

**MARINE BIOLOGY 2002**  
**Examination #1**

**NAME** \_\_\_\_\_

**Part I. Multiple Choice (3 pts each)**

1. The least biologically productive waters in the ocean are usually in what area:
  - a. continental shelf
  - b. continental slope
  - c. ocean gyres
  - d. upwelling zones
  - e. None of the above
  
2. Fill in each blank with the correct letter chosen from below: As temperature increases, the density of water \_\_\_\_\_, the viscosity of water \_\_\_\_\_, and the ability of water to hold gases in solution \_\_\_\_\_.
  - a. increases
  - b. decreases
  - c. stays the same
  
3. Hershey's chocolate is 98% pure chocolate, Ivory soap is 99.44% pure soap, and seawater is 96.5% pure water. Which is the most pure?
  - a. Hershey's chocolate
  - b. Ivory soap
  - c. seawater
  - d. All are equally pure
  
4. Which of the following mechanisms can planktonic organisms use to reduce their sinking rates? Please record all that are correct.
  - a. Decrease their Surface of Resistance
  - b. Possess the equivalent of a Personal Floatation Device
  - c. Exchange  $\text{SO}_2^-$  ions for  $\text{Cl}_2^-$  ions
  - d. Exchange  $\text{Cl}_2^-$  ions for  $\text{SO}_2^-$  ions
  - e. Modify the viscosity of the water
  
5. Most mesoplankton nekton animals have a color pattern that is:
  - a. dark below and light above
  - b. light above and dark below
  - c. generally transparent
  - d. generally dark colored
  - e. None of the above.

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6. The main force(s) that set(s) the surface waters of the ocean into motion is(are):
  - a. the transfer of energy from the prevailing winds to the surface layer of the ocean water through frictional stress.
  - b. density differences between water masses
  - c. the upwelling of cold, nutrient-rich waters
  - d. a and c
  - e. b and c
  
7. Which of the following statements is (are) true about differences between terrestrial and marine communities. Please record all that are correct.
  - a. There are usually shorter food chains in the sea than on land
  - b. Most terrestrial primary production occurs in large organisms
  - c. There are no terrestrial filter feeders
  - d. Herbivory is very common in the oceans
  - e. Filter feeding is a very specialized feeding mode used by very few marine organisms.
  
8. In terms of flux, which location would generally possess the BEST conditions for a sessile filter feeder.
  - a. A tide pool with high concentrations of food and little water movement.
  - b. A side channel of a shallow tropical bay with little food and very little water movement
  - c. A rock on the edge of a shallow temperate reef with high food concentrations and rapidly moving, surging water.
  - d. The bottom of a moving ship in the central Atlantic Ocean with massive amounts of water movement, but very little food per unit volume of water.
  
9. Periods of low plant productivity in polar regions of the ocean most commonly result mostly from:
  - a. unavailability of nutrients
  - b. cold water temperatures
  - c. deficient supply of solar radiation
  - d. lack of upwelling
  - e. All of the above.
  
10. Organisms which reproduce in seawater and live as adults in freshwater are called:
  - a. catadromous species
  - b. anadromous species
  - c. migratory species
  - d. epipelagic species
  - d. None of the above

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11. In the temperate zone, primary production in the summer is limited by:
  - a. the lack of light
  - b. the lack of nutrients
  - c. too many grazers eating the plants
  - d. an unstratified water column
  - e. None of the above
  
12. The oxygen minimum zone can:
  - a. be located in mesopelagic depths
  - b. reduce the abundance of mid-water organisms
  - c. be an area of elevated bacterial populations
  - d. All of the above
  - e. None of the above
  
13. As an organism decreases in size, its surface area to volume ratio
  - a. decreases
  - b. increases
  - c. remains the same
  - d. becomes independent of the organism's size
  - e. None of the above
  
14. Marginal seas tend to have properties that differ from the open ocean because
  - a. local evaporation may be high relative to precipitation
  - b. marginal seas usually have restricted circulation with the adjacent open ocean
  - c. local river input might reduce the salinity of the marginal sea
  - d. All of the above
  - e. None of the above
  
15. If you were in a raft floating off the southeast coast of South America, the surface currents would be carrying you in a\_\_\_\_\_ direction.
  - a. northerly
  - b. southerly
  - c. easterly
  - d. westerly



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4. Draw a profile that shows the position of the continental shelf, continental slope, continental rise and the abyssal plains. Label those regions.

5. How does water viscosity both help and hinder the life style of a planktonic organism.

**Part III. Long answer (12 pts each).**

1. How does water viscosity both help and hinder the life of a planktonic organism.

2. In modern oceans, down-welling is associated with the center of oceanic gyres. Downwelling keeps nutrients in the deep sea from entering the upper layers of the water column. Because there are few nutrients available, little plant life is supported. Without plant life, few animals can exist. Thus, the upper layers of the water column in the center of modern oceans are more or less devoid of large organisms.

With a slight change in the underlying parameters affecting the centers of gyres, however, things could be dramatically different. For example, if the earth rotated in the opposite direction, the central oceans would experience up-welling. Up-welling would result in large-scale nutrient inputs from the deep waters to the upper water column. High amounts of nutrient input would lead to high levels of phytoplankton production and eventually high numbers of animals. Thus, if the earth rotated in the opposite direction, the center oceans would be teeming with life later than being barren deserts.

BRIEFLY explain why this would be the case.