

Bell Ringer

What is science?

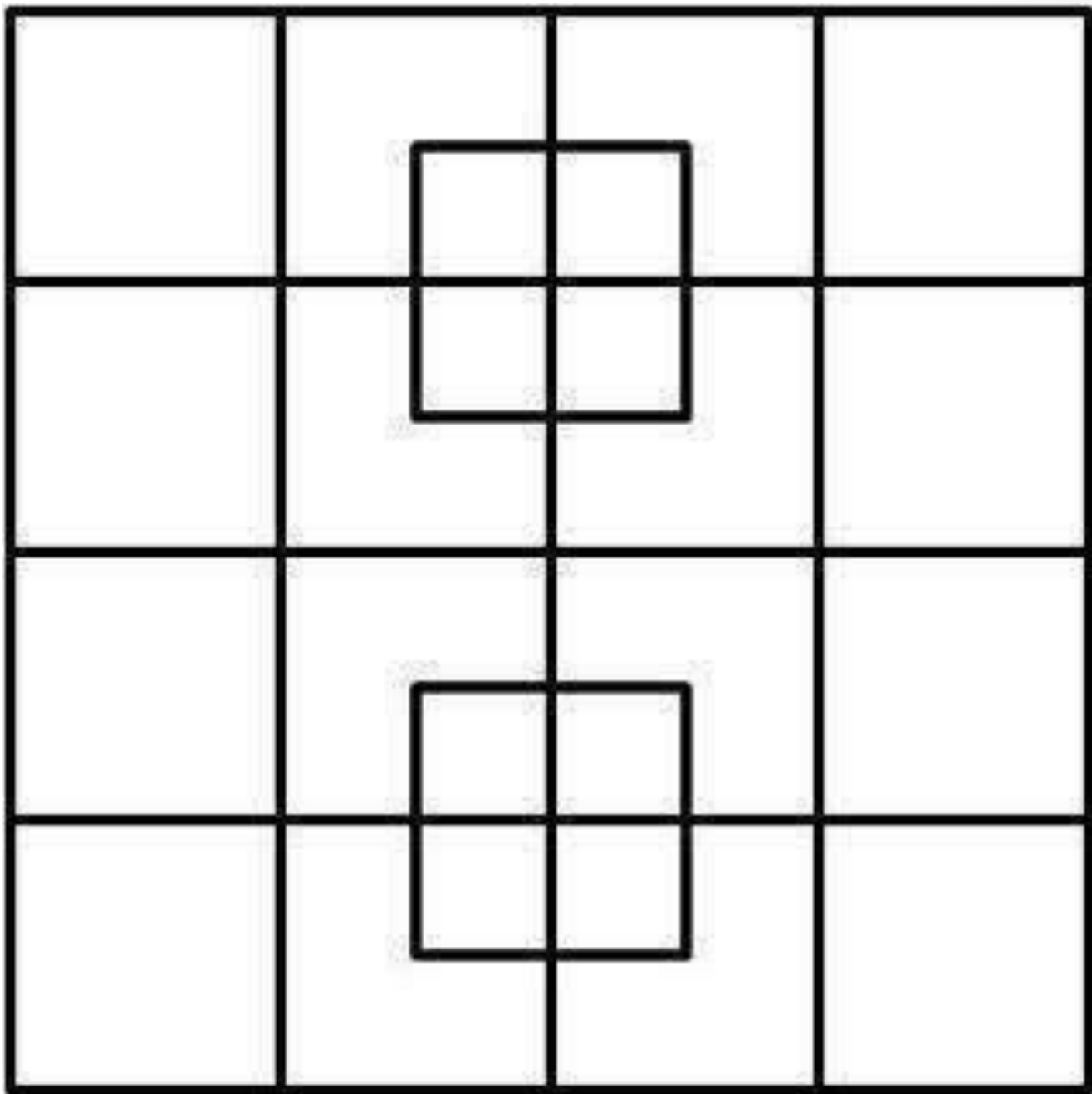


EARTH SCIENCE

Introduction to Earth Science

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What do we use science for?



What is Science?

- Science is a way to understand our world and how it works
- It is a way to systematically study the natural world.



Courtesy of Capital Pictures



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Earth Science

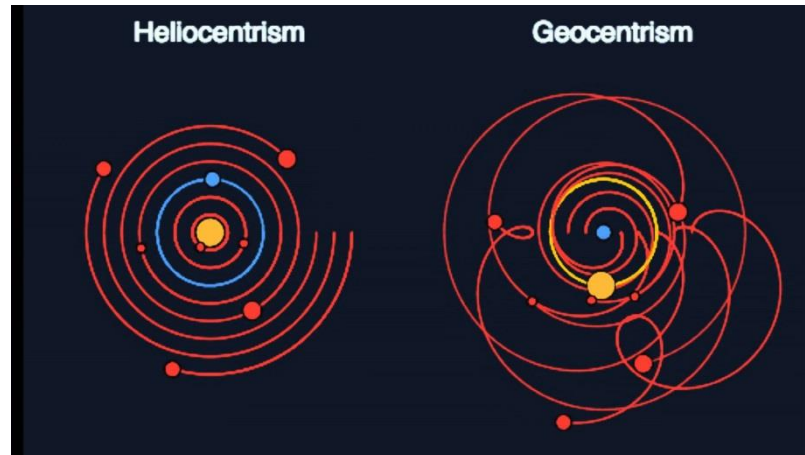
- ◆ Science assumes the natural world is
 - consistent
 - predictable
- ◆ Goals of science are
 - to discover patterns in nature
 - to use the knowledge to predict



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Hypothesis and Theory

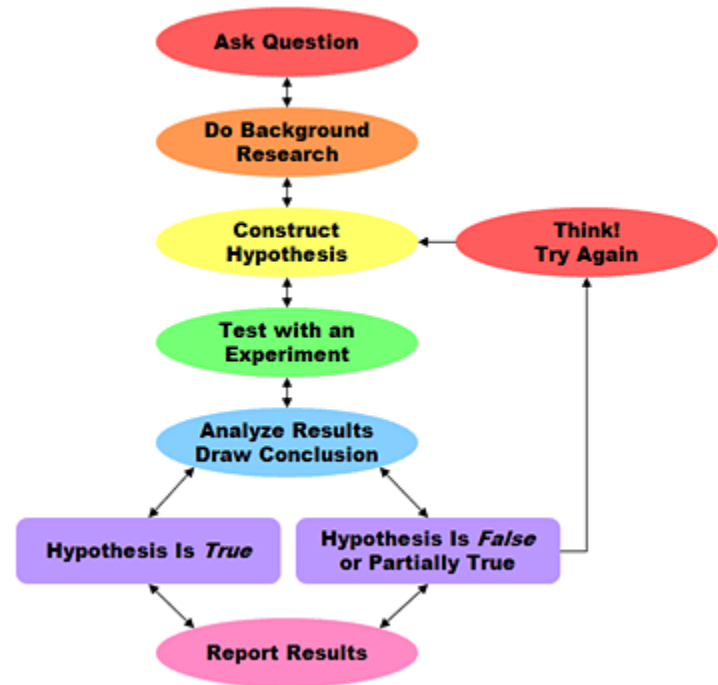
- ◆ An idea can become a
 - **hypothesis**—tentative or untested explanation
 - **theory**—tested, confirmed, supported hypothesis



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Scientific Method

- ◆ Scientific Method
 - A process used by all scientists in the world.
 - Test hypotheses through experiments to formulate theories



Scientific Method



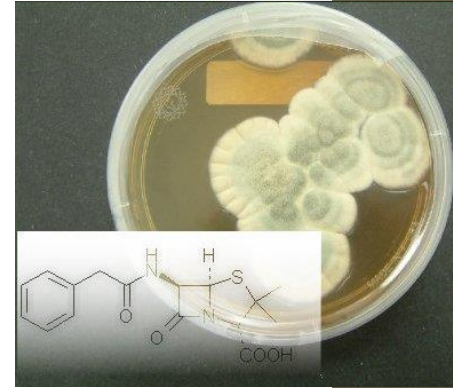
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Scientific Method

- ◆ Scientific knowledge is gained through the following systematic steps:
 1. Collecting facts
 2. Developing a hypothesis
 3. Conducting experiments
 4. Reexamining the hypothesis and accepting, modifying, or rejecting it

Failure can lead to success

Alexander Fleming was investigating bacteria when he noticed some of his bacteria was dead. He had discovered the first antibiotic, penecillin.



Thomas Edison went through hundreds of filaments before perfecting the lightbulb.



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Compare and Contrast a hypothesis and a theory.

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Why are experiments important?

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Overview of Earth Science

◆ Earth science includes:

1. **geology**, the study of Earth
2. **oceanography**, the study of the ocean
3. **meteorology**, the study of the atmosphere and weather
4. **astronomy**, the study of the universe

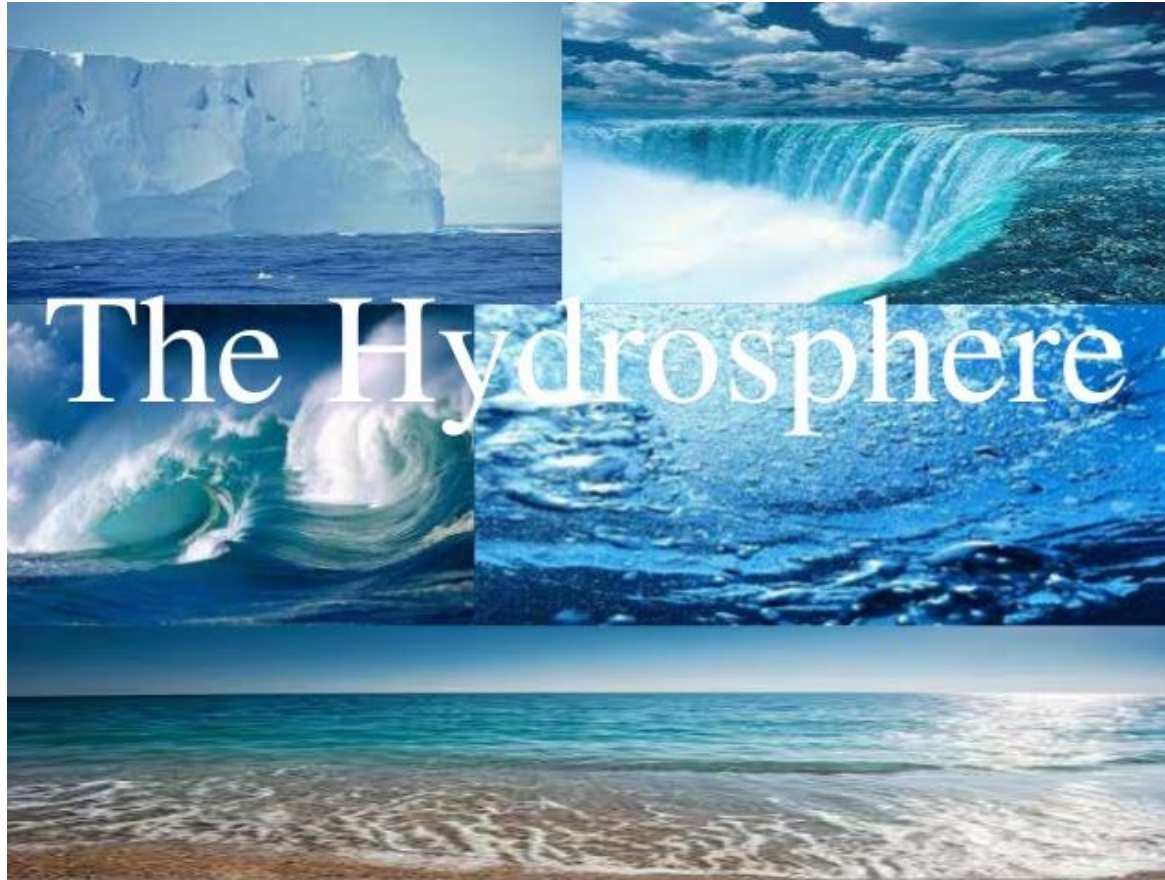
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Earth's Major Spheres

1. Hydrosphere-water portion of Earth

- Ocean is the most prominent feature of the hydrosphere.
 - Is nearly 71% of Earth's surface
 - Holds about 97% of Earth's water
- Also includes fresh water found in streams, lakes, glaciers, and groundwater.

Hydrosphere



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Earth's Major Spheres

2. Atmosphere-gaseous part of Earth

- Thin blanket of air that produces weather
- Protects us from cosmic energy exchanges

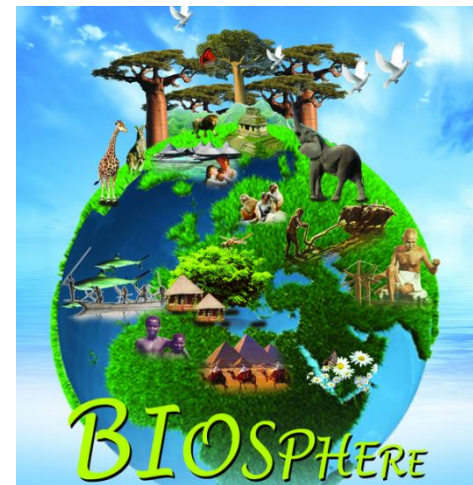


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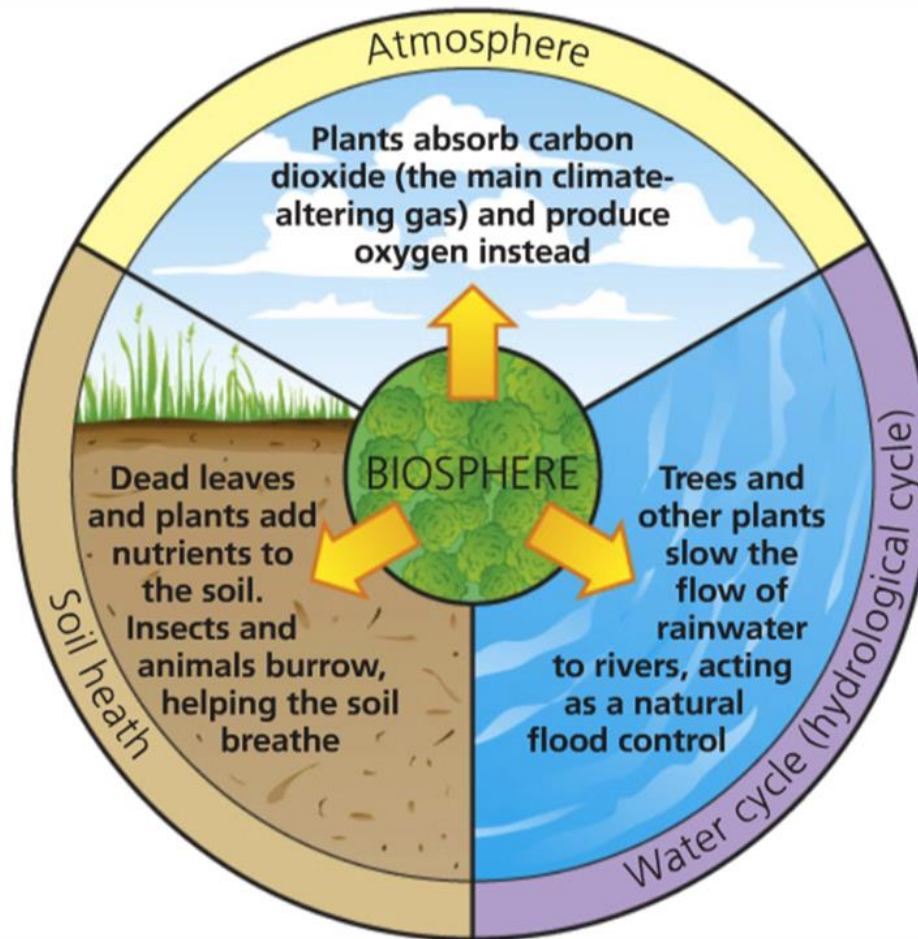
Earth's Major Spheres

3. Biosphere-all life on Earth

- The biosphere greatly affects the other spheres.
- Concentrated near the surface in an area that extends from the ocean floor upward for several miles into the atmosphere.



Impacts of the Biosphere

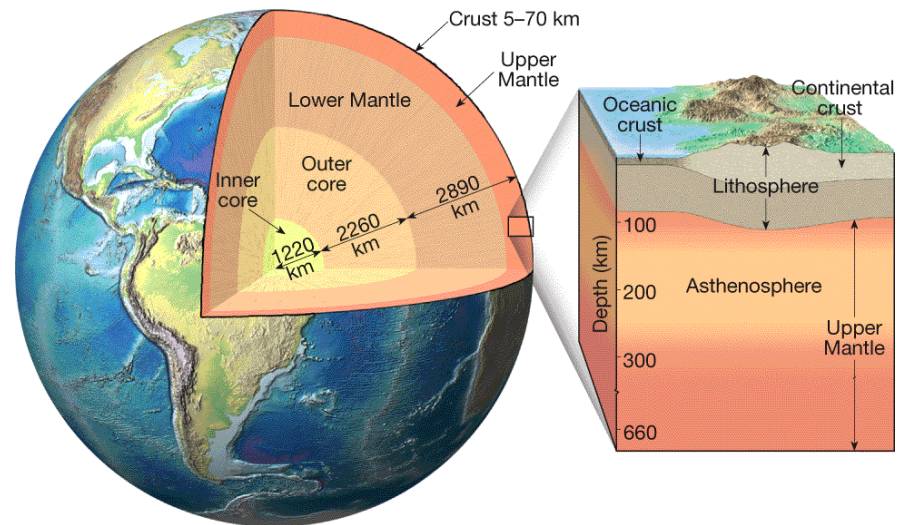


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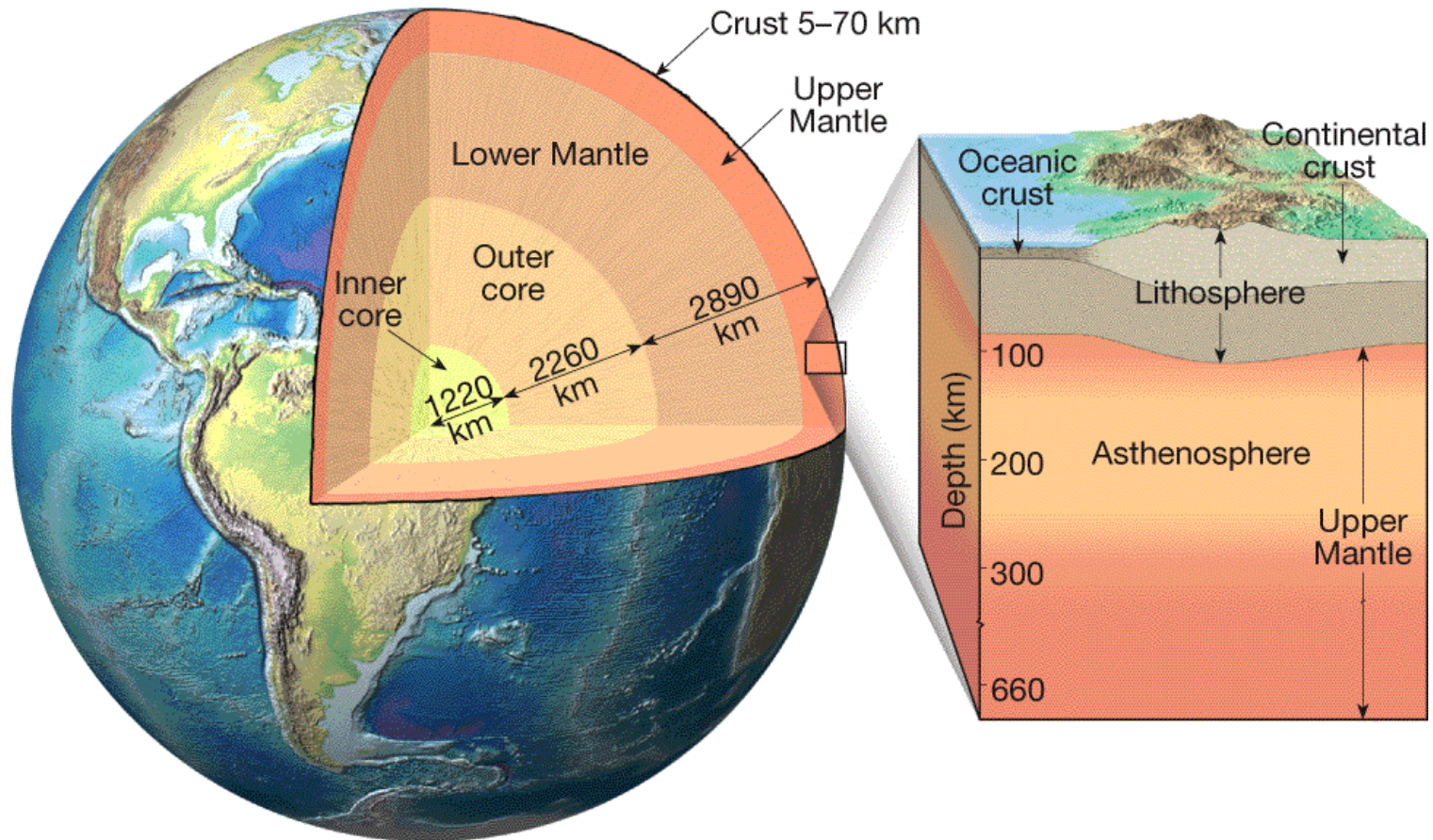
Earth's Major Spheres

4. Geosphere-rock/soil portion of Earth

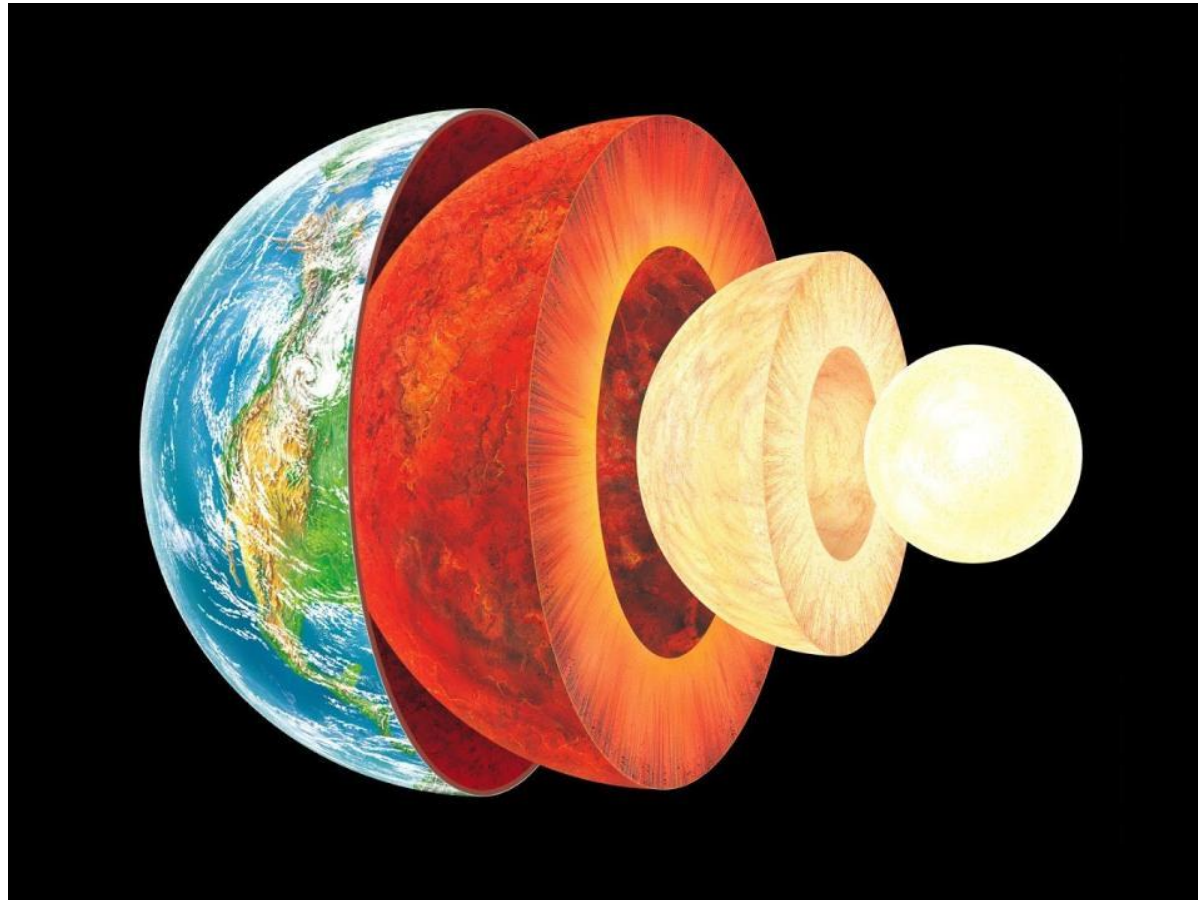
- Based on compositional differences, it consists of the crust, mantle, and core.



Earth's Layered Structure



Earth's Layered Structure



1.4 Earth System Science

People and the Environment

◆ Environment

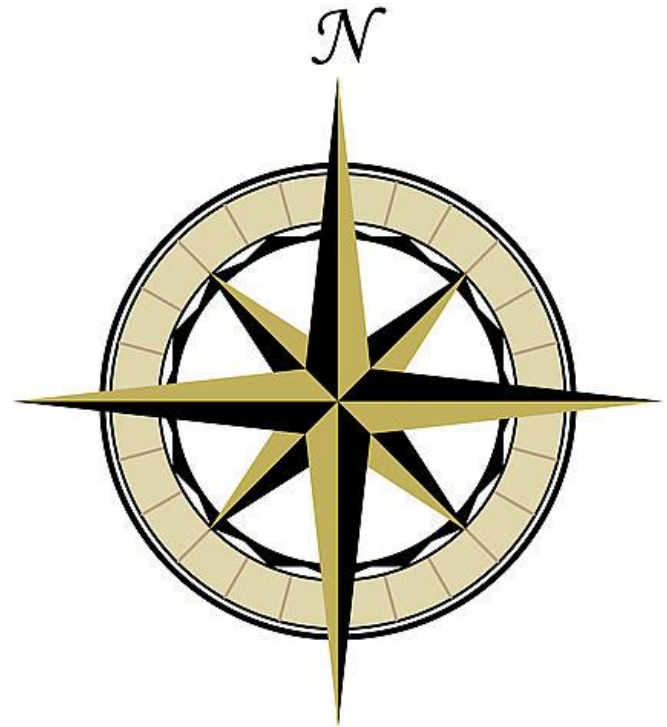
- Surrounds and influences organisms
- Physical environment encompasses water, air, soil, and rock

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How is life on earth connected?

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What is this picture on the right of?
Infer what this symbol might be used for in relation to maps.

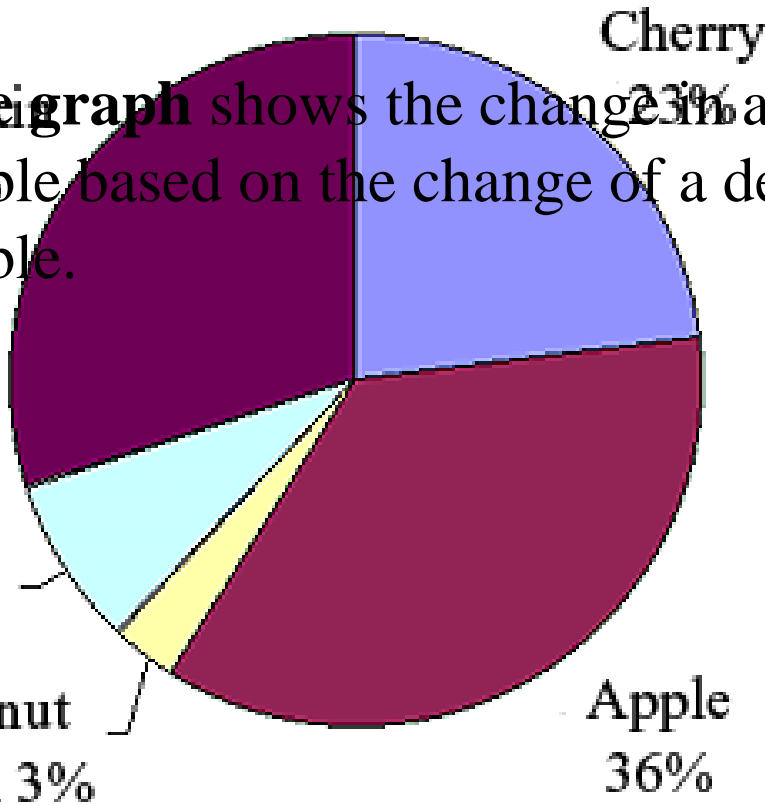


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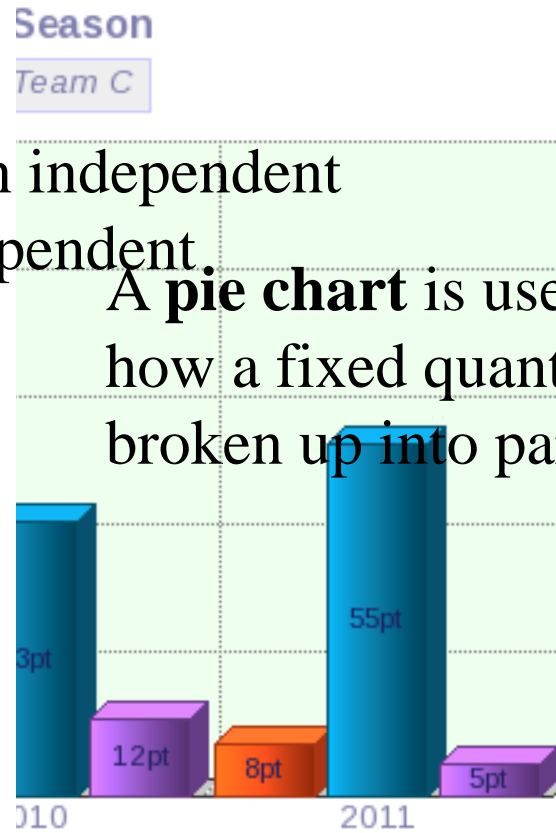
Graph

- ◆ A graph is a way to visually represent data to make it easier to understand.

Pie Preferences

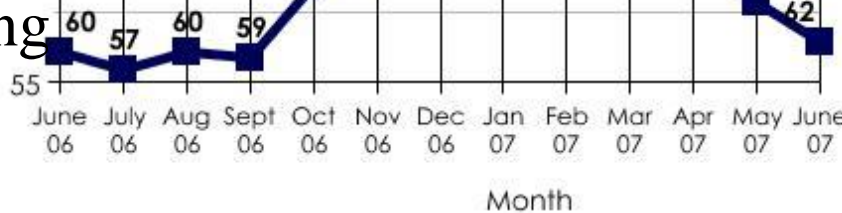


A **line graph** shows the change in an independent variable based on the change of a dependent variable.



A **pie chart** is used to show how a fixed quantity is broken up into parts.

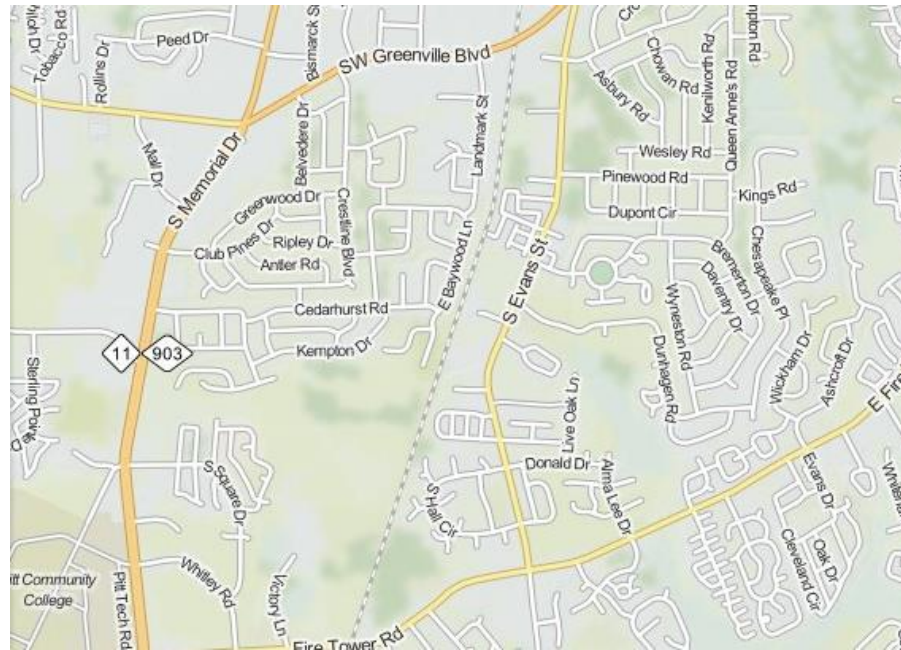
A **bar graph** is useful for collecting data collected by counting



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Maps

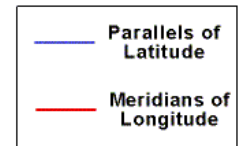
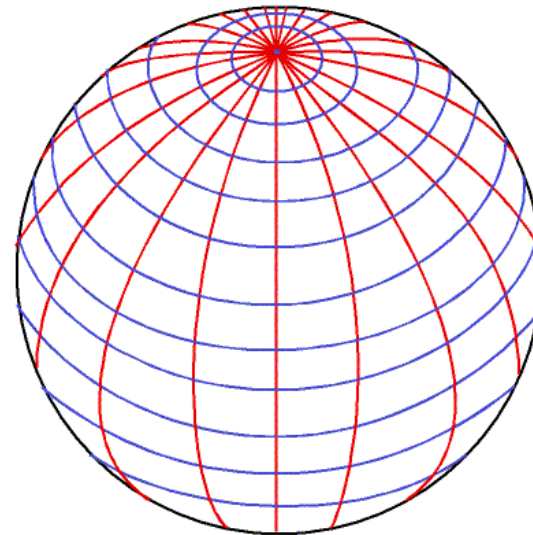
- ◆ A map is a visual representation of an area.



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Determining Location

- ◆ Latitude and longitude are lines on the globe that are used to determine location.

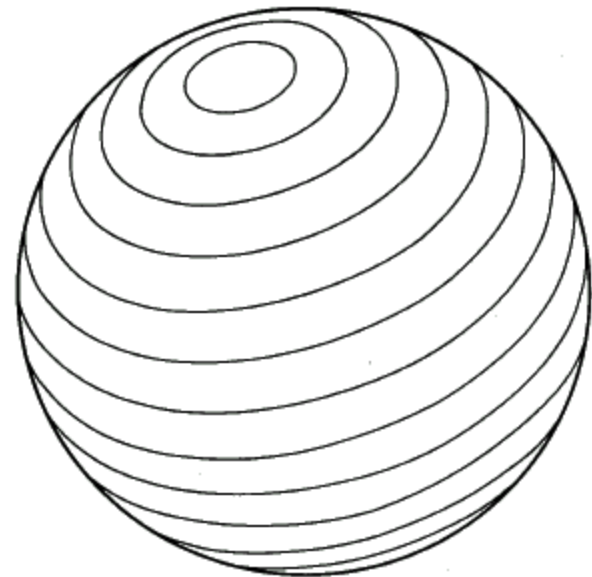


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Determining Location

◆ Latitude

- Latitude is distance north or south of the equator, measured in degrees.
- 0° Latitude is known as the Equator

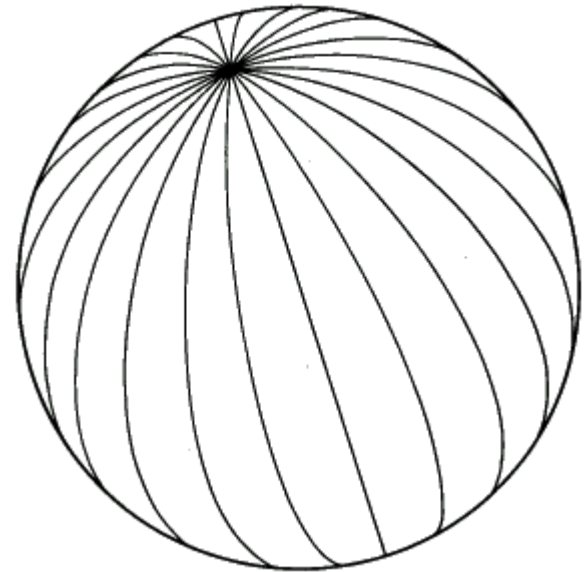


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Determining Location

◆ Longitude

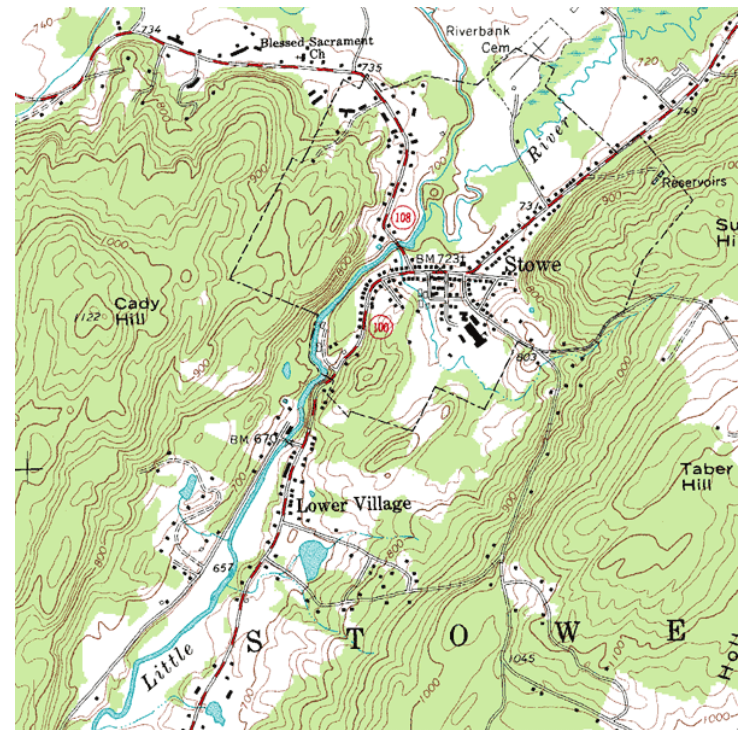
- Longitude is distance east or west of the prime meridian, measured in degrees.
- 0° longitude is known as the Prime Meridian



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Topographic Maps

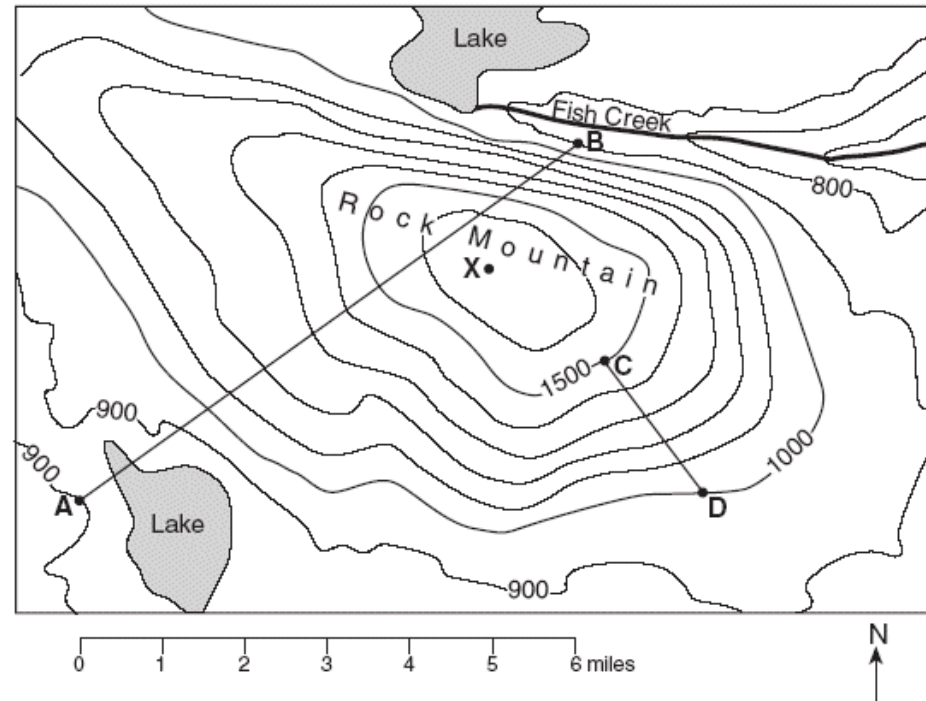
- ◆ Topographic maps represent Earth's surface in three dimensions; they show elevation, distance, directions, and slope angles.



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Topographic Maps

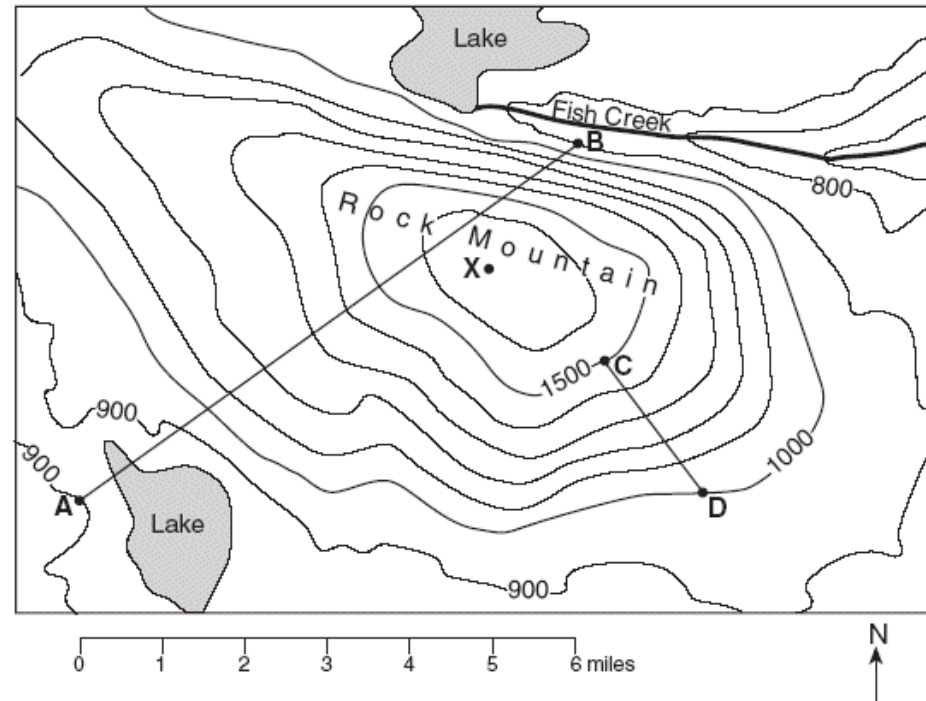
- Contour lines are lines on a topographic map that indicate an elevation.



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Topographic Maps

- Contour interval is the distance in elevation between adjacent contour lines.

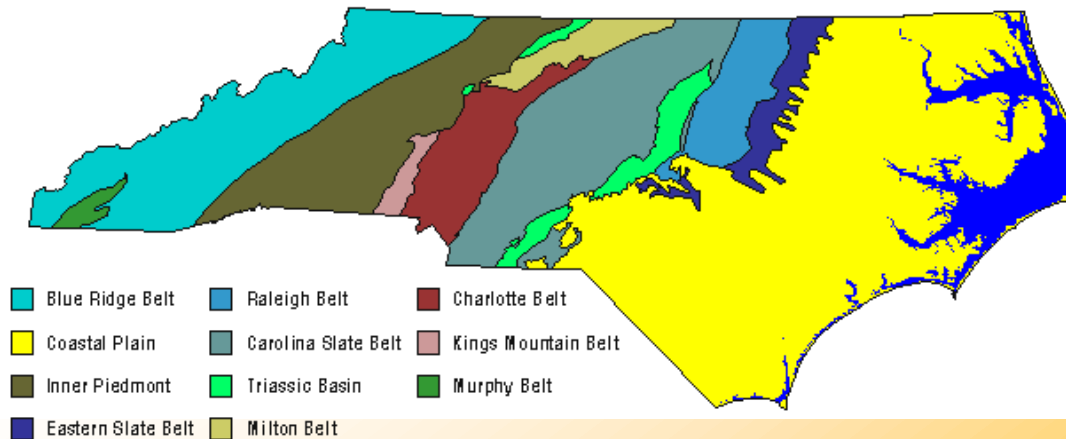


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Geologic Maps

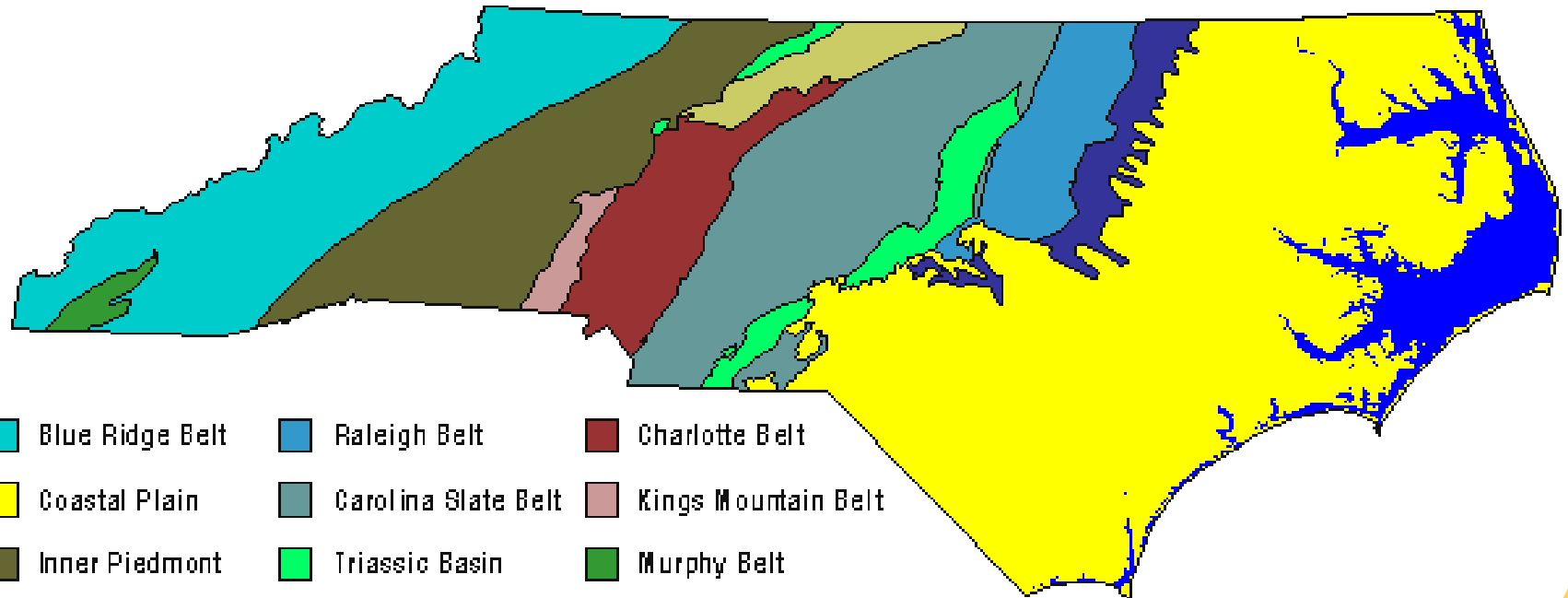
- ◆ Describes the type and age of rocks that are exposed at the surface
- ◆ Rock formations are given a color/pattern

North Carolina Geology

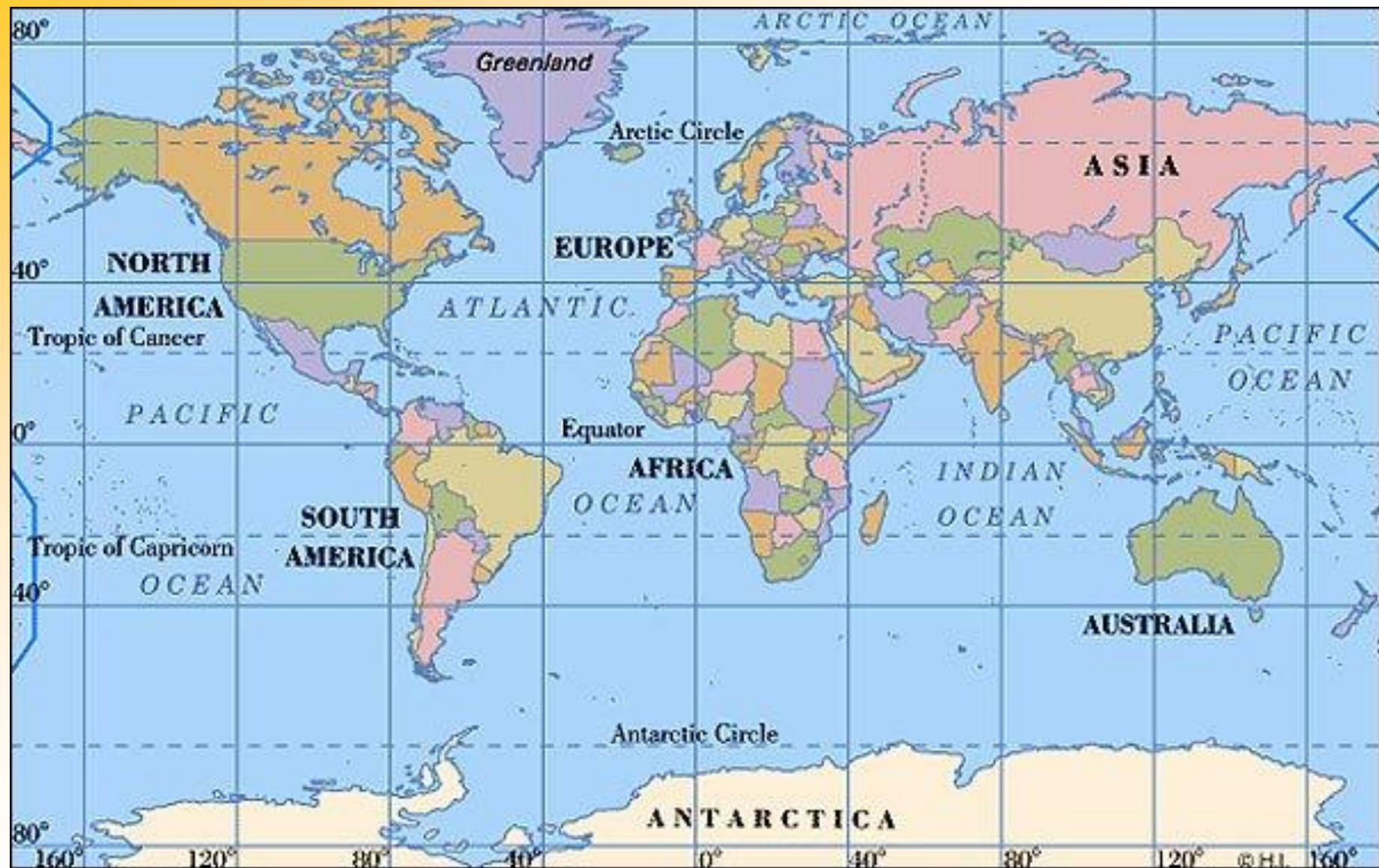


Geologic Map

North Carolina Geology



- | | | |
|--|---|---|
|  Blue Ridge Belt |  Raleigh Belt |  Charlotte Belt |
|  Coastal Plain |  Carolina Slate Belt |  Kings Mountain Belt |
|  Inner Piedmont |  Triassic Basin |  Murphy Belt |
|  Eastern Slate Belt |  Milton Belt | |



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What Is a System?

- ◆ A system is any size group of interacting parts that form a complex whole.
- ◆ Closed systems are self contained (e.g., an automobile cooling system).
- ◆ Open systems allow both energy and matter to flow in and out of the system (e.g., a river system).

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Earth as a System

- ◆ Earth system science studies Earth as a system that is composed of numerous parts, or subsystems.
- ◆ Sources of Energy
 - Sun—drives external processes such as weather, ocean circulation & erosional processes
 - Earth's interior—drives internal processes including volcanoes, earthquakes

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A system is any size group of interacting parts that form a complex whole.

Using the definition of a system from above,
Describe a real world example of a system.

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Why are maps important?