Physics Lab Series – Alignment

Newton's Laws

Performance Expectations

HS-PS2-1: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Science and Engineering Practices

Developing and using models
Planning and carrying out investigations
Analyzing and interpreting data

Crosscutting Concepts

Cause and effect
Systems and system models

Gravity

Performance Expectations

HS-PS2-4: Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

Science and Engineering Practices

Asking questions and defining problems
Constructing Explanations
Engaging in argument from evidence

Crosscutting Concepts

Scale, Proportion, and Quantity
Systems and system models

Hooke's Law

Performance Expectations

HS-PS2-1: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Science and Engineering Practices

Analyzing and Interpreting Data
Constructing Explanations
Engaging in Argument from Evidence

Crosscutting Concepts

Cause and effect

Conservation of Momentum

Performance Expectations

HS-PS3-2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative position of particles (objects).

Science and Engineering Practices

Developing and using models
Analyzing and interpreting data
Engaging in Argument from Evidence
Constructing Explanations

Crosscutting Concepts

Cause and Effects
Patterns
Energy and matter

Simple Machines

Performance Expectations

HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Science and Engineering Practices

Asking questions and defining problems
Analyzing and interpreting data
Using mathematics and computational thinking
Constructing explanations and designing solutions

Crosscutting Concepts

Cause and effect
Scale, proportion, and quantity
Structure and function

Friction

Performance Expectations

HS-PS2-1: Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Science and Engineering Practices

Analyzing and interpreting data
Obtaining, evaluating, and communicating information

Crosscutting Concepts

Cause and Effect

Electricity

Performance Expectations

HS-PS2-4: Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.

Science and Engineering Practices

Asking questions and defining problems
Constructing Explanations
Engaging in argument from evidence

Crosscutting Concepts

Scale, Proportion, and Quantity
Systems and system models

Magnetism

Performance Expectations

HS-PS2-5: Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.

Science and Engineering Practices

Analyzing and interpreting data
Developing and Using Models
Obtaining, evaluating, and communicating information

Crosscutting Concepts

Cause and Effect

Waves and Sound

Performance Expectations

HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves travelling in various media.

Science and Engineering Practices

Developing and using models
Asking questions and defining problems
Planning and carrying out investigations
Analyzing and interpreting data

Crosscutting Concepts

Energy and matter
Systems and system models

Electromagnetic Radiation

Performance Expectations

HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves travelling in various media.

Science and Engineering Practices

Asking questions and defining problems
Planning and carrying out investigations
Using mathematics and computational thinking
Constructing explanations and designing solutions

Crosscutting Concepts

Energy and matter
Cause and Effect

Optics

Performance Expectations

HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves travelling in various media.

Science and Engineering Practices

Asking questions and defining problems
Planning and carrying out investigations
Using mathematics and computational thinking
Constructing explanations and designing solutions

Crosscutting Concepts

Energy and matter
Cause and Effect

Quantum Mechanics

Performance Expectations

HS-PS4-3: Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.

Science and Engineering Practices

Developing and using models
Planning and carrying out investigations
Analyzing and interpreting data

Crosscutting Concepts

Systems and system models
Scale, Proportion, and Quantity