

**Ecology- How does energy flow through an ecosystem?**

Draw the flow of energy through an ecosystem. Predict changes in the food web when one or more organisms are removed. **Chapter 3-2** (B3.2C)

Use a food web to identify and distinguish producers, consumers, and decomposers and explain the transfer of energy through trophic levels. **Chapter 3-2** (B3.3A)

Describe energy transfer through an ecosystem, accounting for energy lost to the environment as heat. **Chapter 3-2** (3.2B)

producers

consumers

decomposer

herbivore

omnivore

carnivore

detritivore

food chain

food web

pyramid of numbers

biomass pyramid

**Ecology - What is the relevance of Biodiversity?**

Recognize and describe that a great diversity of species increases the chance that at least some living organisms will survive in the face of cataclysmic changes in the environment. **Chapter 6-3** (3.4B) *What are the types of biodiversity?*

Describe ecosystem stability. Understand that if a disaster such as flood or fire occurs, the damaged ecosystem is likely to recover in stages of succession that eventually result in a system similar to the original one. **Chapter 6-3** (B3.4A) *What are the 2 types of ecological succession?*

Predict the consequences of an invading organism on the survival of other organisms. **Chapter 6-3** (B3.5C) *How will other populations be affected by an invader?*

Propose how moving an organism to a new environment may influence its ability to survive and predict the possible impact of this type of transfer. **Chapter 6-3** (B2.2g)

*What factors would cause an invasive species to flourish or to perish in its new environment?*

Explain the influences that affect population growth. **Chapter 5-2** (B3.5B) *Compare density independent and density dependent limiting factors. Define biotic and abiotic.*

Graph changes in population growth, given a data table. **Chapter 5-1,2** (B3.5A) *What do the graphs of exponential and logistic growth look like?*

Recognize that and describe how the physical or chemical environment may influence the rate, extent, and nature of population dynamics within ecosystems. **Chapter 5-1,2** (B3.5e) *Define biotic and abiotic factors and discuss how they could limit populations.*

Describe different reproductive strategies employed by various organisms and explain their advantages and disadvantages. **Ch 32-1, 33-3** (B3.5d) *What are the advantages and disadvantages of sexual and asexual reproduction?*

**Evolution (classification)- What is the evidence that organisms are related?**

Explain that living things can be classified based on structural, embryological, and molecular (relatedness of DNA sequence) evidence. **Chapter 15-3, 18-2, 18-3** (B2.4A) *How were organisms first classified? How are they classified now? Why do we share similar genes?*



Explain that some structures in the modern eukaryotic cell developed from early prokaryotes, such as mitochondria, and in plants, chloroplasts. **Chapter 17-2** (B2.4g)

*What is the Endosymbiotic Theory?*

Describe species as reproductively distinct groups of organisms that can be classified based on morphological, behavioral, and molecular similarities. **Chapter 18-2** (B5.2a) *'nuff said*

### **Evolution (Darwinian)- How and why do living things change over time?**

Summarize the major concepts of natural selection (differential survival and reproduction of chance inherited variants, depending on environmental conditions). **Chapter 15-3** (B5.1A) *Where do adaptations come from according to Lamarck? Darwin?*

Describe how natural selection provides a mechanism for evolution. **Chapter 15-3** (B5.1B) *What causes variations in nature?*

Explain how a new species or variety may originate through the evolutionary process of natural selection. **Chapter 16-3** (B5.1d) *What causes speciation?*

Explain how natural selection leads to organisms that are well suited for the environment (differential survival and reproduction of chance inherited variants, depending upon environmental conditions). **Chapter 16** (B5.1e) *How did food resources cause evolution/speciation in Darwin's finches?*

Illustrate how genetic variation is preserved or eliminated from a population through natural selection (evolution) resulting in biodiversity. **Chapter 16** (B5.1g) *Give an example of "survival of the fittest".*

Explain how natural selection acts on individuals, but it is populations that evolve. Relate genetic mutations and genetic variety produced by sexual reproduction to diversity within a given population. **Chapter 16** (B5.3A) *An individual passes on its genes or it doesn't, it cannot evolve. The next generation will show evidence of evolution with their gene pool.*

Describe the role of geographic isolation in speciation. **Chapter 16-3** (B5.3B)

Trace the relationship between environmental changes and changes in the gene pool, such as genetic drift and isolation of subpopulations. **Chapter 16-1,2** (B5.2c)

Give examples of ways in which genetic variation and environmental factors are causes of evolution and the diversity of organisms. **Chapter 16** (B4.3C) *What could cause selection pressures in a species? (what are some traits that could be an advantage or a detriment)*

Explain how evolution through natural selection can result in changes in biodiversity. **Chapter 16** (B5.3d) *How does evolution affect biodiversity globally?*

### **Evolution (Evidence)**

Explain, using examples, how the fossil record, comparative anatomy, and other evidence may support the theory of evolution. **Chapter 12-4, 15-3, 17-1, 18-2** (B5.1f)



Describe how various organisms have developed different specializations to accomplish a particular function and yet the end result is the same (e.g., excreting nitrogenous wastes in animals, obtaining oxygen for respiration).

**Chapter 17-4** (B2.4B)

Explain how different organisms accomplish the same result using different structural specializations (gills vs. lungs vs. membranes). **Chapter 17-4** (B2.4C)

Summarize the relationships between present-day organisms and those that inhabited the Earth in the past (e.g., use fossil record, embryonic stages, homologous structures, chemical basis). **Chapter 15-3, 17-1, 18-2** (B5.1c)

Explain that the degree of kinship between organisms or species can be estimated from the similarity of their DNA and protein sequences. **Chapter 18-2** (B5.2b)

Demonstrate and explain how biotechnology can improve a population and species. **Chapter 13-4** (B5.3f)

Analyze the relationships among organisms based on their shared physical, biochemical, genetic, and cellular characteristics and functional processes. **Chapter 18-1, 18-2** (B2.4d)

*Compare DNA sequences to determine how closely related two organisms are.*

### **Genetics (Mendelian)- How are traits passed on in living things?**

Determine the **genotype** and phenotype of **monohybrid** crosses using a Punnett Square. **Chapter 11-1, 11-2** (B4.1e) *Find some practice problems in chapter 11.*

Draw and label a homologous chromosome pair with heterozygous alleles highlighting a particular gene location. **Chapter 11-4, 14-2** (B4.1A)

Differentiate between **dominant, recessive, codominant, polygenic**, and sex linked traits. **Chapter 11-1, 11-3** (B4.1c)

### **Genetics (Molecular)- How does the Genetic Code work?**

Describe the structure and function of DNA. **Chapter 12-1** (B4.2C) *What is a nucleotide? Histone? DNA vs RNA differences.*

Explain that the information passed from parents to offspring is transmitted by means of genes that are coded in DNA molecules. These genes contain the information for the production of proteins. **Chapter 11-4, 12-3** (B4.1B) *What do genes code for? (don't you dare say traits!)*

Describe the processes of **replication, transcription, and translation** and how they relate to each other in molecular biology. **Chapter 12-2, 12-3** (B4.2g)

Demonstrate how the genetic information in DNA molecules provides instructions for assembling protein molecules and that this is virtually the same mechanism for all life forms. **Chapter 12-3** (B4.2f) *Take a DNA code and be able to transcribe and translate into an amino acid chain.*

Recognize that genetic variation can occur from such processes as **crossing over, jumping genes, and deletion** and **duplication** of genes. **Chapter 11-4, 12-4** (B4.3e) *Look up those bold faced words!*



Explain that cellular differentiation results from gene expression and/or environmental influence (e.g., metamorphosis, nutrition). **Chapter 12-5** (B4.3g) *Your genes and your environment can cause changes in an organisms development.*

**Genetics (Mutation)- What are consequences of genetic material being altered?**

Predict the consequences that changes in the DNA composition of particular genes may have on an organism (e.g., sickle cell anemia, other). **Chapter 14-1** (B4.2D) *What causes sickle cell anemia (what is involved in the mutation), what are the symptoms?*

Propose possible effects (on the genes) of exposing an organism to radiation and toxic chemicals. **Chapter 14-1** (B4.2E) *What happens if some DNA gets messed up?*

Predict how mutations may be transferred to progeny. **Chapter 11-4, 14-1** (B4.3f) *Hmmm, now which cells need to have a mutation in order to pass that mutation on to offspring?*

Explain why only mutations occurring in gametes (sex cells) can be passed on to offspring. (B4.3B) *Oh yeah, that's the answer*

Describe how inserting, deleting, or substituting DNA segments can alter a gene. Recognize that an altered gene may be passed on to every cell that develops from it and that the resulting features may **help, harm, or have little or no effect** on the offspring. **Chapter 11-4, 12-4** (B4.4a) *What were the types of mutations discussed.*

Recognize that genetic engineering techniques provide great potential and responsibilities. **Chapter 13-3, 13-4** (B4.2h) *Potential to use less pesticides and increase crop yields in farming. Cure diseases in humans and animals.*

Predict what would happen if the cells from one part of a developing embryo were transplanted to another part of the embryo. **Chapter 10-3** (B2.1e) *Once cells become specialized, they won't change and they usually won't survive anywhere other than where they are meant to be.*