

A WORLD PREMIERE ADVENTURE

FLY ME TO THE MOON

A SPACE ADVENTURE OF THE THIRD KIND

WWW.FLYMETOTHEMOONTHEMOVIE.COM

Teacher's Guide

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DEAR EDUCATOR:

Space: the last great frontier. What more exciting era was there in the exploration of space than the decade when the focus was putting a man on the moon? And what more exciting time than July 20, 1969, the day when Neil Armstrong became the first human to set foot on its mysterious surface! You and your students will not only relive that monumental moment in time, but you will experience it as never before when the magical immersive images of ***Fly Me to the Moon*** pull you into the action and make you part of this extraordinary story.

Combining the story of the Apollo 11 mission with a whimsical twist involving three young flies who embark on the ultimate adventure, ***Fly Me to the Moon*** will introduce your students to the incredible and awe-inspiring story of space exploration.

A G-rated family film, the story is voiced by such talents as Kelly Ripa, Christopher Lloyd, Nicollette Sheridan, and Tim Curry. It also features a live-action/animation cameo by real life Apollo 11 astronaut Buzz Aldrin.

This teacher's resource guide was developed for nWave Pictures by the award-winning curriculum development team at Young Minds Inspired (YMI). It will assist you in meeting U.S. National Education Standards for students in grades 2-6 (ages 8-14) in science, history, and language arts. Teachers with younger students are encouraged to adapt the materials to meet their students' abilities.

Prepared with the help of professional educators like yourself, this material was designed to be used in conjunction with viewing ***Fly Me to the Moon***; however, the activities in this kit can stand on their own. Please feel free to share the material with other teachers at your school, and to modify and duplicate the copyrighted activity sheets to meet your instructional goals and your students' abilities.

Sincerely,
Ben Stassen
Director

OVERALL PROGRAM OBJECTIVES

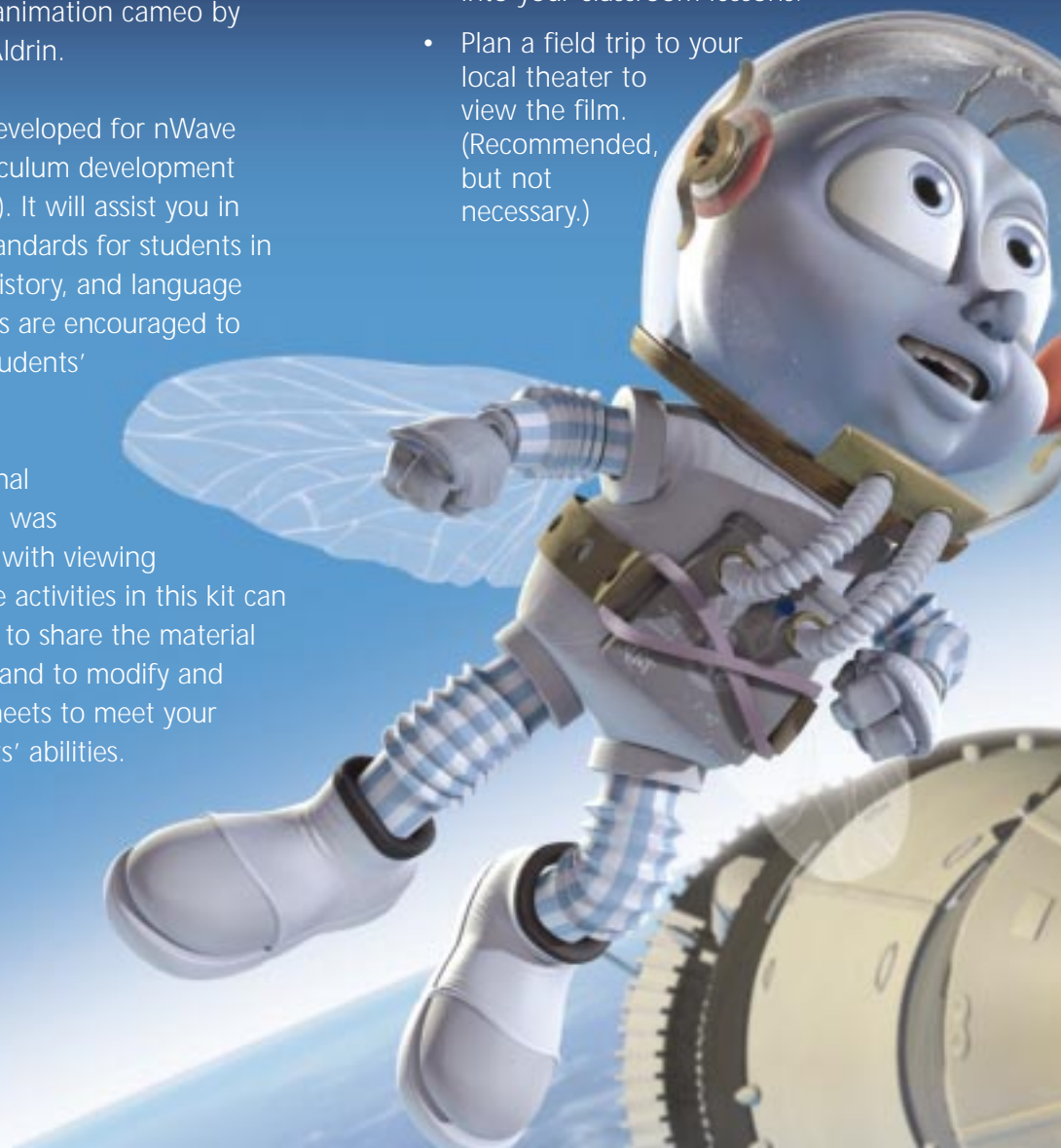
- To introduce students to the history of manned space exploration.
- To develop in students an interest in the important early missions in manned space flight and the science behind them.
- To provide opportunities for students to build skills in science, history, and language arts.

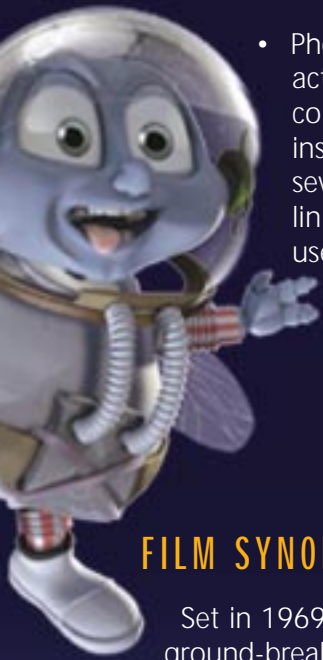
TARGET AUDIENCE

This program has been designed, with teacher input and modifications, for students ages 8-14 (Grades 2-6).

HOW TO USE THIS GUIDE

- Review the materials and schedule them into your classroom lessons.
- Plan a field trip to your local theater to view the film. (Recommended, but not necessary.)





- Photocopy and distribute the five activity masters. The teacher's guide contains background information, instructions, and answers along with several carefully selected Internet links that you and your students can use as resources.
- Use the extended activity ideas to further enrich the activities and provide additional challenges for older students.



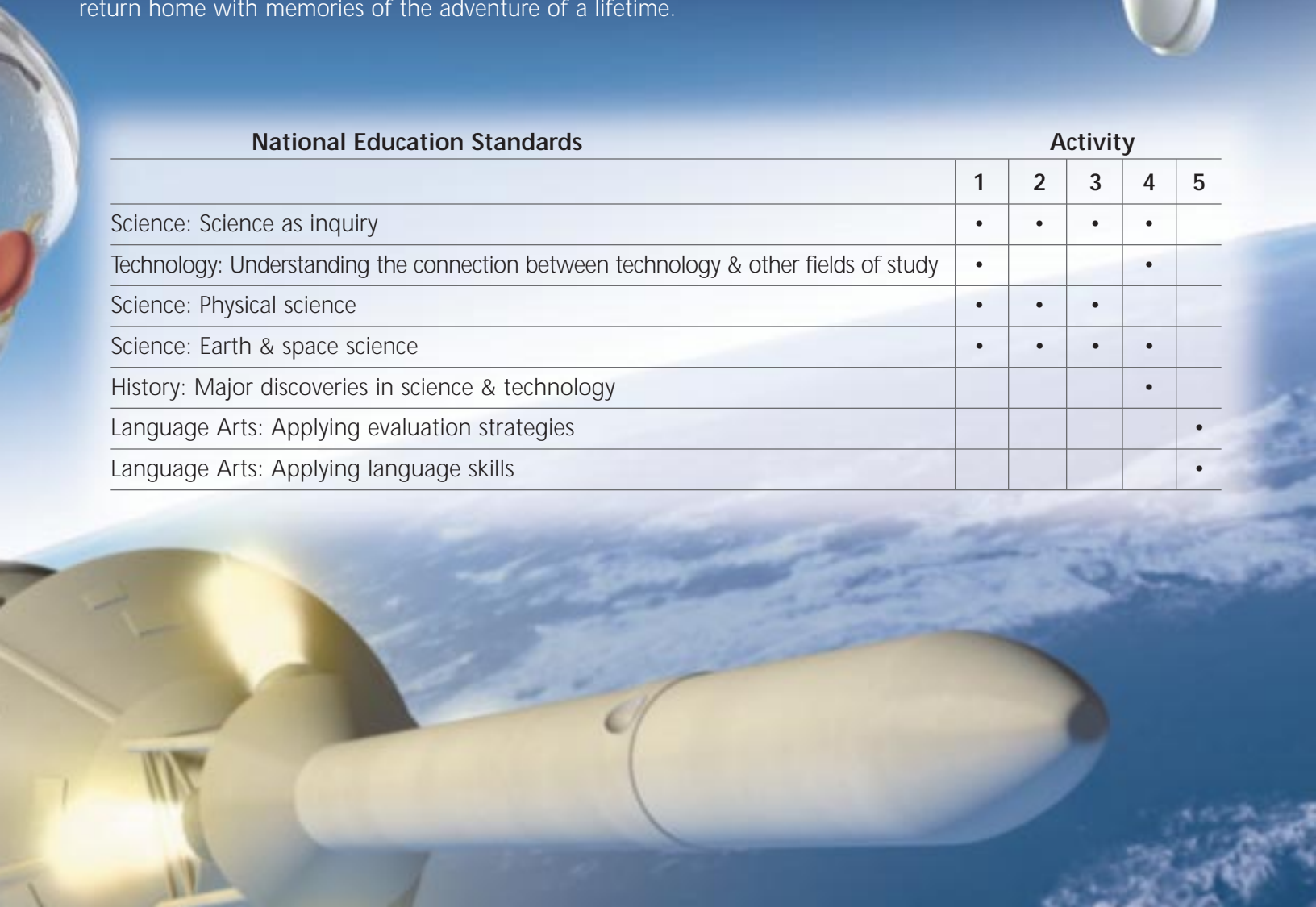
FILM SYNOPSIS

Set in 1969, during one of the most ground-breaking eras in space exploration, *Fly Me to the Moon* combines the story of the Apollo 11 mission to the moon with the whimsical tale of three tween-aged flies in search of adventure who find their way aboard Apollo 11 and go to the moon. During the course of their historic ride, they narrowly escape total disaster when, after being identified by the astronauts as "contaminants," they are sprayed with a numbing aerosol and held captive in a test tube vial. All's well in the end, as Apollo 11 splashes down safely and the three young flies return home with memories of the adventure of a lifetime.

National Education Standards

Activity

	1	2	3	4	5
Science: Science as inquiry	•	•	•	•	
Technology: Understanding the connection between technology & other fields of study	•			•	
Science: Physical science	•	•	•		
Science: Earth & space science	•	•	•	•	
History: Major discoveries in science & technology				•	
Language Arts: Applying evaluation strategies					•
Language Arts: Applying language skills					•



ACTIVITY ONE

IT REALLY IS ROCKET SCIENCE

Goal: To introduce students to Newton's Laws and to help them visualize how rockets work.

Special Materials Required (for each group of students):

One plastic straw, one 10-inch balloon, one 20-25 foot long piece of nylon fishing line, scissors, transparent tape, one clothespin or small binder clip, a tape measure or ruler, and two chairs. You also will need pictures of actual rocket launches. Note: You may want to do this activity as a demonstration for younger students.

Begin by reviewing the introductory material on the activity sheet and sharing pictures of actual rocket launches with your students. Then, divide students into teams.

To guide the rocket experiment:

- (1) Establish one or more "launch" locations in your classroom and place two chairs in each area.
- (2) Review Newton's third law of motion—"For every action there is an equal and opposite reaction"—with your students.
- (3) Have students thread the fishing line through their straw. One team member should blow up the



balloon (you may wish to do this for younger students) and clamp the end tightly with the clothespin or binder clamp. Another team member should cut out the rocket pictures and tape one picture to each side of the balloon, with the nose of the rocket facing away from the clamped end.

- (4) To prepare for launch, team members should tie each end of the fishing line to the back of a chair and pull the chairs apart so the fishing line is taut. Next, they should tape their balloon rocket under the straw (see the picture on the activity master). The straw should be positioned close to the back chair, with the nose of the rocket facing forward.
- (5) Students should count down from 10, and the clamp should be carefully removed from the end of the balloon. One team member should act as recorder and fill in the chart on the activity sheet. Have team members rotate roles during each of the repetitions of the experiment.

Conclude the activity by reviewing how the rocket launch demonstrated Newton's third law of motion.

Extended Activity: Ask students to design a new recording form and experiment with the amount of "fuel" (air) in their balloon rocket, and with the angle of the fishing line (for example, attach one end of the line to the top of a bulletin board), each time measuring and charting the distance the rocket went. Before each launch, they should talk about what they think the outcome will be.

ACTIVITY TWO

THE MOON ROCKS!

Goal: To introduce students to the three classifications of rock found on earth and to consider the similarities and differences between the rocks found on earth and those found on the moon.

Special Materials Required: None

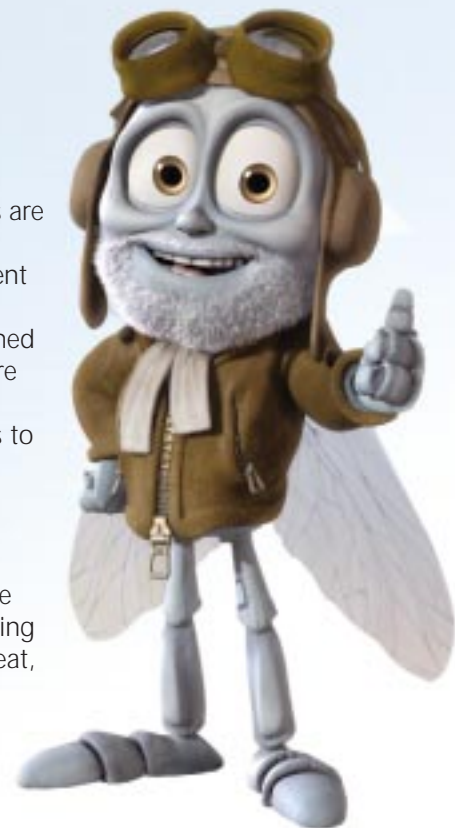
Begin by discussing with your students the science of geology: *Geologists* are scientists who study the earth, the materials that make up the earth, the history of the earth, and the changes that take place on the earth. Geologists study the rocks that are found on earth because rocks tell them all kinds of things about the history of the earth. There are three classifications of rocks:

- *Igneous* rock is formed when the magma from volcanic eruptions cools and hardens.
- *Sedimentary* rock is formed when small fragments of rock,

sand, and other materials are forced together and hardened by the movement of wind, water, and ice.

- *Metamorphic* rock is formed when heat and/or pressure deep below the earth's surface results in changes to existing forms of rock.

All three kinds of rock are found on the surface of the earth, and all these rocks are constantly but slowly changing as a result of exposure to heat, pressure, and weather.



Explain that most of the rock found on the moon is igneous rock, because of the many volcanic eruptions that occurred there over time. There is no sedimentary rock on the moon because there is no weather.

Ask students to complete the quiz on their activity sheet. For younger students, you may wish to complete the quiz as a group activity.

Answer Key:

- (1) **False.** The tools they used were specially designed, but they were still simple rakes and tongs.
- (2) **True.** At first, scientists thought moon rocks might contain new germs that could contaminate the earth, but they soon discovered that the rocks were harmless.
- (3) **False.** There are moon rocks on exhibit in several different museums, including the American Museum of Natural History in New York and the Smithsonian's Air and Space Museum in Washington, DC.

- (4) **False.** There is so much to learn from the moon rocks that scientists have been studying them for decades.
- (5) **True.** Because the rocks on the moon have not been covered up or washed away by wind and rain, they remain unchanged. The earth's surface has been changed dramatically by weather and the life forms that inhabit it.

Extended Activity: With your students, begin a class rock collection that features the kinds of rocks that are found in your community. (See the resource list on page 12 of this guide for information.)



ACTIVITY THREE

FLOATING OR FALLING?

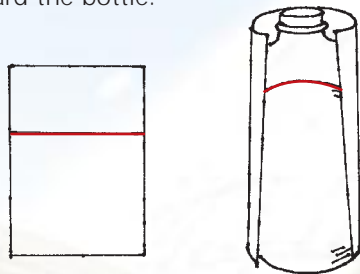
Goal: To introduce students to Newton's law of gravity.

Special Materials Required (for each student pair): One empty, clean, and clear two-liter plastic bottle, a red marking pen, one piece of 8.5- x 11-inch construction paper (a light color—white or yellow—will work well), one 20-inch length of string, stapler, and tape.

Begin by reviewing the introductory material on the activity sheet with your students. Then, divide students into pairs.

To guide the experiment:

- (1) Have students draw a heavy red line four inches from the top of the construction paper. Then, tape the paper around the outside of the plastic bottle, so the red line faces in toward the bottle.



- (2) Ask students to cut out the rectangle with the picture of an astronaut (on the activity sheet), and fold it in half so the astronaut has a front and a back side. Next, slide the end of the string inside and staple so the astronaut is hanging from the string.



- (3) While holding the string, have one student push the astronaut into the bottle and lower until his head is even with the red line.

- (4) As one student observes and records, the other student holds the bottle and quickly releases the string. Have students repeat the experiment, taking turns dropping and recording. Ask students to describe what happened and why it happened.

Answer: The astronaut fell to the bottom of the bottle (space capsule) in a free fall — just like if you jumped off the top rung of a ladder. That's because if there is nothing to break the fall (like a parachute), gravity pulls you quickly back down.

- (5) For the next experiment, the student with the bottle should pull the string back up so the astronaut's head is again level with the red line and hold the string and bottle out and above his/her head. The observer/recorder should stand back about 15 feet. On the count of three, the student should release the bottle and string at the same time. Have students repeat the experiment, again taking turns. Ask students to describe what happened and explain why they think it happened.

Answer: The astronaut stays at the red line level (until the bottle hits the floor), because he is falling at the same rate as the spacecraft (bottle). This is why the astronauts in space float around as if there is no gravity — because they are falling at the same rate as their spacecraft. But what they are actually experiencing is a very slow, very controlled free fall — something that is often called zero gravity.

Extended Activity: Lead a class discussion in which students identify as many situations as they can where they might briefly experience a sense of weightlessness (for example, on an elevator or a roller coaster, or when a moving car comes to a quick stop). Can they explain the principle behind that sensation in their own words?

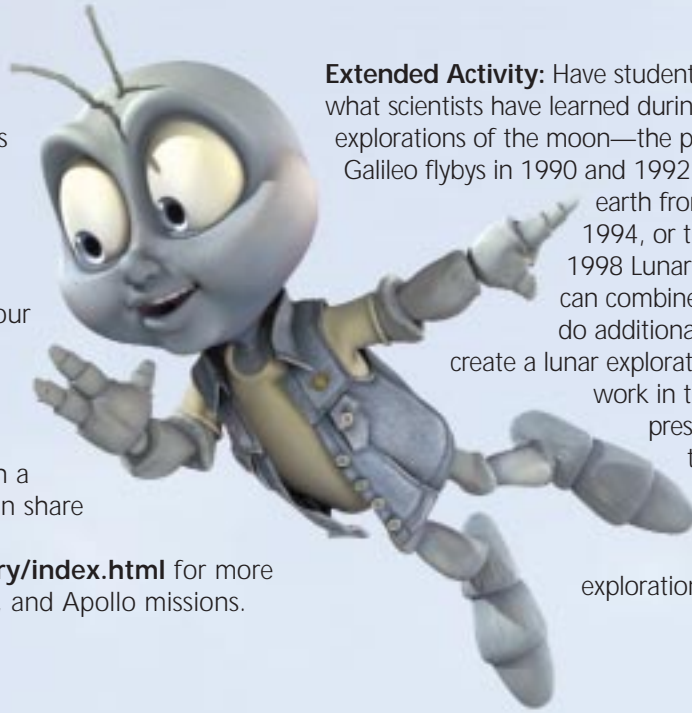
ACTIVITY FOUR

TO THE MOON AND BACK

Goal: To help students learn about the Mercury, Gemini, and Apollo missions that pioneered NASA's manned space flight program.

Special Materials Required: None

To begin, review the introductory material on the activity sheet with your students. You may wish to have younger students work in groups to do their research. Older students might do their research at home, on their own. Conclude the activity with a class discussion in which students can share what they have learned. Visit <http://spaceflight.nasa.gov/history/index.html> for more information on the Mercury, Gemini, and Apollo missions.



Extended Activity: Have students work in teams to research what scientists have learned during some of the more recent explorations of the moon—the photos taken during the Galileo flybys in 1990 and 1992, the images sent back to earth from the Clementine mission in 1994, or the information from the 1998 Lunar Prospector mission. Students can combine the information they gather, do additional research as necessary, and create a lunar exploration timeline. Or, they can work in their teams to develop an oral presentation that highlights what they consider to be the most important and/or interesting lessons scientists have learned from their exploration of the moon.

ACTIVITY FIVE

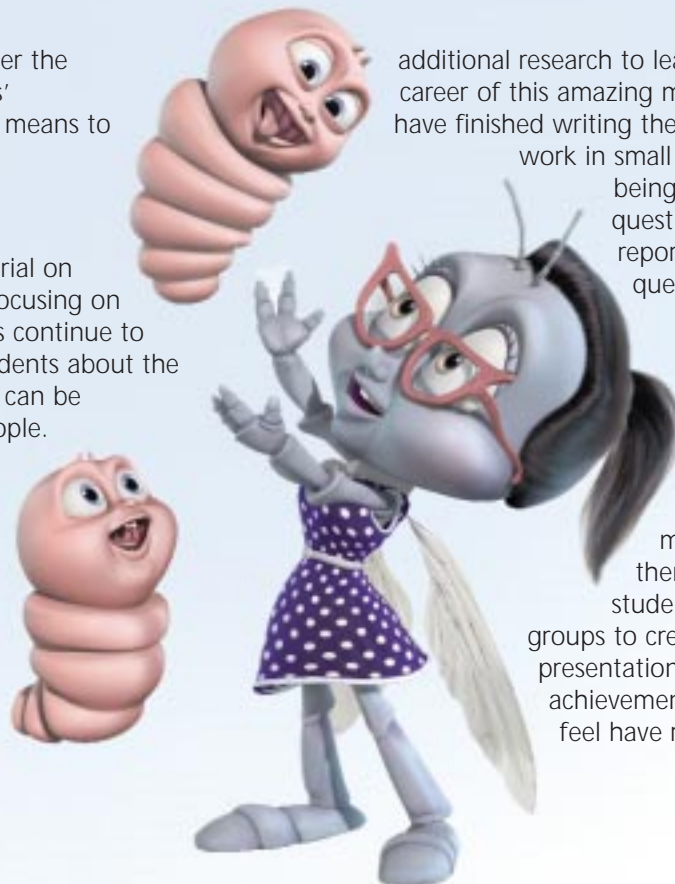
REACHING FOR THE STARS

Goal: To encourage students to consider the magnitude of the Apollo 11 astronauts' achievements, and to focus on what it means to "reach for the stars."

Special Materials Required: None

To begin, review the introductory material on the activity sheet with your students, focusing on Buzz Aldrin's statement, "Let us always continue to reach for the stars." Talk with your students about the meaning of that statement and how it can be exemplified in the lives of everyday people. When students have completed their media watch, provide time for them to share the stories they found. Students may share their personal perspectives on reaching for the stars or not, as they choose.

Next, review the information about Buzz Aldrin on the activity sheet. Older students can do some



additional research to learn more about the life and career of this amazing man. After your students have finished writing their questions, they should work in small groups and take turns being Buzz and answering the questions, and being the reporters and asking the questions.

Extended Activity: Have students add an extra dimension to the meaning of reaching for the stars by creating a piece of original art, in any medium, that depicts the theme. As an alternative, students can work in small groups to create a PowerPoint presentation that highlights the achievements of people whom they feel have reached for the stars.

ACTIVITY ONE

IT REALLY IS ROCKET SCIENCE

In *Fly Me to the Moon*, I.O., Scooter, and Nat are participants in a really awesome event: They take part in the Apollo 11 mission to the moon! But what's even more awesome is the amazing science behind all the rockets that have blasted into space.

Although simple rockets fueled with a type of gunpowder were used in wars for hundreds of years, the first big step in modern rocket science took place in March 1926, when a rocket powered by a very powerful liquid fuel was launched. It was designed and built by a man named Robert Goddard. Because of all his hard work in this field, he is known today as the father of modern rocketry.

Thank you, Isaac Newton!



Even Robert Goddard would probably say that Isaac Newton deserved a lot of credit for rocket science, too. You remember Isaac Newton, don't you? He's the Englishman who, way back in 1666, saw an apple fall from a tree and started thinking about gravity. He thought so much about it, in fact, that he developed a law of gravity.

Newton developed some other important laws, too—his laws of motion. It's Newton's third law of motion, which says that "every action has an equal and opposite reaction," that explains how rockets work. Here's one way to understand it: When fuel is pushed out the back of a rocket, the rocket moves in the opposite direction. The rocket pushes the fuel out, and the fuel pushes the rocket up. The fuel coming out of the rocket is the action, and the rocket shooting into the sky is the equal but opposite reaction.

Prepare to Launch Your Rocket

Let's try an experiment so we can see for ourselves how it works. It's not as complicated as it seems. Follow the instructions below as you build and launch your own air-fueled balloon rocket.

1. Thread the fishing line through your straw.
2. Blow up the balloon and clamp the end tightly with the clothespin or binder clamp.
3. Cut out the rocket pictures at the bottom of the activity sheet and tape one rocket to each side of the balloon, with the nose of the rocket facing away from the clamped end.
4. To prepare for launch, tie each end of the fishing line to the back of a chair and pull the chairs apart so the fishing line has no slack.
5. Tape the balloon rocket under the straw:



The straw should be positioned close to the back chair, with the nose of the rocket facing forward.

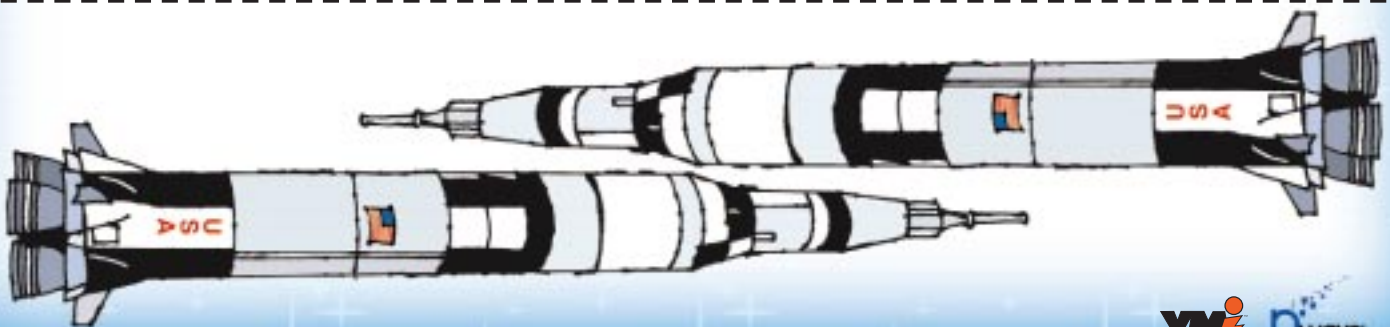
Now you're ready to launch your rocket!

Time to Launch

Because scientists always repeat their experiments to test their findings, you will repeat your experiment four times. Count down from 10, and carefully remove the clamp from the end of the balloon. Write your observations in the space below. For each launch, draw a simple diagram that shows what happened. Measure how far your rocket went, and write that down, too.

My Rocket Launches

	Observations	Diagram	Traveled
Launch 1:			
Launch 2:			
Launch 3:			
Launch 4:			



THE MOON ROCKS!

In *Fly Me to the Moon*, the young flies I.Q., Nat, and Scooter, stow away on the Apollo 11 mission to the moon. Nat becomes part of history when he hitchhikes a ride with Neil Armstrong — the first man on the moon — and happily becomes the first fly on the moon! Does it get any better than that?

Actually, it does — because scientists learned a whole lot of new things as a result of the Apollo missions. And one of the things that helped them learn so much was the moon rocks that the astronauts brought back with them.

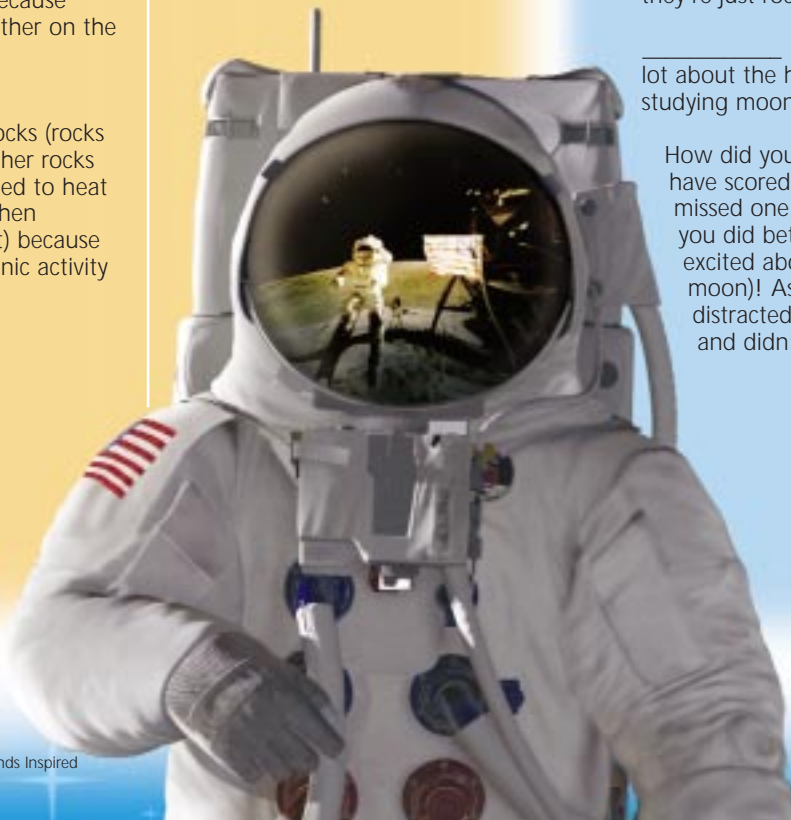
By studying the moon rocks, scientists learned about how the moon and the earth are alike and different. Here are a few examples of what they have learned:

Moon Rocks

- Many of the moon rocks the astronauts collected were a very hard kind of rock called basalt.
- Feldspar is the most common kind of rock found on the moon.
- The surface of the moon is covered mostly in igneous rocks (rocks that are formed after volcanoes erupt).
- There are no sedimentary rocks (rocks that are formed when smaller things like sand are pushed together by wind or water) on the moon because there is no weather on the moon.
- There are some metamorphic rocks (rocks formed from other rocks that are subjected to heat and pressure when volcanoes erupt) because there was volcanic activity on the moon.

Earth Rocks

- Basalt is a very common kind of rock on the earth. In fact, most of Hawaii is basalt.
- Feldspar is the most common kind of rock found on the earth.
- The earth's surface contains three types of rocks: igneous rocks, sedimentary rocks, and metamorphic rocks.



What's Your Moon Rock I.Q.?

How much do you know about moon rocks? Answer each question with a "true" or "false" to find out.

_____ 1. The astronauts used very complicated tools to gather the moon rocks they brought back to earth.

_____ 2. Scientists once were afraid that moon rocks might be dangerous.

_____ 3. All the moon rocks in the United States are at the Johnson Space Center in Houston, Texas.

_____ 4. We didn't learn a whole lot from the rocks the astronauts brought back from the moon. After all, they're just rocks.

_____ 5. Scientists can learn a lot about the history of the earth by studying moon rocks.

How did you do? While you may not have scored as high as I.Q. (he only missed one question), we're sure you did better than Nat (he was too excited about his adventure on the moon)! As for Scooter, he got distracted by some cookie crumbs and didn't even finish!

ACTIVITY THREE

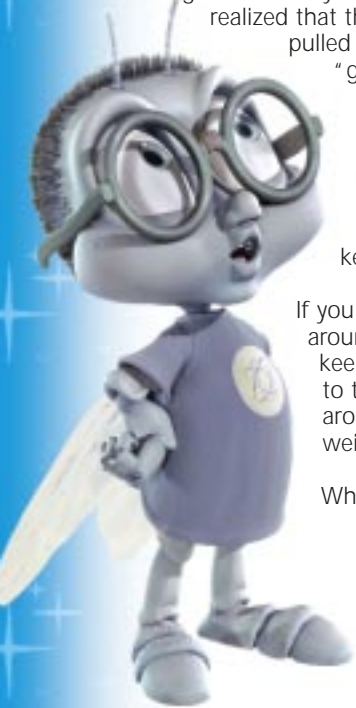
FLOATING OR FALLING?

In *Fly Me to the Moon*, I.Q., Nat, and Scooter become weightless while they are in the lunar module. Or do they...?

Let's go back to Isaac Newton and his famous apple again. (By the way, although he did see it fall, it didn't fall on his head!) When he thought about why the apple didn't just float off into space, he realized that there had to be some kind of force that pulled it to the ground. He called that force "gravity." And the more he thought about it, the more connections he made. For example, when he thought about the moon staying in its orbit around the earth rather than floating off into space, he realized that the same force of gravity that pulled the apple to the ground was keeping the moon in its orbit.

If you were weightless, you'd be floating around all over the place. Gravity is what keeps your feet on the ground. So it's natural to think that, because the astronauts float around in their spacecraft, they are weightless. But the fact is that they aren't.

Why not? We'll find out in just a minute.



Force of Gravity

But first, think about what happens when you throw a baseball. The harder you throw it, the farther it goes. But, even as it moves ahead, the ball is slowly falling. When the ball slows down enough, gravity pulls it back to earth. A spacecraft in orbit is just like the ball you threw, except it has enough power to keep moving. So, even though it is slowly falling, it doesn't drop to the ground like the ball did.

Prepare Your Experiment

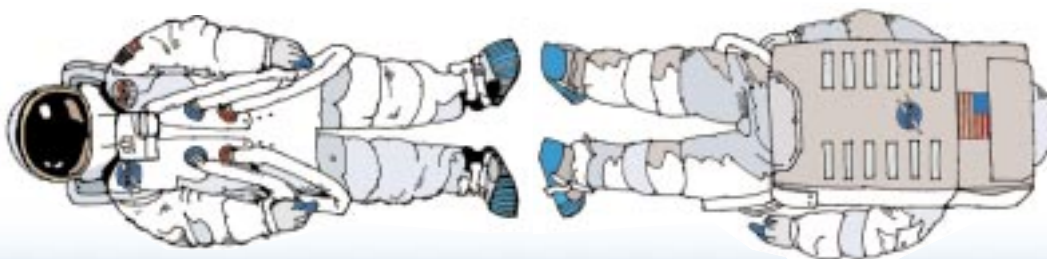
The experiment you are about to conduct will show you what happens to the astronaut in that slowly falling spacecraft. Follow the steps below to prepare your experiment:

1. Draw a heavy red line four inches from the top of the construction paper.
2. Tape the paper around the outside of the plastic bottle, so the red line faces in toward the bottle.
3. Cut out the astronaut at the bottom of the page, and fold it in half.
4. Slide the end of the string between the front and back of the astronaut and staple so the astronaut is hanging from the string.

What Happens to the Astronauts?

Follow your teacher's directions to conduct your experiment. Use the form below to record what happens to the astronaut as you experiment with your spacecraft. Repeat each experiment four times, just like you did with the balloon rocket test.

Test 1: Hold the bottle, release the string	Test 2: Drop the bottle, release the string
What I Observed	What I Observed
Trial 1	Trial 1
Trial 2	Trial 2
Trial 3	Trial 3
Trial 4	Trial 4



ACTIVITY FOUR

TO THE MOON AND BACK

Fly Me to the Moon opens with a quote from a famous speech that President John F. Kennedy made back in 1961. He said: "I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth."

President Kennedy did not live to see his dream come true. However, on July 20, 1969, Apollo 11 Commander Neil Armstrong became the first man to set foot on the moon. In taking that first step, he said the famous words: "One small step for man, one giant leap for mankind." A camera in the lunar module recorded this historic event, and people throughout the world were able to watch as it happened.



Neil Armstrong and his fellow astronaut, Buzz Aldrin, spent 2½ hours on the moon. While they were there they performed a variety of experiments and they collected the moon rocks that we explored in Activity 2. Before they left, they put an American flag on the moon's surface.

What the Apollo 11 astronauts did was important, but many important things also happened during the Mercury and Gemini space programs that led up to Apollo. For example, on May 5, 1961, Mercury astronaut Alan B. Shepard Jr. became the first American to go into space. His flight lasted 15 minutes and 28 seconds. On February 20, 1962, another Mercury astronaut, John Glenn, became the first American to orbit the earth. The second manned space program was named Gemini because the astronauts went up in pairs, like the Gemini twins. The Gemini program sent astronauts into space for longer periods of time.

Three Missions that Made a Dream Come True

Do some research to find out more about the Mercury, Gemini, and Apollo space programs. Use the chart on this page to guide your research. Use the back of this sheet if you need more space.

	Project Mercury	Project Gemini	Project Apollo
Date the project began			
Date the project ended			
Goals of the project			
Most important results			
Most memorable moments			

ACTIVITY FIVE

REACHING FOR THE STARS

Fly Me to the Moon ends with this inspirational statement from Apollo 11 lunar module pilot Buzz Aldrin: "Let us always continue to reach for the stars."

Buzz Aldrin did reach for the stars, because he went into space. But the term "reaching for the stars" has another meaning, too. When people make a special effort and try to achieve something that is very difficult, we say that they are reaching for the stars.

I.Q., Nat, and Scooter reached for the stars in both ways: They went into space with Buzz Aldrin, but they also reached for the stars when they set the goal of having the big adventure that would take them to the moon. In the space provided, describe what reaching for the stars means to you.

Ask the Astronaut

Now, it's your turn to ask some questions. First, read the short biography of Buzz Aldrin in the box on this page. Then, in the space below, write several questions that you would like to ask him about his experience on Apollo 11.



Edwin Eugene Aldrin, Jr. was born on January 20, 1930, in Montclair, New Jersey. Later, he legally changed his name to Buzz Aldrin. He graduated from the U.S. Military Academy, and earned a Ph.D. in astronautics from the Massachusetts Institute of Technology. He was one of the early astronauts. He was the pilot of the Gemini 12 mission in 1966, and the backup command module pilot for Apollo 8, man's first flight around the moon. As the lunar module pilot for Apollo 11 in 1969, he was the second man (after Neil Armstrong) to walk on the moon. In 1971, he resigned from NASA and became the head of the Aerospace Research Pilot's School at Edwards Air Force Base. Since his retirement from the Air Force he has remained active in the effort to ensure that our country continues to play a leading role in manned space exploration.

My Questions for Buzz Aldrin

1. _____

2. _____

3. _____

4. _____

5. _____

Now, conduct a "media watch" to find stories about people you think have reached for the stars in some way. You might find the stories in magazines, or newspapers, or on the evening news. Keep a list of where you saw each story (newspaper, magazine, TV news, etc.) and describe the story. Tell who it was about, what the person did, and why you think the person was reaching for the stars.

What kinds of questions do you think the reporters asked to find out why these people decided to make a special effort and try to do something difficult?



Resources for Teachers

Isaac Newton

Isaac Newton Resources
www.newton.ac.uk/newton.html

Starting a Classroom Rock Collection

Collecting Rocks (U.S. Geological Survey)
<http://pubs.usgs.gov/gip/collect1/collectgip.html>

Ideas from Other Teachers

www.uen.org/Lessonplan/preview.cgi?LPid=10982

http://hegel.lewiscenter.org/users/mhuffine/subprojects/Wildlands%20Curriculum/www_wildlandrocks.htm

www.wpi.edu/Images/CMS/PIEE/3c6.pdf

Space Exploration/Space Flight

Human Space Flight (NASA)
<http://spaceflight.nasa.gov/history/index.html>

Robert Goddard (NASA)
www.gsfc.nasa.gov/gsfsc/service/gallery/fact_sheets/general/goddard/goddard.htm

A Brief History of Rocketry (NASA)
<http://science.ksc.nasa.gov/history/rocket-history.txt>

New Views of the Moon
<http://physicsworld.com/cws/article/print/1041>

Simple Rocket Science (Reference to Activity 1)
www.nasa.gov/pdf/58149main_3.2.1.Liftoff.pdf

Exploring Gravity (Reference to Activity 3)
<http://lesson.taskstream.com/lessonbuilder/v.asp?LID=k4c6cshizizthqck>

Resources for Students

Isaac Newton

Notes on Newton (Timeline Science)
www.timelinescience.org/years/1700.htm

Isaac Newton and the Laws of Motion, by Andrea Gianopoulos. Coughlin Publishing, 2007.

Rocks

What is a Rock? (About.com)
<http://geology.about.com/od/rocks/a/whatisarock.htm>

Space Exploration/Space Flight

The Moon (*World Almanac for Kids*)
www.worldalmanacforkids.com/WAKI-ViewArticle.aspx?pin=wwwwak-220&article_id=581&chapter_id=12&chapter_title=Science&article_title=The_Moon

Apollo's Moon Rocks
www.highlightskids.com/Science/Stories/SS0799_moonrocks.asp


www.nwave.com



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