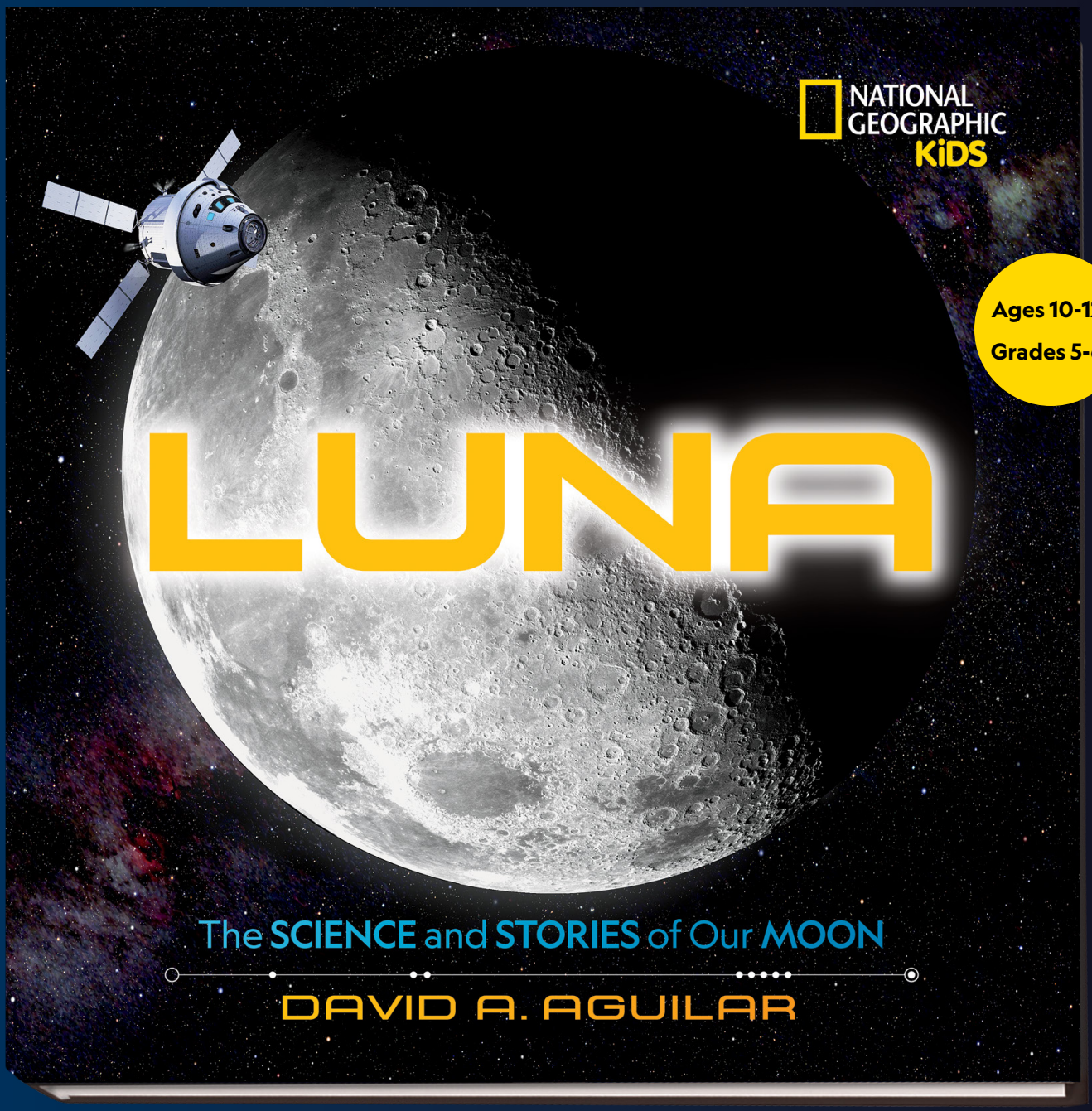
NATIONAL GEOGRAPHIC KiDS

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.

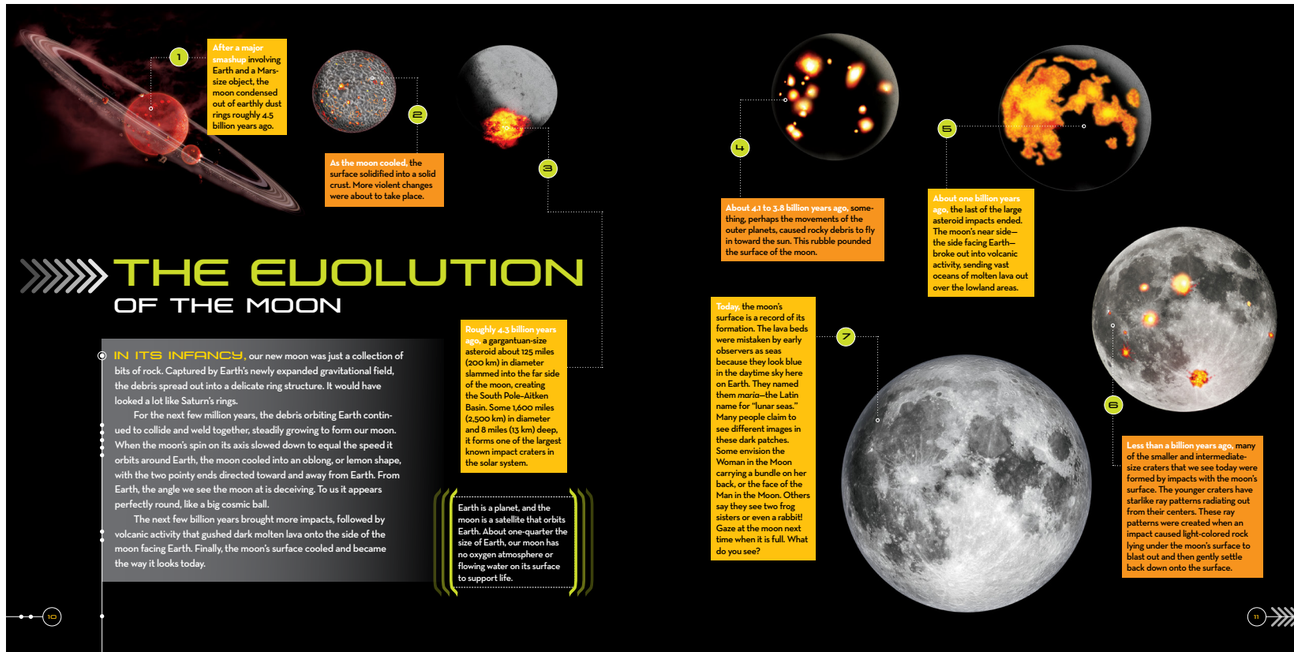
CCSS.ELA-LITERACY.SL.5.4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

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.



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.

WHEN THE TIDE COMES IN

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 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!

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.

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.

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.

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.5.3 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.

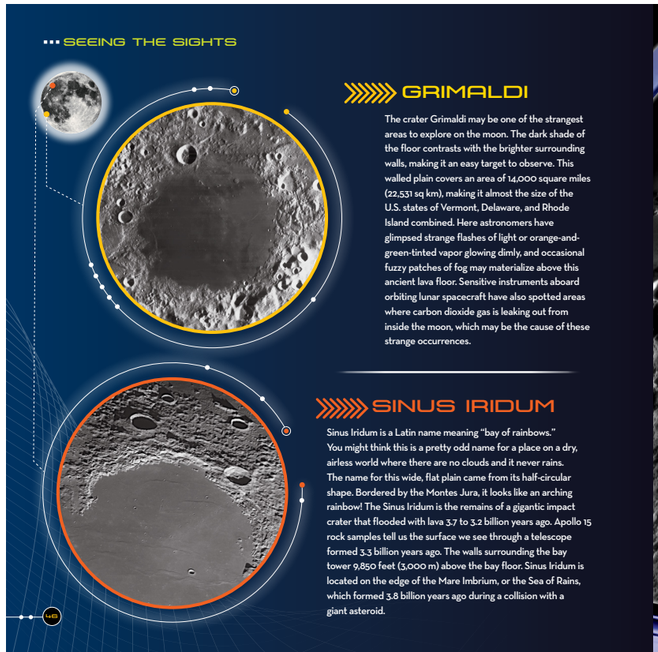
CCSS.ELA-LITERACY.W.6.2.E Establish and maintain a formal style.

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.



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.

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.

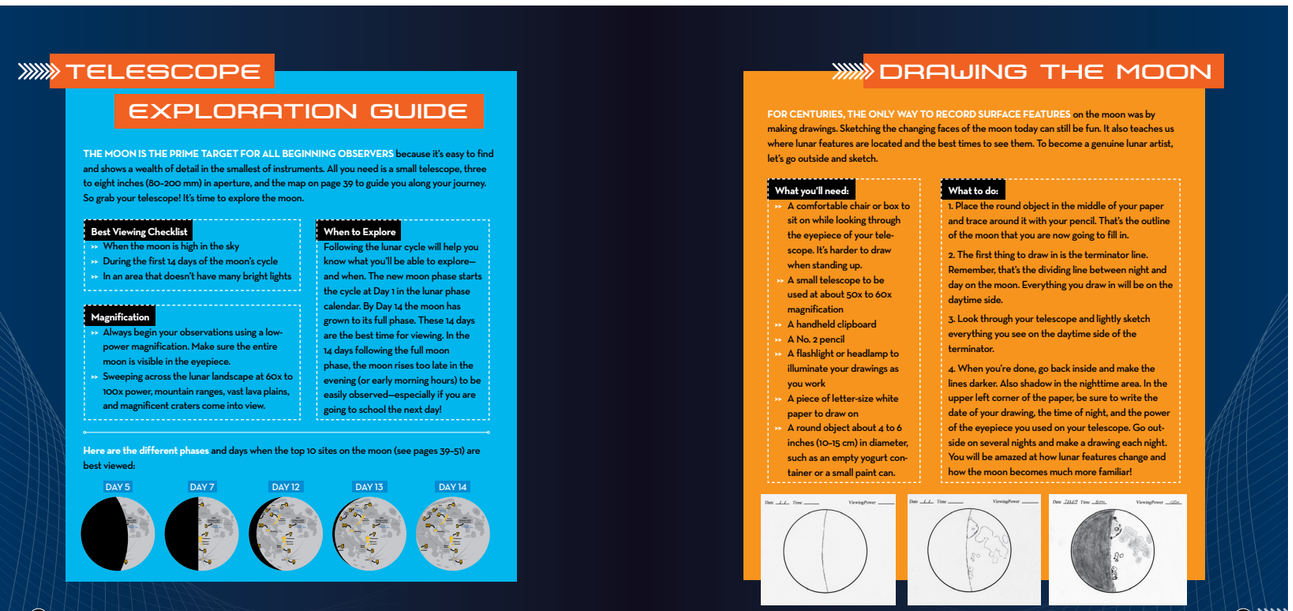
CCSS.ELA-LITERACY.W.6.2.E Establish and maintain a formal style.

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.



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.