

Last Name (print) _____ First Name _____

Bar code # (last 5 digits) _____

OCN 201 Fall 2011 2nd exam Section 1

True/False

Indicate whether the 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. Large numbers of organisms are found around hydrothermal vents that do not have hydrogen sulphide in them
- ___ 3. Deep water forms in the Pacific Ocean and flows to the Atlantic
- ___ 4. Dry air is more dense than humid air
- ___ 5. Low pressure zones in the atmosphere occur where air is ascending
- ___ 6. The atmospheric pressure at the top of Mauna Kea is approximately 562 mb
- ___ 7. Surface currents are driven by atmospheric processes
- ___ 8. At constant wind speed the Ekman layer gets deeper as you approach the equator
- ___ 9. Gyres in the Northern hemisphere are anticlockwise
- ___ 10. Westerly winds and westerly currents travel in the opposite directions
- ___ 11. The speed of a shallow water wave is related to its period
- ___ 12. Waves can refract around island chains
- ___ 13. Short wavelength waves travel faster than long ones
- ___ 14. Wave packets travel at the same speed as individual waves
- ___ 15. Tsunami are shallow water waves
- ___ 16. Tides are created only as a result of gravitational attraction
- ___ 17. During ice ages sea level goes down
- ___ 18. The most significant contributor to future global sea level rise is thermal expansion of surface ocean water
- ___ 19. Most organic matter is decomposed at the bottom of the ocean
- ___ 20. 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

Multiple Choice

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

- _____ 21. How much salt is dissolved in a kilogram of typical seawater
- 1gram
 - 15 grams
 - 35 grams
 - 0.1 gram
- _____ 22. Conservative ions are:
- those whose proportions remain constant relative to each other in all oceans
 - those whose proportions vary relative to each other in all oceans.
 - those ions whose concentration is less than 1 mmol
 - those ions whose concentration is greater than 1 mmol
 - those ions that vote republican
- _____ 23. Most of the chemicals in seawater come from
- hydrothermal vents
 - rivers
 - rain
 - phytoplankton
- _____ 24. How much of the Earth's surface water is in the oceans?
- 10%
 - 97%
 - 99%
 - 73%
- _____ 25. Hydrothermal fluids do not boil at 380 °C at the bottom of the ocean because
- Pressure has raised the boiling point
 - Sea water doesn't boil
 - There are too many chemicals dissolved in the sea water
 - The particles prevent boiling
- _____ 26. 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:
- 10 m
 - 1 km
 - 5 km
 - 100km
- _____ 27. 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

- _____ 28. The 1% light level in the open ocean (say just north of Hawaii) is somewhere around
- 1 m
 - 60 m
 - 120 m
 - 200 m
- _____ 29. The freezing point of seawater of salinity 35 is approximately:
- 0°C
 - 2.9°C
 - 1.9°C
 - 4°C
- _____ 30. If you cool seawater its density
- increases
 - decreases
 - stays the same
- _____ 31. 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
- _____ 32. The thermocline is the part of the ocean where
- the density changes rapidly
 - salinity changes rapidly
 - the temperature changes rapidly
 - you are most likely to find Elvis
- _____ 33. 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
- _____ 34. 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
- _____ 35. In water the speed of sound
- increases with decreasing temperature
 - increases with increasing pressure
 - all of the above
 - none of the above
- _____ 36. The SOFAR layer in the ocean is a region
- with maximum sound speed
 - with minimum sound speed
 - where submarines can hide from SONAR
 - where sound waves refract away from

- _____ 37. The colour of light that is absorbed least in the ocean is
- violet
 - blue
 - green
 - red
- _____ 38. Approximately what % of incoming light reaches 10 m depth
- 1%
 - 6%
 - 16%
 - 46%
- _____ 39. 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
- _____ 40. At the equator the Earth is rotating eastward at approximately:
- 100 mph
 - 10,000 mph
 - 1,000 mph
 - 1,500 mph
- _____ 41. Southern oscillation is:
- a variation in the upwelling along the equator
 - a subsurface wave that travels along the thermocline
 - a variation in the pressure gradient between Tahiti and Darwin
 - a new dance
- _____ 42. 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
- _____ 43. In the movie we saw in class, during the 1982/3 El Nino which area was affected by many typhoons?
- | | |
|---------------------|----------|
| a. Australia | c. India |
| b. French Polynesia | d. Japan |
- _____ 44. Typical tidal range in Hawaii is
- 12-15ft
 - 3-6 ft
 - 10-12ft
 - 20-25ft
- _____ 45. 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

Name: _____

ID: A

- _____ 46. During the movie clip we watched in class about the Hokulea, what was the purpose of observing the directions of the waves in the surface ocean
- a. Predict the arrival of a nearby storm
 - b. Identify the presence of nearby islands
 - c. Maintain the direction of the canoe's travel
 - d. All of the above
- _____ 47. If winds of 23 mi/hr blow for long enough they can produce waves with a height of
- a. 5 ft
 - b. 20 ft
 - c. 40ft
 - d. over 60 ft
- _____ 48. The period of a typical Tsunami is:
- a. 30 seconds
 - b. 2 minutes
 - c. 15 minutes
 - d. 35 minutes
- _____ 49. Spring tides occur when:
- a. the moon is one quarter
 - b. the Sun and Moon are aligned with the Earth
 - c. Jupiter is aligned with Mars
 - d. none of the above
- _____ 50. The current CO₂ content of the atmosphere (in ppmv) is about:
- a. 120
 - b. 180
 - c. 380
 - d. 560
- _____ 51. Recent atmospheric CO₂ levels started to increase around
- a. 1700
 - b. 1780
 - c. 1850
 - d. 1935
- _____ 52. 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:
- a. 2-times
 - b. 6- times
 - c. 13- times
 - d. 20- times
 - e. 50- times
- _____ 53. The Vostock ice core was drilled by French and Soviet scientists in
- a. France
 - b. Greenland
 - c. Siberia
 - d. Antarctica
 - e. Alaska

- _____ 54. Most of the tritium entered the surface ocean
- during the second world war
 - in 1952
 - in 1964
 - in 1981
- _____ 55. Of the total water in the ocean the deep zone accounts for about
- 1%
 - 18%
 - 80%
 - 99.4%
- _____ 56. The wavelength of the radiation entering and leaving the Earth are
- the same
 - incoming is short, outgoing is long
 - incoming is long, outgoing is short
 - none of the above
- _____ 57. Western boundary currents are:
- faster than eastern boundary currents
 - warmer than eastern boundary currents
 - all of the above
 - none of the above
- _____ 58. The period of a wave is:
- the distance between its crests
 - the time it takes succeeding crests to pass a fixed point
 - the number of waves that pass a fixed point each second
 - the distance from the crest to the trough of a wave
- _____ 59. Each day high tide is approximately:
- 1 hour later
 - 1 hour earlier
 - 2 hours later
 - exactly the same time
- _____ 60. The most recent measurements of sea level rise from satellites show sea level rising at:
- 40cm/100 yrs
 - 6 metres/100 yrs
 - 60 metres/100 yrs
 - 100 cm/100 yrs

Completion

Complete each statement.

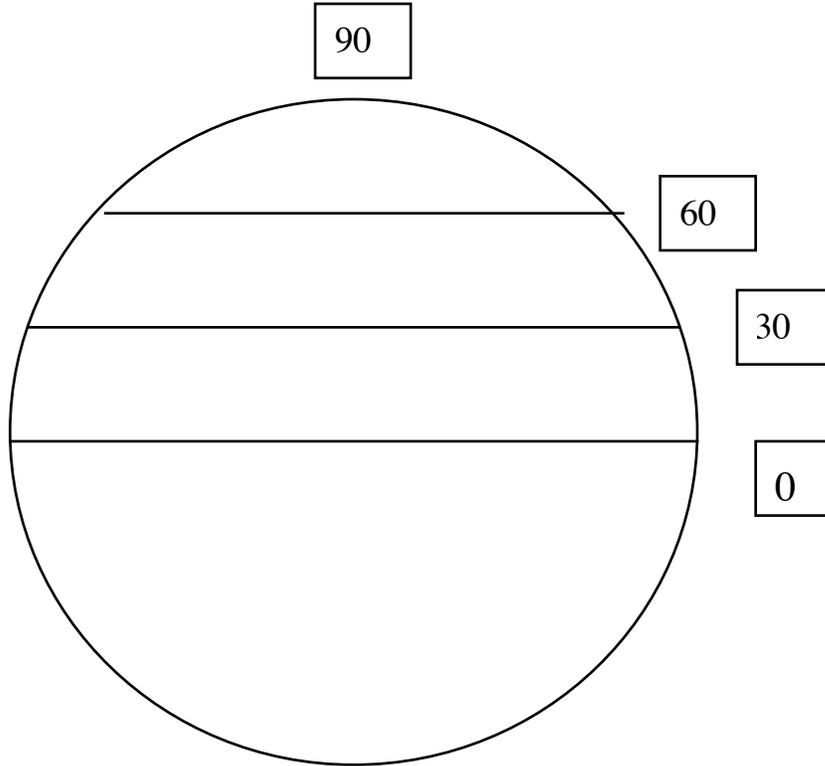
61. The energy released when atmospheric water vapour turns into rain is called _____ heat
62. Currents flow around the boundary of gyres because of _____ balance
63. Westerly winds travel towards the _____
64. Name two ways in which large storms can lose the energy which feed their growth
_____ and _____

Name: _____

ID: A

Essay

65. 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.



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