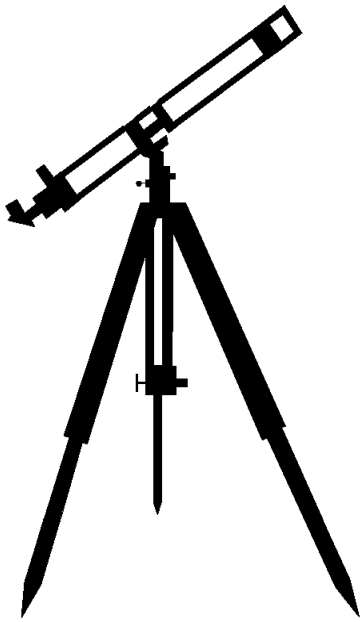
Universe Cycle

The Search for Our Beginnings

FOURTH GRADE

WORKBOOK



student _____

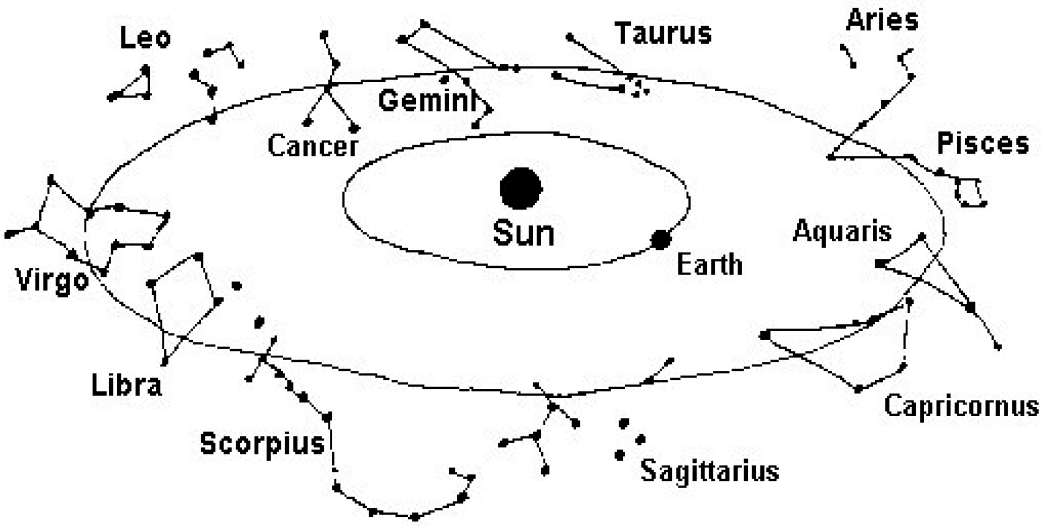
UNIVERSE CYCLE - UNIVERSE (4)
PRE LAB

LIST OF THE 88 CONSTELLATIONS

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

UNIVERSE CYCLE - UNIVERSE (4)
PRE LAB

1. See if you can find the constellations on the picture below, on the Constellation placemat.



2. An association or group of stars is called a constellation. Why do you think ancient people created constellations?

_____
_____
_____
_____

3. Find out the date of each zodiac sign by asking your classmates what their "signs" are. Match this with their birthdays. Record the information below.

_____
_____
_____
_____
_____
_____
_____
_____
_____

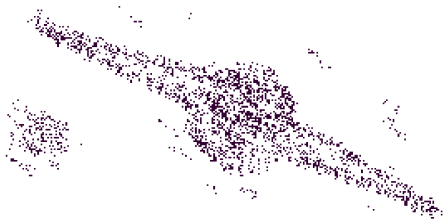
UNIVERSE CYCLE - UNIVERSE (4)
LAB

PROBLEM: How are galaxies classified?

PREDICTION: _____

PROCEDURE:
Part I. Answer the following questions:
1. Galaxies are a group of_____.
2. The galaxies stay together because _____.
3. Galaxies are part of the _____.

Part II. Label the following diagram using the terms stars, arms, dust, and nucleus



Part III. On the following pages there are actual pictures of different galaxies. Group the pictures using the classification explained by your teacher. Cut the pictures out, paste them into their groupings, and label them. In the space below, draw and/or describe the characteristics of each group.

galaxy	list the pictures that belong in group; sketch a general picture of the group
ellipsoidal galaxy	
spiral galaxy- barred	
spiral galaxy - normal	
irregular galaxy	

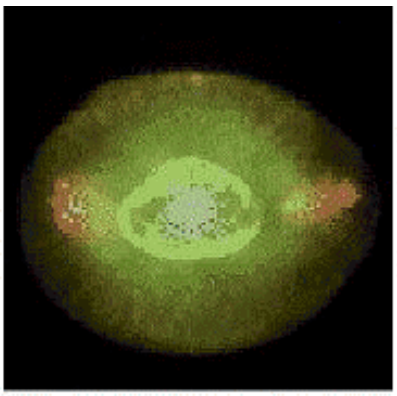
Do you see any relationship between the shape of the galaxies and how they may have evolved? Look closely at the shapes._____
_____
Look on a celestial globe. How can you identify a galaxy from a star?
_____

CONCLUSION: Do all the pictures of galaxies fit into defined groups or do you think the classification of galaxies is nebula (not clear)!
_____

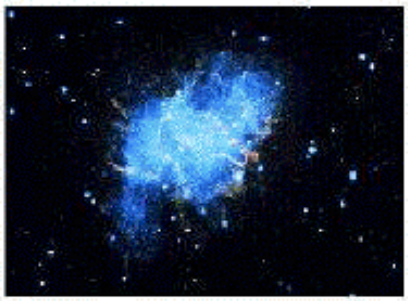
UNIVERSE CYCLE - UNIVERSE (4)
LAB

A

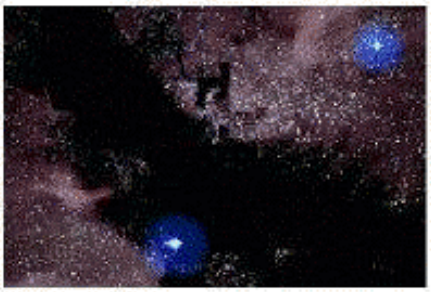
B



C



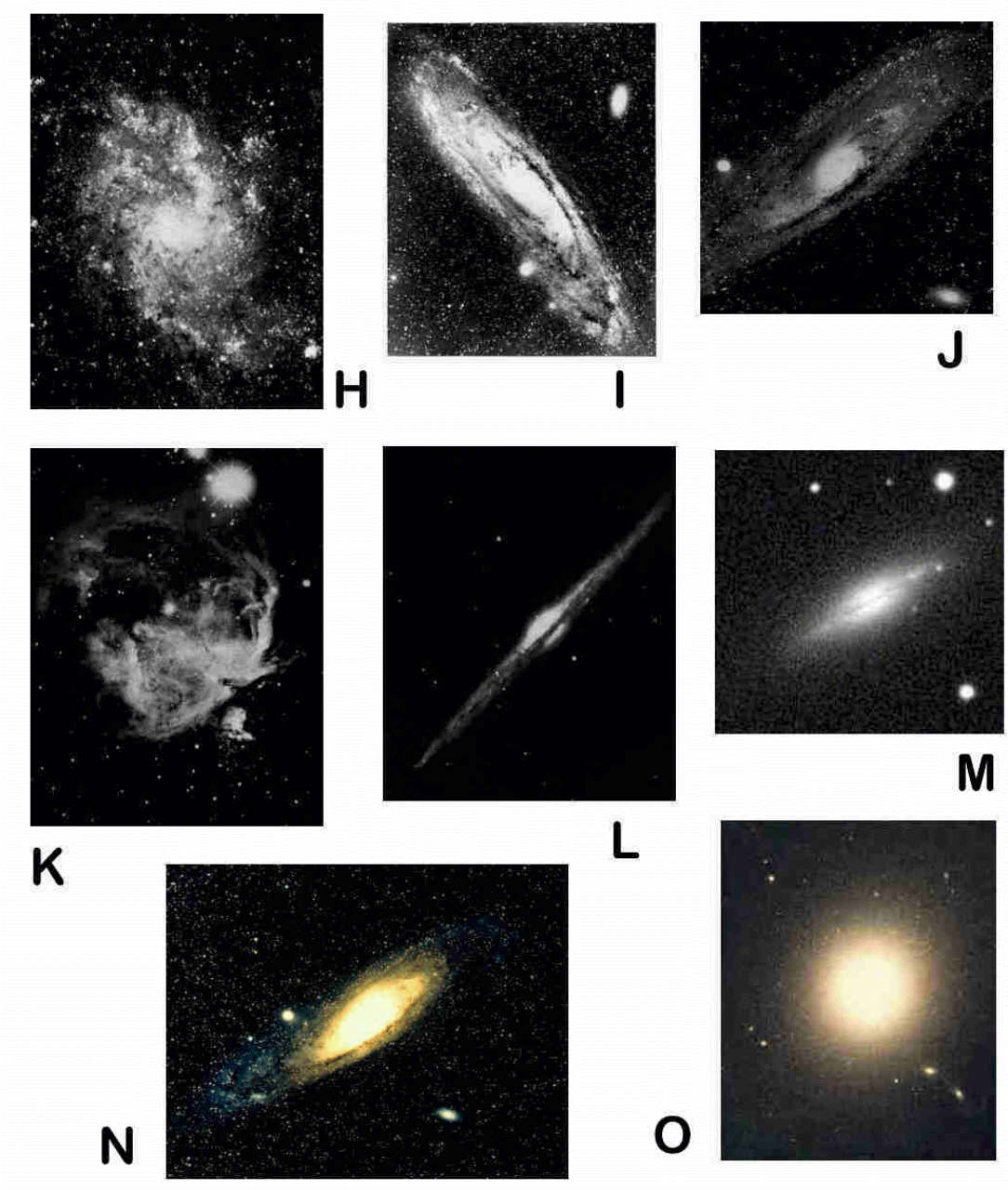
D



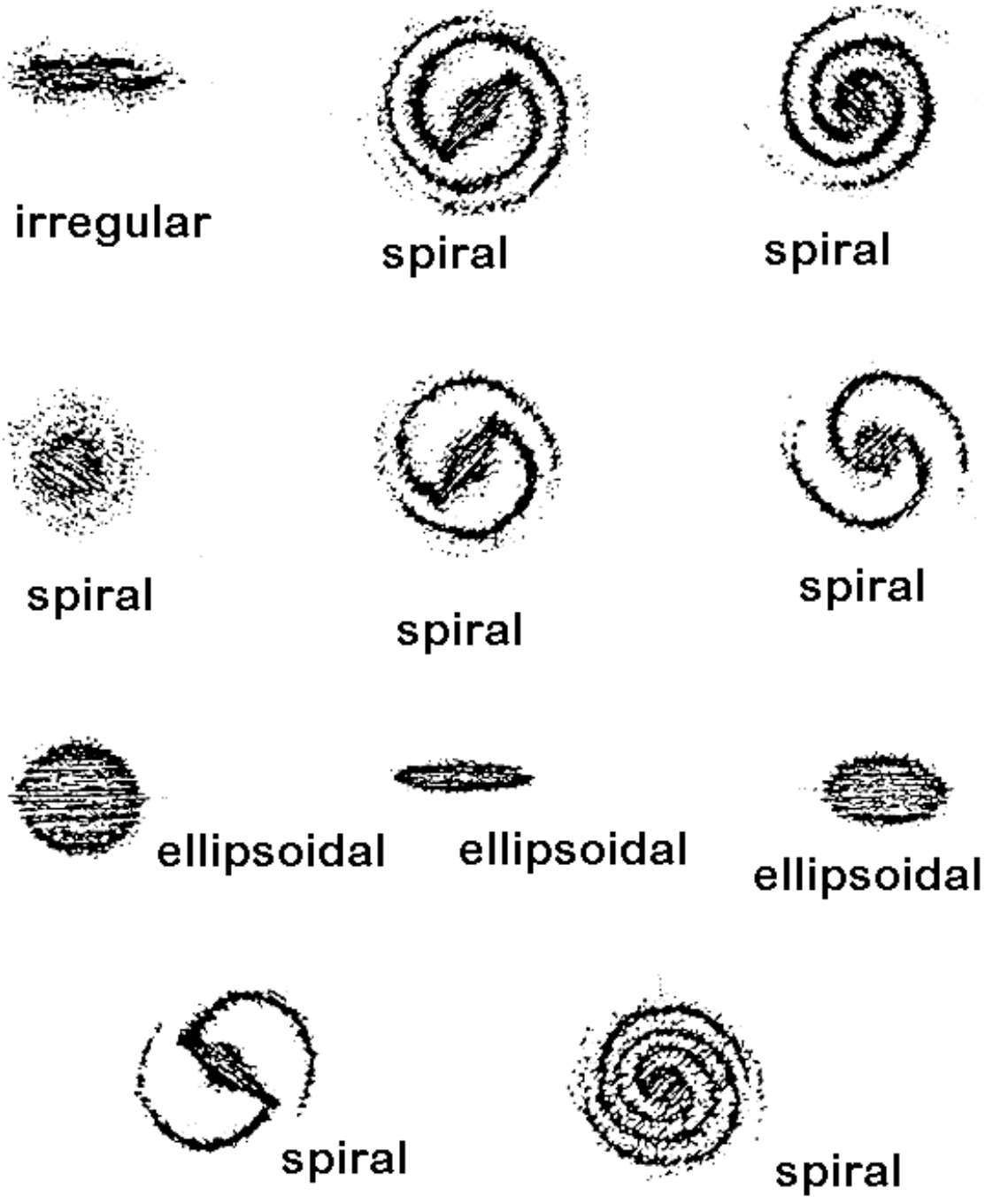
E

F

G


H
I
J
K
L
M
N
O

EVOLUTION OF GALAXIES



UNIVERSE CYCLE - SOLAR SYSTEM (4)
PRE LAB

MEASURING RELATIVE DISTANCE OF THE PLANETS FROM THE SUN

1. The planets are millions of miles from the Sun. It would be impossible to make a real model of these distances. Instead, you will make a relative scale model. The model will use much smaller distances than in the real Solar System, but the spacing of the planets from the Sun will be the same. For example, Saturn will still be about twice as far from the Sun as Jupiter.

The table below shows information on how far the planets are from the Sun. Can you figure out what relative scale to use to make your model fit on one or two pages? Write the scale that you want to use in the space below.

2. The scale used is _____ cm for every _____ km.

Planet	Distance from the Sun	Your Scale
MERCURY	0.0579×10^9 km	
VENUS	0.1082×10^9 km	
EARTH	0.1496×10^9 km	
MARS	0.2279×10^9 km	
JUPITER	0.7783×10^9 km	
SATURN	1.427×10^9 km	
URANUS	2.87×10^9 km	
NEPTUNE	4.497×10^9 km	
PLUTO	5.9×10^9 km	

3. Use two sheets of paper, or the back of this paper to draw your relative scale. The Sun will be at 0. Make a mark where each planet occurs, and label it.

UNIVERSE CYCLE - SOLAR SYSTEM (4)
LAB

PROBLEM: How do craters form on the surface of a planets or moon?
PREDICTION: _____

EXERCISE 1:

MATERIALS: pan, flour, spoon, measuring stick

PROCEDURE: Put flour in a pan, making a layer 4 to 5 centimeters deep. Level the top of the flour layer. Take your pan outside, or if you work inside, put the pan on top of a sheet of newspaper. Stand on a sturdy chair, so your hand can be about 1 meter above the pan. Drop a leveled spoonful of flour into the pan. You and your partners should do one "drop" each. Look at the flour in the pan. Describe and draw the crater that you have created.

Describe the shape and size of the crater you have created.

_____

_____

Draw the crater you made in the box below.

EXERCISE II:

MATERIALS: 4 photographs of the Moon, magnifying glass

PROCEDURE: Look at the photos of Moon with the magnifying glass. Please be careful, these are the actual photos, and difficult to replace. In the space below, record the types of features you see; the number of craters in each picture, and if the crater resembles your flour craters. State if you think the crater is an impact crater or a mare.

PHOTO NUMBER	# OF CRATERS	DESCRIBE THE LANDSCAPE	MARE OR IMPACT

CONCLUSION: Is it difficult to determine the nature of craters? Explain your answer.

_____

_____

_____

UNIVERSE CYCLE - SOLAR SYSTEM (4)
POST LAB

CRITIQUE THE FOLLOWING BOOKS AND WEB SITES ON THE PLANETS

List the books or web sites. Summarize in one sentence each of these books or web sites.

1. Information obtained from:_____
_____
_____

2. Information obtained from:_____
_____
_____

3. Information obtained from:_____
_____
_____

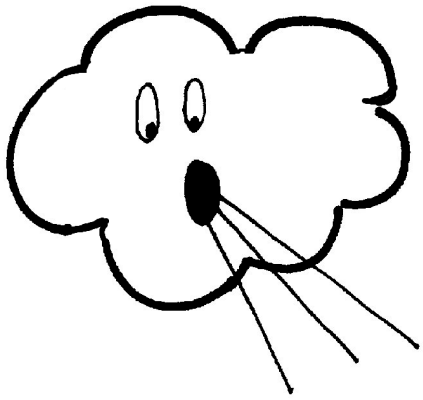
4. Information obtained from:_____
_____
_____

Use the data chart below to help critique the books.

NAME OF BOOK/WEB	SCIENTIFIC CORRECTNESS	PICTURES	CONTENT

UNIVERSE CYCLE - EARTH (4)
PRE LAB

1. In the space below, draw the movement of a sand particle by saltation.



2. Draw a sand dune in the space below. Show the direction the wind blows, and cross-beds.

3. If the wind is not blowing, could sand dunes form? Explain your answer.

_____
_____
_____

4. Can sand dunes form on the Moon? Explain your answer.

_____
_____
_____

UNIVERSE CYCLE - EARTH (4)
LAB

PROBLEM: How do the Earth and Moon move in space?

PREDICTION _____

PROCEDURE: Go to the 4 stations and complete the following experiments.

STATION A:

MATERIALS - stretchy substance, revolving styrofoam ball.

1. Experiment with the revolving styrofoam ball. When can you get an elliptical orbit to form? _____
2. When can you get a circular orbit to form?_____
3 What type of orbit does the Moon have around the Earth? Why?

_____

4. What force keeps the Moon and Earth together?_____

STATION B:

MATERIALS - plain styrofoam ball, styrofoam ball with pin

5. Try to roll the plain styrofoam ball. Now try to roll the ball with the pin in it. Draw the path of each below. Why does this happen?

styrofoam ball

styrofoam ball with pin

STATION C:

MATERIALS - 2 styrofoam balls with handles

6. Which one of these models represents the Moon? _____
7. Which model represents the Earth? _____
8. Revolve the Moon ball around the Earth ball while rotating both of them. Have your teacher watch your movements. Have them initial that you have done the revolution and rotation correctly. _____

STATION D.

MATERIALS - Planetarium

9. After what your instructor has taught you about planets and the Earth and the Moon, can you find anything wrong with this model?

_____

_____

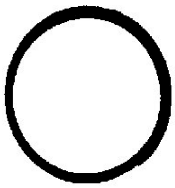
CONCLUSION: Describe how the Earth and Moon move in space with regards to the Sun.

_____

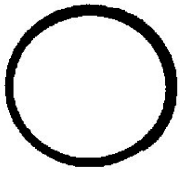
_____

UNIVERSE CYCLE - EARTH (4)
POST LAB

1. DRAW WHAT THE EARTH LOOKS LIKE FROM THE MOON. DRAW A SCENE ON THE EARTH.



2. DRAW WHAT THE MOON LOOKS LIKE FROM THE EARTH. DRAW A SCENE ON THE MOON.



UNIVERSE CYCLE - GEOGRAPHY (4)
LAB

PROBLEM: How do you plot and use data on a map?
PREDICTION:_____
PROCEDURE: Using the maps and soil samples, answer the questions in the following two exercises.

EXERCISE 1: There are many soil types on the Earth. The generalized map of the United States on a following page shows two types of soil pedalfers and pedocal.
1. Define pedalfer, pedocal, and laterite. [Clue: al=aluminum; fe=iron; cal=calcium]
pedalfer _____
pedocal _____
laterite _____
2. Look at the general soil map of the United States. What is the soil type in each of the following areas?

NEW YORK	
CALIFORNIA	
NORTH CAROLINA	
ARIZONA	

EXERCISE 2:
MATERIALS: soil samples, magnifying glass

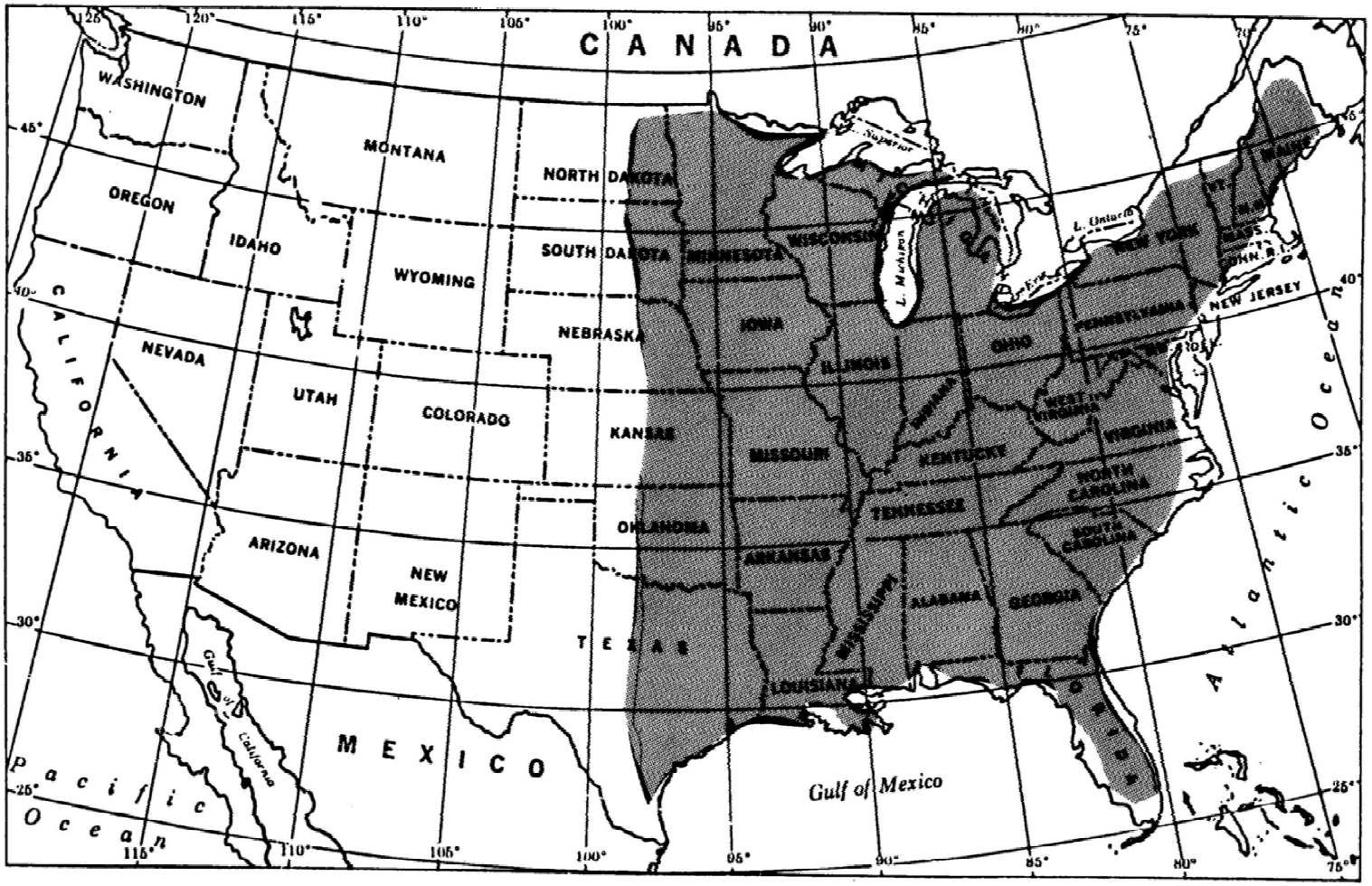
1. Classify each soil sample by color. Call dark soil pedalfers and light soil pedocals. Record the location of each sample, as labeled on the bag.

soil location	pedocal or pedalfer	description

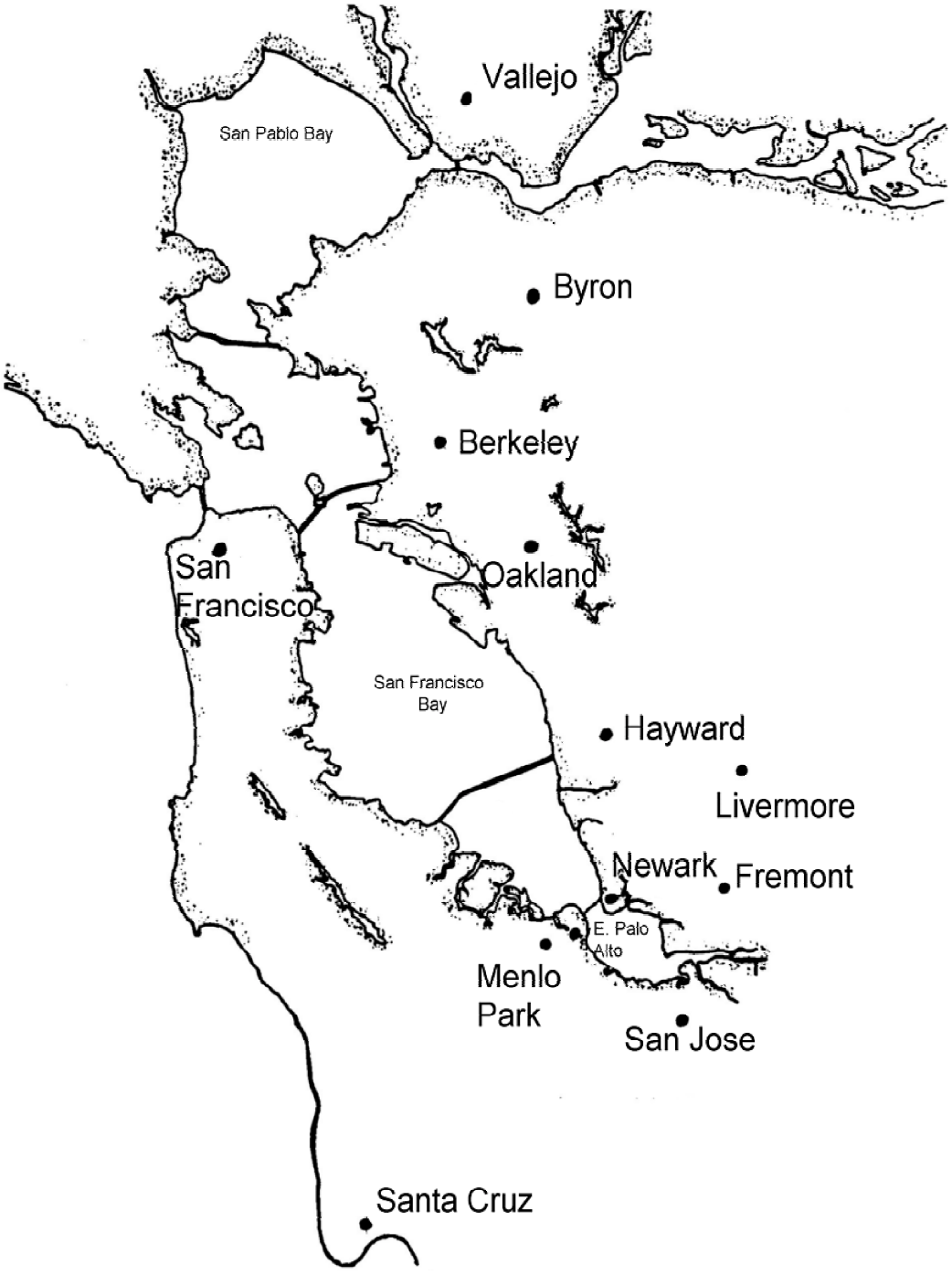
2. Color the pedocal samples blue and the pedalfers red on the detailed map of San Francisco Bay area.

CONCLUSION: Do you see a pattern of pedocals and pedalfers on the San Francisco Bay area map?_____
What is the benefit of a more detailed soil map? Explain your answer
_____

Generalized Map of Soil Types in the United States
Pedocals and Pedalfers Only



Map of Soil Locations
San Francisco Bay Area, California




Caribbean Sea
Netherland Antilles (NL)
Lake Maracaibo
Aruba (NL)
Isla de Margarita (Venezuela)
Trinadad/Tobago
CENTRAL AMERICA
Nicaragua
Gulf of Paria
Costa Rica
Venezuela
Guyana
Pacific Ocean
Panama
Suriname
Gulf of Panama
Colombia
French Guiana (France)
Galapogas Islands (Ecuador)
Atlantic Ocean
Ecuador
Isla Puna
Gulf of Guayaguil
Peru
Brazil
MAP INDEX
Country of South America
Bordering Country
Nation, Region or Territory
Body of Water
Bolivia
Lake Titicaca
Chile
Paraguay
Isla San Ambrosia (Chile)
Isla San Felix (Chile)
SOUTH AMERICAN Continent
South Pacific Ocean
Argentina
Uruguay
Gulf of San Matias
Chile
South Atlantic Ocean
Gulf of San Jorge
Gulf of Penas
Patagonia
Falkland Islands (UK)
South Georgia (UK)
Strait of Magellan
Drake Passage
Scotia Sea