THEATRE IV

Classroom Connections

For teachers and students grades 6-12

Apollo: To the Moon

By Mary Hall Surface • Originally Designed and Performed by Kevin Reese

Teacher Resources

In the Classroom

Apollo: to the Moon is presented in support of Virginia Standards of Learning in Science: 6.10, ES.14, PH4, and in English: 6.4, 6.5, 7.5, 7.6, 8.4, 9.4, 11.4, 12.4.

Activities provided support curriculum in grades 6 - 12.

At the Library

Grades 6-7

Apollo 13: Space Emergency (Count Down to Space) by Michael D. Cole

Grades 7-12

Apollo 13, by Jim Lovell and Jeffrey Kluger

Apollo: The Epic Journey to the Moon, by David West Reynolds

Look in the 523.3 section of the library for more books about the moon and in 629.45 for more books about about the Apollo space program.

On the Web

www.smv.org/pubs/EarthInSpaceMenu.htm

The Science Museum of Virginia's website featuring lots of information and fun activities

www.TheatreIV.org/sidekicks.html

Activities provided are aligned with the Virginia Standards of Learning. Information for teachers and parents, including links to other great web sites.

Moon Facts

The Moon is about one-fourth the diameter of the Earth.

On the surface of the Moon, gravity is about one-sixth that of Earth.

The Moon actually rotates exactly once each time it orbits, which means that it keeps the same face toward the Earth all the time.

It takes about 29.5 days for the Moon to go through all of its phases from one full moon to the next full moon.

Reading Resources: NASA

Who is NASA?

The National Aeronautics and Space Administration (NASA) is an independent United States government agency. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.

Why Work For NASA?

Today there are more opportunities than ever before that await each and every one of you who wants to reach for the stars. In the 21st century, your generation is going to lead the world…and possibly, even leave this world to live on another. These opportunities might lead to adventures such as living on the International Space Station; or working on a research station on a near-Earth asteroid; developing a colony on Mars; or peering thousands of trillions of miles into the vastness of space, looking for Earth-sized planets, and searching for an answer to the big question: Are we alone?

Exploring heavens brings advances here on Earth that we have yet to imagine. But we should also pursue these missions because there's more to life than survival and consumption. Are these goals bold? Yes. Are the missions risky? Yes. Is there a chance we could fail? You bet. But don't be afraid to dream. Now its your turn. Take your place in history. Join the NASA team.

International Space Station Program Description

The International Space Station is the largest international scientific and technological endeavor ever undertaken. With the Space Station, a permanent laboratory will be established in a realm where gravity, temperature and pressure can be manipulated in a variety of scientific and engineering pursuits which are impossible in ground-based laboratories. The Space Station will be a testbed for the technologies of the future and a laboratory for research on new, advanced industrial materials, communications technology, and medical research.

When completed the Space Station will be 361 feet across and 290 feet long, and it will weigh about 925,000 pounds. Six people will live on the Space Station.

The Space Station will be a permanent orbiting laboratory in space capable of performing long-duration research in the unique environment of Earth orbit. Aboard the international laboratory, science crews will conduct medical research in space; develop new materials and processes to benefit industries on Earth; and accelerate breakthroughs in technology and engineering that will have immediate, practical applications for life on Earth and will create jobs and economic opportunities today and for decades to come.

Courtesy of NASA, 09/99

Using Resources:
Reading for Information

1. In paragraph one, how does NASA describe itself?

_____

_____

2. In two sentences, explain why someone might want to work for NASA.

_____

_____

3. What is "the big question? _____

4. Why is the International Space Station important for us on Earth?

_____

_____

_____

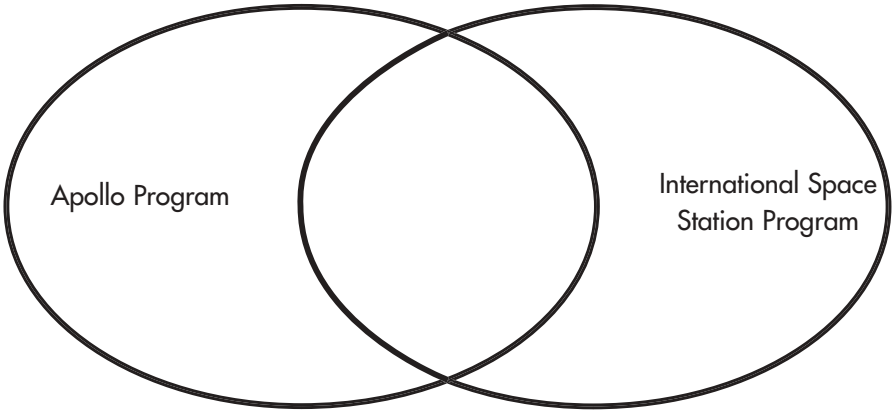
_____

5. Based on what you have read about NASA, what type of person do you think they are looking for to help them with their projects and missions? Explain.

_____

_____

7. Compare the Apollo Program and the International Space Station Program.



Ready Resources

Strategies:
Reading to Be Informed

Ask what you want to learn from the material.

Skim. Look for key words.

Underline, highlight, or take notes.

Use illustrations, captions, bold-faced print, and other aids.

Use resources (dictionary, Internet, library) beyond the material to gather more information.

Challenge Activity

Draft a letter of inquiry to NASA, asking about job and/or student internship opportunities. In your letter, briefly describe the traits that make you a great addition to the NASA team. Additionally, include questions regarding qualifications and educational requirements for a job at NASA that you may be interested in. Be sure to use proper business letter format.

Take it one Step Further

To find out more about NASA's Apollo Program, log on to http://science.ksc.nasa.gov/history/apollo/apollo.html

THEATRE IV *A Theatre IV activity in support of the following Virginia Standards of Learning in English: 6.4, 6.5, 6.7, 6.8, 7.5, 7.6, 7.8, 8.4, 8.5, 9.4, 9.6, 10.7, 11.4, 11.8, 12.4, 12.7 and in Science: 6.10, ES.14, PH4.*

The Space Race:
A Journal Activity…

Key Information

During the 1960's, the U.S.'s enemy was Communism, embodied by the U.S.S.R. An important national goal was to surpass the Russians in what became known as "the race for space." The technology that would get us into space also benefitted military technology, and it was important to the U.S. that we be one step ahead of the Russians in preparation for an armed conflict....

While watching Apollo: to the Moon

Look for these quotes about "the race for space." Then complete the Journal Activities.

"But the Russians have already sent a man into space! We've just sent a couple of satellites and a chimpanzee."

"If the Russians can build rockets that powerful, they can also build new bombs and missiles."

"NASA is fully aware that we cannot be outclassed by new Russian technology."

"I believe that this nation should commit itself to achieving the goal, before the decade is out, of landing a man on the moon and returning him safely to Earth."

"...we shall get there, by God, before we hear radio signals in Russian coming our way from the Moon."

Think About it...

- Do you agree that the "race for space" was a "power play" that served politicians more than the quest for scientific knowledge and technology? Explain.

- Why were both the U.S. and the U.S.S.R. worried that the other nation would get ahead in the space race?

- What does this quote mean?
  "...we shall get there, by God, before we hear radio signals in Russian coming our way from the Moon."

- In your opinion, in the late 60's, was it more important to set resources aside for the space program or to set resources aside to try to conclude the war in Vietnam?

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Think about it

Which of these astronauts said:

"When I was a child, I dreamed about space - I admired pilots, astronauts, and I've admired explorers of all kinds. It was only a dream that I would someday be one of them. It is my hope that all children 'boys and girls' will see this mission and be inspired to reach for their dreams, because dreams do come true!"

How did you know? Explain!

Challenge Activity

Imagine that you were to pursue training as a NASA astronaut. What education, training, and experiences would you seek out? Create a resume for yourself, a NASA astronaut, for the year 2020. What would you include?

Take it one Step Further

Log on to NASA's biography and journal search at **http://quest-db.arc.nasa.gov/bio_search.htm.**

Read abut and explore other NASA careers through the stories of the men and women who work for NASA. What kind of education, training, and experiences do you find?

NASA Astronauts:
What Does it Take?

Name: Eileen Collins
Title: Space Shuttle Commander
Family Background: Her family is very supportive and includes her parents and two brothers and a sister. Eileen is married and has one daughter. Eileen's parents say that Eileen is a hard worker who has earned everything she is today.
Interests: While in high school, Eileen began reading about famous women pilots. She admired the courage of these women.
Education & Training: Eileen graduated from Syracuse Univ. with good grades and a pilot's license. Then she went into Air Force pilot training. Eileen was named first woman Space Shuttle Commander in 1998.

Photos courtesy of NASA bios at http://quest.arc.nasa.gov/people/bios/women/ec.html

Name: John H. Glenn, Jr.
Title: Colonel USMC (Ret.)
Family Background: Glenn grew up in New Concord, Ohio. He has two children and two grandchildren.
Education and Training: Glenn earned a B.S. in Engineering, and by then had learned to fly. He entered the Naval Aviation Cadet Program, but received a commission for the Marines instead. Glenn flew in combat missions in WWII and in ground-support missions in the Korean Conflict. At the frontier of his profession was space travel, and the Manned Space Program began in 1958. Not long after, Glenn was selected as a Mercury astronaut. Glenn made America's first orbital flight in Feb. 1962, piloting the Mercury-Atlas 6 *Friendship 7* spacecraft. Glenn has had a long and distinguished career since Mercury. He won a seat in the U.S. Senate, and became the oldest American in space (at age 77) as a crew member on the Space Shuttle *Discovery* in 1998.

Photo Courtesy of NASA at http://www.jsc.nasa.gov/Bios/htmlbios/glenn-j.html

Use this space to characterize the kind of people Collins and Glenn are. What does it take to be a NASA astronaut?

_____

_____

_____

_____

_____

The Phases of the Moon

Definitions

rotate: To turn or spin on an axis. This word comes from the Latin word *rota*, which means "wheel."

revolve: To orbit around a central body.

wax: To increase. The Moon is said to be waxing when it begins to look larger. The word came from historical times when candles were dipped in wax until they "grew" large enough to use.

wane: To decrease. The Moon is said to be waning when it begins to look smaller.

crescent: The "slice" shape of the Moon when only an outer edge is visible.

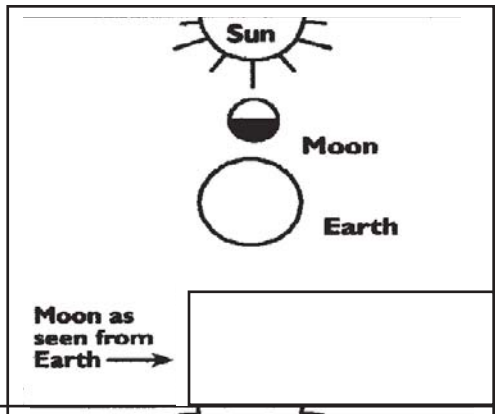
gibbous: When the Moon appears fuller than the first quarter moon, but less than a full moon, it is called a gibbous moon. The word comes from the French word for "hunchback."

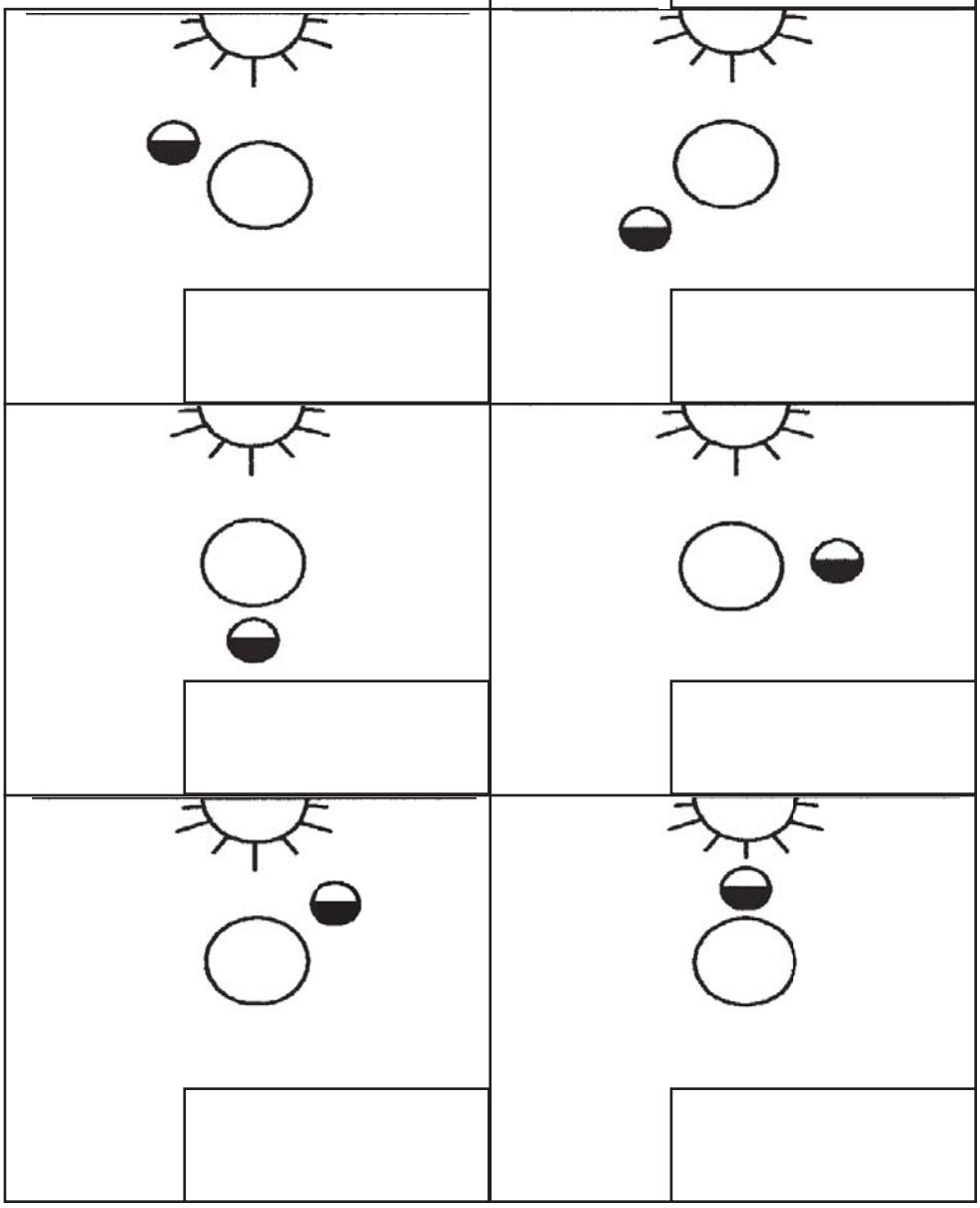
Take it one Step Further

For more activities on the Moon and its phases, go to ***www.smv.org/pubs/EarthInSpaceMenu.htm.***

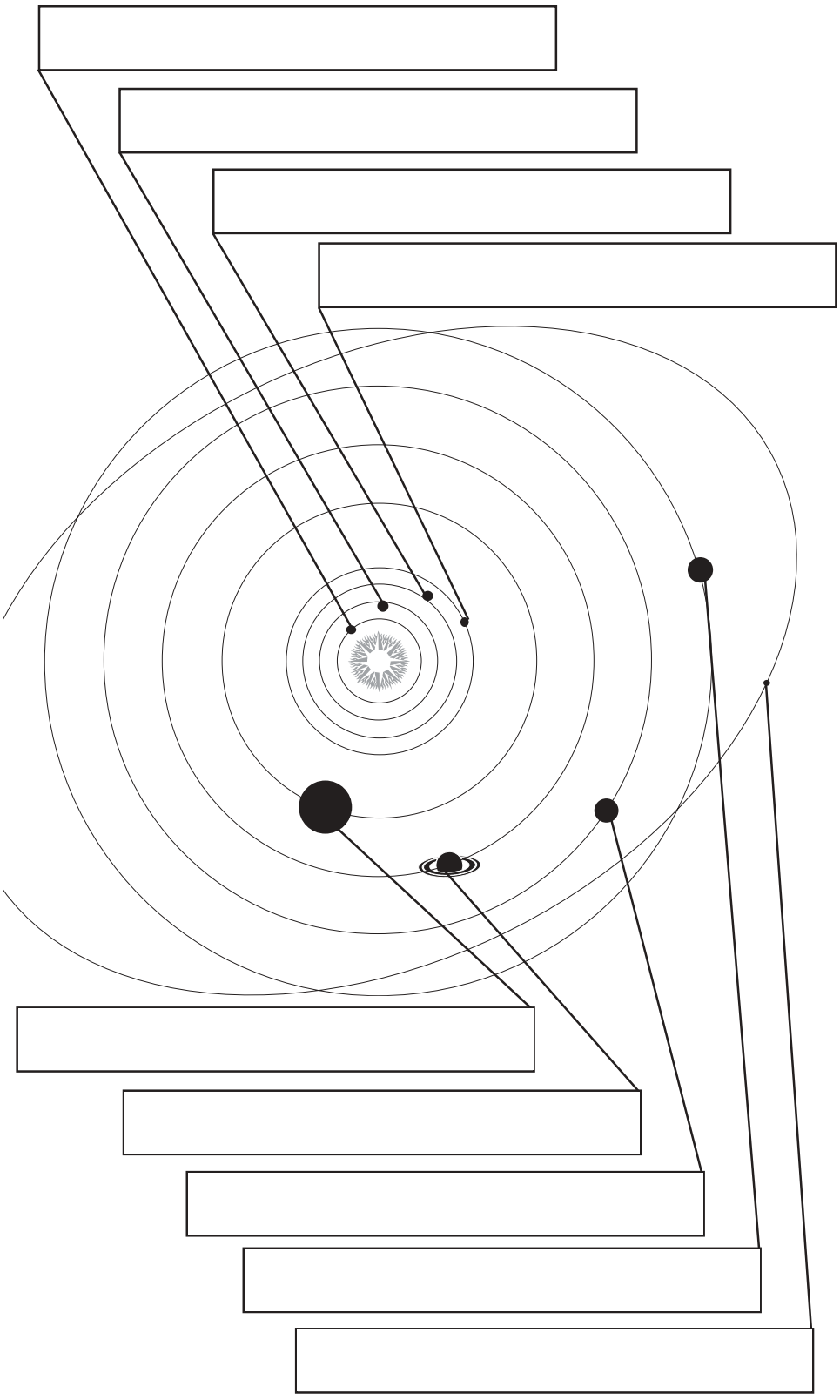
Activity

For each diagram, fill in the box with a picture of how the Moon would look from Earth, and the phase of the Moon.
(for answers log onto www.TheatreIV.org/sidekicks)





Our Solar System



Fun Facts

Lunar and Planetary Explorations (unmanned): 2002–2006

Contour – USA – (launched July 2002) Scientific study of four different comet nuclei, operating until 2008.

Muses-C – Japan – asteroid sample return – (December 2002)
This mission makes a landing on asteroid Nereus and returns a soil sample to Earth.

LUNAR-A – Japan – lunar orbiter/lander – (2002) This mission includes a lunar orbiter, a lander and a sub-satellite. The orbiter is in semi-polar orbit.

Rosetta – Europe – comet rendezvous/landing – (January 2003) Rosetta investigates comet Wirtanen. The spacecraft orbits the comet and drops two probes to land on it. During the spacecraft's eight-year voyage to Wirtanen, it conducts flybys of the asteroids 3840 Mimistrobell and 2530 Shipka.

Mars Twin Exploration Rovers 2003 – USA – Mars probe – (2003) This is part of NASA's 10-year program to launch a series of probes to the Red Planet during periods of favorable launch opportunities.

Mars Reconnaissance Orbiter – USA (2005) This mission will take detailed photos and analysis from orbit.

New Horizons – USA – Pluto flyby – (2006) This mission is scheduled for launch around 2006 and will arrive at Pluto around 2016.

Think about it

Discuss how the space program has changed and developed in the last 50 years. For more resources, go to **www.nasa.gov.**

Take it one Step Further

Go to the website **http://amazing-space.stsci.edu/** and complete the Solar System Trading Cards activity to find out more about each planet in our Solar System!

THEATRE IV

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Theatre IV Presents...

Apollo: to the Moon
written and directed by Mary Hall Surface;
designed and performed by Kevin Reese

Special Thanks...

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- The Virginia Business-Education Partnership
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- the Cincinnati Institute of Fine Arts
- Ohio Arts Council.

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This **Classroom Connections** study guide is the result of a partnership between Theatre IV and the Science Museum of Virginia's Carpenter Science Theatre Company. For more information about the moon and Earth in Space, go to www.smv.org/pubs.

Theatre IV...

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Education Director

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More Teacher Resources...

Additional Core Curriculum Activities

Mathematics

Gr. 6-8

Go to the Science Museum of Virginia's web site at ***www.smv.org/pubs/EarthInSpaceMenu.htm*** and click on Earth In Space Workshop 6: Time and Tide. Students will calculate, model, and graph tide information.

Go to the Science Museum of Virginia's web site at ***www.smv.org/pubs/EarthInSpaceMenu.htm*** and click on Earth In Space Workshop 7: The Solar System. Students will make a model of the solar system in scale for size and distance, using computer spreadsheets.

History and Social Studies

Gr. 7

Go to The Science Museum of Virginia's website at ***www.smv.org/pubs/EarthInSpaceMenu.htm*** and click on Earth In Space Workshop 8: Space Explorations, The Final Frontier?. Students will take part in a creative project in which they will create a timeline of space exploration.

Gr. 7&12

President Kennedy announced America's goal of sending a man to the moon in 1961. That goal was met in 1969. Billions of dollars were poured into the space program in the 1960's. Based on other American needs and goals at the time, was this a wise decision by our government?

Gr. 8 & 9

Go to The Science Museum of Virginia's website at ***www.smv.org/pubs/EarthInSpaceMenu.htm*** and click on Earth In Space Workshop 1: Sky Works. This workshop includes Student information handouts on Aristotle, Ptolemy, Copernicus, and Galileo. Additionally, a student activity entitled *Myth, Idea, Hypothesis, and Theory: An Evolution of Thought* is included, along with Teacher Background.

Gr. 10

Discuss how the first images of Earth from the Moon, taken during the Apollo missions, altered the way we think about the Earth and its geography.

Gr. 11

Astronaut Neil Armstrong, during the Apollo 11 mission, uttered the famous phrase, "That's one small step for man. One giant leap for mankind." Analyze and explain the significance of this phrase, in its historical context.