Lesson 12

Comparing Map Projections

Objective: to identify different map projections and compare their features

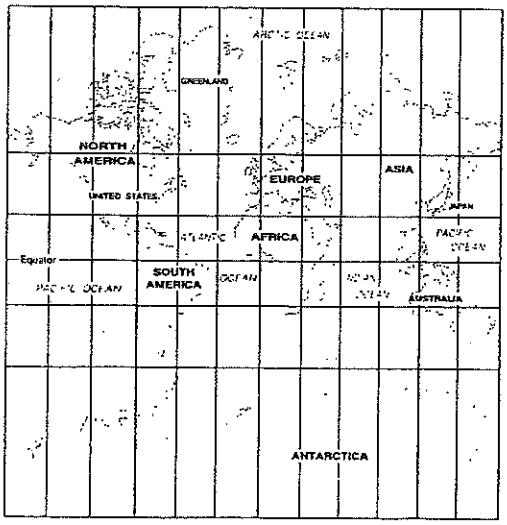
Earth is a sphere, and so the most accurate way to show Earth's surface is with a globe. On a globe, both the sizes and shapes of the continents and oceans are shown accurately. No flat map of the whole Earth can be as accurate as a globe.

Imagine peeling an orange and trying to flatten the peel without breaking it. To do this, you would have to stretch some parts and fold others. Map makers face the same problem in drawing the round Earth on a flat map.

To make a flat picture of the Earth, map makers must change the sizes and shapes of lands and oceans. These changes are called **distortion**. All maps have some distortion. The more of Earth's surface a map shows, the more it has been flattened out and the greater its distortion. Maps of the whole world show the most distortion. Maps of small areas show the least.

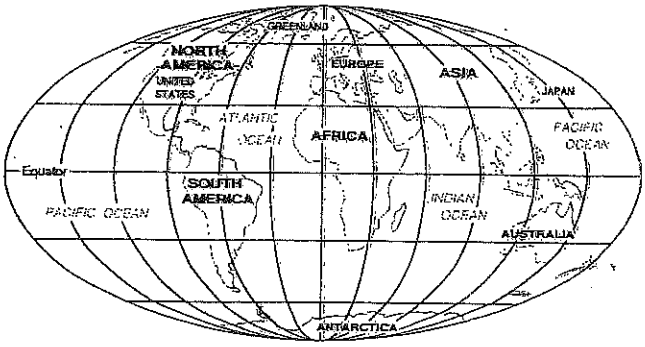
Map makers have tried many ways of drawing Earth. These drawings are called **projections**.

The **Mercator projection** shows the true shapes of land areas. However, the sizes are distorted. Lands near the North and South poles look much larger than they really are. Sizes of the land near the equator are more accurate.



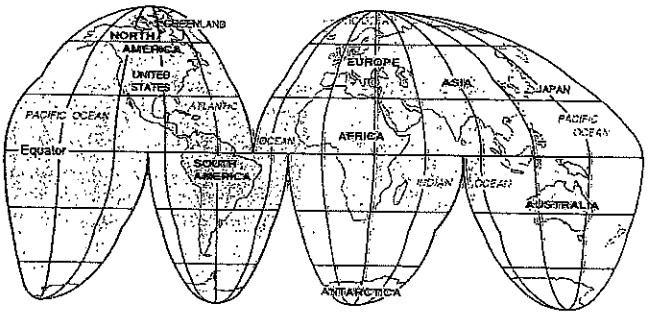
Mercator Projection

The **Mollweide projection** is called an equal-area projection. That is, land areas are shown in accurate size and scale. However, land shapes are distorted, especially near the edges of the map.



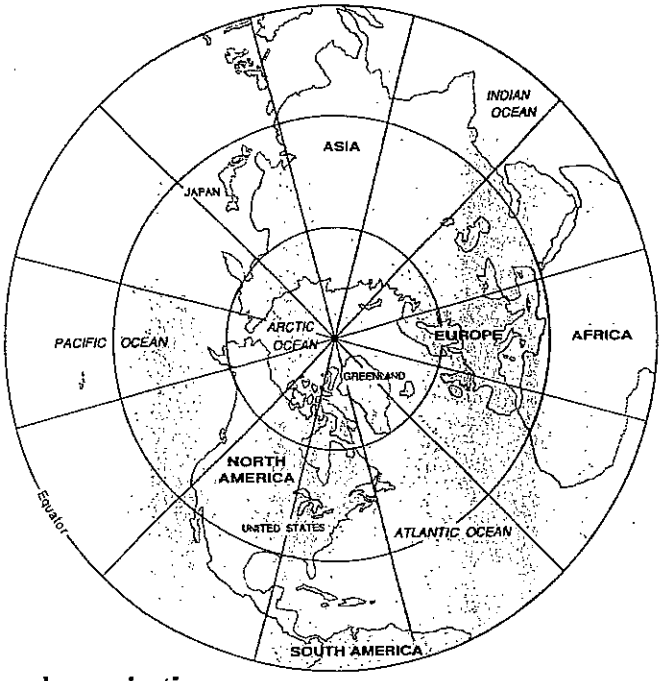
Mollweide Projection

This **Goode's interrupted projection** is also an equal-area projection. It shows sizes accurately. The shapes of the continents are less distorted than on the Mollweide or Mercator projections, too. To make these improvements, however, the map maker had to split the map into sections, dividing the oceans.



Goode's Interrupted Projection

A **polar projection** shows Earth as if you were looking down at the North Pole or the South Pole. This projection shows size accurately, but shapes are distorted more and more toward the edges. A polar projection shows only half the Earth.



polar projection

Compare these map projections and answer the following questions.

1. Which of these maps would have the least distortion when drawn by map makers?
   a. map of North America
   b. map of the United States
   c. map of the state of Illinois
   d. map of the world

2. South America is about nine times larger than Greenland. On which projection do Greenland and South America look about the same size?
   a. Mollweide
   b. Mercator
   c. Goode's
   d. polar

3. Lands far from the equator look larger on the Mercator projection. Which one of these continents would be enlarged the most on a Mercator map?
   a. North America
   b. South America
   c. Africa
   d. Australia

4. In what way is the polar projection different than the other three projections?
   a. It only shows one ocean.
   b. It only shows Africa and Asia.
   c. It only shows Antarctica.
   d. It only shows half of the world.

5. Which two projections allow you to compare the true sizes of continents in both the Northern and Southern hemispheres?

   _____

   _____

6. a. Which continent's shape is impossible to see completely on any of the maps?

   _____

   b. What projection could best show that continent?

   _____

7. a. Which ocean appears at the center of most of these projections?

   _____

   b. Suppose you wanted to show trade connections between the United States and Asia. What ocean would you put at the center of your map?

   _____

Gerardus Mercator, whose world projection was widely used by navigators during the 1500's.