Biology Spring Final Exam
Study Guide

Basic Biology Skills

Graphing
Know the keys to creating a graph
Know how to interpret a graph
Independent variable
Dependent variable

Levels of Organization / Characteristics of Life
What groups give rise to others?
Ex. A group of cells is a __________. A group of tissues is a __________.

Levels of organization in multicellular organism including simplest levels to complex
(cell, tissue, organ, organ system, etc.)

All the organizational levels (Ecosystem, Biosphere, etc.)

Unit 1 → Chemistry of Life

Define matter.

Define element.

Define atom.

What are protons, neutrons, and electrons? Where are they found?

Define atomic number.

Define isotope.

Define ionic bond. Give an example of a compound formed by an ionic bond.

Define covalent bond.

Define chemical reaction. What are reactants? Products?
Define solution, solvent, and solute.

Know properties of water

Know about water polarity

What is the difference between organic/inorganic molecules?

Relationship between monomers and polymers

Monomers and functions of Carbohydrates (sugars---monosaccharide, di, and poly)

Monomers and functions of Lipids (fats, steroids)

Monomers and functions of Proteins (amino acids, polypeptide)

Describe the role of enzymes in the cell

Unit 2  ➔ Cell Structure and Function

Transport
Difference between active and passive transport:

Diffusion, Osmosis, Facilitated Diffusion

Endocytosis

Exocytosis

Know and understand:
Equilibrium

Know how a protein travels through a cell

Hypertonic, Hypotonic, Isotonic solutions
Functions and locations of the following cell parts:

Nucleus

Golgi apparatus

Cell membrane

Nuclear envelope

Endoplasmic Reticulum (smooth and rough)

Cell wall

DNA

Ribosomes

Mitochondria

Vacuole

Nucleolus

Cytoplasm

Cytoskeleton

Vesicle

Lysosome

Flagella and cilia

Differences between plant and animal cells
Difference between Prokaryotic and Eukaryotic cells

Cell Theory

How is the structure of cell parts related their function(s)?

How are nutrients absorbed in cells?

**Unit 3 → Conservation of Matter and Energy**

**Photosynthesis**

Write the chemical equation for Photosynthesis.

Where in the cell does cellular respiration take place?

Where in the cell does photosynthesis take place?

List the two steps of photosynthesis in order and explain what happens during each step.

What role does chlorophyll play in photosynthesis?

Which wavelengths of light does chlorophyll absorb? Which does it reflect?

What part of the plant is responsible for gas exchange?

**Cellular Respiration**

What is ATP? Where is energy stored and released in a molecule of ATP?

Write the chemical equation for Cellular Respiration

List the three steps of cellular respiration in order and explain what happens during each step.

How are the products and reactants of photosynthesis and cellular respiration related to one another?
Explain the difference between aerobic and anaerobic respiration.

Under what conditions does fermentation occur?

What types of cells do lactic acid fermentation?

What does this cause in the human body?

What types of cells do alcoholic fermentation?

What types of foods/beverages are made from this process?

**Energy in Ecosystems**

What is the difference between food webs and food chains?

Explain how carbon is cycled through the atmosphere, organisms, and the soil.

Trophic levels and feeding relationships among organisms

Ecological relationships – producer, consumer, decomposer, heterotroph, autotroph

**Unit 4 → Cellular Reproduction**

Why is mitosis important to organisms?

Compare and contrast mitosis and meiosis in terms of:

Number of cells produced

Type of cells produced (diploid or haploid)

Location in the body

List and describe the phases of the cell cycle.
Why is interphase such an important part of the cell cycle and what occurs during interphase?

What is cytokinesis? Explain the difference between cytokinesis in plant and animal cells.

Explain how cancer is a result of uncontrolled cell division and how environmental factors and genetics play a role in causing cancer.

Explain the relationship between sister chromatids and homologous chromosomes.

**Unit 5 ➔ Molecular Genetics**

Name the 3 parts of a DNA nucleotide.

Explain the process of how DNA replicates itself.

What is the flow of information from DNA to a protein?

What is a gene?

List at least 3 ways that DNA different from RNA

List the 3 types of RNA and the roles they play in the cell.

Explain the processes of transcription and translation.

How do mutations affect the protein coded for by a strand of DNA?

**Unit 6 ➔ Classical Genetics**

Explain how to complete and interpret a Punnett Square.

What is the difference between genotype and phenotype?

Define homozygous and heterozygous.

Define Parent, F1, F2, etc…generations.
Describe the following inheritance patterns and give an example of a trait that follows this pattern:

Incomplete dominance (intermediate inheritance)
- Co-dominance
- Multiple alleles
- Sex-linked
- Polygenic inheritance

How can the environment have an affect on a heritable trait?

Unit 7 → Evolution

Who is credited with developing the theory of evolution?

Explain the ideas of natural selection and decent with modification.

Explain how natural selection occurs.

Explain the idea of use and disuse.

Explain how the following things provide evidence for evolution:
- Fossil Record
- Homologous, analogous, and vestigial structures
- Molecular data (DNA)
- Embryological development

What does Darwin mean when he uses the term “common ancestor?”

What is a gene pool? List and explain the 5 ways a gene pool can change.
- Genetic drift
Founder effect

Bottleneck effect

Gene flow

Mutations

What is a cladogram? Know how to read and interpret a cladogram.

Define the biological species concept and explain how speciation occurs.

Describe the processes of geographic isolation, reproductive isolation, and adaptive radiation.

Explain the differences between the gradualism and punctuated equilibrium models of natural selection.

Describe hominid evolution.

Unit 8 → Ecology

Define the Following:
Ecology

Biosphere

Community

Ecosystem

Population

Distinguish among uniform, random, and clumped distributions.

Draw a graph of an exponential growth curve and a logistic growth curve and be able to explain them.

Explain the idea of competitive exclusion.
What may cause a sudden crash in an exponential growth curve?

What is a limiting factor?

Explain the difference between density-dependent and density-independent limiting factors.

Explain the relationship between predators and prey.

**Terminology (Define the following):**
- Carrying capacity
- Niche
- Habitat
- Biotic factors
- Abiotic factors

**Species interaction**
- Mutualism
- Commensalism
- Parasitism
- Predation
- Competition
- Symbiosis

Primary & secondary succession

Global Climate Change
Know all major earth biomes and describe major biotic & abiotic factors of each.

Tropical rainforest

Tropical grassland

Temperate grassland

Desert

Temperate deciduous forest

Temperate rainforest

Taiga

Tundra

Open Ocean

Coral reefs

Estuary

Freshwater - Rivers and streams

Freshwater - Ponds and lakes