Activity 6: Topographic Maps I

Maine Geological Survey

Objectives:

To have the students become familiar with topographic maps and their uses. To develop in the students an awareness of their local surroundings in terms of geographic and geological features.

Time:

This activity is designed to last 45 – 60 minutes.

Background:

Map development, use, and analysis are an integral part of many private industries as well as government agencies. Until recently, Maine state law required every town within the state to evolve a comprehensive development or growth plan within the next few years. No doubt this mandate will come forth in the future when the economic situation has improved. Maps will play a fundamental role in this process as towns work to determine how and where local development will take place. In addition many industries and businesses use their own special types of maps. It will be useful to show students soils maps, bedrock geology maps, surficial geology maps, and tectonic lithofacies maps.

Materials:

Samples of different types of maps, one copy for each two students of the local 7.5-minute series topographic map (preferably this map shows the local school building), rulers, pens, and notebooks. An index to Maine Topographic Maps in the 7.5-minute series is available free of charge from the Maine Geological Survey. The 7.5-minute designation tells the number of minutes the map covers in area in reference to established longitude and latitude lines. Quadrangle maps are available from the Survey as well as other suppliers (see list of suppliers in the introduction). Click here for an explanation of topographic map symbols.

Procedure:

After a suitable discussion on the nature and importance of all types of maps, pairs of students can work through the exercises with varying amounts of supervision. The teacher can circulate about, helping those students who need assistance. The questions for the exercise are GENERIC and MAY NOT all be applicable to local maps. Teachers should complete the exercise and note any problems before having the students attempt the exercise. After the next exercise, Topographic Maps II, teachers will need to develop activities that are quadrangle specific to their own local maps. While a number of mapping references exist, an excellent one is the U.S. Army Field Manual FM 21-26, Map Reading (Department of the Army, 1969). This is most often available through used book dealers specializing in militaria.

Follow-Up:

If this activity is the last activity on topographic maps, a map quiz to test student skills is appropriate and easily developed from the local quadrangle map. Oddly enough, many students "like" map tests as they have some visual challenges normally missing from typical tests. If more map work is contemplated, testing activities will reinforce these basic skills.

Have students plot their own map of some easily accessible local feature - a stream, swamp, timber lot, network of hiking trails or snowmobile trails - all of these are good candidates for map construction. Involve the graphic arts department or teacher in

production of the finished product; have students take them home and find out if the student's parents can "navigate" with them.

Use mapping skills as well as rock identification skills to construct your own geological map of the exposed bedrock in a local quarry, ledge, or road cut.

Schedule a field trip to a local mapping agency (such as DeLorme Publishing or the Maine Geological Survey) and observe maps in the process of being constructed, published and so forth.

References:

Activity developed by Duane Leavitt

Name_____

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Student Sheet

Purpose:

This exercise will help you learn to read and use a topographic map. The skills that you develop in this activity will help you with almost any map you use in the future.

Materials:

Each pair of students will need a copy of the local topographic map, a ruler, notebook, pencil, pen, and a list of map symbols. If you mark on the map, do so lightly in pencil.

Part 1:

All topographic maps, which are referred to as quadrangles, are named for a town or city which is located on the given map. After orienting the map so the printed words read correctly, look at the upper right hand corner, find the name of your map, and record it here:

As you look at the map, you will notice a large amount of writing in the margin at the bottom. This is referred to as the LEGEND and it always provides you with a lot of useful information that is applicable to the particular map you are using. In the center of the legend, just above three graphic scales, is the word SCALE followed by two numbers separated by a colon. Find this on your map. This is the representative fraction or RF

scale and it tells you the relationship between map distance (first number) and land distance (second number) Record your RF here: _____. If you are using a 7.5-minute series map, the RF numbers should tell you that 1 map inch (or centimeter etc.) equals 24,000 land inches (or centimeters etc.) The RF is used to produce the graphic scales. Use the graphic scales to find the following for this map:

One mile = _____inches.

One kilometer = _____ inches.

One thousand feet = _____ inches.

Now find the total length _____ and width _____ of this map. Calculate (L x W) the total number of square miles that this map covers:

Part 2:

Just as there is a more or less proper way to read a book, a map is always read with the scale at the bottom. By agreement among all map makers, the top of the map (opposite the legend) is the northernmost edge of that particular map. This makes the part of the map just above the legend the southernmost edge.

Thus the right side of the map must be the _____ edge and the left side is the _____ edge.

Notice the colors of the map symbols. Colors on a map are used to categorize map symbols; man-made structures and political boundaries are always black for example. See if you can determine what the other colors stand for:

Green _____ White _____

Red _____ Brown _____

Blue _____

Part 3:

As you look at the overall map you will see a large number of parallel brown lines. Each fifth line is slightly darker than its neighbors and often has a number printed somewhere along its path. These are contour lines and tell you the elevation of that line above sea level. All points along one of these lines have the same elevation. The distance between contour lines is called the CONTOUR INTERVAL and is found in the legend. The contour interval on your map is:

Points on the map whose elevations have been accurately surveyed by mechanical means are called bench marks; these elevations are preceded by a BM and have an X on the map next to the exact elevation at that point. Starting in the lower right hand corner of your map find the closest BM and record its elevation:

Calculate and record the distance in feet to this BM from the lower right hand corner:

What is the general direction to the BM from the lower right hand corner? _____

Locate by name or description the following on your map:

Largest body of water _____Highest elevation_____

Calculate the distance between these two points:

Since the shortest distance between two points is always a straight line, map distances are often measured in straight lines with total disregard for all surface features. Following these lines, even on foot, is not often practical. Calculate the road distance (in miles) between the two points listed above and compare your value with other groups.

What direction does one travel (use the straight line) to go from the highest point to the closest body of water? _____ To go from the closest body of water to the highest point? _____

Questions and Discussion:

1. Describe a situation where a person would want to use feet measurements on a map such as this.

2. Around the sides of the margin you will notice quadrangle names in sets of parentheses; what purpose do these serve?

3. List and explain three (3) items found in the legend of this map that we have not previously discussed.

4. What do you notice about the two directions obtain in Part 3? Why did the directions work out this way?