which may be the cause of these strange occurrences.

SINUS IRIDUM

Sinus Iridum is a Latin name meaning "bay of rainbows." You might think this is a pretty odd name for a place on a dry, airless world where there are no clouds and it never rains. The name for this wide, flat plain came from its half-circular shape. Bordered by the Montes Jura, it looks like an arching rainbow! The Sinus Iridum is the remains of a gigantic impact crater that flooded with lava 3.7 to 3.2 billion years ago. Apollo 15 rock samples tell us the surface we see through a telescope formed 3.3 billion years ago. The walls surrounding the bay tower 9,850 feet (3,000 m) above the bay floor. Sinus Iridum is located on the edge of the Mare Imbrium, or the Sea of Rains, which formed 3.8 billion years ago during a collision with a giant asteroid.

In this imaginative art, a supply ship prepares to land in the Sinus Iridum, or Bay of Rainbows. Although this large, smooth crater was covered by ancient lava flows billions of years ago, you can still see a few ripples embedded in the hardened lava.



ACTIVITY 3: TIDE TIME

OBJECTIVE: Determine the central ideas of a text and write an informational piece.

Read pages 30-31 about how the moon affects the Earth's oceans. Watch a National Geographic video of time-lapse photography from the Fitzgerald Marine Reserve on the Pacific Ocean to see low tide and high tide in action! ([click here](#)). Pretend that a group of younger students has never visited an ocean and they want to learn all about tides. Write the students an informational letter that explains how tides work and the role of the moon in tide levels. Make sure to describe how understanding tide flow helps keep people safe. Ground your letter in textual references and use specific science-related vocabulary. Describe to the students what it would be like to visit an ocean coast during low tide and high tide. After you draft your letter, work with a writing partner to get feedback, and revise.

STANDARDS:

CCSS.ELA-LITERACY.RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.5.2 Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

CCSS.ELA-LITERACY.RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

CCSS.ELA-LITERACY.RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

CCSS.ELA-LITERACY.W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-LITERACY.W.5.2.A Introduce a topic clearly, provide a general observation and focus, and group-related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension.

CCSS.ELA-LITERACY.W.5.2.B Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic.

CCSS.ELA-LITERACY.W.5.2.C Link ideas within and across categories of information using words, phrases, and clauses (e.g., in contrast, especially).

CCSS.ELA-LITERACY.W.5.2.D Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS.ELA-LITERACY.W.5.2.E Provide a concluding statement or section related to the information or explanation presented.

CCSS.ELA-LITERACY.W.5.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.

CCSS.ELA-LITERACY.W.5.5 With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (Editing for conventions should demonstrate command of Language standards 1-3 up to and including grade 5 [here](#).)

CCSS.ELA-LITERACY.W.5.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

TO THE MOON AND BEYOND

THERE ARE MANY INTERESTING PLACES
humans will explore in our solar system. Mars is a world that once had oceans, rivers, and streams beneath an atmosphere filled with white puffy clouds. Jupiter's moon Europa has vast oceans hidden beneath its icy surface. Saturn's moon Titan is like an ancient Earth, with a methane-rich orange atmosphere and icy seas covering its surface. So why bother exploring our moon, this lifeless, gray rock orbiting our planet?
With the looming threats of overpopulation, climate change, or a devastating disaster from space, our easy-to-reach neighbor may just help us survive.
Exploring the moon can prepare us to explore farther out into our solar neighborhood. As an example, voice communications between the moon and Earth travel faster than between Mars and Earth. On Earth, signals from Mars would take between 3 and 22 minutes, depending on the distances between the planets, just to travel one way. This means it might take over 40 minutes to say, "Hi, hello, how are you?" and get an answer back. From the moon, normal voice conversations to and from Earth could be carried on in real time.
The moon also has natural resources we could mine. Precious metals like magnesium, aluminum, and titanium could be refined and launched back up into space, where they could be used to build space stations and planetary exploration vehicles. Minerals and metals could also be transported back to Earth, replacing depleted resources on our own planet.
No matter what the reason, sending humans to the moon for extended periods will take some planning. Deadly, unfiltered cosmic rays from the sun make the moon's surface a dangerous place to be for any length of time. But underground, colonists may find perfect places to live inside protected caves and volcanic caverns. Solar power collectors on the surface would provide electricity. Water in the form of ice could be recovered from craters in the polar regions.
Growing food might present a bit of a challenge. Lunar soils are not rich in nitrogen or other organic materials that plants need to grow. So mineral supplements from Earth would have to be ferried in. Plus, a lack of insects to pollinate crops might mean lunar farmers may need to become lunar beekeepers, too.

Why bother exploring our moon, this LIFELESS, GRAY ROCK orbiting our planet?

The moon is our next step in learning how to permanently live in space. Future exploration missions to the moon and Mars— including early colonies on the surface—may be possible in the next decade! Some private companies are leading the way.



CCSS.ELA-LITERACY.RI.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

CCSS.ELA-LITERACY.RI.6.2 Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.

CCSS.ELA-LITERACY.RI.6.4 Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings.

CCSS.ELA-LITERACY.RI.6.7 Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

CCSS.ELA-LITERACY.W.6.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

CCSS.ELA-LITERACY.W.6.2.A Introduce a topic; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.

CCSS.ELA-LITERACY.W.6.2.B Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples.

CCSS.ELA-LITERACY.W.6.2.C Use appropriate transitions to clarify the relationships among ideas and concepts.

CCSS.ELA-LITERACY.W.6.2.D Use precise language and domain-specific vocabulary to inform about or explain the topic.

CCSS.ELA-LITERACY.W.6.2.E Establish and maintain a formal style.

CCSS.ELA-LITERACY.W.6.2.F Provide a concluding statement or section that follows from the information or explanation presented.

CCSS.ELA-LITERACY.W.6.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

CCSS.ELA-LITERACY.W.6.5 With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. (Editing for conventions should demonstrate command of Language standards 1-3 up to and including grade 6 [here](#).)

CCSS.ELA-LITERACY.W.6.10 Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

TELESCOPE

EXPLORATION GUIDE

THE MOON IS THE PRIME TARGET FOR ALL BEGINNING OBSERVERS because it's easy to find and shows a wealth of detail in the smallest of instruments. All you need is a small telescope, three to eight inches (80–200 mm) in aperture, and the map on page 39 to guide you along your journey. So grab your telescope! It's time to explore the moon.

Best Viewing Checklist

- » When the moon is high in the sky
- » During the first 14 days of the moon's cycle
- » In an area that doesn't have many bright lights

When to Explore

Following the lunar cycle will help you know what you'll be able to explore—and when. The new moon phase starts the cycle at Day 1 in the lunar phase calendar. By Day 14 the moon has grown to its full phase. These 14 days are the best time for viewing. In the 14 days following the full moon phase, the moon rises too late in the evening (or early morning hours) to be easily observed—especially if you are going to school the next day!

Magnification

- » Always begin your observations using a low-power magnification. Make sure the entire moon is visible in the eyepiece.
- » Sweeping across the lunar landscape at 60x to 100x power, mountain ranges, vast lava plains, and magnificent craters come into view.

Here are the different phases and days when the top 10 sites on the moon (see pages 39–51) are best viewed:

DAY 5

DAY 7

DAY 12

DAY 13

DAY 14

DRAWING THE MOON

FOR CENTURIES, THE ONLY WAY TO RECORD SURFACE FEATURES on the moon was by making drawings. Sketching the changing faces of the moon today can still be fun. It also teaches us where lunar features are located and the best times to see them. To become a genuine lunar artist, let's go outside and sketch.

What you'll need:

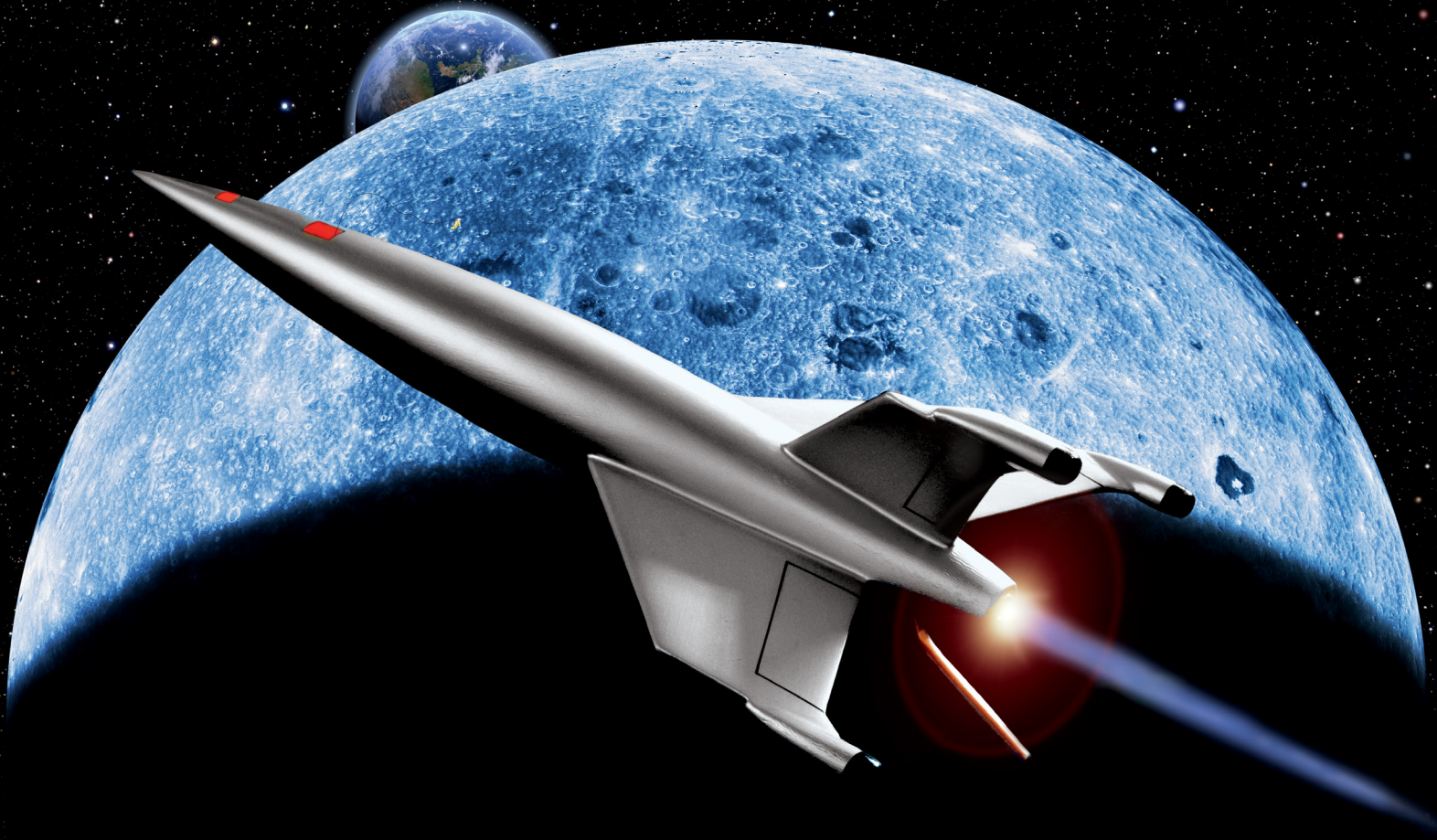
- » A comfortable chair or box to sit on while looking through the eyepiece of your telescope. It's harder to draw when standing up.
- » A small telescope to be used at about 50x to 60x magnification
- » A handheld clipboard
- » A No. 2 pencil
- » A flashlight or headlamp to illuminate your drawings as you work
- » A piece of letter-size white paper to draw on
- » A round object about 4 to 6 inches (10–15 cm) in diameter, such as an empty yogurt container or a small paint can.

What to do:

1. Place the round object in the middle of your paper and trace around it with your pencil. That's the outline of the moon that you are now going to fill in.
2. The first thing to draw in is the terminator line. Remember, that's the dividing line between night and day on the moon. Everything you draw in will be on the daytime side.
3. Look through your telescope and lightly sketch everything you see on the daytime side of the terminator.
4. When you're done, go back inside and make the lines darker. Also shadow in the nighttime area. In the upper left corner of the paper, be sure to write the date of your drawing, the time of night, and the power of the eyepiece you used on your telescope. Go outside on several nights and make a drawing each night. You will be amazed at how lunar features change and how the moon becomes much more familiar!

What would happen if the moon disappeared forever?
Where does the myth of werewolves come from?
How did our moon come to be?

The moon has had a profound impact on the human experience, from tides to tall tales. Join author-illustrator David A. Aguilar as he weaves together science and culture, technology and myth, to answer the biggest questions about our Earth's only natural satellite. See the moon like never before: craters, astronauts, moon men, and more!



Award-winning author and space artist **David A. Aguilar** is a former director of Science Information and Public Outreach at the Harvard-Smithsonian Center for Astrophysics. Through his keenly spirited books, he strives to open minds to his exciting new views of space that inspire budding space enthusiasts and future astronomers. Aguilar is a 2018 NSTA Outstanding Science Trade Book Award recipient.

