



Golden Eagle Charter School

Biology/Life Science Learning Targets

Cell Biology
1. Know cells are enclosed with semipermeable membranes that allow only certain substances to pass through.
2. Understand how enzymes act as catalysts for biochemical reactions and that the activities of enzymes depend on the temperature ionic conditions, and the pH of the surroundings.
3. Understand the differences between prokaryotic cells, eukaryotic cells and viruses.
4. Understand the flow of information from the transcription of ribonucleic acid (RNA) in the nucleus to translation of proteins on ribosomes in the cytoplasm.
5. Know the role of endoplasmic reticulum and Golgi apparatus in the secretion of proteins.
6. Understand the process of photosynthesis.
7. Know the role of the mitochondria in making energy stored in chemical bonds available to cells through the breakdown of glucose to carbon dioxide.
8. Understand that most macromolecules (polysaccharides, nucleic acids, proteins, lipids) in cells are synthesized from a small collection of simpler molecules.
Genetics
9. Understand the process of meiosis and know that only certain cells in a multicellular organism undergo meiosis.
10. Know how random chromosome segregation explains the probability of the presence of a particular allele in a gamete.
11. Understand how the process of fertilization results in different combinations of alleles, and how to predict possible combinations of alleles in a zygote from the genetic makeup of the parents.
12. Understand the role of chromosomes in determining an individual's sex.
13. Understand how to predict the probably outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive)
14. Know the genetic basis for Mendel's laws of segregation and independent assortment.
15. Know the general pathway by which ribosomes synthesize proteins and understand how to apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA.
16. Know that mutations in the DNA sequence of a gene may or may not affect the expression of the gene and that specialization of cells in multicellular organisms is usually due to different patterns of gene expression rather than differences in the genes themselves.
17. Know the general structures and functions of DNA, RNA and protein, and that proteins differ from one another in the number and sequence of amino acids.
18. Understand how genetic engineering is used to produce new biomedical and agricultural products.

Ecology	
19.	Understand the concept of biodiversity and how it is affected by alterations of habitats
20.	Analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size due to variations in the relative rates of birth, immigration, emigration, and death.
21.	Know how water, carbon, and nitrogen cycle between abiotic resources and organic matter, and how oxygen cycles through photosynthesis and respiration.
22.	Know how energy is transferred through trophic levels in an ecosystem and that a vital part of an ecosystem is the stability of its producers and decomposers.
Evolution	
23.	Know how alleles that are lethal in a homozygous individual may be carried in heterozygotes and thus maintained in a gene pool.
24.	Know that new mutations are constantly being generated in a gene pool and that variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions and analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction.
25.	Know why natural selection acts on the phenotype rather than the genotype of an organism and how natural selection determines the differential survival of groups of organisms.
26.	Know the effects of genetic drift on the diversity of organisms in a population and how reproductive or geographic isolation affects speciation.
Physiology	
27.	Understand how the complimentary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide.
28.	Understand how the nervous system mediates communication between different parts of the body and the body's interactions with the environment, as well as how feedback loops in the nervous and endocrine systems regulate conditions in the body.
29.	Know the functions of the nervous system, the role of neurons in transmitting electrochemical impulses, and the roles of sensory neurons, interneurons, and motor neurons in sensation, thought and response.
30.	Know the differences between bacteria and viruses and the human body's primary defenses against bacterial and viral infections, as well as the role of vaccinations in preventing diseases and the effects of a compromised immune system (due to HIV, for example).

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Additional Learning Targets for Lab Biology Class

L1	Select and use appropriate tools and technology to perform tests, collect data, analyze relationships and display data.
L2	Identify and communicate sources of experimental error and identify possible reasons for inconsistent results.
L3	Formulate explanations by using logic and evidence
L4	Apply appropriate mathematical techniques (e.g. quadratic equations, trigonometric, exponential and logarithmic functions) to solve scientific problems.

L5	Distinguish between hypothesis and theory
L6	Read and interpret charts, graphs, and topographic and geologic maps.
L7	Analyze the locations, sequences, or time intervals that are characteristic of natural phenomena.
L8	Critically analyze scientific evidence and recognize the issues of statistical variability and the need for controlled tests.
L9	Analyze situations and solve problems that require combining and applying concepts from more than one area of science.
L10	Investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings.

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