



## 2.4 Map Projections

**Main Idea** Cartographers use various projections to show Earth's curved surface on a flat map.

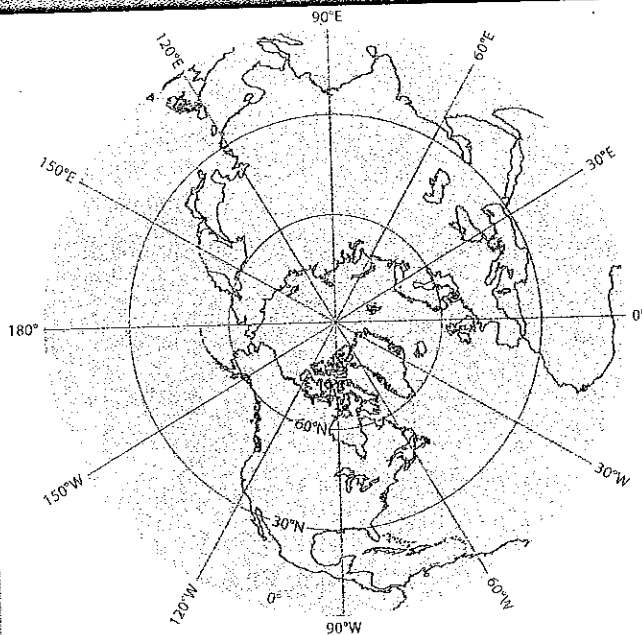
The world is a sphere, but maps are flat. As a result, maps **distort**, or change, shapes, areas, distances, and directions found in the real world. To reduce distortion, mapmakers use **projections**, or ways of showing Earth's curved surface on a flat map. Five common map projections are the azimuthal, Mercator, homolosine, Robinson, and Winkel Tripel. Each projection has strengths and weaknesses—each distorts in a different way.

When cartographers make maps, they need to choose a map projection. The type of projection depends on the map's purpose. Which elements are acceptable to distort? Which are not acceptable to distort? For example, if a cartographer is creating a navigation map, it is important that directions are not distorted. It may not matter, however, if some areas or shapes are distorted.

### Before You Move On

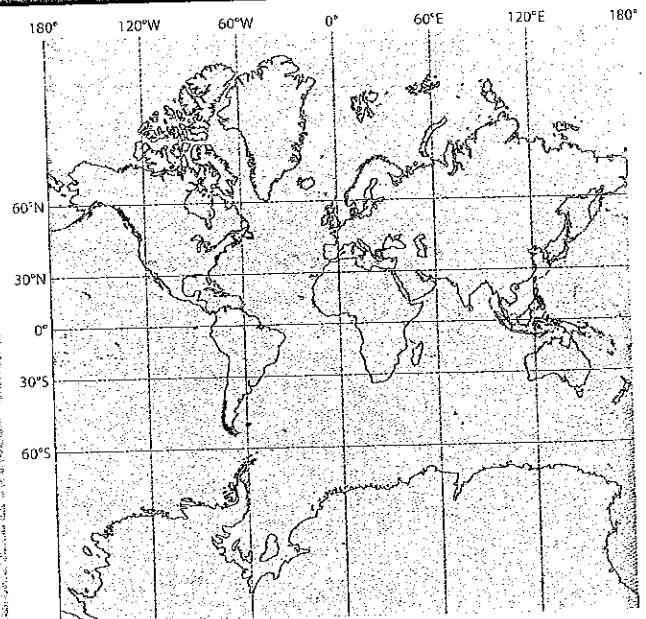
**Make Inferences** How do cartographers decide which projection to use?

#### AZIMUTHAL PROJECTION



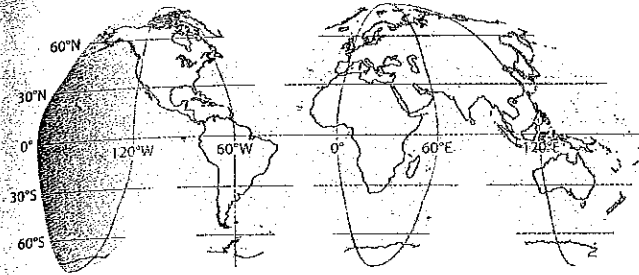
Mapmakers create the **azimuthal projection** by projecting part of the globe onto a flat surface. The projection shows directions accurately but distorts shapes. It is often used for the polar region.

#### MERCATOR PROJECTION



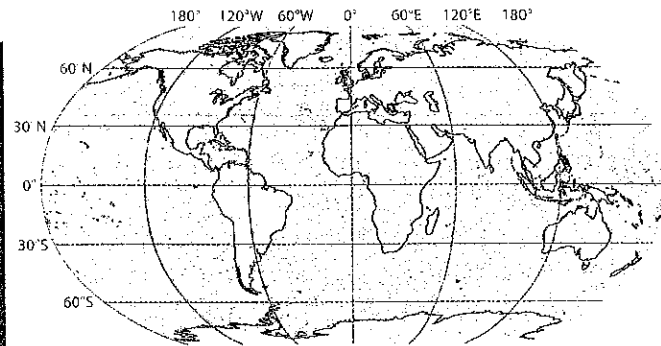
This **Mercator projection** shows much of Earth accurately, but it distorts the shape and area of land near the North and South Poles. This projection shows direction accurately, so it is good for navigation maps.

## HOMOLOGOSINE PROJECTION



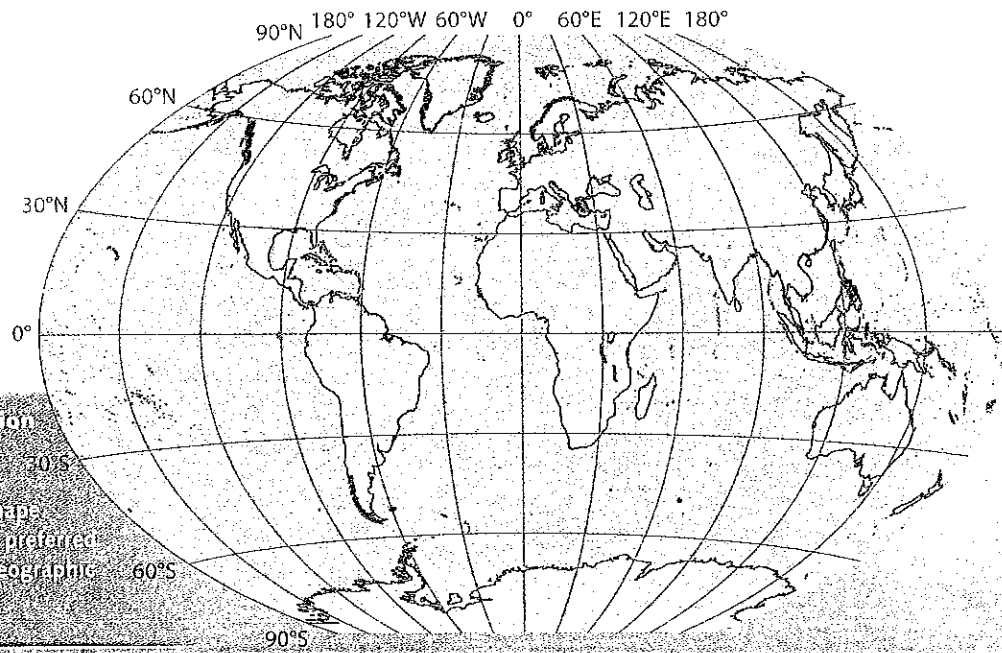
The homologosine projection resembles the flattened peel of an orange. It accurately shows the shape and area of land masses by cutting up the oceans. However, it does not show distances accurately.

## ROBINSON PROJECTION



The Robinson projection combines the strengths of other projections. It shows the shape and area of the continents and oceans with reasonable accuracy. However, the North and South Poles are distorted.

## WINKEL TRIPEL PROJECTION



The Winkel Tripel projection is a modified version of the Robinson projection. It has less distortion of area and shape. This projection has been the preferred projection of the National Geographic Society since 1998.

### ONGOING ASSESSMENT

## MAP LAB



GeoJournal

- 1. Compare and Contrast** Locate Greenland on the Mercator projection and on the Robinson projection. What is similar and different in the two maps? Why?
- 2. Location** What does the azimuthal projection show about the relative location of Alaska and Russia?