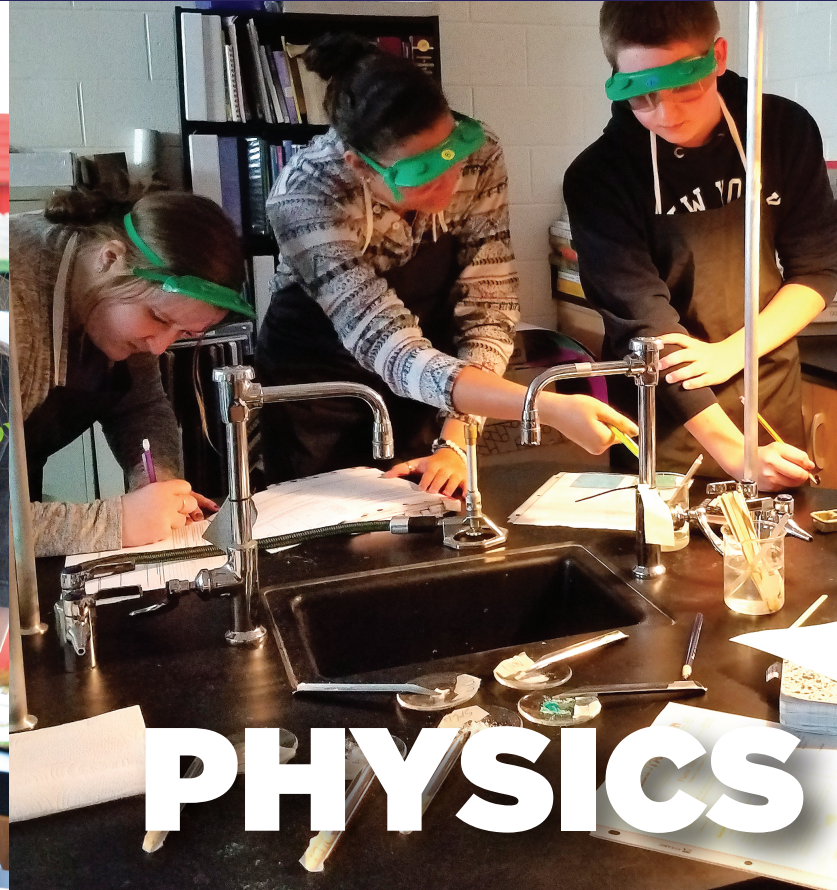




# HENRY COUNTY SCHOOLS

Better Together.



# PHYSICS

| SCIENCE |

 **HENRY**  
Teaching & Learning Standards





# Teaching & Learning Standards

**Science**

**Physics**

*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 understand and analyze concepts related to forces and motion as demonstrated through the integration of scientific processes and practices.*

GA Standard Code

**SP1 Obtain, evaluate, and communicate information about the relationship between distance, displacement, speed, velocity, and acceleration as functions of time.**

- SP1a Plan and carry out an investigation of one-dimensional motion to calculate average and instantaneous speed and velocity. • Analyze one-dimensional problems involving changes of direction, using algebraic signs to represent vector direction. • Apply one-dimensional kinematic equations to situations with no acceleration, and positive, or negative constant acceleration.
- SP1b Analyze and interpret data using created or obtained motion graphs to illustrate the relationships among position, velocity, and acceleration, as functions of time.
- SP1c Ask questions to compare and contrast scalar and vector quantities.
- SP1d Analyze and interpret data of two-dimensional motion with constant acceleration. • Resolve position, velocity, or acceleration vectors into components (x and y, horizontal and vertical). • Add vectors graphically and mathematically by adding components. • Interpret problems to show that objects moving in two dimensions have independent motions along each coordinate axis. • Design an experiment to investigate the projectile motion of an object by collecting and analyzing data using kinematic equations. • Predict and describe how changes to initial conditions affect the resulting motion. • Calculate range and time in the air for a horizontally launched projectile.

**SP2 Obtain, evaluate, and communicate information about how forces affect the motion of objects.**

- SP2a Construct an explanation based on evidence using Newton's Laws of how forces affect the acceleration of a body. • Explain and predict the motion of a body in absence of a force and when forces are applied using Newton's 1st Law (principle of inertia). • Calculate the acceleration for an object using Newton's 2nd Law, including situations where multiple forces act together. • Identify the pair of equal and opposite forces between two interacting bodies and relate their magnitudes and directions using Newton's 3rd Law.
- SP2b Develop and use a model of a Free Body Diagram to represent the forces acting on an object (both equilibrium and non-equilibrium).
- SP2c Use mathematical representations to calculate magnitudes and vector components for typical forces including gravitational force, normal force, friction forces, tension forces, and spring forces.

- SP2d Plan and carry out an investigation to gather evidence to identify the force or force component responsible for causing an object to move along a circular path. • Calculate the magnitude of a centripetal acceleration.
- SP2e Develop and use a model to describe the mathematical relationship between mass, distance, and force as expressed by Newton's Universal Law of Gravitation.

HCS Graduate  
Learner Outcome

*As a Henry County graduate, I will understand and analyze concepts related to energy and momentum as demonstrated through the integration of scientific processes and practices.*

GA Standard Code

**SP3 Obtain, evaluate, and communicate information about the importance of conservation laws for mechanical energy and linear momentum in predicting the behavior of physical systems.**

- SP3a Ask questions to compare and contrast open and closed systems.
- SP3b Use mathematics and computational thinking to analyze, evaluate, and apply the principle of conservation of energy and the Work-Kinetic Energy Theorem. • Calculate the kinetic energy of an object. • Calculate the amount of work performed by a force on an object.
- SP3c Plan and carry out an investigation demonstrating conservation and rate of transfer of energy (power) to solve problems involving closed systems.
- SP3d Construct an argument supported by evidence of the use of the principle of conservation of momentum to • explain how the brief application of a force creates an impulse. • describe and perform calculations involving one dimensional momentum. • connect the concepts of Newton's 3rd law and impulse. • experimentally compare and contrast inelastic and elastic collisions.

HCS Graduate  
Learner Outcome

*As a Henry County graduate, I will understand and analyze the characteristics and properties of waves as demonstrated through the integration of scientific processes and practices.*

GA Standard Code

**SP4 Obtain, evaluate, and communicate information about the properties and applications of waves.**

- SP4a Develop and use mathematical models to explain mechanical and electromagnetic waves as a propagating disturbance that transfers energy.
- SP4b Develop and use models to describe and calculate characteristics related to the interference and diffraction of waves (single and double slits).
- SP4c Construct an argument that analyzes the production and characteristics of sounds waves.

- SP4d Plan and carry out investigations to characterize the properties and behavior of electromagnetic waves.
- SP4e Plan and carry out investigations to describe common features of light in terms of color, polarization, spectral composition, and wave speed in transparent media. • Analyze experimentally and mathematically aspects of reflection and refraction of light waves and describe the results using optical ray diagrams. • Perform calculations related to reflections from plane surfaces and focusing using thin lenses.
- SP4f Plan and carry out investigations to identify the behavior of light using lenses.
- SP4g Plan and carry out investigations to describe changes in diffraction patterns associated with geometry and wavelength for mechanical and electromagnetic waves.

HCS Graduate  
Learner Outcome

*As a Henry County graduate, I will understand and analyze electricity and magnetism as demonstrated through the integration of scientific processes and practices.*

GA Standard Code

**SP5 Obtain, evaluate, and communicate information about electrical and magnetic force interactions.**

- SP5a Develop and use mathematical models and generate diagrams to compare and contrast the electric and gravitational forces between two charged objects.
- SP5b Plan and carry out investigations to demonstrate and qualitatively explain charge transfer by conduction, friction, and induction.
- SP5c Construct an explanation based on evidence of the behavior of charges in terms of electric potential energy.
- SP5d Plan and carry out an investigation of the relationship between voltage, current, and power for direct current circuits.
- SP5e Plan and carry out investigations to clarify the relationship between electric currents and magnetic fields.

HCS Graduate  
Learner Outcome

*As a Henry County graduate, I will understand and analyze concepts of nuclear physics as demonstrated through the integration of scientific processes and practices.*

GA Standard Code

**SP6 Obtain, evaluate, and communicate information about nuclear changes of matter and related technological applications.**

- SP6a Develop and use models to explain, compare, and contrast nuclear processes including radioactive decay, fission, and fusion.
- SP6b Construct an argument to compare and contrast mechanisms and characteristics of radioactive decay.
- SP6c Develop and use mathematical models and representations to calculate the amount of substance present after a given amount of time based on its half-life and relate this to the law of conservation of mass and energy.