Mercator Maps

During the Age of Exploration one of the biggest problems was map making. A geometer could measure distances between every pair of points of interest on the earth, but how could a cartographer take those measurements from a spherical earth and put them on a flat map in a useful way? Useful does not mean accurate because some sort of distortion must enter when flattening the earth's surface. It was a thorny problem.

Many solutions were tried. One that passed the test of time is due to cartographer Gerardus Mercator of The Netherlands. Mercator's innovation was in making the linear scale at any point the same in all directions. Wherever lines crossed on the earth, they crossed on his maps with the same angle between them.[1] Angles are of critical importance to navigation.

As a further consequence, rhumb lines, which are lines of constant navigational bearing, appear as unbroken straight lines. If a ship travels at a constant bearing of 15° north of east, its course will be a straight line on a Mercator map. It is impossible for any other kind of map to have all these properties.

Mercator maps distort areas by enlarging them the closer one gets to the poles. Because most maps today are Mercator maps, far northern and southern land areas are much bigger in people's minds than they actually are. Greenland and Alaska are smaller than people believe. Russia appears to be four times as large as America but is only twice as large.

The images of Greenland below are (left) how it appears on a Mercator map and (right) the shape and size it really has.

The two points that can never appear on a Mercator map are the north and south poles. Polar explorers use special purpose polar maps. Compare the Antarctic continent on a polar map and on a Mercator map.

None of this is meant to criticize Mercator maps, for they are the only maps with the useful properties they were designed to have.

[1] Mathematically the maps are said to be conformal.