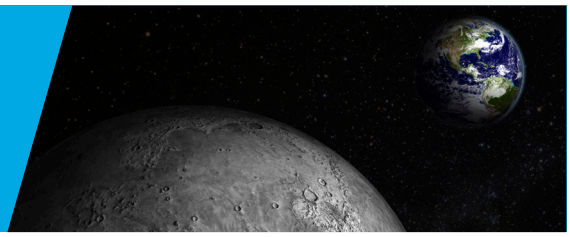
CURIOSITY AT HOME

GOING THROUGH A PHASE



A cycle is a repeating pattern. The movement of the Moon, Earth, and Sun cause a cycle of Moon phases. Create a model of how the phases of the Moon, or a cycle, are created using objects and your own eyes to represent the Moon, the Sun, and the Earth.

MATERIALS

- A lamp (without a lamp shade) or other single source of light.
- Ball that you can balance in the palm of your hand (about 5” in diameter)
- Paper or a science notebook
- Pen or pencil

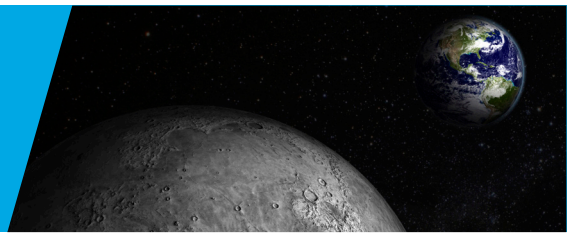
PROCEDURE

- Turn on the lamp or light source.
- Turn off all other lights in the room.
- Stand facing the lamp or light source.
- With one arm outstretched and your palm flat, place the ball on the palm of your hand.
- Carefully observe where the light is hitting the ball. Where on the ball is the light not able to shine?
- Keeping your arm extended, slowly turn counterclockwise. Pay close attention to the light and shadows on the ball.
- Pause and make note of the light after turning 45°, 90°, 135°, 180°, 225°, and 270°. You will have to raise your arm slightly above your head as you turn.
- As you finishing turning around completely, does the light hitting on the ball look the same or different from when you started?

Experiment continued on next page...

CURIOSITY AT HOME

GOING THROUGH A PHASE



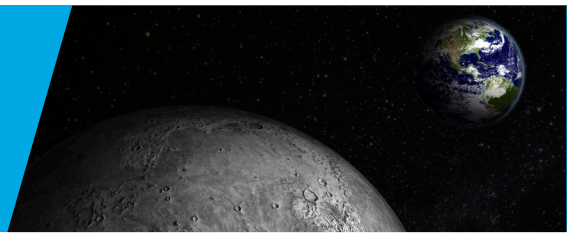
K–2 GRADE EXPLORATION

Here are some questions you can explore together.

- Before doing the activity, draw the different shapes you have seen when you have looked up at the moon.
- Do you see the shapes you drew in the shadows as the light moved across the ball?
- Do you see light and shadow shapes on the ball that you didn't draw earlier?
- If so, draw them now.
- If the ball is the moon, and you are the Earth, what is the lamp or light source?
- Where do you think the light that makes the moon shine come from?

CURIOSITY AT HOME

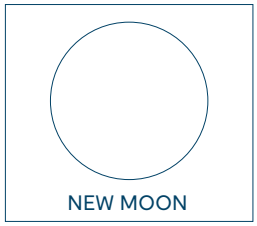
GOING THROUGH A PHASE

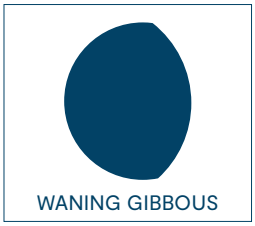


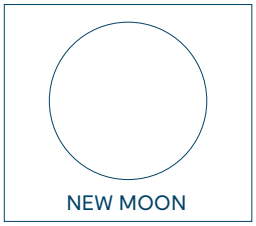
3–5 GRADE EXPLORATION

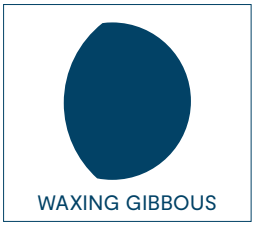
If the Moon starts as a full Moon, throughout a month (27 days) the shape of the Moon changes always returning to a full Moon.

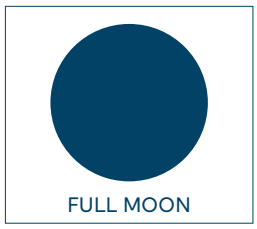
- Before beginning the activity, cut out the following phases of the Moon (currently in random order) and put them in the correct order they are seen throughout a month. You will want to begin and end with the exact same shape.











- Create a model of the phases of the Moon using a ball, a lamp or light source, and follow the procedure above.
- On a piece of paper or in your science notebook, describe how the light and shadows on the ball changed as you turned around.
- In this model, what does the lamp or light source represent?
- In this model, what does the ball represent?
- In this model, what do you represent?
- Is the moon a source of light?
- Where does the light come from?
- How do you know that phases of the moon we see in the sky will repeat?
- Look at the moon today. Which moon phase does it look like.
- How can you tell if the moon is going to be a full moon or a new moon soon?

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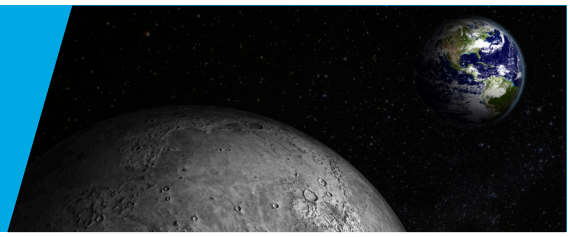
CURIOSITY AT HOME

GOING THROUGH A PHASE



6–8 GRADE EXPLORATION

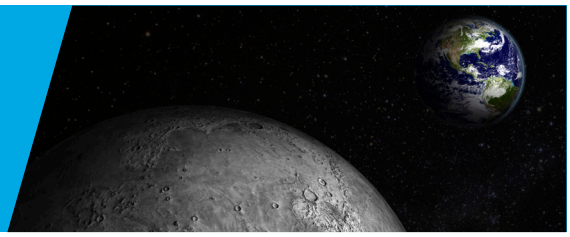
- In this model, what does the lamp or light source represent?
- In this model, what does the ball represent?
- In this model, what do you represent?
- A solar eclipse occurs when the Moon moves across the Sun to partially or fully block the Sun. Align the lamp/light source and the ball, to create a solar eclipse.
- A lunar eclipse is when the Earth blocks the Sun from partially or fully reaching the Moon. Align the lamp/light source and the ball to create a lunar eclipse.
- How does a Full Moon and a lunar eclipse differ?
- A crescent moon can have many angles in the sky. Can you align the ball and lamp/light source, to show both of these images here?

WANING CRESCENT

WAXING CRESCENT

CURIOSITY AT HOME

GOING THROUGH A PHASE



TRY THIS

Find two people to help you. One person will represent the Sun, one person will represent the Earth, and one person will represent the Moon.

- Both the Moon and the Earth **rotate**. To practice rotating, pick an object to look at. Spin around in place until you can see that object again. You have now rotated once.
  - The Earth rotates once every 24 hours. The person representing the Earth should stand facing the person representing the Sun. The Earth will slowly turn clockwise until they are looking towards the Sun again. How many days did you just represent?
  - The Moon rotates once about every 27 days. The individual that represents the Moon will rotate much slower than the individual representing the Earth will. The Moon should stand facing the Moon. Rotate by turning counterclockwise one full time until you are facing the Earth again. By the time you have spun around completely, almost a month has passed.
- Both the Moon and the Earth **revolve.** To practice revolution, you would walk in a circle around the Sun (if you are the Earth) or the Earth (if you are the Moon) one complete time.
  - The Earth revolves or makes one full circle around the Sun about every 365 days. The individual representing the Earth should stand in front of the person representing the Sun. To revolve around the Sun once, the Earth should move around the Sun counterclockwise until the Earth is once again standing in stand in front of the Sun. This revolution of the Earth is about one year. (Imagine spinning 365 times before you are able to complete the circle around the Sun.
  - The Moon revolves or makes one full circle around the Earth about every 27 days. The individual representing the Moon should stand directly in front of the person who represents the Earth. To revolve around the Earth once, the Moon should move around the Earth counterclockwise until the Moon is once again standing in front of the Earth. This revolution of the Moon is about 27 days. Imagine spinning 27 times before you are able to complete the circle around the Earth.
  - The Moon takes about 27 days to both rotate and revolve. Try to simulate this, but spinning slowly as you move in a circle around the Earth. You should have spun a quarter of the way around for each quarter of the circle you move around the Earth. Have the Earth pay attention to the position of the Moon. Does the Earth ever see a different part of the Moon?

CURIOSITY AT HOME

CRATER CREATORS

MATERIALS

- Old newspapers or cardboard (optional)
- Pan or pie tin
- Flour (about 2 cups)
- Cocoa powder or cinnamon (about ¼ cup)
- 4 rocks of various sizes not to exceed 4 cm (1 ½") in diameter
- Meter- or yardstick
- Paper or science notebook
- Pen or pencil

The surface of the moon is scarred with craters of different sizes and shapes. The following activity can help demonstrate the impact asteroids and meteorites have on our moon and other planetary bodies.

PROCEDURE

- If doing this indoors, place newspapers or cardboard on the floor.
- Fill a pan 5 cm (2 in) deep with flour. Level the flour so it forms a smooth surface.
- Sprinkle the surface of the flour with cocoa or cinnamon to cover the flour.
- Measure the diameters of the 4 rocks and record your measurements in the chart or in your science notebook.
- Have a helper hold the meter- or yardstick inside the edge of the pan.
- Drop the smallest rock into the pan from 30 cm (12 in) high. Record your observations in the chart or your science notebook.
- Follow with progressively bigger rocks. Record the diameter of the rocks and your observations for each in the chart or in your science notebook.
- Level the flour so it forms a smooth surface and re-sprinkle it with cocoa or cinnamon.
- Have a helper hold the meter- or yardstick inside the edge of the pan.
- In the same order used previously, drop the rocks again from 60 cm (24 in).
- Record the similarities and differences of the results of the 1st and 2nd steps.

TRY THIS

- Continue from 90 cm (3") if desired.
- Try tossing the rocks from different angles.
- What happens when craters overlap?
- What seems to have the greatest effect on the size of a crater: the speed, size, angle, etc. of the rock?

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CURIOSITY AT HOME

CRATER CREATORS

K–2 GRADE EXPLORATION

- In the space to the right, draw what **you think will happen,** when you drop a rock into the powder mixture. →

- In the chart below, draw pictures of **what happened** when you dropped the rocks into the powder mixture.

	First Drop (30 cm or 12 in)	Second Drop (60cm or 24 in)
Rock 1		
Rock 2		
Rock 3		
Rock 4		

- How does the size of the rock change your crater?
- How does the height which you drop the rock?
- Think about the moon. How does the surface of this landscape compare to the moon?
- Where do you think the objects that made craters on the moon came from?
- Do you think there are craters on other planets including Earth?

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CURIOSITY AT HOME

CRATER CREATORS

3–5 GRADE EXPLORATION

- In the charts below, record your predictions of what **you think will happen,** before beginning the 30 cm (12 in) and 60 cm (24 in) height tests.
- Measure the rock samples and record the diameters in the chart.
- After you drop each rock, draw or write your observations in the correct chart below.

30 cm drop	Diameter of Rock	Prediction	Observation
Rock 1			
Rock 2			
Rock 3			
Rock 4			

60 cm drop	Diameter of Rock	Prediction	Observation
Rock 1			
Rock 2			
Rock 3			
Rock 4			

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CURIOSITY AT HOME
CRATER CREATORS

3–5 GRADE EXPLORATION *continued...*

PARTS OF A CRATER

Floor: the flat or bowl shaped bottom of the crater

Rim: the top of the raised area surrounding the crater

Wall: the sides of the crater between the floor and the rim

Depth: the measurement from the original surface of the landscape to the bottom of the crater floor.

Diameter: the measurement of a straight line from one side of the crater through the center and to the opposite side of the crater

Ejecta: the material thrown out of the crater during impact

Ray: one streak of ejecta starting from the rim and extending outward

Draw a picture of the crater and label the parts.

Part of the Crater	How does the rock diameter change this part of the crater?	How does the height of the impact change this part of the crater?
Floor		
Rim		
Wall		
Depth		
Diameter		
Ejecta		
Ray		

- Think about the moon. How does the surface of this landscape compare to the moon? To the Earth?
- What does the Earth have that the moon doesn't have that protects it from most asteroids and meteorites?

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CURIOSITY AT HOME

CRATER CREATORS

6–8 GRADE EXPLORATION

- In the charts below, record your predictions of what **you think will happen,** before beginning the height tests. Also measure and record the rock sample's diameters in the chart.
- Test each rock from 30 cm (12 in) and 60 cm (24 in) height at a 90° angle to the surface being sure to let go of the rock **without adding** additional force. Simply drop the rock. Draw or write your observations in the chart.
- Test each rock from 30 cm (12 in) and 60 cm 24 in) height at a 90° angle to the surface **adding** an additional force or push to the rock. Draw or write your observations in chart.

30 cm drop	Diameter of Rock	Prediction	Observation
Rock 1			
Rock 2			
Rock 3			
Rock 4			

60 cm drop	Diameter of Rock	Prediction	Observation
Rock 1			
Rock 2			
Rock 3			
Rock 4			

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CURIOSITY AT HOME
CRATER CREATORS

6–8 GRADE EXPLORATION *continued...*

PARTS OF A CRATER

Floor: the flat or bowl shaped bottom of the crater

Rim: the top of the raised area surrounding the crater

Wall: the sides of the crater between the floor and the rim

Depth: the measurement from the original surface of the landscape to the bottom of the crater floor.

Diameter: the measurement of a straight line from one side of the crater through the center and to the opposite side of the crater

Ejecta: the material thrown out of the crater during impact

Ray: one streak of ejecta starting from the rim and extending outward

Draw a picture of the crater and label the parts.

Part of the Crater	What is the relationship between the rock diameter and the part of the crater?	What is the relationship between the impact height and the part of the crater?
Floor		
Rim		
Wall		
Depth		
Diameter		
Ejecta		
Ray		

- How does adding additional force impact the craters you made?
- What happens if the rocks hit the surface from an angle other than 90°? How does the angle change the shape of the crater?
- Comparing the Moon and the Earth, why do you think they show differing evidence of crater impacts?

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