

OCN 201 Exam 2B Spring 2009

True/False

Indicate whether the sentence or statement is true or false.

1. Tsunami are deep water waves
2. Western boundary currents tend to be cold, slow, broad, and shallow. Eastern boundary currents tend to be hot, fast, narrow and deep.
3. Salinities in the open ocean can vary from 32-39
4. Because of the dissolved salt in seawater its freezing point is lower than that of pure water
5. The speed of sound in water increases as temperature increases
6. The most abundant ions have the shortest residence times.
7. Most of the food in the ocean is produced by photosynthesis.
8. Winds blow towards low pressure.
9. The Hadley cell is an atmospheric circulation cell that moves air between the Equator and 30°N
10. Temperature and salinity affect water density. Cold, salty water tends to sink.
11. Tsunami are shallow water waves
12. During La Nina the surface of the western Pacific is higher than the eastern Pacific
13. Deep water forms in the Pacific Ocean and flows to the Atlantic
14. Hydrothermal vents can be found by high concentrations of iron in the water.
15. The pycnocline is a zone in which density increases with depth.
16. Hurricanes in the Northern Hemisphere spin clockwise.
17. Long wavelength waves travel more slowly than short ones
18. When a wave approaches the shore it bends towards it
19. Sea breezes flow onshore in the daytime
20. Ascending air gets warmer.
21. Seawater sulfate is converted to hydrogen sulfide in hydrothermal vents.
22. The concentration of Silicate in the deep water of the Pacific Ocean is greater than that in the deep water of the Atlantic Ocean
23. Winds from the north along the California coast would cause upwelling.
24. The slow circulation of water at great depth is driven by density differences rather than by wind energy.
25. Refraction bends waves toward the faster medium.

26. In the Southern Hemisphere, the Coriolis Force moves fluids to the left.
27. Surface Currents are wind-driven movements of water at or near the ocean's surface. Thermohaline currents are slow, deep, density-driven currents that affect the vast bulk of seawater beneath the pycnocline.
28. Spring tides occur when the Earth, Moon and Sun form a right angle. Neap tides occur when the Earth, Moon, and Sun are inline with each other.

Multiple Choice

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

29. Western boundary currents are:
 - a. colder than eastern boundary currents
 - b. slower than eastern boundary currents
 - c. all of the above
 - d. none of the above
30. Typical tidal range in Hawaii is
 - a. 1-2 ft
 - b. 12-15ft
 - c. 10-12ft
 - d. 20-25ft
31. When sea water passes through a hydrothermal system
 - a. All of the below.
 - b. Anhydrite (Ca SO₄) is precipitated
 - c. Magnesium (Mg) is removed by reaction with the rock.
 - d. Sulphate is reduced to sulphide.
32. Calm winds are found in

a. the doldrums	c. both of the above
b. the horse latitudes	d. neither of the above
33. The energy in winds comes from

a. the moon	c. the sun
b. surface ocean currents	d. the tides
34. Salinity can be increased by

a. rivers	c. rainfall
b. ice formation	d. all of the above
35. How much salt is dissolved in a kilogram of typical seawater
 - a. 0.1 gram
 - b. 1gram
 - c. 15 grams
 - d. 35 grams
36. Updrafts in hurricanes are caused by

a. intense cooling of the air	c. condensation of water vapor
b. the Coriolis force	d. all of the above
37. Data from ice-cores shows that when carbon dioxide levels in the atmosphere went down, average planetary temperatures:

- a. went down
 - b. stayed the same
 - c. went up
38. What determines the depth to which nitrate and phosphate are completely removed from the surface waters of the ocean?
- a. light penetration
 - b. pressure
 - c. upwelling
 - d. temperature
39. Westerly winds are
- a. caused by the Hadley cell
 - b. trades
 - c. in the mid-latitudes
 - d. all of the above
40. The SOFAR layer in the ocean is a region
- a. with maximum sound speed
 - b. that sound waves refract away from
 - c. where submarines can hide from SONAR
 - d. with minimum sound speed
41. If a wind wave has a period of 12 seconds its velocity in meters per second in deep water would be approximately:
- a. 18
 - b. 8
 - c. 36
 - d. 12
42. At the equator the Earth is rotating eastward at approximately:
- a. 100 mph
 - b. 10,000 mph
 - c. 1,500 mph
 - d. 1,000 mph
43. During El Nino conditions the surface waters of the eastern Pacific are:
- a. drier than normal
 - b. warmer than normal
 - c. more productive than normal
 - d. colder than normal
44. Relative to the wind, surface currents in the northern hemisphere move
- a. 20° to the left
 - b. 45° to the right
 - c. 90° to the left
 - d. directly ahead
 - e. 15° to the right
45. There are two Spring tides every
- a. 14 days
 - b. day
 - c. 7 days
 - d. 28 days
46. The source of energy for life around hydrothermal vents is:

- a. Hydrostatic pressure
 - b. L&L Drive-In
 - c. Radioactive decay
 - d. Photosynthesis
 - e. Chemosynthesis
47. During the 1982/83 El Nino the weather conditions in Australia were:
- a. heavy rainfall
 - b. drought
 - c. hurricanes
 - d. unaffected
48. Approximately what % of incoming light reaches 10 m depth
- a. 46%
 - b. 6%
 - c. 16%
 - d. 1%
49. Which of the following chemicals is most likely to be the limiting nutrient in the surface waters of the ocean?
- a. phosphorous
 - b. silicon
 - c. calcium
 - d. cadmium
 - e. carbon
50. The thermohaline circulation is
- a. a process that moves deep water from the Pacific to the Atlantic Ocean
 - b. a process by which organisms remove chemicals from deep ocean waters
 - c. a process which brings hydrothermal fluids to the sea floor
 - d. a process that moves deep water from the Atlantic to the Pacific Ocean
51. In the Pacific Ocean, Tsunami travel at approximately:
- a. 45 mph
 - b. 13 mph
 - c. 450 mph
 - d. 150 mph
52. At approximately what ocean depth do sound waves reach their minimum velocity?
- a. 1,000 meters
 - b. 2,000 meters
 - c. 3,000 meters
 - d. 4,000 meters
53. The amount of CO₂ in the atmosphere is ____ that of the CO₂ concentration in seawater
- a. less than
 - b. greater than
 - c. identical
 - d. undetectable
54. A tropical cyclone converts stored thermal energy located in water molecules into turbulent wind energy by giving up heat through the process called ____.
- a. Vaporization

- b. Condensation
 - c. Climatization
 - d. Accumulation
55. With regard to the naming of tropical cyclones, _____ is to the Caribbean as _____ is to the Western Pacific.
- a. Chubasco, Monsoon
 - b. Papagayo, Kamsin
 - c. Hurricane, Typhoon
 - d. El Viento, Kaminari
56. As incoming waves bend around a point on shore they change direction in a motion called wave _____.
- a. Reflection
 - b. Refraction
 - c. Diffusion
 - d. Diffraction
57. In general, the _____ the wavelength, the _____ the wave energy will move through the water.
- a. longer, slower
 - b. longer, faster
 - c. shorter, slower
 - d. shorter, faster
 - e. a & d
 - f. b & c
58. The sudden upward bulge of water that advances toward the coast during a cyclone is called the storm surge. This phenomenon is caused by _____.
- a. strong winds blowing water onshore.
 - b. advance of a low pressure system
 - c. bottom contour
 - d. all of the above
59. The height of the tides _____ with distance from an amphidromic point.
- a. decreases
 - b. remains the same
 - c. increases
 - d. declines
60. We call the ocean salty because it contains dissolved components of salts such as: NaCl, KCl, CaSO₄, and CaCO₃. When these salts dissolve they dissociate into components that are technically no longer salts, but are called _____.
- a. Atoms
 - b. Elements
 - c. Ions
 - d. Compounds
 - e. Molecules
61. Due to the combined effect of wind friction, Coriolis Effect, Ekman Transport, land mass, and the pressure gradient, ocean currents tend to _____.
- a. flow in straight lines
 - b. flow along the periphery (outside) of ocean basins

- c. spiral in toward the ocean center
 - d. dissipate
 - e. sink downward toward the ocean bottom
62. Which of the following is not a western boundary current?
- a. Agulhas Current
 - b. Brazil Current
 - c. California Current
 - d. Gulf Stream
 - e. Kuroshio Current

Completion

Complete each sentence or statement.

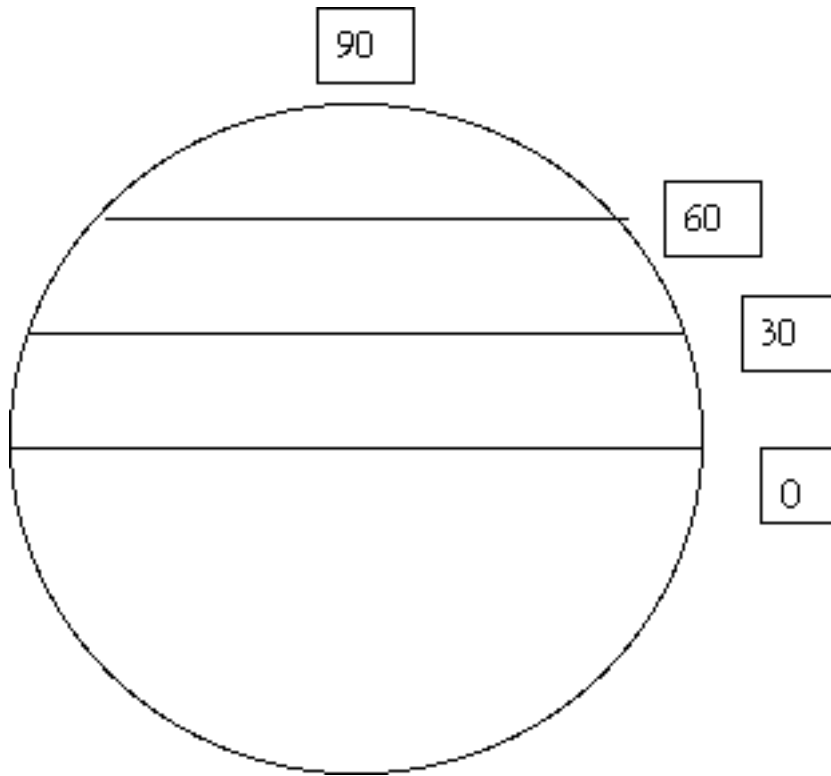
63. Deep water is colder than surface water because _____
64. Excess heat is transported from the tropics to the poles by _____ and _____
65. The energy of absorbed sunlight is converted into _____
66. The mixing time of the oceans is approximately _____ years

Short Answer

67. Why do nutrients accumulate in the deep ocean?

Essay

68. Why is the ocean blue?
69. Using the picture below, draw the principal wind bands in the Northern and southern hemisphere and on ONE SIDE ONLY draw the circulation of the Polar, Ferrel and Hadley cells.



70. Name 3 of the 6 major ions in seawater.

71. Draw a picture and name the principal currents in the North Pacific gyre