

Name: _____

**OCN 201 Spring 2004
Exam 2A**

True/False

Indicate whether the sentence or statement is true or false. Mark A for true and B for false (1 point each).

- ___ 1. Most of the food in the ocean is produced by photosynthesis.
- ___ 2. Winds from the north along the California coast would cause upwelling.
- ___ 3. Because of the dissolved salt in seawater its freezing point is lower than that of pure water
- ___ 4. During La Nina the surface of the western Pacific is higher than the eastern Pacific
- ___ 5. Ekman transport bring nutrients up near Peru
- ___ 6. The Sun has more effect on the tides than the moon
- ___ 7. Sea breezes flow onshore in the daytime
- ___ 8. Hydrothermal vents are found only at mid-ocean ridges.
- ___ 9. The Hadley cell is an atmospheric circulation cell that moves air between the Equator and 30°N
- ___ 10. Food (high energy organic molecules) can be made by chemosynthesis.
- ___ 11. Refraction bends waves toward the faster medium.
- ___ 12. Short residence time elements are uniformly distributed in the oceans
- ___ 13. Salinities in the open ocean can vary from 32-39
- ___ 14. The speed of sound in water increases as pressure increases
- ___ 15. In the Southern Hemisphere, the Coriolis Force moves things to the left.
- ___ 16. Seawater sulfate is converted to hydrogen sulfide in hydrothermal vents.
- ___ 17. When a wave approaches the shore it bends towards it
- ___ 18. Wave packets travel at the same speed as individual waves
- ___ 19. Deep water forms in the Pacific Ocean and flows to the Atlantic
- ___ 20. The most abundant ions have the shortest residence times.
- ___ 21. Hydrothermal vents can be found by high concentrations of manganese in the water.
- ___ 22. Because the major ions are conservative, the ocean is equally salty everywhere.
- ___ 23. Tsunami are shallow water waves

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question (1 point each).

- _____ 24. In sea water major ions constitute what percentage of the total?:
a. 100%
b. 99.4%
c. 90%
d. 50%
e. 10%
- _____ 25. There are two Spring tides every
a. day
b. 7 days
c. 14 days
d. 28 days
- _____ 26. The speed of light in water, compared to air is:
a. greater
b. less
c. same
- _____ 27. When sea water passes through a hydrothermal system
a. Anhydrite (Ca SO_4) is precipitated
b. Magnesium (Mg) is removed by reaction with the rock.
c. Sulphate is reduced to sulphide.
d. All of the above.
- _____ 28. Salinity can be increased by
a. rainfall
b. rivers
c. ice formation
d. all of the above
- _____ 29. The SOFAR layer in the ocean is a region
a. with maximum sound speed
b. with minimum sound speed
c. where submarines can hide from SONAR
d. where sound waves refract away from
- _____ 30. Of the total water in the ocean the deep zone accounts for about
a. 1%
b. 18%
c. 80%
d. 99.4%
- _____ 31. If a wind wave has a period of 8 seconds its velocity in meters per second in deep water would be approximately:
a. 8
b. 12
c. 24
d. 210

- ___ 32. If a wind wave has a period of 12 seconds its velocity in meters per second in deep water would be approximately:
- 8
 - 12
 - 18
 - 36
- ___ 33. Approximately what % of incoming light reaches 10 m depth
- 1%
 - 6%
 - 16%
 - 46%
- ___ 34. Which of the following chemicals is most likely to be the limiting nutrient in the surface waters of the ocean?
- calcium
 - silicon
 - phosphorous
 - carbon
 - cadmium
- ___ 35. Calm winds are found in
- the doldrums
 - the horse latitudes
 - both of the above
 - neither of the above
- ___ 36. All waves can
- reflect
 - refract
 - scatter
 - absorb
 - all of the above
- ___ 37. Typical tidal range in Hawaii is
- 12-15ft
 - 1-2 ft
 - 10-12ft
 - 20-25ft
- ___ 38. The “Chimneys” at hydrothermal vent sites are formed from:
- magnesium
 - lava
 - iron, zinc and copper sulphides
 - the remains of organisms.
- ___ 39. Relative to the wind effective Ekman transport in the northern hemisphere is
- 20° to the left
 - 90° to the left
 - 15 ° to the right
 - 45° to the right
 - directly ahead

- ___ 40. During El Nino conditions the surface waters of the eastern Pacific are:
- colder than normal
 - warmer than normal
 - more productive than normal
 - drier than normal
- ___ 41. At the equator the Earth is rotating eastward at approximately:
- 100 mph
 - 10,000 mph
 - 1,000 mph
 - 1,500 mph
- ___ 42. The tropics are hotter than the poles because
- the Earth's circumference is greatest at the Equator
 - sunlight is most intense in the tropics
 - polar ice caps keep the poles cool
 - all of the above
- ___ 43. Chimneys form at hydrothermal vent sites because
- iron sulphide precipitates
 - the surrounding seawater is oxidising
 - the surrounding seawater is cold
 - all of the above
- ___ 44. The average speed of sound in water is
- 5 metres/second
 - 500 m/s
 - 1500 m/s
 - 3000 m/s
 - the same as in air
- ___ 45. The maximum energy of light coming into the surface ocean is in the following part of the spectrum
- violet-indigo
 - blue-green
 - yellow-orange
 - red-infrared
- ___ 46. The energy in winds comes from
- the sun
 - the moon
 - surface ocean currents
 - the tides
- ___ 47. The source of energy for life around hydrothermal vents is:
- Photosynthesis
 - Chemosynthesis
 - Hydrostatic pressure
 - Radioactive decay
 - Malasadas
- ___ 48. Westerly winds are
- trades
 - in the mid-latitudes
 - caused by the Hadley cell
 - all of the above

- _____ 49. The thermohaline circulation is
- a process that moves deep water from the Atlantic to the Pacific Ocean
 - a process by which organisms remove chemicals in surface waters and remobilise them in deep water
 - a process which brings hydrothermal fluids to the sea floor
 - a process that moves deep water from the Pacific to the Atlantic Ocean
- _____ 50. What determines the depth to which nitrate and phosphate are completely removed from the surface waters of the ocean?
- light penetration
 - upwelling
 - pressure
 - temperature
- _____ 51. Western boundary currents are:
- slower than eastern boundary currents
 - colder than eastern boundary currents
 - all of the above
 - none of the above

Completion

Complete each sentence or statement (1 point for each blank).

52. Absorbed sunlight is converted into _____
53. The mixing time of the oceans is approximately _____ years
54. Excess heat is transported from the tropics to the poles by _____ and _____
55. Deep water is colder than surface water because _____
56. Most tsunami damage is caused by _____
57. Major ions are well mixed in the ocean because they have a _____ residence time.
58. The trade winds blow from _____ to _____.

Short Answer

59. Why do nutrients accumulate in the deep ocean? (2 points)

Essay

60. How can whales talk to one another when they are thousands of miles apart? (2 points)

61. Draw a picture and name the principal currents in the North Pacific gyre (3 points).

62. Name 5 of the 6 major ions in seawater (3 points).

63. Name four chemicals that are needed by all oceanic plants and two that are needed by some organisms that build skeletons (3 points).

64. Why is the ocean blue? (2 points)