

OCN 201, Fall 2000, Exam 2
Section 1

Multiple choice – mark your answers on the scantron (1 point each)

1. 1000 years is:

- a) the average time taken to mix the ocean once
- b) the time taken to fill the oceans from rain water
- c) the time taken to fill the oceans from rivers
- d) the residence time of the major ions in seawater

2. Hydrothermal fluids do not boil at 380° C at depths of 2,500 m below the surface of the ocean because:

- a) Pressure has raised the boiling point
- b) The amount of salt in sea water prevents it from boiling
- c) The bacteria that live on the sulphide in the water prevent it from boiling
- d) The particles prevent boiling

3. Chemosynthetic animal communities at hydrothermal vent sites get their energy from

- a) Sunlight
- b) Pressure
- c) Temperature of the water
- d) Sulphide
- c) Malasadas

4. Nutrients are removed from the surface waters of the ocean down to the point where the light level is

- a) 15%
- b) 8%
- c) 5%
- d) 1%

5. Of 100 units of primary production in surface ocean waters, approximately what amount is exported from the surface layer?

- a) 90 units
- b) 50 units
- c) 10 units
- d) 3 units

6. Compared to pure water, the freezing point of seawater is:

- a) higher
- b) the same
- c) lower

7. If you evaporate water from the surface ocean the density of seawater will

- a) increase
- b) decrease
- c) stay the same

8. The surface mixed layer in the tropics when compared to that in mid latitudes is:

- a) deeper
- b) the same
- c) shallower

9. Of the total water in the ocean the deep zone accounts for about

- a) 1%
- b) 18%
- c) 80%
- d) 99.4%

10. The speed of light in air compared to water is

- a) higher
- b) the same
- c) lower

11. In water the speed of sound

- a) increases with decreasing temperature
- b) increases with increasing pressure
- c) all of the above
- d) none of the above

12. The average weight of 1 square inch of atmosphere is

- a) 1 pound
- b) 5 pounds
- c) 15 pounds
- d) 25 pounds

13. An individual standing on the Earth at the equator is moving at approximately

- a) 100 miles per hour to the west
- b) 1000 miles per hour to the east
- c) 1000 miles per hour to the west
- d) is stationery

14. The atmospheric pressure at the top of Mauna Kea is approximately

- a) 1000 mb
- b) 820 mb
- c) 560 mb
- d) 200 mb

15. Eastern boundary currents are

- a) Warmer than western boundary currents
- b) Faster than western boundary currents
- c) All of the above
- d) None of the above

16. During El Nino the thermocline in the eastern Pacific is

- a) closer to the surface
- b) deeper
- c) unaffected

17. During El Nino rainfall in the Pacific is greater in the

- a) Western Pacific
- b) Central Pacific
- c) Eastern Pacific
- d) Central and western Pacific
- e) Central and Eastern Pacific

18. In the video shown in class what was the major climatic effect of El Nino in Australia

- a) Drought and dust storms
- b) Ocean storms
- c) Hurricanes
- d) Fishery collapse

19. 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 new CD by the Buena Vista Social Club

20. 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

21. If the period of a wave was 8 seconds what would its approximate velocity be in metres/second

- a) 4
- b) 8
- c) 12
- d) 24

22. Relative to individual waves a wave train moves at

- a) The same speed
- b) Half the speed
- c) Twice the speed
- d) 1.56 times the speed

23. When a deep water wave approaches the shore which of the following is true:

- a) Its velocity remains constant
- b) Its period remains constant
- c) Its wavelength remains constant

24. In the Pacific Ocean Tsunami travel at:

- a) 13 mph
- b) 45 mph
- c) 150 mph
- d) 450 mph

25. The period of a typical Tsunami is:

- a) 30 seconds
- b) 2 minutes
- c) 15 minutes
- d) 35 minutes

26. The tides in Hawaii are:

- a) Diurnal
- b) Semi-diurnal
- c) Mixed

27. A typical tidal amplitude in Hawaii is

- a) 6ft
- b) 12ft
- c) 20 ft
- d) 50 ft

28. Friction from tidal forces is slowing down the Earth's rotation. How will this affect the number of days in a year

- a) unaffected
- b) fewer
- c) more

29. During ice ages atmospheric CO₂ levels are

- a) the same as today
- b) higher than today
- c) lower than today

30. 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

31. Compared to the size of the atmospheric reservoir of carbon dioxide the fossil fuel reservoir is approximately

- a) 10 times
- b) 13.5 times
- c) 25.7 times
- d) 100 times
- e) 140 times.

32. The most likely contribution to sea level rise from increased atmospheric CO₂ levels is

- a) Melting of mid latitude glaciers
- b) Melting of polar ice caps
- c) Warming of the surface ocean
- d) Increased number of people at the beach swimming

33. In 1998 the atmospheric carbon dioxide level was approximately:

- a) 280 ppmv
- b) 315 ppmv
- c) 368 ppmv
- d) 560 ppmv

34. In the fishing model we showed in class, what happened to the fish population after the recruitment of juvenile fish was disturbed by an El Nino-like event?

- a) population declined and then rose again
- b) population declined and stayed low
- c) population was unaffected

35. In the model we ran in class, what happened to the biota in the surface waters when we stopped upwelling

- a) They were unaffected
- b) they declined
- c) they increased

36. In class, we ran an atmospheric carbon dioxide model and changed the rate of surface ocean mixing from 12.5 years to 1 year. What was the effect of this change on the maximum atmospheric carbon dioxide levels we saw in the atmosphere approximately 100 years into the future?

- a) There was no change
- b) they were lower
- c) they were higher

37. In the SIM Earth model that we ran in class, what happened to the atmospheric carbon dioxide level when the biota levels increased?

- a) It went up
- b) It went down
- c) It stayed the same

38. How much salt is dissolved in a kilogram of typical seawater?

- a) 1 gram
- b) 15 grams
- c) 35 grams
- d) 1,000 grams
- e) 0.1 gram

True/False – Mark (a)=true, (b)=false on your scantron, (1 point each)

39. Hydrothermal vents are only found at the Mid-ocean ridges

40. The concentration of nitrate (NO₃) in the deep water of the Pacific Ocean is greater than that in the deep water of the Atlantic Ocean

41. The maximum density of seawater occurs at approximately 4° C

42. Deep water forms in the Atlantic Ocean and flows to the Pacific Ocean

43. Air has a lower heat capacity than water

44. Radiation from the Sun is shortwave

45. At high latitudes the sun delivers less heat to the surface of the Earth because the rays of sunlight must penetrate more of the atmosphere

46. In a low pressure zone air is rising?

47. Surface currents are driven by thermohaline processes

48. In the southern hemisphere Coriolis force appears to deflect motion to the left

49. For the same wind speed the depth of the Ekman will be greater closer to the Equator

50. During El Nino, the atmospheric pressure in the Central Pacific at Tahiti is lower than normal

51. During El Nino conditions hurricanes are more likely to come near Hawaii

52. A wave behaves as a deep water wave if it is in water deeper than 1/2 its wavelength

53. Constructive interference is when two waves crests overlap
54. Waves can refract around island chains
55. A storm surge is a progressive wave
56. The effect of the Sun on the generation of tides is about 45% of that of the Moon
57. Neap tides occur when the Sun and the Moon are in line with each other
58. Carbon dioxide is the only greenhouse gases
59. Evidence from ice cores suggests that CO₂ levels in the atmosphere just before the industrial revolution were much higher than today

Essays: (total of 16 points)

Name 5 of the 6 major ions in seawaters (5)

Describe what happens to the blue/green, red, and violet portions of sunlight that enter the ocean (3)

List the three factors that lead to the development of a "full sea" (3)

Draw a schematic that represents the fate of primary production (5)