

Last Name \_\_\_\_\_ First Name \_\_\_\_\_ SS# \_\_\_\_\_

**Multiple Choice (1 pt each)**

1. Major ions in sea water have residence times:
  - a. Greater than 1 million years
  - b. Greater than 1,000 years
  - c. Less than 1 million years
  - d. More than 100 million years
2. 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
3. How much of the Earth's surface is in the oceans?
  - a. 10%
  - b. 97%
  - c. 99%
  - d. 73%
4. 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. Phosphate
  - d. Carbon
  - e. Cadmium
5. The Cambrian explosion was caused by?
  - a. The evolution of sexual reproduction
  - b. The build-up of ozone in the atmosphere
  - c. Evolutionary radiation of species
  - d. All of the above
6. The hierarchy of the modern taxonomic system (in order) is?
  - a. Kingdom, Class, Phylum, Family, Order, Genus, Species
  - b. Phylum, Kingdom, Class, Family, Order, Genus, Species
  - c. Kingdom, Phylum, Class, Order, Family, Genus, Species
  - d. Phylum, Kingdom, Class, Order, Family, Genus, Species
7. What determines the depth to which nitrate is completely removed from the surface waters of the ocean?
  - a. Light penetration
  - b. Upwelling
  - c. Pressure
  - d. Temperature

8. Most of the tritium entered the surface ocean.
  - a. During the second world war
  - b. In 1952
  - c. In 1964
  - d. In 1981
9. Of the total water in the ocean the deep zone accounts for about.
  - a. 1%
  - b. 18%
  - c. 80%
  - d. 99.4%
10. In water the speed of sound
  - a. Increase with increasing temperature
  - b. Increases with increasing pressure
  - c. All of the above
  - d. None of the above
11. If the evolutionary clock were to be replayed on planet Earth again.
  - a. The same species would probably evolve
  - b. Different species would probably evolve
  - c. Human beings would probably evolve again
12. Most scientific evidence for the origin of the Universe supports the
  - a. Hypothesis of Divine Intervention
  - b. The Big Bang Hypothesis
  - c. A hypothesis for Multiple Universes
  - d. A hypothesis for an Oscillating Universe
13. Sea Urchins belong to the Phylum
  - a. Coelenterata
  - b. Porifera
  - c. Echinodermata
  - d. Chordata
14. The maximum energy of light coming into the surface ocean is in the following part of the spectrum
  - a. Violet-indigo
  - b. Blue-green
  - c. Yellow-orange
  - d. Red-infrared
15. 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
16. 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

17. There are two Spring tides every
  - a. Day
  - b. 7 days
  - c. 14 days
  - d. 28 days
18. Typical tidal range in Hawaii is
  - a. 2 ft.
  - b. 6 ft.
  - c. 10 ft.
  - d. 20 ft.
19. Light is converted to heat by
  - a. Scattering
  - b. Absorption
  - c. Refraction
  - d. Reflection
20. SONAR locates things under water that
  - a. Reflect sound waves
  - b. Refract sound waves
  - c. Absorb sound waves
  - d. Convert sound waves to light, thus making the objects visible
21. In the Northern Hemisphere, the Coriolis effect causes winds to
  - a. Rise
  - b. Fall
  - c. Bend left
  - d. Bend right
22. Sea breezes occur
  - a. When land is heated by sunlight
  - b. In the daytime only
  - c. Only in coastal regions
  - d. All of the above
23. The generally cold temperature of California coastal water is due to
  - a. Downwelling
  - b. Ekman transport
  - c. Refraction
  - d. Trade winds
24. The thermohaline conveyor belt makes one circuit in about
  - a. 100 years
  - b. 1000 years
  - c. 1 million years
  - d. 10.5 months
25. The speed of a shallow-water wave is controlled by its
  - a. Wavelength
  - b. Period
  - c. Depth
  - d. All of the above

**True or False (1 pt each) [ a = TRUE, b = FALSE ]**

26. The concentration of Silicate in the deep water of the Pacific Ocean is greater than that in the deep water of the Atlantic
27. The age of the Universe is about 4 billion years
28. Tritium is a chemical that can be used to trace the physical movement of water in the oceans
29. Reproductive isolation leads to genetic drift
30. In the mid-latitudes 30-40 degrees there is more evaporation from the surface of the ocean than precipitation back into it
31. The Phylum Mollusca exhibits bi-lateral symmetry
32. The Hadley Cell is an atmospheric circulation cell that moves air from the Equator to 30 degrees N
33. Gyres in the Northern Hemisphere are anticlockwise
34. Long wavelength waves travel more slowly than short ones
35. Evolution suggests that species evolve by way of natural processes, not fate
36. The Spark Chamber experiment provided evidence in favor of biosynthesis
37. Most of the oceans deep water is formed in the North Pacific
38. Photosynthesis produces CO<sub>2</sub>
39. A sea begins with wind blowing on capillary waves
40. In the ocean, sound travels farthest in the regions where its velocity is greatest
41. Speciation occurs because of Divine Intervention
42. The most fit usually survive
43. Prokaryotes lack a nucleus
44. It is highly unlikely that life exists elsewhere (besides Earth) in the Universe
45. The crest of a tsunami always arrives first
46. Spring tides occur when the Sun and the Moon are in line with each other
47. Lamarck claims that acquired characteristics can be passed on (inherited)
48. 99.9% of all species that ever evolved on Earth are extinct today
49. All species in nature are "fixed" and do not change
50. Many species of insect can be found in the sea

**Fill in the Blank (1 pt each)**

- 51 & 52. The ocean was formed by \_\_\_\_\_ of water, and the accumulation of water from \_\_\_\_\_ hitting the Earth.
53. Whales are in the Phylum \_\_\_\_\_.
- 54 & 55. Evolution proceeds by two kinds (patterns) of change, called: \_\_\_\_\_ and/or \_\_\_\_\_

**Do Da Math (5 pts)**

56. The speed of a deep-water wave with a wavelength of 144 m would be \_\_\_\_\_

**Essay (5 pts each)**

57. Name the Principle Currents in the North Pacific Gyre.

58. Explain why deep water is not formed in Hawai`i.

59. List 5 processes that determine evolution and explain how they interact to produce a new species.