

Honors Biology

Midterm Exam Study Guide

Microscope Use

1. Be sure you know how to properly handle, use, and put away a microscope.
2. How do you calculate the total magnification of the specimen you are viewing?

The Nature of Science

1. When conducting an experiment, what is the difference between an independent variable and a dependent variable?
2. Why is it desirable to have an experimental control when conducting an experiment?
3. What is the purpose of proposing a hypothesis before conducting an experiment?
4. What is the difference between collecting data and analyzing data?

What is Life?

1. What are some of the characteristics typically used to distinguish a living thing from a non-living thing?
2. Would you consider viruses to be alive? Why or why not?

Homeostasis

1. What is homeostasis and what is its importance to the maintenance of life?
2. Be able to identify the set point, receptors, and effectors if given an example of a homeostatic mechanism.
3. Distinguish between negative feedback loops and positive feedback loops.

Cell Membranes

1. What are the two main functions of a cell membrane?
2. What are the four main components of a cell membrane? What is the function of each?
3. Why is the cell membrane sometimes referred to as a “fluid mosaic”? What is semi-permeability?
4. Describe the structure and polarity of a phospholipid.
5. Explain why the lipids in a cell membrane arrange themselves into a bilayer.
6. Distinguish between integral and peripheral proteins. Describe some of the functions of proteins in the cell membrane.
7. Describe passive transport, and compare and contrast simple diffusion, facilitated diffusion, and osmosis.
8. Be able to diagram the movement of molecules across a cell membrane based on the tonicity of the inner cell and outer cell solutions.
9. Describe active transport, and compare and contrast endocytosis and exocytosis.
10. How do protein pumps work?

DNA

1. Describe in detail the structure of a nucleotide and the structure of a DNA molecule.
2. What is the difference between a purine and a pyrimidine, and what significance does this difference play in the structure of a DNA molecule?
3. Be able to correctly pair up bases in a DNA molecule.
4. Explain the anti-parallel nature of a DNA molecule and the effect it has on DNA replication.
5. What type of bond hold base pairs together, and what is the significance of the strength of those bonds?
6. Explain how DNA replicates itself.

Protein Synthesis

1. What is the central dogma of biology?
2. Describe in detail how DNA instructs a cell to make a protein.

Viruses and Vaccines

1. Describe the structure of a virus.
2. How do viruses replicate?
3. How do vaccines work?
4. Explain the importance of herd immunity.

Cell Division

1. Why are cells so small?
2. What are the three main reasons why cells must divide?
3. What are the stages of the cell cycle, and what occurs during each phase?
4. Why must DNA be replicated during the cell cycle?
5. What is cancer, and what relationship may it have to the cell cycle?
6. Describe various types of genetic mutations that may occur during DNA replication.

Stem Cells

1. What are stem cells?
2. What is the significance of stem cell research?
3. What is the main controversy surrounding the use of stem cells in research?

Photosynthesis

1. What is a chemical reaction?
2. What is the chemical formula for photosynthesis?
3. What types of organisms perform photosynthesis?
4. Where in the cell does photosynthesis occur?
5. In general, what happens during photosynthesis?
6. Describe the light-dependent reactions, Calvin cycle, and electron transport chain in detail.
7. What role do pigment molecules play in photosynthesis?
8. What is the specific role of sunlight in photosynthesis?
9. During what part of photosynthesis is water used? When is carbon dioxide used?

Cellular Respiration

1. What is the chemical formula for cellular respiration?
2. What types of organisms perform cellular respiration?
3. Where in the cell does cellular respiration occur?
4. In general, what happens during cellular respiration?
5. Where does glycolysis occur, and what happens during this stage?
6. When is carbon dioxide produced during cellular respiration?
7. How many molecules of ATP are produced from one glucose molecule in each stage of aerobic cellular respiration?
8. What is aerobic respiration? What is anaerobic respiration (fermentation)?
9. What is the only stage of cellular respiration that occurs when no oxygen is present?
10. Distinguish between the two different types of fermentation.
11. What is the advantage, and disadvantage, of a cell performing fermentation instead of aerobic respiration?

Further Textbook Reading

Characteristics of Life: 15-17
Cell Membrane Structure: 182
Passive Transport: 183-187
Active Transport: 188-189
DNA Structure: 291-294
DNA Replication: 295-299
Protein Synthesis: 300-306
Cell Division: 241-245
Stem Cells: 253
Photosynthesis: 200-214
Cellular Respiration: 220-232

Key Vocabulary

homeostasis	helicase	carrier molecule
set point	DNA polymerase	glycolysis
receptor	replication	Krebs cycle
effector	RNA polymerase	pyruvic acid
feedback	transcription	aerobic
phospholipid	translation	anaerobic
protein	mRNA	fermentation
cholesterol	tRNA	
carbohydrate	ribosome	
hydrophilic	codon	
hydrophobic	anti-codon	
semi-permeable	amino acid	
integral protein	cell cycle	
peripheral protein	mitosis	
enzyme	cytokinesis	
diffusion	mutation	
osmosis	capsid	
tonicity	memory cell	
isotonic	herd immunity	
hypotonic	stem cell	
hypertonic	pluripotent	
endocytosis	photosynthesis	
exocytosis	cellular respiration	
protein pump	chemical reaction	
nucleotide	chlorophyll	
base pair	mitochondria	
adenine	pigment	
guanine	chlorophyll	
cytosine	glucose	
thymine	ATP	
uracil	light-dependent reactions	
purine	Calvin cycle	
pyrimidine	electron transport chain	