Coordinate Reference Systems

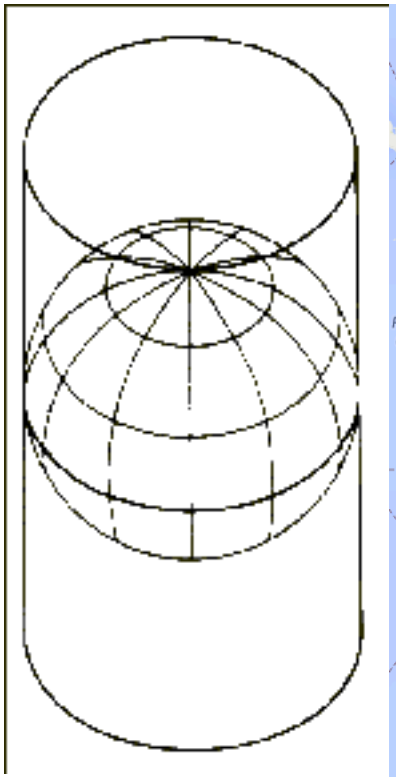
Coordinate Reference Systems (CRS)

- GIS Data (raster and vector) is represented by coordinates (X and Y).
- These X and Y coordinates can mean any number of things!
  - Latitude, Longitude, UTM Easting, UTM Northing, Arbitrary XY data from a defined grid
- Every GIS data file has a CRS, because X and Y coordinates must be represented somehow.

Projections

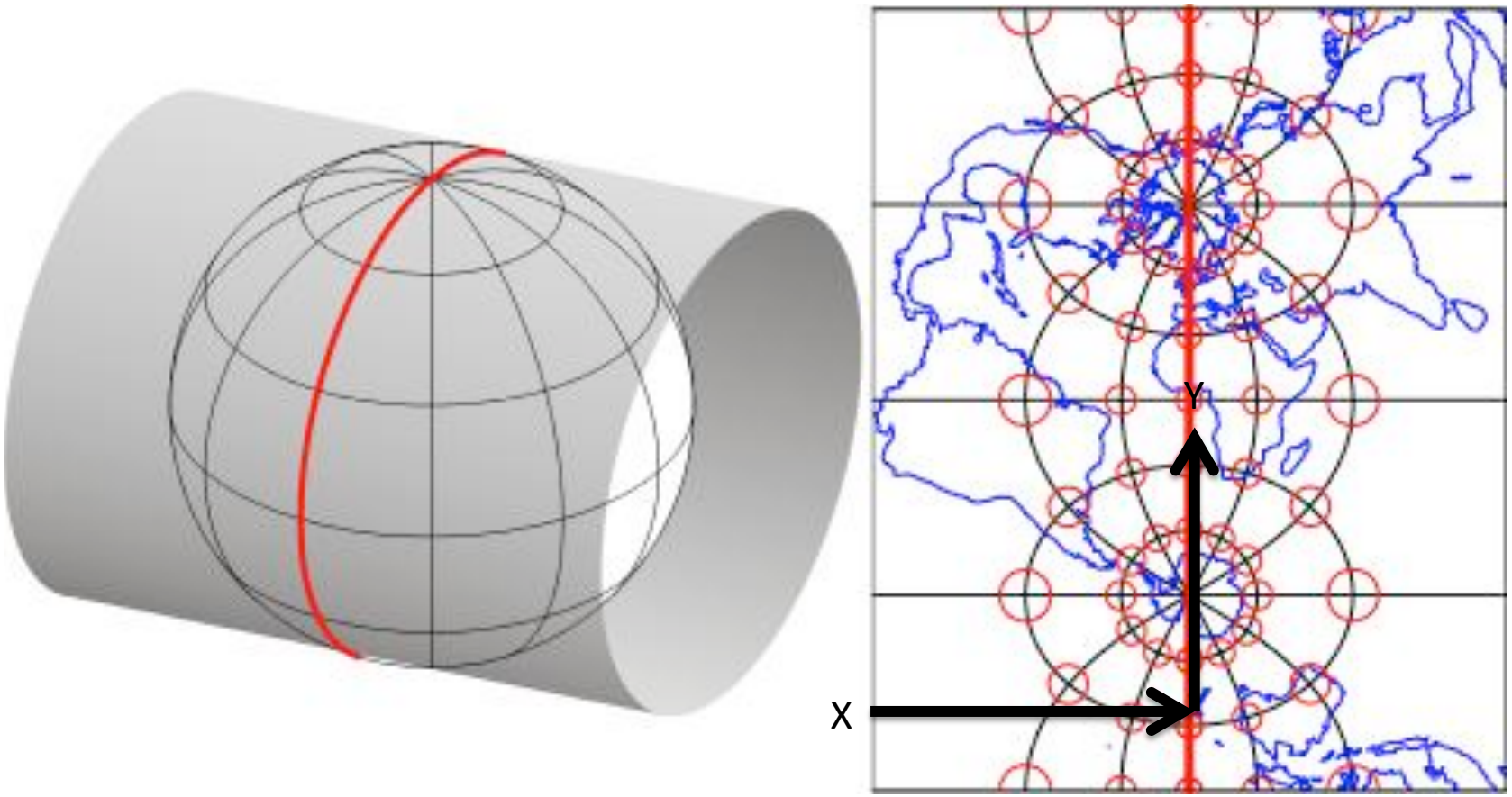
- Earth is a sphere (actually, an ellipsoid), so to represent it on something flat (your screen, a piece of paper) we need a projection.
- Projections are never perfect, always distort some combination of shape (angles), scale (distance), and area.
- Mathematically, projections convert Latitude/ Longitude values (angles) to X/Y values (distances).

Mercator Projection

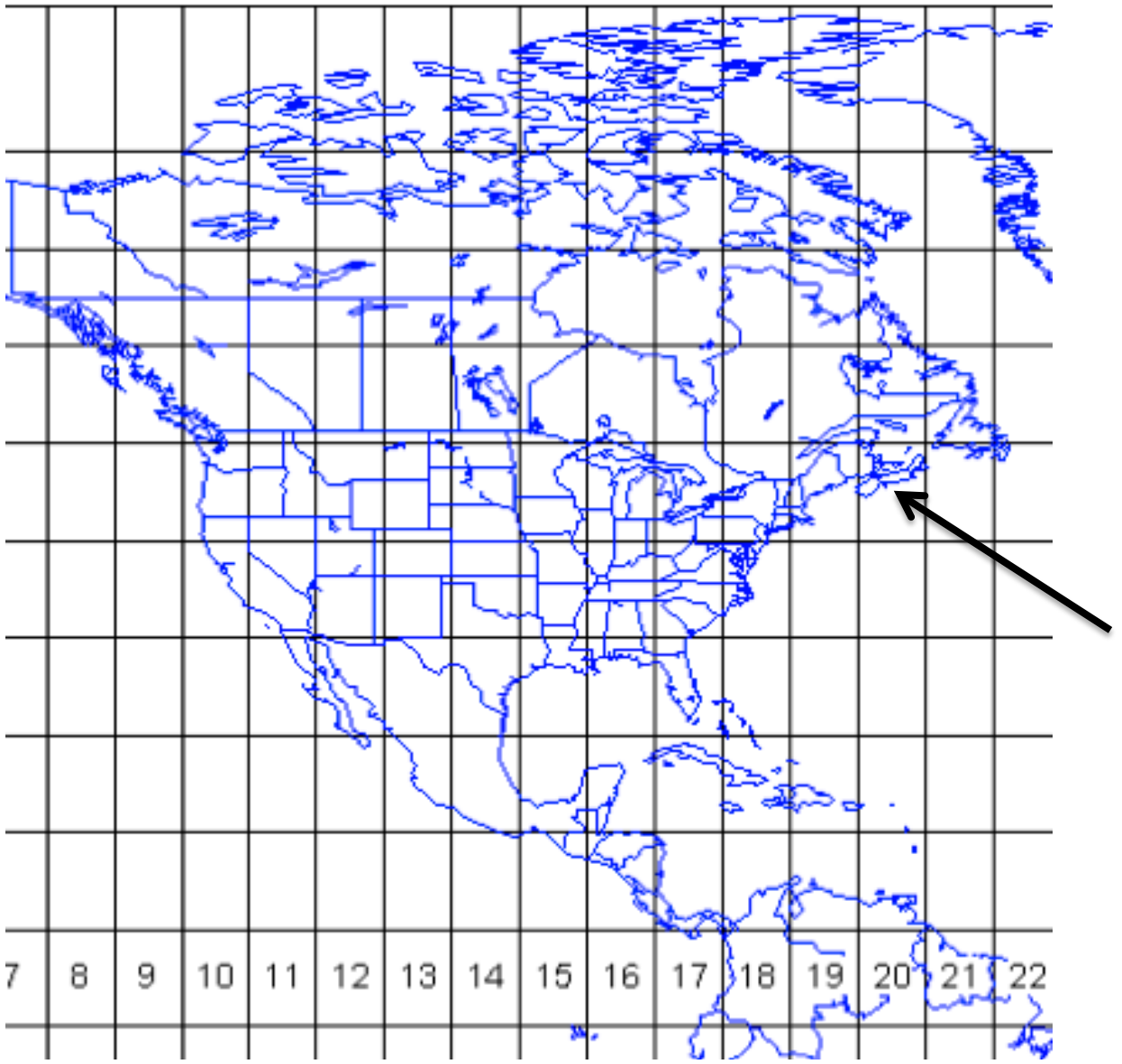


Transverse Mercator Projection

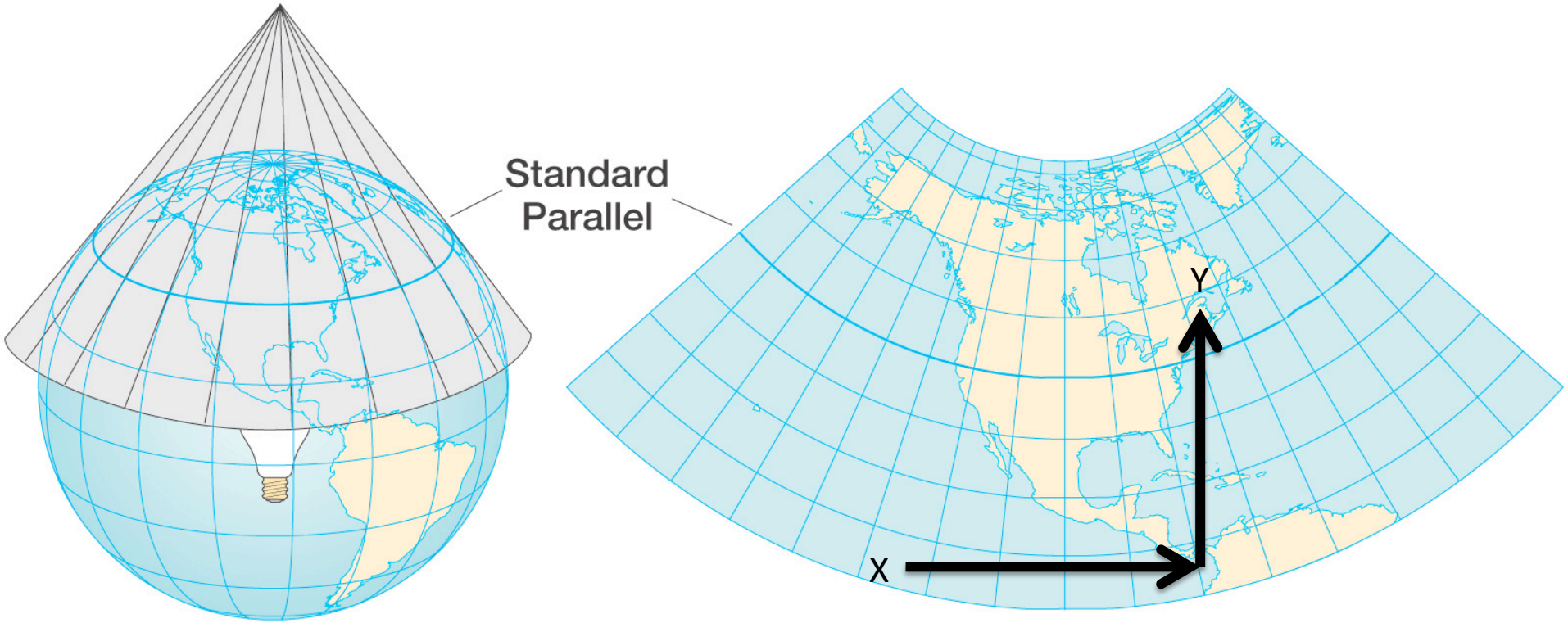
- Low distortion for a very specific strip of the world



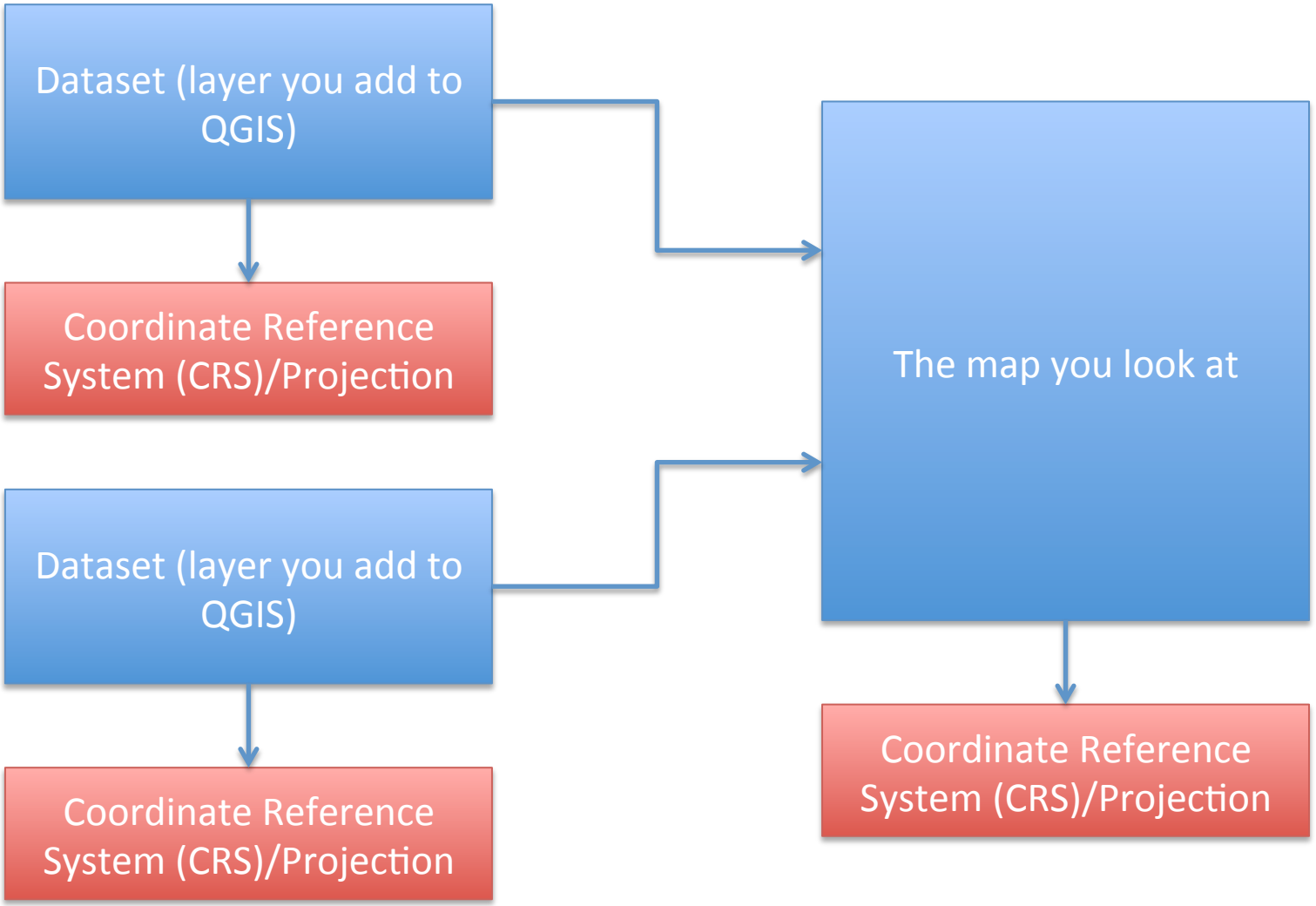
Universal Transverse Mercator Zones



Conic Projection



Projections/CRSs



Projections/CRSs

- The CRS for a dataset can be projected (XY values in distance units) or geographic (latitude/longitude)
- The projection in which you view geographic data can be different than the CRS of the dataset ("on-the-fly projection")
- If your data is not plotting in the right place, you have a CRS problem!

Common CRSs

- WGS84 = Latitude/Longitude
- NAD83 = Latitude/Longitude fixed for North American Plate
- Nova Scotia is UTM Zone 20N
- For small areas (less than 50-100 km across) use UTM!
- For large areas (between UTM zones) use World Mercator or Albers Equal Area Conic
- For the arctic, you may need to use other projections

Exercise!