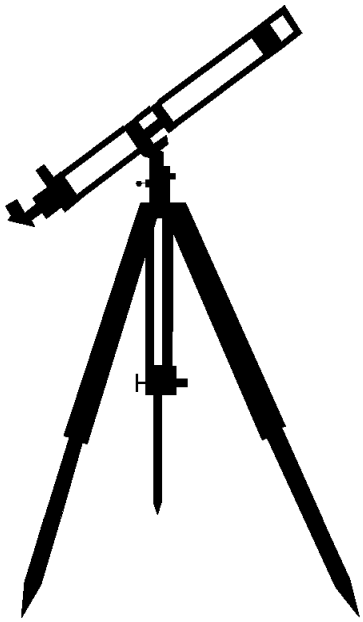
Universe Cycle

The Search for Our Beginnings

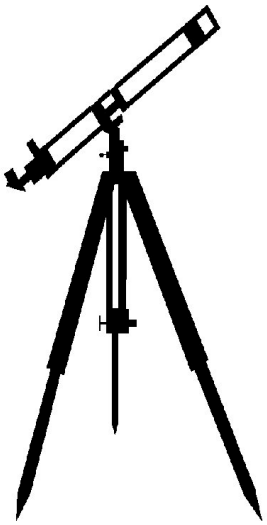
SIXTH GRADE

GEOGRAPHY



1 WEEK
LESSON PLANS AND
ACTIVITIES

UNIVERSE CYCLE
OVERVIEW OF SIXTH GRADE



UNIVERSE

WEEK 1.
PRE: *Exploring how the Universe may have evolved.*
LAB: *Comparing the night sky with zodiac signs.*
POST: *Comparing the different components of the Universe.*

SOLAR SYSTEM

WEEK 2.
PRE: *Exploring the structure of our Sun.*
LAB: *Calculating the weight of objects on different planets.*
POST: *Exploring astronomical themes in songs.*

EARTH

WEEK 3.
PRE: *Comparing the motion of the Sun, Earth, and Moon.*
LAB: *Discovering how the tilt of the axis causes the seasons.*
POST: *Analyzing literature with descriptions about Earth.*

GEOGRAPHY

WEEK 4.
PRE: *Discovering uses for maps.*
LAB: *Exploring military strategies using a map.*
POST: *Creating a three dimensional landscape.*

UNIVERSE CYCLE - GEOGRAPHY (6)

PRE LAB

Students use worksheet to compare maps.

OBJECTIVE:

1. Exploring map skills.
2. Discovering uses for maps.

VOCABULARY:

geologic
globe
legend
map
navigation
topography

MATERIALS:

worksheet
topographic maps & legends
physiographic relief globe

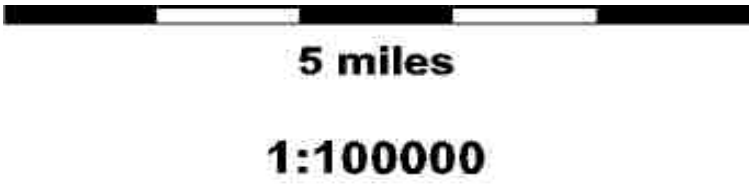
BACKGROUND:

Geography is the science that studies the location of objects, such as mountains, human cultural groups, or even butterfly populations. The location can be either Earth or space. Maps are an essential tool of geography. Maps are a representation of the Earth's surface. Topographic maps, for example show the location and shape of mountains, valleys, and plains; the networks of streams and rivers; and the principal works of man.

Hikers use topographic maps, especially in areas where there are no roads with signs. Geologists depend on topographic maps for superimposing rock types upon the land. Other examples include maps that illustrate physiographic features such as forests, grassland, woodland, tundra, grazing land, ocean floors, and ocean sediments. Meteorological maps that show climate, weather and wind are types of environmental maps. Environmental maps can also record human impacts on the environment. Meteorologists, oceanographers, geographers, city planners, and many other professionals depend greatly on these maps to record and forecast their specific field.

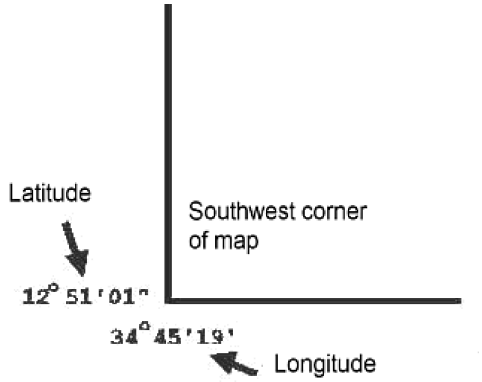
Cartography is the science of making a map. It requires a knowledge of how to represent objects on a smaller space. Maps are smaller than the areas they portray, otherwise, they would be useless. Imagine a map of your city that is city-sized!.

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, the diagram shows how to measure five miles on a map. Topographic maps also have a fractional scale. This appears on the map as a ratio. This ratio tells how many real world measurement units equal one of the same unit on a map. 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 1:24,000 covers a small, detailed area, while a map scale of 1:1,000,000 covers a much larger area.



The legend of a map also explains the symbols used on the map. Topographic maps use a standard set of simple symbols to represent such features as streams, buildings, and roads. These symbols may vary from country to country. The U. S. Geological Survey map symbols are shown on the sheet labeled, "Topographic Map Symbols."

Latitude and longitude are also shown on maps in the corners. Latitude is given to the left and right of the map: longitude is above and below it, as shown in the diagram. On U. S. Geological Survey maps, latitude and longitude are given in degrees, minutes (60 minutes = 1 degree) and seconds (60 seconds = 1 minute), read , for example as, 45◦34'56".



PROCEDURE:

1.Discuss with students on how maps show relief, even in two dimensions. Only topographic or shaded relief maps can show you that the world is not flat. There are also relief maps, but they are three dimensional. Maps help us in several ways including:

1. To make a very large area look small and understandable,
2. As tools for planning (i.e. dams, highways, urban development),
3. To help us find our way in unfamiliar areas,
4. Show us where major places are.

2. Discuss different types of maps with the class. A map is a representation of the Earth's surface. A globe is also a type of map. Show as many examples as you have including topographic, road, political, and weather maps. Show them a physiographic relief map, to show them that not all maps are two dimensional. You may also want to

discuss virtual maps that are in cars to help you when you are lost!

3. Review the orientation information on a map with the students. Include geographic orientation (north, south, east, and west). On almost all maps, north is toward the top of the map. It is also shown by an arrow in the map's legend. Discuss the other components of a map's legend. Show them the Topographic map symbols.

4. Give students the worksheet and then go over the answers with the students.

ANSWERS:

1. Road Map, a map that would have all the states and major roads
2. Globe, since a globe is the best representation of distance
3. Navigation Map, a map of the oceans usually gives miles in nautical miles, especially used by shipping and Navy
4. Topographic Map, elevation and how steep an area is given
5. Geologic Map, different colors usually tell you the different types of rocks
6. Legend

UNIVERSE CYCLE - GEOGRAPHY (6) PRE LAB

Directions: Answer the following questions. Describe the type of map you would use for each answer.

1. Susie lives in California and wants to go to New York City. What kind of map would she use to find out what states she will cross?

_____
_____

2. A pilot is going to Russia from San Francisco. How would he find out the shortest route to fly there?

_____
_____

3. A sailor wants to know how many nautical miles there are between Hawaii and San Francisco. What kind of map would he use?

_____
_____

4. A hiker wants to climb Mt. Whitney in California. What map will tell him how many feet she will have to climb to get to the top?

_____
_____

5. A team of geologists wants to know if there are igneous rocks where they are working. What kind of map would they use?

_____
_____

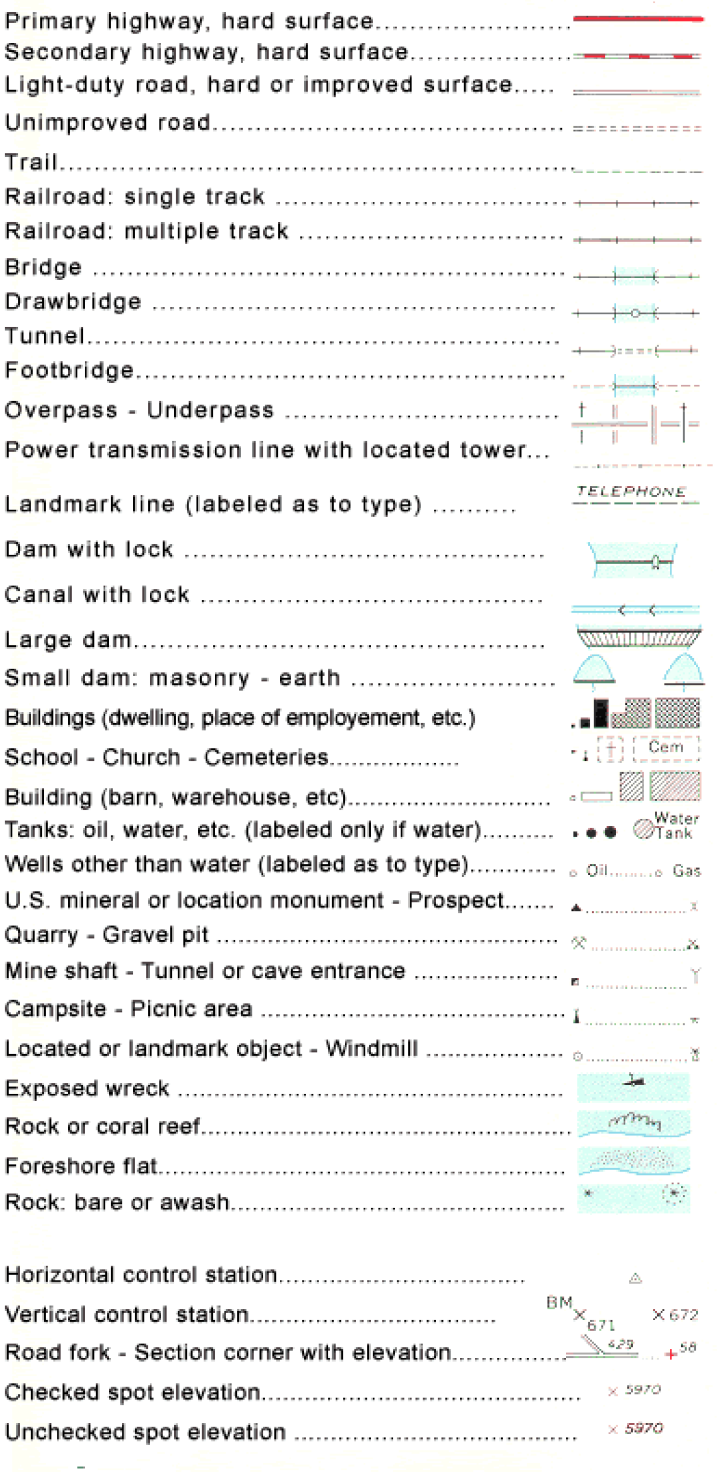
6. Where on a map can you find a list of the symbols used on it?

_____

7. For each map item below, draw the correct symbol. Use the Topographic Map Symbols to find the answer.

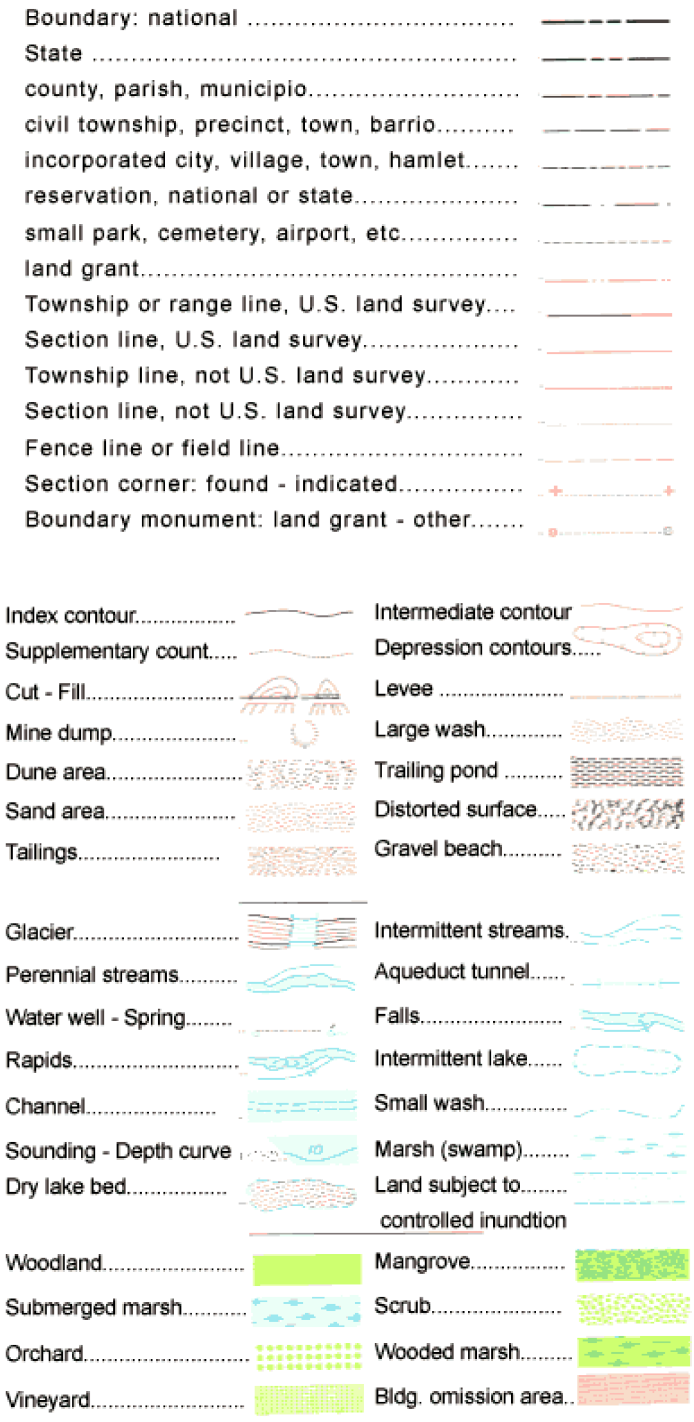
Railroad		Highway		Marsh	
Mine		Church		School	

TOPOGRAPHIC MAP SYMBOLS



UNIVERSE CYCLE - GEOGRAPHY (6) - PRE LAB

VARIATIONS WILL BE FOUND ON OLDER MAPS



UNIVERSE CYCLE - GEOGRAPHY (6)

LAB

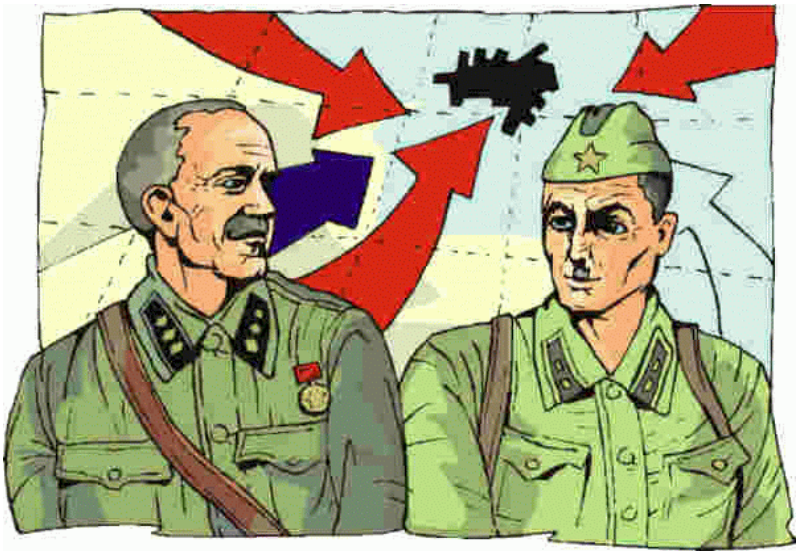
Students use a map to create a defense strategy.

OBJECTIVE:

1. Discovering the importance of map reading.
2. Exploring military defense strategies using a map.

VOCABULARY:

altitude
latitude
longitude
quadrangle
topographic map



MATERIALS:

worksheets
glue or gluesticks

BACKGROUND:

Map reading skills become very important in military operations. Military strategists use maps to locate opposing forces, plan operations, and to coordinate logistics. When an operation is planned, the directions must be precise in terms of time and location. The military has many personnel who are experts in reading topographic maps. Topographic maps portray the physical features of an area. They show the locations and shapes of mountains, valleys and plains, the networks of streams and rivers, and the locations of man-made features such as trails, roads, towns, boundaries, and buildings. They also show what the terrain is like including its steepness, distances, and the kinds of vegetation. All of these are important considerations in military planning. It is easier to move personnel and supplies along a level, paved road than across a series of brush-covered hills and valleys. Topographic maps contain the information needed to decide where to go and where to position things.

In many parts of the world there are detailed topographic maps. In the United States there are 7.5 minute quadrangle maps for every state. These are detailed maps that can locate your position precisely.

In this lab the students are asked to design a strategy to defend a position on a topographic map against invaders. They will use a 7.5 minute quadrangle map. This will get them to think accurately about topography, as they seek to create a successful defense. The students will use the cut-out icons on a following page arrange their “forces.”

Note that they can create their own icons if they wish. We have placed this exercise in prehistoric times, to avoid the use of guns and other modern weaponry. The clear emphasis in the student's directions is to design a defensive strategy rather than an offensive strategy.

PROCEDURE:

1. Make copies of the icon sheet.

2. Explain the purpose of the exercise to the students. Make sure they understand that they are defending the “Flint Outcrop,” not launching an attack. Explain that a good defense makes use of topography, to locate such things as lookout posts, supplies, and reinforcements.

3. Have the students answer the questions in Exercise 1 before they design their strategy. Emphasize that it is always important to look at the legend of a map before you use it.

4. Have the students cut out the icons. Allow them to create new icons if they wish, but remind them to keep the prehistoric time frame in mind. Use the icons to help illustrate the positioning of the strategy and movement of forces.

ANSWERS:

Exercise 1: 1. Blue Lake , CA; 2. 820 feet 3. A stream, called the Mad River; 4. Probably come up the valley. 5. Spread resources between home and the outcrop; have reinforcements ready to move either place.
Exercise 2 will be individual. Evaluate the groups ability to use and understand the map.

UNIVERSE CYCLE - GEOGRAPHY (6) LAB

PROBLEM: Can maps help you design a "defense" strategy?
PREDICTION:_____
PROCEDURE:

In this exercise, you are the leaders of a group of cave people. You live in a good area, that has lots of water, animals to hunt, and plants to gather. On the topographic map, this area is called “The Basin”. There is even a good outcrop of flint for making spear points and arrowheads. This outcrop is labeled on the map. Unfortunately, another group of people is trying to invade your territory. As the leaders of your group, your job is to design a way to defend your territory against the invaders.

EXERCISE 1. Answer the following questions.

1. What topographic map quadrangle are you using?

_____

2. What is the altitude of the Basin?

_____

3. What is the blue line that goes south from the Basin?_____
4. What route do you think invaders might take in attacking your area? _____

_____

5. How will you defend both your home area and the flint outcrop? _____

_____

EXERCISE 2.

1. Cut out the icons on the following page. These are the people, animals, and resources you have to defend your home. Each weapon or item represents a person. Each animal icon is one animal. Draw new icons if you wish. Remember to keep your icons appropriate to cave people: no missiles or tanks!.

2. Read the topographic map and try to visualize the landscape it shows. Be sure to keep in mind the location of hills, valleys, water, and the resources you are trying to defend.

3. Arrange the icons on the map in the way you think best defends your home. Use your knowledge of contours in your defense as much as possible. You may wish to have someone in your group pretend to be an invader, to find weaknesses in your strategy.

4. Write down your plan of attack below. Be sure to explain how you used topography in your defense. Use more space if you need to.

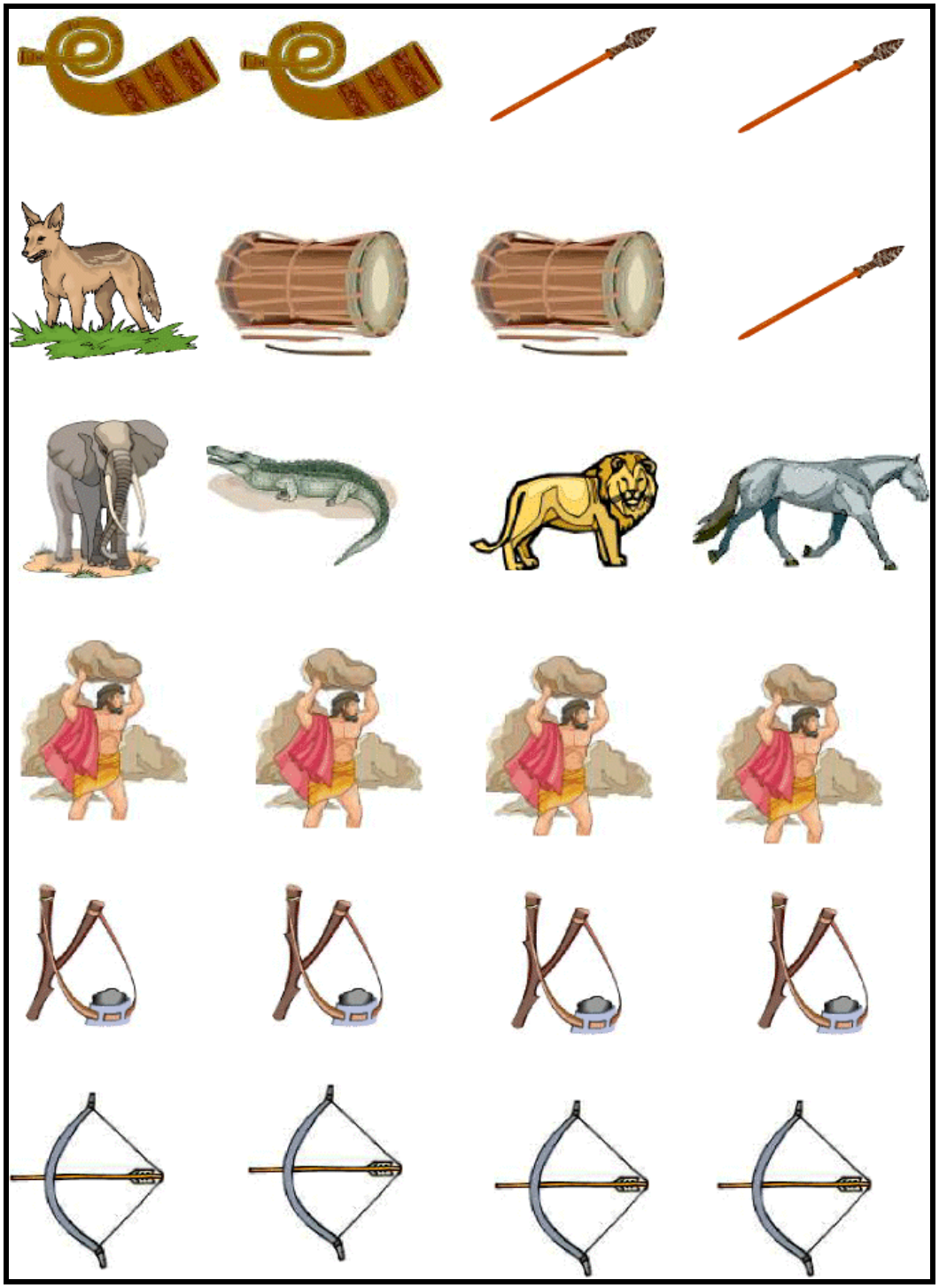
_____
_____
_____
_____
_____

CONCLUSION: Are topographic maps useful in preparing against invasion?

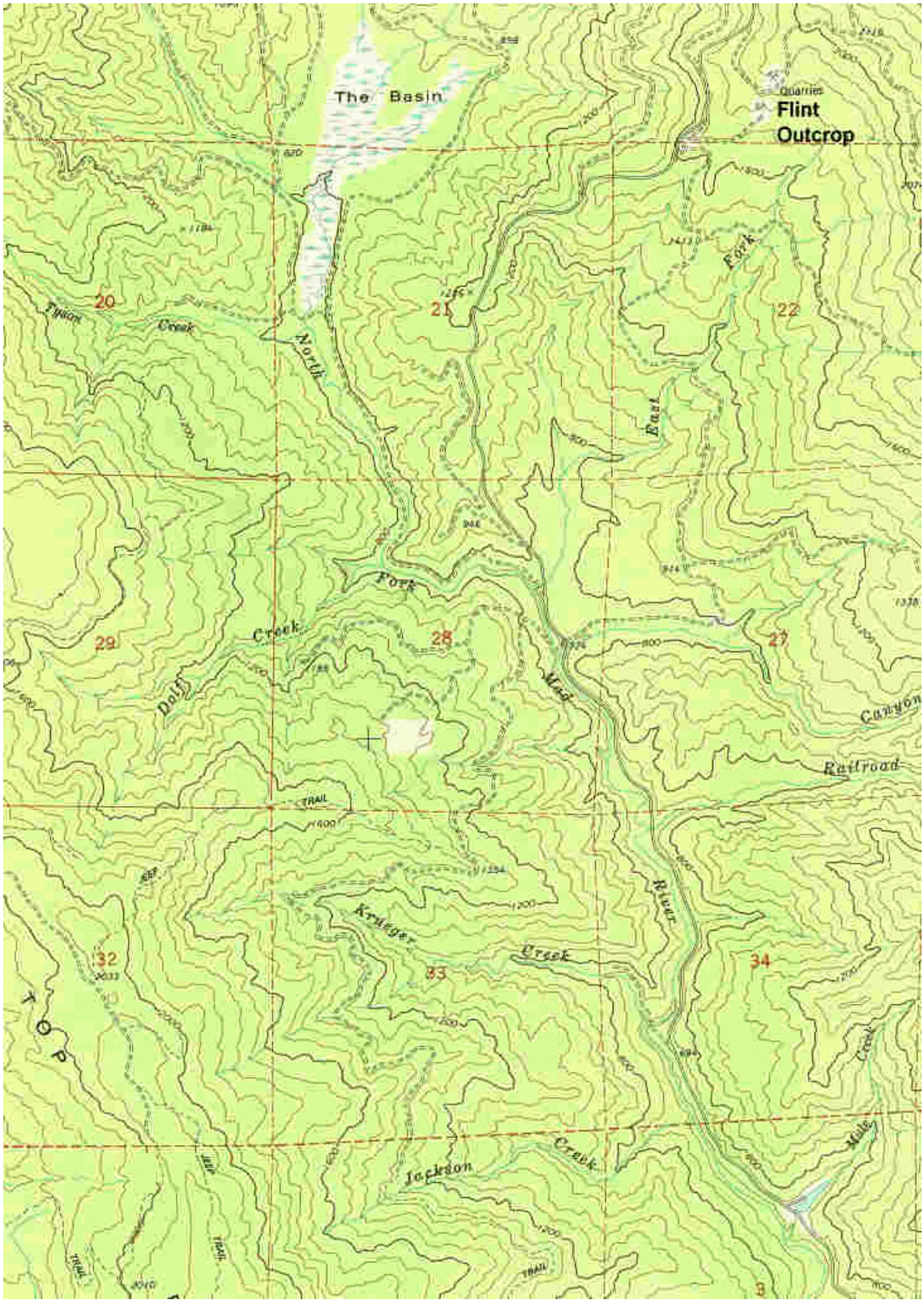
_____
_____

UNIVERSE CYCLE - GEOGRAPHY (6) LAB

Icons for Defense



UNIVERSE CYCLE - GEOGRAPHY (6) LAB



UNIVERSE CYCLE - GEOGRAPHY (6)

POST LAB

Students make a three-dimensional model of Angel Island, California.

OBJECTIVE:

1. Creating a three dimensional landscape.
2. Exploring contour maps.

VOCABULARY:

contour
contour interval


Angel Island

MATERIALS:

rolling pin
wooden board,
thin pieces of wood
modeling clay
a sharp point to cut clay
9 copies of the Angel Island map for each student group
scissors

BACKGROUND:

Topographic maps represent and depict the surface of the land (3 dimensional) upon a 2 dimensional plane (the paper). According to the U.S. Geological Survey, a topographical map is a line and symbol representation of natural and selected man-made features of a part of the Earth's surface plotted to a definite scale. A distinguishing characteristic of a topographic map is its portrayal of the shape and elevation of the terrain with contour lines. These are imaginary lines which connect all the points at the same elevation on a map.

It is often hard for students to understand the connection between three dimensional reality and a two dimensional map. In this exercise, students make this link by creating a 3D model of Angel Island, California from a simplified topographic map. This exercise can also be adapted to other areas. It works well as long as adequate relief is present on the map.

Angel Island is a small island in San Francisco Bay. It is northeast of Alcatraz Island and the city of San Francisco. Angel Island was a U. S. Army base for much of the 19th and the early 20th centuries. For much of this time it was also the “Ellis Island of the West”, the immigration station for foreigners, mostly Asians, seeking to live in the United States. It is currently a California State Park. More information and pictures of Angel Island are

available on the Internet at: http://www.angelisland.org/.

PROCEDURE:

1. Explain contour intervals and topographic maps to the students, if review is necessary. Make sure they can read and understand the simplified Angel Island map included below. This map has a contour interval of 100 feet.

2. You can divide the class into groups of four students. One person will cut the paper templates, another will roll the clay layers, the third will mount and cut the layers, and fourth will assemble the model.

Starting with sea level, use scissors to cut a pattern for each contour interval in the model. You will need patterns for sea level and the 100, 200, 300, 400, 500, 600, and 700 foot contour intervals.

3. Slightly wet the rolling pin, the utility board and the wooden sticks with water. Place the two sticks on either side of the board, flat side down, so that the rolling pin rides along them as if on tracks.

4. Place the clay between the two sticks on the utility board. Roll the pin back and forth over the clay until it rides firmly onto the two wooden sticks. Make a clay "pancake" for each contour interval levels. The Angel Island model requires eight pancakes.

5. Lay the sea level pattern on top of one of the clay pancakes. Cut around the edge of the template with your knife or point. This creates a contour of Angel Island at sea level. Repeat with a new pancake and pattern for the 100' contour interval. Repeat with each remaining pattern and a new pancake.

6. Stack the intervals in the same position as the original map. You now have a step-wise model of the topography of Angel Island!

7. If you wish to make a realistic model with natural slopes, smooth the sides of the model to make them look like a real hillside.

UNIVERSE CYCLE - GEOGRAPHY (6) POST LAB