This Chapter will examine how we use various location systems:

1. Latitude and Longitude  {p. 3-4}
   - Parallels/Meridians/Coordinates
   - Absolute location
   - Relative location

2. Global Positioning System (GPS)  {p. 5}

3. Topographic Maps  {p. 10-11}
   - Physical features
   - Cultural features

4. Street Maps  {p. 12}
   - Small-scale Maps
   - Large-scale Maps
1. Latitude and Longitude
The Universal Language of Location

• In order to identify specific locations on earth we use a geographical grid. This grid reference system covers the entire earth and is represented with intersecting imaginary lines.

• The grid is made up of lines of latitude and lines of longitude.
Lines of Latitude

- **Lines of Latitude** are imaginary lines drawn around the surface of the earth. These horizontal lines measure distances north and south of the equator. The **equator** stretches around the center of the Earth at 0° latitude and because these circles always remain the same distance apart they are called **parallels**. The farther the circles are from the Equator, the smaller they are; at the Poles they are simply points.
Lines of Longitude

• Lines of Longitude are imaginary lines on the surface of the earth that are drawn north to south (vertically) that separate the east from the west. Lines of longitude are also called *meridians* and are the bases for world time zones. The **Prime Meridian** is located at 0° longitude and divides the globe into two halves, the eastern hemisphere and the western hemisphere.
How Latitude and Longitude Work Together

• The points where the lines of latitude (running around the earth) and the lines of longitude (running up/down the earth) intersect provides us with a set of coordinates.
Each degree (°) of longitude and latitude is divided up into 60 minutes (') and each minute is divided into 60 seconds ("). It can become a pinpoint to a location on a map. This exact location of a point on the earth’s surface using a set of coordinates is known as its **absolute location**.

For Example: St John's, NL is 47° 37' N  52° 45' W

(47 degrees 37 minutes North and 52 degrees 45 minutes West)
In contrast to absolute location, **relative location** is the general location of a place described in terms of distance or direction from another place. For example: the park is located 2km east of the mall.
Calculating Longitude and Latitude Discussion

• To determine the exact location of a point on the surface of the earth you can use the longitude and latitude grid reference system. To begin place your finger along the equator (0° latitude). Determine if your point is in the Northern or the Southern Hemisphere. Find the nearest degree latitude that your point lies on. Next begin at the prime meridian (0° longitude) and determine if your point is in the eastern or western hemisphere. Find the nearest degree longitude your point lies along. You now have the degrees of your point, the next step is to determine the minutes for each set of coordinates. As we know there are 60 minutes between each degree of latitude and longitude. We will estimate the minutes between each. For instance, if a point lies between 4° and 5° north and is exactly in the center of these coordinates we will determine that it is 4° 30’ N, we must then determine the longitude of that point to complete the set of coordinates.

• (Note: Although we can also calculate the seconds (" ) for a point on the earth’s surface we will not be doing so during this course.)
2. Global Positioning System (GPS)

- The Global Positioning System (GPS) is a space-based radionavigation system that provides reliable positioning, navigation, and timing services to users on a continuous worldwide basis -- freely available to all. For anyone with a GPS receiver, the system will provide location and time. GPS provides accurate location and time information for an unlimited number of people in all weather, day and night, anywhere in the world.

* The first GPS satellite was launched in 1978.
* A full constellation of 24 satellites was achieved in 1994.
* Each satellite is built to last about 10 years. Replacements are constantly being built and launched into orbit.
How Does GPS Work?

- GPS satellites circle the earth twice a day in a very precise orbit and transmit signal information to earth. GPS receivers take this information and use triangulation to calculate the user's exact location. The receiver can then determine the user's position and display it on the unit's electronic map.

GPS satellites broadcast signals from space that are picked up and identified by GPS receivers. Each GPS receiver then provides three-dimensional location (latitude, longitude, and altitude) plus the time.
3. Topographic Maps {p. 10-11}

• A topographic map is a detailed map showing **physical** and **cultural features** and the elevation (or height) of the land.

• **Physical features** are features on the earth’s surface caused by natural forces. Ex: rivers or valleys.

• **Cultural features** are features on the earth’s surface caused by human activity. Ex: bridges or roads.
An Example of a Topographic Map:

Halifax, Nova Scotia
Seven colours can be found on a map, each relating to different types of features:

- **BLACK** shows cultural features such as buildings, railways and power transmission lines. It is also used to show geographical names and surrounding information.
- **RED** is used for paved roads, highway numbers, interchange exit numbers, certain symbols as well as for names of major transportation routes.
- **ORANGE** indicates unpaved roads and unclassified roads and streets.
• **BROWN** shows contour lines, contour elevations and spot elevations.

• **BLUE** represents water features, such as lakes, streams, falls, rapids, swamps and marshes. The names of bodies of water and water courses are also shown in blue.

• **GREEN** indicates wooded areas, orchards and vineyards.

• **GREY** is used on the back of the map where the different symbols and a glossary of terms and abbreviations can be found.
Topographic Maps {p. 10-11}

Discussion

To locate a point/location on a topographic map you have to use the grid system that is located along the top and side of your map. (p. 10, fig. 1.14)

How do we pinpoint the exact location?

First we mentally divide the distance between the grid lines into tenths and estimate the location.

For instance on the topographic map of Brackley-Stanhope Beach, P.E.I. (Fig. 1.14, p.10) the bridge is located at 887 because the bridge is about seven-tenths of a grid space beyond 88 we designate the east-west location (horizontal grid) as 887. We designate the north-south location (vertical grid) as 416, because the bridge is about six-tenths of a grid space beyond 41. So the grid location of the bridge combined would be 887416.

Complete Questions #1 and 2 on page 11 for more practice with grid systems of topographic maps.
4. Street Maps {p. 12}

- Street maps are mobility maps that are often used by people that are traveling to unfamiliar places. These maps provide many details (both cultural and physical features) of an area. In order to determine a specific point on a street map you have to coordinate it using a number and letter grid reference system. (See p. 12 Fig. 1.16 – Street of downtown Fredericton)
Street maps are usually drawn in very large scale compared to other maps. Large scale maps present information such as a city road map. Large Scale maps show a large amount of detail to the reader. This of course would prove to be very valuable to someone wanting to learn more about an unknown area. In contrast a small scale map shows a very small amount of detail, these maps would include political maps displaying countries boarders, etc.
4. Street Maps {p. 12}

- Examine the street map (and the map legend) on page 12 to locate the grid location of the following:
  * University of New Brunswick Tourist Hotel
  * Fredericton Small Craft Aquatic Center
  * Lord Beaverbrook Art Gallery