

**Correlation to Virginia Public Schools: Science Standards of Learning
Curriculum Resource Guide**

Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH01.a	Physics	The student will investigate and understand how to plan and conduct investigations in which:	the components of a system are defined		<i>Car and Ramp</i> B-8 Equilibrium, Action, and Reaction	

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PH01.b	Physics	The student will investigate and understand how to plan and conduct investigations in which:	instruments are selected and used to extend observations and measurements of mass, volume, temperature, heat exchange, energy transformations, motion, fields, and electric charge.	<p><i>Car and Ramp</i> A-1 Time and Distance A-2 Investigations and Experiments A-3 Speed A-4 Describing Motion A-5 Gravity</p> <p><i>Electric Circuits</i> A-3 Current and Voltage</p> <p><i>Electric Motor</i> A-5 Measuring Current and Voltage</p> <p><i>Gravity Drop</i> A-1 Introduction to the Gravity Drop A-2 Speed and the Gravity Drop A-3 Falling Motion</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Pendulum</i> A-2 Making a Clock</p> <p><i>Rollercoaster</i> A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p>	<p><i>Air Rocket</i> B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion B-5 The Acceleration of a Rocket</p> <p><i>Car and Ramp</i> B-1 Time and Distance B-2 Investigating Speed B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration B-6 Force, Mass, and Acceleration</p> <p><i>Electric Circuits</i> B-1 Voltage B-2 Current B-3 Ohm's Law</p> <p><i>Electric Motor</i> B-4 Current, Voltage, and Power</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-1 Seeing an Image</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range</p> <p><i>Pendulum</i></p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Electric Circuits</i> C-1 Series Circuits C-3 Compound Circuits</p> <p><i>Electric Motor</i> C-1 Introduction to the Electric Motor C-2 Optimizing Performance C-3 Generators and Faraday's Law of Induction</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-3 Accuracy, Precision, and Error</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum C-3 The Physical Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
					B-1 Harmonic Motion <i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-3 Mass and Motion <i>Ropes and Pulleys</i> B-1 Forces in Machines B-2 Work and Energy B-3 Efficiency	C-2 Compound Pulley System <i>Sound and Waves</i> C-2 The Speed of a Wave Pulse C-3 Natural Frequency and Resonance

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PH01.c	Physics	The student will investigate and understand how to plan and conduct investigations in which:	information is recorded and presented in an organized format.	<p><i>Car and Ramp</i> A-2 Investigations and Experiments A-4 Describing Motion</p> <p><i>Gravity Drop</i> A-3 Falling Motion</p> <p><i>Light and Optics</i> A-3 Rules of Reflection</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance</p> <p><i>Pendulum</i> A-1 The Pendulum</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p> <p><i>Sound and Waves</i> A-1 Sound</p>	<p><i>Air Rocket</i> B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p> <p><i>Car and Ramp</i> B-2 Investigating Speed B-4 Position and Time B-6 Force, Mass, and Acceleration</p> <p><i>Electric Circuits</i> B-2 Current B-3 Ohm's Law</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-1 Seeing an Image B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range B-3 Relating Launch Speed and Range</p> <p><i>Pendulum</i> B-1 Harmonic Motion</p> <p><i>Rollercoaster</i> B-3 Mass and Motion</p> <p><i>Ropes and Pulleys</i> B-1 Forces in Machines B-2 Work and Energy B-3 Efficiency</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-3 Mass, Motion, and Energy</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH01.d	Physics	The student will investigate and understand how to plan and conduct investigations in which:	metric units are used in all measurements and calculations.	<p><i>Car and Ramp</i> A-1 Time and Distance A-3 Speed A-4 Describing Motion A-5 Gravity</p> <p><i>Gravity Drop</i> A-1 Introduction to the Gravity Drop A-2 Speed and the Gravity Drop A-3 Falling Motion</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Rollercoaster</i> A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p>	<p><i>Air Rocket</i> B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion B-5 The Acceleration of a Rocket</p> <p><i>Car and Ramp</i> B-1 Time and Distance B-2 Investigating Speed B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration B-6 Force, Mass, and Acceleration</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-1 Seeing an Image B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion</p> <p><i>Ropes and Pulleys</i> B-1 Forces in Machines</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces C-4 Energy and Power C-5 Conservation of Momentum</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity C-3 Interpreting Graphs of Accelerated Motion</p> <p><i>Light and Optics</i> C-4 The Convex Lens C-7 Wave Properties of Light</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation C-3 Accuracy, Precision, and Error</p> <p><i>Pendulum</i> C-2 Newton's Second Law and the Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-2 Rotational Kinetic Energy C-3 Mass, Motion, and Energy</p>

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					B-2 Work and Energy B-3 Efficiency	Ropes and Pulleys C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System Sound and Waves C-2 The Speed of a Wave Pulse
PH01.e	Physics	The student will investigate and understand how to plan and conduct investigations in which:	the limitations of the experimental apparatus and design are recognized.	<p>Car and Ramp A-1 Time and Distance A-2 Investigations and Experiments A-3 Speed A-4 Describing Motion</p> <p>Gravity Drop A-2 Speed and the Gravity Drop A-3 Falling Motion</p> <p>Marble Launcher A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p>Rollercoaster A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster</p> <p>Ropes and Pulleys A-1 Ropes and Pulleys A-2 What is Work?</p>	<p>Air Rocket B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed</p> <p>Car and Ramp B-1 Time and Distance B-2 Investigating Speed B-3 Using a Scientific Model to Predict Speed B-4 Position and Time</p> <p>Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p>Light and Optics B-4 Ratios</p> <p>Marble Launcher B-1 Launch Angle and Range</p> <p>Rollercoaster B-1 Energy and the Rollercoaster B-2 Conservation of Energy</p> <p>Ropes and Pulleys B-1 Forces in Machines B-2 Work and Energy</p> <p>Sound and Waves B-1 Sound</p>	<p>Car and Ramp C-1 Uniform Accelerated Motion</p> <p>Gravity Drop C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity</p> <p>Light and Optics C-6 The Thin Lens Equation</p> <p>Marble Launcher C-1 Projectile Motion and the Range Equation</p> <p>Pendulum C-2 Newton's Second Law and the Pendulum</p> <p>Ropes and Pulleys C-1 Simple and Complex Pulley Systems</p> <p>Sound and Waves C-4 Sound</p>

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PH01.f	Physics	The student will investigate and understand how to plan and conduct investigations in which:	the limitations of measured quantities through the appropriate use of significant figures or error ranges are recognized.		<p><i>Car and Ramp</i> B-3 Using a Scientific Model to Predict Speed</p> <p><i>Gravity Drop</i> B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range</p>	<p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity</p> <p><i>Light and Optics</i> C-6 The Thin Lens Equation</p> <p><i>Pendulum</i> C-2 Newton's Second Law and the Pendulum</p>

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PH01.g	Physics	The student will investigate and understand how to plan and conduct investigations in which:	data collected from non-SI instruments are incorporated through appropriate conversions.	<p><i>Car and Ramp</i> A-1 Time and Distance A-3 Speed A-4 Describing Motion</p> <p><i>Gravity Drop</i> A-1 Introduction to the Gravity Drop A-3 Falling Motion</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Rollercoaster</i> A-2 Height on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> A-2 What is Work?</p>	<p><i>Air Rocket</i> B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion B-5 The Acceleration of a Rocket</p> <p><i>Car and Ramp</i> B-1 Time and Distance B-3 Using a Scientific Model to Predict Speed B-5 Acceleration B-6 Force, Mass, and Acceleration</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-1 Seeing an Image B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster</p> <p><i>Ropes and Pulleys</i> B-2 Work and Energy</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces C-4 Energy and Power</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Gravity Drop</i> C-2 Measuring Gravity</p> <p><i>Light and Optics</i> C-4 The Convex Lens C-7 Wave Properties of Light</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-3 Accuracy, Precision, and Error</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System</p>

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PH01.h	Physics	The student will investigate and understand how to plan and conduct investigations in which:	appropriate technology, including computers, graphing calculators, and probeware is used for gathering and analyzing data and communicating results.			<i>Car and Ramp</i> C-3 The Physics of the Inclined Plane

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH02.a	Physics	The student will investigate and understand how to analyze and interpret data.	a description of a physical problem is translated into a mathematical statement in order to find a solution.	<p><i>Gears and Levers</i> A-1 The Lever A-2 Gears A-4 Designing Gear Machines</p> <p><i>Light and Optics</i> A-2 Color</p> <p><i>Pendulum</i> A-1 The Pendulum</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p>	<p><i>Gears and Levers</i> B-1 Levers, Torque and Mechanical Advantage B-2 Gears and Rotating Motion B-4 Machines with Gears and Levers</p> <p><i>Marble Launcher</i> B-2 Launch Speed and Range B-3 Relating Launch Speed and Range</p> <p><i>Pendulum</i> B-2 The Five Second Pendulum</p> <p><i>Ropes and Pulleys</i> B-1 Forces in Machines B-2 Work and Energy</p> <p><i>Sound and Waves</i> B-1 Sound</p>	<p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion</p> <p><i>Gears and Levers</i> C-2 The Center of Gravity and Equilibrium</p> <p><i>Gravity Drop</i> C-3 Interpreting Graphs of Accelerated Motion</p> <p><i>Light and Optics</i> C-6 The Thin Lens Equation</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation</p> <p><i>Pendulum</i> C-3 The Physical Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems</p> <p><i>Sound and Waves</i> C-1 Standing Waves</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH02.b	Physics	The student will investigate and understand how to analyze and interpret data.	relationships between physical quantities are determined using the shape of a curve passing through experimentally obtained data.	<p><i>Car and Ramp</i> A-4 Describing Motion</p> <p><i>Gears and Levers</i> A-4 Designing Gear Machines</p> <p><i>Gravity Drop</i> A-3 Falling Motion</p> <p><i>Light and Optics</i> A-2 Color</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Pendulum</i> A-1 The Pendulum</p> <p><i>Rollercoaster</i> A-2 Height on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p> <p><i>Sound and Waves</i> A-1 Sound</p>	<p><i>Air Rocket</i> B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p> <p><i>Car and Ramp</i> B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration B-6 Force, Mass, and Acceleration B-7 Weight, Gravity, and Friction</p> <p><i>Electric Circuits</i> B-3 Ohm's Law</p> <p><i>Gravity Drop</i> B-2 Speed, Acceleration, and Free Fall</p> <p><i>Light and Optics</i> B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range B-3 Relating Launch Speed and Range</p> <p><i>Pendulum</i> B-1 Harmonic Motion B-2 The Five Second Pendulum</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion</p> <p><i>Ropes and Pulleys</i></p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Electric Circuits</i> C-1 Series Circuits</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-3 Interpreting Graphs of Accelerated Motion</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum C-2 Newton's Second Law and the Pendulum C-3 The Physical Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-2 Rotational Kinetic Energy C-3 Mass, Motion, and Energy</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems</p>

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					B-1 Forces in Machines B-2 Work and Energy Sound and Waves B-1 Sound	Sound and Waves C-1 Standing Waves C-3 Natural Frequency and Resonance C-4 Sound
PH02.c	Physics	The student will investigate and understand how to analyze and interpret data.	the slope of a linear relationship is calculated and includes appropriate units.		Car and Ramp B-4 Position and Time B-5 Acceleration Electric Circuits B-3 Ohm's Law Light and Optics B-4 Ratios Pendulum B-2 The Five Second Pendulum	Car and Ramp C-1 Uniform Accelerated Motion Gravity Drop C-3 Interpreting Graphs of Accelerated Motion Rollercoaster C-1 Motion on the Roller Coaster

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PH02.d	Physics	The student will investigate and understand how to analyze and interpret data.	interpolated, extrapolated, and analyzed trends are used to make predictions.	<p><i>Car and Ramp</i> A-2 Investigations and Experiments A-4 Describing Motion A-5 Gravity</p> <p><i>Electric Circuits</i> A-3 Current and Voltage</p> <p><i>Gears and Levers</i> A-4 Designing Gear Machines</p> <p><i>Gravity Drop</i> A-3 Falling Motion</p> <p><i>Light and Optics</i> A-2 Color A-3 Rules of Reflection</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Pendulum</i> A-1 The Pendulum A-2 Making a Clock</p> <p><i>Rollercoaster</i> A-2 Height on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p> <p><i>Sound and Waves</i> A-1 Sound</p>	<p><i>Air Rocket</i> B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p> <p><i>Car and Ramp</i> B-2 Investigating Speed B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration B-6 Force, Mass, and Acceleration B-7 Weight, Gravity, and Friction</p> <p><i>Electric Circuits</i> B-1 Voltage B-2 Current B-3 Ohm's Law</p> <p><i>Gravity Drop</i> B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range B-3 Relating Launch Speed and Range</p> <p><i>Pendulum</i> B-1 Harmonic Motion B-2 The Five Second Pendulum</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Electric Circuits</i> C-1 Series Circuits C-3 Compound Circuits</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity C-3 Interpreting Graphs of Accelerated Motion</p> <p><i>Light and Optics</i> C-1 Light and Color C-5 Geometric Optics C-6 The Thin Lens Equation</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation C-3 Accuracy, Precision, and Error</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum C-2 Newton's Second Law and the Pendulum C-3 The Physical Pendulum</p>

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					B-2 Conservation of Energy B-3 Mass and Motion Ropes and Pulleys B-1 Forces in Machines B-2 Work and Energy B-3 Efficiency Sound and Waves B-1 Sound	Rollercoaster C-1 Motion on the Roller Coaster C-2 Rotational Kinetic Energy C-3 Mass, Motion, and Energy Ropes and Pulleys C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System Sound and Waves C-1 Standing Waves C-3 Natural Frequency and Resonance C-4 Sound
PH02.e	Physics	The student will investigate and understand how to analyze and interpret data.	analysis of systems employs vector quantities utilizing trigonometric and graphical methods.	Gravity Drop A-3 Falling Motion	Car and Ramp B-4 Position and Time B-5 Acceleration Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law	Air Rocket C-3 Acceleration and G-forces C-5 Conservation of Momentum Car and Ramp C-1 Uniform Accelerated Motion C-3 The Physics of the Inclined Plane Gravity Drop C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity C-3 Interpreting Graphs of Accelerated Motion Marble Launcher C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation C-3 Accuracy, Precision, and Error

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PH03.a	Physics	The student will investigate and understand how to demonstrate scientific reasoning and logic.	analysis of scientific sources to develop and refine research hypotheses.	<i>Ropes and Pulleys</i> A-2 What is Work?	<i>Electric Circuits</i> B-3 Ohm's Law <i>Ropes and Pulleys</i> B-2 Work and Energy	<i>Light and Optics</i> C-1 Light and Color <i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems

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PH03.b	Physics	The student will investigate and understand how to demonstrate scientific reasoning and logic.	analysis of how science explains and predicts relationships.	<p><i>Car and Ramp</i> A-2 Investigations and Experiments A-4 Describing Motion A-5 Gravity</p> <p><i>Electric Circuits</i> A-3 Current and Voltage</p> <p><i>Gears and Levers</i> A-1 The Lever A-2 Gears A-4 Designing Gear Machines</p> <p><i>Gravity Drop</i> A-3 Falling Motion</p> <p><i>Light and Optics</i> A-1 Introduction to Light A-2 Color A-3 Rules of Reflection</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Pendulum</i> A-1 The Pendulum A-2 Making a Clock</p> <p><i>Rollercoaster</i> A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p> <p><i>Sound and Waves</i> A-1 Sound</p>	<p><i>Air Rocket</i> B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p> <p><i>Car and Ramp</i> B-2 Investigating Speed B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration B-6 Force, Mass, and Acceleration B-7 Weight, Gravity, and Friction</p> <p><i>Electric Circuits</i> B-1 Voltage B-2 Current B-3 Ohm's Law</p> <p><i>Gears and Levers</i> B-1 Levers, Torque and Mechanical Advantage B-2 Gears and Rotating Motion B-4 Machines with Gears and Levers</p> <p><i>Gravity Drop</i> B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-2 Polarization B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Electric Circuits</i> C-1 Series Circuits C-3 Compound Circuits</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gears and Levers</i> C-2 The Center of Gravity and Equilibrium</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity C-3 Interpreting Graphs of Accelerated Motion</p> <p><i>Light and Optics</i> C-1 Light and Color C-5 Geometric Optics C-6 The Thin Lens Equation</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum C-2 Newton's Second Law and the Pendulum</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
					B-3 Relating Launch Speed and Range Pendulum B-1 Harmonic Motion B-2 The Five Second Pendulum Rollercoaster B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion Ropes and Pulleys B-1 Forces in Machines B-2 Work and Energy B-3 Efficiency Sound and Waves B-1 Sound	C-3 The Physical Pendulum Rollercoaster C-1 Motion on the Roller Coaster C-2 Rotational Kinetic Energy C-3 Mass, Motion, and Energy Ropes and Pulleys C-1 Simple and Complex Pulley Systems Sound and Waves C-1 Standing Waves C-3 Natural Frequency and Resonance C-4 Sound
PH03.c	Physics	The student will investigate and understand how to demonstrate scientific reasoning and logic.	evaluation of evidence for scientific theories.	Car and Ramp A-2 Investigations and Experiments Rollercoaster A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster	Car and Ramp B-2 Investigating Speed Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law Marble Launcher B-1 Launch Angle and Range B-3 Relating Launch Speed and Range Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion Sound and Waves B-1 Sound	Car and Ramp C-1 Uniform Accelerated Motion C-3 The Physics of the Inclined Plane Gravity Drop C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity Light and Optics C-1 Light and Color C-5 Geometric Optics C-6 The Thin Lens Equation Marble Launcher C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation Sound and Waves C-4 Sound

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH03.d	Physics	The student will investigate and understand how to demonstrate scientific reasoning and logic.	examination of how new discoveries result in modification of existing theories or establishment of new paradigms.	<i>Car and Ramp</i> A-2 Investigations and Experiments	<i>Air Rocket</i> B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion <i>Car and Ramp</i> B-2 Investigating Speed B-7 Weight, Gravity, and Friction <i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-3 Mass and Motion	<i>Air Rocket</i> C-3 Acceleration and G-forces <i>Car and Ramp</i> C-1 Uniform Accelerated Motion
PH03.e	Physics	The student will investigate and understand how to demonstrate scientific reasoning and logic.	construction and defense of a scientific viewpoint (the nature of science).		<i>Electric Circuits</i> B-2 Current	
PH04.a	Physics	The student will investigate and understand how applications of physics affect the world.	examples from the real world.		<i>Car and Ramp</i> B-8 Equilibrium, Action, and Reaction <i>Light and Optics</i> B-3 Optical Technology <i>Ropes and Pulleys</i> B-1 Forces in Machines	<i>Light and Optics</i> C-2 The Law of Reflection <i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems
PH04.b	Physics	The student will investigate and understand how applications of physics affect the world.	expolation of the roles and contributions of science and technology.		<i>Electric Circuits</i> B-3 Ohm's Law <i>Light and Optics</i> B-2 Polarization B-3 Optical Technology	<i>Light and Optics</i> C-1 Light and Color

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH05.a	Physics	The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes.	linear motion	<p><i>Car and Ramp</i> A-3 Speed A-4 Describing Motion A-5 Gravity</p> <p><i>Gravity Drop</i> A-2 Speed and the Gravity Drop A-3 Falling Motion</p> <p><i>Rollercoaster</i> A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster</p>	<p><i>Air Rocket</i> B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion B-5 The Acceleration of a Rocket</p> <p><i>Car and Ramp</i> B-2 Investigating Speed B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration B-6 Force, Mass, and Acceleration</p> <p><i>Gears and Levers</i> B-2 Gears and Rotating Motion</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Marble Launcher</i> B-2 Launch Speed and Range</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces C-6 Rotational Motion</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-3 The Physics of the Inclined Plane</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gears and Levers</i> C-1 Rotational Motion</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity C-3 Interpreting Graphs of Accelerated Motion</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation C-3 Accuracy, Precision, and Error</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-2 Rotational Kinetic Energy C-3 Mass, Motion, and Energy</p> <p><i>Ropes and Pulleys</i> C-2 Compound Pulley System</p> <p><i>Sound and Waves</i> C-2 The Speed of a Wave Pulse</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH05.b	Physics	The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes.	uniform circular motion		<p>Gears and Levers</p> <p>B-1 Levers, Torque and Mechanical Advantage</p> <p>B-2 Gears and Rotating Motion</p>	<p>Air Rocket</p> <p>C-6 Rotational Motion</p> <p>Gears and Levers</p> <p>C-1 Rotational Motion</p> <p>C-2 The Center of Gravity and Equilibrium</p> <p>Rollercoaster</p> <p>C-2 Rotational Kinetic Energy</p>
PH05.c	Physics	The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes.	projectile motion	<p>Car and Ramp</p> <p>A-5 Gravity</p> <p>Gravity Drop</p> <p>A-2 Speed and the Gravity Drop</p> <p>A-3 Falling Motion</p>	<p>Air Rocket</p> <p>B-5 The Acceleration of a Rocket</p> <p>Car and Ramp</p> <p>B-7 Weight, Gravity, and Friction</p> <p>Gravity Drop</p> <p>B-1 Introduction to the Gravity Drop</p> <p>B-3 Newton's Second Law</p> <p>Marble Launcher</p> <p>B-1 Launch Angle and Range</p>	<p>Car and Ramp</p> <p>C-3 The Physics of the Inclined Plane</p> <p>Gravity Drop</p> <p>C-2 Measuring Gravity</p> <p>C-3 Interpreting Graphs of Accelerated Motion</p> <p>Marble Launcher</p> <p>C-1 Projectile Motion and the Range Equation</p>
PH05.d	Physics	The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes.	Newton's laws of motion		<p>Air Rocket</p> <p>B-1 The Air Rocket</p> <p>B-2 Motion of the Air Rocket</p> <p>B-3 Pressure and Speed</p> <p>B-4 The Rocket and Newton's Laws of Motion</p> <p>Car and Ramp</p> <p>B-6 Force, Mass, and Acceleration</p> <p>B-8 Equilibrium, Action, and Reaction</p> <p>Gravity Drop</p> <p>B-3 Newton's Second Law</p>	<p>Air Rocket</p> <p>C-5 Conservation of Momentum</p> <p>Car and Ramp</p> <p>C-2 Newton's Second Law and Friction</p> <p>Gravity Drop</p> <p>C-2 Measuring Gravity</p> <p>Pendulum</p> <p>C-2 Newton's Second Law and the Pendulum</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH05.e	Physics	The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes.	gravitation	<p><i>Car and Ramp</i> A-5 Gravity</p> <p><i>Gravity Drop</i> A-2 Speed and the Gravity Drop A-3 Falling Motion</p>	<p><i>Air Rocket</i> B-5 The Acceleration of a Rocket</p> <p><i>Car and Ramp</i> B-7 Weight, Gravity, and Friction</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-3 Newton's Second Law</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range</p>	<p><i>Car and Ramp</i> C-3 The Physics of the Inclined Plane</p> <p><i>Gravity Drop</i> C-2 Measuring Gravity C-3 Interpreting Graphs of Accelerated Motion</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation</p>
PH05.g	Physics	The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes.	work, power, and energy	<p><i>Ropes and Pulleys</i> A-2 What is Work?</p>	<p><i>Air Rocket</i> B-3 Pressure and Speed</p> <p><i>Ropes and Pulleys</i> B-2 Work and Energy B-3 Efficiency</p>	<p><i>Air Rocket</i> C-4 Energy and Power</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System</p>
PH06.a	Physics	The student will investigate and understand that quantities including mass, energy, momentum, and charge are conserved.	kinetic and potential energy.	<p><i>Rollercoaster</i> A-2 Height on the Roller Coaster</p>	<p><i>Air Rocket</i> B-3 Pressure and Speed</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy</p> <p><i>Ropes and Pulleys</i> B-2 Work and Energy</p>	<p><i>Air Rocket</i> C-4 Energy and Power C-5 Conservation of Momentum</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-2 Rotational Kinetic Energy C-3 Mass, Motion, and Energy</p> <p><i>Ropes and Pulleys</i> C-2 Compound Pulley System</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH06.b	Physics	The student will investigate and understand that quantities including mass, energy, momentum, and charge are conserved.	elastic and inelastic collisions.			<i>Air Rocket</i> C-5 Conservation of Momentum
PH07.a	Physics	The student will investigate and understand properties of fluids.	density and pressure.		<i>Air Rocket</i> B-3 Pressure and Speed	
PH07.b	Physics	The student will investigate and understand properties of fluids.	variation of pressure with depth.		<i>Air Rocket</i> B-3 Pressure and Speed B-5 The Acceleration of a Rocket	
PH07.c	Physics	The student will investigate and understand properties of fluids.	Archimedes' principle of buoyancy.		<i>Air Rocket</i> B-3 Pressure and Speed B-5 The Acceleration of a Rocket	
PH07.d	Physics	The student will investigate and understand properties of fluids.	Pascal's principle		<i>Air Rocket</i> B-3 Pressure and Speed B-5 The Acceleration of a Rocket	

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH08.a	Physics	The student will investigate and understand that energy can be transferred and transformed to provide usable work.	transformation of energy among forms, including mechanical, thermal, electrical, gravitational, chemical, and nuclear.		<i>Pendulum</i> B-1 Harmonic Motion <i>Ropes and Pulleys</i> B-2 Work and Energy	<i>Air Rocket</i> C-4 Energy and Power
PH08.b	Physics	The student will investigate and understand that energy can be transferred and transformed to provide usable work.	efficiency of systems.		<i>Ropes and Pulleys</i> B-3 Efficiency	<i>Air Rocket</i> C-4 Energy and Power
PH09.a	Physics	The student will investigate and understand how to use models of transverse and longitudinal waves to interpret wave phenomena.	wave characteristics (period, wavelength, frequency, amplitude, and phase)	<i>Pendulum</i> A-1 The Pendulum <i>Sound and Waves</i> A-1 Sound A-2 Musical Sounds A-3 Making Waves	<i>Light and Optics</i> B-2 Polarization <i>Pendulum</i> B-1 Harmonic Motion B-3 Graphs of Harmonic Motion <i>Sound and Waves</i> B-1 Sound B-2 Musical Sounds B-3 Standing Waves on a String B-4 Natural Frequency and Resonance	<i>Sound and Waves</i> C-1 Standing Waves C-2 The Speed of a Wave Pulse C-3 Natural Frequency and Resonance C-5 Interference and Diffraction of Sound
PH09.b	Physics	The student will investigate and understand how to use models of transverse and longitudinal waves to interpret wave phenomena.	fundamental wave processes (reflection, refraction, diffraction, interference, polarization, Doppler effect).	<i>Light and Optics</i> A-2 Color	<i>Light and Optics</i> B-2 Polarization B-3 Optical Technology B-4 Ratios <i>Sound and Waves</i> B-4 Natural Frequency and Resonance B-5 Resonant Sounds	<i>Light and Optics</i> C-1 Light and Color C-2 The Law of Reflection C-7 Wave Properties of Light <i>Sound and Waves</i> C-3 Natural Frequency and Resonance C-5 Interference and Diffraction of Sound

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH09.c	Physics	The student will investigate and understand how to use models of transverse and longitudinal waves to interpret wave phenomena.	light and sound in terms of wave models.	<i>Light and Optics</i> A-1 Introduction to Light <i>Sound and Waves</i> A-1 Sound	<i>Sound and Waves</i> B-1 Sound B-2 Musical Sounds B-3 Standing Waves on a String B-5 Resonant Sounds	<i>Atom Building Game</i> C-2 Photons and Lasers <i>Light and Optics</i> C-1 Light and Color <i>Sound and Waves</i> C-4 Sound C-5 Interference and Diffraction of Sound
PH10.a	Physics	The student will investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum are phenomena ranging from radio waves through visible light to gamma radiation.	the properties of radio, microwaves, infrared, visible light, ultraviolet, x-rays, and gamma rays.	<i>Light and Optics</i> A-2 Color		
PH10.b	Physics	The student will investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum are phenomena ranging from radio waves through visible light to gamma radiation.	current applications based on the wave properties of each band.			<i>Sound and Waves</i> C-1 Standing Waves

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH11.a	Physics	The student will investigate and understand how light behaves in the fundamental processes of reflection, refraction and image forming in describing optical systems.	application of the laws of reflection and refraction.	<i>Light and Optics</i> A-3 Rules of Reflection	<i>Light and Optics</i> B-1 Seeing an Image B-3 Optical Technology	<i>Air Rocket</i> C-3 Acceleration and G-forces <i>Light and Optics</i> C-2 The Law of Reflection C-3 Refraction and Snell's Law C-4 The Convex Lens C-5 Geometric Optics
PH11.b	Physics	The student will investigate and understand how light behaves in the fundamental processes of reflection, refraction and image forming in describing optical systems.	construction and interpretation of ray diagrams.		<i>Light and Optics</i> B-1 Seeing an Image	<i>Light and Optics</i> C-2 The Law of Reflection C-4 The Convex Lens C-5 Geometric Optics
PH11.c	Physics	The student will investigate and understand how light behaves in the fundamental processes of reflection, refraction and image forming in describing optical systems.	development and use of mirror and lens equations.	<i>Light and Optics</i> A-3 Rules of Reflection	<i>Light and Optics</i> B-1 Seeing an Image B-3 Optical Technology	<i>Light and Optics</i> C-2 The Law of Reflection C-3 Refraction and Snell's Law C-4 The Convex Lens C-5 Geometric Optics C-6 The Thin Lens Equation

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH11.d	Physics	The student will investigate and understand how light behaves in the fundamental processes of reflection, refraction and image forming in describing optical systems.	predictions of type, size, and position of real and virtual images.		Light and Optics B-1 Seeing an Image	Light and Optics C-2 The Law of Reflection C-4 The Convex Lens C-5 Geometric Optics
PH12.a	Physics	The student will investigate and understand how to use the field concept to describe the effects of gravitational, electric, and magnetic forces.	inverse square laws (Newton's law of universal gravitation and Coulomb's law).		Gravity Drop B-1 Introduction to the Gravity Drop	
PH12.b	Physics	The student will investigate and understand how to use the field concept to describe the effects of gravitational, electric, and magnetic forces.	operating principles of motors, generators, transformers, and cathode ray tubes.	Electric Motor A-3 How a Motor Works A-4 Designing Motors A-5 Measuring Current and Voltage	Electric Motor B-3 The Electric Motor B-4 Current, Voltage, and Power B-5 Generators Light and Optics B-2 Polarization B-3 Optical Technology	Electric Motor C-1 Introduction to the Electric Motor C-2 Optimizing Performance C-3 Generators and Faraday's Law of Induction

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH13.a	Physics	The student will investigate and understand how to diagram and construct basic electrical circuits and explain the functions of various circuit components.	Ohm's law.		<i>Electric Circuits</i> B-3 Ohm's Law	<i>Electric Circuits</i> C-1 Series Circuits C-2 Parallel Circuits C-3 Compound Circuits
PH13.b	Physics	The student will investigate and understand how to diagram and construct basic electrical circuits and explain the functions of various circuit components.	series, parallel, and combined circuits.	<i>Electric Circuits</i> A-2 Types of Circuits		<i>Electric Circuits</i> C-1 Series Circuits C-2 Parallel Circuits
PH13.c	Physics	The student will investigate and understand how to diagram and construct basic electrical circuits and explain the functions of various circuit components.	circuit components including resistors, batteries, generators, fuses, switches, and capacitors.	<i>Electric Circuits</i> A-1 What is a Circuit? A-3 Current and Voltage	<i>Electric Circuits</i> B-1 Voltage B-2 Current B-3 Ohm's Law <i>Electric Motor</i> B-5 Generators	<i>Electric Circuits</i> C-1 Series Circuits C-3 Compound Circuits <i>Electric Motor</i> C-3 Generators and Faraday's Law of Induction

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH14.b	Physics	The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics	wave properties of matter.	<i>Light and Optics</i> A-1 Introduction to Light		<i>Atom Building Game</i> C-2 Photons and Lasers <i>Light and Optics</i> C-1 Light and Color
PH14.d	Physics	The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics	quantum mechanics and uncertainty.			<i>Periodic Table Tiles</i> C-1 Electrons and the Periodic Table
PH14.f	Physics	The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics	nuclear physics		<i>Atom Building Game</i> B-2 Nuclear Reactions Game	

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PH14.i	Physics	The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics	radioactivity.		<i>Atom Building Game</i> B-2 Nuclear Reactions Game	
PS01.a	Physical Science	The student will plan and conduct investigations in which:	chemicals and equipment are used safely	<i>Electric Circuits</i> A-3 Current and Voltage <i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance <i>Ropes and Pulleys</i> A-1 Ropes and Pulleys	<i>Air Rocket</i> B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion <i>Car and Ramp</i> B-7 Weight, Gravity, and Friction <i>Electric Circuits</i> B-1 Voltage B-2 Current <i>Marble Launcher</i> B-1 Launch Angle and Range <i>Rollercoaster</i> B-3 Mass and Motion <i>Ropes and Pulleys</i> B-1 Forces in Machines	<i>Electric Circuits</i> C-1 Series Circuits C-2 Parallel Circuits C-3 Compound Circuits <i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation <i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS01.b	Physical Science	The student will plan and conduct investigations in which:	length, mass, volume, density, temperature, weight, and force are accurately measured and reported using the SI system	<p><i>Car and Ramp</i> A-1 Time and Distance A-3 Speed A-4 Describing Motion</p> <p><i>Gravity Drop</i> A-1 Introduction to the Gravity Drop A-3 Falling Motion</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Rollercoaster</i> A-2 Height on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p>	<p><i>Air Rocket</i> B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion B-5 The Acceleration of a Rocket</p> <p><i>Car and Ramp</i> B-1 Time and Distance B-3 Using a Scientific Model to Predict Speed B-5 Acceleration B-6 Force, Mass, and Acceleration</p> <p><i>Gears and Levers</i> B-1 Levers, Torque and Mechanical Advantage</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-1 Seeing an Image B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion</p> <p><i>Ropes and Pulleys</i> B-1 Forces in Machines B-2 Work and Energy</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces C-4 Energy and Power</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Gravity Drop</i> C-2 Measuring Gravity</p> <p><i>Light and Optics</i> C-4 The Convex Lens C-7 Wave Properties of Light</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-3 Accuracy, Precision, and Error</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-3 Mass, Motion, and Energy</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System</p> <p><i>Sound and Waves</i> C-2 The Speed of a Wave Pulse</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
					B-3 Efficiency <i>Sound and Waves</i> B-4 Natural Frequency and Resonance	
PS01.c	Physical Science	The student will plan and conduct investigations in which:	conversions are made among metric units applying appropriate prefixes		<i>Gravity Drop</i> B-1 Introduction to the Gravity Drop	<i>Air Rocket</i> C-4 Energy and Power

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS01.d	Physical Science	The student will plan and conduct investigations in which:	triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and spring scales are used to gather data	<p><i>Car and Ramp</i> A-1 Time and Distance A-2 Investigations and Experiments A-3 Speed A-4 Describing Motion A-5 Gravity</p> <p><i>Electric Circuits</i> A-3 Current and Voltage</p> <p><i>Electric Motor</i> A-5 Measuring Current and Voltage</p> <p><i>Gravity Drop</i> A-1 Introduction to the Gravity Drop A-2 Speed and the Gravity Drop A-3 Falling Motion</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Rollercoaster</i> A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p>	<p><i>Air Rocket</i> B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion B-5 The Acceleration of a Rocket</p> <p><i>Car and Ramp</i> B-1 Time and Distance B-2 Investigating Speed B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration B-6 Force, Mass, and Acceleration</p> <p><i>Electric Circuits</i> B-1 Voltage B-2 Current B-3 Ohm's Law</p> <p><i>Electric Motor</i> B-4 Current, Voltage, and Power</p> <p><i>Gears and Levers</i> B-1 Levers, Torque and Mechanical Advantage</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Electric Circuits</i> C-1 Series Circuits C-3 Compound Circuits</p> <p><i>Electric Motor</i> C-1 Introduction to the Electric Motor C-2 Optimizing Performance C-3 Generators and Faraday's Law of Induction</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity</p> <p><i>Light and Optics</i> C-4 The Convex Lens C-7 Wave Properties of Light</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-3 Accuracy, Precision, and Error</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum C-3 The Physical Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
					B-2 Launch Speed and Range <i>Pendulum</i> B-1 Harmonic Motion <i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion <i>Ropes and Pulleys</i> B-1 Forces in Machines B-2 Work and Energy B-3 Efficiency <i>Sound and Waves</i> B-4 Natural Frequency and Resonance	C-3 Mass, Motion, and Energy <i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System <i>Sound and Waves</i> C-2 The Speed of a Wave Pulse C-3 Natural Frequency and Resonance
PS01.f	Physical Science	The student will plan and conduct investigations in which:	research skills are utilized using a variety of resources			<i>Light and Optics</i> C-1 Light and Color

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS01.g	Physical Science	The student will plan and conduct investigations in which:	independent and dependent variables, constants, controls, and repeated trials are identified	<p><i>Car and Ramp</i> A-2 Investigations and Experiments A-3 Speed</p> <p><i>Gravity Drop</i> A-3 Falling Motion</p> <p><i>Light and Optics</i> A-2 Color A-3 Rules of Reflection</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance</p> <p><i>Pendulum</i> A-1 The Pendulum A-2 Making a Clock</p> <p><i>Rollercoaster</i> A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster</p>	<p><i>Air Rocket</i> B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p> <p><i>Car and Ramp</i> B-2 Investigating Speed</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop</p> <p><i>Pendulum</i> B-1 Harmonic Motion</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion</p> <p><i>Ropes and Pulleys</i> B-3 Efficiency</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS01.h	Physical Science	The student will plan and conduct investigations in which:	data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted	<p><i>Car and Ramp</i> A-4 Describing Motion</p> <p><i>Gravity Drop</i> A-3 Falling Motion</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance</p> <p><i>Pendulum</i> A-1 The Pendulum</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p> <p><i>Sound and Waves</i> A-1 Sound</p>	<p><i>Air Rocket</i> B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p> <p><i>Car and Ramp</i> B-4 Position and Time B-6 Force, Mass, and Acceleration</p> <p><i>Electric Circuits</i> B-3 Ohm's Law</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-1 Seeing an Image B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range B-3 Relating Launch Speed and Range</p> <p><i>Rollercoaster</i> B-3 Mass and Motion</p> <p><i>Ropes and Pulleys</i> B-1 Forces in Machines B-2 Work and Energy B-3 Efficiency</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-3 Mass, Motion, and Energy</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS01.i	Physical Science	The student will plan and conduct investigations in which:	data tables for descriptive statistics showing specific measures of central tendency, the range of data set, and the number of repeated trials are constructed and interpreted	<p><i>Car and Ramp</i> A-1 Time and Distance A-4 Describing Motion</p> <p><i>Gravity Drop</i> A-3 Falling Motion</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance</p> <p><i>Pendulum</i> A-1 The Pendulum</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p> <p><i>Sound and Waves</i> A-1 Sound</p>	<p><i>Air Rocket</i> B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p> <p><i>Car and Ramp</i> B-1 Time and Distance B-4 Position and Time B-6 Force, Mass, and Acceleration</p> <p><i>Electric Circuits</i> B-3 Ohm's Law</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Light and Optics</i> B-1 Seeing an Image B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range B-3 Relating Launch Speed and Range</p> <p><i>Rollercoaster</i> B-3 Mass and Motion</p> <p><i>Ropes and Pulleys</i> B-1 Forces in Machines B-2 Work and Energy B-3 Efficiency</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity</p> <p><i>Marble Launcher</i> C-3 Accuracy, Precision, and Error</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-3 Mass, Motion, and Energy</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS01.j	Physical Science	The student will plan and conduct investigations in which:	frequency distributions, scattergrams, line plots, and histograms are constructed and interpreted	<p><i>Car and Ramp</i> A-4 Describing Motion</p> <p><i>Gravity Drop</i> A-3 Falling Motion</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Pendulum</i> A-1 The Pendulum</p> <p><i>Rollercoaster</i> A-2 Height on the Roller Coaster</p> <p><i>Sound and Waves</i> A-1 Sound</p>	<p><i>Air Rocket</i> B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p> <p><i>Car and Ramp</i> B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration B-6 Force, Mass, and Acceleration B-7 Weight, Gravity, and Friction</p> <p><i>Electric Circuits</i> B-3 Ohm's Law</p> <p><i>Gravity Drop</i> B-2 Speed, Acceleration, and Free Fall</p> <p><i>Light and Optics</i> B-4 Ratios</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range B-2 Launch Speed and Range B-3 Relating Launch Speed and Range</p> <p><i>Pendulum</i> B-1 Harmonic Motion B-2 The Five Second Pendulum</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion</p> <p><i>Sound and Waves</i></p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction C-3 The Physics of the Inclined Plane</p> <p><i>Electric Circuits</i> C-1 Series Circuits</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-3 Interpreting Graphs of Accelerated Motion</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum C-2 Newton's Second Law and the Pendulum C-3 The Physical Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-2 Rotational Kinetic Energy C-3 Mass, Motion, and Energy</p> <p><i>Sound and Waves</i> C-1 Standing Waves</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
					B-1 Sound	C-3 Natural Frequency and Resonance C-4 Sound
PS01.k	Physical Science	The student will plan and conduct investigations in which:	valid conclusions are made after analyzing data	<p><i>Car and Ramp</i> A-2 Investigations and Experiments A-4 Describing Motion A-5 Gravity</p> <p><i>Light and Optics</i> A-1 Introduction to Light</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance A-2 Launch Speed and Distance</p> <p><i>Rollercoaster</i> A-2 Height on the Roller Coaster</p> <p><i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?</p>	<p><i>Car and Ramp</i> B-2 Investigating Speed B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration</p> <p><i>Electric Circuits</i> B-3 Ohm's Law</p> <p><i>Light and Optics</i> B-2 Polarization</p> <p><i>Rollercoaster</i> B-3 Mass and Motion</p> <p><i>Ropes and Pulleys</i> B-1 Forces in Machines B-2 Work and Energy</p> <p><i>Sound and Waves</i> B-1 Sound</p>	<p><i>Light and Optics</i> C-1 Light and Color</p> <p><i>Marble Launcher</i> C-2 Improving the Range Equation</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-3 Mass, Motion, and Energy</p> <p><i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS01.l	Physical Science	The student will plan and conduct investigations in which:	research methods are used to investigate practical problems and questions	<p><i>Car and Ramp</i> A-2 Investigations and Experiments A-3 Speed</p> <p><i>Gravity Drop</i> A-3 Falling Motion</p> <p><i>Light and Optics</i> A-1 Introduction to Light A-3 Rules of Reflection</p> <p><i>Marble Launcher</i> A-1 Launch Angle and Distance</p> <p><i>Pendulum</i> A-1 The Pendulum A-2 Making a Clock</p> <p><i>Rollercoaster</i> A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster</p>	<p><i>Air Rocket</i> B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p> <p><i>Car and Ramp</i> B-2 Investigating Speed B-7 Weight, Gravity, and Friction</p> <p><i>Gravity Drop</i> B-2 Speed, Acceleration, and Free Fall</p> <p><i>Light and Optics</i> B-2 Polarization</p> <p><i>Marble Launcher</i> B-1 Launch Angle and Range</p> <p><i>Pendulum</i> B-1 Harmonic Motion</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion</p> <p><i>Ropes and Pulleys</i> B-3 Efficiency</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-2 Newton's Second Law and Friction</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall</p> <p><i>Pendulum</i> C-1 Energy Conservation and the Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-3 Mass, Motion, and Energy</p>
PS01.m	Physical Science	The student will plan and conduct investigations in which:	experimental results are presented in appropriate written form		<p><i>Air Rocket</i> B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion</p>	

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS01.n	Physical Science	The student will plan and conduct investigations in which:	an understanding of the nature of science is developed and reinforced		<i>Light and Optics</i> B-2 Polarization <i>Marble Launcher</i> B-3 Relating Launch Speed and Range <i>Pendulum</i> B-2 The Five Second Pendulum	<i>Gravity Drop</i> C-3 Interpreting Graphs of Accelerated Motion <i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation
PS03.b	Physical Science	The student will investigate and understand the modern and historical models of atomic structure	the modern model of atomic structure	<i>Atom Building Game</i> A-1 Building Atoms A-2 Atomic Challenge A-3 Building Molecules <i>Light and Optics</i> A-1 Introduction to Light <i>Periodic Table Tiles</i> A-1 The Periodic Table A-2 Groups of Elements	<i>Atom Building Game</i> B-1 Comparing Atoms B-2 Nuclear Reactions Game B-3 Bonding and Molecules <i>Periodic Table Tiles</i> B-1 Chemical Formulas B-2 A Tour of the Periodic Table	<i>Atom Building Game</i> C-1 Electrons and the Periodic Table C-2 Photons and Lasers C-3 Valence Electrons and Molecules <i>Light and Optics</i> C-1 Light and Color <i>Periodic Table Tiles</i> C-1 Electrons and the Periodic Table
PS04.a	Physical Science	The student will investigate and understand the organization and use of the periodic table of elements to obtain information.	symbols, atomic numbers, atomic mass, chemical families (groups), and periods	<i>Atom Building Game</i> A-1 Building Atoms A-2 Atomic Challenge A-3 Building Molecules <i>Periodic Table Tiles</i> A-1 The Periodic Table A-2 Groups of Elements	<i>Atom Building Game</i> B-1 Comparing Atoms B-2 Nuclear Reactions Game B-3 Bonding and Molecules <i>Periodic Table Tiles</i> B-2 A Tour of the Periodic Table	<i>Atom Building Game</i> C-3 Valence Electrons and Molecules <i>Periodic Table Tiles</i> C-1 Electrons and the Periodic Table
PS04.b	Physical Science	The student will investigate and understand the organization and use of the periodic table of elements to obtain information.	classification of elements as metals, metalloids, and nonmetals	<i>Periodic Table Tiles</i> A-1 The Periodic Table	<i>Periodic Table Tiles</i> B-2 A Tour of the Periodic Table	<i>Periodic Table Tiles</i> C-1 Electrons and the Periodic Table

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS04.c	Physical Science	The student will investigate and understand how to use the periodic table of elements to obtain information.	simple compounds (formulas and nature of bonding)	<i>Atom Building Game</i> A-3 Building Molecules <i>Periodic Table Tiles</i> A-1 The Periodic Table A-2 Groups of Elements	<i>Atom Building Game</i> B-3 Bonding and Molecules <i>Periodic Table Tiles</i> B-1 Chemical Formulas B-2 A Tour of the Periodic Table	<i>Atom Building Game</i> C-1 Electrons and the Periodic Table C-3 Valence Electrons and Molecules <i>Periodic Table Tiles</i> C-1 Electrons and the Periodic Table
PS05.b	Physical Science	The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy	nuclear reactions (products of fusion and fission and their effects on human beings and the environment)		<i>Atom Building Game</i> B-2 Nuclear Reactions Game	
PS05.c	Physical Science	The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy	chemical changes (types of reactions, reactants and products, and balanced equations)	<i>Periodic Table Tiles</i> A-3 Chemical Reactions	<i>Periodic Table Tiles</i> B-3 Chemical Equations	<i>Periodic Table Tiles</i> C-1 Electrons and the Periodic Table C-2 Challenging Chemical Equations C-3 Classifying Reactions

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS06.a	Physical Science	The student will investigate and understand states and forms of energy and how energy is transferred and transformed	potential and kinetic energy		<i>Air Rocket</i> B-3 Pressure and Speed <i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy <i>Ropes and Pulleys</i> B-2 Work and Energy	<i>Air Rocket</i> C-4 Energy and Power <i>Pendulum</i> C-1 Energy Conservation and the Pendulum <i>Rollercoaster</i> C-1 Motion on the Roller Coaster <i>Ropes and Pulleys</i> C-2 Compound Pulley System
PS06.b	Physical Science	The student will investigate and understand states and forms of energy and how energy is transferred and transformed	mechanical, chemical, and electrical energy		<i>Ropes and Pulleys</i> B-2 Work and Energy	
PS08.a	Physical Science	The student will investigate and understand characteristics of sound and technological applications of sound waves	wavelength, frequency, speed and amplitude	<i>Pendulum</i> A-1 The Pendulum <i>Sound and Waves</i> A-1 Sound A-2 Musical Sounds A-3 Making Waves	<i>Pendulum</i> B-1 Harmonic Motion B-3 Graphs of Harmonic Motion <i>Sound and Waves</i> B-1 Sound B-3 Standing Waves on a String B-4 Natural Frequency and Resonance	<i>Sound and Waves</i> C-1 Standing Waves C-2 The Speed of a Wave Pulse C-3 Natural Frequency and Resonance
PS08.b	Physical Science	The student will investigate and understand characteristics of sound and technological applications of sound waves	resonance		<i>Sound and Waves</i> B-4 Natural Frequency and Resonance B-5 Resonant Sounds	<i>Sound and Waves</i> C-3 Natural Frequency and Resonance C-5 Interference and Diffraction of Sound

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS08.c	Physical Science	The student will investigate and understand characteristics of sound and technological applications of sound waves	the nature of mechanical waves	<i>Sound and Waves</i> A-3 Making Waves	<i>Light and Optics</i> B-2 Polarization <i>Sound and Waves</i> B-3 Standing Waves on a String	<i>Sound and Waves</i> C-1 Standing Waves C-2 The Speed of a Wave Pulse
PS09.a	Physical Science	The student will investigate and understand the nature and technological applications of light	the wave behavior of light (reflection, refraction, diffraction, and interference)	<i>Light and Optics</i> A-2 Color A-3 Rules of Reflection	<i>Light and Optics</i> B-1 Seeing an Image B-3 Optical Technology B-4 Ratios	<i>Air Rocket</i> C-3 Acceleration and G-forces <i>Light and Optics</i> C-1 Light and Color C-2 The Law of Reflection C-3 Refraction and Snell's Law C-4 The Convex Lens C-5 Geometric Optics C-7 Wave Properties of Light
PS09.c	Physical Science	The student will investigate and understand the nature and technological applications of light	electromagnetic spectrum	<i>Light and Optics</i> A-2 Color		<i>Sound and Waves</i> C-1 Standing Waves

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS10.a	Physical Science	The student will investigate and understand scientific principles and technological applications of work, force, and motion	speed, velocity, and acceleration	<p><i>Car and Ramp</i> A-3 Speed A-4 Describing Motion A-5 Gravity</p> <p><i>Gravity Drop</i> A-2 Speed and the Gravity Drop A-3 Falling Motion</p> <p><i>Rollercoaster</i> A-1 Speed on the Roller Coaster A-2 Height on the Roller Coaster</p>	<p><i>Air Rocket</i> B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion B-5 The Acceleration of a Rocket</p> <p><i>Car and Ramp</i> B-2 Investigating Speed B-3 Using a Scientific Model to Predict Speed B-4 Position and Time B-5 Acceleration B-6 Force, Mass, and Acceleration</p> <p><i>Gravity Drop</i> B-1 Introduction to the Gravity Drop B-2 Speed, Acceleration, and Free Fall B-3 Newton's Second Law</p> <p><i>Marble Launcher</i> B-2 Launch Speed and Range</p> <p><i>Rollercoaster</i> B-1 Energy and the Rollercoaster B-2 Conservation of Energy B-3 Mass and Motion</p>	<p><i>Air Rocket</i> C-3 Acceleration and G-forces C-5 Conservation of Momentum</p> <p><i>Car and Ramp</i> C-1 Uniform Accelerated Motion C-3 The Physics of the Inclined Plane</p> <p><i>Electric Motor</i> C-2 Optimizing Performance</p> <p><i>Gravity Drop</i> C-1 Speed, Acceleration, and Free Fall C-2 Measuring Gravity C-3 Interpreting Graphs of Accelerated Motion</p> <p><i>Marble Launcher</i> C-1 Projectile Motion and the Range Equation C-2 Improving the Range Equation C-3 Accuracy, Precision, and Error</p> <p><i>Pendulum</i> C-2 Newton's Second Law and the Pendulum</p> <p><i>Rollercoaster</i> C-1 Motion on the Roller Coaster C-2 Rotational Kinetic Energy C-3 Mass, Motion, and Energy</p> <p><i>Ropes and Pulleys</i> C-2 Compound Pulley System</p> <p><i>Sound and Waves</i> C-2 The Speed of a Wave Pulse</p>

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Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS10.b	Physical Science	The student will investigate and understand scientific principles and technological applications of work, force, and motion	Newton's laws of motion	Ropes and Pulleys A-1 Ropes and Pulleys	Air Rocket B-1 The Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion Car and Ramp B-6 Force, Mass, and Acceleration B-8 Equilibrium, Action, and Reaction Gravity Drop B-1 Introduction to the Gravity Drop B-3 Newton's Second Law Ropes and Pulleys B-1 Forces in Machines B-3 Efficiency	Air Rocket C-5 Conservation of Momentum Car and Ramp C-2 Newton's Second Law and Friction Gravity Drop C-2 Measuring Gravity Pendulum C-2 Newton's Second Law and the Pendulum Ropes and Pulleys C-1 Simple and Complex Pulley Systems
PS10.c	Physical Science	The student will investigate and understand scientific principles and technological applications of work, force, and motion	work, force, mechanical advantage, efficiency and power	Ropes and Pulleys A-1 Ropes and Pulleys A-2 What is Work?	Air Rocket B-2 Motion of the Air Rocket B-3 Pressure and Speed B-4 The Rocket and Newton's Laws of Motion Car and Ramp B-6 Force, Mass, and Acceleration Gravity Drop B-1 Introduction to the Gravity Drop B-3 Newton's Second Law Ropes and Pulleys B-1 Forces in Machines B-2 Work and Energy B-3 Efficiency	Air Rocket C-4 Energy and Power Gravity Drop C-2 Measuring Gravity Ropes and Pulleys C-1 Simple and Complex Pulley Systems C-2 Compound Pulley System

Correlation to Virginia Public Schools: Science Standards of Learning Curriculum Resource Guide

Standard #:	Subject	Standard	Key Concept	Investigation Level A	Investigation Level B	Investigation Level C
PS10.d	Physical Science	The student will investigate and understand scientific principles and technological applications of work, force, and motion	applications (simple machines, compound machines, powered vehicles, rockets and restraining devices)	<i>Gears and Levers</i> A-1 The Lever A-2 Gears A-3 Compound Gear Machines A-4 Designing Gear Machines <i>Ropes and Pulleys</i> A-1 Ropes and Pulleys A-2 What is Work?	<i>Gears and Levers</i> B-1 Levers, Torque and Mechanical Advantage B-2 Gears and Rotating Motion B-4 Machines with Gears and Levers <i>Ropes and Pulleys</i> B-1 Forces in Machines B-2 Work and Energy B-3 Efficiency	<i>Ropes and Pulleys</i> C-1 Simple and Complex Pulley Systems
PS11.a	Physical Science	The student will investigate and understand basic principles of electricity and magnetism	static, current, circuits	<i>Electric Circuits</i> A-1 What is a Circuit? A-2 Types of Circuits A-3 Current and Voltage <i>Electric Motor</i> A-5 Measuring Current and Voltage	<i>Electric Circuits</i> B-1 Voltage B-2 Current B-3 Ohm's Law <i>Electric Motor</i> B-4 Current, Voltage, and Power	<i>Electric Circuits</i> C-1 Series Circuits C-2 Parallel Circuits C-3 Compound Circuits <i>Electric Motor</i> C-1 Introduction to the Electric Motor
PS11.b	Physical Science	The student will investigate and understand basic principles of electricity and magnetism	magnetic fields and electromagnets	<i>Electric Motor</i> A-1 Magnets A-2 Magnetic Materials A-3 How a Motor Works A-4 Designing Motors A-5 Measuring Current and Voltage	<i>Electric Motor</i> B-1 Permanent Magnets B-2 Electromagnets B-3 The Electric Motor B-4 Current, Voltage, and Power B-5 Generators	<i>Electric Motor</i> C-1 Introduction to the Electric Motor C-2 Optimizing Performance C-3 Generators and Faraday's Law of Induction
PS11.c	Physical Science	The student will investigate and understand basic principles of electricity and magnetism	motors and generators	<i>Electric Motor</i> A-3 How a Motor Works A-4 Designing Motors A-5 Measuring Current and Voltage	<i>Electric Motor</i> B-3 The Electric Motor B-4 Current, Voltage, and Power	<i>Electric Motor</i> C-1 Introduction to the Electric Motor C-2 Optimizing Performance