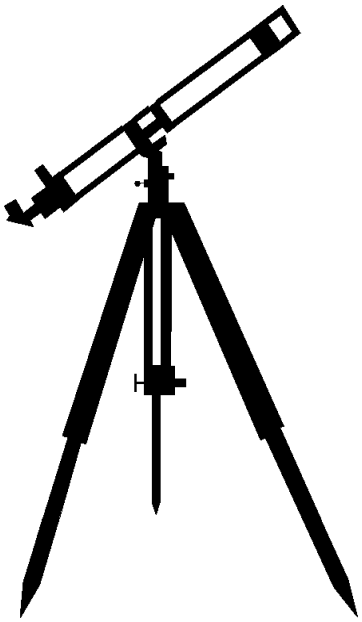
Universe Cycle

The Search for Our Beginnings

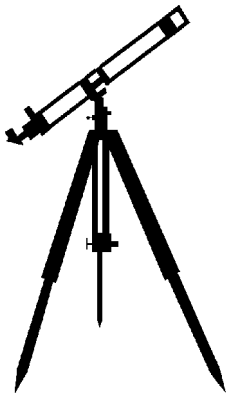
FIRST GRADE

SOLAR SYSTEM



1 WEEK
LESSON PLANS AND
ACTIVITIES

UNIVERSE CYCLE
OVERVIEW OF FIRST GRADE



UNIVERSE

WEEK 1.
PRE: *Describing the Universe.*
LAB: *Comparing and contrasting bodies that reflect light.*
POST: *Exploring the meaning of stars.*

SOLAR SYSTEM

WEEK 2.
PRE: *Differentiating between a star and a planet.*
LAB: *Discovering the surface of some planets.*
POST: *Comparing and contrasting the planets of our Solar System.*

EARTH

WEEK 3.
PRE: *Comparing night and day.*
LAB: *Exploring rotation on the Earth's axis.*
POST: *Analyzing evidence that the Earth rotates.*

GEOGRAPHY

WEEK 4.
PRE: *Discovering a relief map.*
LAB: *Exploring with a compass.*
POST: *Comparing geographic locations.*

UNIVERSE CYCLE - SOLAR SYSTEM (1)

PRE LAB

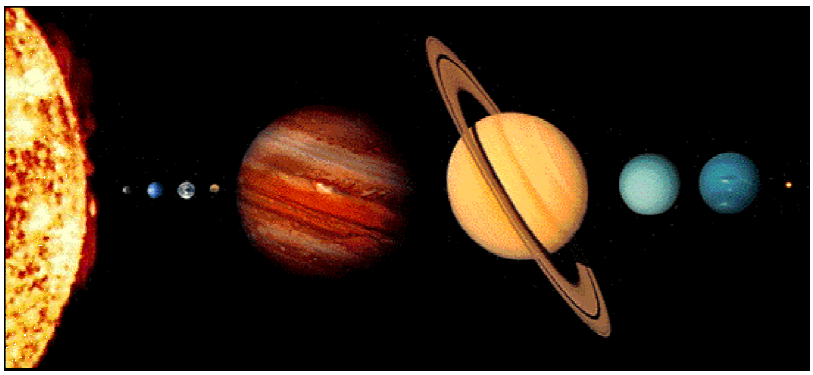
Students learn about the different planets.

OBJECTIVES:

1. Differentiating between a star and a planet.
2. Exploring our Solar System.

VOCABULARY:

Earth
planet
Solar System
Sun
Universe



MATERIALS:

Is there Life in Outer Space? by F. Branley (Harper)
Planetarium model
worksheet

BACKGROUND:

Our Solar System has a central Sun, around which revolve the nine planets and countless small objects. As a unit the Solar System revolves amongst the stars of the Milky Way, slowly circling the core of the galaxy.

There are numerous differences between the Sun and the planets. These include:

1) *radiation vs. reflection* - The Sun creates its own energy; we see this energy radiating as light. The planets only reflect the light created by the sun

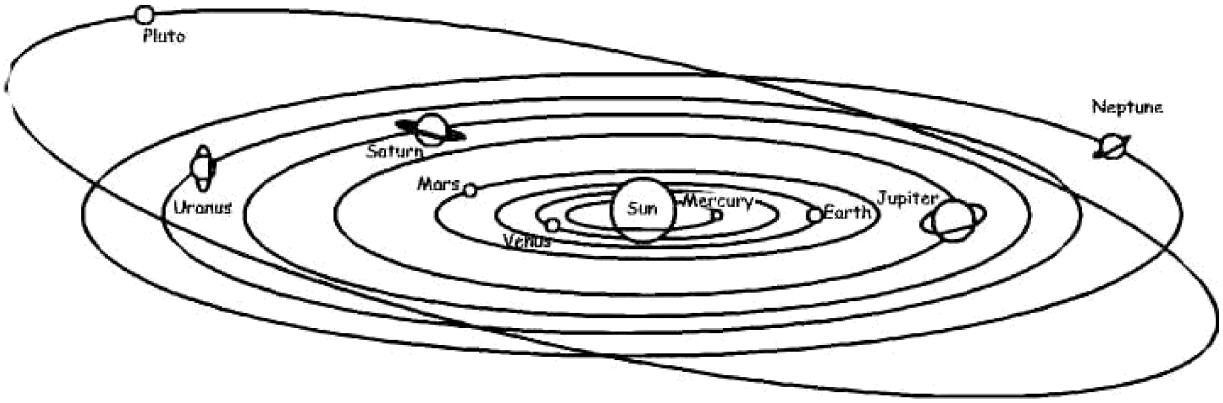
2) *size* - The Sun is by far the largest body in the Solar System, with a diameter of 1.4×10^{16} kilometers - that is 14 followed by fifteen zeros! Jupiter is the largest planet, with a diameter of 142980 kilometers. The Earth's diameter is 12756 kilometers.

3) *composition* - the Sun is largely composed of gaseous hydrogen and helium, with small amounts of other elements. The planets have a wide variety of compositions. Jupiter , Saturn, Uranus, and Neptune are similar to the Sun, but contain more carbon compounds such as methane, and small amounts of rock. The inner planets - Mars, Earth, Venus, and Mercury, are composed mostly of rock and metal, with thin gaseous atmospheres. The composition of Pluto is uncertain.

4) *temperature* - the Sun is very hot; its surface temperature is about 6000 K (degrees Kelvin). The planets are much cooler. Venus has the hottest planetary surface temperature, about 750K, while Pluto likely has the coldest, at about 50 K.

PROCEDURE:

1. Explain to the students that our Sun and its planets are called the Solar System. Tell them that the Solar System is part of a larger grouping of stars, called a galaxy. Our galaxy is called the Milky Way; this is where the name of the candy bar came from. Emphasize to the students that the Solar System and the Milky Way are only a small part of the Universe. Go over the different planets of the Solar System. Draw a picture as below to show the planets orbit. Notice that the planets revolve around the Sun in a well defined zone. The planets do not revolve in any direction.



2. Use the Planetarium to show students the movement of the Earth and Sun. The Sun also shows how it generates light. Only stars produce light; all other bodies in the Universe only reflect starlight.

3. Have the students complete the worksheet. First, have them list the differences between a star and a planet. You can have them work individually, or go over the answers as a group.

Next, have the students color the worksheet, using colors which accurately portray the Sun and Earth. The Sun can be yellow to orange. The Earth can be white (clouds), blue (ocean), and brown or green (continents).

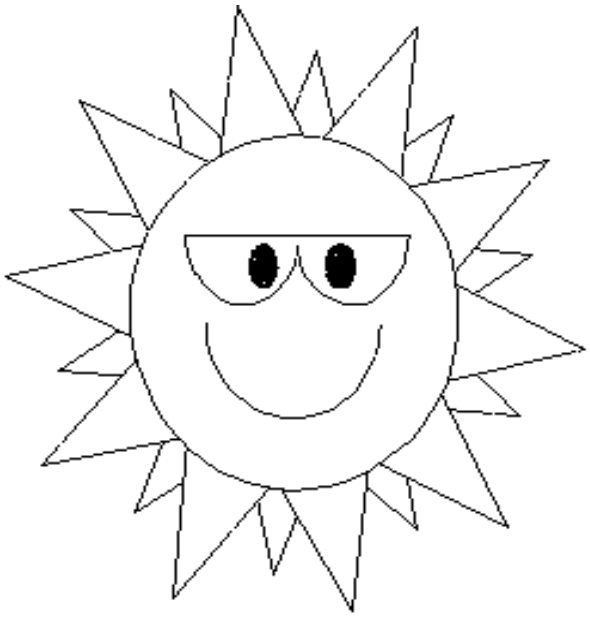
4. Read the book *Is there Life in Outer Space* to the class. This will familiarize the students with the different components of the Solar System. Do not have them memorize information about the planets. Instead, let them slowly digest the information.

Information on the planets increases every year. Not only is the United States exploring space, but many other countries are investigating the planets of our Solar System. Books that have been published in the past may contain erroneous or out-of-date information because of this new research. However, these books may still be useful for their ability to reach younger children, as long as you correct their mistakes.

UNIVERSE CYCLE - SOLAR SYSTEM (1) PRE LAB

WHAT IS THE DIFFERENCE BETWEEN THE SUN AND A PLANET?

LIST THE CHARACTERISTICS



UNIVERSE CYCLE - SOLAR SYSTEM (1)

LAB

Students observe and create the surface of the moon.

OBJECTIVES:

1. Exploring planets in our Solar System that have satellites.
2. Discovering the surface of some planets.

VOCABULARY:

craters
meteorite
Moon
planet
satellite

Earth's Moon

MATERIALS:

Photos of the moon
Sand
Moon Surface Box - assemble in advance
Play dough - make in advance or purchase
cardboard or styrofoam trays

BACKGROUND:

The surface of many of the planets and moons are different than the Earth. The Earth's surface is hard, and is composed of solid rock. The Earth's surface continually changes, due to the presence of liquid water and life, and the activity of plate tectonics.

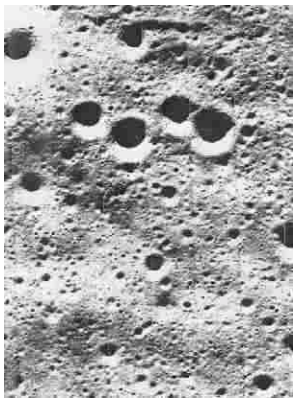
The large gas giant planets, Jupiter, Saturn, Neptune, and Uranus, all have outer surfaces composed mainly of gas. You could not really land on the surface of these planets; there is no "ground" as we know it. However, many of the moons or satellites of the gas giant planets have a cratered surface similar to our Moon.

The other inner planets, Mercury, Venus, and Mars have a hard rocky surface like the Earth. However, many of these planetary surfaces are inactive, and covered with craters like the Moon. The surface of Pluto is probably rocky, but has not been clearly observed yet.

PROCEDURE:

1. This activity concentrates on the surface of the Moon. Learning about the Moon's surface helps students to observe and describe the other rocky planets. Explain

the basic components of the Solar System - the Sun, nine planets and their moons - to the class.



2. Show the students photos of the Moon. Ask them what is different about the surface of the Moon compared with the Earth They should be able to see that the Moon has many craters, with no trees, or rivers. The craters are caused when meteorites (or big space rocks) hit the surface of the Moon. The Earth has also been hit by meteorites, but wind, water, and ice have covered up and destroyed their craters.

3. Tell the students that a long time ago people told stories about the Moon to explain its light, movement and changes in shape. The Romans believed that the goddess Diana drove a pale, silvery chariot across the heavens each night. However, she often preferred to go hunting on Earth, and would leave the night sky dark while she chased the animals.

In Burma, some people believed that the Moon was a silver rabbit that lived in a box. On the first night after the new Moon, the rabbit would open the box to peek out a little. He would gradually open the lid wider until he was completely out of the box, at the full Moon. The rabbit would then reenter the box slowly, until he was all the way in, at the new Moon. The lid would then shut, and the night would be completely dark.

There were also stories about the “face” in the Moon. Show the students a picture of the Moon that is shadowed properly to show the “face”. Tell them that ancient peoples saw different pictures in these shadows. The Iroquois Indians saw a woman who is weaving a forehead strap. These straps were used to carry burdens. When she finishes the strap, the world will come to an end. But when she gets up, the cat that is always at her side unravels the strap, and she must start over.

The Malayans of Southeast Asia see an old hunchback man, who is sitting under a tree making a fishing line. When he finishes the fishing line, he wants to fish up everything on Earth. He never gets finished because a rat chews the line in two, so he has to start all over.

4. Have the students each put a hand inside the MOON SURFACE BOX without looking into the box. They will feel that the surface is pitted, and covered with a little loose material. Next, have them look inside the box, to see a make believe, eerie scene from the Moon. Show the students the pictures of the Moon (included in the module). You may want to have them compare the craters in the box with the craters on the pictures. Make sure the students understand that craters are three dimensional.

Instructions for making a Moon Surface Box

Materials

large box with lid (storage box)
plaster of Paris
glow in dark stickers (star shaped)
sand
black or brown spray paint

Assembly

a. If necessary, cut a hole in the side of the box; the students will look through this at the “moonscape”.

b. Paint the box black, both inside and out.

c. Mix Plaster of Paris in a bucket. Spread a layer of Plaster of Paris on the inside of the box. Make a cratered scene, so it looks like the Moon's surface. Let it dry thoroughly before continuing.

d. Paint the craters gray and brown, to make them look realistic. Make a scene on one side of the box with the glow in the dark stickers. Students will be "peeking" in one of the holes so make sure the stickers

e. Sprinkle a little sand on the surface to simulate “ejecta” thrown out by meteorite impacts.

5. Next, tell students that they are going to recreate the surface of the Moon using playdough. Give each child enough play dough to be able to cover their tray. You may also give each child a rock or other hard object to help them make craters. Make sure that real pictures of the Moon’s surface are available, so that the students can accurately model it. You can also add a little sand on the surface of the craters to simulate material thrown out of craters.

HOW TO MAKE PLAY DOUGH

MATERIALS:

250 ml flour
125 ml salt
5 ml cream of tartar
250 ml water
about 1/2 ml food coloring
about 1/2 ml oil

Cook this mixture, over medium heat, stirring it constantly until it forms a dough-like texture. Knead it briefly, after the mixture has cooled. Multiply this recipe by 6 to get enough for a class of 30 students, but it should be made in two batches. Large amounts of dough are difficult to stir because the mixture becomes firm. Store the play dough in a plastic bag or a margarine container.

UNIVERSE CYCLE - SOLAR SYSTEM (1)

POST LAB

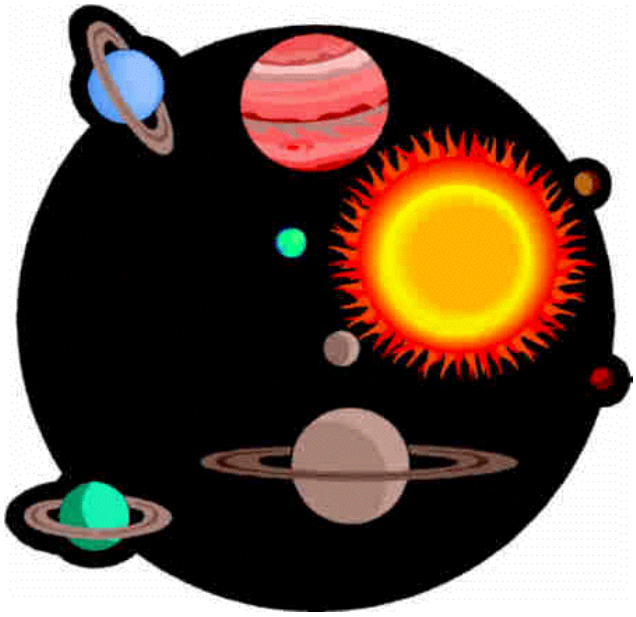
Discussing planets through books.

OBJECTIVES:

1. Comparing and contrasting the planets of our Solar System.
2. Exploring how books can help students recognize planets.

VOCABULARY:

Moon
planet
revolve
Solar System
star
telescope
Universe



MATERIALS:

Planets by Kim Jackson (Troll) or other book on planets
Internet

BACKGROUND:

The Solar System seems very large to children. You cannot easily point to an object in the sky and say that is a planet. Even with a telescope we cannot clearly see all of the planets.

Many elementary books on the planets have outstanding pictures. Pictures can help students to distinguish the different planets. They can observe size, color, and the presence or absence of rings and moons, to name a few. Remember that information on the planets changes and increases every year. Books published in the past may contain erroneous or out-of-date information because of this new research. However, these books may still be useful for their ability to reach younger children, as long as you correct their mistakes. Students should learn early that just because information is in a book does not mean it is correct.

PROCEDURE:

1. Many primary books are based around a short story that involves someone taking a trip to the different planets. We recommend *Planets* by K. Jackson. In this book,

an owl flies into outer space to look at our Solar System. The owl explains the difference between a star (produces light) and a planet (reflects light). The characteristics of each planet are described. There are pictures of each of the planets. You can add extra information on the planets as you see fit.

You may want to ask the children some of the following questions:

Can the owl actually fly in outer space? No, there is no air.
Can we see the planets as the owl sees them? No, they are too far away.
What instrument can we use to see things in outer space? A telescope.
Can we get as close to the planets as the owl does? No.
Are there aliens living in outer space? Unknown
Is there only one star (our Sun) in the Universe? No, billions of stars.
Do the planets remain still, or do they move around the Sun? They move around the Sun.

2. The Internet has many sites on the planets. As space probes go to the different planets, there will be sites devoted to providing the public with this data.

The following sites may be helpful in finding more information.

http://www.windows.umich.edu/

Windows on the Universe - an excellent site with lots of information on the Solar System.

http://www.hawastsoc.org/

View of the Solar System, information on each of the planets.

http://oposite.stsci.edu/pubinfo/Anim.html

Animations of planets and galaxies. The main Hubble Space Telescope site contains many Hubble Space Telescope pictures.

http://pds.jpl.nasa.gov/planets/

An introduction to the planets from NASA, hosted by the Jet Propulsion Laboratory. Many excellent pictures.

http://www.nasa.gov/kids/kids_planets.html

A NASA link site that connects with much of the organizations student activities and information.

http://www.seds.org/nineplanets/nineplanets/nineplanets.html

An overview of the history, mythology, and current scientific knowledge of each of the planets and moons in our solar system. Many pages also have sounds and movies.