2026-27 Physics Scope and Sequence

Unit 1: Mechanics in One Dimension	Module 2: Representing Motion	Instructional Periods: 18
Module, Lessons	**STEELS Standards**	
Module 2 (August 24 – September 30) **PPS Anchoring Phenomenon:** The anchoring phenomenon for this module is a proposed bill (SB9.61) in California that requires certain vehicles sold or manufactured in the state to be equipped with speed limiter technology. Please use resources in the **Schoology Physics Group** to implement the anchoring phenomenon routine. **Investigative Phenomenon:** *How does a GPS unit know where you are?* **Launch Lab: Toy Car Race** Lesson 1: Picturing Motion **PhysicsLab: Motion Diagrams** Lesson 2: Where and When? **Suggested Activity: Vector Maps** Lesson 3: Position-Time Graphs **Suggested Activity: Position-Time Graph Creation** **Vernier Labs: Graph Matching** Lesson 4: How Fast? **PhysicsLab: Constant Speed** And/Or **ProbewareLAB**: **Measure Velocity** **Vernier Labs: Back and Forth Motion** Additional Resources: **Revisit the Phenomenon and DQB**	**3.2.9-12.I Physical Science: Forces and Interactions** Students who demonstrate understanding can 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. Clarifying Statement: Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object sliding down a ramp, or a moving object being pulled by a constant force. **Assessment Boundary:** Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds. **Science and Engineering Practice (SEP):** **Analyzing and Interpreting Data** - Analyzing data in 9–12 builds on K–8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. • Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. **Disciplinary Core Idea (DCI):** **PS2.A: Forces and Motion** • Newton's second law accurately predicts changes in the motion of macroscopic objects. **Crosscutting Concepts (CCC):** Cause and Effect • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.	

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Go Further: Data Analysis Lab (Optional) **Module Test** **Related Gizmos: Distance-Time Graphs, Measuring Motion** **STEM Unit Project: *Build a Rocket***	

Unit 1: Mechanics in One Dimension	**Module 3: Accelerated Motion**	**Instructional Periods: 19**
Module, Lessons		**STEELS Standards**
Module 3 (October 1 – October 31) **PPS Anchoring Phenomenon:** The anchoring phenomenon for this module is the exploration of the critical impact of G-forces on pilots, and their ability to maintain consciousness and control during flight maneuvers and the physiological limitations pilots face. **Investigative Phenomenon:** *Why do sudden changes in the direction or speed of jet planes affect pilots?* Lesson 1: Acceleration **Quick Investigation: Steel Ball Race** Lesson 2: Motion with Constant Acceleration **Probeware Lab: Measuring Acceleration** **Vernier Labs: Cart on a Ramp (Motion Detector), Determining g on an Incline** Lesson 3: Freefall **Quick Investigation: Free Fall** **PhysicsLab: Free-Fall Acceleration** And/or **Suggested Activity: Ball Drop - Vernier video analysis**		**3.2.9-12.I Physical Science:** Forces and Interactions **Students who demonstrate understanding can** 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. **Clarifying Statement:** Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object sliding down a ramp, or a moving object being pulled by a constant force. **Assessment Boundary:** Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds. **Science and Engineering Practice (SEP):** **Analyzing and Interpreting Data -** Analyzing data in 9–12 builds on K–8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. • Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. **Using Mathematical and Computational Thinking -** Mathematical and computational thinking in 9- 12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.	

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Vernier Labs: Picket Fence Free Fall, Ball Toss **STEM Unit Project:** *Build a Rocket* Additional Resources: **Revisit the Module Phenomena and DGB** **Go Further: Data Analysis Lab (Optional)** **Module Test** **Related Gizmos:** Atwood Machine, Inclined Plane - Rolling Objects, Free Fall Tower, Free Fall Laboratory	**Disciplinary Core Idea (DCI):** **PS2.A: Forces and Motion** • Newton's second law accurately predicts changes in the motion of macroscopic objects. **Crosscutting Concepts (CCC):** **Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

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nit 1: Mechanics in One Dimension	Module 4: Forces in One Dimension	Instructional Periods: 19
Module, Lessons	**STEELS Standards**	
Module 4 (November 2 – December 4) **PPS Anchoring Phenomenon:** The anchoring phenomenon for this module is the evolution of the wingsuit for base jumpers over time. **Investigative Phenomenon:** *How do wing suits help base jumpers control their velocity?* **Launch Lab: Forces in Opposite Directions** Lesson 1: Force and Motion **Suggested Activity: PhET Simulation – Force and Motion Basics** **Vernier Labs: Newton's Second Law, Atwood Machine** Lesson 2: Weight and Drag Force **Quick Investigation: Mass and Weight** and **Probeware Lab: Terminal Velocity** **Vernier Labs: Air Resistance** Lesson 3: Newton's Third Law **PhysicsLab: Newton's Third Law** **Vernier Labs: Newton's Third Law** **STEM Unit Project:** *Build a Rocket (Optional)* *additional periods are necessary to complete the Unit Project Additional Resources: **Revisit the Phenomena and DQB** **Go Further: Data Analysis Lab (Optional)**	**3.2.9-12.I Physical Science:** Forces and Interactions **Students who demonstrate understanding can** 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. **Clarifying Statement:** Examples of data could include tables or graphs of position or velocity as a function of time for objects subject to a net unbalanced force, such as a falling object, an object sliding down a ramp, or a moving object being pulled by a constant force. **Assessment Boundary:** Assessment is limited to one-dimensional motion and to macroscopic objects moving at non-relativistic speeds. **Science and Engineering Practice (SEP):** **Analyzing and Interpreting Data -** Analyzing data in 9–12 builds on K–8 and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. • Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. **Disciplinary Core Idea (DCI):** **PS2.A: Forces and Motion** • Newton's second law accurately predicts changes in the motion of macroscopic objects. **Crosscutting Concepts (CCC):** **Cause and Effect** • Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.	

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Module Test **Related Gizmos:** Forces and Motion, Fan Cart Physics, Weight ad Mass	

Unit 3: Momentum and Energy	**Module 9A: Momentum and Impulse**	**Instructional Periods: 18**
Unit 3 Encounter the Phenomenon: *Why is energy important to humans and society?*		

Module/Lessons	**STEELS Standards**
Module 9 Launch (December 7th – January 8th) **PPS Anchoring Phenomenon:** How do airbags, helmets, seatbelts, crumple zones, and other safety systems protect people during a crash? **Investigative Phenomenon:** *Two objects can have very different crash outcomes even when they are moving at similar speeds.* **COLLECT EVIDENCE:** Lesson 1: Momentum **Suggested Activities: IIHS Momentum Bashing** **Gizmo - Sled WSars** Lesson 2: Impulse **Vernier: Impulse Lab** **Virtual Field Trip: Science is Cool with the IIHS** Lesson 3: Impulse-Momentum Relationship **Suggested Activity – Modeling with Airtracks** Lesson 4: Engineering Design Challenge **Egg Car Engineering Challenge**	Master Performance Expectations 3.2.9-12.J Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. 3.2.9-12.K Apply scientific and engineering ideas to design, evaluate and refine a device that minimizes the force on a macroscopic object during a collision. 3.5.9-12.N Analyze and use relevant and appropriate design thinking processes to solve technological and engineering problems. Related Gizmo •Crumple Zone **Disciplinary Core Ideas:** 3.2 Physical Science Forces and Motion 3.5 Technology and Engineering **Science and Engineering Practices:** Gizmos SEP Graphic Organizers Asking questions and defining Problems Using mathematics and computational thinking Constructing explanations and designing solutions Obtaining, evaluating, and communicating information **Cross-cutting Concepts:** Gizmos CCC Graphic Organizers Cause and effect

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	Systems and system models

Unit 2: Mechanics in Two Dimensions **Module 5: Displacement and Forces in Two Dimensions** **Instructional Periods: 22** **Unit 2 Encounter the Phenomenon:** *How can forces cause so many different types of motion?*	
Module/Lessons	**STEELS Standards**
Module 5 (January 25 – February 19) **PPS Anchoring Phenomenon:** The anchoring phenomenon for this module is that specialized trains use high-pressure water jets to remove slippery leaves from tracks, revealing how changes in friction and applied forces affect motion in two dimensions. **Investigative Phenomenon:** *Why is this specialized train washing the train tracks?* **COLLECT EVIDENCE:** **Launch Lab: Adding Vectors** Lesson 1: Vectors Lesson 2: Friction **PhysicsLab: Coefficient of Friction** **Forensics Lab: Hit-and-Run Driver** Lesson 3: Forces in Two Dimensions **PhysicsLab: Perpendicular Forces** **Probeware Lab: Friction on a Plane** **Quick Investigation: Equilibrium** **Quick Investigation: Forces on a Plane**	Build to Performance Expectations 3.3.9-12.D Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. Related Gizmos •Orbital Motion - Kepler's Laws •Solar System Explorer 3.2.9-12.L Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. Related Gizmos •Coulomb Force (Static) •Gravitational Force •Pith Ball Lab Expand on Performance Expectations 3.2.9-12.I 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. Related Gizmos •Atwood Machine •Fan Cart Physics •2D Collisions •Inclined Plane – Simple Machine •Inclined Plane – Sliding Objects •Air Track •Crumple Zones **Disciplinary Core Ideas:** 3.2: Physical Science Forces and Motion **Science and Engineering Practices:** Gizmos SEP Graphic Organizers Asking questions (for science) and defining problems (for engineering)

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Additional Resources: **Revisit the Phenomena** **Go Further: Data Analysis Lab** **Module Vocabulary Practice** **Module Test**	Analyzing and interpreting data Using mathematics and computational thinking Obtaining, evaluating, and communicating information **Cross-cutting Concepts:** **Gizmos CCC Graphic Organizers** Patterns Cause and Effect

Unit 2: Mechanics in Two Dimensions	**Module 6: Forces in Two Dimensions**	**Instructional Periods: 20**
Unit 2 Encounter the Phenomenon: ***How can forces cause so many different types of motion?***		
Module/Lessons	**STEELS Standards**	

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Module 6 (February 22– March 31) **Investigative Phenomenon:** *Why do thrown basketballs travel in arcs?* **Launch Lab: Projectile Motion** **Lesson 1:** **Quick Investigation: Over the Edge** **Quick Investigation: Projectile Path** **Forensics Lab: Launch an Investigation** **Lesson 2:** **PhysicsLab: Centripetal Force** **Lesson 3:** **PhysicsLab: Moving Reference Frame** **STEM Unit Project:** *In Orbit* **Module Wrap up:** Revisit the Phenomena, Go Further: Data Analysis Lab, Module Vocabulary Practice and Module Test	Build to Performance Expectations 3.2.9-12.L Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. Related Gizmos •Orbital Motion - Kepler's Laws •Solar System Explorer Expand on Performance Expectations 3.2.9-12.I 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. Related Gizmos • Feed the Monkey •Trebuchet •Gravity Pitch •Golf Range •Uniform Circular Motion •Measuring Motion •Free Fall Tower •Free Fall Laboratory **Disciplinary Core Ideas:** 3.2: Physical Science Forces and Motion **Science and Engineering Practices:** Gizmos SEP Graphic Organizers Asking questions (for science) and defining problems (for engineering) Analyzing and interpreting data Using mathematics and computational thinking Obtaining, evaluating, and communicating information **Cross-cutting Concepts:** Gizmos CCC Graphic Organizers Patterns Cause and Effect

Unit 3: Momentum and Energy	**Module 10: Energy and its Conservation**	**Instructional Periods: 18**
Unit 3 Encounter the Phenomenon: *Why is energy important to humans and society?*		
Module/Lessons **(April 1 – April 30)**	**STEELS Standards**	

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Module 10 Launch **Invesigative Phenomenon:** *How can energy from power plants be stored in the power grid for later use?* **Launch Lab: Energy and Falling** Lesson 1: Work and Energy **Quick Investigation: Force Applied at an Angle** **PhysicsLab: Stair Climbing and Power** Lesson 2: The Many Forms of Energy Lesson 3: Conservation of Energy **Quick Investigation: Energy Exchange** **PhysicsLab: Conservation of Energy** **Quick Investigation: Interrupted Pendulum** **Additional Resources:** Revisit the Phenomena, Go Further: Data Analysis Lab, Module Vocabulary Practice and Module Test	Master Performance Expectations 3.2.9-12.O Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. 3.2.9-12.P Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects). 3.2.9-12.Q Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. Related Gizmos •Feel the Heat •Trebuchet •Energy Conversion in a System •Energy of a Pendulum •Inclined Plane - Rolling Objects •Inclined Plane - Simple Machine •Inclined Plane - Sliding Objects Expand on Performance Expectations 3.2.9-12.J Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. Related Gizmos •2D Collisions •Air Track **Disciplinary Core Ideas:** 3.2 Physical Science Definitions of Energy Conservation of Energy and Energy Transfer **Science and Engineering Practices:** Gizmos SEP Graphic Organizers Asking questions and defining Problems Using mathematics and computational thinking Constructing explanations and designing solutions Obtaining, evaluating, and communicating information **Cross-cutting Concepts:** Gizmos CCC Graphic Organizers Cause and Effect Energy and matter

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Unit 4: Waves and Light	**Module 13: Vibrations and Waves**	**Instructional Periods: 10**
Unit 4 Encounter the Phenomenon: ***How do waves affect our everyday lives?***		
Module/Lessons **(May 3- May 28)**	**STEELS Standards**	
Module 13 Launch **Encounter the Phenomenon:** *How can this pendulum save a building from earthquake damage?* **Launch Lab: Wave Interactions** Lesson 1: Periodic Motion **PhysicsLab: Pendulum Vibrations** Lesson 2: Wave Properties Lesson 3: Wave Behavior **Quick Investigation: Wave Interactions** **STEM Unit Project:** *What's inside Earth?* **Module Wrap up:** Revisit the Phenomena, Go Further: Data Analysis Lab, Module Vocabulary Practice and Module Test	Master Performance Expectations 3.2.9-12.T Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. Related Gizmos •Earthquakes 1 - Recording Station •Refraction •Ripple Tank •Waves •Simple Harmonic Motion •Doppler Shift Advanced •Energy of a Pendulum **Disciplinary Core Ideas:** 3.2 Physical Science Wave Properties Conservation of Energy and Energy Transfer **Science and Engineering Practices:** Gizmos SEP Graphic Organizers Asking questions and defining Problems Using mathematics and computational thinking Constructing explanations and designing solutions Obtaining, evaluating, and communicating information **Cross-cutting Concepts:** Gizmos CCC Graphic Organizers Cause and effect Energy and matter	

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Unit 2: Mechanics in Two Dimensions **Module 7: Gravitation (OPTIONAL)** **Instructional Periods: 10** **Unit 2 Encounter the Phenomenon: *How can forces cause so many different types of motion?***		
Module/Lessons	**Suggested Hands-on Activities**	**STEELS Standards**
Module 7 Launch **Encounter the Phenomenon:** *How can gravity keep moons orbiting planets but also cause things to fall?* **(CLAIM)** **COLLECT EVIDENCE:** Lesson 1: Planetary Motion and Gravitation Lesson 2: Using the Law of Universal Gravitation **STEM Unit Project:** *In Orbit* **Module Wrap up:** Revisit the Phenomena, Go Further: Data Analysis Lab, Module Vocabulary Practice and Module Test *additional periods are necessary to complete the Unit Project	**Launch Lab: Model Mercury's Motion** protractor ruler **Lesson 1:** **PhysicsLab: Modeling Orbits** cardboard plain white paper push pins ruler sharp pencil or pen small pieces of tape string **Lesson 2:** **Quick Investigation: Weightless Water** colored water foam or paper cup pencil **PhysicsLab: Inertial Mass and Gravitational Mass** hook hook collar material samples for sample cup meterstick protractor right angle support clamp sample cup with handle stopwatch string support rods triple-beam mass balance	Build to Performance Expectations 3.2.9-12.L Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. Related Gizmos •Coulomb Force (Static) •Gravitational Force •Pith Ball Lab Master Performance Expectations 3.3.9-12.D Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. Related Gizmos •Orbital Motion - Kepler's Laws •Solar System Explorer •Gravitational Force Expand on Performance Expectations 3.2.9-12.I 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. **Disciplinary Core Ideas:** 3.2: Physical Science Forces and Motion 3.3: Earth and Space Science Earth and the Solar System **Science and Engineering Practices:** Gizmos SEP Graphic Organizers Using mathematics and computational thinking Obtaining, evaluating, and communicating information **Cross-cutting Concepts:** Gizmos CCC Graphic Organizers Scale, Proportion, and Quantity

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Unit 5: Electricity and Magnetism	**Module 18: Electrostatics**	**Instructional Periods: 11**
Unit 5 Encounter the Phenomenon: ***What role do electricity and magnetism play in the technology we use every day?***		
Module/Lessons **(May 1 – May 15)**	**Suggested Hands-on Activities**	**STEELS Standards**
Module 18 Launch **Encounter the Phenomenon:** *Why does the rod cause the water to bend?* **(CLAIM)** **COLLECT EVIDENCE:** Lesson 1: Electric Charge Lesson 2: Electrostatic Force Lesson 3: Measuring Electric Fields Lesson 4: Applications of Electric Fields **STEM Unit Project:** *From Raw Resource to Usable Energy* *additional periods are necessary to complete the Unit Project **Module Wrap up:** Revisit the Phenomena, Go Further: Data Analysis Lab, Module Vocabulary Practice and Module Test	**Launch Lab: Electrostatic Force: Another Field Force** hole punch piece of wool plastic ruler scraps of paper **Lesson 2:** **Quick Investigation: Investigating Induction and Conduction** balloon electroscope wool **Lesson 4:** **Quick Investigation: Electric Fields** 30- x 30-cm foam square nylon thread piece of wool pith ball plastic straw **Quick Investigation: Construct a Capacitor** 10- x 10-cm aluminum foil squares 10- x 10-cm plastic wrap squares alligator clip hand-crank generator voltmeter	Build to Performance Expectations 3.2.9-12.N Communicate scientific and technical information about why the molecularlevel structure is important in the functioning of designed materials. 3.2.9-12.S 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. Related Gizmos •Charge Launcher •Electromagnetic Induction •Magnetic Induction •Magnetism •Pith Ball Lab •Polarity and Intermolecular Forces •Sticky Molecules Master Performance Expectations 3.2.9-12.L Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. Related Gizmos •Coulomb Force (Static) •Gravitational Force •Pith Ball Lab **Disciplinary Core Ideas:** 3.2 Physical Science Types of Interactions **Science and Engineering Practices:** Gizmos SEP Graphic Organizers Asking questions and defining Problems Using mathematics and computational thinking Constructing explanations and designing solutions Obtaining, evaluating, and communicating information **Cross-cutting Concepts:** Gizmos CCC Graphic Organizers

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		Cause and effect Energy and matter Patterns