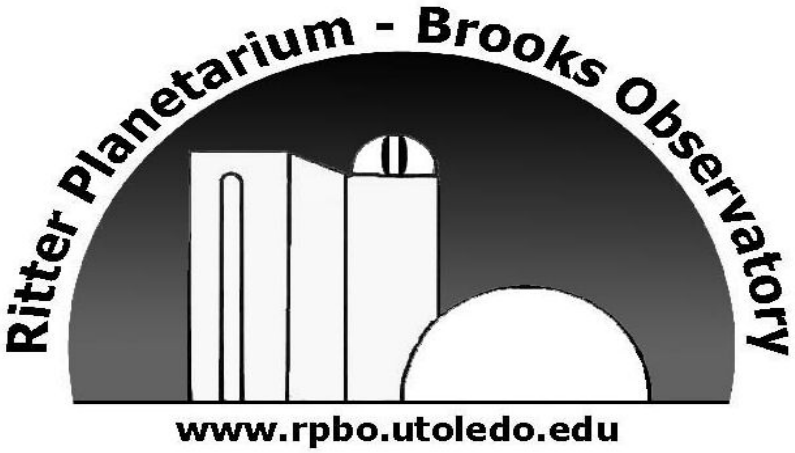

Moonwitch

Post-visit Packet

Ritter Planetarium-Brooks Observatory
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Name _____ Date _____

Summary

Now that you've seen the program you may be wondering what to do next. We're here to help. In the following pages we've provided some samples of vocabulary, possible questions and discussion topics as well as some activities that could be done in the classroom or at home. These are simply suggestions and we encourage you to modify this packet to suit your particular needs.

Concepts covered in show:

1. **Night Sky**
   The nighttime sky is introduced. Light pollution is defined and its effect on the sky we see is discussed. Students learn several constellations in the current nighttime sky as well as any planets that are visible.

2. **Moon's Inhabitants**
   The suggestion of a moon witch prompts a discussion of what images various cultures see in the moon, such as a man, a woman, a three-legged toad and a rabbit. The Roman god of the moon is also discussed.

3. **The Moon Follows**
   The moon appears to follow us from night to night. In reality, this is just an illusion. This illusion is explained and the actual Moon-Earth distance is specified. Also a brief explanation of the moon's apparent change in size throughout the night is given. The apparent motion of the moon across the sky is described as the result of a rotating Earth.

4. **Moon Phases**
   The moon's appearance changes from night to night. These changes are called phases and the reason for these changes are given. A classroom example is mentioned and the students learn the names of the moon's phases. The origin of our month is also pointed out.

5. **Lunar Features**
   Diana imagines what it would be like to be on the surface of the moon. Topics like temperature, wind, and the absence of air on the moon are introduced. The moon's surface is discussed and Moon craters are explained.

Name _____ Date _____

Vocabulary

1. **Constellation**

2. **Light Pollution**

3. **Moon**

4. **Month**

5. **Moon Phase**

6. **Waxing**

7. **Waning**

8. **Crescent**

9. **Gibbous**

10. **Earthshine**

Name _____ Date _____

Vocabulary-Key

1. **Constellation**- group of stars that seem to form a shape; sometimes human shapes or animals. 88 official constellations make up a map of the night sky.

2. **Light Pollution**- an excess of light in the night sky. Cities suffer the most from these extra lights that make the night sky not quite as dark as it could be.

3. **Moon**- the Earth's natural satellite.

4. **Month**- originally "moonth," named for the period of time from one full moon to the next.

5. **Moon Phases**- the apparent change in the moon's shape throughout the month. Actually a change in the area that we see reflecting sunlight.

6. **Waxing**- growing; when the moon is waxing we see more and more of the moon each night.

7. **Waning**- getting smaller; when the moon is waning we see less and less of the moon each night.

8. **Crescent**- called the banana moon in the show. The phase between just before and after a new moon.

9. **Gibbous-** literally meaning humpbacked; the period when the moon is between a half moon and a full moon.

10. **Earthshine**- the reflected sunlight from the earth that bounces off of the moon and back to us. Literally when you see the dark edge of the moon.

Name _____ Date _____

Short Answer and Discussion Questions

1. Can you see more stars out in the country or in the city? Why?

2. What is a constellation? Give an example.

3. Why does the moon seem to follow you as you walk?

4. Name the moon's phases.

5. Why does the moon go through phases?

Bonus question:
Have you driven far enough to reach the moon? (Hint; ask your parents how many cars they've owned, and how many miles they put on each car.)

Name _____ Date _____

Short Answer and Discussion Questions - Key

1. Can you see more stars out in the country or in the city? Why?

   You can see more stars in the country. That is because the extra lights of the city make it hard to see the dimmer stars. This effect is called light pollution.

2. What is a constellation? Give an example.

   A constellation is a group of stars that together form a picture. There are 88 official constellations that make up a map of the sky.

3. Why does the moon seem to follow you as you walk?

   The moon is very far away. The trees and houses are really close in comparison. As you walk along, things close like trees and houses appear to move between the moon and you. Because the moon is so far away, it doesn't seem to move at all. Hence, appearing to always be behind you.

4. Name the moon's phases.

   The moons phases are: new moon, waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, third quarter, waning crescent, new moon. Simpler version is: new, crescent, half, gibbous, full.

5. Why does the moon go through phases?

   The apparent change in the moon's shape throughout the month is the result of the differing angle between the sun, earth, and moon. For example, a new moon occurs when the sun, moon, and earth are in a direct line with the sunlit side of the moon facing away from the earth.

   Bonus question:
   Have you driven far enough to reach the moon? (Hint; ask your parents how many cars they've owned, and how many miles they put on each car.)

   The distance to the moon is about 250,000 miles so chances are most of the parents will have driven enough to have reached there. In fact, some of them may have driven far enough to go to the moon and back again!

Name _____ Date _____

Classroom Activity

Famous Astronauts

There have been many brave people who have shown us the way into space.
Here are just a very few of them.

C B O R M A N H M Z

F E F G A G A R I N

A R M S T R O N G C

L H L W T Q P E S O

D A O E I G N F H L

R I V I N L H P E L

I S E G G E O E P I

N E L E L N U Y A N

G P L R Y N P R R S

L X J T O K F N D O

Clues:

1. One of the astronauts on Apollo 11, this man also walked on the Moon.
2. This man read from the book of Genesis as he orbited the Moon on Christmas Eve, 1968
3. A Russian, this man was the first to orbit the Earth
4. The second astronaut on the Apollo 13 mission
5. This man didn't go on the Apollo 13 mission because doctors thought he had the measles
6. The third astronaut on the Apollo 11 mission, this man made sure the others returned safely from the Moon's surface.
7. Now a US Senator, this man was the first American to orbit Earth. He is going back to space in the fall of 1998
8. This man commanded the famous Apollo 13 mission
9. The first American to fly in space
10. The third astronaut on the Apollo 13 mission
11. The first man on the moon

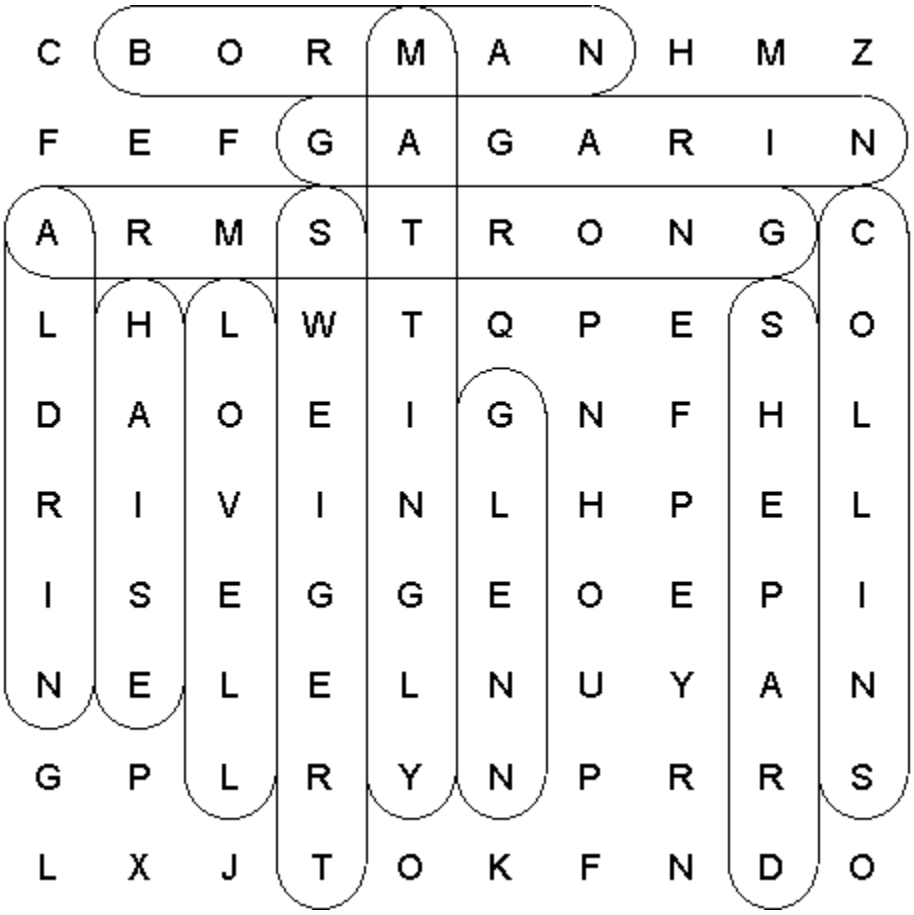
Special thanks to Astronomy for kids for this activity

Name _____ Date _____

Classroom Activity

Famous Astronauts - Key

Answers for Famous Astronauts



Answers:

1. Aldrin
2. Borman
3. Gagarin
4. Haise
5. Mattingly
6. Collins
7. Glenn
8. Lovell
9. Shepard
10. Sweigert
11. Armstrong

Special thanks to Astronomy for kids for this activity

Name _____ Date _____

Take-home Activity

Building a lunar settlement

In this activity you'll learn what is needed to sustain human life on the moon. Many of the things that we take for granted are unavailable in the harsh lunar environment. You and your family will build a model lunar settlement that provides all the necessities for healthy and happy human inhabitants.

You will need:

- 1 piece of poster board or thin plywood, about 1 to 1 1/2-foot square.
- A variety of building supplies such as: scrap wood, cardboard, poster board, construction paper,

What to do:

1. Gather all your supplies and tools. The poster board or plywood represents the lunar surface. All the other building materials will be used to construct your model settlement.
2. Begin to build a model moon settlement. Have family members pretend that they are going to live on the moon for at least a year. Encourage a discussion of what would be needed in your model settlement to provide happy living and survival for an extended period of time. Label and discuss the purpose of each structure in your lunar base. For example, label "oxygen tanks" or the "recreation area" accordingly. Review the "Potentially Helpful Facts About the Moon" section and make sure that your settlement takes into account all aspects of the lunar environment.

Potentially Helpful Facts About the Moon

Water: In the form of ice (found by NASA's Prospector mission in 1998)
Diameter: 2,159 miles (3,476 kilometers)
Distance from Earth: 238,606 miles (384,000 kilometers)
Atmosphere: None
Mean surface temperature in the day: 224° Fahrenheit (107° Celsius)
Mean surface temperature at night: -243° Fahrenheit (-153° Celsius)
Gravity: 15% of that on Earth. A person who weights 110 pounds (50 kilograms) on Earth would weigh 16.5 pounds (7.5 kilograms) on the Moon.
Rotational period or lunar day: 27.3 Earth days

Name _____ Date _____

Classroom Activity

Phases of the Moon

Every 29½ days, or about once a month, the moon goes through a cycle of phases. Starting with new moon, when the moon is not visible, we can see more and more of the moon each night, until we can see the entire near side of the moon at full moon. After full moon, we can see less of the moon each night, until we have reached new moon again. The activity described below helps students to understand how the moon goes through its phases.

You will need:

- A ball, about 6 inches in diameter. Styrofoam balls work well, since they have a "cratered" appearance.
- A flashlight
- A dark classroom
- Two volunteers

What to do:

3. Turn off the lights in the room.
4. Pick one student to hold the flashlight. This student is going to be the **sun**.
5. Pick another student to hold the moon (Styrofoam ball). This student will be the **earth**. The two students should stand about five feet apart, depending on the strength of the flashlight. "Earth" should hold the moon in front of him at arm's length and start out facing "Sun." "Sun" should hold the flashlight close to her, at the same level as the moon. In this position, "Earth" should notice that the side of the moon that is facing him is completely dark. This is what happens at new moon. You may want to point out that since "Earth" sees "Sun" and the moon at the same time, the new moon is only up during the day.
6. Now, "Earth" should make a one-quarter (90-degree) turn to the left, continuing to hold the moon in front of his face. He should notice at this point that half of the moon is lighted. This is first quarter moon. (An easy way to remember this is that "Earth" has turned one quarter of the way around.)
7. After another quarter turn, the whole moon should be lighted. This is full moon. Since "Sun" is now behind "Earth," the full moon is on the opposite side of the earth from the sun. It can be seen all night long.
8. One more quarter-turn will cause half of the moon to be lighted again. This is last quarter moon. And a final quarter-turn brings us back to new moon. Point out that this marks the end of one month, or about 29½ days.

Throughout the activity, students elsewhere in the classroom should notice that, although "Earth" sees the moon differently at different times, half of the moon is always lit. Repeat the activity for as many different volunteers as time allows. Direct participation makes the concept much clearer than simply watching.

This activity was developed by Will Fischer of the Ritter Planetarium and Brooks Observatory.

Name _____ Date _____

Classroom Activity

Birthday Moon

Students become familiar with lunar phases by locating and then drawing the Moon phase of their own birthdays. After listening and discussing lunar myths and legends they create their own Birthday Moon Stories. This activity is most effective after a lesson on the moon and its phases.

You will need:

- crayons, markers, or colored pencils
- access to the internet

What to do:

1. During the class, the teacher can go to one of the following sites:

   http://liftoff.msfc.nasa.gov/academy/universe/MOON.HTML
   http://www.googol.com/moon/
   http://tycho.usno.navy.mil/vphase.html

   Then, as each student gives his/her birthday, that date can be entered in, and the proper Moon picture generated. Each student then can record (by drawing) the Moon picture for his/her birthday. (If all students have internet access at home this step may be assigned as homework.)
2. Have the teacher read at least one moon myth to the students. Several are available at the following website:

   http://btc.montana.edu/ceres/html/birthdaymyths.htm

   (You may also choose other moon stories.)
3. Have the students observe the moon and make up their own moon myths that may explain things like the moon's coloring, shape or position in the sky. The students may either write them down or take turns telling them to the class.

Special Thanks to NASA/MSU-Bozeman CERES project for this activity.

Name _____ Date _____

Recommended Astronomy Web Sites

After seeing a program you may be interested in finding out more about a particular subject. These are some of our favorite websites.

Misc

Ritter Planetarium-Brooks Observatory	**www.rpbo.utoledo.edu**
Search for Extra-Terrestrial Intelligence Inst.	www.seti.org
SETI@home	setiathome.ssl.berkeley.edu
Space.com	www.space.com
Space Ref	www.spaceref.com
Heavens Above (Satellite Tracking)	www.heavens-above.com

Education

Windows to the Universe	windows.arc.nasa.gov
Bad Astronomy	www.badastronomy.com
The Nine Planets	seds.lpl.arizona.edu/nineplanets/nineplanets

NASA

NASA Homepage	www.nasa.gov
NASA Human Space Flight	www.spaceflight.nasa.gov
NASA Jet Propulsion Laboratory	www.jpl.nasa.gov
Space Telescope Science Institute (Hubble)	www.stsci.edu

Telescopes

Meade	www.meade.com
Celestron	www.celestron.com
Orion	www.telescope.com
Astromart	www.astromart.com

Magazines

Sky and Telescope	www.skyandtelescope.com
Astronomy Magazine	www.astronomy.com

Societies and Organizations

International Dark-Sky Association	www.darksky.org
The Astronomical Society of the Pacific	www.aspsky.org
International Astronomical Union	www.iau.org
The Planetary society	planetarysociety.org