

Earth Science I, Section 200, Fall 2022
Homework
Concepts Check: 20 pts
Due: Thursday, August 25 at beginning of class

Name: Eric Burnett

Signatures _____

Note 1: You may work together on these problems. In all cases however, your answers must be your own.

Note 2: You do not need to turn this entire set of pages in. You can write your answers (legibly) on the last pages below or type your answers on a separate sheet of paper.

Earth can be viewed as a *system of interconnected components that interact and affect one another*. The principal subsystems of Earth are the *atmosphere, hydrosphere, biosphere, lithosphere, mantle and core*. Earth is a *dynamic planet* that continually changes because of the interactions among its various subsystems and cycles.

Geology, the study of Earth, is divided into (1) *physical geology*, which is the study of Earth materials and the processes that operate both within Earth and on its surface; and (2) *historical geology*, which examines the origin and evolution of Earth, its continents, oceans, atmosphere, and life.

The *scientific method* is an orderly, logical approach that involves gathering and analyzing facts about a particular phenomenon, formulating *hypotheses* to explain the phenomenon, *testing the hypotheses*, and finally *proposing a theory*. A *theory* is a *testable explanation* for some natural phenomenon that has a large body of supporting evidence.

About 4.6 billion years ago, our *solar system* formed from a rotating cloud of interstellar matter (*the nebular hypothesis*). As this cloud condensed, it eventually collapsed under the influence of gravity and flattened into a counterclockwise-rotating disk. Within this rotating disk, the Sun, planets, and moons formed from the turbulent eddies of nebular gases and solids.

Earth formed from a swirling eddy of *nebular material* 4.6 billion years ago, accreting as a solid body and soon thereafter differentiating into a layered planet.

Earth's outermost layer is the *crust*, which is divided into continental and oceanic portions. The crust and underlying *solid upper mantle*, together known as the *lithosphere*, overlie the *asthenosphere*, a zone that behaves plastically and flows slowly. The asthenosphere is underlain by the *solid lower mantle*. Earth's *core* consists of an *outer liquid* portion and an *inner solid* portion composed of Nickel and Iron, very heavy elements.

The *lithosphere* is divided into a series of *plates* that diverge, converge, and slide sideways past one another.

Plate tectonic theory provides a unifying explanation for many geologic features and events. The interaction between plates is responsible for volcanic eruptions, earthquakes, the formation of mountain ranges and ocean basins, and the recycling of rock materials.

The *rock cycle* illustrates the interactions between Earth's internal and external processes and how the three rock groups are interrelated.

Time sets geology apart from the other sciences except astronomy, and an appreciation of the immensity of geologic time is central to understanding Earth's evolution. The geologic time scale is the calendar geologists use to date past events.

Earth Science I, Section 100, Fall 2022
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1. List the Sciences that make up Earth Science:

geology _____ meteorology _____
oceanography _____ astronomy _____

2. List at least six phenomena that can be regarded as natural hazards

cyclones _____ lightning _____
drought _____ tornadoes _____
floods _____ heatwaves _____

3. How is a scientific hypothesis different from a scientific theory?

The difference between a scientific hypothesis and a scientific theory is that a hypothesis is a prediction that is made before the research while a theory is the form to explain what was already shown in the data.

4. How old is the Earth? 4.54 billion years

5. Name and briefly outline the theory that describes the formation of our Solar System

The most accepted view is the Nebular Hypothesis and it states in the theory that the sun and the planets and all other objects in the solar system formed by the nebulous material a billion years ago.

6. List the inner planets and the outer planets of our Solar System and briefly describe the basic differences in size and composition

Inner: Mercury, Venus, Earth, and Mars which are closest to the sun. They are smaller and composed mainly of metals and rocks.

Outer: Jupiter, Saturn, Uranus and Neptune are larger and composed mostly of gases.

7. How much of the Earth's surface do the Oceans cover? 70 %

8. How much of the Earth's surface does Land cover? 30 %

9. How much of the planet's total water supply do oceans represent? 96.5 %

10. What are the two sources of Energy for the Earth system?

an internal source (the decay of radioactive elements in the geosphere, which generates geothermal heat) and an external source (the solar radiation received from the Sun).

11. How is an open system different from a closed system?

An open system can exchange both energy and matter with its surroundings while A closed system, on the other hand, can exchange only energy with its surroundings, not matter.

12. List and briefly define the four "spheres" that constitute our environment.

the four spheres are lithosphere which represents land, hydrosphere represents water, biosphere represents living things and atmosphere represents air.
