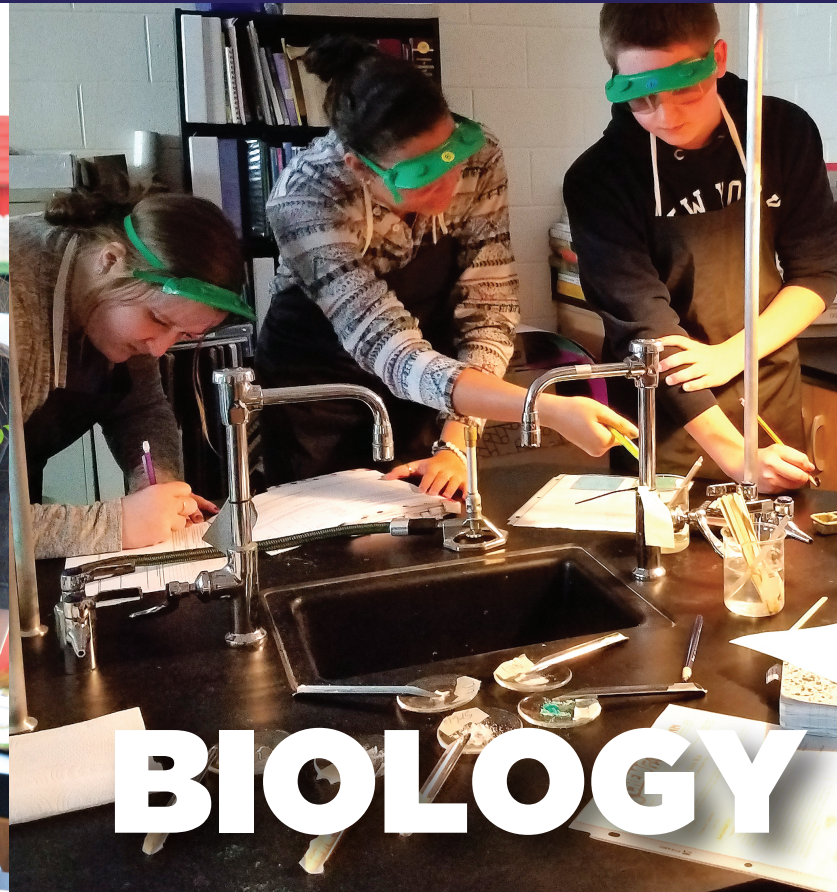




HENRY COUNTY SCHOOLS

Better Together.



BIOLOGY

| SCIENCE |

 **HENRY**
Teaching & Learning Standards



Teaching & Learning Standards

Science

Biology

Collaboration, Communication, Creativity, and Critical Thinking skills are embedded within the language of the Henry Teaching and Learning Standards

HCS Graduate
Learner Outcome

As a Henry County graduate, I will apply scientific and engineering practices to understand and analyze molecular, structural, and chemical biology as they relate to biological systems and each level of organization from cells to organ systems.

GA Standard Code

SB1 Obtain, evaluate, and communicate information to analyze the nature of the relationships between structures and functions in living cells.

- SB1a Construct an explanation of how cell structures and organelles (including nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, Golgi, endoplasmic reticulum, vacuoles, ribosomes, and mitochondria) interact as a system to maintain homeostasis.
- SB1b Develop and use models to explain the role of cellular reproduction (including binary fission, mitosis, and meiosis) in maintaining genetic continuity.
- SB1c Construct arguments supported by evidence to relate the structure of macromolecules (carbohydrates, proteins, lipids, and nucleic acids) to their interactions in carrying out cellular processes.
- SB1d Plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis.
- SB1e Ask questions to investigate and provide explanations about the roles of photosynthesis and respiration in the cycling of matter and flow of energy within the cell (e.g., single-celled alga).

HCS Graduate
Learner Outcome

As a Henry County graduate, I will apply scientific and engineering practices to understand and analyze the relationship between genetics, adaptation, and biodiversity.

GA Standard Code

SB2 Obtain, evaluate, and communicate information to analyze how genetic information is expressed in cells.

- SB2a Construct an explanation of how the structures of DNA and RNA lead to the expression of information within the cell via the processes of replication, transcription, and translation.
- SB2b Construct an argument based on evidence to support the claim that inheritable genetic variations may result from: new genetic combinations through meiosis (crossing over, nondisjunction); non-lethal errors occurring during replication (insertions, deletions, substitutions); and/or heritable mutations caused by environmental factors (radiation, chemicals, and viruses).
- SB2c Ask questions to gather and communicate information about the use and ethical considerations of biotechnology in forensics, medicine, and agriculture.

SB3 Obtain, evaluate, and communicate information to analyze how biological traits are passed on to successive generations.

- SB3a Use Mendel's laws (segregation and independent assortment) to ask questions and define problems that explain the role of meiosis in reproductive variability.
- SB3b Use mathematical models to predict and explain patterns of inheritance.
- SB3c Construct an argument to support a claim about the relative advantages and disadvantages of sexual and asexual reproduction.

SB6 Obtain, evaluate, and communicate information to assess the theory of evolution.

- SB6a Construct an explanation of how new understandings of Earth's history, the emergence of new species from pre-existing species, and our understanding of genetics have influenced our understanding of biology.
- SB6b Analyze and interpret data to explain patterns in biodiversity that result from speciation.
- SB6c Construct an argument using valid and reliable sources to support the claim that evidence from comparative morphology (analogous vs. homologous structures), embryology, biochemistry (protein sequence) and genetics support the theory that all living organisms are related by way of common descent.
- SB6d Develop and use mathematical models to support explanations of how undirected genetic changes in natural selection and genetic drift have led to changes in populations of organisms.
- SB6e Develop a model to explain the role natural selection plays in causing biological resistance (e.g., pesticides, antibiotic resistance, and influenza vaccines).

HCS Graduate
Learner Outcome

As a Henry County graduate, I will apply scientific and engineering practices to understand and analyze the structural similarities of organisms and how they can be compared scientifically.

GA Standard Code

SB4 Obtain, evaluate, and communicate information to illustrate the organization of interacting systems within single-celled and multi-celled organisms.

- SB4a Construct an argument supported by scientific information to explain patterns in structures and function among clades of organisms, including the origin of eukaryotes by endosymbiosis. Clades should include: archaea, bacteria, eukaryotes (fungi, plants, animals).
- SB4b Analyze and interpret data to develop models (i.e., cladograms and phylogenetic trees) based on patterns of common ancestry and the theory of evolution to determine relationships among major groups of organisms.
- SB4c Construct an argument supported by empirical evidence to compare and contrast the characteristics of viruses and organisms.

HCS Graduate
Learner Outcome

As a Henry County graduate, I will apply scientific and engineering practices to understand and analyze the characteristics, functions, and behavioral interactions within an ecosystem.

GA Standard Code

SB5 Obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment.

- SB5a Plan and carry out investigations and analyze data to support explanations about factors affecting biodiversity and populations in ecosystems.
- SB5b Develop and use models to analyze the cycling of matter and flow of energy within ecosystems through the processes of photosynthesis and respiration: arranging components of a food web according to energy flow, comparing the quantity of energy in the steps of an energy pyramid, and explaining the need for cycling of major biochemical elements (C, O, N, P, and H).
- SB5c Construct an argument to predict the impact of environmental change on the stability of an ecosystem.
- SB5d Design a solution to reduce the impact of a human activity on the environment.
- SB5e Construct explanations that predict an organism's ability to survive within changing environmental limits (e.g., temperature, pH, drought, fire).