

BIOS 100 - Fall 2006
Final Exam, 11 December, 2006
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Name:

TA:

This exam consists of 52 questions over 5 pages. Please check to see that all the pages are present before you begin. Use a #2 pencil and bubble in all answers. Your score will be posted on the UIC Blackboard site as soon as they are in. No kidding. Good Luck!

1. Sickle cell anemia is due to a change in amino acid six from Glutamic Acid to Valine in a hemoglobin subunit. This is an example of a change in protein _____ structure.
A. Primary B. Secondary C. Tertiary D. Quaternary
2. Which of the following is not a polysaccharide?
A. Lactose B. Starch C. Cellulose D. Cholesterol E. Sucrose
3. Ions differ in the number of _____ in the atom or molecule.
A. Protons B. Neurons C. Electrons D. A & B E. B & C
4. Which of the following properties of water is FALSE?
A. Water has a high specific heat capacity
B. Water has high surface tension
C. Water has strong adhesive but weak cohesive properties
D. Liquid water is more dense than solid water
E. Water is a polar molecule (yup, I'll still fail you if you choose this answer)
5. In which bond is carbon the most reduced (D & E are double bonds)?
A. C-C B. C-O C. C-N D. C=O E. C=N
6. During feedback inhibition:
A. The products of the reaction series allosterically regulate an enzyme in the series
B. The products of the reaction series destroy all of the substrates
C. The products of the reaction series act as transcription factors to shut off the reaction
D. The products of the reaction series are destroyed by the enzymes in the system
E. The products of the reaction series are not involved in regulation of the reaction series
7. Which of the following statements about enzymes is FALSE?
A. Most enzymes are proteins
B. The active site is the only site on the enzyme where molecules can bind
C. Allosteric regulation of enzymes is common
D. Enzymes function by lowering the activation energy of the reaction
E. Enzymes catalyze both the forward and the reverse reaction
8. The pH of the blood is 7.4. What do you predict the pH optimum of the enzyme carbonic anhydrase to be?
A. 5.0 B. 6.5 C. 7.0 D. 7.4 E. 8.0
9. Which of the following would you not expect to be associated with a biological membrane?
A. Phospholipids B. Cholesterol
C. Antigens D. Receptor sites
E. DNA binding sites

10. Which molecule would you expect to have the most difficulty diffusing across a biological membrane?
 A. H₂O B. CO₂ C. Na⁺ D. C₆H₁₄ E. Estrogen
11. Which two factors are most responsible in determining the rate of diffusion of a molecule?
 A. Molecular size and ionic state B. Molecular size and system temperature
 C. Ionic state and system temperature D. Molecular size and molecular shape
 E. Molecular shape and system temperature
12. Which of the following statements about the Na⁺/K⁺ pump is FALSE?
 A. The Na⁺/K⁺ pump transports 3 Na⁺ and 2 K⁺ across a membrane
 B. The Na⁺/K⁺ pump is an antiport
 C. The Na⁺/K⁺ pump is used to create the resting potential of a neuron
 D. The Na⁺/K⁺ pump is an example of a facilitated diffusion carrier protein
 E. The Na⁺/K⁺ pump creates a gradient to aid in removal of glucose and vitamins from the filtrate in a nephron
13. From where does PS II (p680) replenish its lost electron during non-cyclic photophosphorylation?
 A. H₂O B. CO₂ C. O₂ D. NADPH E. NADP⁺
14. Which statement about the light-dependent reactions is FALSE?
 A. Cyclic photophosphorylation produces ATP
 B. Non-cyclic photophosphorylation produces ATP
 C. Both cyclic and non-cyclic photophosphorylation utilize PS I (p700)
 D. Both cyclic and non-cyclic photophosphorylation produce NADPH
 E. Both cyclic and non-cyclic photophosphorylation occur on the thylakoid membranes
15. What are the two substrates utilized by the enzyme Rubisco during the light-independent reactions?
 A. NADPH and ATP B. CO₂ and NADPH C. CO₂ and RUBP
 D. NADPH and RUBP E. CO₂ and O₂
16. Photorespiration is bad for the plant.
 A. True B. False
17. Living plant cells contain mitochondria
 A. True B. False
18. What enzyme fixes carbon in the bundle sheath of a C₄ plant?
 A. Rubisco B. PEP Carboxylase C. Carbonic Anhydrase
 D. A & B E. A & C
19. When do CAM plants typically open their stomates?
 A. During the day B. During the night C. When it is raining
 D. When it is sunny E. Whenever the hell they want to
20. ATP is produced in all of the following EXCEPT:
 A. Glycolysis B. Conversion of Pyruvate to Acetyl CoA
 C. Krebs Cycle D. Oxidative Phosphorylation
21. What is the final electron acceptor in Oxidative Phosphorylation?
 A. NAD⁺ B. NADH C. O₂ D. CO₂ E. H₂O

22. Which famous scientist or scientific team is incorrectly matched with their contribution to science?
- Hershey & Chase - showed that DNA was the molecule of heredity
 - Meselson & Stahl - showed that DNA replication was semi-conservative
 - Avery, McCarthy, & MacLeod - first demonstrated bacterial transformation in *Streptococcus* bacteria
 - Chargaff - discovered that, in any organism, the number of A=T and the number of C=G
 - Freeman - wrote your textbook (and fed me dinner last week - yum!)
23. Which enzyme is incorrectly matched with its function?
- Topoisomerase - removes supercoils
 - DNA Polymerase III - uses template to synthesize complementary DNA strand in 5' to 3' direction
 - Ligase - seals nicks and gaps in DNA
 - Helicase - rewinds unwound DNA
 - Primase - creates an RNA primer
24. All of the following are necessary for initiation of translation except:
- A large ribosomal subunit
 - A small ribosomal subunit
 - A mRNA
 - A charged tRNA in the P site
 - A charged tRNA in the A site
25. During transcription, where does RNA polymerase II bind?
- The promoter
 - The operator
 - The primase location
 - The TATA box
 - None of the above
26. When is the rate of transcription of the *lac* operon the greatest?
- When lactose and glucose are present
 - When lactose is present and glucose is absent
 - When lactose is absent and glucose is present
 - When lactose and glucose are absent
27. Which form of gene regulation involves TATA binding protein binding to the TATA box?
- Transcription control
 - Post-transcription control
 - Translation control
 - Post-translation control
28. What do restriction endonucleases do?
- Aid in the formation of the 5' Guanine cap in mRNA
 - Cut DNA in specific sequences, often leaving sticky ends
 - Kill bacteria
 - Join DNA, allowing us to seal DNA in plasmids
 - Destroy plasmids which have not taken in our inserted gene
29. When is MPF formed?
- At the G1 checkpoint
 - When enough cyclins have accumulated
 - At the M checkpoint
 - At the end of mitosis
30. When does crossing over take place?
- Prophase of mitosis
 - Prophase I
 - Prophase II
 - A & B
 - B & C

31. What does PCR do?
 A. Separates DNA fragments based upon size
 B. Sequences DNA
 C. Creates multiple copies of a strand of DNA
 D. Inserts DNA into a plasmid
 E. None of the above
32. When are sister chromatids separated during meiosis
 A. Anaphase I B. Anaphase II
33. How many of the below cell types are living at functional maturity?
 Parenchyma cell, collenchyma cell, fiber, vessel, companion cell, tracheid
 A. 1 B. 2 C. 3 D. 4 E. 5
34. The _____ is the region of a plant root which regulates what dissolved particles can enter into the xylem
 A. epidermis B. endodermis C. pericycle D. phloem
35. All of the following are found in monocots EXCEPT:
 A. Apical meristems B. Pericycle C. Endodermis
 D. Vascular cambium E. Fibrous root system
36. Solution A has a Ψ_p of 1.0 and a Ψ_s of -2.2. Solution B has a Ψ_p of -0.5 and a Ψ_s of -0.7. Which way will water move?
 A. From A to B B. From B to A C. There will be no net movement of water
37. In a moss, where does meiosis take place?
 A. The archegonium B. The antheridium C. The sporangia D. The ovule
38. Which characteristic is not unique to angiosperms (flowering plants)?
 A. Flowers B. Fruits C. Seeds
 D. Double fertilization E. Pollination by insects
39. In a pine tree, the female gametophyte is the:
 A. Pollen B. Ovule C. Ovary D. Egg sac E. Egg cell
40. Where is the concentration of oxygen the lowest?
 A. In the lungs B. In the alveolar capillaries C. In the arteries
 D. In the tissue capillaries E. In the interstitial fluids
41. Where in the digestive system does most of the absorption of nutrients occur?
 A. In the mouth B. In the stomach C. In the small intestine
 D. In the large intestine E. In the rectum
42. What side of the heart is involved in systemic circulation?
 A. The right side B. The left side C. The atria
 D. The ventricles

43. What type of blood vessel has the thinnest walls and lowest blood velocity?
 A. Arteries B. Arterioles C. Capillaries D. Venules E. Veins
44. In the proximal tubule, how do glucose and vitamins leave the filtrate and enter the epithelial cells?
 A. Diffusion B. Facilitated diffusion C. Active transport
 D. Osmosis E. B & C
45. Much of the liquid portion of the blood is filtered out into the Bowman's Capsule at the:
 A. Glomerulus B. Vasa recta C. Alveolar capillaries
 D. Afferent arterioles E. Efferent arterioles
46. Neurotransmitters released at a synapse are an example of a _____ action
 A. Autocrine B. Paracrine C. Endocrine
47. Which of the following statements about neurons is FALSE?
 A. An action potential is all or none
 B. A neuron at rest is positive on the inside and negative on the outside
 C. Na⁺/K⁺ pumps help to establish the gradient during repolarization
 D. When a nerve fired, gated Na⁺ channels open up, allowing Na⁺ to flow down its concentration gradient
 E. After a neuron fires, there is a brief refractory period during which the neuron cannot fire
48. What portion of the cerebrum is responsible for integration of visual stimuli?
 A. The frontal lobe B. The temporal lobe C. The parietal lobe
 D. The occipital lobe E. The ocular lobe
49. A virgin or memory Cytotoxic T-Cell must come in contact with the appropriate Antigen Presenting Cell (APC) and the appropriate effector Helper T-Cell to become activated.
 A. True B. False
50. Which line of defense is most effective in keeping the body free of pathogens?
 A. The first line of defense (skin and mucous membranes)
 B. The second line of defense (phagocytes, macrophages, etc)
 C. The third line of defense (B-Cells, Cytotoxic T-Cells, etc)
 D. None of the above
51. Which of the following statements (A-D) about antibodies is FALSE?
 A. Antibodies bind to specific pathogens, marking them for phagocytes
 B. Antibodies are produced by effector B-Cells
 C. Some antibodies can reduce the mobility of pathogens
 D. Some antibodies stimulate reproduction in pathogens
 E. Some antibodies clump pathogens together
52. In order for a virgin or memory B Cell to become active, it must receive signals or bind to:
 A. Helper T-Cell B. Macrophage/APC C. The pathogen
 D. A & B E. A & C

Everyone listen up - double check that you have bubbled in your LAST NAME FIRST. If you do this, you will get 4 bonus points. If you don't, you will lose these points. Yes, I will really do this and not feel the least bit upset by it. Have a great break and good luck with the rest of your studies at UIC!!!