

Biology Semester 1 Final Review

***This review guide is meant to be used with your Note Templates. The learning targets should be in order with the notes. This is a good way to identify what you remember and what you need to review. Spend more time on the BIG concepts and things that we reviewed and reinforced more often in class. There is no way for us to cover EVERYTHING on a final – so focus more on concepts that we spent more time on.**

Biology Review Guide

Characteristics of Life, Biodiversity, Classification (Prokaryotes: Eu- and Archeobacteria, & Protists), Microscopy

Characteristics of Life

- Define biology
- Identify and describe the 8 characteristics of life
 - What are examples of unicellular organisms and multicellular organisms? (Cellular organization)
 - What are examples of stimuli? (Response to environment)
- Define metabolism and list the processes that are included
- Define and provide examples of homeostasis

Biodiversity

- Define biodiversity
 - How can a change in biodiversity change the overall stability of an ecosystem?

Classification

- Identify reasons for why we classify organisms
- List the levels of classification from most broad to most specific
- Distinguish between prokaryotes and eukaryotes
 - Which kingdoms contain prokaryotes and which contain eukaryotes?
- Identify key characteristics of organisms belonging to the kingdoms Eubacteria and Archaeobacteria
 - How do they get energy/nutrients?
 - Which kingdom contains more ancient bacteria?
 - Which kingdom contains "extremophiles"?
- Identify the 6 kingdoms
- Identify key characteristics of organisms belonging to the kingdom Protista
 - Single-celled or multicelled?
 - Where can they be found?
 - What are examples of protists?

Microscopy

- Identify all of the parts of a light microscope
- Describe the steps necessary to focus on high power using a light microscope
 - What must you never use on high power?
- Explain how you find total magnification of a specimen
- Identify how field of view changes with higher/lower magnification and higher/lower light
 - How can you adjust the amount of light on the specimen?
- Describe the steps in making a wet mount

Biology Review Guide

Cell Discovery & Theory, Cell Structure & Function, and Systems

Cell Discovery & Cell Theory

- Identify who made the first microscope
- Identify who discovered and documented the first "cell"
- Identify who is credited for discovering bacteria, protists, sperm cells, blood cells, and nematodes (all same person)
- Identify who helped advance microscopes by becoming an expert lens grinder (same as above) ☺
- Identify the two scientists who discovered that animals and plants were made up of cells
- Describe the three tenants of the Cell Theory
 - Which scientist is given credit for putting the cell theory together?
- Compare and contrast light microscopes with electron microscopes
 - How are their total magnifications different?
 - What does each use in order to "view" a specimen?

Cell Structure and Function

- Compare and contrast prokaryotes and eukaryotes
 - What are examples of prokaryotes? Eukaryotes?
 - What structures do they have in common? How is their DNA different?
- Define organelle
- Identify the function (and in some cases location) of the following structures within eukaryotic cells:
 - Cell Membrane

- Cytoplasm
 - Cytosol
 - Cytoskeleton
 - Nucleus
 - Nuclear Membrane (envelope)
 - Nucleolus
 - Chromatin
 - Endoplasmic reticulum
 - Rough
 - Smooth
 - Vesicle
 - Ribosome
 - Golgi Apparatus
 - Mitochondrion
 - Vacuole
 - Lysosome
 - Centrioles
 - Cell Wall
 - Chloroplast
 - Large Central Vacuole
- Identify the organelles that are unique to a plant cell and an animal cell
 - Identify examples of unicellular and multicellular organisms

Systems

- Define system
 - What are examples of systems?
 - What are the three qualities that characterize a system?

- List the levels of organization in biology
- Describe what makes up the biosphere

Biology Review Guide

Organic Chemistry, Lipids, Cell Membrane, Passive Transport, Active Transport

Organic Chemistry

- Identify 4 elements that make up 96% of a living organism
- Explain the difference between an organic and inorganic molecule
 - What are some examples?
- Identify the structural types for carbon-based molecules
 - What are the three types of structures that carbon-based molecules typically come in?
- Describe the processes of dehydration synthesis and hydrolysis
 - Be able to **DRAW** a general picture of what this looks like
 - What are these processes used to do?
 - How is water involved in these processes?
- List the 4 classes of macromolecules

Lipids

- Identify characteristic properties of lipids
- Identify the (general) structure, function, and examples of triglycerides
 - What are the pieces that make up a triglyceride?
- Differentiate between a saturated and unsaturated fatty acid
- Identify the structure and function of phospholipids
- Compare and contrast the structure of triglycerides and phospholipids
 - You do not need to DRAW the structures for the test. But you may have to identify the parts
 - What is the structural difference between a saturated and unsaturated fat?
 - How does this structural difference affect their properties?
- Identify the (general) structure, functions, and examples of steroids
 - How is the structure different from the other types of lipids you learned about?

Cell Membrane and Regulation

- Identify the two jobs of the cell membrane
- Identify the two main parts of the cell membrane
 - Sketch what the lipid bilayer looks like.
- Describe the parts of the phospholipid that is hydrophobic and hydrophilic
 - What does polar vs. nonpolar mean? Are polar molecules hydrophobic or hydrophilic?
 - Where would you find the hydrophobic part of the phospholipid within the lipid bilayer?
- Explain the fluid mosaic model of the cell membrane
 - What does the "fluid" part refer to?
 - What does the "mosaic" part refer to?
- Identify and describe the function of the three types of proteins that are found within the cell membrane
 - Which protein is most likely to interact with hormones?
- Describe why the cell membrane can be called semi-permeable or selectively permeable

Passive Transport

- Define passive transport
- Define solute, solvent, and solution
- Describe the process of diffusion
 - How does concentration affect where molecules move?
- Define osmosis
- Differentiate between hypertonic, isotonic, and hypotonic solutions
 - Draw pictures representing what happens to an animal cell when it is placed in these solutions. Do the same with a plant cell.
 - What words do we use to describe animal and plant cells in these solutions? (*Hint: The words we use to describe the "possible consequences" for the cells)
- Define facilitated diffusion
 - Why is this still a type of PASSIVE transport?
 - What properties affect whether a molecule can move directly through the lipid bilayer while others need a channel protein to "facilitate" their movement through the membrane?

Active Transport

- Describe why active transport is different from passive transport
 - What energy molecule is involved in this process?
- Describe the general process of using an active transport pump

- What does “against the concentration gradient” mean?
- Compare and contrast endocytosis and exocytosis
- Differentiate between phagocytosis and pinocytosis

Biology Review Guide

Carbohydrates, Photosynthesis, and Respiration

***Don't forget to use our “Photosynthesis & Respiration Comparison” notes completed together in class.**

Carbohydrates

- Identify the atoms that make up carbohydrates
 - Review: How many bonds can carbon, oxygen, and hydrogen atoms make?
- Identify the main function of carbohydrates
- Differentiate between monosaccharides, disaccharides, and polysaccharides
 - What are examples of each?
 - What are the chemical and structural formulas for glucose? (be able to draw a glucose molecule)
 - What processes build up and break down disaccharides and polysaccharides?
 - (be able to show your work to support this, e.g. what is the chemical formula for a disaccharide made up of 2 glucose molecules? Must show your work)
- Compare and contrast the types of storage or structural polysaccharides found in animals and plants
 - Which ones are used for storage? Structure?
 - Where are they found within the organism?

Photosynthesis

- Identify the types of organisms that can use photosynthesis to convert light energy into chemical energy stored in food
- Describe the process of photosynthesis (2 main steps – use a plant as an example)
 - What is the overall goal of photosynthesis?
 - What are the reactants? (requirements) How does the plant get these?
 - What are the products? Where do these go next?
 - What is the balanced equation for photosynthesis?
 - In what organelle does it occur and in what parts of it?
- Describe what occurs in the light dependent reaction and the light independent reaction
 - Where do these processes occur?
 - What pigment is important to this process? What wavelength of visible light does this pigment reflect?

- Explain what ATP is used for (in general)

Respiration

- Define cellular respiration
- Identify the types of organisms that undergo cellular respiration
 - Do all of the organisms that use cellular respiration have mitochondria? Does that mean they don't do cellular respiration?
- Describe the process of respiration
 - What is the overall goal of respiration?
 - What are the reactants? (requirements) Where do these come from?
 - What are the products?
 - What is the balanced equation for respiration?
 - In what organelle does it occur and in what parts?
- Describe what occurs during glycolysis, the Krebs cycle, and the electron transport chain
 - Which reactants are needed where?
 - Which products are produced at which point?
 - When is ATP made (and when is ATP made in the GREATEST quantity)?
- Differentiate between anaerobic respiration and aerobic respiration

Biology Review Guide

Ecology, Pyramids, and Populations

Ecology

- Define ecology
- Identify and differentiate between the levels of organization (species > > > biome)
 - How are they related? How are they different?
- Identify and explain the different symbiotic relationships (commensalism, predation, parasitism, mutualism, **ADD competition**)
 - How does the relationship affect both individuals? (positive, negative, neutral)
- Differentiate between biotic and abiotic factors
 - If something was once living or a product of something living, how do you classify it?
- Differentiate between a food chain and a food web
 - What do the arrows represent? Which direction must they point?
- Differentiate between producers and consumers
 - What is a producer? Why are they called that? What are they also known as?
 - What is the difference between primary, secondary, and tertiary consumers?

- How do carnivores, herbivores, and omnivores fit into this?
- Describe the effects of altering a food web
 - What happens when species is reduced in number or removed? What if they increase in number or a whole new organism is introduced?

Pyramid Models

- Identify the different trophic levels (autotroph, heterotroph, saprotroph)
 - Why are saprotrophs/decomposers/detritivores so important?
- Explain how energy flows through an ecosystem
 - Be able to do simple math to calculate how much energy/biomass/numbers are left at the top of the pyramid (including units!!!)
 - Why is it that only about 10% of the energy is available for the next trophic level? Where does the rest of the energy go?
- Define biomass
- Describe how the number of organisms is affected by energy flow and matter (biomass) availability

Populations

- Define population
- Identify the three types of geographic dispersion
 - What are some factors that influence whether an organism is dispersed in a random, uniform, or clumped manner?
- Identify and explain the four factors that affect population size (make it increase or decrease)
 - Be able to calculate population size given numbers for births, deaths, immigration, and emigration.
- Draw examples of logistic growth and exponential growth
 - Be able to explain the relationship of birth rate to death rate on different parts of the graph (we will exclude immigration and emigration from this discussion).
 - What is carrying capacity and what does it look like on a graph?
 - Match the graphs to positive and negative feedback – why do they match this type of growth?
- Describe possible limiting factors for a population
 - What are examples of biotic factors and abiotic factors that could limit population growth?
- Calculate population density
 - What are factors that limit a population which are dependent on density (density-dependent factors) and those that are not dependent on density (density-independent factors)?

Human Population (Study Guide 16.1 or Crash Course Human Population Growth)

- Identify and explain four ways that humans stretch their environment's carrying capacity

- Differentiate between renewable and nonrenewable resources
 - What are some examples?
 - How can a renewable resource become nonrenewable?

- Identify consequences of human population growth as of present day

Human Impact (Study Guide 16.5)

- Define sustainable development
 - What are practices used by the timber industry and fisheries to make them more sustainable?

- Define umbrella species