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Exam2Sec1Fall2007

True/False
Indicate whether the statement is true or false.

___ 1. Because of the dissolved salt in seawater its freezing point is lower than that of pure water
___ 2. Short residence time elements are uniformly distributed in the oceans
___ 3. Salinity is used to determine the density of sea water
___ 4. Hydrothermal vents are found only at mid-ocean ridges.
___ 5. All of the nitrate in the ocean comes from rivers
___ 6. Tritium (3H) was produced during the atmospheric testing of nuclear weapons
___ 7. The density of seawater is determined by temperature and salinity
___ 8. There are only two places in the ocean where deep water is currently made
___ 9. In the mid-latitudes 30-40° there is more evaporation from the surface of the ocean than precipitation back into it
___ 10. Humid air is more dense than dry air
___ 11. Low pressure zones in the atmosphere occur where air is ascending
___ 12. Gyres in the Southern hemisphere are anticlockwise
___ 13. During El Nino conditions hurricanes are less likely to come near Hawaii
___ 14. El Nino is a very recent climatic event dating from 1970
___ 15. Wave packets travel at the same speed as individual waves
___ 16. The trough of a tsunami always arrives first
___ 17. Tides are created only as a result of gravitational attraction
___ 18. Average tidal range in Hawaii is 9 feet
___ 19. Methane is also a greenhouse gas
___ 20. Our current state of knowledge allows us to accurately predict the rise in sea level as atmospheric CO₂ levels increase
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
   a. 1 gram
   b. 15 grams
   c. 35 grams
   d. 0.1 gram

___ 22. What is the approximate mixing time of the oceans?
   a. 100 years
   b. 1,000 years
   c. 36,000 years
   d. 1 million years

___ 23. How much of the Earth’s surface water is in the oceans?
   a. 10%
   b. 97%
   c. 99%
   d. 73%

___ 24. Hydrothermal fluids do not boil at 380 °C at the bottom of the ocean because
   a. Pressure has raised the boiling point
   b. Sea water doesn’t boil
   c. There are too many chemicals dissolved in the sea water
   d. The particles prevent boiling

___ 25. The chemosynthetic based communities at hydrothermal vent sites get their energy ultimately from:
   a. Sulphide
   b. Sunlight
   c. Warmth of the water
   d. Radioactive decay
   e. Twinkie bars

___ 26. When sea water passes through a hydrothermal system
   a. Anhydrite (Ca SO4) is precipitated
   b. Magnesium (Mg) is removed by reaction with the rock.
   c. Sulphate is reduced to sulphide.
   d. All of the above.

___ 27. 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

___ 28. If a 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
29. 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

30. The heat capacity of a substance is the amount of heat needed to raise its temperature by
   a. 1°C
   b. 10°C
   c. 15°C
   d. 100°C

31. 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

32. The colour of light that is absorbed least in the ocean is
   a. violet
   b. blue
   c. green
   d. red

33. The speed of light in water, compared to air is:
   a. greater
   b. less
   c. same

34. The atmospheric pressure at the top of Mauna Kea is approximately
   a. 1000 mb
   b. 829 mb
   c. 562 mb
   d. 213 mb

35. The wavelength of the radiation entering and leaving the Earth are
   a. the same
   b. incoming is short, outgoing is long
   c. incoming is long, outgoing is short
   d. none of the above

36. 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

37. Western boundary currents are:
   a. faster than eastern boundary currents
   b. warmer than eastern boundary currents
   c. all of the above
   d. none of the above
38. The southern oscillation is:
   a. the change in direction of Coriolis force at the equator
   b. the change in pressure differential between Darwin and Tahiti
   c. the change in the thermocline depth between El Nino and La Nina
   d. A popular dance from Brazil

39. During the 1982/83 El Nino the weather conditions in Australia were:
   a. drought
   b. heavy rainfall
   c. hurricanes
   d. unaffected

40. In the movie clip about the 1982/3 El Nino we watched in class, where were the large waves washing away the foundations of houses
   a. Tahiti
   b. Australia
   c. California
   d. Washington

41. A wave behaves as a shallow water wave when the depth of the ocean is equal to or less than:
   a. one wavelength
   b. 1/2 wavelength
   c. 1/20 wavelength
   d. 1/23 wavelength

42. 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

43. When wave trains propagate away from a storm they lose what percentage of their height each day?
   a. 10%
   b. 50%
   c. 30%
   d. 22%

44. The period of a wave is:
   a. the distance between its crests
   b. the time it takes succeeding crests to pass a fixed point
   c. the number of waves that pass a fixed point each second
   d. the distance from the crest to the trough of a wave

45. In the Pacific Ocean, Tsunami travel at approximately:
   a. 13 mph
   b. 45 mph
   c. 150 mph
   d. 450 mph

46. 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
47. Conservative ions are:
   a. those whose proportions remain constant relative to each other in all oceans
   b. those whose proportions vary relative to each other in all oceans.
   c. those ions whose concentration is less than 1 mmol
   d. those ions whose concentration is greater than 1 mmol
   e. those ions that vote republican

48. If you cool seawater its density
   a. increases
   b. decreases
   c. stays the same

49. Of the total water in the ocean the deep zone accounts for about
   a. 1%
   b. 18%
   c. 80%
   d. 99.4%

50. The mass of one square inch of the atmosphere at the Earth's surface is approximately
   a. 5 pounds
   b. 1 pound
   c. 15 pounds
   d. 25 pounds
   e. 10 pounds

51. During El Nino the layer of warm water at the surface ocean in the Western Pacific is
   a. thicker than normal
   b. thinner than normal
   c. stays the same

52. The period of a wave is:
   a. the distance between its crests
   b. the time it takes succeeding crests to pass a fixed point
   c. the number of waves that pass a fixed point each second
   d. the distance from the crest to the trough of a wave

53. In the movie clip we saw in class, where were the very large waves?
   a. Cape Horn
   b. Cabo san Lucas
   c. Cape of Good Hope
   d. South of Iceland

54. As a result of tides the length of a day on Earth is:
   a. increasing
   b. decreasing
   c. not changing

55. The tides in Hawaii are:
   a. diurnal
   b. semi-diurnal
   c. mixed

56. The current CO₂ content of the atmosphere (in ppmv) is about:
   a. 120
   b. 180
   c. 380
   d. 560
57. 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

58. During an ice age sea level
   a. goes up
   b. goes down
   c. stays the same

59. Data from ice-cores shows that when carbon dioxide levels in the atmosphere went down, average planetary temperatures:
   a. stayed the same
   b. went up
   c. went down

60. The Vostock ice core was drilled by French and Soviet scientists in
   a. France
   b. Greenland
   c. Siberia
   d. Antarctica
   e. Alaska

Completion

Complete each statement.

61. The Earth loses its heat by __________
62. Westerly winds travel towards the ________

Essay

63. Name 5 of the 6 major ions in seawater.
64. Name four chemicals that are needed by all oceanic plants and two that are needed by some organisms that build skeletons

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