

Project-Based Learning Unit
Earth/Moon/Sun Systems
Marcie Owen
Pilot Elementary

Grade Level:3

Essential Question:

How do the Earth, Moon, and Sun Interact?

Subquestions:

1. Does the moon change shape? If so, why?
2. What causes day and night?
3. What caused us to have different seasons?
4. Why can you sometimes see the moon during the day?
5. Name and draw the phases of the moon.
6. Why can you only see the stars at night?
7. Are the Earth, moon, and Sun planets? If not, what are they?
8. Why do you see the Sun at different places during the day?
9. How far apart are the Earth, moon, and Sun?
10. How many moons make up the Sun? How many moons make up the Earth?

Science Objectives:

Competency Goal 3:

The learner will make observations and use appropriate technology to build an understanding of the earth/moon/sun system.

3.01 Observe that light travels in a straight line until it strikes an object and is reflected or absorbed.

3.02 Observe that objects in the sky have patterns of movement including: Sun, Moon, and Stars

- 3.03 Using shadows follow and record the apparent movement of the sun in the sky during the day.
- 3.04 Use appropriate tools to make observations of the moon.
- 3.05 Observe and record the change in the apparent shape of the moon from day to day over several months and describe the pattern of changes.
- 3.06 Observe that patterns of stars in the sky stay the same, although they appear to move across the sky nightly.

Technology Goals:

- 1.14 Identify, discuss, and use terms/concepts e.g.. web browser, URL, keyword, search engine, web links
- 1.15 Recognize, discuss demonstrate responsible and safe online behaviors as a class/group
- 3.04 Identify discuss, and use multimedia to present ideas/concepts.information in a variety or ways as a class

English/Language Arts Goals:

- 2.02 Interaction with the text before, during, and after reading, listening or viewing by setting a purpose, asking questions, and locating information for specific purposes, making connections
- 2.03 Read a variety of texts; including nonfiction, drama, poetry
- 3.03 Use text and own experiences to verify facts, concepts, and ideas
- 3.06 Conduct research on assigned and self-selected projects from a variety of sources.
- 4.06 Compose a draft that conveys major ideas and maintains focus on the topic by using preliminary plans

Activities:

1. The students will begin a KWL chart on what they already know and want to know about the Earth, Moon, and Sun.
2. The students will rotate into each third grade classroom to do different experiments and activities on the moon phases.
3. The students will use flashlights and the overhead to view the reflection of light and the shadows created.
4. The students will write a creative paper on his or her imaginary trip to the moon.
5. The students will put together ingredients for making fossils to create the surface of the moon including craters and an American flag.
6. The students will journal each night about the moon. They will fill out a moonwatch to describe what time of night they observe the moon and what it looks like. They will draw it each evening for a month.
7. The students will make a flip book of facts to go along with the book: If You Decided to go to the Moon.
8. The students will complete a triple Venn Diagram on how the Earth, Moon, and Sun are alike and different.
9. The students will do web quests under Nettekker to answer the ten subquestions. They will also complete a Moon web quest and answer questions. (A list of the best web sites are included).
10. The students will use a variety of nonfiction texts to research the ten subquestions.
11. The students will learn two songs; one about the Earth, and one about the Earth, Moon, and Sun (created by the third grade teachers to the beat of "She'll be Coming 'Round the Mountain.")
12. The students will go on a field trip to the Natural Science Center for the planetarium.
13. The students will write a poem about the Earth, Moon, and/or Sun.

14. The students watched a video titled The Moon and took notes relating to the subquestions.
15. The students learned to spell “moon” related words. They did activities with the words and took a spelling test on them.

Final Product/Presentation Description:

The third grade will present to parents what they learned about the essential question. We will sing songs, act-out skits (cosmic conversations with the Earth, Moon, and Sun), and students will say “Did you know” facts about each. Students will share some of their poem and imaginary writings. The program will close with an iMovie of the experience. The iMovie will include pictures of the students doing research with the computer and with text, dressing as astronauts, video clips of the students performing the experiments, student voices, and pictures of the students on the field trip. The credits will name each student involved. After the presentation, we will serve refreshments of Moon Pies, Milky Ways, Starbursts, and Tang.

Each student will have a completed work folder displayed for his or her parents to view. The folders include each of the mentioned activities. The students will have the opportunity to put their folders in order.

Evaluation of Product:

The teachers created a rubric on <http://rubistar.4teachers.org>. We included Quality of Work, Pride, and Working With Others as the categories. We focused on high quality, complete work. We also wanted sharing and working well with others to be included.

Activity Title: Understanding the Moon Phases

Each classroom did a different activity.

First classroom: Activity Two

Materials Needed:

orange, grapefruit, and a flashlight per group of three
pencil, notebook paper, drawing paper, and crayons

Approximate time: 45 minutes to an hour

Activity Description:

The teacher will demonstrate the experiment. In a dark room, the teacher will line up the grapefruit (Earth) with the orange (Moon). He or she will back up as far as possible with the flashlight (Sun). Shining the flashlight on the grapefruit will show how light is reflected off of the Earth onto the Moon. It will also show that we have a full moon when the Earth is between the moon and the sun, and we have a new moon when the moon is between the Earth and the sun.

The teacher will put the students in groups of three to practice the experiment. One student moves the orange, another student holds the flashlight, and the other students records the phases along the way. When they have had several minutes to explore the light on the orange, pass out the drawing paper. On the paper, the student should illustrate the experiment drawing the Earth, Moon, and Sun. Under the illustration, have the students write a paragraph describing what happened and what they learned.

Second Classroom: Activity Two Continued

Materials Needed:

styrofoam ball (half of it white and half of it colored black), a toothpick attached to the bottom of the ball to hold it, a large sun placed on one wall of the classroom, activity log, tape marking spots on the floor

Approximate Time Needed: 45 minutes to an hour

Activity Description:

Students work in partners to see the phases of the moon. There is tape marking the positions along the moon's revolution around the Earth. One student holds the styrofoam ball by the toothpick. The student on the outside goes to each of the positions while looking at the ball. The student can actually see the different phases of the moon! The other student stands inside the tape but turns so that the white part of the ball is always facing the sun. After this activity, the students sit down and complete a patterns of the moon activity sheet.

Third Classroom: Activity Two Continued

Materials Needed:

several bags of Oreo cookies, poster board, blue, green, and yellow construction paper, glue, scissors, plastic knives, and markers

Approximate Time Needed: 45 minutes to an hour

Activity Description:

In groups of four or five students, the students open the Oreo cookies. They create the phases of the moon by taking of some of the white icing to duplicate what the moon looks like in each phase. After getting the Oreos ready, the students create an earth with the construction paper. The Earth is the size of four moons put together, so the Earth needs to be the size of four Oreo cookies put together. The Earth is glued to the middle of the poster board. Then the Oreos are glued around it showing each phase. Use the yellow construction paper to make a sun for the left-hand side of the paper. The students use the markers to label the sun, Earth, and each phase of the moon.

Fourth Classroom: Activity Three

Materials Needed:

basketball, overhead projector, globe/or inflatable Earth, scissors, glue, yellow and black crayons, sentence strips, activity sheet where the students color each moon phase

Approximate Time Needed: 45 minutes to an hour

Activity Description:

The teacher demonstrates the shadows in space. She puts two stools on top of each other. You can use anything that would be about that height. She puts the basketball on the stool in front of the overhead. The basketball acts as the moon. (The position of the Earth and moon are reversed to show the shadows better). A student holds the globe or inflatable Earth about four feet beside the stool. The overhead light produces a shadow onto the overhead. You can see the effect this has on the globe. After the demonstration, the students create the different phases of the moon by coloring appropriately on a moon phase activity sheet. The strips on the sheet can be cut out and glued in the right order on a sentence strip.

Activity Title: My Imaginary Trip to the Moon Writing Activity Four

Materials Needed:

notebook paper, pencil, items to use to dress as an astronaut, outline of an astronaut for students to add details

Approximate Time Needed: 5-7 days

Activity Description:

The students will begin with a prewriting. The first part of the prewriting will be for the students to use an astronaut outline to add colors and detail. They can use their illustrations to add detail to their writing. The teacher will model a beginning paragraph to the prompt "My Imaginary Trip to the Moon." Students will write their own paragraph and conference with the teacher about it. Before doing the middle paragraph, the students will bring items from home such as, helmets, heavy jackets, gloves, bulky ski clothes, hats, boots, etc. to put on to show what an astronaut must go through before going to space. During this activity, the students must list the steps they had to perform to get ready to go to space. The class comes up with a class list. This list will be used in the first middle paragraph. The teacher models this paragraph, and each student writes his or her own preparation paragraph. After conferencing with the students about his or her paragraph, the teacher models a paragraph about actually being on the moon. The students write this paragraph. Finally the teacher models, and the students write his or her ending. After editing the papers, the students write their final copy. This takes several days doing a step each day.

Activity Title: Creating Moon Craters

Activity Five:

Materials Needed:

recipe for making Fossil Dough (attached) , small American flags, markers and/or objects that have smooth tips, paper plates

Approximate Time Needed: 1 hour/24 hours to dry

Activity Description:

Mix the recipe in advance or have the students mix it. Mold the dough like you would a hamburger and put it on a paper plate. Pat it hard and thick. Have the students use markers, pencils, etc. to punch holes or craters in the surface. Stick the American flag in the dough and allow time to dry.

Activity Title: Journaling about the Moon

Activity Six:

Materials Needed:

journaling moon flip book sheet found on this website
(<http://ology.amnh.org/astronomy/stufftodo/moon.html>)

Approximate Time Needed: 28 days

Activity Description:

Students record time, weather, comments, and draw a picture of the current moon phase each night for 28 days. This can be used to make a flip book.

Activity Title: Using Facts from Literature

Activity Seven:

Materials Needed:

book-If You Decide to go to the Moon ,construction paper folded to make a flip book, pencil, and crayons

Approximate Time Needed: 45 minutes

Activity Description:

The teacher reads aloud the book. Students use the book to write a fact on each page of the flip book. Above each fact, the student should illustrate the fact. The title goes on the front of the book.

Activity Title: Comparing and Contrasting the Earth, Moon, and Sun

Activity Eight:

Materials Needed:

Copy of a Triple Venn Diagram, nonfiction books

Approximate Time Needed: 45 minutes

Activity Description:

Students use what they have learned plus various nonfiction books to compare and contrast each of the three space objects.

Activity Title: Researching the Subquestions:
Activity Nine and Ten:

Materials Needed:

Nonfiction books, Science textbooks, computers, subquestions, pencils

Approximate Time Needed: 3 to 4 weeks

Activity Description:

Students work in the computer lab and in the classroom to find the answers to the subquestions. My assistant stayed in the room with half of the class using books to research while I took the other half to the computer lab to use web sites for research. After about 45 minutes, the students switched places. At times, I took the whole class to the computer lab to search the web. We had lots of nonfiction books relative to the essential question. The students had a copy of the subquestions and tried to answer them throughout their research. At the end of the unit, we went over the questions together to make sure that each student had the correct answer.

Web sites used for Researching the Subquestions:

These titles were found at www.nettrekker.com

OLogy: Moon Watch Flip Book

<http://ology.amnh.org/astronomy/stufftodo/moon.html>

NasaStarChild: What are the phases of the moon?

<http://starchild.gsfc.nasa.gov/docs/StarChild/questions/question3.html>

Fear of Physics: Sun, Earth, and Moon

<http://www.fearofphysics.com/SunMoon/sunmoon.html>

Zoom Astronomy: All About Space

<http://www.zoomschool.com/subjects/astronomy/>

http://192.107.108.56/portfolios/e/ebianetti_1/Moon/moonfact.htm

Books Used as Resources:

Titles:

If you Decided to go to the Moon

Does the Moon Change Shape?

The Moon

Why do we Have Different Seasons?

As the Earth Turns: Day and Night

The Moon by Seymour Simon

The Sun by Seymour Simon

The Amazing Planets and Their Moons

The Solar System

