

BIOLOGY OBJECTIVES

Unit 2 – The Cell and Cellular Respiration

CHAPTER 4: A Tour of the Cell

NOTE: You will have a 25-minute QUIZ on this chapter. It won't be on Unit Test 2.

Biology and Society: Cells That Cure

1. Explain how cell therapy may help heal hearts damaged by heart attacks.
2. Explain why cells are fundamental to biology. What is the "cell theory"?

The Microscopic World of Cells

3. Compare the following pairs of terms, noting the most significant differences: light microscopes versus electron microscopes, scanning electron microscopes versus transmission electron microscopes, prokaryotic cells versus eukaryotic cells, plant cells versus animal cells.
4. Be prepared to label a **cell diagram** of a plant and/or animal cell. (Refer to your handout, but don't expect to see the exact same diagrams on the quiz!)

Membrane Structure

5. Describe the structure of the plasma (cell) membrane, which is found in ALL cells. Explain why this structure is called a fluid mosaic.
6. Describe the structure and function of a plant cell wall, found outside the plasma membrane only in plant cells.

The Nucleus and Ribosomes: Genetic Control of the Cell

7. Describe the structure of the nucleus, nuclear envelope, and ribosomes.
8. Explain how the genetic information in the nucleus is used to direct the production of proteins in the cytoplasm.

The Endomembrane System: Manufacturing and Distributing Cellular Products

9. Compare the **structures** and **functions** of the following components of the endomembrane system: rough endoplasmic reticulum, smooth endoplasmic reticulum, Golgi apparatus, lysosomes, and vacuoles.
10. Explain how these components function as a team.

Chloroplasts and Mitochondria: Energy Conversion

10. Compare the structure and function of chloroplasts and mitochondria.

The Cytoskeleton: Cell Shape and Movement

11. Describe the functions of the cytoskeleton. Compare the structures and functions of cilia and flagella.

Key Terms

cell theory	lysosome
central vacuole	magnification
chloroplast	microtubule
chromatin	mitochondria
chromosome	nuclear envelope
cilia	nucleolus
cytoplasm	nucleus
cytoskeleton	organelles
cytosol	phospholipid
electron microscope (EM)	phospholipid bilayer
endomembrane system	plasma membrane
endoplasmic reticulum (ER)	prokaryotic cell
eukaryotic cell	resolving power
extracellular matrix	ribosome
flagella	rough ER
fluid mosaic	scanning electron microscope (SEM)
food vacuoles	smooth ER
gene	transmission electron microscope (TEM)
Golgi apparatus	transport vesicles
light microscope (LM)	vacuole
lysosomal storage disease	

Chapters 5 and 6 will be on Test 2

CHAPTER 5: The Working Cell

Membrane Function

1. Describe, in detail, the structure and function of the cell membrane and its components, including the following terms: **fluid mosaic model, phospholipid bilayer, phosphate heads, fatty acid tails, hydrophobic, hydrophilic, cholesterol, integral proteins, peripheral proteins, carbohydrate chains.** ***Be able to diagram the membrane with all of these structures.**
2. Explain why we say that cell membranes are **selectively permeable** (semipermeable).
3. Know the primary functions of membrane proteins: attachment, cell signaling, enzymatic activity, transport, intercellular joining, and cell-cell recognition.
4. Describe the processes of **diffusion, osmosis, facilitated diffusion (passive transport), and active transport.** Define: **hypotonic, hypertonic, isotonic, exocytosis, endocytosis.** Know which processes require energy.
5. What does it mean for a substance to move down the **concentration gradient** (or “**with the gradient**”)? What does moving “**against the gradient**” mean? Be able to predict the direction of movement of a substance through a membrane.

Some Basic Energy Concepts

6. Define the terms energy, kinetic energy, potential energy, and the principle of conservation of energy.
7. Explain the relationship between heat and entropy.
8. Compare the processes by which a car and a human use “fuel” to perform work. Explain why the human process is more efficient.
9. Compare the amount of energy in a Calorie to that found in a kilocalorie. Which is most commonly used on food labels?

ATP and Cellular Work

10. Explain how ATP powers cellular work.
11. Describe the ATP-ADP cycle.
12. Describe the process of **energy coupling** in cells.

Enzymes

13. Explain why enzymes are needed in living organisms.
14. Explain how enzymes are able to speed up specific chemical reactions.
15. Explain how inhibitors and poisons can affect enzyme activity.
16. Understand how changes in temperature and pH can affect enzyme activity.

Key Terms

diffusion	ADP
endocytosis	ATP
energy	Calorie
exocytosis	cellular respiration
facilitated diffusion	chemical energy
hypertonic	conservation of energy
hypotonic	energy
isotonic	energy coupling
osmosis	entropy
passive transport	enzyme
phagocytosis	enzyme inhibitor
pinocytosis	heat
plasmolysis	induced fit
receptor-mediated endocytosis	kinetic energy
signal-transduction pathway	metabolism
transport proteins	potential energy
activation energy	substrate
active site	

Ch. 6: Cellular Respiration: Obtaining Energy from Food

Biology and Society: Feeling the Burn

1. Explain why we breathe faster when we exercise.

Energy Flow and Chemical Cycling in the Biosphere

2. Describe where photosynthesis occurs and explain why this process is important to most ecosystems.
3. Define and compare autotrophs and heterotrophs, producers and consumers.
4. Explain how the processes of photosynthesis and cellular respiration are complementary to each other.

Cellular Respiration: Aerobic Harvest of Food Energy

5. Compare the processes of cellular respiration and breathing.
6. Write and explain the overall equation for cellular respiration.
7. MAJOR OBJECTIVE: Compare the **reactants**, **products**, and **energy yield** of the three stages of respiration (glycolysis, citric acid cycle, and electron transport chain). Indicate where each process occurs in the cell.
8. Describe, in detail, the structure and function of the electron transport chain located in the inner mitochondrial membrane.

Fermentation: Anaerobic Harvest of Food Energy

9. Compare the reactants, products, and energy yield of fermentation in human and yeast cells. Indicate where this process occurs in each type of cell.

Key Terms

aerobic	fermentation
aerobic capacity	glycolysis
anaerobic	heterotroph
ATP synthase	NADH
autotroph	obligate aerobe
cellular respiration	obligate anaerobe
citric acid cycle (Krebs cycle)	oxidation
consumer	photosynthesis
electron transport chain	producer
facultative anaerobe	reduction