

**BMD 334**  
**Practice Exam 1**  
**Sample 2**

Name \_\_\_\_\_

Student ID \_\_\_\_\_

**Questions 1-35 are multiple choice questions. All answers must be recorded on the computer form to receive credit. Choose the one best answer. 2 points each.**

1. **At high altitudes, respiration increases to maintain normal blood oxygen and carbon dioxide levels. This is an example of what type of explanation?**
  - A) Teleological
  - B) Mechanistic
  
2. **Most of the water in the body is located in the \_\_\_\_\_.**
  - A) Intracellular fluid
  - B) Extracellular fluid
  - C) Interstitial fluid
  - D) Plasma
  
3. **The process of maintaining the internal environment in a state compatible for life is called \_\_\_\_\_, and it occurs primarily through \_\_\_\_\_.**
  - A) Intrinsic control, homeostasis
  - B) Negative feedback, intrinsic control
  - C) Homeostasis, negative feedback
  - D) Intrinsic control, negative feedback
  - E) Positive feedback, intrinsic control
  
4. **Which of the following is an INCORRECT association between molecule and its chemical property?**
  - A) Monosaccharide : Hydrophilic
  - B) DNA : Polymer of nucleotides
  - C) Fatty acid : Amphipathic
  - D) ATP : Nucleotide
  - E) Steroid : Derived from cholesterol
  
5. **Which of the following ions is located in higher concentration inside the cell?**
  - A) Potassium
  - B) Sodium
  - C) Calcium
  - D) A and C
  - E) B and C
  
6. **Most ATP in our cells is synthesized**
  - A) in the cytosol.
  - B) in the mitochondria.
  - C) in the endoplasmic reticulum.
  - D) in the nucleus.
  - E) in the liver and delivered to the cells by the blood.

- 7. Where are triglycerides synthesized?**
- A) Cytosol
  - B) Mitochondria
  - C) Rough endoplasmic reticulum
  - D) Smooth endoplasmic reticulum
  - E) Golgi apparatus
- 8. Where is RNA?**
- A) Nucleus
  - B) Mitochondria
  - C) Cytosol
  - D) Endoplasmic reticulum
  - E) More than one of the above is correct
- 9. Hydrolysis of ATP**
- A) is an exergonic reaction.
  - B) releases energy.
  - C) is often coupled to energy requiring reactions.
  - D) A and C
  - E) All of the above
- 10. The rate of an enzyme-catalyzed reaction can be increased by**
- A) increasing the concentration of substrate.
  - B) increasing the concentration of enzyme.
  - C) increasing the activity of the enzyme.
  - D) Only two of the above are correct.
  - E) A, B, and C are all correct.
- 11. Enzymes increase the rate of an enzyme-catalyzed reaction by**
- A) increasing the activation energy.
  - B) decreasing the activation energy.
  - C) increasing the free energy of reactant.
  - D) increasing the free energy of product.
  - E) decreasing the free energy of reactant.
- 12. Which of the following best describes allosteric modulation?**
- A) An enzyme increases the rate of a reaction.
  - B) An enzyme causes a reaction to occur that would not occur in its absence.
  - C) An inhibitor molecule binds to the active site of an enzyme blocking the substrate from binding.
  - D) A protein kinase catalyzes the phosphorylation of a protein.
  - E) A modulator molecule binds to a protein altering its shape.
- 13. Glycogenolysis is an example of what type of metabolic reaction?**
- A) Anabolism
  - B) Catabolism

14. **Why can the liver break down glycogen and provide glucose to other cells, but muscle cells cannot?**
- A) Muscle cells have no glycogen.
  - B) Glycolysis does not occur in muscle cells.
  - C) The liver contains an enzyme that removes a phosphate group from glucose-6-P, which the muscle does not have.
  - D) The liver has transporters for glucose, whereas muscle cells do not.
  - E) All of the above
15. **The final product of glycolysis under aerobic conditions is pyruvate. What happens to pyruvate under aerobic conditions?**
- A) Pyruvate is converted into acetyl CoA in the cytosol, and the acetyl CoA then enters the mitochondrial matrix.
  - B) Pyruvate enters the mitochondrial matrix where it is converted into acetyl CoA.
  - C) Pyruvate is converted to lactic acid in the cytosol.
  - D) Pyruvate is converted to lactic acid in the mitochondrial matrix.
  - E) Pyruvate provides electrons to the electron transport chain.
16. **Which of the following statements about the Krebs cycle (TCA cycle) is FALSE?**
- A) The initial substrate is acetyl CoA.
  - B) Three NADs are reduced to NADH + H<sup>+</sup>.
  - C) Two FADs are reduced to FADH<sub>2</sub>.
  - D) Carbon dioxide is produced.
  - E) One ATP (GTP) is formed by substrate phosphorylation.
17. **Where is the electron transport chain?**
- A) Cytosol
  - B) Outer mitochondrial membrane
  - C) Inner mitochondrial membrane
  - D) Inter-membrane space of the mitochondria
  - E) Mitochondrial matrix
18. **The enzyme ATP synthase is DIRECTLY activated by**
- A) Electrons moving along components of the electron transport chain.
  - B) Movement of electrons from the inter-membrane space to the mitochondrial matrix.
  - C) Movement of electrons from the mitochondrial matrix to the inter-membrane space.
  - D) Movement of hydrogen ions from the inter-membrane space to the mitochondrial matrix.
  - E) Movement of hydrogen ions from the mitochondrial matrix to the inter-membrane space.
19. **In muscle cells, ATP can be synthesized by the transfer of a phosphate group from creatine phosphate to ADP by the following reaction:**
- $$\text{creatine phosphate} + \text{ADP} \rightarrow \text{creatine} + \text{ATP}$$
- This is an example of**
- A) Substrate phosphorylation
  - B) Oxidative phosphorylation

20. **Proteins, carbohydrates, and lipids can all be converted to which of the following if they occur in excess of the body's needs?**
- A) Proteins
  - B) Carbohydrates
  - C) Lipids
21. **The break down of fatty acids into acetyl CoA occurs by \_\_\_\_\_.**
- A) Oxidative deamination
  - B) Beta oxidation
  - C) Lipolysis
  - D) Gluconeogenesis
22. **What is the function of RNA polymerase?**
- A) Causes the two strands of DNA to separate.
  - B) Causes the ribosome to bind to the mRNA in the cytosol.
  - C) Catalyzes the reaction linking together nucleotides in RNA.
  - D) A and C
  - E) B and C
23. **When proteins are synthesized by ribosomes on the rough endoplasmic reticulum, where does the translation begin?**
- A) Cytosol
  - B) Rough endoplasmic reticulum
  - C) Smooth endoplasmic reticulum
  - D) Nucleus
  - E) Golgi apparatus
24. **Which of the following is a membrane protein?**
- A) Sodium channel
  - B) Na/K-ATPase
  - C) Connexons
  - D) A and B
  - E) All of the above
25. **Which of the following molecules can diffuse across the lipid bilayer?**
- A) Water
  - B) Fatty acids
  - C) Oxygen
  - D) A and C
  - E) All of the above
26. **During cotransport with sodium, amino acids move**
- A) into the cell.
  - B) out of the cell.
  - C) not enough information to determine

27. Which of the following properties exist for BOTH enzymes and carrier proteins?
- A) Saturation
  - B) Competition
  - C) Specificity
  - D) A and C
  - E) All of the above
28. White blood cells are an important component of our immune system. One thing they do is take up and destroy bacteria by extending their plasma membrane around the bacterium and bringing it inside the cell in a vesicle. By what process do they engulf the bacterium?
- A) Phagocytosis
  - B) Receptor-mediated endocytosis
  - C) Pinocytosis
  - D) Exocytosis
  - E) Transcytosis
29. What ion triggers exocytosis?
- A) Sodium
  - B) Potassium
  - C) Chloride
  - D) Calcium
  - E) Magnesium
30. A membrane permeable to water separates a chamber into two compartments: A and B. Compartment A contains a 10 mM solution of non-permeating solute, whereas compartment B contains a 40 mM solution of non-permeating solute. Which of the following statements is true?
- A) Solute will move from side A to B, and water will move from side B to A.
  - B) Solute will move from side B to A, and water will move from side A to B.
  - C) Both water and solute will move from side B to A.
  - D) Water will move from side A to B, but solute will not move.
  - E) Water will move from side B to A, but solute will not move.
31. Which of the following cells would have a greater electrical attraction for sodium ions to enter the cell?
- A) Cell with membrane potential = -70 mV
  - B) Cell with membrane potential = -90 mV
  - C) Cell with membrane potential = -50 mV
  - D) Cell with membrane potential = 0 mV
  - E) Cell with membrane potential = +20 mV
32. Which of the following statements is true about a cell at rest?
- A) Permeability to sodium is greater than to potassium.
  - B) Sodium ions are leaking into the cell.
  - C) There is a greater electrochemical force for potassium movement.
  - D) A and B
  - E) All of the above

- 33. What would happen to the membrane potential if potassium channels opened?**  
 A) The cell would depolarize.  
 B) The cell would hyperpolarize.  
 C) The membrane potential would not change.
- 34. If the concentration of sodium in the extracellular fluid increased, what would happen to the equilibrium potential for sodium?**  
 A) The equilibrium potential would stay the same because it is independent of the concentration gradient.  
 B) The equilibrium potential would become more positive.  
 C) The equilibrium potential would become less positive.
- 35. What is the primary role of the Na/K-ATPase in establishing the resting membrane potential?**  
 A) It pumps a net positive charge out of the cell creating the resting membrane potential.  
 B) It creates the chemical gradients for sodium and potassium ions.  
 C) It creates the electrical gradients for sodium and potassium ions.

**Short answer questions. Print answers to the following questions directly on the exam. Answers must be legible to receive credit.**

- 36. (4 points) Answer the following questions about the Na/K-ATPase. Put your answers in the blanks before the question.**

\_\_\_\_\_ What direction is sodium pumped?

\_\_\_\_\_ How many sodiums are pumped per ATP?

\_\_\_\_\_ What direction is potassium pumped?

\_\_\_\_\_ How many potassiums are pumped per ATP?

- 37. (3 points) Name the three types of gated ion channels.**

\_\_\_\_\_

\_\_\_\_\_

**38. (3 points) Answer the following questions about epithelial tissue. Put your answers in the blanks before the question.**

\_\_\_\_\_ In epithelial tissue, the cells are linked together by what type of cell junction that prevents movement from lumen to extracellular fluid?

\_\_\_\_\_ What is the portion of the plasma membrane facing the lumen called?

\_\_\_\_\_ What is the portion of the plasma membrane facing the extracellular fluid called?

**39. (4 points) Match the following organelles to the appropriate function/description. Place the letter corresponding to the appropriate answer in the blank by the description.**

**a) Lysosome**

**b) Peroxisome**

**c) Mitochondria**

**d) Smooth ER**

**e) Rough ER**

**f) Golgi apparatus**

\_\_\_\_\_ Proteins are packaged into secretory vesicles.

\_\_\_\_\_ Proteins are packaged into transport vesicles.

\_\_\_\_\_ The enzyme catalase is located here.

\_\_\_\_\_ Phagocytic vesicles fuse with this organelle

**40. (5 points) Match the metabolic pathway to the correct description.**

**a) Glycolysis**

**b) Krebs cycle**

**c) Electron transport chain**

**d) Beta oxidation**

**e) Gluconeogenesis**

**f) Glycogenesis**

\_\_\_\_\_ Acetyl CoA is the initial substrate

\_\_\_\_\_ Acetyl CoA is the final product

\_\_\_\_\_ Glucose is synthesized

\_\_\_\_\_ Glucose is catabolized

\_\_\_\_\_ Glucose is used to synthesize a larger molecule

41. (4 points) Name the four primary types of tissues, and state the general function of each.

42. (4 points) 100 milligrams of  $\text{CaCl}_2$  is present in water for a total volume of 1 liter. The atomic mass of calcium is 40 and of chloride is 35.5. Answer the following questions in the blanks before the question. You must show your work and include units to receive full credit.

\_\_\_\_\_

What is the concentration of  $\text{CaCl}_2$  in terms of weight percent?

\_\_\_\_\_

What is the concentration of  $\text{CaCl}_2$  in terms of molarity (assume 1 liter of water was used)?

\_\_\_\_\_

What is the concentration of  $\text{CaCl}_2$  in terms of osmolarity?

\_\_\_\_\_

If a cell is placed in this solution, will it swell, shrink, or remain the same size?

**43. (3 points) Use the following terms to form the equation describing Fick's Law of Diffusion as it pertains to movement across membranes:**

**Q = diffusion rate**

**MW = molecular weight**

**D = distance**

**(C1-C2) = concentration gradient**

**A = surface area**

**P = permeability**

**BONUS (2 POINTS) What is meant by the term "Virtual Professor"?**