

From Globes to Maps

When the curves of a globe become straight lines on a map, the size, shape, distance, or area can change. Imagine taking an orange peel and trying to flatten it on a table. You would either have to cut it or **distort**, or stretch, parts of it. Mapmakers face a similar problem in showing the surface of the Earth on a map. Using mathematics, they have created different types of map **projections** (pruh•JEK•shuhnz), or ways of showing the Earth on a flat sheet of paper. Each kind of projection shows the Earth's surface in a slightly different way.

Flattening Out the Planet

When you take an image of the Earth and flatten it, big gaps open up. To fill in the gaps, mapmakers stretch parts of the Earth. They show either the correct shapes of places or their correct sizes. It is impossible to show both. As a result, mapmakers use different map projections depending on their goals.

Map Projections

Take another look at that flattened orange peel. You might see something that looks like a map based on Goode's Interrupted Equal-Area projection. A map made using this projection shows continents close to their true shapes and sizes. This projection is helpful for comparing land areas among continents.

The map on the top right was made using the Mercator projection. It shows true direction and land shapes fairly accurately. However, it does not show correct size or distance. Areas located far from the Equator are distorted on this projection. Alaska, for example, appears much larger on a Mercator map than it does on a globe.

A map using the Robinson projection is less distorted. Land on the western and eastern sides of the Robinson map appears much as it does on a globe. Areas near the North and South Poles are distorted the most on this projection.

The Winkel Tripel projection gives a good overall view of the continents' shapes and sizes. You can see that land areas in this projection are not as distorted near the Poles.

✓ PROGRESS CHECK

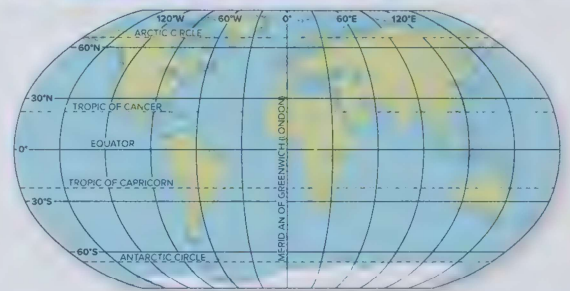
Analyzing What are an advantage and a disadvantage to using a map rather than a globe to study the Earth's geography?

Mercator Projection



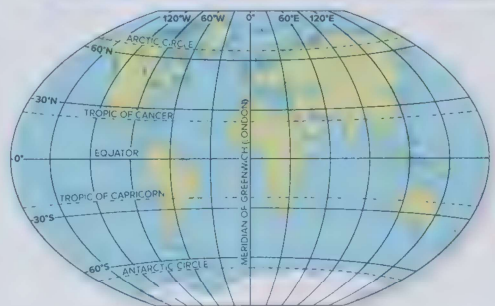
On a Mercator projection, land size and distance appear quite distorted.

Robinson Projection



The Robinson projection shows a truer picture of land size and shape. However, the North and South Poles show a great deal of distortion.

Winkel Tripel Projection



The representation of land areas on the Winkel Tripel projection most closely resembles the globe model.