



2023-2024 Jackson County Schools Physics Pacing Guide

1st Quarter

Kinematics

Standard 1 - [Proficiency Scale Part 1](#) [Proficiency Scale Part 2](#) [Proficiency Scale Part 3](#)

Investigate and analyze, based on evidence obtained through observation or experimental design, the motion of an object using both graphical and mathematical models (e.g., creating or interpreting graphs of position, velocity, and acceleration versus time graphs for one- and two-dimensional motion; solving problems using kinematic equations for the case of constant acceleration) that may include descriptors such as position, distance traveled, displacement, speed, velocity, and acceleration.

Forces

Standard 2 - [Proficiency Scale Part 1](#) [Proficiency Scale Part 2](#) [Proficiency Scale Part 3](#)

Identify external forces in a system and apply Newton's laws graphically by using models such as free-body diagrams to explain how the motion of an object is affected, ranging from simple to complex, and including circular motion. a. Use mathematical computations to derive simple equations of motion for various systems using Newton's second law. b. Use mathematical computations to explain the nature of forces (e.g., tension, friction, normal) related to Newton's second and third laws.

Standard 3 -

Evaluate qualitatively and quantitatively the relationship between the force acting on an object, the time of interaction, and the change in momentum using the impulse-momentum theorem.

Standard 4 - [Proficiency Scale](#)

Identify and analyze forces responsible for changes in rotational motion and develop an understanding of the effect of rotational inertia on the motion of a rotating object (e.g., merry-go round, spinning toy, spinning figure skater, stellar collapse [supernova], rapidly spinning pulsar).

Additional Resources:

[AMSTI Learning Resources](#)

[Standard 1 Formative Assessments](#)

[Standard 2 Formative Assessments](#)

[Standard 2B Formative Assessments](#)

[Standard 4 Formative Assessments](#)

2nd Quarter

Vectors

Standard 1 - [Proficiency Scale Part 1](#) [Proficiency Scale Part 2](#) [Proficiency Scale Part 3](#)

Investigate and analyze, based on evidence obtained through observation or experimental design, the motion of an object using both graphical and mathematical models (e.g., creating or interpreting graphs of position, velocity, and acceleration versus time graphs for one- and two-dimensional motion; solving problems using kinematic equations for the case of constant acceleration) that may include descriptors such as position, distance traveled, displacement, speed, velocity, and acceleration.

Standard 2 - [Proficiency Scale Part 1](#) [Proficiency Scale Part 2](#) [Proficiency Scale Part 3](#)

Identify external forces in a system and apply Newton's laws graphically by using models such as free-body diagrams to explain how the motion of an object is affected, ranging from simple to complex, and including circular motion. a. Use mathematical computations to derive simple equations of motion for various systems using Newton's second law. b. Use mathematical computations to explain the nature of forces (e.g., tension, friction, normal) related to Newton's second and third laws.

Projectile Motion

Standard 1 - [Proficiency Scale Part 1](#) [Proficiency Scale Part 2](#) [Proficiency Scale Part 3](#)

Investigate and analyze, based on evidence obtained through observation or experimental design, the motion of an object using both graphical and mathematical models (e.g., creating or interpreting graphs of position, velocity, and acceleration versus time graphs for one- and two-dimensional motion; solving problems using kinematic equations for the case of constant acceleration) that may include descriptors such as position, distance traveled, displacement, speed, velocity, and acceleration.

Standard 2 - [Proficiency Scale Part 1](#) [Proficiency Scale Part 2](#) [Proficiency Scale Part 3](#)

Identify external forces in a system and apply Newton's laws graphically by using models such as free-body diagrams to explain how the motion of an object is affected, ranging from simple to complex, and including circular motion. a. Use mathematical computations to derive simple equations of motion for various systems using Newton's second law. b. Use mathematical computations to explain the nature of forces (e.g., tension, friction, normal) related to Newton's second and third laws.

Additional Resources:

[AMSTI Learning Resources](#)

[Standard 1 Formative Assessments](#)

[Standard 2 Formative Assessments](#)

[Standard 2B Formative Assessments](#)

3rd Quarter

Sound and Waves

Standard 8 - [Proficiency Scale](#)

Investigate the nature of wave behavior to illustrate the concept of the superposition principle responsible for wave patterns, constructive and destructive interference, and standing waves (e.g., organ pipes, tuned exhaust systems). a. Predict and explore how wave behavior is applied to scientific phenomena such as the Doppler effect and Sound Navigation and Ranging (SONAR).

Standard 9 -

Obtain and evaluate information regarding technical devices to describe wave propagation of electromagnetic radiation and compare it to sound propagation. (e.g., wireless telephones, magnetic resonance imaging [MRI], microwave systems, Radio Detection and Ranging [RADAR], SONAR, ultrasound).

Standard 10 -

Plan and carry out investigations that evaluate the mathematical explanations of light as related to optical systems (e.g., reflection, refraction, diffraction, intensity, polarization, Snell's law, the inverse square law).

Circular Motion

Standard 4 - [Proficiency Scale](#)

Identify and analyze forces responsible for changes in rotational motion and develop an understanding of the effect of rotational inertia on the motion of a rotating object (e.g., merry-go round, spinning toy, spinning figure skater, stellar collapse [supernova], rapidly spinning pulsar).

Momentum

Standard 6 - [Proficiency Scale](#)

Investigate collisions, both elastic and inelastic, to evaluate the effects on momentum and energy conservation.

Mechanical Energy

Standard 6 - [Proficiency Scale](#)

Investigate collisions, both elastic and inelastic, to evaluate the effects on momentum and energy conservation.

Additional Resources:

[AMSTI Learning Resources](#)

[Standard 8 Formative Assessments](#)

[Standard 4 Formative Assessments](#)

[Standard 6 Formative Assessments](#)

4th Quarter

Thermodynamics

Standard 7 - [Proficiency Scale](#)

Plan and carry out investigations to provide evidence that the first and second laws of thermodynamics relate work and heat transfers to the change in internal energy of a system with limits on the ability to do useful work (e.g., heat engine transforming heat at high temperature into mechanical energy and low-temperature waste heat, refrigerator absorbing heat from the cold reservoir and giving off heat to the hot reservoir with work being done). a. Develop models to illustrate methods of heat transfer by conduction (e.g., an ice cube in water), convection (e.g., currents that transfer heat from the interior up to the surface), and radiation (e.g., an object in sunlight). b. Engage in argument from evidence regarding how the second law of thermodynamics applies to the entropy of open and closed systems.

Electricity/Magnetism/Circuits

Standard 11 - [Proficiency Scale](#)

Develop and use models to illustrate electric and magnetic fields, including how each is created (e.g., charging by either conduction or induction and polarizing; sketching field lines for situations such as point charges, a charged straight wire, or a current carrying wires such as solenoids; calculating the forces due to Coulomb's laws), and predict the motion of charged particles in each field and the energy required to move a charge between two points in each field.

Standard 12 - [Proficiency Scale](#)

Use the principles of Ohm's and Kirchoff's laws to design, construct, and analyze combination circuits using typical components (e.g., resistors, capacitors, diodes, sources of power).

Electricity/Magnetism/Circuits

Standard 10 -

Plan and carry out investigations that evaluate the mathematical explanations of light as related to optical systems (e.g., reflection, refraction, diffraction, intensity, polarization, Snell's law, the inverse square law).

Additional Resources:

[AMSTI Learning Resources](#)

[Standard 7 Formative Assessments](#)

[Standard 11 Formative Assessments](#)

[Standard 12 Formative Assessments](#)