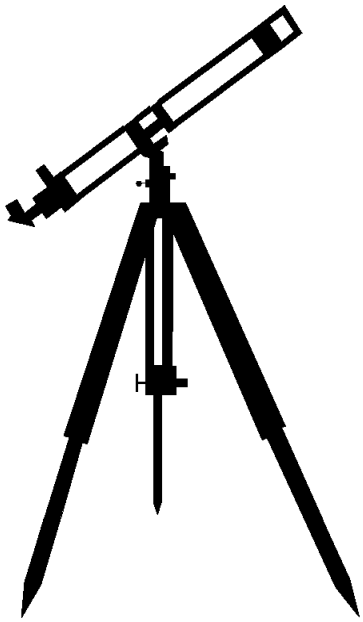
Universe Cycle

The Search for Our Beginnings

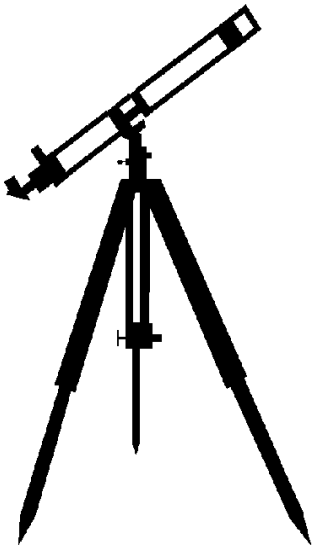
FIFTH GRADE

GEOGRAPHY



1 WEEK
LESSON PLANS AND
ACTIVITIES

UNIVERSE CYCLE
OVERVIEW OF FIFTH GRADE



UNIVERSE

WEEK 1.
PRE: *Comparing components of the Universe.*
LAB: *Exploring how the Universe may have formed.*
POST: *Comparing constellation charts with celestial globes.*

SOLAR SYSTEM

WEEK 2.
PRE: *Comparing and contrasting the features of the planets.*
LAB: *Comparing meteorites to Earth rocks.*
POST: *Discovering the atmosphere on different planets.*

EARTH

WEEK 3.
PRE: *Exploring how planets are formed.*
LAB: *Comparing landforms of the Moon, Mars, and Earth.*
POST: *Discovering influence of ice, rain, and wind.*

GEOGRAPHY

WEEK 4.
PRE: *Exploring how topographic maps are made.*
LAB: *Comparing and contrasting topographic maps.*
POST: *Understanding topographic maps.*

UNIVERSE CYCLE - GEOGRAPHY (5)

PRE LAB

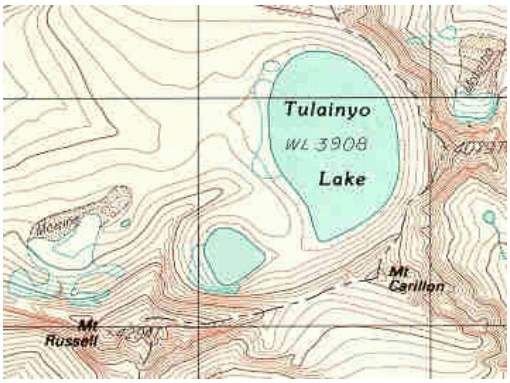
Students construct a contour map using an image maker.

OBJECTIVE:

1. Exploring contours.
2. Discovering how topographic maps are made.

VOCABULARY:

contour
map
topography



Part of a topographic map of the Sierra Nevada Mountains, California

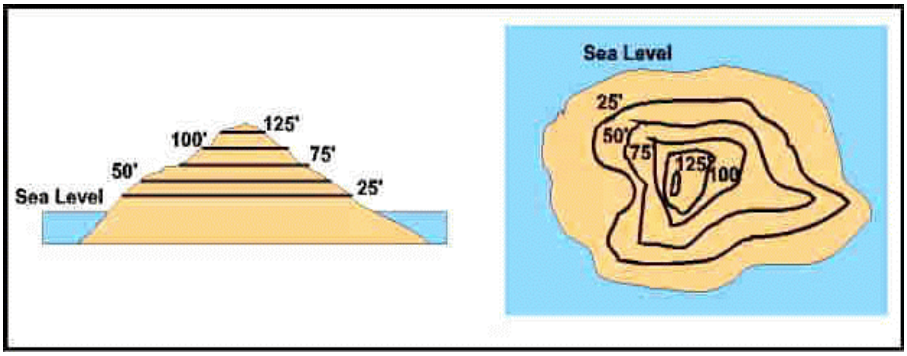
MATERIALS:

Image Maker
wax paper
wax pencil

BACKGROUND:

A map is a flat sheet of paper, but the surface of the Earth is not flat at all. Maps are two-dimensional, while the Earth's surface is three-dimensional. Maps use contour to show elevation above sea level. Maps with contours are called topographic maps.

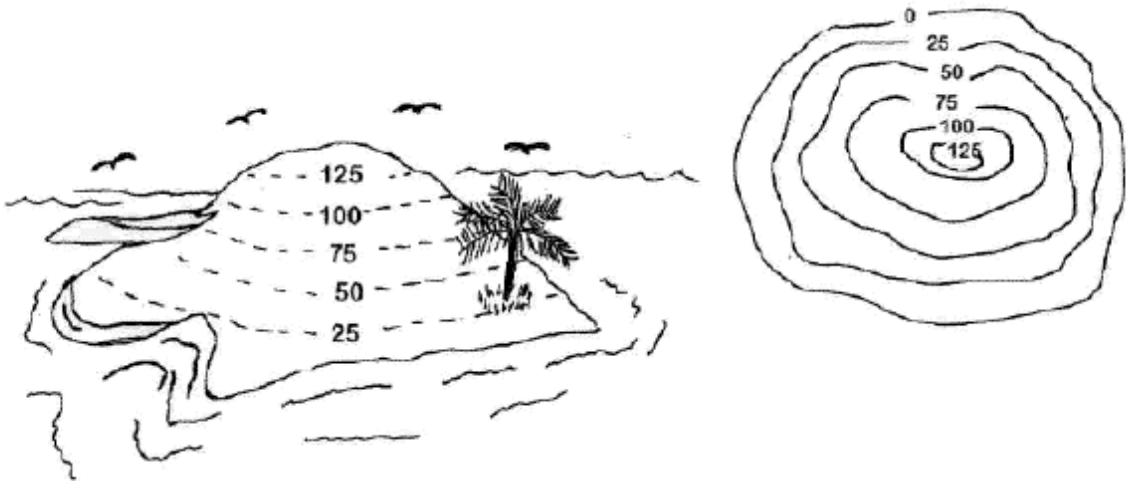
To help visualize how the shape of the surface is shown on a map, visualize an island in the ocean. The island is surrounded by water, and the line around the island where the water touches it is all at the same elevation or sea level. Next imagine a line 25 feet above sea level that goes all around the island. This line of constant elevation is called a contour line. It also shows the shape of the land at that level. The 0 contour would be the shore line.



Contour lines on a make believe island. Sea level is the 0' contour.

On a topographic map, the vertical distance between contour lines, called the contour interval, stays the same. For the island example, the next contour line after the 25 foot line would be at 50 feet. This line would be created by connecting all the points 50 feet above sea level. If the island were 130 feet tall, 75, 100 and 125 foot contour lines would also be needed. The 125 foot contour line will probably be almost a circle and very small because there is only 5 feet of island left above it. This tells you that anything inside a closed contour line is higher than the elevation of that line, and anything outside is lower.

The meaning of contour lines on topographic maps is a difficult concept to convey to students. Some students with an eye for form will have no difficulty, but the majority of students will have problems. A good way to introduce the concept of contours is for the students to figure out on their own how to make a 2 dimensional representation from a 3 dimensional object.



PROCEDURE:

1. Explain the concept and purpose of topographic maps to the students. You may wish to use the island example and drawing above.

2. Introduce the image maker to students. Make sure you go over the precautions because once the students can "play" with it, they will. The precautions include:

*The pins are blunted for safety, but never make an image of your face with your eyes open.

* Never force the pins.

* Keep out of reach of small children.

* Never grab the product while someone is using it.

3. Tell students they are going to construct try and figure out a system to make a three dimensional object into a map.

4. Set up the image maker, by putting an object under the Image Maker so it looks

like an island. You can simply crush a piece of paper into an island shape.

5. If you only have one image maker, have the students do this activity throughout the day. Each student should get a piece of wax paper so they can put the wax paper over the imagine. Have a wax pencil available so they can draw their model. Have the students try and see if they can make a map out of the shape. Some students will realize that if you look straight down you can see "contours." The pins that are at the same elevation represent the contours. Make sure the students draw what they see without adding any shading. They must draw a flat representation to accurately show the image in the Image Maker.

6. Have students write their name on their attempt. When they are completed go over them to see if any of them used contours. Discuss some of the various other ways students may have used.

UNIVERSE CYCLE - GEOGRAPHY (5)

LAB

Students compare a series of topographic maps.

OBJECTIVE:

1. Discovering topographic maps.
2. Comparing and contrasting topographic maps.

VOCABULARY:

landscape
map
topography

a flat landscape, contour lines will be far apart

MATERIALS:

road maps of local area
topographic maps of local area (optional)
5 topographic maps per group

BACKGROUND:

A map is a picture or representation of the Earth's surface. Maps show how things are related to each other by distance (both horizontal and vertical), direction, and size. Maps are a way of showing many things about a portion of the Earth's three dimensional surface on a flat piece of paper. This two dimensional representation can be carried and transported easily. A map is not a picture of the Earth's surface. Maps can show many things that pictures cannot show.

Topographic maps contain accurate information about vertical distances, or elevations, on the Earth's surface. As discussed in the Pre Lab, elevations are shown on topographic maps using contour lines. These are imaginary lines of equal elevation. The 0 foot contour line is always sea level. Contour lines are spaced at a regular contour interval, such as 25 feet.

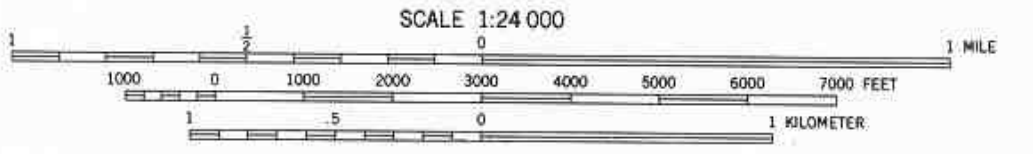
Maps are smaller than the areas they portray: otherwise, they would be useless. Imagine a map of your city that is city-sized!. Distances on maps are thus smaller than the real distances they represent. The relationship between map distance and real distance is called a map's scale. Topographic maps show two scales. A bar scale shows distances graphically.

5 miles

1:100000

Map scales: a bar scale above and a fractional scale below.

Topographic maps also have a fractional scale. This appears on the map as a ratio. This ratio tells how many real measurement units equal one of the same unit on a map. In the example in the diagram, the fractional scale is 1:100000. This means than one inch on the map equals 100,000 inches in the real world. This scale can be used with any measurement, such as inches, centimeters, or feet. The larger this scale is, the more area a map covers. For example, a map scale of 1:24000 covers a few miles: a map scale of 1:1000000 covers many states.



The details of these scales are more than most students can understand. The important point for them to understand is that maps accurately show the real world through mathematical ratios or scales.

PROCEDURE:

This lab can be customized to your local area if you have appropriate topographic maps. You would have to create a new lab sheet, but it would be worth the time. Also, the internet has more and more topographic maps available. This may be a good lab to do with computers.

1. Compare a topographic map with a road map. Explain that a topographic map can show land features (landscape) and elevations (vertical distances), while a road map just shows human-made features and horizontal distances. You may wish to write a chart on the board, comparing topographic and road maps on the board. Here are some suggested differences:

TOPOGRAPHIC MAP	ROAD MAP
waterways landforms parks forest mountains	roads buildings boundaries landmarks street names

2. Go over the topographic symbols with students.

3. Give the students the 5 topographic maps or other maps you might be using. We have enclosed copies of the topographic maps, but they are not at the right scale. We highly suggest you purchase large maps for students to use. Maps can be purchased

through the U.S. Geological Survey (www.usgs.gov under mapping).

Have them compare and contrast the maps, and answer the questions on their worksheets. Don't give them too many hints about how to answer the questions. See if they recognize that although the topography on each of the maps is different, the maps all have the same color and symbols. This will be discussed in the post lab.

ANSWERS using the maps suggested:

1. Mt. Whitney
2. Blue Lake, CA
3. Laguna Beach, CA; Newark, CA, Joshua Tree South, CA, Blue Lake, CA
4. Newark (1:24,000); Bluelake, CA (1:24,000); Superstition Mountain, CA (1:24,000); Laguna Beach, CA (1:24,000), Mount Whitney, CA 1:24,000
5. Laguna Beach, CA [Newark, CA shows San Francisco Bay]
6. Mt. Whitney, CA - 4416.9 meters, or 14494 ft [on Mt. Whitney, CA]
7. Mt. Whitney, CA
8. Newark, CA
9. Mt. Whitney, CA
10. Superstition Mountain, CA (the dotted blue lines mean a creek that is dry most of the time)
11. Blue Lake, CA - the solid green shows forest
12. Laguna Beach, CA
13. Newark (1:24,000) flat, near San Francisco Bay; Bluelake, CA (1:24,000) many trees, lots of creeks, hilly; Superstition Mtn., CA (1:24,000) mountainous in the center, flat toward the north and south, vegetation during wet times; Laguna Beach, CA (1:24,000) near ocean, mountainous land, Mount Whitney, CA 1:62,500, very mountainous (highest in continental United States)

UNIVERSE CYCLE - GEOGRAPHY (5) LAB

PROBLEM: Can a topographic map help us determine the landscape of an area?
PREDICTION:_____
MATERIALS: 5 topographic maps
PROCEDURE: Answer the following questions as you look at the maps on the next several pages.

1. Which map has the highest mountains? _____

2. Which map has the most creeks? _____

3. Which maps shows you details about the roadways?_____

4. List the scale of each map.

_____
_____

5. Which map or maps show oceans? _____

6. What is the highest mountain shown on one of the maps? Give the map name and its name and elevation. _____

7. Which map has the most mountains? _____

8. Which map has the flattest landscape? _____

9. Which one has the most lakes? _____

10. Which one has the driest climate? _____

11. What map has the most forest? _____

12. Which map has the most water? _____

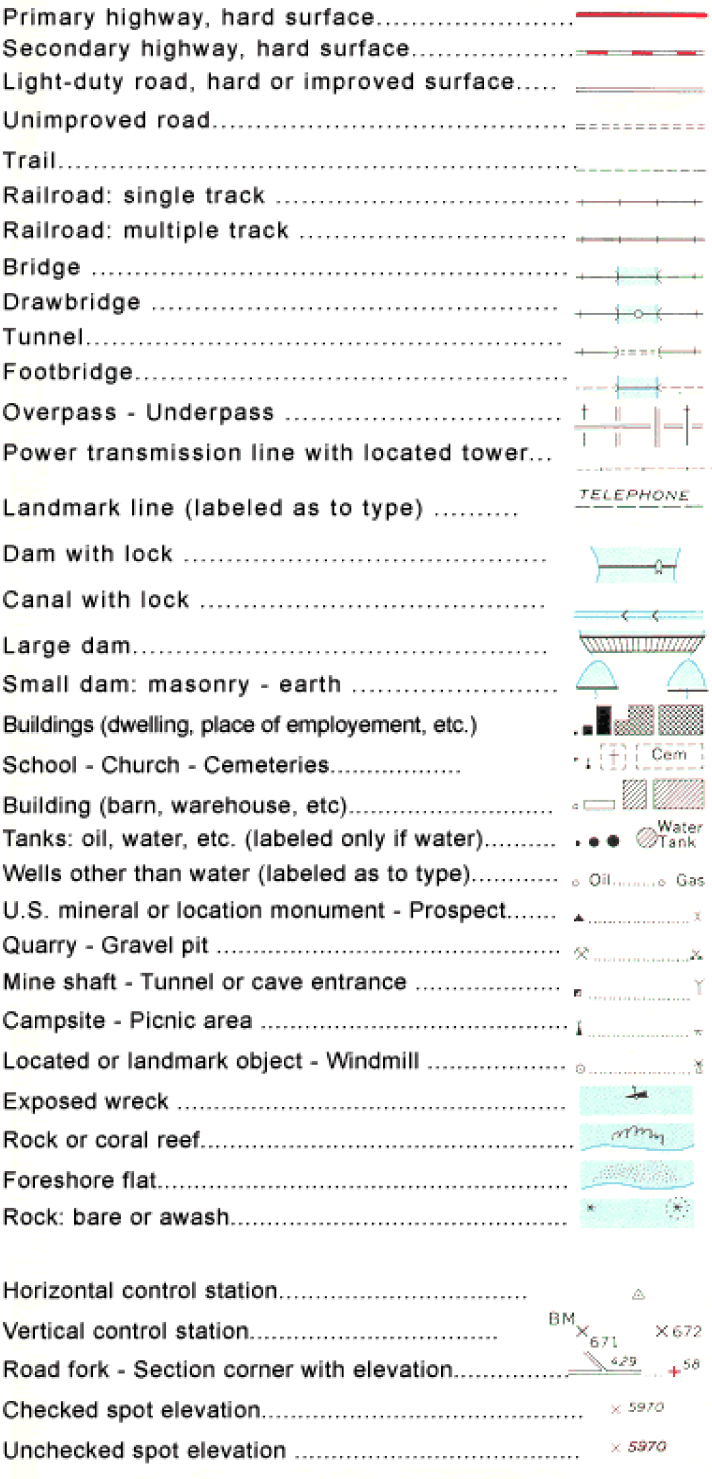
13. Describe the landscape of each map. (For example, has mountains, many rivers)

_____
_____
_____
_____

CONCLUSION: Can you describe the general landscape of an area using topographic maps?

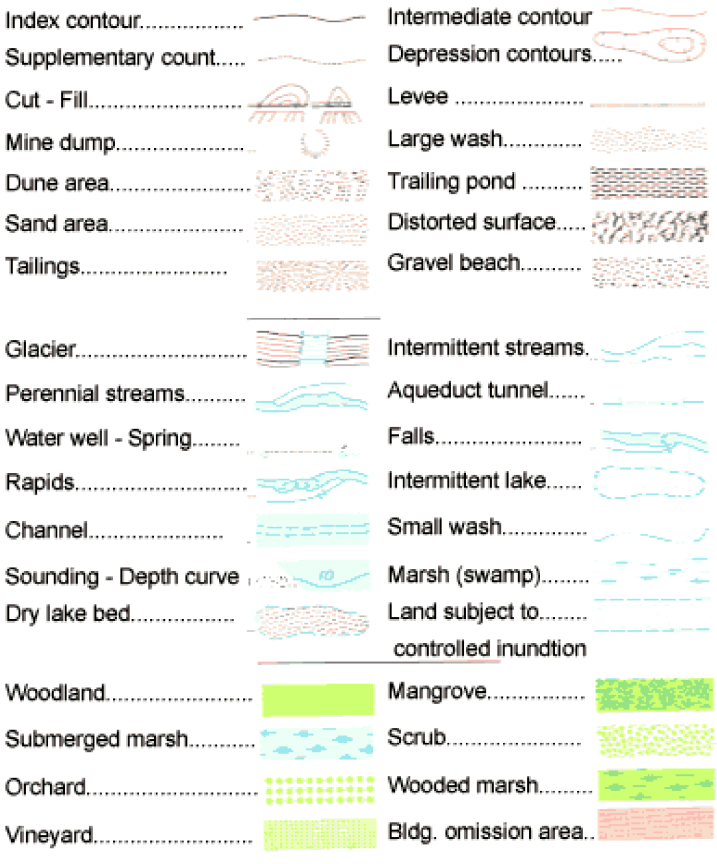
_____
_____

TOPOGRAPHIC MAP SYMBOLS



VARIATIONS WILL BE FOUND ON OLDER MAPS

Boundary: national .....
State .....
county, parish, municipio.....
civil township, precinct, town, barrio.....
incorporated city, village, town, hamlet.....
reservation, national or state.....
small park, cemetery, airport, etc.....
land grant.....
Township or range line, U.S. land survey....
Section line, U.S. land survey.....
Township line, not U.S. land survey.....
Section line, not U.S. land survey.....
Fence line or field line.....
Section corner: found - indicated.....
Boundary monument: land grant - other.....



UNIVERSE CYCLE - GEOGRAPHY (5) - LAB

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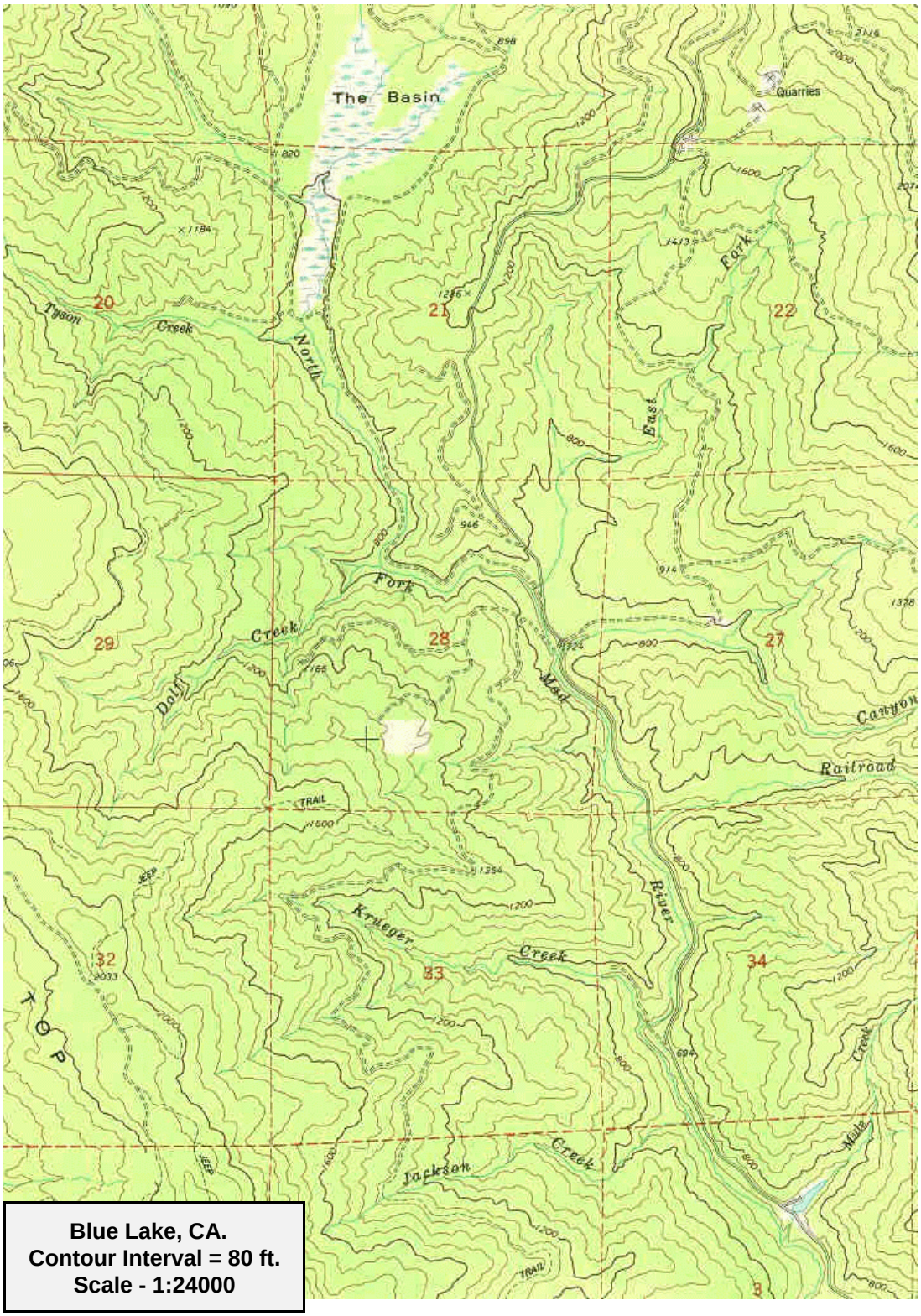
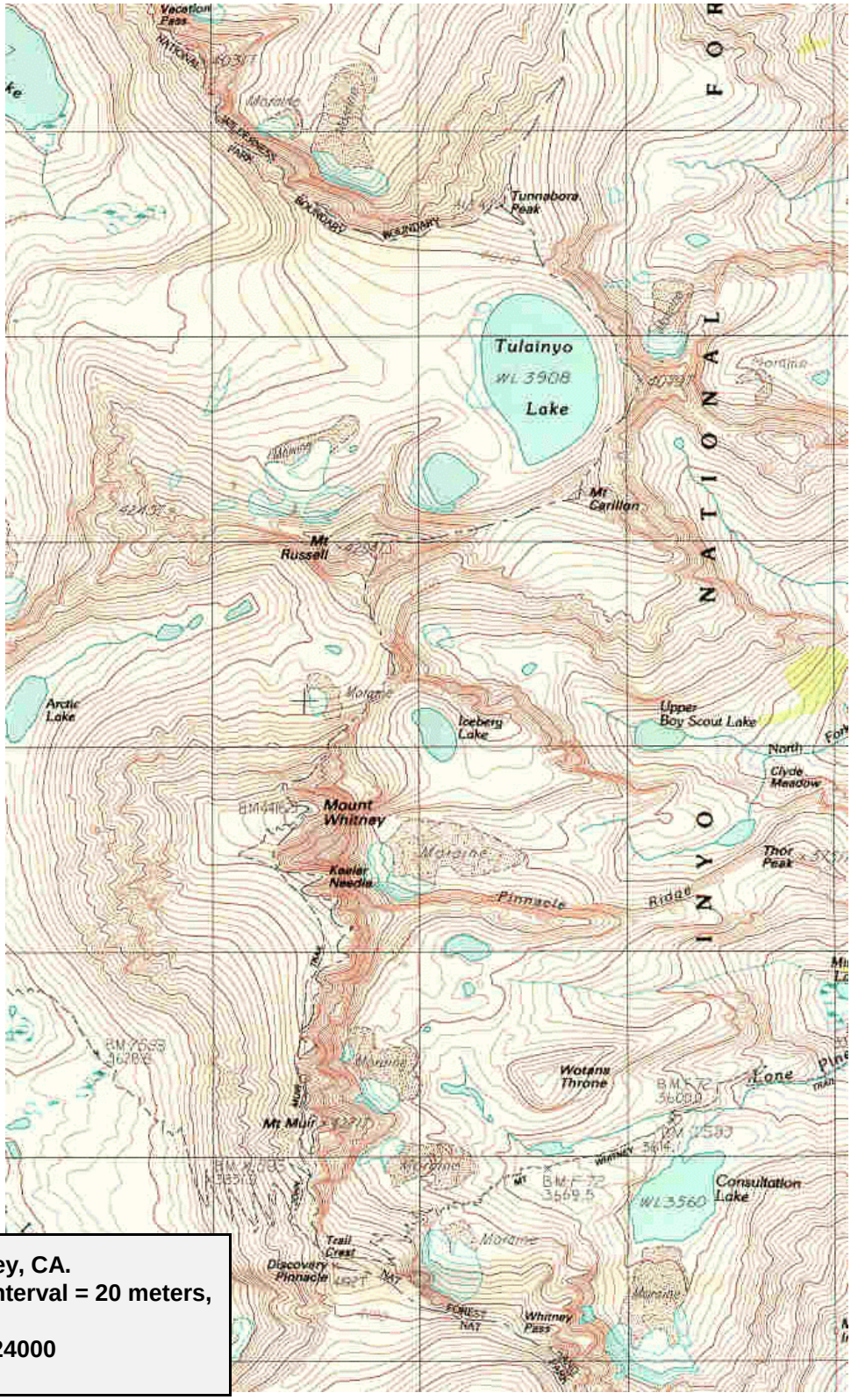


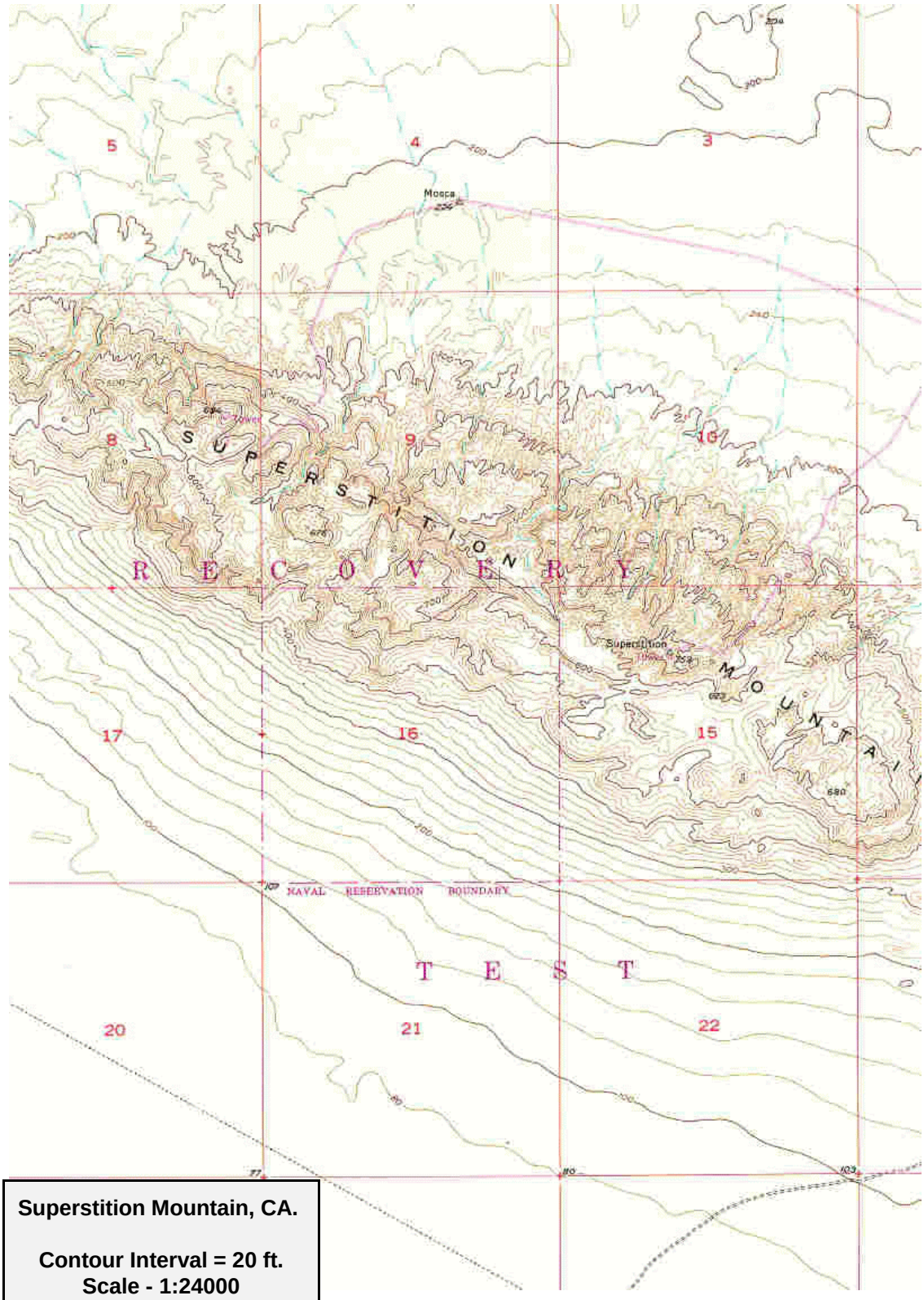
Blue Lake, CA.
Contour Interval = 80 ft.
Scale - 1:24000

UNIVERSE CYCLE - GEOGRAPHY (5) - LAB



Mt. Whitney, CA.
Contour Interval = 20 meters, or ~67ft.
Scale - 1:24000

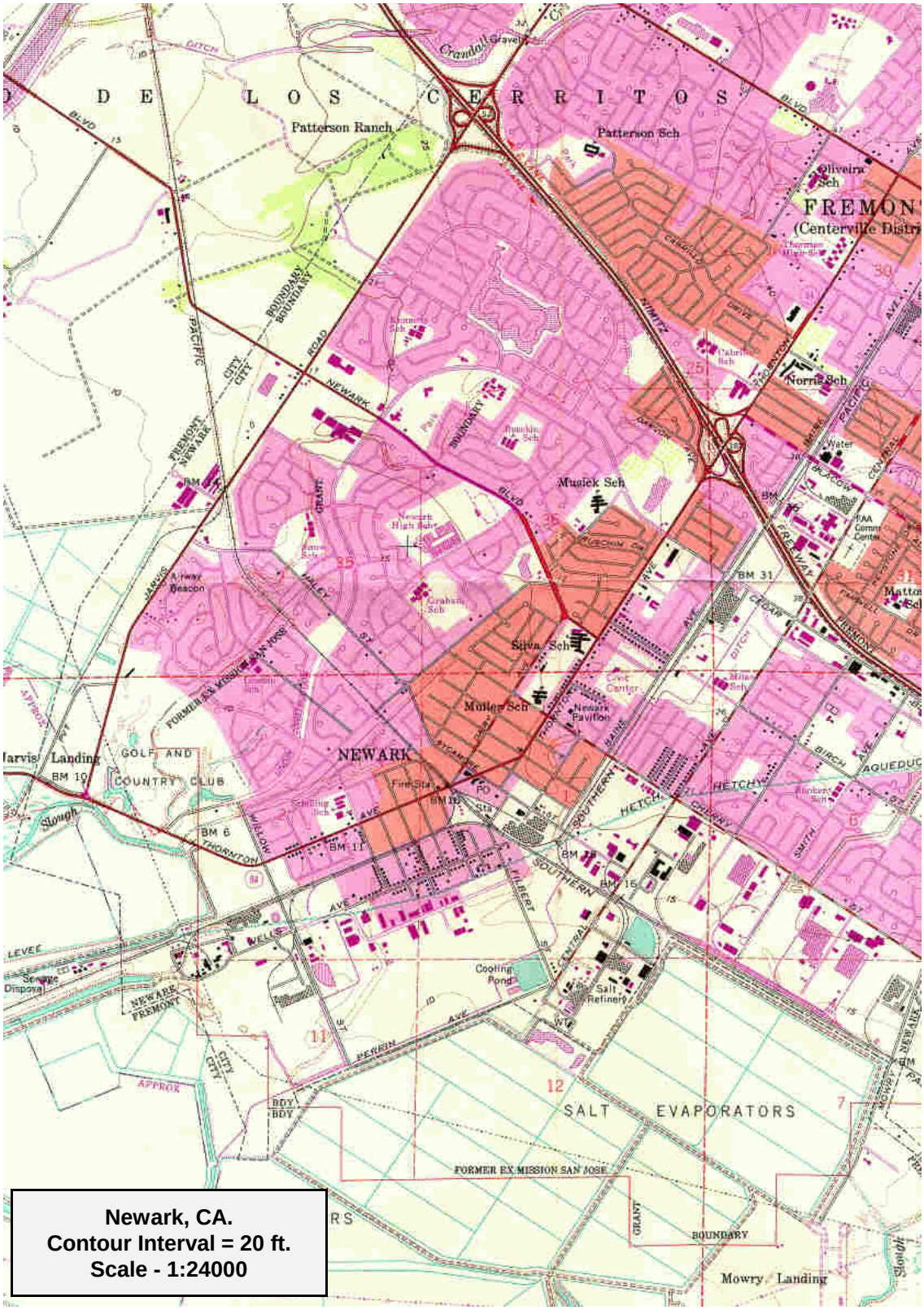
UNIVERSE CYCLE - GEOGRAPHY (5) - LAB



Superstition Mountain, CA.

Contour Interval = 20 ft.
Scale - 1:24000

UNIVERSE CYCLE - GEOGRAPHY (5) - LAB



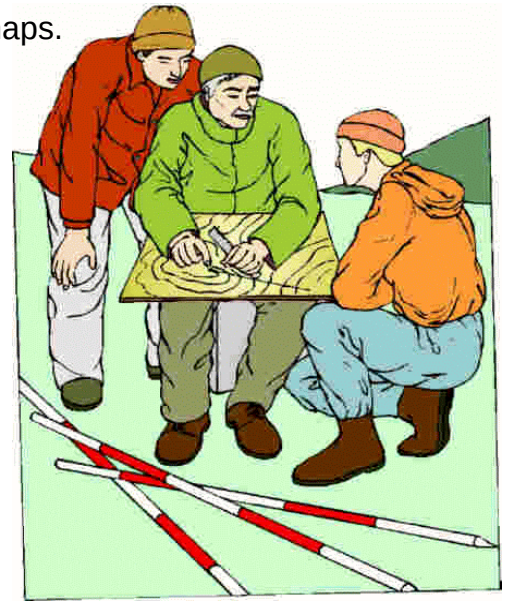
UNIVERSE CYCLE - GEOGRAPHY (5)

POST LAB

Students use the Internet to learn about different types of maps.

OBJECTIVE:

1. Understanding the uses of maps.
2. Comparing the different components of maps.



VOCABULARY:

cartography
geography
legend
map
scale
contour
sea level

MATERIALS:

topographic maps
examples of maps
U.S. Geological Survey information on Topographic Maps

BACKGROUND:

Maps are made to show information that would be difficult to understand or interpret using photographs or some other means. For example, it would take a large book to tell someone how to drive from New York to San Francisco using only words, but a map can show this easily on one sheet of paper. A map is the best way to see roads. There are many other things that a map can show well. A city map can show where the parks, the schools, city buildings, and libraries are located.

Suppose you wanted to live in the part of your city that had the most ice cream stores. You and your friends could go all over town and find all the ice cream stores and write down their addresses. However, if your city is very large you would soon have pages and pages of addresses and no way of telling where the greatest number were concentrated. A good way to record them is to use a map of your city, and putting a "X" in each block where there is an ice cream store. Then when you are finished you can see what part of the city has the most "X's" and you can look for a house there.

Maps are used by lots of people. Bus maps show commuters which routes buses take. Climate maps show geographers how much rain or the highest temperature in an area. Fire departments plot locations of fire-hydrants. Geologists plot the locations of different rock types on geologic maps.

PROCEDURE:

1. Explain to the class that maps have many uses. Have the students list different types of maps. List their ideas on the board.

2. As an in class or homework assignment, have each student find a virtual map on the Internet or a real map. Have the student write a paragraph describing the purpose of the map, how it shows information, and giving the map's scale and other features it may have. You may wish to assign specific map types to each student especially if you do the assignment in the classroom.

Encourage them to look for a map that interests them. We recommend using one of the search engines to find especially local maps. Make sure the students writes down the URL of the website.