

U. S. DEPARTMENT OF THE INTERIOR  
U. S. GEOLOGICAL SURVEY

## Make your own Earth

# Globe

By

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## Description

This report contains instructions and patterns for making a terrestrial globe. The pattern or map projection is designed to be glued onto a used tennis ball. The terrestrial globe is intended to help visualize the location of the continents and oceans. By constructing and examining the globe, students and others will obtain a greater appreciation of the oceans, continents, and edges of continents and of their shapes and positions. This exercise will give the students an insight as to how the parts of Earth's surface are put together. Included in this report are the paper patterns (map projections), instructions for assembly, educator's guides, and a simple description of terrestrial globes.

Any theme or subject can be added to the terrestrial map projection before or after attaching it to the tennis ball. Global themes as ocean currents, tropical rain forests, population centers, geology, sedimentary basins, and mountain ranges are more easily understood when seen in a global context.

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## **Educator's Guide**

### **Globes**

A globe is a world map on the surface of a small sphere that represents the Earth. Of all the world maps, the globe is the easiest to understand because it gives us the most realistic picture of the Earth and has the same attributes as the Earth; round and immense, and impossible to see all at once. Spatial attributes such as distance, direction, shape, and area are preserved as well as the continuity of the all-curved surface. Globes represent the best possible map projection because they include a minimum of distortion and are the ultimate in geographic realism. Globes come in all sizes and are designed for many uses. Most are terrestrial or geographic globes, some are for decoration, without much thought given to geography as we know it, and some are training globes for navigation and general education. Globes that represent the heavens are called celestial globes. Today's globes are constructed of plastic, but, before plastic was available, paper and plaster were used. Early globes used hand-drawn segments of a map projection that were attached to a sphere. These segments, called gores, were tied together near the equator and separated or interrupted toward the poles. As most printing machines cannot print on the all-curved surface of a sphere, the gore method of making globes is still used.

### **Tennis ball globes**

An earth globe can be constructed using the enclosed world map. The world map is composed of twelve gores that are designed to be attached to a tennis ball. Each gore has a width of 30°, the time it takes the sun to travel two hours over the surface of the Earth. The twelve gores can be cut into four groups of three gores each and glued onto the tennis ball, or the gores can be glued on as a group of twelve. Either way, it is important to have the equator divide the tennis ball into two equal parts and for the equator to be in a straight line. See instructions for the construction of tennis ball globes, pages 9 and 10 in this report.

The Earth globe or terrestrial globe (pertaining to the Earth) is a world map that outlines the continents. This globe can be the base for showing any theme or subject, such as ocean currents, tropical rain forests, mountain ranges, river systems, human population, geology and so on. The globe allows us to see the whole world and to look at the world from a different angle, giving us a better understanding of the Earth's relationships.

### **Great-Circle Indicator**

You can use the great-circle indicator to measure both latitude and longitude. To find the latitude of your city align the great-circle indicator for latitude over both poles and your city. Use the indicator like a ruler to find the degree of latitude directly over your city. To find the longitude of your city, hold the great-circle indicator on the equator. Where a meridian, a north-south line, from your city intersects the great-circle indicator is the longitude

for your city. Longitude is read in degrees east or west of the Greenwich (prime) meridian.

## Glossary

The following glossary will help you get acquainted with some of the terms associated with earth globes.

**Geology** - the study of the planet Earth.

**Globe** - a body having the form of a sphere that has a map of the Earth attached to it.

**Gore** - a lune-shaped piece of paper that conforms to a spherical base.

**Great circle** - the shortest distance between any two points on the globe.

**Lune** - a crescent-shaped figure on a plane or sphere.

**Sphere** - an object bounded by a uniformly all curved surface, all points on which are equidistant from the center.

**Terrestrial globe** - an earth globe.

**Up** - Which way is up? On the earth "up" means away from the center of the earth and "down" means toward the center of the earth. That's why people in the southern hemisphere can stand "up" with their feet pointing "down" to the center of the earth.

## Questions

In what direction does the earth rotate?

In what direction does the day travel?

What is the circumference of the earth?

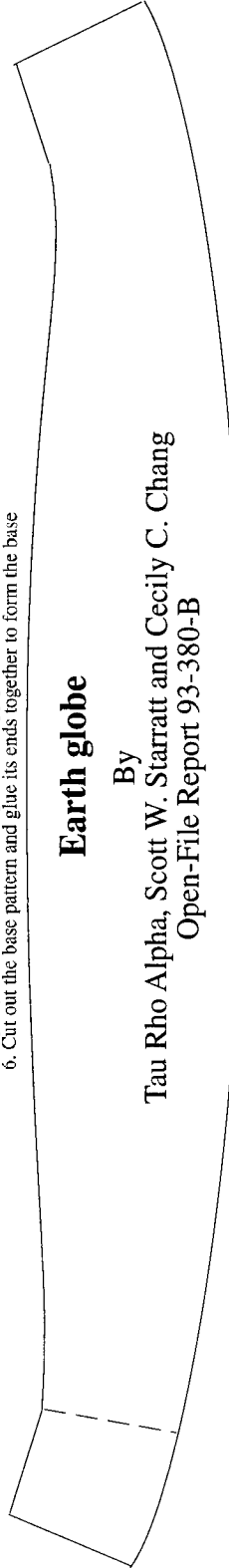
## Acknowledgments

A project of this kind is a journey into the unknown--no one knows what the outcome will be. There is no guarantee that the pattern will work, nor that all of the different software used to compile such a publication will provide satisfactory solutions. Without Daan Strebe's map-projection software, Geocart (distributed in the U.S.A. by Terra Data Inc., Bramblebush, Croton-on-Hudson, N. Y., 10520), this report could not have been completed. The patterns for the globes are similar to a map projection called Rectangular Polyconic that was invented by Strebe. Many people, mostly teachers, provided help and encouragement in development of the globes. Although there is not enough space here to list them individually, their support is gratefully acknowledged. This report was enhanced by the excellent reviews by Wilma Kiouss, John Galloway and Jim Pinkerton.

**Instructions for constructing a tennis ball globe**

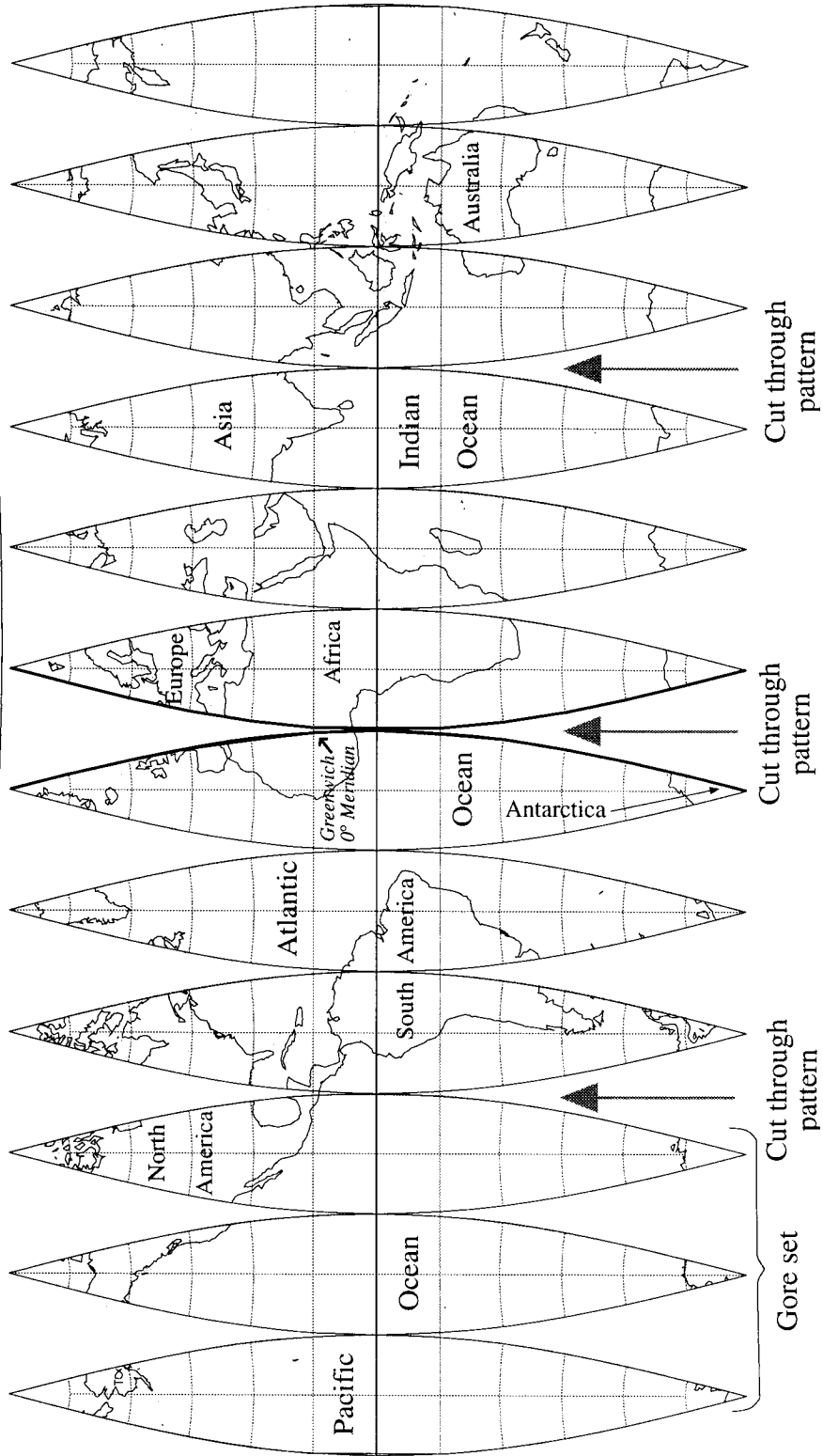
1. Cut out the pattern of the map projection
2. Cut the map projection into four groups of gores (three gores each)
3. Apply glue to the back side of first set of gores
4. Apply the glued gore set to the tennis ball
5. Apply glue to the other sets of gores and apply them to the tennis ball
6. Cut out the base pattern and glue its ends together to form the base

Glue here for globe base

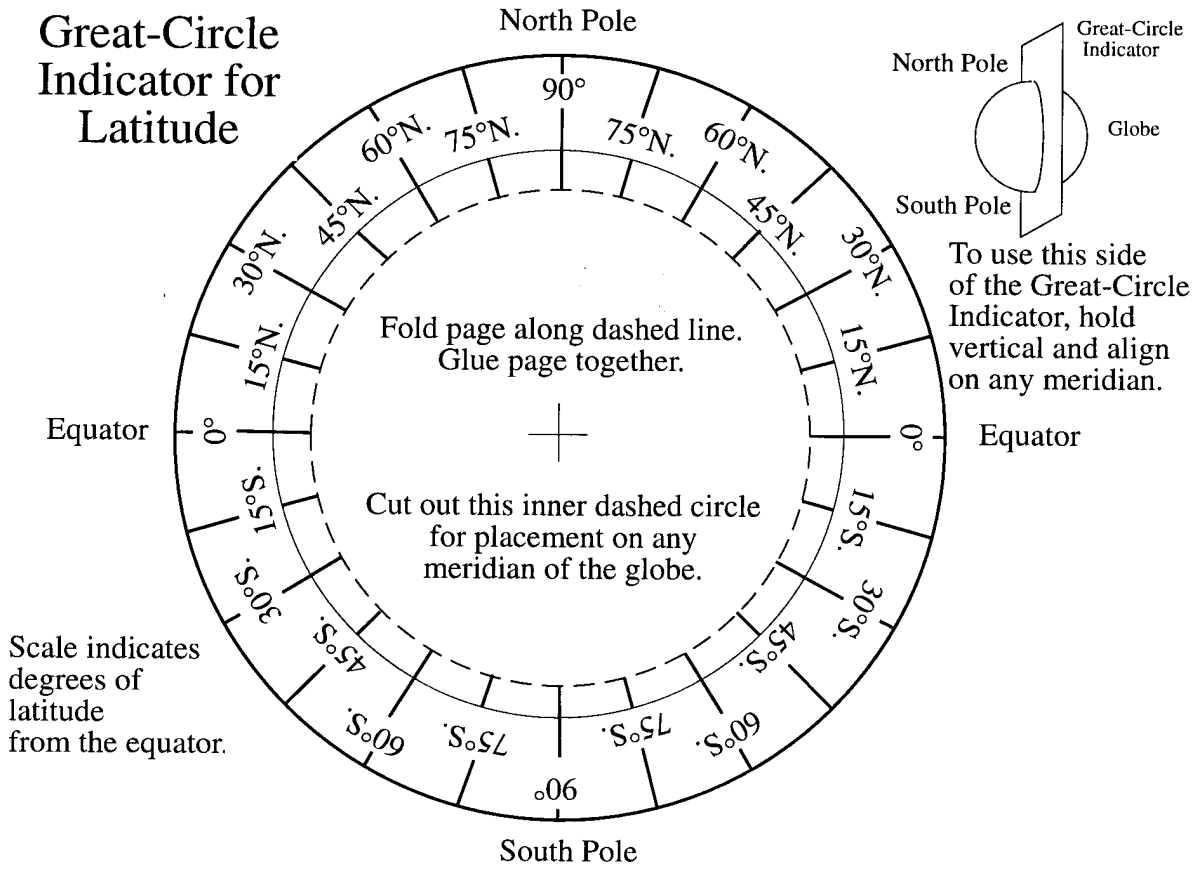


**Earth globe**

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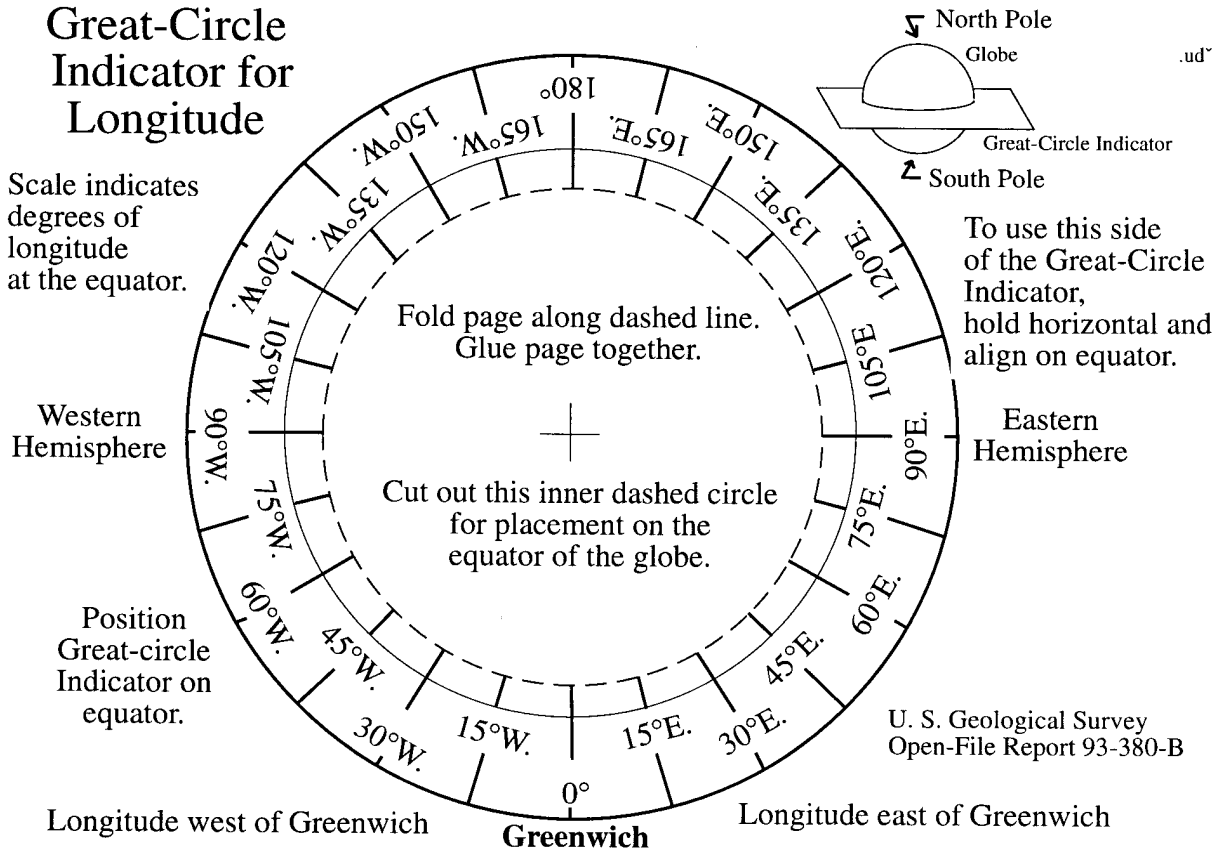


### Great-Circle Indicator for Latitude



-- Fold so printed side is out.

### Great-Circle Indicator for Longitude



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