

The Space Around Us

Grades 9-10

Using the activities in this learning plan, you will explore space including the phases of the moon, sundials, stars, and the International Space Station (ISS). Along the way, you will collect information, look for patterns, learn Wabanaki teachings, practice your design and writing skills, and much more! Consider completing some or all of these activities in a language that you are learning (for example, French or English as an additional language).

Some of these activities require a tablet or a computer and an internet connection, but others can be completed offline with common household items.

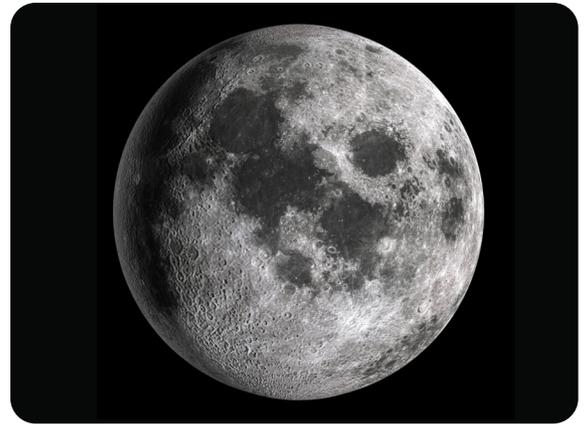
Information for Parents

Several activities in this plan include online options that use free software or apps. Please be aware of the following:

- Tinkercad requires users to create an account, which includes providing an email address, creating a password, and entering the user's date of birth.
- Star Walk 2 is available in a free and a paid version. The free version is sufficient for the activities suggested in this plan. Please note that the free version displays ads.
- GarageBand and iMovie are free apps on the iOS (Apple) App Store.
- BandLab requires users to create a free account, which includes providing a name and email address and creating a password.

Track the Phases of the Moon

Space exploration began long before rocket technology existed. Humans have been looking at the sky and studying patterns and relationships to determine how Earth is affected by the space around us. Scientists use journals to record their findings and collect data (information) over a long period of time. In this activity, you'll observe and record the phases of the moon and then look for patterns. **Follow these steps:**



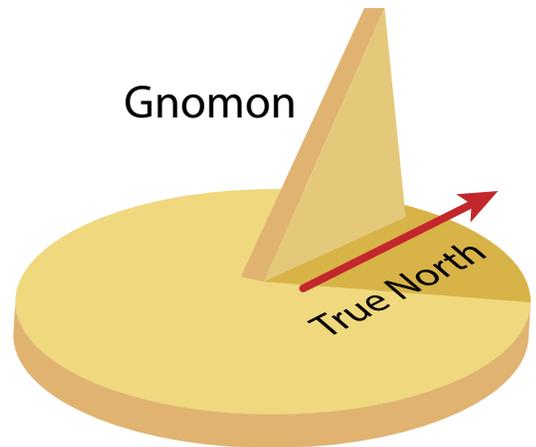
- 1 Decide how you will record your observations. You can print the Phases of the Moon Tracker sheet at the end of this document or make your drawings and notes on your own paper.
- 2 Observe the moon from the same location each night. Mark a spot in your driveway or another location around your home to make sure that you observe from the same place each night. Record what you see by drawing the moon and making notes. Here is an example:

	<p>Date: 16 April 2020</p> <p>Notes: Tonight, I observed that the moon was only partially visible due to cloud coverage. From what I was able to see the moon was bright and I could make out some craters in the bottom point.</p>
---	---

- 3 At the end of one week, review your drawings and notes. What patterns do you notice? What are you wondering about? Record your thoughts.
- 4 Continue observing the moon and recording what you see for another week or longer. What patterns do you notice? What are you still wondering about? Record your thoughts. If you have internet access and a device, try to find the answers to your questions.

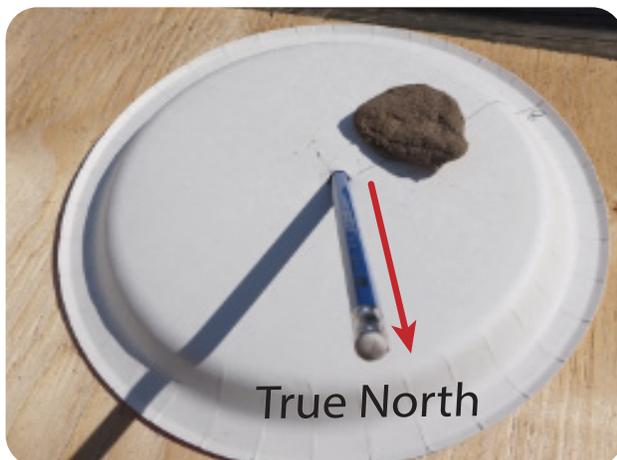
Make a Sundial

Long before watches and smartphones, people used the sun to tell them the time. One of the first tools used to tell time was the sundial. There are many types of sundials, but they all have one thing in common—a pointer, called a gnomon, which makes a shadow when the sun shines. In this activity, you will build your own sundial and observe and record the shadows over time.



Follow these steps:

- 1 Create your own sundial with items around your house. The picture above shows the basic parts. You'll need a circular base and a pointer (a gnomon) that goes from the centre of the circular base to the edge. You can create your sundial with poster board or any type of recycled cardboard and tape or glue.

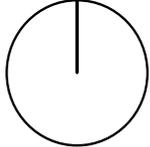
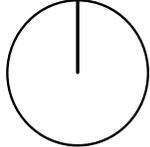
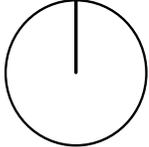


One idea (shown here) is to build your sundial by using a paper plate, some tape and a pencil, straw, or stick. When you build your sundial, poke a hole in the centre of the plate and secure your gnomon to make sure it won't move.

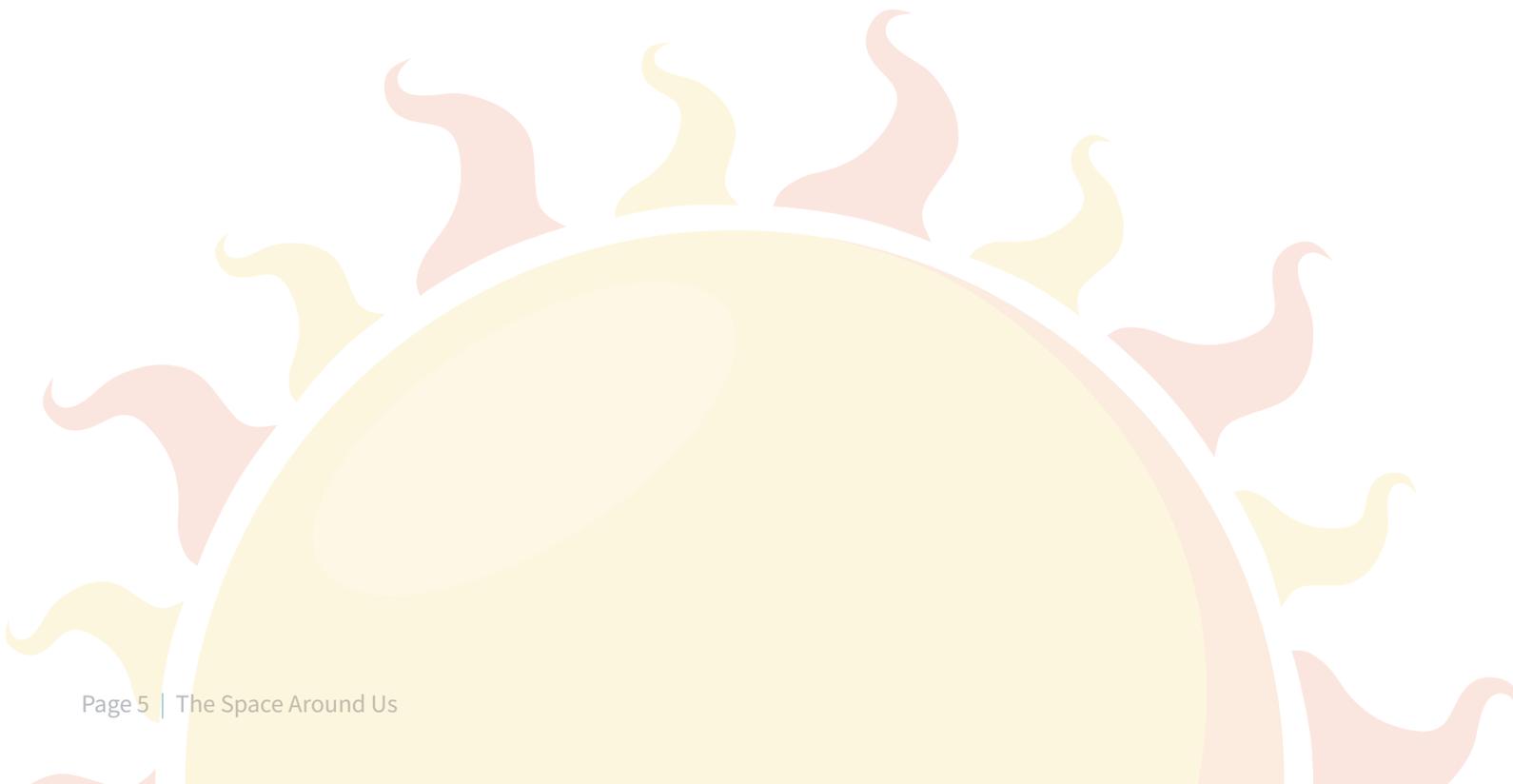
- 2 Decide how you will record your observations. You can print the Sundial Tracker sheet at the end of this document or make your drawings and notes on your own paper.
- 3 Once you have made your sundial, find a sunny, open place outside where your sundial will not be in a shadow at any time during the day. Using a traditional compass or compass app on a cell phone, place your sundial on a flat surface with the gnomon pointing toward true north. Put an object, like a rock, on your sundial to make sure it does not move. (It may be a good idea to mark the spot where you placed the sundial in case it gets moved accidentally.)

Make a Sundial

- ④ Observe your sundial four times a day. If possible, spread your observations out evenly. For example, you could collect data at 9:00, 12:00, 3:00 and 6:00. Draw the position of the shadow the gnomon makes and record the time of your observation. (Note that the vertical lines in the circles below indicate the location of your gnomon.)

Date:	Time: 9:00am	Time:	Time:	Time:
April 16th				

- ⑤ After the first day, what do you notice about the shadows? Why do you think the shadows are moving? What are you wondering? Record your thoughts.
- ⑥ Repeat your observations at the same times over a week or more. What do you notice about the shadows? What does the position of the sun do to the shadows? Could you tell the time of day by using your sundial? What are you still wondering? Record your thoughts.

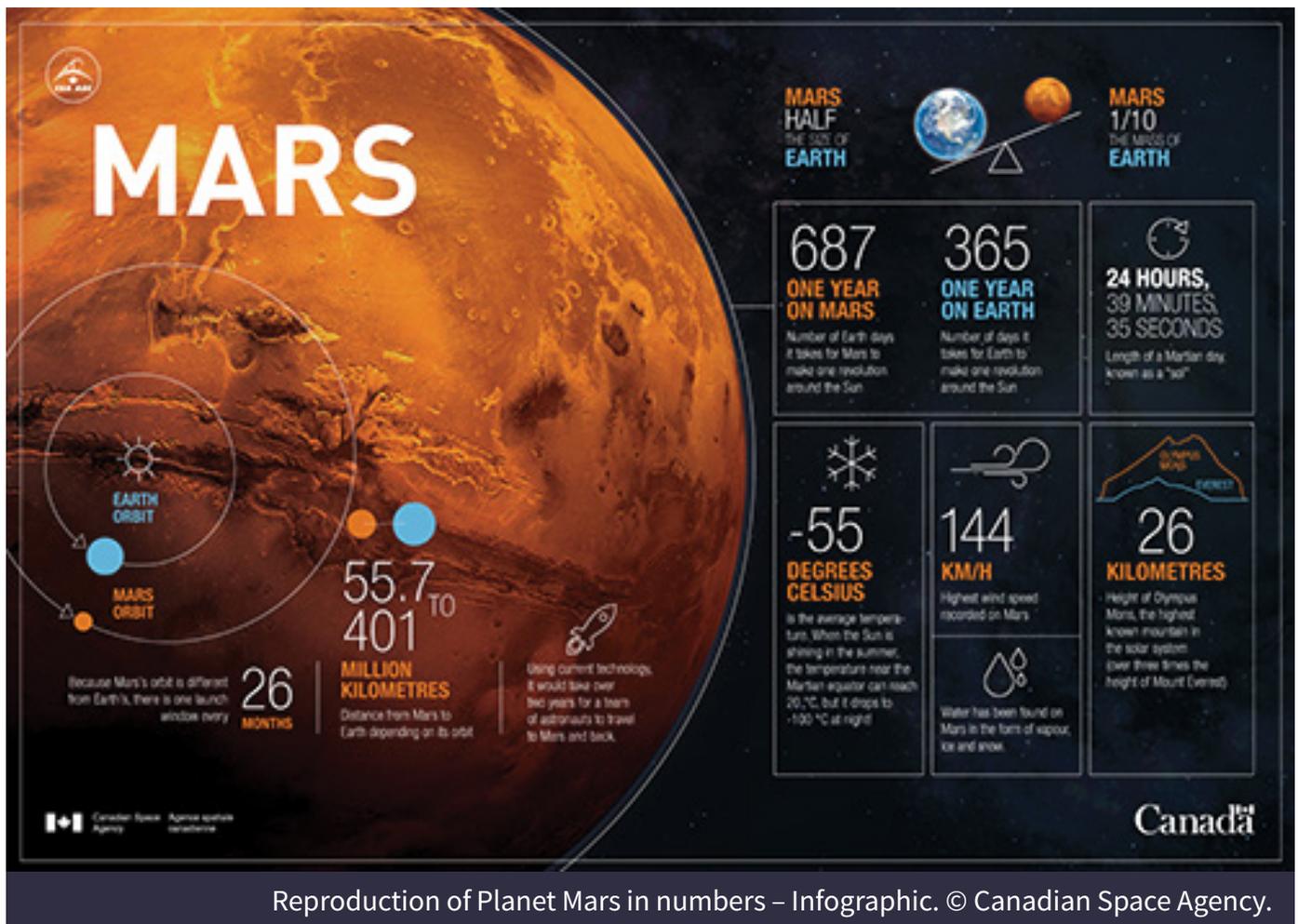


Research a Planet

Choose a planet and do some research using books or magazines around your house, documentaries on television, or online sources. Once you have researched your planet, display the information using an infographic. You can create your infographic using a computer or by hand.



What's an infographic? An infographic is a way of presenting information with pictures, text and data in an interesting and clear way. You can think of an infographic as full-page graphic or a poster. An example of an infographic from the Canadian Space Agency is shown below. You can also [see more examples of infographics](#) on the NASA website.



Reproduction of Planet Mars in numbers – Infographic. © Canadian Space Agency.

When you are finished, share your infographic with a family member or, with a parent or guardian's permission, share it on social media.

Make a Map of the Stars

For thousands of years, people have looked at the stars and imagined animals, objects, and mythological figures. These arrangements or groupings of stars are called constellations. You may have heard of some constellations such as Ursula Major, Ursula Minor, and Orion. (The Big Dipper is part of Ursula Major and the Little Dipper is part of Ursula Minor.) Although the International Astronomical Union recognizes 88 constellations, various cultures have grouped stars and named constellations in many different ways.



Look out your window or go outside on a clear, dark night. Draw a star map of what you see in the night sky. Can you see any constellations? Use the Constellation Map at the end of this document to help you identify some of the constellations and label them on your map.

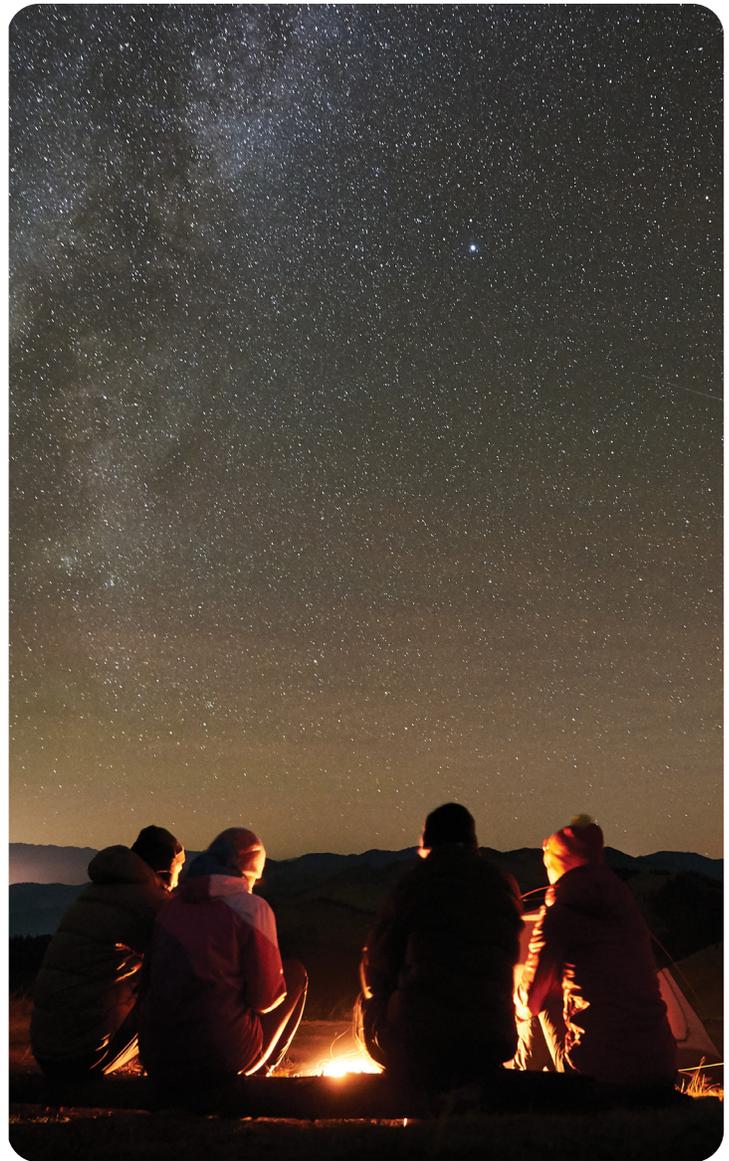
If you have access to a tablet or smartphone and you have a parent or guardian's permission, download the free version of the Star Walk 2 app. This app allows you to point your device at the sky and see the names of stars, constellations, and other objects. Use the app to do these activities:

- Compare your star map to the digital star map and make note of any differences or similarities. Use the app to add more labels to your sky map.
- See if you can find a satellite using the app. Once you know where to look, can you spot the satellite with your naked eye?





Think of a time when you sat out under the stars. Maybe you were at a camp with friends, outside for a walk at night, or around a fire with family. When you looked at those beautiful stars, what came to mind? Since the beginning of time, the stars have held a magical place for storytelling. Where did the names of constellations come from? They came from stories of course! Read a [Mi'kmaq story about stargazing](#) from the Canadian Museum of History.



Based on a grouping of stars you can see, create your own constellation and write a children's story about how the constellation got its name. If you prefer, you can retell a traditional story about the stars that you have heard. As you plan your story, think about your audience (their ages and interests) and your purpose for writing. For example, think about the words your audience knows and understands. Take a look at some children's books at home or online. Make a checklist of elements that are important to include in a story for children. If you have a friend who is doing this activity, create a list together.

Be sure to follow the writing process! Generate your ideas and write a draft, review your work and edit, and then publish your work. Share your story with a younger family member or email your story to a child you know!



Explore the International Space Station (ISS)

The International Space Station (ISS) is a joint project between the space agencies of the United States, Russia, Japan, Europe, and Canada. The ISS is a research laboratory in space where crew members conduct research, including experiments in biology, physics, astronomy, and meteorology. The ISS is also used to test spacecraft equipment needed for missions to the Earth's moon and Mars. The ISS circles the Earth in roughly 92 minutes and completes 15.5 orbits per day.

(Source: Adapted from “**International Space Station**” by Wikipedia licenced under **CC-BY-SA 3.0.**)



To learn more about space and life on the ISS, check out these links:

- [NASA's Live Space Station Tracking Map](#)
- [NASA's video tours of the ISS](#)
- [A document from NASA answering student questions about life on the ISS](#)
- [NASA's At Home webpage](#), which includes videos, podcasts, e-books and more
- [A YouTube video that compares the size of different objects in the universe](#)

Design a Tool for the ISS

After exploring the information about the ISS, design a new tool for the space station. Think about tools that could help the crew members who are living in zero gravity. Remember, even on the ISS, the crew members must do everyday tasks like sleeping, bathing, exercising and eating!

You can sketch your idea on paper or, if you have access to a computer and a parent or guardian's permission, try using **Tinkercad**, a free online 3D design program. The Tinkercad app is also available for free for iOS, Android, and Windows phones and tablets in app stores.

Imagine You Are a Crew Member of the ISS

After exploring the information about the ISS, pretend that you are a crew member on the space station. Think about the challenges that you would face. For example, how would you make dinner in zero gravity? How would you brush your hair? How would you cope with being away from friends and family for so long? For more information about life in space, [visit this page](#) on the Canadian Space Agency website.



Describe your life on the ISS in a creative way by using the facts that you learned. Here are some project ideas:

- Write a series of diary entries describing your life on the ISS.
- Write a series of email exchanges between you and a friend or a family member at home on Earth.
- Record a podcast about your life on the ISS.
- Create a presentation that you would share with high school students when you return back to Earth.
- Create a graphic novel about life on the ISS.
- Record a song. With a parent or guardian's permission, you could download and use GarageBand or Bandlab to create your song. These tools can be used on a computer or downloaded to a phone or tablet. If you compose some music, try writing it down in traditional or non-traditional notation!
- Make a movie. If you have a green sheet, tablecloth, or paper, you could use a green screen app or iMovie on an iPad to create your video. Use costumes or props to bring your movie to life. Also, consider adding music to set the tone. The iMovie app has several background tracks that you can use or you could compose your own.
- Create a skit. Use costumes or props to make your skit interesting. Use household objects or traditional instruments to create sound effects and/or music to go with your skit.

Be sure to share your finished work with a family member or friend!



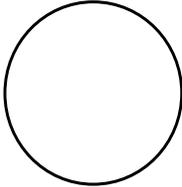
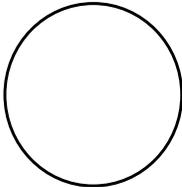
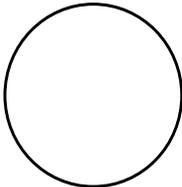
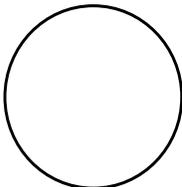
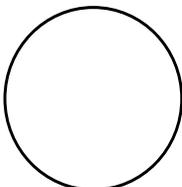
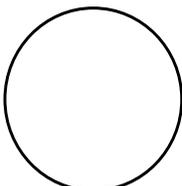
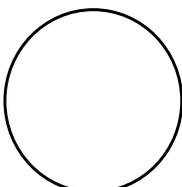
Build a Mars Rover



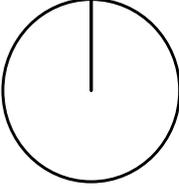
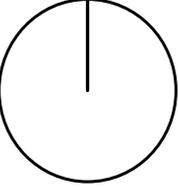
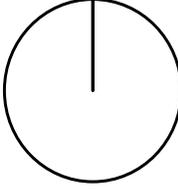
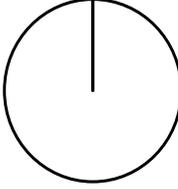
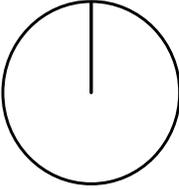
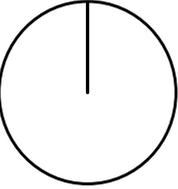
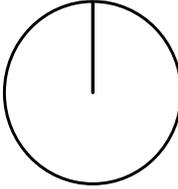
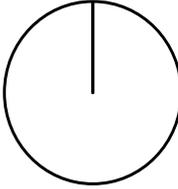
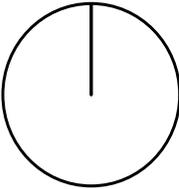
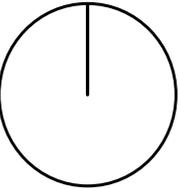
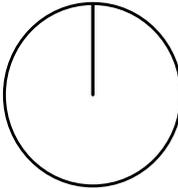
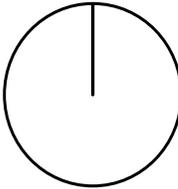
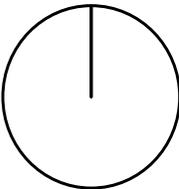
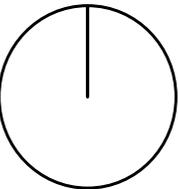
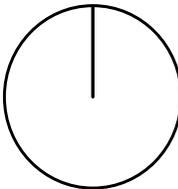
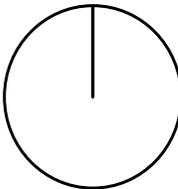
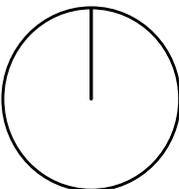
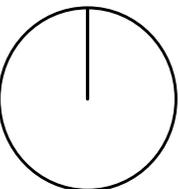
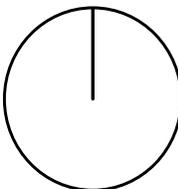
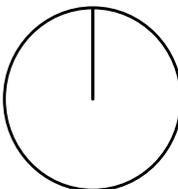
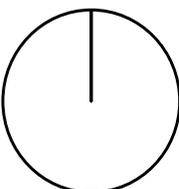
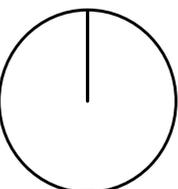
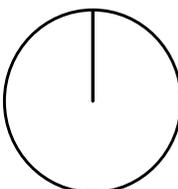
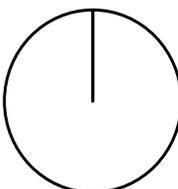
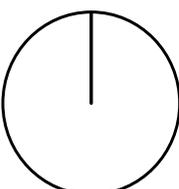
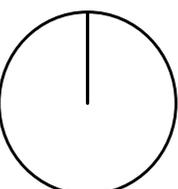
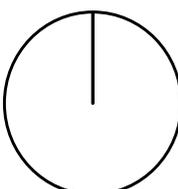
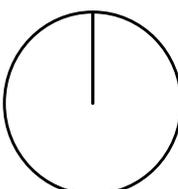
Mars rovers are vehicles that are used to explore and collect information about Mars. [Watch this YouTube video](#) from National Geographic to learn about these vehicles. Then, design and build a new Mars rover. Your rover must be able to move on uneven and bumpy surfaces and must be able to store objects. Be creative and use everyday items around your house, such as cardboard, clean milk cartons, straws, pencils, elastic bands, tape, glue or Lego.

If you are at a loss for ideas or need more instructions, check out NASA's [step-by-step instructions for designing and building your own cardboard rover](#).

Phases of the Moon Tracker

	<p>Date:</p> <p>Notes:</p>
	<p>Date:</p> <p>Notes:</p>
	<p>Date:</p> <p>Notes:</p>
	<p>Date:</p> <p>Notes:</p>
	<p>Date:</p> <p>Notes:</p>
	<p>Date:</p> <p>Notes:</p>
	<p>Date:</p> <p>Notes:</p>

Sundial Tracker

Date:	Time:	Time:	Time:	Time:
				
				
				
				
				
				
				

Constellation Map

This picture shows some of constellations that can be seen in the Northern hemisphere.

