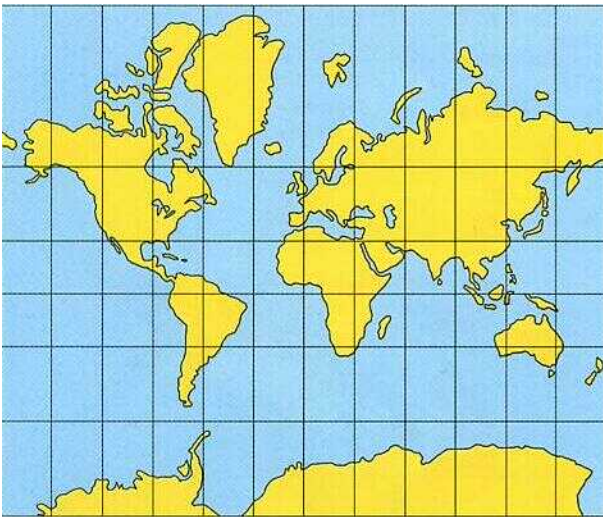
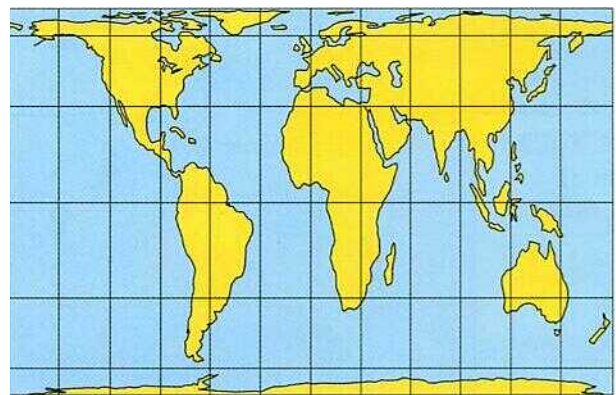


Map projections are the means by which the curved surface of a globe is transferred to the flat surface of a map. Because the earth is a sphere, a globe is its only perfect model. Even though there are an infinite number of map projections, none can be as accurate as a globe. A globe simultaneously shows accurate shapes, sizes, distances, and directions. No single world map can show all four of these properties accurately. Every world map distorts one or more of them. For example, a world map that shows correct shapes cannot show correct sizes, and vice versa.

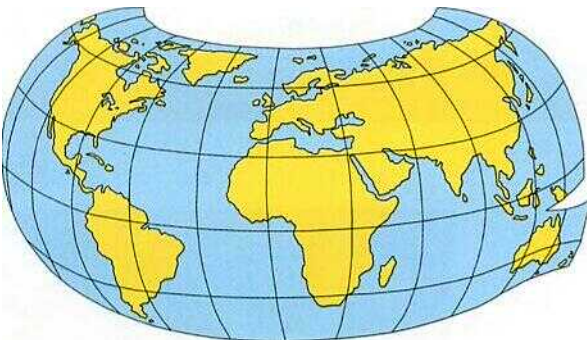
The projections illustrated here can be classified according to their map properties. **Conformal** projections show true shapes, but distort sizes. (You can remember this term's meaning by associating shape with the word *form* in *conformal*.) Equal-area projections show all areas in their true relative sizes, but distort shapes. Compromise projections allow some size distortions in order to portray shapes more accurately. For all types of world map projections, distortion is generally least near the center of the map and greatest at its edges.



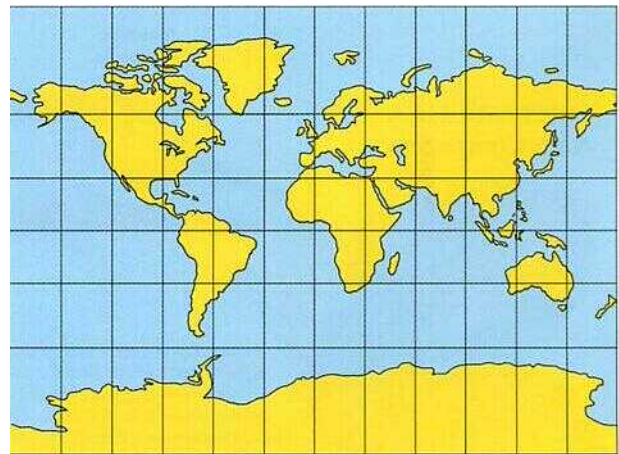
Mercator: First published in 1569, the Mercator is a conformal projection. North and South Poles are shown not as points, but as lines the same length as the Equator. The result is extreme size distortion in the higher latitudes. The Mercator map was designed for navigation, and the true compass direction between any two points can be determined by a straight line.



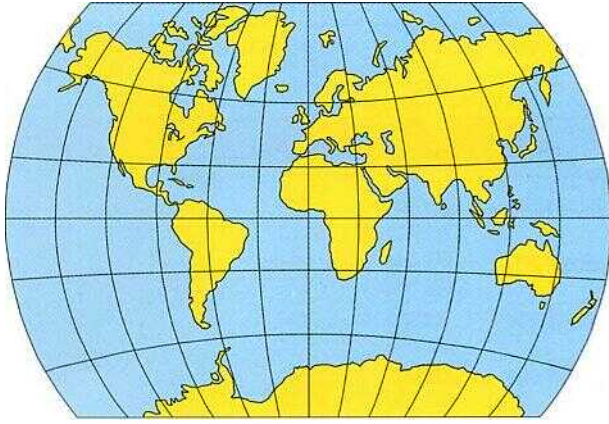
Gall-Peters: An equal-area projection first produced in the 1850's, the Gall-Peters greatly distorts shapes near the Equator as well as near the poles. Features near the Equator are stretched vertically, while features near the poles are flattened horizontally. The resulting shapes are quite different from those on the globe.



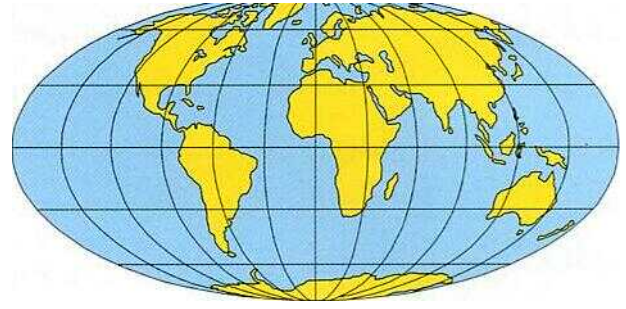
Armadillo: The Armadillo is a compromise projection that is intended to give young students the impression of a map being peeled from a globe. Because its unique appearance results in severe distortions, especially at the map's outer edges, it has seldom been used outside the classroom.



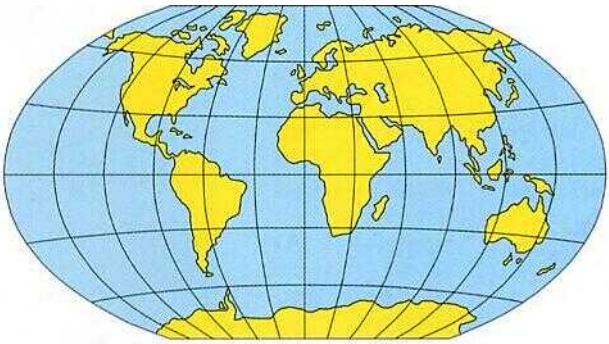
Miller Cylindrical: The Miller is a compromise projection based on the Mercator. Its shapes are not as accurate as those on the Mercator map, but it has much less size distortion in the higher latitudes. The Miller cylindrical projection is frequently used when mapping world time zones.



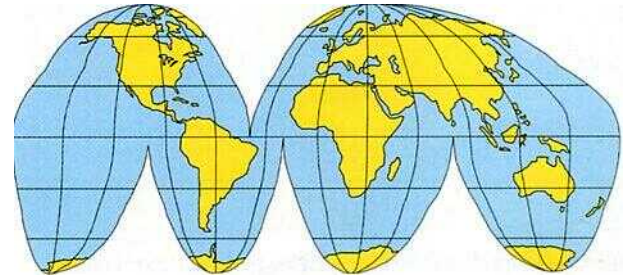
Vander Griten: The Van der Griten is a compromise between the Mercator and the Mollweide. The full projection is shaped like a circle, but the polar areas are normally not shown. Shapes, sizes, and directions are reasonably accurate between 60 degrees N and 60 degrees S, where most of the world's people live. The Vander Griten has long been used for general reference maps.



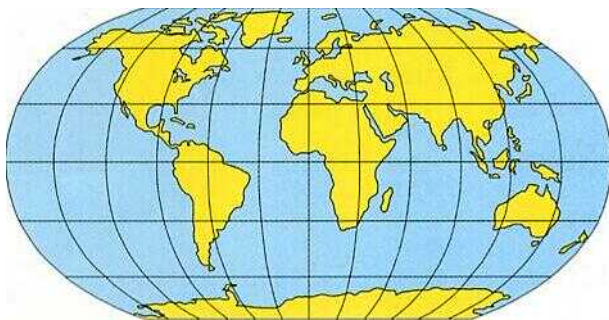
Mollweide: An equal-area projection, the Mollweide has an oval shape that reminds the viewer of a globe. The Mollweide projection is frequently used for world distribution maps. (A distribution map shows the relative location and extent of something—such as crops, livestock or people—across the face of the earth.)



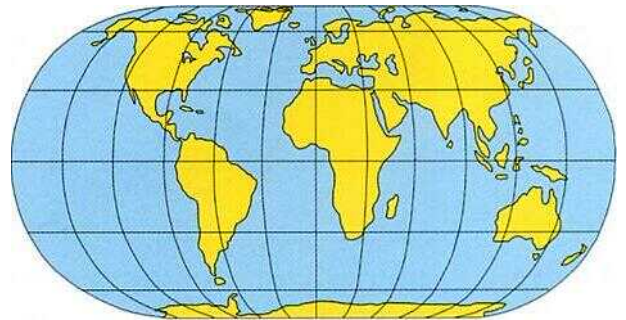
Winkel "Tripel": The Winkel "Tripel" is a compromise projection. Its oval shape and curving parallels result in a map with realistic shapes and minor size distortions at all latitudes. The Winkel has less size distortion than the Van der Griten (above) and less shape distortion than the Robinson (below).



Goode's Homolosine: Goode's is an equal-area map that also shows shapes extremely well. Shapes can be shown more accurately than on most equal-area maps because the grid is *interrupted* or split in the ocean areas. The interruptions allow land areas to be shown with less stretch and distortion.



Robinson; First used in 1963, the Robinson is a compromise projection. Because it presents a reasonable overall picture of the world, it is often used for maps in educational materials. It looks similar to the Eckert IV (at right), but the Robinson is easily distinguished by its size distortion in the polar areas.



Eckert IV: An equal-area projection, the Eckert IV has relatively minor shape distortions near the Equator and the poles. The result is a map that is well-suited either for general reference or for showing world distributions. It has been used in several atlases to show world