

# Global Positioning System (GPS)

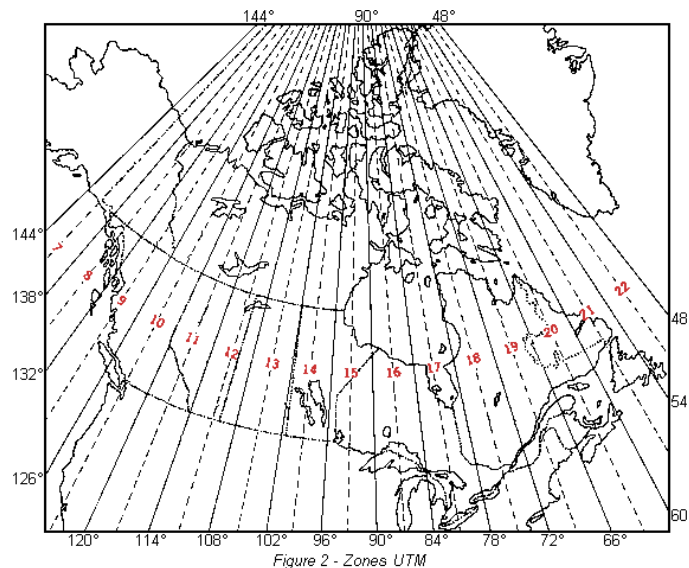
## What is GPS?

- The **Global Positioning System (GPS)** is a space-based satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. The system provides critical capabilities to military, civil and commercial users around the world. It is maintained by the United States government and is freely accessible to anyone with a GPS receiver (Wikipedia).
  - Advantages include being able to improve map skills and being easily found in case of emergency.
  - Disadvantages include people becoming dependant and less self-sufficient as well as requiring batteries.

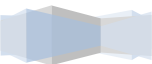
## How does it work?

### The UTM System

- Because the Earth is a sphere, any representation of its surface on a flat sheet of paper involves distortion.
- The Universal Transverse Mercator (UTM) system divides Earth into numbered zones of 6 degrees of longitude. These narrow zones can be mapped with less distortion.
- The map below shows the zones that include Canada, Manitoba lies mostly in Zone 14.
- Each zone has a central meridian dividing the zone in half from pole to pole (shown as dashed lines below).



- Each longitude zone is divided into 20 latitude bands of 8 degrees. These bands are lettered starting near the South Pole.
- Southern Manitoba is in latitude band U so our full zone grid reference is 14U.
- We use the Universal Transverse Mercator system as a grid for most of our Topographic Maps and GPS.

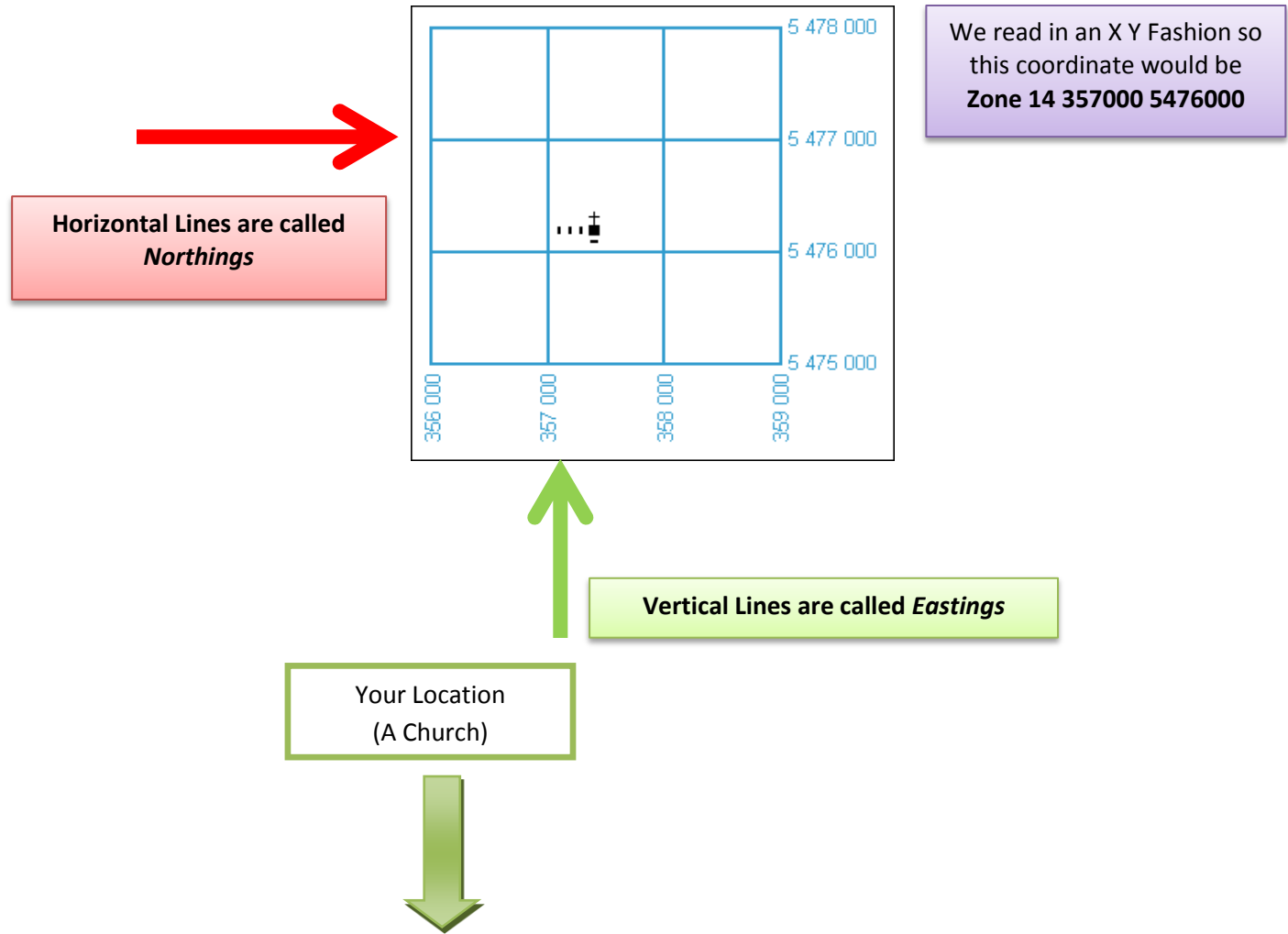


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## Reading your Location on a Map:

When reading your location on a map you read the location in an X Y Fashion. The X axis corresponds to location in the east-west dimension; the Y axis to the north-south dimension.

For example:



In a location, the zone grid is given first, then the easting and finally the northing. In the northern hemisphere, the northing is measured from the equator (i.e., the origin of the grid is on the equator). The zero reference point for the easting is more complicated. Each zone has its own reference point (or origin) which is arbitrarily placed 500000 metres west of its central meridian. Because this point actually falls outside of the zone, all eastings are positive numbers, and increase from west to east.



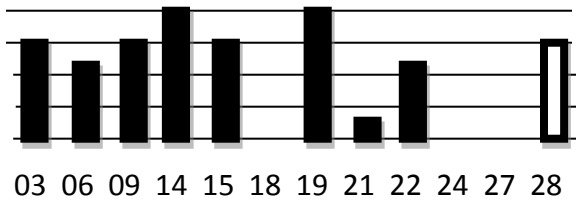
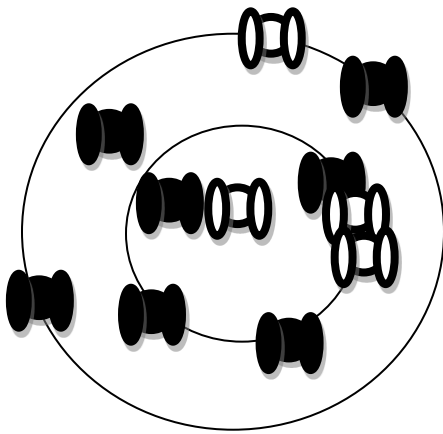

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## GPS Unit Display:

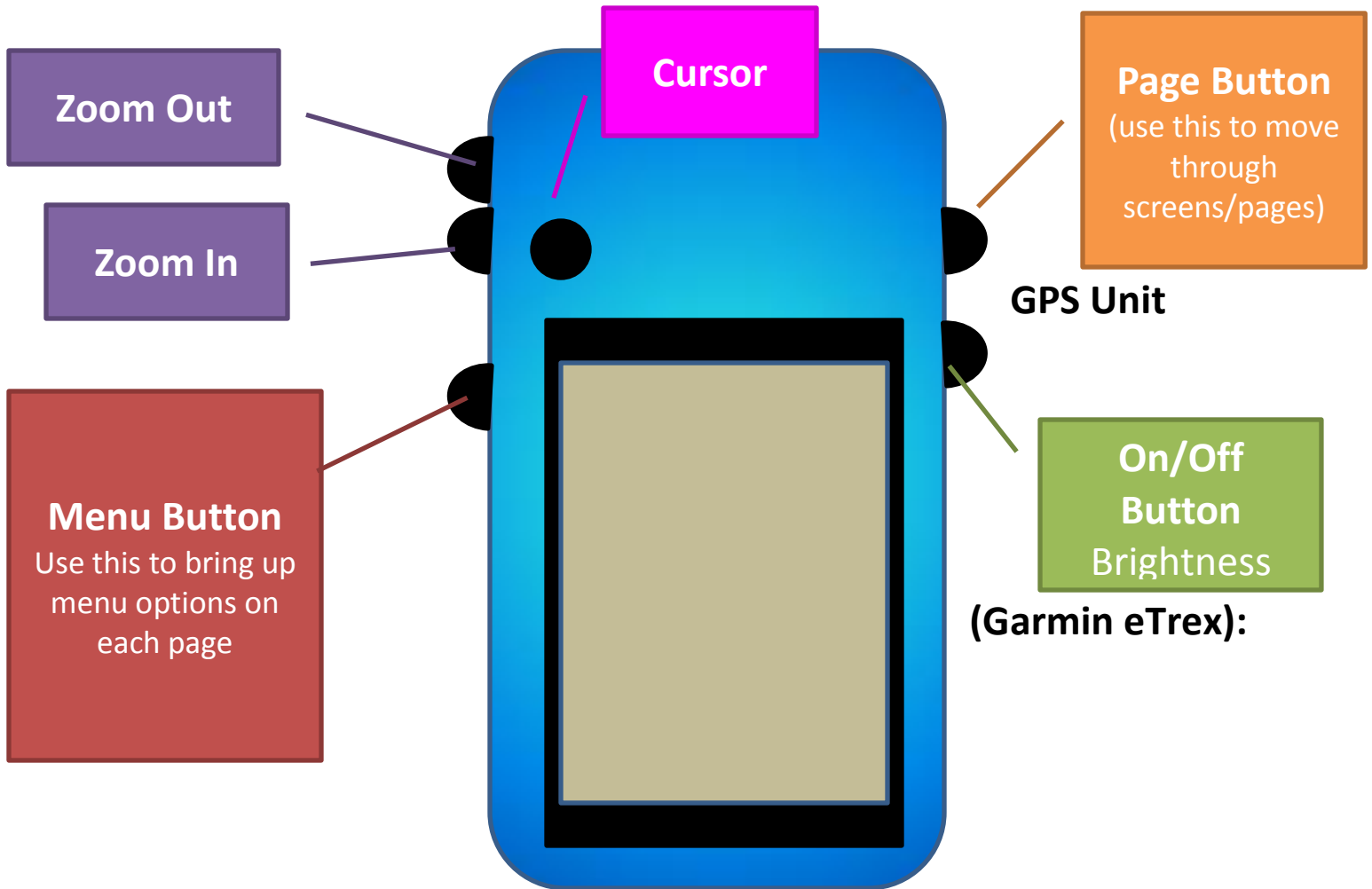
Therefore when you are viewing a GPS and see the display with the Coordinates 14U 0481574 5500009, it means you are in Zone 14, Segment U (lower Manitoba), 481574 metres east of the reference line and 5500009 metres north of the equator.

Location    **14 U**    **0481574**  
± 9m        UTM        **5500009**

Your Location:  
14U 0481574 5500009



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## How to Operate

### Turning on the GPS

1. Hold bottom right button down.
2. Wait for GPS to acquire satellites.
3. Press top right button until screen is at map.
4. In the bottom left corner of the screen the zoom should be at 5m. Press up/down arrows on left to adjust.

### Waypoint

- A Waypoint is a **specific coordinate**
- To make a waypoint of the spot you are currently standing on, hold down the cursor button.
- Here you can change the name and symbol of your new waypoint.
- Press OK
- You now have a WAYPOINT!



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## Putting in a Coordinate

**If you have been given only the UTM of a coordinate, you can find it's location by turning it into a waypoint:**

1. Hold cursor button down.
2. Move cursor down to highlight location and press down.
3. Enter coordinates
4. O.K.
5. Go to map screen and walk towards marker flag.
6. If you cannot see the marker, adjust the zoom until you can see it. Once you get closer to the marker adjust zoom to 5m for most accurate location.

## Coordinate Check

- Input a Coordinate into your GPS Unit (Teachers input a coordinate near your location prior to this exercise use a geographic landmark as a destination, such as a tree, large boulder, building, fire hydrant etc.)
- Press **GO TO**
- *You have to be moving in order for the GPS unit to aim you in the right direction*
- Now let's go find this Coordinate outside!

## Main Menu

- Page the screens until you get to **Main Menu**
- Under here we will use *Find, Routes* and *Tracks*

### **Find**

- Use this to find any Waypoints we have inputted

### **Routes**

- Use this to follow a preprogrammed route along a series of waypoints.
- Once you arrive at a waypoint start walking towards the next waypoint on your map. No need to press any buttons. The GPS will automatically switch to the next waypoint.

### **Tracks**

- Everywhere you walk is being recorded as **Tracks**
- These tracks are shown as dotted lines on your map

## References

En.wikipedia.org (1973) *Global Positioning System - Wikipedia, the free encyclopedia*. [online] Available at: [http://en.wikipedia.org/wiki/Global\\_Positioning\\_System](http://en.wikipedia.org/wiki/Global_Positioning_System) [Accessed: 22 Jan 2013].

Nrcan.gc.ca (2007) *The UTM Grid - Section 1 | Earth Sciences*. [online] Available at: <http://www.nrcan.gc.ca/earth-sciences/geography-boundary/mapping/topographic-mapping/10733> [Accessed: 22 Jan 2013].

