

Name (*print*, last name first): \_\_\_\_\_

Social Security No: \_\_\_\_\_ -- \_\_\_\_\_ -- \_\_\_\_\_

**OCEANOGRAPHY 201 - Fall 1997**

**Exam #3: Sections I & 2**

Answer 1-57 on the computer-scan sheet. Use a dark (#2) pencil only, and mark neatly within the circles. Erase mistakes completely. Double check your Soc. Sec. #!

**True/False.** mark (a) for "true" and (b) for "false," (1 point each)

1. Chemical evolution is basically different from biological evolution in that it doesn't involve natural selection.
2. 95% of all species in the ocean are found in coastal waters.
3. Dolphins are toothed whales
4. The first organisms on earth were heterotrophs.
5. Lateral lines are used for camouflage in the deep sea
6. In recent years, the increase in aquaculture harvest exceeded the increase in the fishery harvest from the ocean.
7. Aerobic respiration is much more efficient than fermentation.
8. Tuna and dolphins have similar reproductive potentials
9. Sexual reproduction reduces variability within a population
10. In general, terrestrial ecosystems have more trophic levels than marine ecosystems.
11. Humans are eucaryotes
12. Hawaiian waters have a high number of endemic species.
13. Diatoms live best in low nutrient, turbid water
14. Fixing nitrogen means turning inorganic nitrogen into organic nitrogen
15. In order to maintain a high surface-to-volume ratio, it is best to be extremely large.
16. Some fish have lungs
17. The food chain in eutrophic waters is longer than the food chain in oligotrophic waters.
18. In the deep sea, red fish appear blue.
19. Deposit feeders feed primarily on dead fish
20. The killer whale is the top predator in the ocean

**Multiple choice:** pick the best answer (2 points each)

21. Which group is most vulnerable to overfishing:
  - a. Fish
  - b. Sharks
  - c. Copepods
  - d. Dinoflagellates
  - e. None of the above
  
22. Which is a great advantages of living in the benthic region of the ocean.
  - a. Fixed suspension feeding
  - b. Counterillumination
  - c. Easy dispersal
  - d. Freedom from primary production
  - e. All of the above

23. Proteins are made of:

- a. Amino acids
- b. Fats
- c. Lipids
- d. Nucleic acids
- e. Nucleotides

24. High species diversity in coral reef habitats is partially due to

- a. Low f-ratio
- b. Zooxanthellae
- c. Complexity of the coral habitat
- d. Oligotrophic conditions
- e. None of the above

25. High primary production of coral reefs is due to the

- a. Shallow-water habitat
- b. Strong recycling
- c. Nitrogen fixation
- d. Macroalgae
- e. All of the above

26. An f-ratio describes the ratio of

- 1. total production to new production
- 2. recycled production to total production
- 3. total production to recycled production
- 4. new production to new and regenerated production
- 5. regenerated production to new and regenerated production

27. Low fishery harvest in the tropical open ocean is due to

- a. low primary production
- b. low f-ratio
- c. long (=high) trophic pyramids
- d. distance from land
- e. all of the above

28. Mesopelagic animals are generally

- a. weakly muscled
- b. bioluminescent
- c. black, red or silvery
- d. small
- e. all of the above

29. The dominant group of the nekton in biomass is

- a. fish
- b. whales
- c. sharks
- d. squids
- e. none of the above

30. The four major macromolecules that make up a cell are:

- a. Carbohydrates, lipids, fats, sugars
- b. Starch, glycogen, sugars, chiton
- c. Carbohydrates, lipids, proteins, nucleic acids
- d. Lipids, carbohydrates, nucleic acids, amino acids
- e. None of the above

31. The most common function of bioluminescence is to:

- a. search for food
- b. search for mates
- c. deter predators
- d. conceal their silhouette
- e. none of the above

32. Critical Depth refers to:

- a. The depth where there is less than .01% of the light found at the surface
- b. The point in the water column where an organism's photosynthetic rate equals its respiration rate.
- c. Where vertically migrating fish are neutrally buoyant
- d. The depth in the water column where the sum of all photosynthesis above that depth equals the sum of all respiration above that depth
- e. The bottom of the euphotic zone.

33. The depth to which reef-building corals grow is limited by

- a. nutrients
- b. temperature
- c. zooplankton
- d. currents
- e. light

34. The world's largest fishery is for:

- a. Blue whale
- b. Peruvian anchovy
- c. Cod
- d. Tuna
- e. *Euphausia superba*

35. Photoautotrophs differ from heterotrophs in having/producing

- a. respiration
- b. ATP
- c. complex organic molecules
- d. CO<sub>2</sub>
- e. none of the above

36. The factor that limits the growth of plants throughout most of the ocean is

- a. nutrient levels
- b. light
- c. CO<sub>2</sub>
- d. temperature
- e. salinity

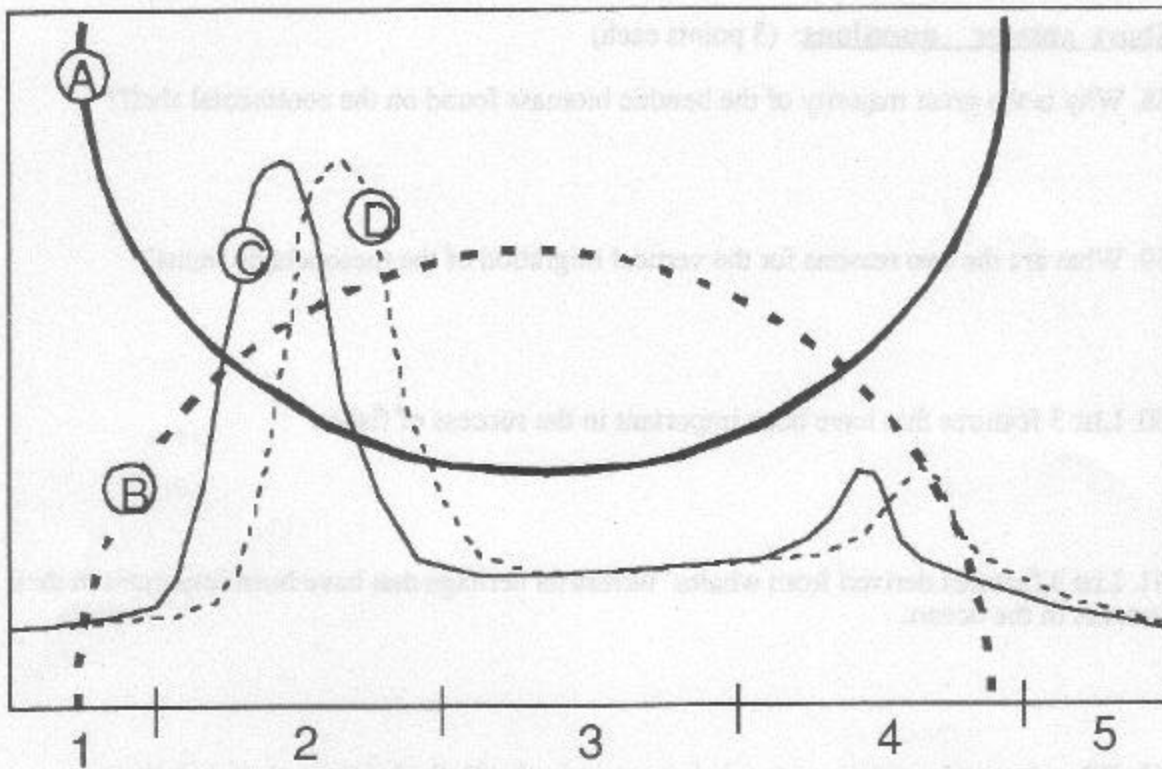
37. New production refers to production that occurs
- in the early parts of the year
  - as a result of recycling nutrients
  - as a result of nutrients from outside areas entering the system
  - below the critical depth
  - in the late parts of the year
38. Blue whales, the largest organisms on Earth, are able to sustain their enormous bodies with food because:
- They eat huge fish, like tuna
  - They feed low on the trophic pyramid
  - They can photosynthesize due to their blue color
  - The food chain is very long where they eat
  - None of the above
39. The lower limit of the epipelagic zone is determined by
- the depth of the continental shelf
  - The limit of light penetration
  - The depth animals can conceal themselves with bioluminescence
  - The maximum depth to which copepods can descend
  - None of the above
40. Mitochondria provide \_\_\_\_\_ to the cell.
- DNA
  - RNA
  - Protein
  - Chloroplasts
  - Energy
41. Coral polyps control the growth of zooxanthellae by
- limiting their supply of nitrogen
  - limiting their supply of CO<sub>2</sub>
  - providing simple sugars
  - providing light
  - none of the above
42. The Great Law of Fishing states that
- fisheries that are unlimited become unprofitable
  - productivity of fish populations is independent of changes in the physical and biological environment
  - debate on the condition of fish stocks is only resolved by the collapse of the stock
  - risk prone decisions increase fishery economic loss
  - none of the above
43. Which of the following organisms can fix nitrogen:
- Dinoflagellates
  - Coccolithophorids
  - Protists
  - Cyanobacteria
  - None of the above

44. MSY

- a. is constant from year to year
- b. changes from year to year
- c. is generally much lower than the OSY
- d. is important for determining primary production in the ocean
- e. is mostly dependent on seasonal changes in the environment

45. Species diversity is highest in

- a. epipelagic waters
- b. mesopelagic waters
- c. bathypelagic waters
- d. mud bottoms
- e. coral reefs



The above figure describes the growing season in temperate seas. Identify the curves:

(2 points each)

46. A= \_\_\_\_\_

47. B= \_\_\_\_\_

48. C= \_\_\_\_\_

49. D= \_\_\_\_\_

**Multiple choice:** pick the BEST answer from the following: (1 point each)

- a. < 1500 mya
- b. between 1500 and 2500 mya
- c. > 3500 mya
- d. > 4000 mya

- 50. Oxygen revolution
- 51. First eucaryote
- 52. Oldest fossils
- 53. Origin of sexual reproduction
- 54. Formation of the Earth
- 55. Origin of Metazoa
- 56. First stromatolites
- 57. Origin of land animals

**Short answer questions:** (3 points each)

58. Why is the great majority of the benthic biomass found on the continental shelf?

59. What are the two reasons for the vertical migration of the mesopelagic fauna?

60. List 3 features that have been important in the success of fishes.

61. List 3 features derived from whales' terrestrial heritage that have been important in their success in the ocean.

62. What unusual sensory system is important in sharks for locating prey in darkness

63. Write an equation that describes respiration.