

Eart 1 - Oceanography
Exam #1 - Fall 2003

NameSS#.....

Multiple choice and true/false Questions (1 pt each). Fill in the appropriate matching circle on your PARSCORE form. Select only one answer for each question.

1. T F Of all the planets in the solar system, the Earth is the only planet to have large quantities of liquid water on its surface.
 - A. T
 - B. F

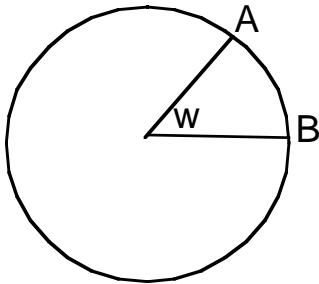
2. Until recently, many scientists were tentative in their acceptance of the theory of the chemical evolution of life on Earth. What has changed their minds?
 - A. The discovery of organic molecules in a meteorite from Mars.
 - B. The discovery of organic molecules at geothermal vents on the deep seafloor.
 - C. Experiments in which organic molecules were synthesized in chambers replicating a hypothetical early Earth environment.
 - D. All of the above.

3. In discussion section, you worked with a bathymetric map of southern Monterey Bay. The lines on the map that connect points of equal depth are called
 - A. isobars
 - B. isomaps
 - C. isostacy
 - D. isotherms
 - E. isobaths

4. The oceans help sustain life on this planet because
 - A. they retain heat
 - B. moderate seasonal and daily temperature variations
 - C. dissolve solids and gasses
 - D. suspend nutrients
 - E. all of the above

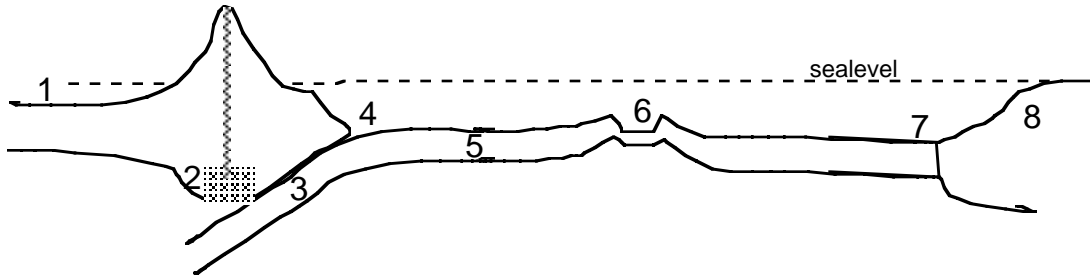
5. John Harrison's invention of the chronometer was important because
 - A. it enabled sailors to calculate local time.
 - B. it allowed the calculation of latitude after weeks at sea.
 - C. it allowed the calculation of longitude after weeks at sea.
 - D. it was used to calibrate navigational tools.
 - E. the devices were very valuable and were considered works of art.

6. The Meteor expedition was able to determine the bathymetry of the south atlantic by
- lowering lines to the seafloor until they touched bottom
 - using a new technique called sonar
 - measuring the time it took for light beams to reflect off the seafloor
 - by measuring anomalies in the gravity field
 - all the above
7. Your ship had departed Santa Cruz a week earlier. The sun is directly overhead indicating that it is 12 noon. At the same time a watch set to the time in Santa Cruz shows a time of 3 PM. If Santa Cruz is at a longitude of 120°W what is your current longitude?
- 105°E
 - 90°E
 - 90°W
 - 135°W
 - 165°W



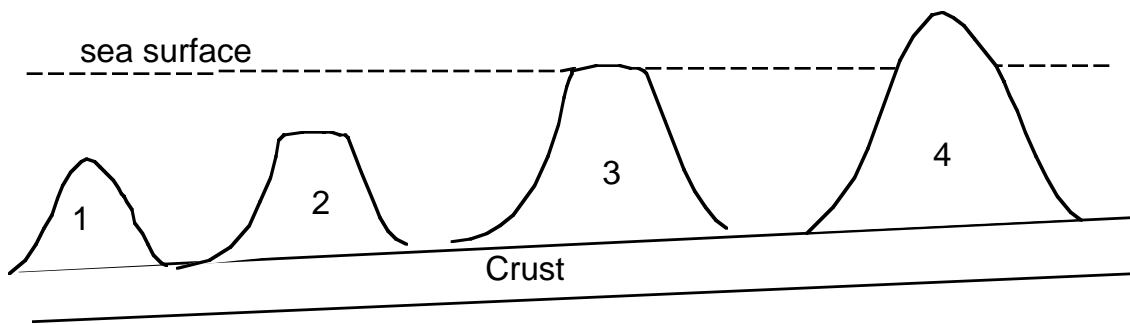
8. Eratosthenes used simple geometry to compute the circumference of the Earth. To compute the circumference of a hypothetical planet (see figure), you have the following information, a distance (4000 km) between two locations A & B, and the angle ($W=45^{\circ}$) of the arc of between those points as defined by two lines drawn from the center of the planet through those locations (see below). With this information you determine the circumference to be:
- 180,000 km
 - 89 km
 - 5000 km
 - 32,000 km
 - 320,000 km
9. At which of these locations is the Earth's crust thickest?
- Beneath Denver, high in the Rocky Mountains.
 - Beneath Los Angeles, at the Pacific coast.
 - Beneath Washington, D.C., on the trailing edge of the continent.
 - Beneath the ocean floor 2,000 kilometers south of Honolulu.
 - The crust is about the same thickness all over the Earth.

10. In the diagram of a mid-ocean ridge above, what was the average rate of seafloor subsidence (sinking in meters/million years) between 5 and 25 million years (m.y.) ago.
- A. 80 meter / m.y.
 B. 25 meters/ m.y.
 C. 50 meters / m.y.
 D. 250 meters / m.y.



11. The above diagram represents a cross section of the earth's crust with both oceanic and continental plates and a mid-ocean ridge (at F).
- In this diagram, where would you expect to find a tectonically inactive, passive margin?
- A. 3
 B. 4
 C. 6
 D. 8
 E. there is no passive margin in this cross section
12. In the above diagram, the crust with the highest density is located at _____
- A. 1
 B. 2
 C. 3
 D. 5
 E. 6
13. In the diagram above, the most powerful earthquakes would occur at
- A. 1
 B. 3
 C. 4
 D. 5
 E. 6

14. The origin of *deltas* is related to
- glacial deposition and the formation of moraines.
 - river deposition of sediments eroded from continents.
 - glacial erosion and the formation of troughs and fjords.
 - volcanic activity in coastal regions.
 - biological activity of corals, cyanobacteria, and small shelled organisms.
15. The islands bordering the deep-sea trenches
- result from a series of quiet, continuous basaltic eruptions.
 - are accumulations of sediments on the margins of the trenches.
 - are formed from the activities of coral and other organisms.
 - are explosive volcanoes that emit lavas.
16. T F Detailed maps of the Arctic ocean bathymetry have been made by teams of geophysicists conducting soundings from the sea-ice.
17. T F In the diagram above, the oceanic plate must be moving to the right.

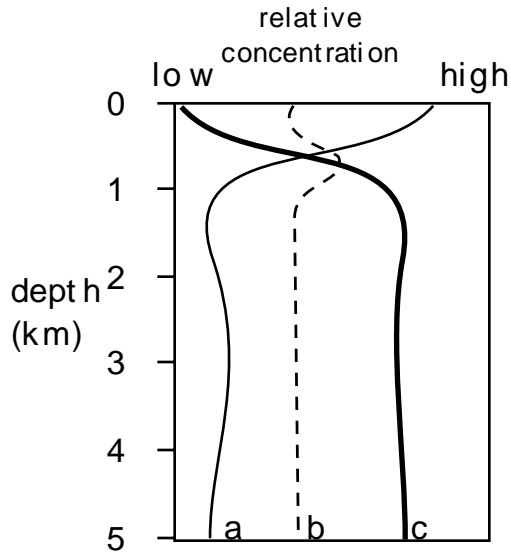


18. In the diagram below, feature 3 is referred to as a
- seamount
 - atoll
 - guyot
 - eraser seamount
 - graben
19. In the diagram above, all the features (1-4) can be attributed to
- subduction zone volcanism
 - ridge crest volcanism
 - an upwelling plume of magma (hot spot)
 - accumulation of sediments near the continental margin
 - all the above
20. Underlying the unconsolidated sediments of the seafloor are
- basalt pillows and basement rocks.
 - granite boulders.
 - glacial deposits left from the Ice Age.
 - ancient remnants of sunken continents.

Use these 5 choices for the 4 questions below. Each choice can be used more than once.

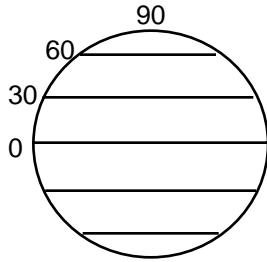
- (a) Terrigenous sediments
- (b) Biogenous sediments
- (c) Hydrogenous (or authigenic) sediments
- (d) Cosmogenous sediments
- (e) All of these

21. Arrive in the ocean from continents via rivers.
22. Sometimes are made of glass.
23. A sand size sediment particle drops into the ocean. If it is sinking at a rate of 800 m/day, how long will it take to reach the bottom in 4 km of water.
- A. 3600 hours
 - B. 800 days
 - C. 2 days
 - D. 5 days
24. Other than the hydrogen and oxygen atoms themselves, the two most abundant elements (ions) dissolved in seawater are
- A. flourine and iodine.
 - B. gold and silver.
 - C. bromine and boron.
 - D. sodium and chloride.
 - E. carbonate and sulfate.
25. The following chemical reaction is very common in the ocean:
 $\text{CH}_2\text{O} + \text{O}_2 \Leftrightarrow \text{CO}_2 + \text{H}_2\text{O}$
The reaction is often referred to as
- A. photosynthesis
 - B. hydrolysis
 - C. respiration (oxidation)
 - D. chlorination
 - E. precipitation
26. There are 1×10^5 KILOGRAMS of element X dissolved in all the world's oceans. It is added to the ocean at the rate of 1×10^5 GRAMS/year. What is the residence time of element X?
- A. 0.1 years
 - B. 1 year
 - C. 1000 years
 - D. 10000 years
 - E. 1,000,000 years



27. In the diagram above, which of the vertical chemical profiles most likely resembles that of dissolved oxygen (O_2) in the ocean.
- a
 - b
 - c
 - a & c
 - none of the above
28. In the diagram above, which of the vertical chemical profiles most closely resembles that of dissolved nitrate (NO_3) in ocean.
- a
 - b
 - c
 - a & b
 - none of the above
29. The hydrogen bonds of water molecules account for which of the following?
- Water is the universal solvent.
 - Water has a high surface tension.
 - Water has a high boiling point.
 - Water has a high heat capacity.
 - All of these are correct.
30. The transmission of sound by water can best be described by which of the following statements?
- It is inefficient as compared with transmission by air.
 - It is the same as by air.
 - It is lacking completely, a property known as incompressibility.
 - It is more efficient than transmission by air.

31. The physical and chemical properties of deep waters in the world ocean are most similar to those of the
- A. the tropical mixed layer.
 - B. the sub-tropics
 - C. the polar mixed layer
 - D. deep waters of the Red Sea
32. The speed (velocity) of sound in water increases at
- A. higher temperatures
 - B. shallower depth
 - C. lower salinities
 - D. lower density
 - E. all the above
33. How much heat is required to evaporate 100 grams of water vapor from the ocean surface.
- A. 1 calories
 - B. 1000 calories
 - C. 540 calories
 - D. 54000 calories
 - E. heat is released during evaporation, not absorbed.
34. Earth is "tilted" at about $23\frac{1}{2}^{\circ}$ relative to its orbital plane around the sun. This causes
- A. the change in temperature and climate known as the seasons.
 - B. the periods of illumination (or darkness) at the poles that last for six months.
 - C. longer day lengths around here in the summer.
 - D. higher summer temperatures.
 - E. all of the above.
35. The Coriolis effect causes objects moving in the northern hemisphere to veer off course
- A. to the right, or clockwise when viewed from above.
 - B. to the left, or counterclockwise when viewed from above.
 - C. in an upward direction.
 - D. in a downward direction.
 - E. they don't veer off course -- they continue straight.



36. Sketch the prevailing winds in the diagram above. If you were standing on top of a mid-Pacific island at 15° south latitude, from which direction would you expect the prevailing winds to come?
- north
 - south
 - west
 - southeast
 - southwest
37. Areas of persistent, large scale vertical air movement and calm winds are found on the Earth at latitudes
- 15° and 30° .
 - 45° and 60° .
 - 5° and 85° .
 - 0° and 30° .
 - 45° and 55° .
38. The dependable surface winds of the Earth centered at about 15° north and south latitudes are called
- the westerlies.
 - the northerlies.
 - the trade winds.
 - the doldrum winds.
 - the ITCZ.
39. When viewed from above, tropical cyclones rotate _____ in the **southern** hemisphere.
- clockwise
 - counterclockwise
 - either way -- it depends on the individual storm
 - only *northern* hemisphere tropical cyclones rotate
40. Pacific air masses moving inland over the Santa Cruz Mountains will
- rise and begin to warm causing condensation and precipitation
 - rise and begin to warm causing evaporation
 - sink and begin to cool causing evaporation
 - rise and begin to cool causing condensation and precipitation
 - none of the above

41. Primary productivity can be measured from satellites by sensors that detect
- A. oxygen in seawater.
 - B. carbohydrates in seawater.
 - C. sea surface temperature.
 - D. latitude and longitude.
 - E. chlorophyll concentrations.
42. The percentage of organic matter created in the surface ocean (i.e. primary production) that survives oxidation and eventually reaches the seafloor and is buried is ____.
- A. 90%
 - B. 75%
 - C. 50%
 - D. 10%
 - E. <1%
43. T F Of all the trophic levels in the food chain, the greatest % of total marine biomass is found in the top-most trophic level (carnivores).