Key Ideas — Models of the Earth

The Earth is made up of 4 “spheres”: Atmosphere (air); Hydrosphere (water); Lithosphere (rock); and Biosphere (living organisms).

A globe is the best model of our planet because both are 3-dimensional spheres. Evidence that the Earth is round include: photos from spaceflight (best evidence); ships disappearing slowly over the horizon; and Earth’s curved shadow on the Moon seen during a lunar eclipse.

Reference lines of latitude and longitude are used to identify any position on the earth. Lines of latitude run east-west, but measure distances north and south of the Equator (0°). They are parallel each other. They go from the Equator to 90° N (North Pole) and 90° S (South Pole.) Longitude is based upon observations of the Sun, comparing the position of the observer with the position at the Prime Meridian (0°longitude) which passes through the Old Royal Observatory at Greenwich, near London, England. Since Earth spins (rotates) through 360° in one day (24 hours), it turns at a rate of 15° of longitude each hour. This is the basis for standard time zones.

The altitude of Polaris (North Star) is the same as the latitude of the observer.

Measurements show a greater pull of gravity at the poles than at the equator, showing that the poles are slightly closer to center of the Earth. Because the Earth bulges slightly at the equator and is slightly flattened at the poles it is called an oblate spheroid. Remember it is more round than a basketball.

The oceans cover almost three-quarters of the surface, but are comparably thinner than a film of water on a basketball.

The Earth’s solid layers include the crust, mantle, outer core, and inner core. The core is made of iron and nickel. The outer core is molten (fluid) and the inner core is solid. Movements within the core create Earth’s magnetic field, which enable compasses to function and protects our planet from harmful solar radiation, among other effects. Temperature, density, and pressure all increase going from the crust deeper toward the center of the Earth.

A map is a 2-dimensional representation that can symbolically depict portions of Earth’s surface in more detail than would be possible with any globe. In recent years, digital imagery has greatly advanced contributions of cartography. Landforms can be represented on topographic maps through the use of contour lines, which connect points of equal elevation. Other patterns can also be represented by the use of isolines, such as isobars (pressure) and isotherms (temperature) on weather maps. Isolines can never cross each other. (No point can have two values.) Hachure marks show depressions (valleys within flat areas). Where contour lines cross a stream, they always form a “V” pointing upstream.

Contour lines can be used to create a topographic profile, which represents the shape of the landform as seen from a distance. (Imagine looking at a mountain’s shape from the bottom.) The closer together isolines are, the steeper the gradient (slope or difference in value over a distance.)

Landforms, weather patterns, sea surface temperatures, and anthropogenic features (such as traffic
patterns) can be represented by electronic imagery. Many digital maps use **color-coding** to bring out significant patterns. Other manipulated software data to create “fly-throughs” and other effects.

Eratosthenes was a 3rd Century B.C. Greek mathematician who first determined the approximate circumference of the Earth. He used principles of **geometry** to find the **altitude (angle above the horizon)** of the Sun at two positions at **solar noon** and the distance between those positions.