

**LESSON PLAN**  
**INTRODUCTION TO MAP READING**  
**(45 Minutes)**

**MATERIALS REQUIRED**

1 1/24,000 topographic map per Scout	1 road map
1 map symbol handout per Scout	Examples of 1/50,000 maps
1 plotting aid per Scout	

**INTRODUCTION**

Among the earliest written records of mankind are maps. Maps were essential for traveling extended distances and returning safely home and many an explorer and trader died because their maps were incorrect. Today's maps are extremely accurate, and an ability to read them is an essential requirement of Scouting.

**PURPOSE AND MAIN IDEAS**

The purpose of this period of instruction is to introduce you to basic map reading.

We will do this by covering:

- What a map is,
- Map scales,
- Map colors,
- Map symbols,
- Contour lines,
- Orienting a map, and
- Map grid coordinates.

Upon completion of this period of instruction you will be able to:

1. Explain what a map is, explain map scales, explain what the different colors used on a map indicate, and interpret the symbols used on a map.
2. Interpret contour lines to identify hilltops, valleys, cliffs, and other terrain features.
3. Orient a map by inspection, and determine an object's location by UTM grid coordinates.

**BODY**

**1<sup>st</sup> Main Idea: What is a map?**

The official definition of a map states that "a map is a graphic representation of the earth's surface, or a portion thereof, drawn to scale on a plane." In plain English, that means a map is a picture of the ground drawn on a flat surface, like a piece of paper.

There are several different types of maps including maps of the ocean, air navigation maps, road maps, and topographical maps. (Maps of the ocean and those used for air navigation are more correctly referred to as charts, and the proper name for a mapmaker is cartographer, which is Latin for chart drawer.)

The two types of maps we are most likely to use are roadmaps and topographical maps. Roadmaps are good for figuring out how to get from one town to another, but don't help very much in the field. For that, we use a topographical map, which is a detailed drawing of a small part of the ground.

## **2<sup>nd</sup> Main Idea: Map scales, colors, and symbols.**

### **Map Scales**

Map scales indicate how much area a map covers and are expressed as a fraction or ratio such as 1/24,000 or 1:50,000. The larger the second part of the number is, the more area is covered. For example, on a map with a scale of 1/24,000, 1 inch on the map equals 24,000 inches on the ground. On a map with a scale of 1/50,000, 1 inch on the map equals 50,000 inches on the ground. Maps with smaller scales generally show more detail. That is, a 1/24,000 map will show more detail than a 1/50,000 map.

### **Map Colors**

Maps use five basic colors to indicate various features: green, white, blue, black, and brown. (Red is also used to show principal highways.)

- **Green** indicates heavy vegetation – areas covered by forests, woods, jungles, etc.
- **White** indicates areas that are mostly clear of trees – fields, plains, sand flats, etc.
- **Blue** indicates bodies of water – lakes, rivers, streams, etc. If a blue line is broken, it indicates an intermittent stream (that is, one that does not always have water in it). A series of broken blue lines with tufts of grass drawn over them indicates a marsh or swamp.
- **Black** indicates manmade features, including roads, trails, buildings, bridges, railroads, airports, etc. A solid black square or rectangle indicates an inhabited building such as a house, a church, or a school. Hollow black squares or rectangles indicate barns, sheds, and other outbuildings. Parallel solid black lines indicate “improved” roads (i.e., paved or graveled). Parallel dashed black lines indicate dirt roads large enough for vehicles. Single dashed black lines indicate trails. (**NOTE:** Principle roads are often shown in red or red and white also.)
- **Brown** is used for contour lines.

## **Map Symbols**

Map symbols are little pictures of things on the ground. Most full size topographic maps will have a legend that identifies the symbols used on the map, but since the symbols are standardized, you shouldn't need a legend to recognize what the symbol means. Your handout shows some of the most common symbols.

### **3<sup>rd</sup> Main Idea: Contour Lines**

#### **What are contour lines?**

Maps are flat, but the areas they represent might be full of hills, valleys, mountains, and plains. Each contour line on a map connects points that have the same elevation (height) above sea level. Contour lines allow mapmakers to show the shape of the land.

#### **Contour Intervals**

A note in the margin of the map indicates how far apart the contour lines are spaced. For example, "contour interval 50 feet" each line is 50 feet higher or lower than the lines on either side of it.

Every fifth contour line is darker than the other four, and at intervals along the line numbers are printed. The numbers indicate the line's elevation above sea level.

#### **Interpreting Contour Lines**

Contour lines that are close together indicate a steep slope; those that are farther apart indicate a more gentle slope. V-shaped contour lines indicate a stream or gully and the closed part of the V always points uphill.

Small circular contour lines indicate hilltops. A number on a hilltop indicates the elevation of the hilltop above sea level.

### **4<sup>th</sup> Main Idea: Orienting a Map by Inspection**

Every topographical map and most other types of maps are drawn so that north is at the top. Since north is at the top, south is at the bottom, east is to the right, and west is to the left.

To more precisely orient the map, look out at the land for features such as buildings, a bridge, a water tower, or a prominent hill. Find the symbols for the same features on the map and then turn the map until the symbols on the map line up with the landscape features they represent.

## **5<sup>th</sup> Main Idea: Map Coordinates**

Modern topographic maps use two main types of coordinates systems: latitude and longitude, and the Universal Transverse Mercator (UTM) grid. The UTM grid is the easiest to use, and that is what we will learn now.

On maps using the UTM grid, lines are drawn left to right across the map, and another set is drawn up and down. A two-digit number identifies each of the lines. The lines form a grid of squares, with each square being 1000 meters wide and 1000 meters high.

A four-digit number identifies each square. The first two digits of the number are taken from the line that forms the square's left edge; the last two digits are taken from the line that forms its bottom edge. The square can be further divided into 100 meter and 10 meter increments. A four-digit grid coordinate identifies a 1000-meter square. A six-digit coordinate locates a point within 100 meters. An eight-digit coordinate locates a point within 10 meters. A ten-digit coordinate locates a point within 1 meter. For general use, six- or eight-digit coordinates are all that are required.

**NOTE:** The UTM coordinates displayed by GPS unit have several “extra” numbers. You only need to use the last five digits of each coordinate. Also, most GPS units display the “Northing” coordinate first, then the “Easting” coordinate below it, so when using a GPS, start with the bottom coordinate first. For example, the GPS UTM grid coordinate for the fork in the road at the parking area is:

35**64**555 Northing  
04**19**264 Easting

The 1000-meter grid square is 1964 and the eight-digit map coordinate is 19266455.

The rule for reading UTM grid coordinates is “read right up.” That is, begin with the line that forms the left edge of the square (for example “19”) then count the number of 100 meter increments from the line to the point. If the point is 260 meters to the right of line 19, the first part of the coordinate (Easting) is 1926. Next begin with the line that forms the bottom edge of the square (for example “64”) then count the number of 100 meter increments from the line to the point. If the point is 550 meters above the line, the second part of the coordinate (Northing) is 6455. The whole eight-digit coordinate is 19266455.

### **SUMMARY**

Maps are tools that you can use to find places you have never been to before and get you back to where you started. They can help you plan the best route, even though you have never seen the area they represent.

Maps are scaled. The most common topographical map uses a 1/24,000 scale. Other common scales are 1/50,000 and 1/100,000. The larger the number in the second part of the scale ratio, the more area the map covers.

Maps use five basic colors: green for heavy vegetation, white for cleared areas, blue for water, black for manmade features and notes, and brown for contour lines. Some maps use red to indicate major highways.

Standardized map symbols are used to represent various terrain features such as buildings, bridges, roads, trails, airports, marshes, and swamps.

Contour lines are used to show the shape of the land. Every fifth contour line is a numbered index line. The spacing of contour lines indicates the steepness of a slope.

Modern topographic maps are drawn with north at the top. A map is oriented by lining up features on the map with the actual features on the ground.

The easiest coordinate system to use is the UTM grid, consisting of 1000 meter squares drawn on the map, each square being identified by a four-digit number indicating its lower left corner. The square can be further divided into 100-meter increments, and even 10-meter increments. A six-digit coordinate locates a point within 100 meters; an eight-digit coordinate locates it within 10 meters.

### **QUESTIONS FROM THE CLASS**

### **QUESTIONS TO THE CLASS**