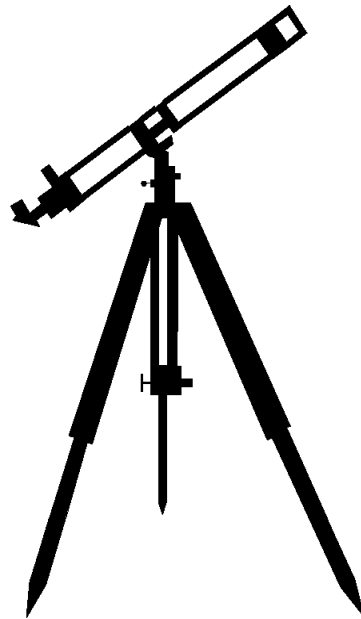




Universe Cycle
The Search for Our Beginnings

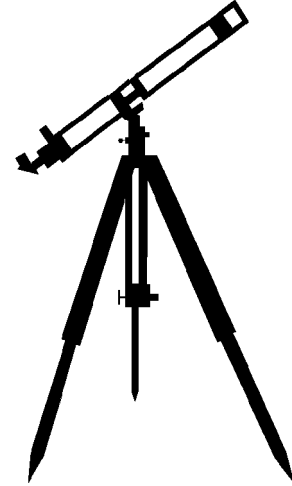


KINDERGARTEN SOLAR SYSTEM



1 WEEK
LESSON PLANS AND
ACTIVITIES

UNIVERSE CYCLE OVERVIEW OF KINDERGARTEN



UNIVERSE

WEEK 1.

PRE: *Discovering misconceptions of the Universe.*

LAB: *Comparing size and distances in space.*

POST: *Exploring the living requirements in space.*

SOLAR SYSTEM

WEEK 2.

PRE: *Distinguishing the different planets.*

LAB: *Distinguishing rotation and revolution of planets.*

POST: *Exploring the Solar System.*

EARTH

WEEK 3.

PRE: *Discovering the shape of the Earth.*

LAB: *Exploring mountains and plains.*

POST: *Observing different landforms.*

GEOGRAPHY

WEEK 4.

PRE: *Distinguishing between land and water.*

LAB: *Identifying continents and oceans on a globe.*

POST: *Exploring the Earth's surface.*

UNIVERSE CYCLE - SOLAR SYSTEM (K)

PRE LAB

Students make planets with paper and clay.

OBJECTIVES:

1. Distinguishing the different planets.
2. Exploring our Solar System.

VOCABULARY:

Earth
Moon
planets
Solar System
Sun

MATERIALS:

worksheet
crayons
Solar System Placemats
clay or play dough
toothpicks



BACKGROUND:

The Universe is everything in outer space, including stars, black holes, quasars, and galaxies. The Solar System is part of the Universe. It is composed of the Sun, the nine planets, and many small objects like comets and asteroids. The Sun radiates light while planets and asteroids are visible only by reflected sunlight.

The planets are all rotating around their own axis, as they revolve around the Sun. The planets are divided into inner and outer planets. The inner planets are all composed of "rock," just like the Earth. The outer planets, except for Pluto, are composed of gas.

Mercury is the closest planet to the Sun. It orbits the Sun quickly, once every 88 days. It rotates slowly, however, only once every 59 days. Mercury is small, about 4850 kilometers (~3000 miles) in diameter. Because Mercury is so close to the Sun, the side of its surface that faces the Sun is very hot, ~700°K. The surface of Mercury is gray to orange in color, and is covered with craters. Mercury is named for a mythical god who ran very fast.

Venus, the second planet away from the Sun, is Earth's closest neighbor. It is about the same size as the Earth, a little over 12,000 kilometers (7300 miles) in diameter. Venus has a very thick atmosphere, composed largely of sulphuric acid and CO₂. We

could not breathe on Venus, because the atmosphere would be very toxic to humans. This atmosphere gives Venus a brownish-yellow color. It also traps heat (the greenhouse effect) making the surface of Venus the hottest in the Solar System, about 750°K. Venus rotates very slowly, taking 243 days to complete one turn. It is named for the Roman goddess of love.

Earth is a little more than 12,000 kilometers in diameter. It differs from the other planets because it has liquid water on its surface, maintains life, and has active plate movement. It rotates on its axis every 24 hours (a day) and revolves around the Sun every 365 days (a year). The Earth has one moon.

Mars is a little more than half the size of the Earth, having a diameter of 6,790 kilometers. It takes Mars 687 days to revolve once around the Sun. It rotates at about the same speed as the Earth, taking 24.6 hours. Mars has a very thin atmosphere which is composed largely of CO₂. Its surface is very cold, and is covered with craters, volcanoes, and large canyons. Mars is reddish in color. Mars has two small moons. It is named for the Roman god of war.

Jupiter is the largest planet in the Solar System, with a diameter of 142,980 kilometers, more than 11 times wider than the Earth. Jupiter orbits the Sun once every 12 years. It rotates very fast, in only 10 hours. Its surface is made up of gas (mostly hydrogen), so that if you landed on the surface you would sink into it. Jupiter probably has a core of metallic hydrogen and rock, although evidence for this is theoretical. The outer gaseous part of Jupiter is broken into bands of white, yellow, red, and brown clouds. Huge oval-shaped storms also occur on the surface. Jupiter has at least 16 moons. Jupiter is named for the Roman supreme god of heaven.

Saturn is well known for its system of three rings. It is a large planet: at 120,536 kilometers it is only a little smaller than Jupiter. It revolves around the Sun in 12 years, and rotates a little more than 10 hours. Like Jupiter, Saturn is composed mostly of gas, and has a core composed of rock and metallic hydrogen. The surface of Saturn looks banded, and has a brown-yellow, butterscotch color. Saturn's rings are probably composed of small particles of ice and rock. Saturn has at least 20 moons. It is named for the Roman god of agriculture.

Uranus is 51,118 kilometers in diameter, about 4.4 times the size of the Earth. It revolves around the Sun slowly, taking 84 years to complete one orbit. It rotates in about 17 hours. It is covered by a thick layer of gas, and has a fairly uniform blue-green color. Uranus has both at least 15 satellites, and is surrounded by a system of nine rings. It is named for another Roman god, the grandfather of Jupiter.

Neptune is slightly smaller than Uranus, with a diameter of 49,500 kilometers. It circles the Sun once every 165 years, and rotates in 16 hours. Its atmosphere appears blue, and is marked by large dark blue storm systems. It is surrounded by a system of five rings and at least 8 moons. Neptune is named for the Roman god of the ocean.

Pluto is the most distant planet from the Sun. It has an eccentric, oval-shaped orbit, which is tilted with respect to the rest of the Solar System. Pluto revolves around the Sun in 248 years, and rotates in a period of 6.4 days. Pluto is probably composed of rock. Its surface and color are unknown. It has one large moon. Pluto is named for the Roman

god of outer darkness.

PROCEDURE:

1. Discuss the nine planets of the Solar System with the students. Go over a few of the "facts," gearing the discussion toward the worksheet or pictures of the planets. Use the Solar System placemats to help students locate the different planets and to understand their orbits.

Mercury: is the closest to the Sun, it is not very big

Venus: has a very spooky atmosphere, that makes this planet the hottest in the Solar System

Earth: is one of the planets, noted for its forest, water, and life

Mars: is about the same size as Earth

Jupiter: is the largest planet, and it not made up of just rocks, it is made in part of gas

Saturn: is noted for its rings, and it like Jupiter is more of a gas planet

Uranus: has some rings, and is a gas planet also

Neptune: has some rings, and it a gas planet

2. Have the students color the planets on the worksheet. Note that the planets are not to scale. Have the students cut out their pictures, and place them on top of the correct planet on the Solar System Placemat.

3. Have the students use clay or play dough to make models of the planets. Have the students try to make models that reflect the real sizes of the planets, as shown on the the Solar System Placemat. You may have them mount their models on toothpicks.

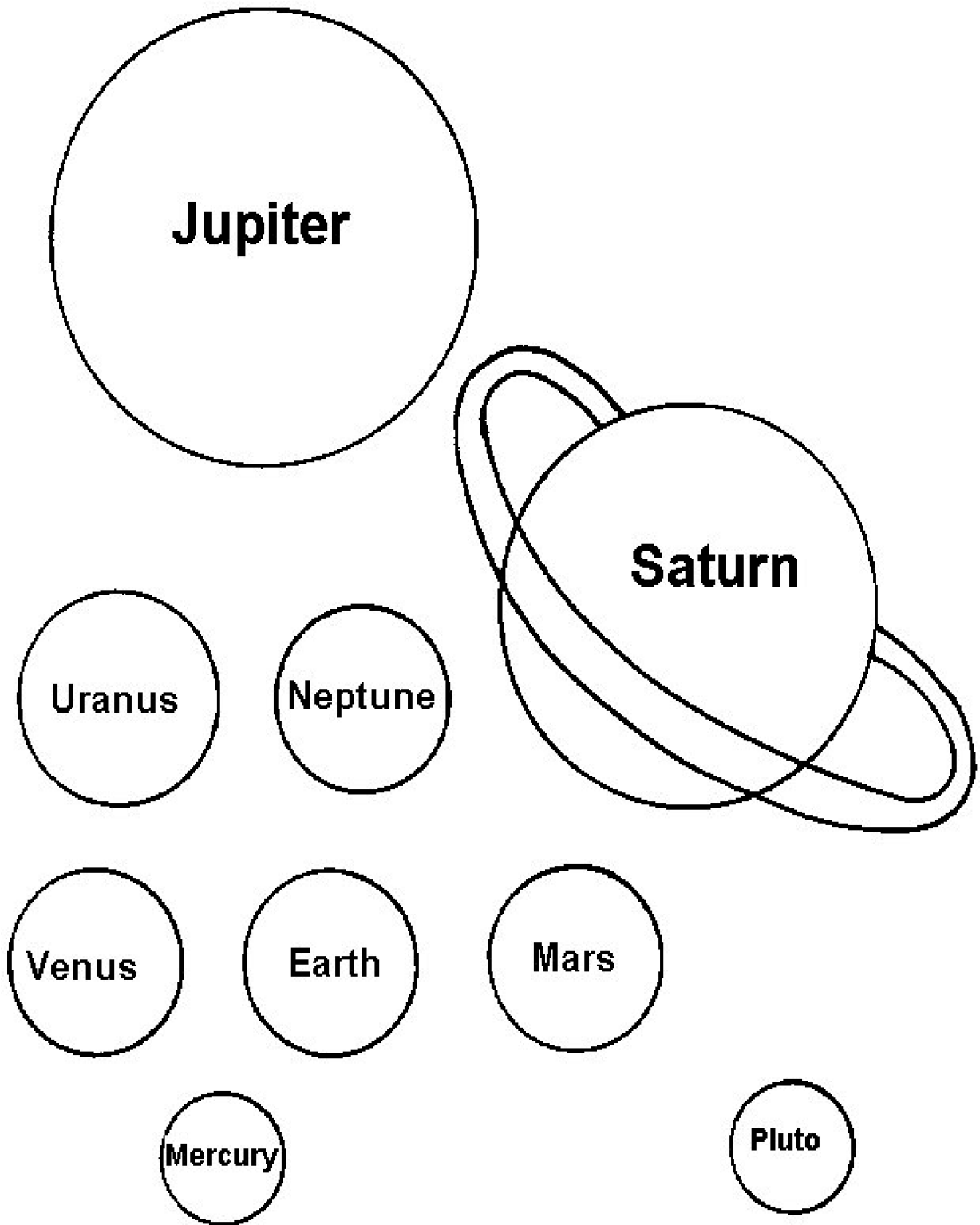
HOW TO MAKE PLAY DOUGH

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 (K) PRE LAB



UNIVERSE CYCLE - SOLAR SYSTEM (K)

LAB

Students rotate and revolve around the Sun.

OBJECTIVES:

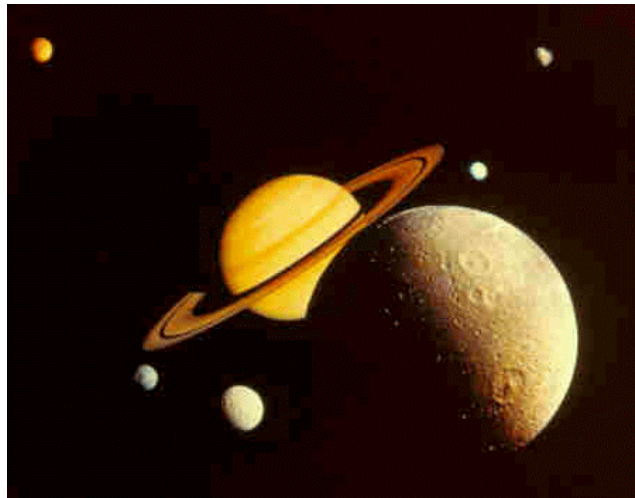
1. Exploring the planets.
2. Distinguishing rotation and revolution of planets.

VOCABULARY:

axis
planets
reflected
revolution
rotation

MATERIALS:

4 flashlights
Inflatable World Globe



BACKGROUND:

The planets move around the Sun. This motion is called *revolution*. Each of the planets also spins around an internal axis which is called *rotation*. Although these are simple concepts, our language sometimes uses these words differently. For example, revolving sometime is used to mean an object turning on itself, like a revolving door; this is actually rotation. This makes the astronomical use of these terms confusing for students.

PROCEDURE:

1. Explain the astronomical meaning of revolve and rotate to the students. Darken the classroom. Have 4 students stand back to back and shine the flashlights outwards. These students are the “Sun”. Divide the remaining students so they slowly revolve around the “Sun”. They are “planets”. Have the “planets” rotate by spinning as they revolve around the Sun. Make sure you do this activity in a large open space.

Ask the “Sun” how long it takes the planets to complete one revolution. Ask them how long one revolution of the Earth takes (365 days or one year). Ask the “planets how long it takes them to rotate. Also ask them how long it takes the real Earth to rotate (1 day)

2. Have a pair of students pretend to be the Earth and the Moon. Have the “Earth”

stand still and rotate, and the “Moon” revolves around the Earth. Explain to the class that these two motions happen as the entire Earth-Moon system revolves around the Sun.

3. Ask the class if the Earth and Moon “shine” by themselves (no). Ask the students where the light comes from (the Sun). State that the light starts from the Sun, bounces off (is reflected) from the Moon and then we see it on Earth. It may look like the Moon has its own light, but it does not.

4. Using the inflatable globes, show students that the Earth does not rotate straight up and down, but that its rotational axis is tilted at an angle away from the Sun. The actual tilt averages about 23.5° . Designate a spot in a clear part of the classroom as the Sun. Tell the students that when you say “revolution” they should start walking around the Sun. When you say “rotation”, they should start to turn around on their axes. This can be a fun game. Continue until the students get it right. This may take a while!

5. As the students are rotating on their axes, make sure they realize that when they are facing the flashlights (the Sun) it is day, and when they are facing away it is night.

6. Make sure that your students understand that rotation and revolution are going on at the same time. Some students may have difficulty doing both activities simultaneously. You may wish to have a student with good motor skills demonstrate them to the class. Tell the students that everything in the Universe is moving: the Earth, the Moon, the planets, the Sun, and even entire galaxies. The one thing all the parts of the Universe have in common is that they are moving. Your students are moving with the Earth as you talk!

UNIVERSE CYCLE - SOLAR SYSTEM (K)

POST LAB

OBJECTIVES:

1. Exploring the Solar System.
2. Dramatizing an adventure in space.

VOCABULARY:

planets
solar system

MATERIALS:

The Planets in our Solar System by F.M.
Branley
Internet

BACKGROUND:

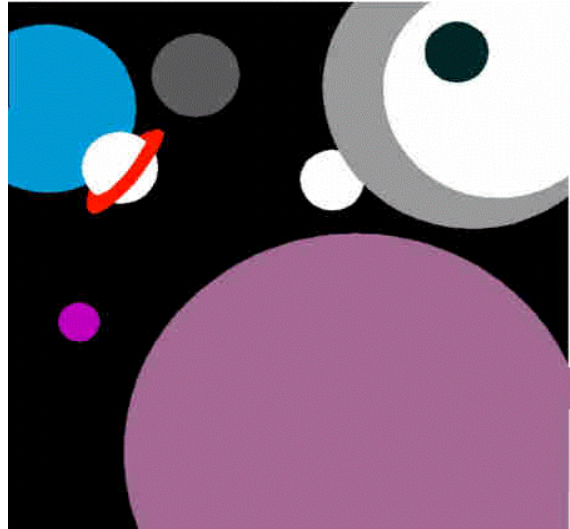
Information on the planets increases every year. Not only is the United States exploring space, but many other countries are investigating the planets of our Solar System. Books that have been published in the past may contain erroneous or out-of-date information because of this new research. However, these books may still be useful for their ability to reach younger children, as long as you correct their mistakes. The Internet can help you update your lessons, and provide spectacular pictures of the planets and the other components of the Universe. Combining the information gained from the Internet and the use of children's books only enhances what your students will learn.

PROCEDURE:

1. Read *The Planets in our Solar System* to your students. The book contains a number of activities that you might want to do with your students. They will enhance their understanding of the different planets.

2. If you have classroom internet access, you may want to show the students the internet sites listed below. Tell the students that new information on the planets comes from many satellites and space probes that scientists launch into space. These space probes take a long time to get to the planets. When they get there, they send back pictures and information on the rocks, atmosphere, and other characteristics of the planet. This information may change what we know about the planet, often making us understand

Students listen to a story about planets and work on the Internet.



it better.

The following sites can be used to update information for yourself and to show students a place to go to get new 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://opposite.stsci.edu/pubinfo/Anim.html>

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

<http://seds.lpl.arizona.edu/nineplanets/nineplanets.html/>

Collection of information on the nine planets. Also contains links to music and the planets. Audio files that you can download.