

# FLINT RIVER ACADEMY SCIENCE STANDARDS

## ADVANCED BIOLOGY

### 1. Vertebrate Overview

- a. Identify the major groups of vertebrates and list the order in which they evolved
- b. Describe key adaptations of each group of vertebrates that enable them to succeed in their environment
- c. Compare and contrast the major organ systems among the groups of vertebrates
- d. Be able to state the classification levels of humans. Discuss the unique qualities of Homo sapiens
- e. List and discuss in order of increasing complexity the levels of organization of the body
- f. Identify and discuss the four major types of body tissues with respect to structure, function and location

### 2. Organ Systems

- a. Integumentary, Skeletal, Muscular, Digestive, Respiratory, Lymphatic, Circulatory, Endocrine, Nervous and Reproductive Systems:
  - List the functions of each system and explain how these functions are accomplished.
  - State the organs / structures involved in each system and the role that they play in accomplishing the system goal.
  - Be able to identify structure names and parts (anatomy of a long bone, anatomy of the skeleton, etc.).

### 3. Genetics

- a. Discuss the discovery of the DNA structure
- b. Compare DNA and RNA in terms of structure, nucleotides and base pairs.
- c. Describe the basic process of DNA replication and how it relates to the transmission and conservation of the genetic code. Explain the basic process of transcription and translation and how they result in the expression of genes. Distinguish among the end products of replication, transcriptions and translation
- d. 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's success in its environment. Mutations in the DNA sequence of a gene may not affect the expression of a gene or the sequence of amino acids in an encoded protein
- e. Discuss several autosomal recessive/dominant and sex-linked diseases

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## 4. Respiration and Photosynthesis

- a. Explain the process of glycolysis
- b. Compare and contrast alcoholic fermentation and lactic acid fermentation
- c. Explain what happens during the Krebs Cycle and how high energy electrons are used by the electron transport chain
- d. Identify three pathways the body uses to release energy
- e. Compare and contrast photosynthesis and respiration
- f. Discuss the role of ATP in cellular activities
- g. Describe the role of light and chlorophyll in photosynthesis
- h. Describe what happens during light-dependent reactions and the Calvin Cycle
- i. Explain the factors that affect the rate of photosynthesis

## Investigation and Experimentation

1. Make observations, raise questions and formulate hypotheses.
  - a. Observe the world from a scientific perspective
  - b. Pose questions and from hypotheses based on personal observations, scientific articles, experiments and knowledge
  - c. Read, interpret, and examine credibility and validity of scientific claims in different sources of information, such as scientific articles, advertisements, or media stories
  - d. Recognize that science is a progressive endeavor that reevaluates and extends what is already accepted
2. Design and conduct scientific investigations.
  - a. Articulate and explain the major concepts being investigated and the purpose of an investigation
  - b. Select required materials, equipment, and conditions for conducting an experiment
  - c. Identify independent and dependent variables
  - d. Write procedures that are clear and replicable
  - e. Employ appropriate methods for accurately and consistently making observations, making and recording measurements at appropriate levels of precision and collecting evidence or data in an organized way
  - f. Properly use instruments, equipment, and materials (scales, balances, meter sticks, probeware, microscopes, computers, etc...) including set up, calibration, technique, maintenance, and storage
  - g. Follow safety guidelines
3. Analyze and interpret results of scientific investigations.
  - a. Present relationships between and among variables in appropriate forms using charts, graphs, appropriate technology (graphing software) and other tools
  - b. Use mathematical operations to analyze and interpret data results
  - c. Assess the reliability of data and identify reasons for inconsistent results, such as sources of error or uncontrollable conditions

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- d. Recognize, analyze, and evaluate alternative explanations for the same set of observations
  - e. Use results of an experiment to develop a conclusion to an investigation that addresses the initial questions and supports or refutes the stated hypothesis
  - f. State questions raised by an experiment that may require further investigation
4. Communicate and apply the results of scientific investigations.
- a. Develop descriptions of explanations for scientific concepts that were a focus of one or more investigations
  - b. Review information, explain statistical analysis and summarize data collected and analyzed as the result of the investigation
  - c. Explain diagrams and charts that represent relationships between variables
  - d. Construct a reasoned argument and respond appropriately to critical comments and questions
  - e. Use language and vocabulary appropriately, speak clearly and logically, and use appropriate technology and other tools to present findings
  - f. Use and refine scientific models that stimulate physical processes or phenomena

### Application of Mathematical Skills

- a. Construct and use tables and graphs to interpret data sets
- b. Solve simple algebraic expressions
- c. Perform basic statistical procedures to analyze the center and spread of data
- d. Measure with accuracy and precision (length, volume, mass, temperature, time)
- e. Convert within a unit
- f. Use common prefixes such as milli, centi, and kilo
- g. Use scientific notation, where appropriate
- h. Use ratio and proportions to solve problems
- i. Translate data into the correct units and dimensions using conversion factors and scientific notation
- j. Determine the correct number of significant figures
- k. Determine percent error from experimental and accepted values
- l. Use appropriate metric/standard international (SI) units of measurement
- m. Use the Celsius and Kelvin scales

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FLINT RIVER ACADEMY

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## Flint River Academy Advanced Biology

### Year Curriculum Map

Year Curriculum Map										
1 <sup>st</sup> Nine Weeks			2 <sup>nd</sup> Nine Weeks			3 <sup>rd</sup> Nine Weeks			4 <sup>th</sup> Nine Weeks	
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11
Human Body Overview and Classification Human Body Tissues	Integumentary System	Skeletal and Muscular Systems	Digestive System	Circulatory System and Blood	Respiratory and Lymphatic Systems	Endocrine System	Reproductive System	Function and Structure of DNA	DNA Mutations and Genetic Diseases	Photosynthesis and Respiration
3 weeks	3 weeks	5 weeks	3 weeks	2 weeks	2 weeks	3 weeks	4 weeks	4 weeks	3 weeks	4 weeks