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Sample Exam 1 questions with answers marked in green highlight.

Note: Exam 1 will be 50 pts and approximately 50 questions. This document contains 36 questions from Exam 1 of the Fall 2009 semester. They are provided to help you study.

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**BIOL 101 – Foundations of Biology**  
**Exam 1 – Fall 2009 -- Prof. Hardy**

Instructions:

- Scantron answer bubbles should be completely filled in with a number 2 pencil.
- Start by filling in your complete last name and both first and middle name initials.
- Fill in your MU number in the Social Security number slot.
- Read ALL possible answers, then choose THE BEST answer.
- Please do not turn this page over until Prof. Hardy has instructed you to do so.

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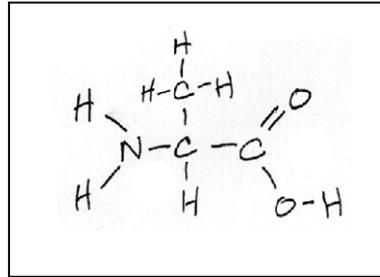
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- The nucleus of an atom typically contains
  - protons and neutrons.
  - protons and electrons.
  - only neutrons.
  - only protons.
  - only electrons.
- A(n) \_\_\_\_\_ forms when two atoms share electrons.
  - ion
  - element
  - covalent bond
  - ionic bond
  - hydrogen bond
- \_\_\_\_\_ are weak bonds that are not strong enough to hold atoms together to form molecules, but are strong enough to form bridges between molecules.
  - Ionic bonds
  - Covalent bonds
  - Hydrogen bonds
- In salad dressings, oil quickly separates from vinegar (which is mostly water) because oils
  - are hydrophobic.
  - are polar.
  - are lipids.
  - are both A and B.
  - are both A and C.
- Small insects are able to walk on water because of the cohesion of neighboring water molecules. This cohesion is caused by
  - Hydrogen bonding.
  - Ionic bonding.
  - Covalent bonding.
- In the equation  $2 \text{H}_2 + \text{O}_2 \rightarrow 2 \text{H}_2\text{O}$ , the  $\text{H}_2$  molecules are \_\_\_\_\_ and the  $\text{H}_2\text{O}$  molecules are \_\_\_\_\_.
  - reactants . . . products
  - products . . . reactants
  - reactants . . . reactants
  - products . . . products
- Organic compounds
  - always contain nitrogen.
  - are synthesized by only animal cells.
  - always contain carbon.
  - always contain oxygen.

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8. The molecule below at right is a(n)

- A) carbohydrate
- B) protein
- C) amino acid



9. Cells typically make all of their macromolecules from a set of 40-50 common monomers and a few other rare ingredients via dehydration (or condensation) reactions. Which of the following statements is/are *true* about dehydration reactions?

- A) One monomer loses a hydrogen atom, and the other loses a hydroxyl (-OH) group.
- B) Electrons are shared between atoms of the joined monomers.
- C) H<sub>2</sub>O is formed as the monomers are joined.
- D) Covalent bonds are formed between the monomers.
- E) All of the choices are correct.

10. The results of a dehydration (condensation) reaction can be reversed by

- A) hydrolysis.
- B) polymerization.
- C) the addition of an amino group.

11. The idea that all living things are composed of cells and that all cells come from other cells is an important component of:

- A) Central Dogma.
- B) Organelle Theory.
- C) Cell Theory.

12. Which type of cell(s) lacks a nucleus?

- A) a eukaryotic cell
- B) a bacterial cell
- C) a prokaryotic cell
- D) both A and B
- E) both B and C

13. Organisms belonging to the plant kingdom

- A) have cells containing plastids.
- B) have cells with cell walls.
- C) have cells with both plastids and cell walls.
- D) contain chloroplasts and are all unicellular.
- E) lack a nucleus.

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14. Lysosomes

- A) help to digest worn-out or damaged organelles.
- B) recycle materials within the cell.
- C) fuse with food vacuoles to expose nutrients to lysosomal enzymes.
- D) destroy harmful bacteria engulfed by white blood cells.
- E) All of the choices are correct.

15. What is the role of the Golgi Apparatus?

- a. DNA / gene replication.
- b. Polypeptide synthesis.
- c. protein packaging and shipping.

16. What is the role of the ribosome?

- a. DNA / gene replication.
- b. Polypeptide synthesis.
- c. protein packaging and shipping.

17. Important components of the cytoskeleton are....

- a.) microarrays
- b.) microfibers
- c.) microfilaments
- d.) microcosms

18. Which of the following are junctions that allow for cytoplasmic connections between cells in a plant?

- A. Tight junctions
- B. Anchoring junctions
- C. Gap junctions
- D. Plasmodesmata

19. The cell-cell junctions that seal off the lining of your digestive track from your interior body cavities, for example, are called....

- A. Tight junctions
- B. Anchoring junctions
- C. Plasmodesmata

20. The Fluid Mosaic Model of cellular membranes refers to

- A) Individual proteins and phospholipids that can drift in a phospholipid bilayer.
- B) The membrane as a mosaic of molecules.
- C) The membrane as a mosaic of function.
- D) B and C.
- E) A, B, and C.

21. Osmosis is

- A) The net flow of water across a membrane from low to high water concentration.
- B) The diffusion of water across a differentially permeable membrane.
- C) The diffusion of any substance across a membrane.
- D) The diffusion of osmium-tetroxide across a membrane.

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22. Which type of transmembrane transport requires the expenditure of ATP?
- A) Passive Transport.
  - B) Active Transport.**
  - C) Osmosis.
  - D) Diffusion.
23. If you rest in a bath tub of just water for a couple of hours, would your skin be expected to gain or lose cellular water content?
- A. Lose
  - B. Gain**
24. Plasma membranes are selectively permeable. This means that
- A) anything can pass into or out of a cell.
  - B) the plasma membrane allows some substances to enter or leave a cell more easily than others.**
  - C) glucose cannot enter the cell.
  - D) plasma membranes must be very thick.
25. Phospholipids are characterized by the following:
- A. polar phosphate-containing headgroups and non-polar fatty-acid tails.**
  - B. non-polar phosphate-containing headgroups and non-polar fatty-acid tails.
  - C. non-polar phosphate-containing headgroups and polar fatty-acid tails.
  - D. polar phosphate-containing headgroups and polar fatty-acid tails.
26. Which of the following molecules are not typically embedded between neighboring phospholipids of cellular membranes?
- A. Cholesterol
  - B. Transport proteins
  - C. Proteins
  - D. nucleic acids like DNA or RNA**
  - E. glycoproteins
27. Most of a cell's enzymes are
- A) RNA molecules.
  - B) proteins.**
  - C) amino acids.
  - D) nucleic acids.
  - E) carbohydrates.
28. The excess water absorbed by a cactus in the desert after a rare rain shower is stored in
- A) the nucleus.
  - B) the golgi apparatus.
  - C) a lysosome.
  - D) a vacuole.**
  - E) a plastid

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For every chemical reaction, there is an energy barrier to its happening. This is called the Activation Energy or Energy of Activation (see p. 87 in your book). Enzymes lower this barrier and therefore

29. When an enzyme catalyzes a reaction,

- A) it lowers the activation energy of the reaction.
- B) it raises the activation energy of the reaction.
- C) None of the choices are correct.

30. Which one of the following is *false*?

- A) An enzyme's function depends on its three-dimensional shape.
- B) Enzymes are very specific for certain substrates.
- C) Enzymes are used up in chemical reactions.
- D) Enzymes emerge unchanged from the reactions they catalyze.
- E) An enzyme binds to its substrate at the enzyme's active site.

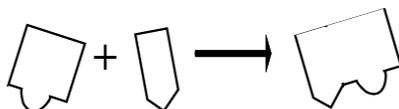
31. A child is brought to the hospital with a fever of 107°F. Doctors immediately order an ice bath to lower the child's temperature. Which explanation offers the most logical reason for this action?

- A) Elevated body temperature will cause the release of toxins in the blood.
- B) Too high a body temperature may compromise the 3D structure of (even denature) enzymes, thereby interfering with normal life-sustaining activities of cells.

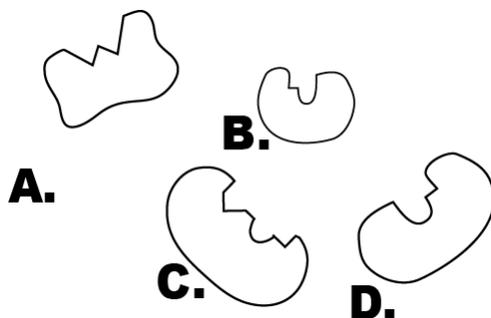
32. Which of the following can affect the rate of an enzyme-catalyzed reaction?

- A) temperature
- B) pH
- C) competitive inhibitors
- D) noncompetitive inhibitors
- E) All of the choices are correct.

33. Refer to the chemical reaction below:



Which of the following enzymes catalyze this reaction? (THE ANSWER IS C)

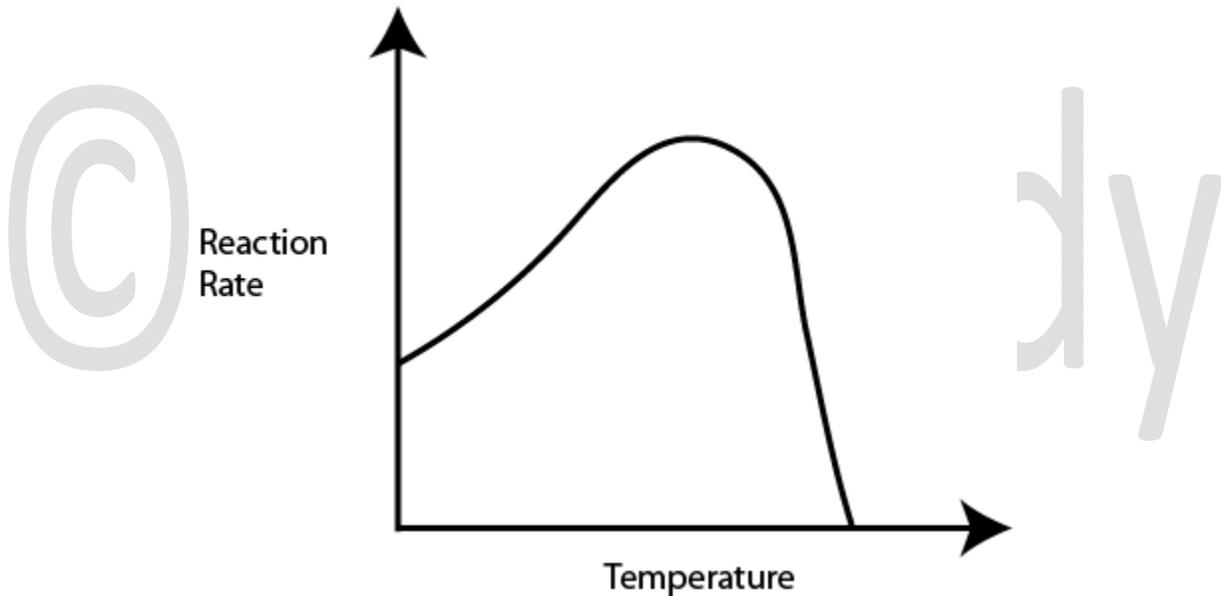


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34. What is the difference between “mitochondrion” and “mitochondria”?
- A) the former is plural, the latter is singular.
  - B) the former is singular, the latter is plural.**
  - C) the former is involved in photosynthesis, the latter in respiration.
  - D) none of the above.

35. What is ATP?
- A) Active Transport Protein.
  - B) The energy “currency” of the cell.
  - C) Adenosine Tri-Phosphate
  - D) Both A and B.
  - E) Both B and C.**

36. What is the simplest interpretation of the right side of this curve, plotted from real data in an enzyme experiment conducted Biology 100?



- A) the increasing temperature kept causing an increase in enzyme activity.
- B) the addition of a foreign inhibitor molecule caused a decrease in enzyme activity.
- C) temperatures were too high, causing enzyme denaturing and thus a decrease in activity.**