

Moon Phase Flipbook

Program Type: Demonstration or
Classroom Program

Audience Type: Grade 4–8

Description: Students assemble a flipbook of Moon phases and discuss why the Moon appears to change shape over the course of a month.

Topics: Moon phases, Moon, Earth, Sun, astronomy, patterns.

Process Skills Focus: Critical thinking, inquiry, observing, prediction.

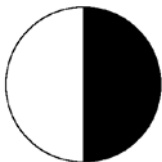
LEARNING OBJECTIVES

For Next Generation Science Standards alignment, see end of outline.

- Moon phases occur in regular patterns that can be predicted.
- The Moon's phases are caused by the relative positions of the Sun, Moon, and Earth.

TIME REQUIRED

Advance Prep



30 minutes

Set Up



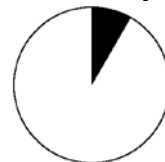
5 minutes

Activity



35 minutes

Clean Up



5 minutes

SITE REQUIREMENTS

- Large open area
- Access to a chalkboard or whiteboard
- The presence of at least one adult (two is helpful)

PROGRAM FORMAT

<u>Segment</u>	<u>Format</u>	<u>Time</u>
Introduction	Large group discussion	10 min
Moon Phases	Instructor-led activity	10 min
Moon Flipbook	Individual activity	15 min
Wrap-Up	Large group discussion	5 min

SUPPLIES

Permanent Supplies	Amount	Notes
Scissors	1/student	
Large ball	1	Basketball, rubber ball, or similarly sized ball
White masking tape or paint	1 roll or bottle	Skip if you can find a white ball
Staplers	2	

Major Consumables	Amount	Notes
Flipbook pages printed single sided on cardstock	1/student	At the end of this document

ADVANCE PREPARATION

- Print out the flipbook pages single-sided and in color on cardstock (English or Spanish versions available). Each student should have two different pages.
- Make a sample flipbook.
- Apply the masking tape or paint to one half of the ball. Any covering method works as long as half of the ball is white.
- Refill the staplers, if necessary.

SET UP

- Place the large ball near the front of the room.

INTRODUCTION

5 minutes

Let students speculate before offering answers to any questions. The answers given are provided primarily for the instructor's benefit.

Suggested script is **shaded**. Important points or questions are in **bold**. Possible answers are shown in *italics*.

Who has seen the Moon before? What did it look like?

A full circle, a small sliver, half full.

Is the Moon always the same shape? What shapes can it take?

Circle, crescent, disappear.

Why do you think the Moon appears to change shape?

It moves. It gets bigger or smaller.

Today, we're going to investigate why the Moon looks different at different times of the month.

INSTRUCTOR-LED ACTIVITY

Moon Phases

10 minutes

Draw a large Sun on the board on the front of the room. Have the students sit on the floor together in the middle of the room, if possible.

What do you think this might be?

The Sun!

Yes, it's the Sun. And you are the Earth. Why are the Sun and Earth important for determining what shape the Moon appears to be?

The Moon goes around the Earth.

Let's find out. That is the Sun. You are the Earth and all the people on it who love to gaze at the Moon. And this ball in my hand is the Moon.

The Moon revolves around the Earth (you all) like this.

Walk around the kids in a big circle making sure to turn the Moon so the bright side always faces the Sun. Stop at the front of the class again.

But where does the moonlight that we see come from?
The Moon glowing. The Sun.

The Moon is basically a ball of rock covered in dust. Do rocks and dust glow?

No.

Neither does the Moon. So, where does the light come from?

The Sun.

The Sun shines on the Moon. Some of the sunlight bounces off the Moon's surface towards us on Earth.

Stand between the Sun (the board) and the Earth (the class).

Does the Sun's light cover the whole surface of the Moon?

No, just the part facing the Sun.

So, if only the part of the Moon facing the Sun has sunlight on it, which part of my Moon here should be bright (the white part) and which part is dark?

The part facing the Sun is light, and the part facing away is dark.

Hold the Moon so the white part is toward the Sun and away from the kids/Earth.

How much of the bright side of the Moon can you see?

None.

That is what's called a New Moon. That's when you can't see the Moon at all because the bright part is facing away from us.

Where would the Moon be during a Full Moon when you can see all of the bright side and it looks like a full circle?

Behind us! On the other side.

Stand behind the students with them between you and the Sun.

When the Moon is behind the Earth, people on Earth can see all of the bright part of the Moon and it looks full.

Stand on the side of the students.

How much of the bright side can you see now?

One half.

What is that Moon phase called?

A half Moon?

It can be called a Half Moon because half of it is visible. It is also called a Quarter Moon because it is a quarter of the way through its cycle around the Earth. If it getting bigger, it is called a First Quarter Moon. If it is getting smaller, it is called a Third Quarter Moon.

Where would I stand to make a Crescent Moon? One that just shows a sliver of light?

Almost between Earth and the Sun.

Yes, the Moon looks like a crescent when the Moon is mostly between Earth and the Sun, but just a little bit to the side. If the Moon is getting bigger, it is called a waxing crescent. If it is getting smaller, it is called a waning crescent.

Walk to the back of the class and a little to the side.

What is this Moon phase called?

It is a Gibbous Moon. The Moon looks almost full when it is almost on the backside of the Earth, but just a little bit to the side. If the Moon is getting bigger, it is called a waxing gibbous. If it is getting smaller, it is called a waning gibbous.

Slowly walk in a circle to your right around the students.

Ask *What shape is this?* and help them remember the names of each shape as you revolve around them:

- New Moon (front of class, 0°)

- Waxing Crescent Moon (between the right side and the front, 45°)
- First Quarter (right side of the students, 90°)
- Waxing Gibbous Moon (between the right side and the back, 135°)
- Full Moon (behind the students, 180°)
- Waning Gibbous Moon (between the left side and the back, 225°)
- Third Quarter (the left side of the students, opposite the first quarter, 270°)
- Waning Crescent Moon (between the left side and the front, 315°)

INDIVIDUAL ACTIVITY

Moon Flipbook

15 minutes

Now, we're going to make a flipbook showing what we just learned about how the Moon appears to change shape.

Distribute the flipbook pages and scissors to each student.

These pages show positions of the Sun, Earth, and Moon for each phase of the Moon. In the corner, it also shows what the Moon looks like at each position.

Can you find the pages that show the Full Moon and the New Moon?

Page 1 is a New Moon.

Page 5 is a Full Moon.

Carefully cut out each page with scissors. Then stack the pages in order using the page numbers in the lower-left corner. Don't forget the title page!

When you're finished, raise your hand, and I'll come over with a stapler to help you bind your flipbook.

Instructions for facilitators: Staple the flipbooks along their spine with two staples as close to the edge of the paper as possible. (See image to left with red lines for where the staples go.)



WRAP-UP

5 minutes

Ask for student observations. There is no correct answer. Let students guide the discussion and present their hypotheses before discussing explanations.

Has everyone tried using their flipbooks? What does your flipbook show?

The Moon going around Earth. The Moon getting bigger and then smaller.

What did you learn about the Moon that you didn't know before?

What is something that you would like to learn more about?

What do you think it would be like to look up from a planet like Jupiter that has more than 65 moons?

How about if you were on Mercury? This planet has no moons.

CLEAN UP

- Recycle the paper scraps from the flipbooks and collect the scissors and staplers.

OPTIONAL EXTENSIONS

- Students can observe the Moon over the course of a month and mark the dates that they observe each shape of the Moon in their flipbook.

RESOURCES

NASA gallery of Moon phases

<https://solarsystem.nasa.gov/galleries/phases-of-the-moon>

Moon information for the solar system and additional Moon activities

<https://spaceplace.nasa.gov/how-many-moons/en/>

GLOSSARY

Full Moon	The Moon phase where the illuminated part of the Moon is fully visible.
New Moon	The Moon phase where the illuminated part of the Moon is not visible.
Waning	A word that means “decreasing.” A “waning Moon” is one that appears to be growing smaller (i.e., less illuminated) over time.
Waxing	A word that means “growing.” A “waxing Moon” is one that appears to be growing larger (i.e., more illuminated) over time.

NEXT GENERATION SCIENCE STANDARDS

Practices

2. Developing and using models
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions

Crosscutting Concepts

1. Patterns
2. Cause and effect
4. Systems and system models

DCIs

	Disciplinary Core Idea	K	1	2	3	4	5	MS	HS
Earth & Space Science									
ESS1	Earth's Place in the Universe	n/a			n/a		✓	✓	
ESS2	Earth's Systems		n/a						
ESS3	Earth and Human Activity		n/a	n/a					

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MOON PHASES

Flipbook

OMSI

1

New Moon

2

Waxing Crescent

3

First Quarter

4

Waxing Gibbous

5

Full Moon



FASES DE LA LUNA

OMSI

9

Luna nueva

10

Luna creciente

11

Cuarto creciente

12

Creciente gibosa

13

Luna llena

