

OCN 201 Fall 2002 Exam 2
Section 2

True/False

Indicate whether the sentence or statement is true or false.

1. Marquet's principle states that "regardless of how the salinity may vary from place to place the ratios between the amounts of the major ions in the waters of the open ocean are nearly constant"
2. Hydrothermal vents always have large numbers of animals around them
3. Hydrothermal vents can be found by high concentrations of manganese in the water.
4. Tritium is a chemical that can be used to trace the physical movement of water in the oceans
5. Deep water forms in the Pacific Ocean and flows to the Atlantic
6. In the mid-latitudes 30-40° there is more evaporation from the surface of the ocean than precipitation back into it
7. Low pressure zones in the atmosphere occur where air is ascending
8. Surface currents are driven by atmospheric processes
9. Gyres in the Northern hemisphere are anticlockwise
10. During La Nina the surface of the western Pacific is higher than the eastern Pacific
11. Wave packets travel at the same speed as individual waves
12. Tsunami are deep water waves
13. The effect of the Sun on the generation of tides is about 45% of that of the Moon
14. Tides have wavelengths of up to 12,000 miles
15. Methane is also a greenhouse gas
16. Atmospheric carbon dioxide levels are currently higher than they have been during the last 160,000 years
17. During ice ages sea level goes down
18. Because of the dissolved salt in seawater its freezing point is lower than that of pure water
19. There is more phosphate in the deep water of the Pacific Ocean than in the deep water of the Atlantic Ocean
20. Humid air is more dense than dry air
21. During El Nino conditions hurricanes are less likely to come near Hawaii
22. The Ferrel cell is an atmospheric circulation cell that moves air between the Equator and 30°N
23. When wind blows over cold ocean water it is more likely to produce rain than when it blows over warm water
24. It doesn't matter what the salinity of the seawater is -- you can always make it dense enough to form deep water if you cool it enough
25. The maximum density of seawater occurs at approximately 4°C

Multiple Choice

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

26. How much salt is dissolved in a kilogram of typical seawater
 - a. 1 gram
 - b. 15 gram
 - c. 35 gram
 - d. 1000 gram
 - e. 0.1 gram
27. Most of the chemicals in seawater come from
 - a. hydrothermal vents
 - b. rivers
 - c. rain
 - d. phytoplankton
28. Hydrothermal fluids result from the reaction of sea water with high temperature magma below the bottom of the sea-floor. How deep can these fluids go:
 - a. 10 m
 - b. 1 km
 - c. 5 km
 - d. 100km
29. The source of energy for life around hydrothermal vents is:
 - a. Photosynthesis
 - b. Chemosynthesis
 - c. Hydrostatic pressure
 - d. Radioactive decay
 - e. Malasadas
30. 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.
31. Chimneys form at hydrothermal vent sites because
 - a. iron sulphide precipitates
 - b. the surrounding seawater is oxidising
 - c. the surrounding seawater is cold
 - d. all of the above
32. Which of the following chemicals is most likely to be the limiting nutrient in the surface waters of the ocean?
 - a. calcium
 - b. silicon
 - c. phosphorous
 - d. carbon
 - e. cadmium
33. The 1% light level in the open ocean (say just north of Hawaii) is somewhere around
 - a. 1 m
 - b. 60 m
 - c. 120 m

- d. 200 m
34. The heat capacity of a substance is the amount of heat needed to raise its temperature by
- 1°C
 - 10°C
 - 15°C
 - 100°C
35. 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
36. The mass of one square inch of the atmosphere at the Earth's surface is approximately
- 5 pounds
 - 1 pound
 - 15 pounds
 - 25 pounds
 - 10 pounds
37. 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
38. The southern oscillation is:
- the change in direction of Coriolis force at the equator
 - the change in pressure differential between Darwin and Tahiti
 - the change in the thermocline depth between El Nino and La Nina
 - A popular dance from Brazil
39. When wave trains propagate away from a storm they lose what percentage of their height each day?
- 10%
 - 50%
 - 30%
 - 22%
40. The current CO₂ content of the atmosphere (in ppmv) is about:
- 120
 - 180
 - 369
 - 560
41. If we were to burn all the fossil fuels and all the organic carbon in sediments we could, in principle, increase atmospheric CO₂ levels by:
- 2-times
 - 6- times
 - 13- times
 - 2- times
 - 50- times
42. The most recent measurements of sea level rise from satellites show sea level rising at:
- 40cm/100 yrs
 - 6 metres/100 yrs

- c. 60 metres/100 yrs
 - d. 100 cm/100 yrs
43. Of the total water in the ocean the deep zone accounts for about
- a. 1%
 - b. 18%
 - c. 80%
 - d. 99.4%
44. The atmospheric pressure at the top of Mauna Kea is approximately
- a. 1000 mb
 - b. 829 mb
 - c. 562 mb
 - d. 213 mb
45. Eastern boundary currents are:
- a. slower than western boundary currents
 - b. colder than western boundary currents
 - c. all of the above
 - d. none of the above
46. 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
47. The freezing point of seawater of salinity 35 is approximately:
- a. 0°C
 - b. -2.9°C
 - c. -1.9°C
 - d. 4°C
48. The pycnocline is the depth in the ocean where
- a. the temperature changes rapidly
 - b. the salinity changes rapidly
 - c. the density changes rapidly
 - d. sharks hang out waiting for surfers
49. Approximately what % of incoming light reaches 10 m depth
- a. 1%
 - b. 6%
 - c. 16%
 - d. 46%
50. At the equator the Earth is rotating eastward at approximately:
- a. 100 mph
 - b. 10,000 mph
 - c. 1,000 mph
 - d. 1,500 mph
51. If a wind wave has a period of 12 seconds its velocity in meters per second in deep water would be approximately:
- a. 8
 - b. 12
 - c. 18
 - d. 36

52. What is the approximate mixing time of the oceans?
- 100 years
 - 1,000 years
 - 36,000 years
 - 1 million years
53. Typical tidal range in Hawaii is
- 12-15ft
 - 3-6 ft
 - 10-12ft
 - 20-25ft
54. The thermohaline circulation is
- the process that moves deep water from the Atlantic to the Pacific Ocean
 - the process by which organisms remove chemicals in surface waters and remobilise them in deep water
 - the process which brings hydrothermal fluids to the sea floor
 - a new transport system at San Francisco airport
55. Spring tides occur when:
- the moon is one quarter
 - the Sun and Moon are aligned with the Earth
 - Jupiter is aligned with Mars
 - none of the above

Completion

Complete each sentence or statement.

56. The Earth loses its heat by _____
57. Name two ways in which large storms can lose the energy which feed their growth
_____ and _____
58. The two forces that raise the tides on the surface of the Earth are _____ and _____

Essay (If necessary use the next page to continue your answer)

59. Name 5 of the 6 major ions in seawater.
60. Draw a picture that shows what happens to 100 units of primary production in the ocean. Label the amounts of material at each depth in the ocean and sediments
61. Draw a picture and name the principal currents in the North Pacific gyre

