

**OCN 201 Spring 2003 Exam 2**  
**Section 1**

**True/False**

*Indicate whether the sentence or statement is true or false.*

- \_\_\_ 1. The Hadley cell is an atmospheric circulation cell that moves air from the Equator to 30°N
- \_\_\_ 2. Long residence times for ions result from removal rates which are shorter than ocean mixing times.
- \_\_\_ 3. Upwelling usually brings nutrient-poor water to the surface.
- \_\_\_ 4. Aerosol particles in air pollution can have a cooling effect on climate.
- \_\_\_ 5. There is more phosphate in the deep water of the Pacific Ocean than in the deep water of the Atlantic Ocean
- \_\_\_ 6. The density of seawater is determined by temperature and salinity
- \_\_\_ 7. Deserts are found at the latitudes where air masses are rising
- \_\_\_ 8. Gyres in the Southern hemisphere move clockwise
- \_\_\_ 9. Tsunami are deep water waves
- \_\_\_ 10. The highest tides occur in the spring
- \_\_\_ 11. The speed of sound increases with pressure
- \_\_\_ 12. Rising air gets warmer.
- \_\_\_ 13. During an El Nino event, seawater in the Eastern Pacific gets colder.
- \_\_\_ 14. Paleoclimate records allow us to see how the Earth reacted when it last had this same CO<sub>2</sub> concentration.

**Multiple Choice**

*Identify the letter of the choice that best completes the statement or answers the question.*

- \_\_\_ 15. What is the approximate mixing time of the oceans?
  - a. 100 yrs
  - b. 1,000
  - c. 36,000 years
  - d. 1 million years
- \_\_\_ 16. Major ions in sea water have residence times:
  - a. greater than 1 million years
  - b. greater than 1,000 years
  - c. less than 1million years
  - d. more than 100 million years
- \_\_\_ 17. Nutrients are removed from the surface waters of the ocean down to the point where the light level is
  - a. 50%

- b. 10%
  - c. 5%
  - d. 1%
- \_\_\_ 18. If 100 units of organic matter are produced in the upper waters of the ocean on average how many units of this organic matter will fall through the water column, reach the sea bed, and be preserved in the sediments:
- a. less than 1
  - b. 90
  - c. 7-9
  - d. 0
- \_\_\_ 19. The freezing point of seawater of salinity 35 is approximately:
- a. 0°C
  - b. -2.9°C
  - c. -1.9°C
  - d. 4°C
- \_\_\_ 20. In the Pacific Ocean, Tsunami travel at approximately:
- a. 15 mph
  - b. 45 mph
  - c. 150 mph
  - d. 450 mph
- \_\_\_ 21. Nutrient nitrate comes from
- a. rain
  - b. rivers
  - c. rain and rivers
  - d. neither rain nor rivers
- \_\_\_ 22. Winds are caused by
- a. Ekman transport
  - b. the geostrophic balance of Hadley cells
  - c. different solar heating rates
  - d. refraction of light
- \_\_\_ 23. Below 1000 m depth, tropical waters
- a. are warmer than polar waters
  - b. are the same temperature as polar waters
  - c. are colder than polar waters
  - d. are moved by trade winds
- \_\_\_ 24. The speed of a shallow-water wave is controlled by its
- a. wavelength
  - b. period
  - c. depth
  - d. all of the above
- \_\_\_ 25. The ocean is blue because
- a. Blue light is absorbed more readily than other colors
  - b. Reefs and other benthic structures are blue
  - c. Red light is absorbed more readily than other colors
  - d. None of the above
- \_\_\_ 26. As you move down deep into the ocean, the sodium concentration
- a. increases
  - b. decreases
  - c. stays the same
  - d. none of the above
- \_\_\_ 27. The 1% light level in the open ocean (say just north of Hawaii) is somewhere around
- a. 1 m
  - b. 40 m
  - c. 120 m

- d. 200 m
- \_\_\_ 28. The pycnocline is the depth in the ocean where
- the temperature changes rapidly
  - the salinity changes rapidly
  - the density changes rapidly
  - sharks hang out waiting for surfers
- \_\_\_ 29. Effective transport in the Ekman layer in the northern hemisphere relative to the wind is
- 20° to the left
  - 90° to the left
  - 15° to the right
  - 45° to the right
  - directly ahead
- \_\_\_ 30. Eastern boundary currents are:
- slower than western boundary currents
  - colder than western boundary currents
  - both of the above
  - none of the above
- \_\_\_ 31. The tides in Hawaii are:
- diurnal
  - semi-diurnal
  - mixed
  - non-existent
- \_\_\_ 32. Submarines can hide from their enemies in
- the SOFAR channel
  - the layer of minimum sound velocity
  - the layer of maximum sound velocity
  - the photic zone
- \_\_\_ 33. In the Northern Hemisphere, the coriolis effect causes winds to
- rise
  - fall
  - bend left
  - bend right
- \_\_\_ 34. During an El Nino event, Southeast Asia and Indonesia get
- rainier
  - drier
  - higher sea level
  - more intense hail storms
- \_\_\_ 35. How do we know how hot the Earth was 100,000 years ago?
- thermometers measured it
  - ice cores recorded temperatures
  - computer models tell us
  - oral histories of early cultures

### Completion

*Complete each sentence or statement.*

36. Major ions are well mixed in the ocean because they have a \_\_\_\_\_ residence time.
37. The doldrums are located in the \_\_\_\_\_ zone.
38. The speed of a deep-water wave with a wavelength of 144 m would be \_\_\_\_\_

**Short Answer**

39. How does the ocean minimize climate change?

**Essay**

40. Why are some elements present in constant relative proportions, while others vary widely?