

Biology 150: 1st in-class examination
Sept 16, 2011

Name _____

Indicate the lab you are registered in:

Tuesday, 8-9:50 _____

Tuesday, 10-11:50 _____

Tuesday, 12-1:50 _____

Tuesday, 3-4:50 _____

Tuesday, 5-6:50 _____

Thursday, 3-4:50 _____

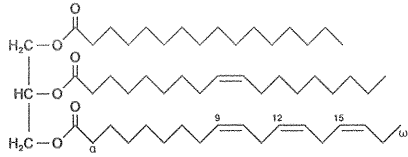
Answer the questions in the space provided and you may also use the back of the page to complete your response. There are 36 questions worth a total of 50 points (plus a three one point bonus questions). The point value of individual questions appears in parentheses.

1. All living things exhibit homeostasis. What is homeostasis? (1)
2. All science assumes *uniformity of natural laws*. What does this mean? (1)
3. A distinction is made between discovery science and hypothetical science? Reporting on the existence of bacteria capable of surviving in toxic conditions would be an example of which? (1)
4. Name in order the four steps to the scientific method. (1)
5. For what were Barry Marshall and Robin Warren awarded the Nobel Prize? (1)
6. Charles Darwin saw in nature three processes that explained the evolutionary change. Name (or describe) all three. (3)

7. Name or describe one example of artificial selection. (1)
8. What four elements are most abundant in all living things? (1)
9. Carbon in nature occurs in the form of three isotopes, ^{12}C , ^{13}C , and ^{14}C . How many neutrons do each contain? Which isotope is most abundant? (2)
10. How many bonds does C form? (1)
11. What is the valence of O? (1)
12. Give one example of each of the following: (4)
 - (a) a non-polar covalent bond
 - (b) a ionic bond
 - (c) a polar covalent bond
 - (d) a cation
13. The weak attractions that occur between the O end of one individual water molecule and the H end(s) of another water molecule are called _____ (1).
14. These same attractions occur between water and what other kinds of molecules? (1)
15. Molecules that contain only non-polar covalent bonds and don't dissolve easily in water and are described as _____. (1)
16. Phospholipids and detergent molecules are examples of molecules said to be _____ as they contain both regions containing only non-polar bonds as well as regions contain polar or ionic bonds. (1)
17. You are asked to make a 2 L solution at 100 mM . The compound has a molecular weight of 300 g/mole. How much of the compound would you need? (Note: don't forget the units) (1)

18. The pH of water is _____. What then is the concentration of H^+ in pure water? (Note: don't forget the units.) (2)
19. As you struggle to escape a burning building, two fairly light but equally hot objects bounce off your bare arm. The first object has a specific heat of 0.3 calorie/g while the second has a specific heat of 1.0 calories/g. Which, first or second is more likely to burn you? Why? (2)
20. If a substance is a buffer, what property does it have? (1)
21. A certain compound has a central carbon bonded to an amino group, a carboxyl group, a phosphate, and an hydroxyl group. Draw its complete structure showing all atoms and bonds and beside that molecule draw its enantiomer. (6)
22. Name one hexose aldose. (1)
23. Name one disaccharide. (1)
24. How do amylose and cellulose differ? (2)
25. What is the name for the reaction in which insertion of a water molecule is used to break apart the monomers of a biological polymer? (1)
26. Glucose, amylose, or sucrose which is a reducing sugar? (1)

27. What kind of lipid is this molecule? Which configuration are the C to C double bonds? (2)



28. Name one steroid. (1)

29. Draw the structure of an amino acid. (1)

30. How many different kinds of protein amino acids are there? How many are that have non-polar side chains (1)

31. Name two examples of protein secondary structure. (2)

32. How do purines and pyrimidines differ? Name two of each that occur in DNA (3)

Bonus questions:

(1) What is the central thesis or contention of Thomas Malthus's "Essay on Population"? (1)

(2) A visit to a volcano on what island inspired Lyell's central insight described in his 1837 book "Principles of Geology"? (1)

(3) What are the ratios of C, H, and O in all sugars? (1)