

## Fall 2001 exam #2 section 2

### True/False

*answer on scantron a=true; b=false*

1. Because of the dissolved salt in seawater its freezing point is lower than that of pure water
2. Hydrothermal vents always have large numbers of animals around them
3. There is more phosphate in the deep water of the Pacific Ocean than in the deep water of the Atlantic Ocean
4. Deep water forms in the Pacific Ocean and flows to the Atlantic
5. Outgoing radiation from the Earth is longwave
6. Gyres in the Northern hemisphere are anticlockwise
7. When wind blows over cold ocean water it is less likely to produce rain
8. The velocity of a deep water wave can be calculated from its period
9. The trough of a tsunami always arrives first
10. The effect of the Sun on the generation of tides is about 45% of that of the Moon
11. Our current state of knowledge allows us to accurately predict the rise in sea level as atmospheric CO<sub>2</sub> levels increase
12. During ice ages sea level goes down
13. Hydrothermal vents can be found by high concentrations of manganese in the water.
14. The maximum density of seawater occurs at approximately 4°C
15. Most of the volume of the ocean is composed of pycnocline waters
16. In the mid-latitudes 30-40° there is more evaporation from the surface of the ocean than precipitation back into it
17. High pressure zones in the atmosphere occur where air is descending
18. During El Nino conditions hurricanes are more likely to come near Hawaii
19. Wave packets travel at the same speed as individual waves
20. Carbon dioxide is the only greenhouse gas being put into the atmosphere by human activity
21. Deserts are found at the latitudes where air masses are rising
22. At constant wind speed the Ekman layer gets deeper as you approach the equator
23. During El Nino conditions atmospheric pressure is lower in Tahiti than in Darwin
24. When the crest of a wave overlaps with the trough of another wave this is called constructive interference

25. The most significant contributor to future global sea level rise is thermal expansion of surface ocean water

### Multiple Choice

*Choose letter on scantron that best completes the statement or answers the question.*

26. In sea water major ions constitute what percentage of the total?:
- 100%
  - 99.8%
  - 90%
  - 50%
  - 10%
27. How much salt is dissolved in a kilogram of typical seawater
- 1gram
  - 15 gram
  - 35 gram
  - 1000 gram
  - 0.1 gram
28. How long would it take to replace all the water in the oceans with river water?
- 36,000 yrs
  - 8 million years
  - 1000 years
  - 1 million years
  - 100 million years
29. What percentage of the Earth's surface water is in the oceans?
- 10%
  - 97%
  - 99%
  - 73%
30. 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
31. When sea water passes through a hydrothermal system
- Anhydrite ( $\text{Ca SO}_4$ ) is precipitated
  - Magnesium (Mg) is removed by reaction with the rock.
  - Sulphate is reduced to sulphide.
  - All of the above.
32. Hydrothermal chimneys form from:
- Precipitation of materials from the hydrothermal fluid
  - From molten lava as new ocean floor is created.
  - The remains of dead animals that live near the vents
  - Left over plate lunch

33. Most of the  $\text{NO}_3$  in the ocean comes from
- the atmosphere
  - rivers
  - rain
  - hydrothermal fluids
  - ships
34. Nutrients are removed from the surface waters of the ocean down to the point where the light level is
- 50%
  - 10%
  - 5%
  - 1%
35. Most of the tritium entered the surface ocean
- during the second world war
  - in 1952
  - in 1964
  - in 1981
36. 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:
- 1-3
  - 90
  - 9
  - 0
37. The heat capacity of a substance is the amount of heat needed to raise its temperature by
- $1^\circ\text{C}$
  - $10^\circ\text{C}$
  - $15^\circ\text{C}$
  - $100^\circ\text{C}$
38. Approximately what % of incoming light reaches 10 m depth
- 1%
  - 6%
  - 16%
  - 46%
39. Currents flow around the boundary of the gyres because of
- geostrophic balance
  - Coriolis force
  - trade winds
  - Ekman spiral
40. A wave behaves as a shallow water wave when the depth of the ocean is equal to or less than:
- one wavelength
  - $1/2$  wavelength
  - $1/20$  wavelength
  - $1/23$  wavelength

41. If a wind wave has a period of 8 seconds its velocity in meters per second in deep water would be approximately:
- 8
  - 12
  - 24
  - 210
42. In the Pacific Ocean, Tsunami travel at approximately:
- 13 mph
  - 45 mph
  - 150 mph
  - 450 mph
43. The current CO<sub>2</sub> content of the atmosphere (in ppmv) is about:
- 120
  - 180
  - 369
  - 560
44. 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
45. During an ice age sea level
- goes up
  - goes down
  - stays the same
46. The chemosynthetic based communities at hydrothermal vent sites get their energy ultimately from:
- sulphide
  - sunlight
  - warmth of the water
  - radioactive decay
  - Twinkie bars
47. The atmospheric pressure at the top of Mauna Kea is approximately
- 1000 mb
  - 829 mb
  - 562 mb
  - 213 mb
48. 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

49. 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
50. 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
51. When a deep water wave approaches the shore which of the following is true:
- its velocity remains constant
  - its period remains constant
  - its wavelength remains constant
52. As a result of tides the length of a day on Earth is:
- increasing
  - decreasing
  - has no effect
53. Neap tides occur when:
- The moon is new
  - The moon is full
  - The sun and moon are aligned
  - Jupiter is aligned with Mars
  - none of the above
54. At the equator the Earth is rotating eastward at approximately:
- 100 mph
  - 10,000 mph
  - 1,000 mph
  - 1,500 mph
55. Eastern boundary currents are:
- slower than western boundary currents
  - colder than western boundary currents
  - all of the above
  - none of the above
56. During the 1982/83 El Nino the weatrhher conditions in Australia were:
- drought
  - heavy rainfall
  - hurricanes
  - unaffected
57. Typical tidal range in Hawaii is
- 2ft
  - 6ft
  - 10ft
  - 20ft

Name \_\_\_\_\_ Class section: \_\_\_\_\_ Date: \_\_\_\_\_ Soc. Sec. #: \_\_\_\_\_

**Completion**

*Complete each sentence or statement on the exam*

58. The mixing time of the oceans is approximately \_\_\_\_\_ years
59. The two forces that raise the tides on the surface of the Earth are \_\_\_\_\_ and \_\_\_\_\_
60. The three factors that determine the development of a "full sea" are \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_

**Essay**

*Answer on the exam sheet in the space below*

61. In hydrothermal circulation name two chemicals that are removed or changed into another form in seawater and name three chemicals that are added to sea water
62. Name the principal currents in the North Pacific gyre
63. Name 5 of the 6 major ions in seawater.