

BIOS 100 - Summer 2006
Exam IV, 28 July, 2006
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Name:
TA:

This exam consists of 54 questions over 6 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. Which of the following is NOT a part of the process of science?
 - A. Asking questions about the natural world around us
 - B. Developing hypotheses to test these questions
 - C. Designing experiments to test hypotheses
 - D. Finding evidence to support or refute your hypothesis
 - E. Developing models and theories to explain the natural world
2. Isotopes differ in the number of _____ in the atom
 - A. Protons
 - B. Neutrons
 - C. Electrons
 - D. None of the above
3. Which of the following statements about water is FALSE?
 - A. Water has a low boiling point when compared to other similarly-sized molecules
 - B. Water is a polar molecule
 - C. Water has high surface tension
 - D. Water has strong adhesive and cohesive properties
 - E. Water has a high specific heat
4. Which of the following molecule is NOT a polymer
 - A. Polysaccharides
 - B. Lipids
 - C. Proteins
 - D. Nucleic Acids
5. Protein synthesis is an example of a _____ reaction
 - A. Condensation
 - B. Hydrolysis
6. An alpha helix is an example of protein _____ structure
 - A. Primary
 - B. Secondary
 - C. Tertiary
 - D. Quaternary
7. Which statement about enzymes is FALSE?
 - A. Enzymes are not consumed in the reaction
 - B. Enzymes catalyze a reaction by lowering the activation energy of the reaction
 - C. Enzymes catalyze both the forward and the reverse reaction
 - D. Enzymes are either proteins or carbohydrates
 - E. Enzymes may be allosterically regulated
8. Oxygen is what kind of inhibitor to the enzyme Rubisco?
 - A. Allosteric
 - B. Competitive
 - C. Non-competitive
 - D. Semi-conservative
 - E. Conservative

9. Which cellular structure is incorrectly matched with its function?
- A. Nucleus - contains the DNA
 - B. Mitochondria - site of aerobic respiration
 - C. Nucleoli - ribosome synthesis
 - D. Golgi Apparatus - lipid synthesis
 - E. Microtubules - cytoskeleton
10. Which of the following features is not common to all cells?
- A. Cytoplasm
 - B. Plasma membrane
 - C. Ribosomes
 - D. Nucleus
 - E. Enzymes
11. Which of the following is NOT typically associated with a biological membrane
- A. Phospholipids
 - B. Cholesterol
 - C. Proteins with α -helices
 - D. Nucleic acids
 - E. Antigens
12. A cell placed in a hypertonic environment will
- A. Expand
 - B. Shrink
 - C. Remain the same
13. A mother and father are both blood type AB. They cannot have a baby with blood type:
- A. A
 - B. B
 - C. AB
 - D. O
 - E. They can have a baby with all of the above blood types
14. Which of the following statements about the Na^+ / K^+ pump is FALSE?
- A. The Na^+ / K^+ pump is an example of an active transport system
 - B. The Na^+ / K^+ pump transports 3 Na^+ and 2 K^+ in opposite directions across a membrane
 - C. The Na^+ / K^+ pump is involved in reestablishing the polarity in a just-fired neuron
 - D. The Na^+ / K^+ pump utilizes a carrier protein
 - E. The Na^+ / K^+ pump is present in the alveolar membranes in the lungs
15. How many of the processes listed below can transport molecules against their concentration gradient?
- Osmosis Diffusion Facilitated Diffusion Active Transport
- A. Zero
 - B. One
 - C. Two
 - D. Three
 - E. Four
16. Which of the following is NOT a function of the cytoskeleton
- A. Maintain cell shape
 - B. Anchor organelles
 - C. Provide a track way for movement of vesicles and organelles
 - D. Contractility and movement
 - E. All of the above are functions of the cytoskeleton
17. Plant cells contain mitochondria
- A. True
 - B. False

18. Which of the following statements about the light-dependent reactions is false?
- Both cyclic and non-cyclic photophosphorylation produce ATP
 - Non-cyclic photophosphorylation produces CO_2
 - Both cyclic and non-cyclic photophosphorylation involve electron transport chains
 - Cyclic photophosphorylation pumps H^+ into the thylakoid space
 - PSI (p700) is involved in both cyclic and non-cyclic photophosphorylation
19. How many CO_2 molecules are necessary to produce one molecule of glucose?
- Two
 - Three
 - Four
 - Five
 - Six
20. What happens during photorespiration?
- Light excites chemical breakdown of sugars in the mitochondria
 - Rubisco fixes a molecule of O_2 to RuBP
 - CO_2 is transported into the bundle sheath
 - ATP is formed
 - A & D
21. What enzyme first fixes CO_2 in a C_4 plant?
- Rubisco
 - PEP Carboxylase
 - Carbonic Anhydrase
 - Carbonylase
 - None of the above
22. Elevated CO_2 levels will be beneficial to farmers world wide as it will increase photosynthetic rates (and therefore growth) in crop plants
- True
 - False
23. Which process(es) listed below produces oxidizes NADH to NAD^+ and produces ATP
- Oxidative phosphorylation
 - Lactic acid fermentation
 - Alcohol fermentation
 - B & C
 - A, B, & C
24. Which process below produces the most ATP?
- Glycolysis
 - Oxidation of pyruvate
 - Krebs Cycle
 - Oxidative phosphorylation
 - Alcohol fermentation
25. What is beta oxidation?
- The oxidation of beta-pleated sheets
 - The breakdown of amino acids in the kidneys
 - The breakdown of fatty acids into 2-carbon units for input into the Krebs cycle
 - The oxidation of NAD^+ from NADH
 - The process through which pyruvate is entered into the Krebs cycle
26. How does phosphofructokinase regulate glycolysis?
- ATP is an allosteric regulator of this enzyme
 - If ATP levels are high, the enzyme will turn on
 - It destroys pyruvate
 - It converts NADH to NAD^+

27. Which scientist is incorrectly matched with their contribution to science?
- A. Hershey & Chase - used radiolabeled isotopes to show that DNA was the molecule of heredity
 - B. Messelson & Stahl - demonstrated that DNA replication was semi-conservative
 - C. Watson & Crick - first proposed the double helix model of DNA
 - D. Chargaff - showed that the proportion of A & T and C & G was always constant, no matter what species of organism you looked at
 - E. Rosalind Franklin - first demonstrated transformation
28. Which enzyme chews up RNA primers and replaces it with DNA?
- A. Primase
 - B. DNA polymerase I
 - C. DNA polymerase III
 - D. Ligase
 - E. Telomerase
29. Which strand of DNA would have the most Okazaki fragments
- A. The leading strand
 - B. The lagging strand
 - C. The template strand
 - D. The non-template strand
30. Telomerase synthesizes DNA:
- A. 5' to 3'
 - B. 3' to 5'
 - C. Both 5' to 3' and 3' to 5'
31. What is the start codon?
- A. 5' AUG 3'
 - B. 5' UAA 3'
 - C. 5' GAA 3'
 - D. 5' AUU 3'
32. What is necessary to have the *lac* operon operating at full capacity?
- A. High lactose and high glucose
 - B. High lactose and low glucose
 - C. Low lactose and high glucose
 - D. Low lactose and low glucose
33. Which of the following is not required for initiation of translation?
- A. A large ribosomal subunit
 - B. A small ribosomal subunit
 - C. A charged tRNA in the P-site
 - D. A charged tRNA in the A-site
 - E. A mRNA
34. Which of the below is not an example of post-transcription gene regulation?
- A. Removal of introns
 - B. TATA binding protein binding to DNA
 - C. Addition of a 5' Guanine cap
 - D. Addition of a poly-A tail
35. Both TATA-binding protein and other unique transcription factors are required to turn on most eukaryotic genes
- A. True
 - B. False
36. A molecule with a helix-turn-helix:
- A. is an integral membrane protein
 - B. is a DNA binding protein
 - C. is an enzyme
 - D. is involved in initiation of translation
 - E. is the result of a mutation

37. During which stage of meiosis do sister chromatids separate?
 A. Metaphase I B. Metaphase II C. Anaphase I D. Anaphase II
38. During which stage of meiosis does crossing over occur?
 A. Prophase I B. Prophase II C. Metaphase I D. Metaphase II
39. Which of the following statements about cyclins is FALSE?
 A. Cyclin levels are variable throughout the cell cycle
 B. Cyclin levels are highest in G₂ and M stages of the cell cycle
 C. Cyclins combine with maturation promotion factor (MPF) to form a cyclin-dependent kinase (CDK)
 D. Cyclin levels are dramatically reduced by the end of mitosis
40. Which of the following cell types would you not expect to find in the xylem tissue?
 A. Parenchyma B. Tracheids C. Companion cells D. Vessels
41. Monocots exhibit all of the following characteristics except:
 A. Leaves with parallel venation B. Secondary Growth
 C. Flower parts in multiples of three D. Fibrous root system
 E. Herbaceous habit
42. A fruit is a ripened:
 A. Egg sac B. Pollen grain C. Ovule D. Ovary
43. Which of the plant groups below are seed plants?
 A. Ferns B. Pine trees C. Angiosperms D. B & C E. A, B, & C
44. Where does meiosis occur in a fern?
 A. In the archegonia B. In the antheridia
 C. In the sporangia D. In the gametophyte
45. _____ contain thick, elastic walls and are under the greatest blood pressure
 A. Arteries B. Arterioles C. Capillaries D. Venules E. Veins
46. In which of the following organs does the majority of the absorption of nutrients take place?
 A. Mouth B. Stomach C. Small Intestine D. Large Intestine E. Rectum
47. Which of the following statements about an antibody-mediated immune response is FALSE?
 A. A macrophage engulfs a pathogen, becoming an antigen-presenting cell
 B. The antigen-presenting cell activates a virgin or memory helper T cell
 C. The virgin or memory B Cell becomes activated the antigen-presenting cell
 D. The activated helper T Cell further activates the B cell
48. Which level of defense prevents over 99% of the pathogens from entering the body?
 A. The skin (the first line of defense)
 B. The non-specific phagocytes (the second line of defense)
 C. Effector B and cytotoxic T cells (the third line of defense)

49. In a nephron, where is blood first filtered out of the capillaries?
- A. The glomerulus
 - B. The proximal tubule
 - C. The descending Loop of Henle
 - D. The ascending Loop of Henle
 - E. The distal tubule
50. This portion of a nephron is impermeable to water, but actively transports Na^+ and Cl^- into the kidney medulla.
- A. The glomerulus
 - B. The proximal tubule
 - C. The descending Loop of Henle
 - D. The ascending Loop of Henle
 - E. The distal tubule
51. What is the function of an agonist?
- A. It causes an immune response
 - B. It prevents an immune response
 - C. It binds to a cell receptor, initiating a response
 - D. It prevents other molecules from binding to a cell receptor, preventing the response
 - E. None of the above
52. What is the main function of the cerebellum?
- A. Regulation of homeostasis
 - B. Smoothing out movements
 - C. Integration of visual stimuli
 - D. Source of conscious thought
 - E. None of the above
53. A hormone can have different effects on different target cells
- A. True
 - B. False
54. Which of the following statements about neurons is FALSE?
- A. Action potentials are all or none
 - B. At rest, the neuron is negatively charged on the inside and positively charged on the outside
 - C. When the nerve fires, gated sodium channels open and sodium rushes into the neuron
 - D. At a synapse, sodium ions cross the synaptic cleft and open post-synaptic gated sodium channels