

PBGHS Freshman Medical Student Biology Summer Assignment

Welcome Medical Freshmen Class of 2022,

My name is Eric Edwards and I will be your teacher for Biology Honors during the 2018-2019 school year. I have been teaching the Medical Magnet biology classes for 9 years and have enjoyed the challenge of teaching the best and brightest at Palm Beach Gardens High School. Since the beginning of our program, we have had a number of our Medical students become the Valedictorian and/or the Salutatorian for the school. A majority of our Medical Magnet students end their high school careers in the top 10% of their graduating class and many of them are able to choose which college they would like to attend.

With that said, it is not without a lot of dedication. That work begins in your freshman year when you take classes such as Geometry/ Algebra II, AICE General Papers, AICE thinking Skills, AP Human Geography, Latin, Chemistry, and yes, Biology. You have a more rigorous workload than others in your class and a lot will be expected of you. I have every faith that you will be able to deliver on those expectations. There will be homework each night, if only studying for quizzes and tests that you will take during the next class period. The quicker you make the adjustment to high school life, the easier that transition will be.

In an effort to get you prepared, I have put together this summer assignment based on 302 vocabulary words that your knowledge of, will help you to be successful in **EVERY SINGLE** life science course you take from this point forward. Please take the time to do the assignment as it is your first grade for my class and is due on the first day of school.

Over the last few years I have also noticed that school supplies go on sale before school starts and then they are suddenly off sale when it's time to buy them. That, and the fact that there is no time to waste, I have a few things you should buy when they go on sale (wait for the sale at the end of July/ Early August) and have with you on the first day of school:

- 1 College ruled composition book
- Crayola 24 count coloring pencils
- The note cards (for your summer assignment)
- Something to write with (a pencil and a pen are a must!)
- A highlighter
- \$10 lab fees to help with the costs of labs we will be doing throughout the year.

Your Pre-Medicine biology class will not only prepare you for AP Biology and Anatomy that you will take during your sophomore year, but also teach you leadership and presentation skills that will be crucial for your success in the future. I hope that you have a fantastic summer as you prepare for your transition into high school and I look forward to meeting you in August.

Also parents, if you could please e-mail me at eric.edwards@palmbeachschools.org so I can keep in contact with you during the year, it would be great.

Sincerely,

Eric Edwards
Palm Beach Gardens High School

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Pre-Med Biology Honors

Using a 3 x 5 index card, write the vocabulary word on the front (no lines) and the definition on the back (lines). Write legibly. Next, draw a picture on the FRONT of the card that helps you remember the **DEFINITION**. For example, for Biology you would write **BIOLOGY** on the front (no lines) and *the study of life and living things* on the back (lined side) and draw a picture of a plant, person, and an animal or two. All of these things represent **LIFE** which helps you with the definition. The pictures must be colored and relevant. Another example: for chlorophyll (a green pigment) you could draw a green pig! BE CREATIVE! HAVE FUN! You can also find the definitions on-line at quizlet.com (search for PBGHS Medical Biology)

Be prepared for a quiz on the first 10 words on the first week of school. These cards are **due on the first day of class**. Knowing these terms will greatly increase your success in Biology Honors.

1. **Biology**—The science of life or living matter in all its forms and phenomena
2. **Scientific method**—The process scientists use to answer questions.
3. **Qualitative data**—Information collected in the form of descriptions.
4. **Quantitative data**—Information collected in the form of numbers.
5. **Hypothesis**—a statement that is going to be tested.
6. **Controlled experiment**—a test of a hypothesis under carefully managed conditions.
7. **Control**—the group in an experiment used as a standard of comparison.
8. **Independent variable**—The factor that is changed in an experiment.
9. **Dependent variable**—the factor that is measured in an experiment.
10. **Scientific model**—a conceptual representation whose purpose is to explain and predict observed phenomena.
11. **Homeostasis**--The steady-state physiological condition of the body.
12. **Metric system**—a decimal system of weights and measures used in science.
13. **Theory**--An explanation that is broad in scope, generates new hypotheses, and is supported by a large body of evidence.
14. **Law**—A statement based on repeated experimental observations that describes some aspect of the universe.
15. **Matter**—something that has mass and takes up space.
16. **Element**—something that cannot be broken down into simpler substances.
17. **Compound**—two or more elements combined
18. **Trace elements**—any substance that is required in minute quantities for physiological functioning.
19. **Atom**—The smallest unit of matter that retains the properties of an element
20. **Neutron**—An electrically neutral particle found in the nucleus of an atom with a mass of 1 Atomic Mass Unit (AMU).
21. **Proton**—a particle found in the nucleus of an atom that has a positive charge with a mass of 1 AMU.
22. **Electron**—a particle found in a cloud around the nucleus that has negative charge with no significant mass.
23. **Atomic nucleus**—An atom's central core, containing protons and neutrons.
24. **Atomic number**—the number found in the periodic table for an element. Equals the number of protons for that element.
25. **Atomic mass**—The average mass of all the isotopes of an element.
26. **Mass number**—the sum of protons and neutrons in each atom of an element.
27. **Isotopes**—atoms of elements with several different mass numbers.
28. **Radioisotope**—a version of an element that has an unstable nucleus so it will decay over time.
29. **Energy**—the ability to do work.

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30. **Electron shells**—An energy level represented as the distance of an electron from the nucleus of an atom.
31. **Valence electron**—An electron found in the outermost shell.
32. **Valence shell**—the outermost shell of an atom.
33. **Chemical bond**-- a mutual attraction between two atoms resulting from a redistribution of their outer electrons.
34. **Covalent bond**—A chemical attraction in which atoms share electrons.
35. **Molecule**—A chemical compound composed of covalent bonds between atoms.
36. **Non-polar covalent**—A molecule in which electrons are evenly distributed.
37. **Polar covalent**-- A molecule with a slight positive charge on one side and a slight negative charge on the other.
38. **Ion**—A charged atom
39. **Cation**—A positively charged atom
40. **Anion**—A negatively charged atom
41. **Ionic bond**—An attraction formed when electrons are transferred between atoms.
42. **Hydrogen bond**—Weak attraction between a hydrogen atom and another atom
43. **Van der Waals forces**—Slight attraction that develops between oppositely charged regions of nearby molecules
44. **Chemical reaction**—The process that changes, or transforms, one set of chemicals into another set of chemicals
45. **Reactant**—Elements or compounds that enter into a chemical reaction
46. **Product**—Elements or compounds synthesized by a chemical reaction
47. **Equilibrium**—A state in which a process and its reverse are occurring at equal rates
48. **Cohesion**—The binding together of like molecules, often by Hydrogen bonds.
49. **Adhesion**—The force of attraction between different kinds of molecules.
50. **Solvent**—The dissolving substance in a solution
51. **Solute**—The substance that is dissolved in a solution
52. **Solution**—A liquid that is a homogeneous mixture of two or more substances.
53. **Hydrophilic**—A substance that is soluble in water; having an affinity for water
54. **Hydrophobic**—A substance that is not soluble in water; having an aversion to water
55. **Acid**-- A compound that forms hydrogen ions (H^+) in solution; a solution with a pH of less than 7.
56. **Base**-- A compound that produces hydroxide ions (OH^-) in solution; a solution with a pH of more than 7.
57. **Protein**—An organic compound that contains carbon, hydrogen, oxygen, nitrogen, and sulfur; needed by the body for growth and repair
58. **Carbohydrate**—an organic compound made up of carbon, hydrogen, and oxygen atoms in a 1:2:1 ratio that is the major source of energy for the body
59. **Lipid**—an organic compound made mostly from carbon and hydrogen atoms, which includes fats, oils and waxes.
60. **Nucleic acid**—an organic compound that contains Hydrogen, Carbon, Oxygen, Nitrogen, and Phosphorus that is the source of hereditary information for the organism.
61. **Adenosine Triphosphate**—a nucleic acid that living things use to store and release energy.
62. **Macromolecule**—A covalently bonded compound containing a very large number of atoms, such as protein, nucleic acid, or synthetic polymer.
63. **Polymer**—A large molecule consisting of many similar or identical monomers linked together.
64. **Monomer**—A subunit that serves as a building block of a polymer.
65. **Metabolism**--The totality of an organism's chemical reactions, consisting of catabolic (breaking down)

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and anabolic (building up) pathways.

66. **Condensation reaction**—a chemical reaction in which water is released and a macromolecule is built.
67. **Hydrolysis**—A chemical reaction in which water is added and macromolecules are broken down.
68. **Monosaccharide**— any of the class of sugars that cannot be hydrolyzed to give a simpler sugar.
69. **Disaccharide**-- any of a class of sugars whose molecules contain two simple sugars.
70. **Glycosidic bond**-- A covalent bond formed between two monosaccharides by a condensation reaction.
71. **Polysaccharide**-- A polymer of up to over a thousand monosaccharides, formed by condensation reactions.
72. **Phospholipid**-- A molecule that is a constituent of the inner bilayer of biological membranes, having a polar, hydrophilic head and a nonpolar, hydrophobic tail.
73. **Enzyme**— A protein serving as a biological catalyst, a chemical agent that changes the rate of a reaction without being consumed by the reaction
74. **Catalyst**-- A chemical agent that changes the rate of a reaction without being consumed by the reaction.
75. **Peptide bond**-- The covalent bond between two amino acid units, formed by a condensation reaction.
76. **Nucleotide**-- A building block of a nucleic acid, consisting of a five-carbon sugar covalently bonded to a nitrogenous base and a phosphate group.
77. **Cell Theory**—A set of statements in Biology that states that all organisms are composed of cells, cells come from cells, and cells are the basic unit of living things.
78. **Light microscope**-- An optical instrument with lenses that refract (bend) visible light to magnify images of specimens.
79. **Organelle**-- One of several formed bodies with specialized functions, suspended in the cytoplasm of eukaryotic cells.
80. **Electron microscope**—An instrument that focuses an electron beam through a specimen, resulting in resolving power a thousand fold greater than that of a light microscope.
81. **Prokaryotic cell**-- A type of cell lacking a membrane-enclosed nucleus and membrane-enclosed organelles; found only in the domains Bacteria and Archaea.
82. **Eukaryotic cell**-- A type of cell with a membrane-enclosed nucleus and membrane-enclosed organelles, present in protists, plants, fungi, and animals; also called eukaryote.
83. **Cytoplasm**— jelly-like portion of the cell, exclusive of the nucleus, and bounded by the plasma membrane.
84. **Plasma membrane**-- The fluid boundary of every cell that acts as a selective barrier, thereby regulating the cells chemical composition.
85. **Cell nucleus**-- The chromosome-containing organelle of a eukaryotic cell.
86. **Nucleolus**-- A specialized structure in the nucleus, formed from various chromosomes and active in the synthesis of ribosomes.
87. **Ribosomes**— sites of protein synthesis in all types of cells.
88. **Rough Endoplasmic Reticulum**-- internal membrane system found in eukaryotic cells covered with ribosomes; place where proteins bound for the cell membrane are assembled
89. **Smooth Endoplasmic Reticulum**—Site of lipid synthesis and detoxification in eukaryotic cells
90. **Golgi apparatus**-- An organelle in eukaryotic cells consisting of stacks of flat membranous sacs that modify, store, and route products of the endoplasmic reticulum.
91. **Lysosome**-- A membrane-enclosed sac of digestive enzymes found in the cytoplasm of eukaryotic cells
92. **Phagocytosis**— A type of endocytosis involving large, particulate substances, accomplished mainly by macrophages, neutrophils, and dendritic cells.
93. **Pinocytosis**-- A type of endocytosis in which the cell ingests extracellular fluid and its dissolved solutes.
94. **Vacuole**-- cell organelle that stores materials such as water, salts, proteins, and carbohydrates

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95. **Mitochondria**-- cell organelle that converts the chemical energy stored in food into compounds that are more convenient for the cell to use
96. **Chloroplast**-- organelle found in cells of plants and some other organisms that captures the energy from sunlight and converts it into chemical energy
97. **Cytoskeleton**-- network of protein filaments in a eukaryotic cell that gives the cell its shape and internal organization and is involved in movement
98. **Centrioles**-- structure in an animal cell that helps to organize cell division
99. **Flagella**-- structure used by protists for movement; produces movement in a whip-like motion
100. **Cilia**—many short hair-like projections that produce movement in a wavelike motion
101. **Cell wall**-- strong, supporting layer around the cell membrane in some cells
102. **Selectively permeable**-- A property of biological membranes that allows some substances to cross more easily than others.
103. **Integral protein**-- a transmembrane protein with hydrophobic regions that completely spans the hydrophobic interior of the membrane.
104. **Peripheral proteins**-- A protein appendage loosely bound to the surface of a membrane and not embedded in the lipid bilayer.
105. **Transport proteins**-- A transmembrane protein that helps a certain substance or class of closely related substances to cross the membrane.
106. **Diffusion**-- The spontaneous tendency of a substance to move down its concentration gradient from a more concentrated to a less concentrated area.
107. **Passive transport**-- The diffusion of a substance across a biological membrane.
108. **Osmosis**-- The diffusion of water across a selectively permeable membrane.
109. **Hypertonic solution**-- the solution with a greater solute concentration.
110. **Hypotonic solution**-- the solution with a lower solute concentration.
111. **Isotonic solution**-- the same solute concentration as another solution.
112. **Active transport**-- The movement of a substance across a biological membrane against its concentration or electrochemical gradient with the help of energy input and specific transport proteins.
113. **Facilitated diffusion**—passive diffusion that allows substances through a selectively permeable membrane with the help of transport proteins.
114. **Exocytosis**-- The cellular secretion of macromolecules by the fusion of vesicles with the plasma membrane.
115. **Endocytosis**-- The cellular uptake of macromolecules and particulate substances by localized regions of the plasma membrane that surround the substance and pinch off to form an intracellular vesicle.
116. **Exergonic reaction**-- A spontaneous chemical reaction, in which there is a net release of free energy.
117. **Endergonic reaction**-- A non-spontaneous chemical reaction, in which free energy is absorbed from the surroundings.
118. **Phosphorylation**—the addition of a phosphate group to a molecule.
119. **Activation energy**-- The amount of energy that reactants must absorb before a chemical reaction will start; also called free energy of activation.
120. **Substrate**-- The reactant on which an enzyme works.
121. **Active site**-- The specific portion of an enzyme that attaches to the substrate by means of weak chemical bonds.
122. **Fermentation**-- A catabolic process that makes a limited amount of ATP from glucose without an electron transport chain and that produces a characteristic end product, such as ethyl alcohol or lactic acid.
123. **Cellular respiration**-- The most prevalent and efficient catabolic pathway for the production of ATP, in which oxygen is consumed as a reactant along with the organic fuel.

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124. **Cristae**-- An infolding of the inner membrane of a mitochondrion that houses the electron transport chain and the enzyme catalyzing the synthesis of ATP.
125. **Mitochondrial matrix**-- The compartment of the mitochondria enclosed by the inner membrane and containing enzymes and substrates for the Krebs cycle.
126. **Electron transport chain**-- A sequence of electron carrier molecules (membrane proteins) that shuttle electrons during the redox reactions that release energy used to make ATP.
127. **Glycolysis**-- The splitting of glucose into pyruvate. The one metabolic pathway that occurs in all living cells, serving as the starting point for fermentation or aerobic respiration.
128. **Citric acid cycle**-- A chemical cycle involving eight steps that completes the metabolic breakdown of glucose molecules to carbon dioxide; occurs within the mitochondrion; the second major stage in cellular respiration.
129. **Aerobic**-- Containing oxygen; referring to an organism, environment, or cellular process that requires oxygen.
130. **Anaerobic**-- Lacking oxygen; referring to an organism, environment, or cellular process that lacks oxygen and may be poisoned by it.
131. **Alcohol fermentation**-- The conversion of pyruvate to carbon dioxide and ethyl alcohol.
132. **Lactic acid fermentation**-- The conversion of pyruvate to lactate with no release of carbon dioxide.
133. **Pyruvate**-- the end product of glycolysis and may be metabolized to lactate or to acetyl CoA.
134. **Photosynthesis**-- The conversion of light energy to chemical energy that is stored in glucose or other organic compounds; occurs in plants, algae, and certain prokaryotes.
135. **Chlorophyll**-- A green pigment located within the chloroplasts of plants. Chlorophyll *a* can participate directly in the light reactions, which convert solar energy to chemical energy.
136. **Stomata**-- small openings in the epidermis of a plant that allows carbon dioxide, water, and oxygen to diffuse into and out of the leaf
137. **Stroma**-- The fluid of the chloroplast surrounding the thylakoid membrane; involved in the synthesis of organic molecules from carbon dioxide and water.
138. **Thylakoids**-- The flattened membrane sacs inside the chloroplast, used to convert light energy to chemical energy.
139. **Calvin cycle**-- The second of two major stages in photosynthesis (following the light reactions), involving atmospheric CO₂ fixation and reduction of the fixed carbon into carbohydrate.
140. **Mitosis**-- A process of nuclear division in eukaryotic cells.
141. **Cell cycle**-- An ordered sequence of events in the life of a eukaryotic cell, from its origin in the division of a parent cell until its own division into two; composed of the M, G₁, S, and G₂ phases.
142. **Genome**-- The complete complement of an organism's genes; an organism's genetic material.
143. **Chromosomes**-- Threadlike, gene-carrying structures found in the nucleus. Each one consists of one very long DNA molecule and associated proteins..
144. **Somatic cells**—All cells in a multicellular organism except a sperm or egg cell.
145. **Gametes**-- Haploid cells, such as an egg or sperm. They unite during sexual reproduction to produce a diploid zygote.
146. **Chromatin**-- The complex of DNA and proteins that makes up a eukaryotic chromosome.
147. **Sister chromatids**--Replicated forms of a chromosome joined together by the centromere and eventually separated during mitosis or meiosis II.
148. **Centromere**-- The centralized region joining two sister chromatids.
149. **Cytokinesis**-- The division of the cytoplasm to form two separate daughter cells immediately after mitosis.
150. **G₁ phase**-- The first growth phase of the cell cycle, consisting of the portion of interphase before DNA synthesis begins.

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151. **S-Phase**-- The synthesis phase of the cell cycle; the portion of interphase during which DNA is replicated.
152. **G₂ phase**--The phase of the cell cycle consisting of the portion of interphase after DNA synthesis occurs.
153. **Prophase**--The stage of mitosis in which the chromatin is condensing and the mitotic spindle begins to form, but the nucleolus and nucleus are still intact.
154. **Metaphase**--The stage of mitosis in which the spindle is complete and the chromosomes, attached to microtubules at their kinetochores, are all aligned at the metaphase plate.
155. **Anaphase**--The stage of mitosis in which the chromatids of each chromosome have separated and the daughter chromosomes are moving to the poles of the cell.
156. **Telophase**--The stage of mitosis in which daughter nuclei are forming and cytokinesis has typically begun.
157. **Metaphase plate**--An imaginary plane during metaphase in which the centromeres of all the duplicated chromosomes are located midway between the two poles.
158. **Cleavage furrow**--The first sign of cleavage in an animal cell; a shallow groove in the cell surface near the old metaphase plate.
159. **Cell plate**--A double membrane across the midline of a dividing plant cell, between which the new cell wall forms during cytokinesis.
160. **Binary Fission**--The separation of a parent into two or more individuals of approximately equal size.
161. **Origin of replication**--Site where the synthesis of a DNA molecule begins.
162. **Cancer**--a large group of different diseases, all involving unregulated cell growth.
163. **Metastasis**--The spread of cancer cells to locations distant from their original site.
164. **Meiosis**--A two-stage type of cell division in sexually reproducing organisms that results in cells with half the chromosome number of the original cell.
165. **Diploid**--A cell containing two sets of chromosomes ($2n$), one set inherited from each parent.
166. **Haploid**--A cell containing only one set of chromosomes (n).
167. **Zygote**--The diploid product of the union of haploid gametes in conception; a fertilized egg.
168. **Fertilization**--The union of haploid gametes to produce a diploid zygote.
169. **Tetrad**--A paired set of homologous chromosomes, each composed of two sister chromatids.
170. **Chiasma**--The X-shaped, microscopically visible region representing homologous chromatids that have exchanged genetic material through crossing over during meiosis.
171. **Homologous chromosomes**--Chromosome pairs of the same length, centromere position, and staining pattern that possess genes for the same characters at corresponding loci.
172. **Sex cell**-- A spermatozoon or an ovum; a cell responsible for transmitting DNA to the next generation
173. **Karyotype**--A display of the chromosome pairs of a cell arranged by size and shape.
174. **Variation**--Differences between members of the same species.
175. **Genetics**--The scientific study of heredity and hereditary variation.
176. **Gene**--A discrete unit of hereditary information consisting of a specific nucleotide sequence in DNA
177. **Locus**--A specific place along the length of a chromosome where a given gene is located.
178. **Asexual reproduction**--A type of reproduction involving only one parent that produces genetically identical offspring by budding or by the division of a single cell or the entire organism into two or more parts.
179. **Trait**--Any detectable variation in a genetic character.
180. **Homozygous**--Having two identical alleles for a given gene.
181. **Heterozygous**--Having two different alleles for a given gene.
182. **Allele**--Alternative versions of a gene that produce distinguishable phenotypic effects
183. **Dominant**--An allele that is fully expressed in the phenotype of a heterozygote.

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184. **Recessive**--An allele whose phenotypic effect is not expressed in a heterozygote.
185. **Punnett square**--A diagram used in the study of inheritance to show the results of random fertilization in genetic crosses.
186. **Genotype**--The complete set of alleles of an organism.
187. **Phenotype**--The physical and physiological traits of an organism that are determined by its genetic makeup.
188. **Monohybrid**--An organism that is heterozygous with respect to a single gene of interest
189. **Dihybrid**--An organism that is heterozygous with respect to two genes of interest.
190. **Codominance**--The situation in which the phenotypes of both alleles are exhibited in the heterozygote.
191. **Incomplete dominance**--The situation in which the phenotype of heterozygotes is intermediate between the phenotypes of individuals homozygous for either allele.
192. **Epistasis**--A type of gene interaction in which one gene alters the phenotypic effects of another gene that is independently inherited.
193. **Polygenic**--An additive effect of two or more gene loci on a single phenotypic character.
194. **Carriers**-- An individual who is heterozygous at a given genetic locus, with one normal allele and one potentially harmful recessive allele.
195. **Deletion**--(1) A deficiency in a chromosome resulting from the loss of a fragment through breakage. (2) A mutational loss of one or more nucleotide pairs from a gene.
196. **Duplication**--An aberration in chromosome structure due to fusion with a fragment from a homologous chromosome, such that a portion of a chromosome is duplicated.
197. **Inversion**--An aberration in chromosome structure resulting from reattachment in a reverse orientation of a chromosomal fragment to the chromosome from which the fragment originated.
198. **Translocation**--An aberration in chromosome structure resulting from attachment of a chromosomal fragment to a nonhomologous chromosome.
199. **Bacteriophage**--A virus that infects bacteria.
200. **Semiconservative model**--Type of DNA replication in which the replicated double helix consists of one old strand, derived from the old molecule, and one newly made strand.
201. **Lagging strand**--A discontinuously synthesized DNA strand that elongates in a direction away from the replication fork.
202. **Okazaki fragment**--A short segment of DNA synthesized on a template strand during DNA replication
203. **DNA ligase**--A linking enzyme essential for DNA replication; catalyzes the covalent bonding of the 3' end of a new DNA fragment to the 5' end of a growing chain.
204. **Primer**--A polynucleotide with a free 3' end, bound by complementary base pairing to the template strand that is elongated during DNA replication.
205. **Primase**--An enzyme that joins RNA nucleotides to make the primer.
206. **Helicase**--An enzyme that untwists the double helix of DNA at the replication forks.
207. **Transcription**--The synthesis of RNA on a DNA template.
208. **Translation**-- The synthesis of a polypeptide using the genetic information encoded in an mRNA molecule.
209. **Codon**--A three-nucleotide sequence of DNA or mRNA that specifies a particular amino acid or termination signal
210. **Anticodon**--A specialized base triplet at one end of a tRNA molecule that recognizes a particular complementary codon on an mRNA molecule.
211. **Mutation**--A rare change in the DNA of a gene, ultimately creating genetic diversity.
212. **Point mutation**--A change in a gene at a single nucleotide pair.
213. **Frameshift mutation**--A mutation occurring when the number of nucleotides inserted or deleted is not a multiple of three, resulting in the improper grouping of the following nucleotides into codons.
214. **Insertion**--A mutation involving the addition of one or more nucleotide pairs to a gene.

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215. **Substitution**—A mutation involving the replacement of one or more nucleotides with an equal amount.
216. **Endangered species**--A species that is in jeopardy of extinction throughout all or a significant portion of its range.
217. **Natural selection**--Differential success in the reproduction of different phenotypes resulting from the interaction of organisms with their environment.
218. **Evolution**--All the changes that have transformed life on Earth from its earliest beginnings to the diversity that characterizes it today.
219. **Adaptation**--heritable characteristic that increases an organism's ability to survive and reproduce in an environment
220. **Fossil**--A preserved remnant or impression of an organism that lived in the past.
221. **Taxonomy**-- the branch of biology concerned with naming and classifying the diverse forms of life.
222. **Gradualism**--A view of Earth's history that attributes profound change to the cumulative product of slow but continuous processes.
223. **Catastrophism**--The hypothesis that each boundary between strata corresponded in time to a natural disaster, such as a flood or drought that had destroyed many of the species living there at that time.
224. **Uniformitarianism**--The idea that geologic processes have not changed throughout Earth's history.
225. **Vestigial organ**--A structure of marginal, if any, importance to an organism.
226. **Biogeography**--The study of the past and present distribution of species.
227. **Gene pool**--The total aggregate of genes in a population at any one time.
228. **Hardy-Weinberg equilibrium**--The principle that the frequency of alleles and genotypes in a population remain constant from generation to generation, provided that only Mendelian segregation and recombination of alleles are at work
229. **Genetic drift**--Unpredictable fluctuations in allele frequencies from one generation to the next because of a population's finite size.
230. **Bottleneck effect**--Genetic drift resulting from the reduction of a population, typically by a natural disaster, such that the surviving population is no longer genetically representative of the original population.
231. **Founder effect**--Genetic drift that occurs when a few individuals become isolated from a larger population, with the result that the new population's gene pool is not reflective of the original population.
232. **Gene flow**--Genetic additions to or subtractions from a population resulting from the movement of fertile individuals or gametes.
233. **Fitness**--The contribution an individual makes to the gene pool of the next generation, relative to the contributions of other individuals.
234. **Directional selection**--Natural selection that favors individuals at one end of the phenotypic range.
235. **Disruptive selection**--Natural selection that favors individuals on both extremes of a phenotypic range over intermediate phenotypes.
236. **Stabilizing selection**--Natural selection that favors intermediate variants by acting against extreme phenotypes.
237. **Speciation**--The origin of new species in evolution.
238. **Species**--A group whose members possess similar anatomical characteristics and have the ability to interbreed.
239. **Binomial nomenclature**--classification system in which each species is assigned a two-part scientific name
240. **Phylogeny**--The evolutionary history of a species or group of related species.
241. **Cladogram**--A diagram depicting patterns of shared characteristics among taxa.
242. **Derived character**—a trait that appears in recent parts of a lineage, but not in its older members.
243. **Clade**—A group of organisms, such as a species, whose members share homologous features derived

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from a common ancestor.

- 244. **Ecology**--The study of how organisms interact with their environment.
- 245. **Abiotic**—Nonliving things that are part of an environment.
- 246. **Biotic**--Referring to all living things that are part of the environment.
- 247. **Population**--A localized group of individuals that belong to the same biological species.
- 248. **Community**--an assemblage of populations of different species living close enough together for potential interaction.
- 249. **Ecosystem**-- a community and its physical environment.
- 250. **Biosphere**--The entire portion of Earth inhabited by life
- 251. **Climate**--The prevailing weather conditions at a locality.
- 252. **Biome**--Any of the world's major ecosystems, classified according to the predominant vegetation and characterized by adaptations of organisms to that particular environment.
- 253. **Photic zone**--The narrow top slice of the ocean, where light permeates sufficiently for photosynthesis to occur.
- 254. **Canopy**--The uppermost layer of vegetation in a terrestrial biome.
- 255. **Understory**--layer in a rainforest found underneath the canopy formed by shorter trees and vines
- 256. **Permafrost**—A constantly frozen stratum below the arctic tundra.
- 257. **Arid**—barren or unproductive because of a lack of moisture.
- 258. **Immigration**--The influx of new individuals from other areas.
- 259. **Emigration**--The movement of individuals out of a population.
- 260. **Logistic growth**--A model describing population growth that levels off as population size approaches carrying capacity.
- 261. **Exponential growth**--The geometric increase of a population as it grows in an ideal, unlimited environment.
- 262. **Carrying capacity**--The maximum population size that can be supported by the available resources
- 263. **Predation**--An interaction between species in which one species hunts and eats the other.
- 264. **Niche**--The sum total of a species' use of the biotic and abiotic resources in its environment.
- 265. **Habitat**--area where an organism lives including the biotic and abiotic factors that affect it
- 266. **Mimicry**-- the similarity of one species to another which protects one or both
- 267. **Symbiosis**--An ecological relationship between organisms of two different species that live together in direct contact.
- 268. **Parasitism**--A symbiotic relationship in which the symbiont benefits at the expense of the host by living either within the host or outside the host.
- 269. **Mutualism**--A symbiotic relationship in which both participants benefit.
- 270. **Commensalism**--A symbiotic relationship in which the symbiont benefits but the host is neither helped nor harmed.
- 271. **Pathogen**--A disease-causing agent.
- 272. **Keystone species**—organisms that are not necessarily abundant in a community yet exert strong control on community structure by the nature of their ecological role or niche.
- 273. **Exotic species**—An organism that is introduced to an environment in which it has no natural predators.
- 274. **Trophic level**--each step in a food chain or food web
- 275. **Food chain**--The pathway along which food is transferred from trophic level to trophic level, beginning with producers.
- 276. **Food web**--The elaborate, interconnected feeding relationships in an ecosystem.
- 277. **Autotroph**--An organism that obtains organic food molecules without eating other organisms or substances derived from other organisms.
- 278. **Producer**—An organism that has the ability to create its own energy.
- 279. **Heterotroph**--An organism that obtains organic food molecules by eating other organisms or their

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by-products.

- 280. **Consumer**--organism that relies on other organisms for its energy.
- 281. **Detritivore**--An organism that uses organic waste as a food source, as certain insects.
- 282. **Decomposer**--An organism, usually a bacterium or fungus, that breaks down the cells of dead plants and animals into simpler substances.
- 283. **Scavenger**--animal that consumes the carcasses of other animals
- 284. **Biomass**--The dry weight of organic matter comprising a group of organisms in a particular habitat.
- 285. **Succession**— Transition in the species composition of a biological community, often following ecological disturbance of the community
- 286. **Primary succession**--A type of ecological succession that occurs in a virtually lifeless area, where there were originally no organisms and where soil has not yet formed.
- 287. **Secondary succession**--A type of succession that occurs where an existing community has been cleared by some disturbance that leaves the soil intact.
- 288. **Pioneer species**--first organisms to populate an area during succession
- 289. **Limiting factor**--factor that causes population growth to decrease
- 290. **Eutrophication**--A process by which nutrients, particularly phosphorus and nitrogen, become highly concentrated in a body of water, leading to increased growth of organisms such as algae.
- 291. **Biogeochemical cycle**--Any of the various nutrient circuits, which involve both biotic and abiotic components of ecosystems.
- 292. **Nitrogen fixation**--The assimilation of atmospheric nitrogen by certain prokaryotes into nitrogenous compounds that can be directly used by plants.
- 293. **Biological magnification**--A trophic process in which retained substances become more concentrated with each link in the food chain.
- 294. **Greenhouse effect**--The warming of planet Earth due to the atmospheric accumulation of carbon dioxide, which absorbs infrared radiation and slows its escape from the irradiated Earth.
- 295. **Global warming**--increase in the average temperatures on Earth
- 296. **Cerebrum**--The dorsal portion of the vertebrate forebrain, composed of right and left hemispheres
- 297. **Cerebellum**—Part of the vertebrate hindbrain located dorsally; functions in unconscious coordination of movement and balance.
- 298. **Brainstem**--Collection of structures in the adult brain, including the midbrain, the pons, and the medulla oblongata; functions in homeostasis, coordination of movement, and conduction of information to higher brain centers.
- 299. **Pons**--Portion of the brain that participates in certain automatic, homeostatic functions, such as regulating the breathing centers in the medulla.
- 300. **Medulla**--a swelling of the hindbrain dorsal to the anterior spinal cord that controls autonomic, homeostatic functions, including breathing, heart and blood vessel activity, swallowing, digestion, and vomiting.
- 301. **Xylem**--Vascular plant tissue consisting mainly of tubular dead cells that conduct most of the water and minerals upward from roots to the rest of the plant.
- 302. **Phloem**--Vascular plant tissue consisting of living cells arranged into elongated tubes that transport sugar and other organic nutrients throughout the plant.