Oceanography, Chapter 4
Learning Objectives and Study Questions

1. Knowing the speed of sound in seawater and the time it takes an echo sounder pulse to travel to and from the seafloor, calculate the depth of the ocean.
2. Draw a neatly labeled profile of a passive continental margin and identify the continental shelf, slope, rise, as well as the adjacent abyssal plain.
3. Explain how spreading rates and isostasy interact to produce steeper profiles on slow spreading ridges and gentler profiles on faster spreading ones.
4. Infer the relative ages of a series of tropical volcanic islands from the structure of the coral reefs growing on or around them.
5. Sketch a cross-section of a graded bed and briefly describe how such beds form.
6. Give an example of each of the four types of marine sediments discussed in class (lithigenous, biogenous, hydrogenous, and cosmogenous) and suggest which part of an ocean basin you might look in to find some of each.

1. Assuming that the speed of sound in seawater is 1500 m/s, how deep is the ocean floor beneath a vessel whose echo sounder records a return time of 5.33 seconds?
   A. 280 m
   B. 560 m
   C. 4000 m
   D. 8000 m
   E. indeterminate, can’t tell

2. If a ship is sailing over a deep-sea trench that is about 9750 m deep, approximately how long will an echo sounder pulse take for its round trip to the seafloor and back?
   A. 6.5 s
   B. 9.75 s
   C. 13.0 s
   D. 15.0 s
   E. indeterminate, can’t tell

3. The shallowest part of a passive continental margin, which is typically less than 200 m deep, is known as the _____.
   A. abyssal plain
   B. continental rise
   C. continental shelf
   D. continental slope
   E. foggy bottom

4. Sediments that have swept down the continental slope in turbidity currents are deposited on the continental rise to produce _____ beds.
   A. contorted
   B. cross
   C. graded
   D. planar
   E. reversely graded
5. The coral reef shown in the accompanying photo is best characterized as a/an _____.
   A. atoll
   B. barrier reef
   C. fossil reef
   D. fringing reef
   E. patch reef

6. The principle of isostasy states that lithosphere will rise or sink until it displaces an equal _____ of the asthenosphere.
   A. height
   B. mass
   C. thickness
   D. volume
   E. width

7. Because of their faster spreading rates, oceanic rises have slopes _____ those of oceanic ridges.
   A. comparable to
   B. gentler than
   C. more erratic than
   D. steeper than
   E. variable compared to

8. Manganese nodules, which precipitate directly from seawater, are examples of _____ sediments.
   A. biogenous
   B. cosmogenous
   C. hydrogenous
   D. lithigenous
   E. terrigenous

9. Siliceous oozes, which are lithified to form cherts, are made of the remains of organisms such as _____.
   A. coccolithophores
   B. diatoms
   C. foraminifera
   D. radiolarians
   E. B and D

10. Because of the increased solubility of CO₂ with depth in seawater, _____ are not deposited below the carbonate compensation depth.
    A. calcareous oozes
    B. cosmogenous sediments
    C. hydrogenous sediments
    D. siliceous oozes
    E. terrigenous sediments
11. In general, as you go out away from the land across a continental shelf, lithigenous sediments become _____.
   A. coarser
   B. finer
   C. older
   D. younger
   E. more interesting

12. Siliceous oozes are common on the deep ocean floor beneath areas where upwelling brings _____ to the surface.
   A. fish
   B. other plankton
   C. dissolved CO₂
   D. nutrients
   E. lost treasure