PROGRAM OVERVIEW

The purpose of this program is to give students the opportunity to explore the Moon over the course of 1-2 weeks in an exciting, hands-on, and motivating way. Instead of just reading about the Moon, our students get the opportunity to observe the Moon as part of a family project. Students participate in making craters. They learn vocabulary and practice math skills by exploring the craters. Students explore the history of the first Moon landing in a meaningful way by re-creating the scene. After exploring the scene, students write about it. Students learn that scientists are going back and studying how we went to the Moon in order to plan for the future of going there again.

The student’s progress will be assessed via observation as well as work. See the attached rubric.

This program has been implemented in kindergarten and first grade classrooms with students with special needs mainstreamed in them. It is easily adapted for second and third grade students. Class sizes have ranged from 18-22 students. The lesson plans indicate whether the activity is designed for whole group or small group instruction.

Tables or desks will be needed for the activities. We use a school owned laptop, Eiki projector, and screen to show video clips and Power Point Presentations. See “Materials Budget” for specific materials needed.

OVERALL VALUE

Students love this program. They come to school every day asking who is coming to speak to them and what will they be speaking about. The students pick up and apply advanced vocabulary. Parents come in and ask questions like: did you really have a real Engineer come in and talk to the class? Students make connections to this program throughout the year; constantly building upon the base of knowledge we gave them. We know that our students will always remember what they did during this program.

LESSON PLAN TITLES

- Craters
- Moonscapes
- Phases of the Moon
(For additional lesson plans, contact the Program Developers.)

MATERIALS

Materials for each lesson are listed with each lesson plan. Overall materials budget including pricing and vendors follows the lesson plans.

ABOUT THE DEVELOPERS

Caroline Kaiser has a B.S in Early Childhood Education from Karlsruhe, Germany and a Masters in Early Childhood Special Education from the Mankato State University in Minnesota. She taught exceptional students in Minnesota for 20 years before moving to Florida. She is currently a Kindergarten teacher at Davenport School of the Arts.

Janice Katz has a B.S. in Early Childhood Education and Intervention from Purdue University. She has taught kindergarten for 7 years at Davenport School of the Arts. During the summer she works with Educators at Space Academy in Huntsville, Alabama. She has presented at the Space Exploration Educator’s Conference in Houston, Texas.

Erica Gotshall has a B.S. in Elementary Education from Anderson University in Indiana. She has been teaching kindergarten at Davenport School of the Arts for two years. She enjoys being a mother, spending time with her family, and reading.
Elementary Moon Exploration
Lesson Plan No 1: Craters

SUBJECTS COVERED
Science

GRADES
Kindergarten - Three

OBJECTIVES
Goal: Familiarize students with Crater Anatomy.
Objective: Students will identify the following parts of a crater: floor, wall, rim, ray
Goal: Familiarize students about what happens when an impactor hits an object.
Objective: Students will explore how height, weight and velocity affect the craters.
Objective: Students will measure and compare craters made by different objects.

SUNSHINE STATE STANDARDS
SC.H.1.1.1 ...knows that in order to learn, it is important to observe the same things often and compare them.
SC.H.1.1.2 ...knows that when tests are repeated under the same conditions, similar results are usually obtained.
SC.H.1.1.3 ...knows that in doing science, it is often helpful to work with a team and to share findings with others.
SC.H.1.1.4 ...knows that people use scientific processes including hypotheses, making inferences, and recording and communicating data when exploring the natural world.
MA.B.2.1.1 ...uses direct (measured) and indirect (not measured) comparisons to order objects according to some measurable characteristics (length, and weight).

MATERIALS
(Moon Crater Activity)
This activity can be done with a large or small group and requires the following materials:
• 19 quart clear plastic tub
• 10 lb. flour (used to create the moon surface)
• 8 oz. Hershey's cocoa (this will be sprinkled in small quantities on the top of the flour surface to create a better visual image)
• Golf ball, ping pong ball, and magnetic marbles with a wand
• One yard stick and one clear 12 inch ruler
• Paper to record each crater drop
To create the “Moon Crater Poster” you will need one sheet of white foam board and broad Crayola Markers.

DIRECTIONS
Vocabulary:
floor – bowl shaped or flat, below ground level, bottom of the crater
walls – usually steep, sides of the crater
rim- the edge of the crater
rays – streaks starting from the crater going out and away from the crater.
(See the picture of a large diagram for students.)

Flour Activity:
Model the creation of a crater. Take a container (shoebox size or larger) of all-purpose flour several inches deep, with a thin layer of cocoa powder to represent the surface layer. Drop different size objects (e.g. marbles, golf ball, ping pong ball) from different heights into the flour. Then measure the depth and diameter of the craters. Find and identify the parts of the crater previously discussed such as the floor, walls, rim, and rays.

Hints:
• Use magnetic marbles. Use a magnetic wand to pull them out of the flour without ruining the parts of the crater.
• Put a popsicle stick over the top of the crater to help students read the depth on the ruler.

Play-Dough Activity:
Push a golf ball into Play-Dough. This will form a crater. Print and cut out the crater vocabulary words. Students can take the vocabulary words and put them on each part of the crater.

EVALUATION/ASSESSMENT
See attached Rubric for Evaluation and Assessment information.

ADDL INFORMATION
Related books:
• Footprints on the Moon by Alexandra Siy
• On the Moon by Anna Milbourne and Benji Davies

2007 - 2008 IDEA CATALOG OF EXCELLENCE
“Elementary Moon Exploration”
Lesson Plan No 2: Moonscapes

■ SUBJECTS COVERED
Science

■ GRADES
Kindergarten - Three

■ OBJECTIVES
Goal: Familiarize students with the history of the first Moon landing.

Objectives: Students will learn that only 2 astronauts explored the Moon at a time. Students will learn that the astronauts placed an American Flag on the Moon.

Goal: Familiarize students with the surface of the Moon.

Objective: Students will learn that the Moon is covered with impact craters.

Goal: Familiarize students with the equipment used during the first Moon landing.

Objective: Students will explore designing and constructing equipment.

Goal: Familiarize students with the concept of gravity.

Objective: Students will be able to explain or show what gravity is. Students will be able to identify some problems of working in an environment with reduced gravity.

■ SUNSHINE STATE STANDARDS
SC.E.1.1.1 …knows that the light reflected by the Moon looks a little different every day but looks the same again about every 28 days.

SC.E.1.1.2 …knows that the appearance of the sunrise and sunset is due to rotation of the Earth every 24 hours.

SC.E.2.1.1 …knows that there are many objects in the sky that are only visible at night.

SS.A.5.1.1 …knows significant individuals in United States history since 1880 (e.g. presidents, scientists, and inventors, significant women, and people who have worked to achieve equality and improve individual lives).

SS.B.1.1.2 …uses simple maps, globes and other three dimensional models to identify and locate places.

■ MATERIALS
Each student will need:
- one Styrofoam egg carton (used for lunar module)
- one empty toilet tube (used for the astronauts)
- one 8 1/2 x 11 piece of cardboard
- one 9 x 12 sheet of aluminum foil (Reynolds Wrap)
- one 1/8 cup of red kidney beans
- two 12 " long pipe cleaners (will be cut in half)
- four plastic buttons
- two copies of an astronaut
- one mini USA flag (found with the party favors)
- small amount of modeling clay (used to secure the flag on the “moon surface”)

In addition you will need the following classroom supplies:
- Markers
- Glue
- Scissors
- Stapler
- Clear packing tape (to seal together the lunar module)
- Velcro dots to secure the two parts of the lunar module and to make it possible for these to separate (when the lunar module leaves the moon and returns to the command module)

■ DIRECTIONS
Moon: Glue beans randomly across a small piece of cardboard, along with one small piece of Play-Dough near the center. Cover this with aluminum foil. This will create a basis for the diorama that resembles the rough, uneven surface of the moon.

Flag: use a toothpick flag, place through the aluminum foil into the Play-Dough ball

LEM (Lunar Module):
A. Cut plastic egg cartons into 2x2 pieces. Poke one hole in each of the four sections.
B. Cut a pipe clean in half. Put a flat button on one end for the pad. Put the other end of the pipe cleaner through the hole in the plastic egg carton. (hint: the legs will all need to be the same length to stand)

■ EVALUATION/ASSESSMENT
See attached Rubric for Evaluation and Assessment information.

■ ADDL INFORMATION
Related books:
- Man on the Moon by Anastasia Suen
- One Giant Leap by Don Brown
- Project Apollo by Diane M. and Paul P. Sipiera

★★★
ELEMENTARY MOON EXPLORATION
Lesson Plan No 3: Phases of the Moon

SUBJECTS COVERED
Science

GRADES
Kindergarten - Three

OBJECTIVES
Goal: Familiarize students with the phases of the Moon.
Objectives: Students will
• identify the different phases of the Moon (crescent, gibbous, half/quarter, full, new).
• identify the correct order of the phases of the Moon.
• recognize that the Moon does not change its shape.
• use the words waxing and waning.

SUNSHINE STATE STANDARDS
SC.E.1.1.1 …knows that the light reflected by the moon looks a little different every day but looks the same again about every 28 days.
SC.E.2.1.1 …knows that there are many objects in the sky that are only visible at night.
LA.B.1.1.3 …produces final simple documents that have been edited for: correct spelling; appropriate end punctuation; correct capitalization of initial words, “I,” and names of people; correct sentence structure; and correct usage of age-appropriate verb/subject and noun/pronoun agreement.
MAC.1.1.1 …understands and describes the characteristics of basic two- and three-dimensional shapes.

MATERIALS
Each student will need:
• One 5 page book (for half cycle) or 8 page book (for full cycle)
• One glue stick
• Five/eight 3” die cut circles cut from manila drawing paper
• Three/six 3” die cut circles cut from black construction paper

In addition you will need the following classroom supplies:
• Markers or pencils for writing phases of the moon
• Scissors
• One 5” Styrofoam ball (used to create the moon model)
• One permanent black marker (used to color half of the Styrofoam moon model)
• Phases of the moon master found on the CD (can be used to project/model each phase of the moon as the students create their books)

DIRECTIONS
Vocabulary:
wax • wane • crescent • gibbous

Introduce/review the phases of the Moon using pictures, books, and “The Moon Song”.

Hang a “Moon” from the ceiling. Take a Styrofoam ball and paint half of it black. Then hang it from the ceiling. You can see all of the phases of the Moon by walking around the Moon. See the picture of the Styrofoam Moon.

The Phases of the Moon book

The teacher may want to make the book ahead of time, depending on the grade level. The book is made with 1 piece of construction paper as the cover and 4 pieces of white copy paper. Fold in half and staple. Write “Phases of the Moon” on the cover. The inside pages will be: new moon, crescent moon, first-quarter moon (aka: half moon), gibbous moon, full moon, gibbous moon, half moon, crescent moon, and new moon. You can choose to stop at full moon and explain that it will go back through the phases to complete the cycle. The Moon pieces are made from the circle die cut. Since one of the objectives is for students to realize the Moon itself does not change its shape, students will always place a manila circle on the page. Then they will place the shadow (made from black construction paper) on top of the manila circle.

new moon – manila circle, black circle on top
crescent moon – manila circle, black gibbous shadow on top
first-quarter (half) moon – manila circle, black half circle on top
gibbous moon – manila circle, black crescent shadow on top (WAXING)
full moon – manila circle
gibbous moon – manila circle, black crescent shadow on top (WANING)
first-quarter (half) moon – manila circle, black half circle on top
crescent moon – manila circle, black gibbous shadow on top
new moon – manila circle, black circle on top

Students should write the name of each phase on each page.

Students will take the book home to observe the moon along with an explanation letter to parents. The teacher asks the students each morning what phase the moon was in the previous night. This information can be charted or graphed.

EVALUATION/ASSESSMENT
See attached Rubric for Evaluation and Assessment information.

ADDL INFORMATION
Related Book:
The Moon Book by Gail Gibbons

For additional Lesson Plans contact the Program Developers

2007 - 2008 IDEA CATALOG OF EXCELLENCE
## Materials Budget

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2007 - 2008 IDEA CATALOG OF EXCELLENCE
# Elementary Moon Exploration

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<td>Phases of the moon</td>
<td>Recalls the moon looks different on different nights</td>
<td>Identifies and labels the different phases of the moon</td>
<td>Correctly orders and labels the phases, waxing, and waning.</td>
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<td>Recalls the moon doesn’t change shape.</td>
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<td>Crater anatomy and creation</td>
<td>Identifies a crater on the moon.</td>
<td>Identifies a crater on the moon and explains what causes them.</td>
<td>Identifies and labels the parts of a crater and concludes</td>
<td>Experiments with velocity and size of craters.</td>
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<td>velocity and speed affects its size.</td>
<td>Identifies and labels parts of a crater.</td>
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<td>Moon surface and landing</td>
<td>Recalls astronauts have landed on the moon and used special tools.</td>
<td>Recalls astronauts explored the moon, used tools, and planted the</td>
<td>Explains equipment, tools, and moon surface. Tells in own words</td>
<td>Makes and identifies specific equipment of astronauts.</td>
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<td>exploration</td>
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<td>American flag.</td>
<td>about the force of gravity.</td>
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<td>Suggests potential problems of gravity.</td>
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**Phases of the Moon**

- **half moon**
- **full moon**
- **gibbous moon**
- **crescent moon**
- **new moon**

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**“The Moon Song”**

author: unknown  
tune: “I’m a Little Teapot”

I’m a little new moon.  
You can’t see me.  
Now I’m a crescent  
shining on the sea.

Then you see a half of me  
in the dark sky.  
Look, I’m a full moon.  
shaped like a pie.

I’m like shining silver  
lighting the skies,  
Until I shrink to  
half my size.

Then I start to fade  
and that is when,  
The moon song starts  
all over again.
From the Earth to the Moon HBO Series

The following are my personal suggestions. Please pre-view everything before you show it to your students. From the Earth to the Moon is not rated. Please speak with your administration before showing it to your students.

Part 5 “The Spider”
This is about constructing the Lunar Module (LEM). It also shows Apollo 9 testing the first LEM. I show clips of this part before we make “Moonscapes.”

Start 14:00 - 20:00 min..... This clip shows the Engineers having to make changes when their original ideas don’t work out.
Start 35:40 - 37:52.......... LEM finished (“Spider”)
Start 46:50 - 47:00.......... CSM & LEM in space
Start 48:00 - 49:30.......... LEM leaves its platform & re-docks with CSM
Start 50:30 - 51:35.......... shut down LEM, move to CSM, let LEM go

Part 6 “Mare Tranquilitatis”
This is about Apollo 11 - the first Moon landing

Start 3:55 - 6:00............ Interview with Armstrong, Aldrin, and Collins, July 16, 1969, lift off
Start 11:04 - 15:00............ Interview, Lunar Landing Research Vehicle Simulator, LEM simulator
Start 29:42 - 31:02............ Collins explains the Apollo 11 Mission Patch design
Start 33:36 - 34:15............ CSM & LEM linked in space, go for undocking
Start 34:37 - 47:05.......... undocking, news clips, power descent, alarms, landing
Start 49:13 - 53:50.......... on the Moon
Phases of the Moon Homework

Our Kindergarteners are learning about space. As a part of this study we are learning about the different phases of the Moon. We have made our own book with pictures of each of the different phases and their names.

Your homework for the next month is to look at the Moon each night before you go to bed or when you first get up in the morning. Then using your book to decide which phase the moon is currently in.

We will make a class graph to track the cycles. All of the students need to be looking at the Moon every night in order to report what they saw at school the next morning. This can be a fun project for the whole family so we really encourage you to help your child remember to check the sky each night to see each of the different phases!

On the evening of Thursday, February 1, 2007 we will have an up close view of the Moon. We will set up telescopes for you and your family to come and use at school. Please watch for more details about this exciting activity.

Suggested books for teaching about the Moon / Apollo:

The Moon Book (non-fiction Phases of the Moon) by Gail Gibbons
Man on the Moon by Anastasia Suen (story of Apollo 11; illustrated)
One Giant Leap: The Story of Neil Armstrong by Don Brown
Project Mercury by Diane M. and Paul P. Sipiera
Project Gemini by Diane M. and Paul P. Sipiera
Project Apollo by Diane M. and Paul P. Sipiera
Footprints on the Moon by Alexandra Siy (photographs; advanced text)
On the Moon by Anna Milbourne and Benji Davies (“realistic fiction”)
Moon Landing the Race for the Moon by Carole Stott (excellent photographs and facts about the rockets, modules... This is not a story book.

A great space reference book with pictures and text explanation:

World Book Encyclopedia presents Space; Picture Reference by Sue Becklake