# Some Basics of Spatial Information

The most common way to describe a location is with a pair of measurements called coordinates, which are (most commonly) given in **latitude** and **longitude**.

Latitude is a measure of angular distance north/south of the equator (which is 0° latitude)

Longitude is a measure of angular distance east/west of the **Prime Meridian** (which we have placed at Greenwich, England for Eurocentric reasons, and set equal to 0° longitude)
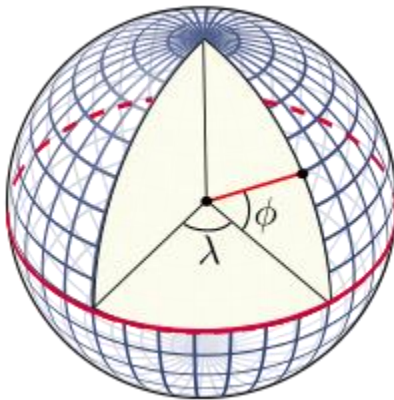
Locations are coordinate pairs:
40.713° N, 74° W
40.713 degrees north of the equator (θ)
74 degrees west of Greenwich, England (λ)

These measurements depend on what we call a **Geographic Coordinate System** (GCS), which is made up of:

- A **spheroid** (a geometric model of the shape of the planet)
- A **datum**[1] (an estimation of where the center of the earth is)
- A prime meridian
- A unit (i.e. degrees)

A GCS lets you describe "flat" space—basically it's just a simple XY plane. To measure area and do other calculations we need to define a **projection**. A projection is a particular calculation of how to "flatten" curved space onto a flat map. A **Projected Coordinate System** (PCS) is a GCS plus a particular method of projection chosen.

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[1] People often use the word datum to refer to the entire Geographic Coordinate System.

The most common GCS is known as WGS84. Data from GPS units and the vast majority of online mapping platforms are in WGS84.

A very common PCS is the Universal Transverse Mercator system (**UTM**). This system divides the planet into 60 different zones, each 6° of longitude long (approx. 660 km). Archaeologists but also city-planners, surveyors, and many others frequently use this system.

World UTM Zones
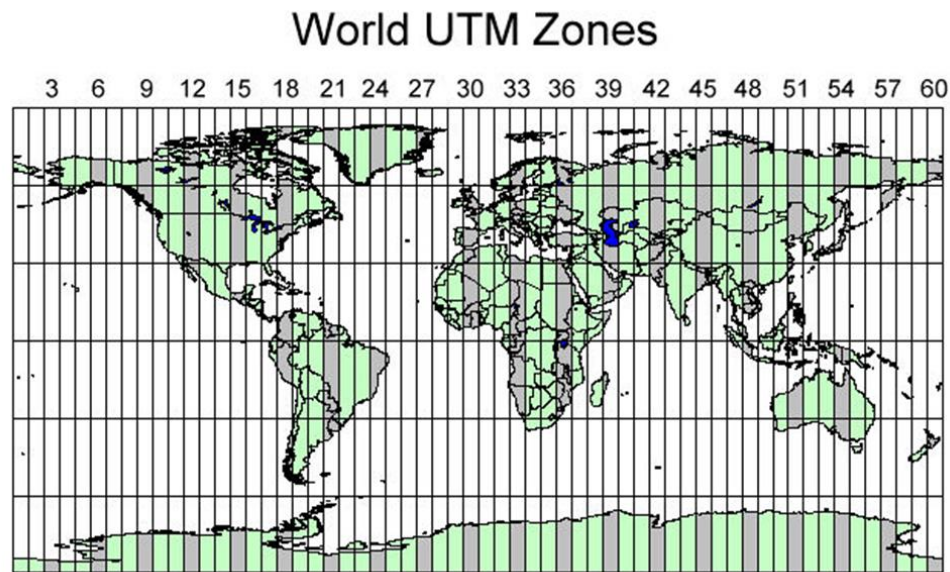
For example, if you see a location described as 36S 683895.70 m E, 4394079.11 m N this is in UTM. The location is in Zone 36, and is several hundred thousand meters north and east of the center of that zone. Note that the measurements are in meters instead of degrees. You can think of this in terms of the fact that, with the projection, space has been flattened out. While you couldn't use a meter stick to measure a distance on a globe, you could if it had been flattened out like a paper map.

Especially as you begin to learn GIS it is fine to just know that these kinds of systems exist. The whole point of GIS software is that things like conversions between systems are done with very little intervention by the user. We will eventually get to the point where thinking in terms of these questions feels intuitive.