Oceanography
Chapter 8 Learning Objectives and Study Questions

1. Sketch a cross section of an ocean basin that shows the general density structure of water between 70°N and 70°S, and explain why surface water has the lowest density near the equator and the highest density near the poles (especially in regions where sea ice is forming).

2. Sketch a graph that shows how the density of water varies with depth in typical mid-latitude ocean, and identify the pycnocline on your graph.

3. Identify what time of year it is (summer or winter) in a mid-latitude ocean given a sketch of the shallow thermocline, and explain what factors contribute to the thermocline's observed shape.

4. Predict whether water will upwell or downwell in a region where: (1) surface currents are converging or diverging; and (2) in a region where winds are sweeping onshore or offshore across a coastline.

1. Because of the shape of water density curves in T-S space, the mixing of two bodies of water with similar densities but different temperatures and salinities always produces a mixture that is _____ than the original water bodies.
   A. cooler
   B. denser
   C. equally dense
   D. less dense
   E. warmer

2. The densest surface waters in an ocean basin typically occur _____.
   A. astride the equator
   B. between 20-30° N and S
   C. at mid-latitudes
   D. at high latitudes
   E. over the deepest basins

3. Because of the combined effects of decreasing temperature and increasing salinity, the density of water increases rapidly with depth across a region called the _____.
   A. anticline
   B. halocline
   C. pycnocline
   D. syncline
   E. thermocline

4. Due to stirring by storms, the well-mixed layer at the top of a mid-latitude ocean is thickest during the _____.
   A. summer
   B. fall
   C. winter
   D. spring
   E. night
5. The sinking of cold, salty seawater formed below the seasonal sea ice that develops adjacent to Antarctica is an excellent example of _____ circulation.
   A. convergent
   B. divergent
   C. isopycnal
   D. thermohaline
   E. wind-driven

6. Zones of surface convergence are regions of ______.
   A. exceptional productivity
   B. downwelling
   C. high salinity
   D. low temperature
   E. upwelling