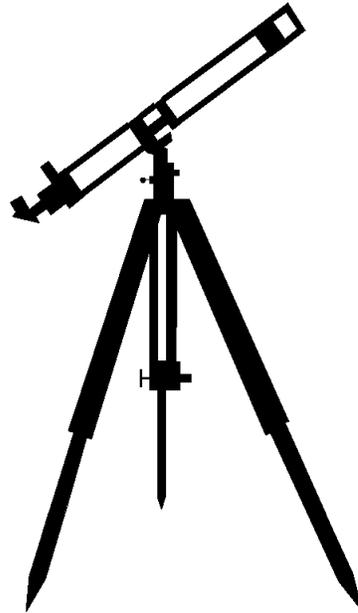




Universe Cycle
The Search for Our Beginnings



SECOND GRADE
UNIVERSE



1 WEEK
LESSON PLANS AND
ACTIVITIES

UNIVERSE CYCLE OVERVIEW OF SECOND GRADE

UNIVERSE

WEEK 1.

PRE: *Discovering stars.*

LAB: *Analyzing the geometric pattern of constellations.*

POST: *Exploring myths about the constellations.*

SOLAR SYSTEM

WEEK 2.

PRE: *Comparing the 9 planets of our Solar System.*

LAB: *Comparing the distance between planets.*

POST: *Exploring terrestrial and gas planets.*

EARTH

WEEK 3.

PRE: *Comparing the Earth and the Moon.*

LAB: *Exploring the characteristics of the Earth's surface.*

POST: *Exploring the features of the Moon.*

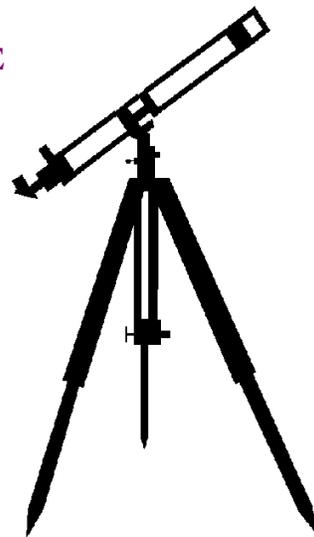
GEOGRAPHY

WEEK 4.

PRE: *Contrasting different types of maps.*

LAB: *Exploring longitude and latitude.*

POST: *Comparing maps and globes.*



UNIVERSE CYCLE - UNIVERSE (2)

PRE LAB

Students identify Orion and Ursa Major.

OBJECTIVES:

1. Discovering stars.
2. Identifying and comparing constellations.

VOCABULARY:

constellation
galaxy
light year
nebula
star
universe



MATERIALS:

Celestial Globe Model
The Big Dipper by F. Branley (Harper)
Glow in the Dark Night Sky Book by C. Hatckett (Random)

BACKGROUND:

The Universe is a vast space of unknown dimensions. The Milky Way is our address in the Universe. Our Sun is only one small component amongst the other billions of stars in our galaxy, the Milky Way. The Solar System is a group of 9 planets that revolve around the Sun.

We see objects in the night sky because they are either generating or reflecting light. While these objects also shine or reflect light during the day, we generally cannot see them because they are much dimmer than the bright light emitted by the nearby Sun.

Most of the light we see at night comes from within our own galaxy, the Milky Way. Some points of light, however, are from other galaxies or nebulas, which are glowing clouds of gas within our galaxy.

Most of the stars and galaxies we see at night are very far away. This is difficult for humans to comprehend. We do not even measure the distance in kilometers; instead, we use light years. Light travels about 300,000 km per second, faster than anything we know.

A light year is the distance light can travel in one year, an almost unimaginable number. Multiply the number of seconds in one year (31,557,000) times 300,000 km/yr. This results in a distance of 9,467,100,000,000 km per year, or about 9.5 quadrillion kilometers/year.

When ancient people looked in the night sky, they noticed groups of stars which

formed images of animals, gods, and heroes. In the silence and darkness, ancient humans started to tell stories to one another for entertainment. The students will look at two constellations in the lab: Orion and the Big Dipper.

Orion was a hunter who was killed by a giant scorpion. He was placed in the sky but was still chased by the scorpion, which is found in a constellation (Scorpio) on the other side of the sky. When Orion is visible, the scorpion is below the horizon. When the scorpion rises, Orion sets, so that they are never visible at the same time. The Big Dipper is actually part of the Ursa Major (Big Bear) constellation, and represents a cup with a long handle.

These points of light in the sky, and the shapes they represented, were also important for traveling at night and for determining the time of the year. The constellations, as they are now called, helped to guide the early people in many ways.

The constellations are groupings of points of light, as seen from the Earth. Some of the points of light may represent far away galaxies, but the majority represent individual stars. There are 88 constellations that have been part of a historical written record. There are many other cultures who had terms for patterns of light, but unfortunately their record was not passed on through generations like the European/North African stories. These constellations will help students orient themselves in the nighttime sky.

PROCEDURE:

1. Show students a celestial globe or a picture of the night sky. In the celestial globe the Earth is in the center. Tell students that if they are standing on the Earth and looking up they will see the stars on the other clear globe. If you are standing in the United States the stars you see in the sky are different than if you are standing on Australia. There is many directions to the Universe, depending on where you are looking.



2. Tell the students that we cannot see all the points of light of the night sky that are shown in many books (as shown the *Glow in the Dark Night Sky Book*) because of city lights and haze. Ask the students to name things that they may see in the night sky (moon, stars, satellites, planets, and galaxies). Explain that only stars and galaxies shine, or emit light; the other sky objects all reflect light.

3. You may want to ask students, how fast does light travel? They may never have thought about this question before. Switch the light on and off and ask them how long it takes the light to move from the bulb to the ground. Students won't be able to time such an event. Explain the speed of light and light years. You may want to compare the speed

of light with the speed of a car on the freeway which is about 80 km per hour or 1.33 km per minute or .02 km per second. Light is fast!

4. Ask the students which objects make their own light. Stars generate light because they are giving off energy. Ask them which star is closest to us. If they do not know, explain that it is our own Sun. Tell them that stars are like our Sun, but very far away. Show pictures of different types of stars, and say that our Sun is only a medium size star.

5. Explain that patterns of stars are called constellations, and that there are stories about some of these groups. Astronomers now use 88 constellations to help divide the Universe into areas. Scientists use these to help locate components in that sector. So the term constellations can mean a historical grouping of stars with stories and myths associated with them, or as a way to locate an area on a Celestial Globe.

6. Have the students read, "The Big Dipper."

UNIVERSE CYCLE - UNIVERSE (2)

LAB

Students make a constellation telescope.

OBJECTIVES:

1. Comparing and contrasting constellations.
2. Analyzing the geometric patterns of constellations.

VOCABULARY:

constellation
galaxy
star

MATERIALS

Constellation tubes (students make)
Inflatable Celestial Globes



BACKGROUND:

Recognizing the constellations in the night sky usually requires one person pointing out the geometric configuration to another. Few people can see all the constellations because they cannot find some of the key stars. For example, the key star group in Orion is to locate the three stars of Orion's belt. For the Big Dipper (part of the Ursa Major constellation), the four points of the bucket help locate it in the sky.

Students should understand that constellations are not scientific groupings, but are a way astronomers can locate celestial objects from Earth. Not all the points of light in constellations are stars; some are far away galaxies.

Describe galaxies as a big bunch of stars. The Milky Way is the galaxy that we are in and contains all the stars we can see. The faint streak across the night sky (a purple streak on the Inflatable Celestial Globes) is caused by looking into the center of the Milky Way.

PROCEDURE:

1. This activity concentrates on two constellations in the night sky, Orion and the Big Dipper. These two constellations were chosen because they are visible in the night sky if you are doing these labs in the later part of the school year. Note that the Big Dipper is not a constellation, but part of the Ursa Major constellation, as shown on the dot to dot exercise. Increasing students geometric recognition of patterns can help them see the

patterns in the night sky. However, the night sky is not available during the day so you need to make Constellation Tubes, which bring the night sky to the classroom.

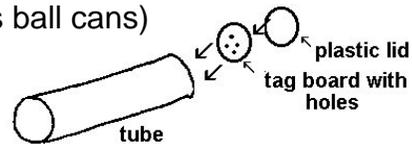
Direct students to complete the dot to dot exercise on Orion and Ursa Major. This will guide them to see the objects in the constellation tubes.

2. The instructions below guide you in making Constellation Tubes with the students.

CONSTELLATION STATIONARY TUBE

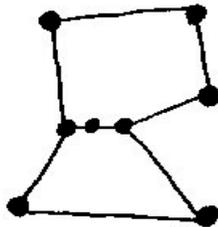
MATERIALS:

long cans with plastic lids (e.g., potato chip or tennis ball cans)
matte black paint (optional)
tag board
margarine tub with lid

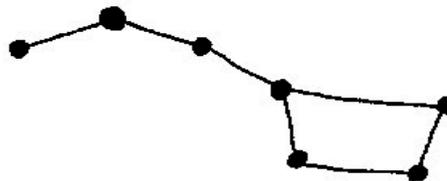


Cut both ends of the can, making a tube that you can look through. Paint the tube inside and out with matte black spray paint. Cut circles the size of the ends of the tube from the black tag board or heavy cardboard. The plastic lid should be used to keep the cardboard in place.

Punch holes to create the constellations Orion and Big Dipper(Ursa Major) as shown below.



Orion



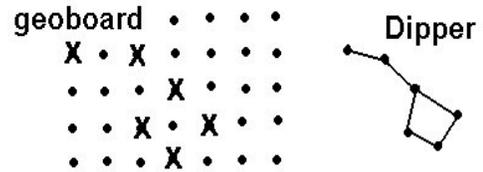
Big Dipper
(Ursa Major)

Note that you can make any constellation by punching different patterns in the tag board.

Assemble the materials together as shown above. You have now made a child's telescope of the constellations.

3. Let children look into the open end of the Constellation Tube, and point the end with the tag board circles towards a window or light. They should see the star pattern in their "telescope".

4. Give the students either a paper "geoboard" (see enclosed master) or real geoboards. Have the students trace the patterns of the stars onto paper or the geoboards in the correct geometric relationship. You may want to demonstrate how to trace objects by putting 2 dots on the board and tell the students to copy them, as shown in the diagram to the right. Tell the students to make sure they place the dots in a similar pattern. Add a third dot and have them place the dot position on their paper. Again make sure they see the position. Give them only the two templates of Orion and the Big Dipper. You may want to add other templates but do not give them too many at a time. The goal is for them to be able to recognize Orion and the Big Dipper in the night sky. Please remember this only works in the Northern Hemisphere.



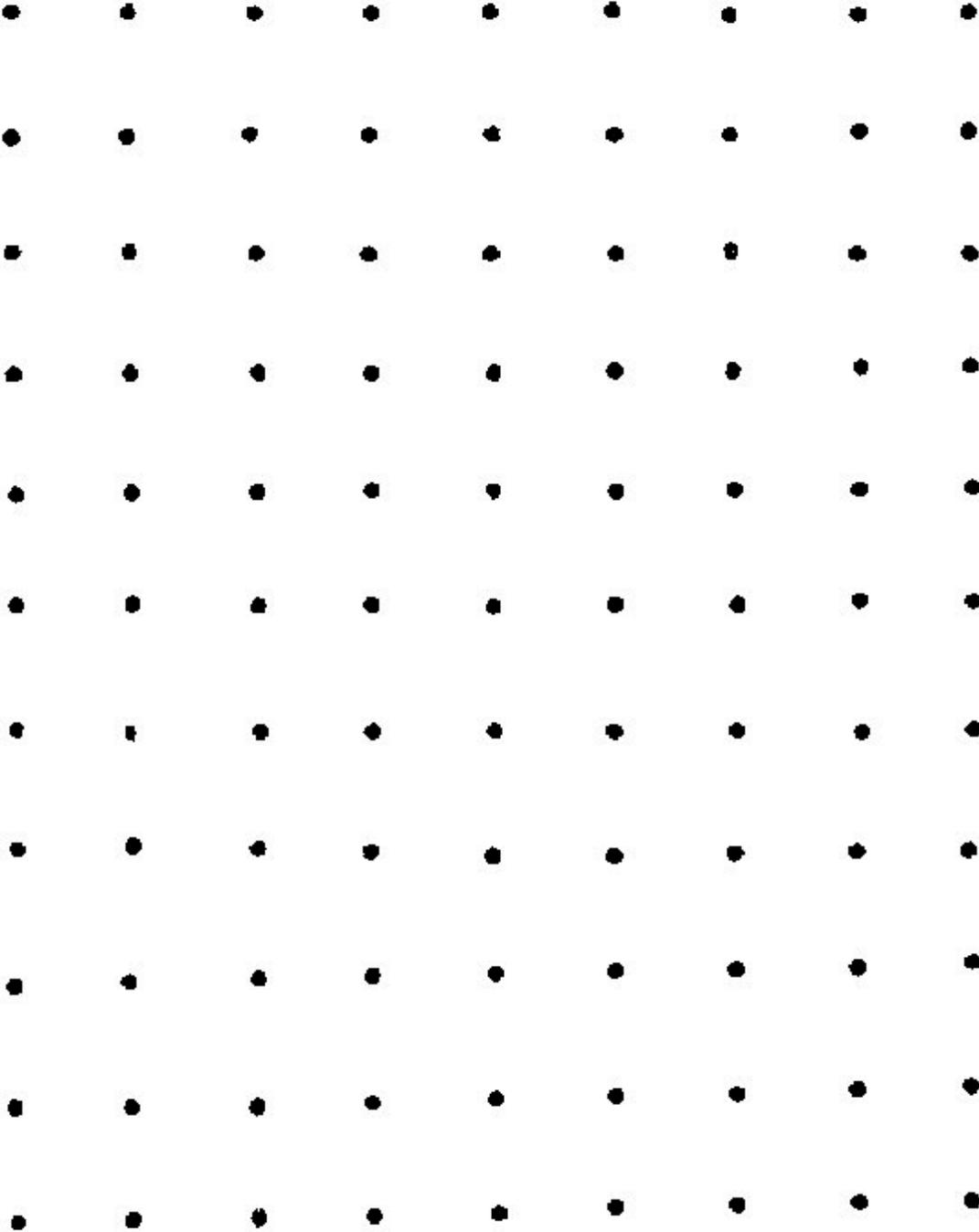
UNIVERSE CYCLE - UNIVERSE (2) LAB

BIG DIPPER(within the URSA MAJOR)



UNIVERSE CYCLE - UNIVERSE (2) LAB

GEOBOARD



UNIVERSE CYCLE - UNIVERSE (2)

POST LAB

Students write a paragraph on one of the constellations.

OBJECTIVE:

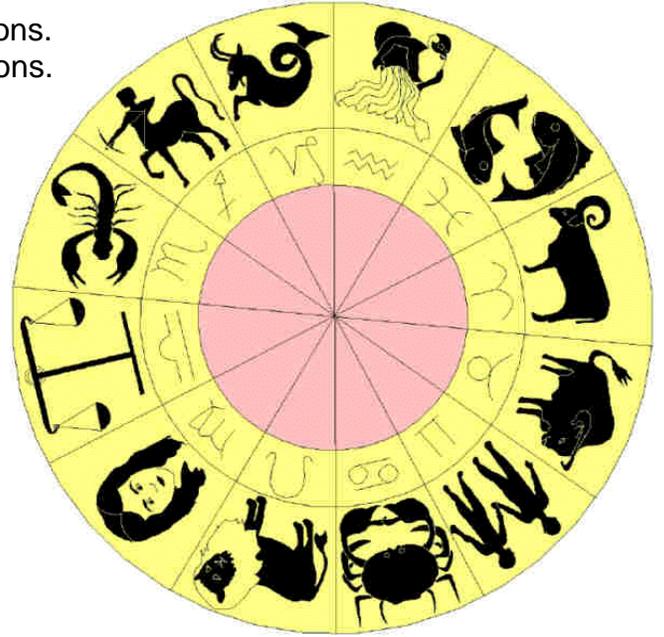
1. Exploring myths about the constellations.
2. Finding information on the constellations.

VOCABULARY:

constellation
myths

MATERIALS:

paper and pencil
Internet
Glow in the Dark Night Sky Book
worksheet



BACKGROUND:

Constellations are groupings of stars and galaxies that we see from Earth. Remember that constellations are apparent associations of celestial objects that are many light years away. Many of these objects themselves are very far from each other.

The zodiac is an imaginary belt in the heavens, usually between 18 degrees of the celestial equator, that encompasses the apparent paths of the principal planets of the Solar System, except for Pluto. Within this belt there are 12 constellations that are referred to as the Constellations of the Zodiac. They are used when we talk about the astrological sign we were born under. For example, if you are born at the end of January to mid February, your sign is Aquarius, the water bearer.

The list of the 88 constellations is fun to review. These constellations are used to divide the heavens into units which help us locate other objects. It also tells something of the ancient peoples who looked up into the night time sky. In order to see animals such as elephants and lions in the sky, these animals must have been common in everyday life. The stories behind the constellations were created by “story tellers” within tribes of people.

LIST OF THE 88 CONSTELLATIONS

ANDROMEDA (Princess)	LEO (Lion)
ANTLIA (Air Pump)	LEO MINOR (Little Lion)
APUS (Bird of Paradise)	LEPUS (Hare)
AQUARIUS (Water Bearer)	LIBRA (Balance)
AQUILA (Eagle)	LUPUS (Wolf)
ARA (Altar)	LYNX (Bobcat)
ARIES (Ram)	LYRA (Harp)
AURIGA (Charioteer)	MENSA (Table Mt.)
BOOTES (Herdsman)	MICROSCOPIUM (Microscope)
CAMELOPARDALIS (Giraffe)	MONOCEROS (Unicorn)
CANCER (Crab)	MUSCA (Fly)
CANES VENATICI (Hunting Dog)	NORMA (Level)
CANIS MAJOR (Big Dog)	OCTANS (Octant)
CANIS MINOR (Little Dog)	OPHIUCHUS (Serpent Holder)
CAPRICORNUS (Sea Goat)	ORION (Hunter)
CARINA (Keel of Ship)	PEGASUS (Winged Horse)
CASSIOPEIA (Queen)	PAVO (Peacock)
CENTARUS (Centaur)	PERSEUS (Perseus)
CEPHEUS (King)	PHOENIX (Legendary Bird)
CETUS (Whale)	PICTOR (Easel)
CHAMAELEON (Chameleon)	PISCES (Fishes)
CIRCINUS (Compass)	PISCIS AUSTR. (Southern fish)
COELUM (Graving Tool)	PUPPIS (Stern of Ship)
COLUMBA (Dove)	PYXIS (Compass of ship)
COMA ABERENIES (Bernice's Hair)	RETICULUM (Net)
CORONA AUSTR. (Southern Crown)	SAGITTA (Arrow)
CORONA BOREALIS (Northern Crown)	SAGITTARIUS (Archer)
CORVUS (Crow)	SCORPIUS (Scorpion)
CRATER (Cup)	SCULPTOR (Sculptor's tools)
CRUX (Southern Cross)	SCUTUM (Shield)
CYGNUS (Swan)	SERPENS (Serpent)
DELPHINUS (Dolphin)	SEXTANS (Sextant)
DORADO (Swordfish)	TAURUS (Bull)
DRACO (Dragon)	TELESCOPIUM (Telescope)
EQUULEUS (Horse)	TRIANGULUM (Triangle)
ERIDANUS (Po River)	TRIANGULUM AUS. So. (triangle)
FORNAX (Furnace)	TUSCANA (Toucan)
GEMINI (Twins)	URSA MAJOR (Big Bear)
GRUS (Crane)	URSA MINOR (Little Bear)
HERCULES (Hercules)	VELA (Sail of Ship)
HORROLOGIUM (Clock)	VIRGO (Virgin)
HYDRA (Sea Serpent)	VOLANS (Flying Fish)
HYDRUS (Water Snake)	VULPECULA (Fox)
INDUS (Indian)	
LACERTA (Lizard)	

PROCEDURE:

1. Remind students that constellations are groups of stars that form a pattern. Early people would look into the night sky and wonder what was in "outer space." They developed stories on the groups of stars. Astronomers use 88 constellations to divide up the heavens.

2. Give each student one of the constellations and have them imagine what the constellation may look like in the sky. Instruct students to write a paragraph on why that constellation may named.

You may want to use the worksheet to concentrate on one constellation.

3. In the *Glow in the Dark Night Sky Book*, have the students find what their constellation actually looks like and see if they were correct.

4. If you have an Internet connection, you may wish to instruct the students to find their constellation on the Internet. The following sites may help students find the constellation pattern that we should see on Earth.

<http://www.lhl.lib.mo.us/pubserv/hos/stars/welcome.htm>

The Golden Age of the Celestial Atlas. An excellent site. Historical pictures of different astronomers view of the celestial skies.

<http://www.nationalgeographic.com/features/97/stars/>

National Geographic site which includes star charts of the nighttime sky.

<http://www.astro.wisc.edu/~dolan/constellations/>

The constellations and their stars. Includes interactive sky charts and pictures of stars and galaxies.

