Historical Geology, Chapter 4
Learning Objectives and Study Questions

1. Predict the amount of the energy captured by photosynthesis that will reach a given level in a **food web** with an efficiency of 10%.
2. Predict likely direction of **wind** at a point on Earth’s surface based on knowledge of atmospheric circulation and the Coriolis Effect.
3. Predict conditions (average temperatures, precipitation, and seasonality) in each of Earth’s terrestrial **climate belts**, and explain why they occur in light of the nature of the planetary wind system and seasonal variations in the position of the Sun.
4. Explain local variations in precipitation due to **monsoons** and **rainshadows**.
5. Predict **surface current** directions in an ocean basin based on wind directions from the planetary wind system model and the Coriolis Effect.
6. Briefly explain why regions of **upwelling** are some of the most productive in the oceans.

1. A group of organisms of the same species that live together in a particular area is known as a _____.
   A. community
   B. food web
   C. population
   D. ecosystem
   E. political party

2. Typically, the total mass of organisms _____ as you go “up” through a food web from producers to consumers.
   A. increases
   B. decreases
   C. remains constant
   D. varies wildly
   E. changes seasonally

3. Approximately _____% of the energy captured by producers is transmitted up to the first level of carnivores in a food web that is 10% efficient.
   A. 100
   B. 10
   C. 1
   D. 0.1
   E. 0.01

4. Oxygen presently makes up about _____% of Earth’s atmosphere.
   A. 80
   B. 50
   C. 20
   D. 10
   E. 1
5. In addition to temperature differences caused by variations in how much sunlight Earth’s surface receives, the directions of surface winds are strongly influenced by _____.
   A. The humidity (moisture content) of the atmosphere
   B. The Coriolis effect, which is related to Earth’s rotation
   C. Daily variations in cloud cover
   D. Burning of fossil fuels by humans
   E. Regional volcanic activity

6. The climates of savannas, centered about 15° N and S, tend to have _____.
   A. rain all year long
   B. wet winters / dry summers
   C. dry conditions all year long
   D. wet summers / dry winters
   E. frequent frosts

7. With prevailing winds here in California coming from the west, we expect the rainshadow of the Sierra Nevada to lie on the _____ side of the range.
   A. northern
   B. southern
   C. eastern
   D. western
   E. higher

8. Wind-driven surface currents in Earth’s southern hemisphere oceans circulate _____.
   A. clockwise
   B. counterclockwise
   C. erratically
   D. vertically
   E. when the feel like it

9. The formation of sea ice causes _____ of oxygen-rich surface water near Antarctica.
   A. counterclockwise circulation
   B. clockwise circulation
   C. local warming
   D. upwelling
   E. downwelling

10. The shallowest parts of the oceans, which border the continents and lie at depths less than 200 m, are the _____.
    A. continental shelves
    B. continental slopes
    C. continental rises
    D. abyssal plains
    E. oceanic rises
11. Collectively, marine organisms that live on or in the seafloor are referred to as _____.
   A. benthos
   B. nekton
   C. plankton
   D. craton
   E. seafood

12. Because of the flows of nutrient-rich waters to the surface, _____ are among the most productive marine environments.
   A. open oceans
   B. tropical seas
   C. continental margins
   D. polar seas
   E. upwelling zones

13. The salinities of bay and lagoons along the margins of oceans are typically _____ than those of the adjoining oceans.
   A. higher
   B. lower
   C. comparable to
   D. more variable
   E. more uniform

14. Typically, freshwater environments are _____ than marine environments.
   A. equally diverse
   B. less diverse
   C. more diverse
   D. more saline
   E. more fun