

Biology - Level 2 - Mid-Year Exam Study Guide

Exam Rules:

1. You must bring your own #2 pencil to the exam
2. You may use one 3" X 5" index card (both sides):
 - Write your full name in the upper right corner on both sides of the card
 - The card must be hand-written (no photocopies)
 - The card must remain intact and must be the specified size
3. All backpacks, biology books, and personal belongings should be left in your locker
4. Please bring something to do if you finish early (must be kept under chair)
5. Your Test will be composed of 100 Multiple Choice Questions

Scientific Method & Biological Themes

Whale Book: Chapter 1

Elephant Book: Chapter 1

- a. science
 - b. scientists
 - c. hypothesis
 - d. characteristics of living things
 - e. level of treatment
 - f. 3 types of variables
 - g. types of microscopes
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1. What is SI/Metric System and how do you use it to make conversions? Why is it important?
 2. What are the steps of the scientific method? Why is it important?
 3. What is homeostasis?
 4. What is living? What is nonliving?
 5. What are the characteristics of life?
 6. What is the organization of organisms from atoms to biosphere?
 7. What kind of safety equipment is in our room and where is it located?
 8. Identify the common tools of a biologist

Chemistry of Life

Whale Book: Chapter 6

Elephant Book: Chapter 4

- a. atomic # & mass
 - b. isotopes
 - c. radioactive isotopes
 - d. compounds & molecules
 - e. ions & ionic bonding
 - f. suspensions & mixtures
 - g. pH, acids, bases
 - h. activation energy
 - a. polar molecules
 - b. monomers and polymers
 - c. Structure & Function- enzymes
-
1. What are some important properties of water?

2. Explain how water is a polar molecule.
3. How are these properties an advantage for living things?
4. What are some characteristics of acids and bases?
5. What is the pH scale? Explain how the scale is exponential.
6. Give some examples of strong/weak acids & bases.
7. How do extremes in pH affect living things?
8. What are the 4 classifications of biological macromolecules?
9. What is an amine group?
10. What is the difference between a monosaccharide and a polysaccharide?
11. What makes amino acids unique?
12. Which part of a lipid molecule is hydrophilic?
13. What is a dehydration synthesis reaction?
14. What is a hydrolysis reaction?
15. Explain how enzymes speed up chemical reactions?
16. What is a substrate in reference to an enzyme?
17. What happens when the shape of an enzyme is changed?
18. How could this possible happen?
19. How many valence electrons does carbon have & why is this important?

The Cell: Structure, Function, and Transport

Whale Book: Chapter 7, 8.1

Elephant Book: Chapter 5

- a. 3 types of microscopes
 - b. cell theory
 - c. discovery of the cell
 - d. S&F- nucleus
 - e. S&F- ribosomes
 - f. S&F- mitochondrion
 - g. S&F- cytoskeleton
 - h. path of protein in the cell
 - i. S&F- cell membrane
 - j. surface area & cell growth
 - k. diffusion
 - l. concentration gradient
 - m. dynamic equilibrium
 - n. passive vs. active transport
 - o. osmosis
 - p. osmosis in animal & plant cells
 - q. plasmolysis & cytolysis
 - r. facilitated diffusion
 - s. sodium-potassium pump
 - t. endocytosis & exocytosis
1. What are the differences between prokaryotes and eukaryotes?
 2. Give some examples of each.
 3. What are the major differences between animal cells and plant cells?
 4. Name 3 specialized organelles present only in plants.

5. What is the difference between rough ER and smooth ER?
6. Describe the structure of the cell membrane.
7. How does the structure of the cell membrane accomplish selective permeability?
8. Why is selective permeability important for a cell?
9. What material provides the structure of the cell wall in plants?
10. What is the purpose of the cytoskeleton?
11. Explain the basic principles of osmosis.
12. Define hypertonic and hypotonic and explain the direction of water flow.
13. What is turgor pressure?
14. Is facilitated diffusion active or passive transport?
15. What is a concentration gradient?
16. Explain the difference between endocytosis and exocytosis.
17. What is the function of a lysosome?
18. Explain the analogy of the ER acting as a "highway."
19. Understand the importance of the Na-K pump and electrical gradient
20. Understand & provide examples of ion transport across the cell membrane

The Cell: Cell Energy

Whale Book: Chapter 9

Elephant Book: Chapter 6

- a. chlorophyll
- b. S&F- chloroplast
- c. R&P- light & dark reaction
- d. light & dark reaction steps
- e. light & rate of photosynthesis
- f. temp & rate of photosynthesis
- a. anaerobic vs. aerobic
- b. glycolysis
- c. reactions occurring in cytoplasm
- d. R&P- respiration
- e. lactic acid fermentation & exercise
- f. S&F- Electron Transport Chain
- g. energy yield
- h. respiration vs. photosynthesis

1. Recognize the names of the steps of cellular respiration (aerobic pathway).
2. Explain how energy is stored in and released from ATP.
3. Identify the reactants and products of photosynthesis and cellular respiration.
4. Recognize the equation of photosynthesis.
5. What are the two main parts of photosynthesis?
6. Know the organelle photosynthesis occurs in.
7. Know the organelle aerobic respiration occurs in.
8. What types of organisms perform photosynthesis?
9. What types of organisms perform cellular respiration?

The Cell: Nucleic Acids, Protein Synthesis, and Mutations

Whale Book: Chapter 11

Elephant Book: Chapter 7, 10-2

- a. structure of DNA
- b. enzymes
- c. complementary base pairing
- d. replication
- e. types of RNA
- f. DNA vs. RNA
- g. transcription
- h. translation
- i. protein synthesis
- j. protein structure
- k. mutations

1. Define and explain the importance of complementary base pairing
2. Which bases are purines? Which are pyrimidines?
3. Where are the hydrogen bonds located in DNA?
4. List the enzymes associated with DNA replication.
5. Why does replication happen?
6. Why does the nucleus of every cell have openings or pores?
7. How is DNA used as a “template” or pattern for the process of transcription?
8. What is the association between a codon and an anticodon?
9. What does a “stop” codon mean in the genetic code?
10. What is a gene?
11. What is a frameshift mutation?
12. Why are proteins so crucial for living things?
13. What is a mutation?
14. What is the result of a mutation (in molecular terms).
15. What are the building blocks of proteins?
16. Distinguish between histones and nucleosomes

Know That Scientist :

Be able to identify the following scientists, their works, and their achievements.

1. Calvin
2. Krebs
3. Griffith
4. Avery
5. Hershey
6. Chase
7. Chargaff
8. Franklin
9. Watson
10. Crick
11. Virchow
12. Leeuwenhoek
13. Hooke
14. Schleidan
15. Schwaan