Physical Geology Learning Objectives and Study Questions
Chapter 1: Tarbuck and Lutgens 12e

1. Explain how our current understanding of uniformitarianism accounts for the fact that some types of rocks which once formed on Earth, such as komatiites and banded iron formations, are no longer being formed today.

2. Determine whether a hypothesis can be tested using the scientific method or not based on the criteria discussed in class.

3. Describe how the inner (terrestrial) planets differ in mass and composition from the outer (Jovian) ones and relate these differences to the original composition and early history of the solar nebula.

4. Outline the roles that gravity played in both the accretion and subsequent differentiation of the Earth, and describe how it interacted with other processes (e.g., impact heating, radioactive decay, and liquid immiscibility) to influence the planet’s internal structure.

5. Draw a neatly labeled cross-section that shows the structure of Earth’s lithosphere and includes the names, rock types, and thicknesses of its major parts.

6. Contrast the processes by which igneous, sedimentary and metamorphic rocks are formed and give an example of a rock from each family.

7. Describe the major differences between continents and oceans and state where you would go to find (1) outcrops of the oldest rocks on a continent and (2) the youngest rocks on the floor of an ocean.

1. The idea that physical laws have remained constant over time, so that ancient features can be interpreted in terms of modern processes, is called _____.
   A. catastrophism
   B. neptunism
   C. plutonism
   D. synchronicity
   E. uniformitarianism

2. In order for science to test a hypothesis it must, at least potentially, be _____ using observations from nature.
   A. confirmed
   B. debatable
   C. falsifiable
   D. provable
   E. quantifiable

3. A hypothesis that has passed numerous different types of tests and provides a generally-accepted explanation of a large body of observations is called a _____.
   A. law
   B. model
   C. policy
   D. rule
   E. theory
4. Geologists and astronomers have concluded that Earth accreted from the solar nebula about _____ years ago.
   A. 6000
   B. 500 million
   C. 1 billion
   D. 4.6 billion
   E. 13.8 billion

5. Like all of the other planets, Earth revolves around the Sun _____.
   A. at a constant rate
   B. clockwise
   C. counterclockwise
   D. erratically
   E. over the course of one year

6. The early Earth was heated significantly by all of the following except _____.
   A. gravitational compression
   B. impacts
   C. radioactive decay
   D. solar energy
   E. actually, all of these processes were important

7. Earth’s oceans and atmosphere are thought to have formed primarily by _____.
   A. capture of gases from the solar nebula
   B. chemical reactions that occurred in the crust
   C. capture from a nearby planetesimal
   D. degassing of the planet’s interior
   E. vaporization of infalling of comets

8. The outer, cool, rigid part of the Earth that forms the “plates” is called the _____.
   A. asthenosphere
   B. core
   C. crust
   D. lithosphere
   E. mantle

9. As you go deeper into the Earth materials generally become _____.
   A. cooler
   B. denser
   C. less dense
   D. richer in silicon and aluminum
   E. younger

10. _____ rock is formed by the deposition and cementation of material produced by weathering at or near Earth’s surface.
   A. Classic
   B. Igneous
   C. Metamorphic
11. A typical continent stands about 4.5 km higher than ocean floor because continental crust is _____ and _____ than oceanic crust.
   A. denser and thicker
   B. older and denser
   C. thicker and less dense
   D. thinner and denser
   E. younger and less dense

12. Where would you expect to find the youngest seafloor crust in an ocean basin?
   A. abyssal plain
   B. continental rise
   C. continental shelf
   D. continental slope
   E. oceanic ridge or rise