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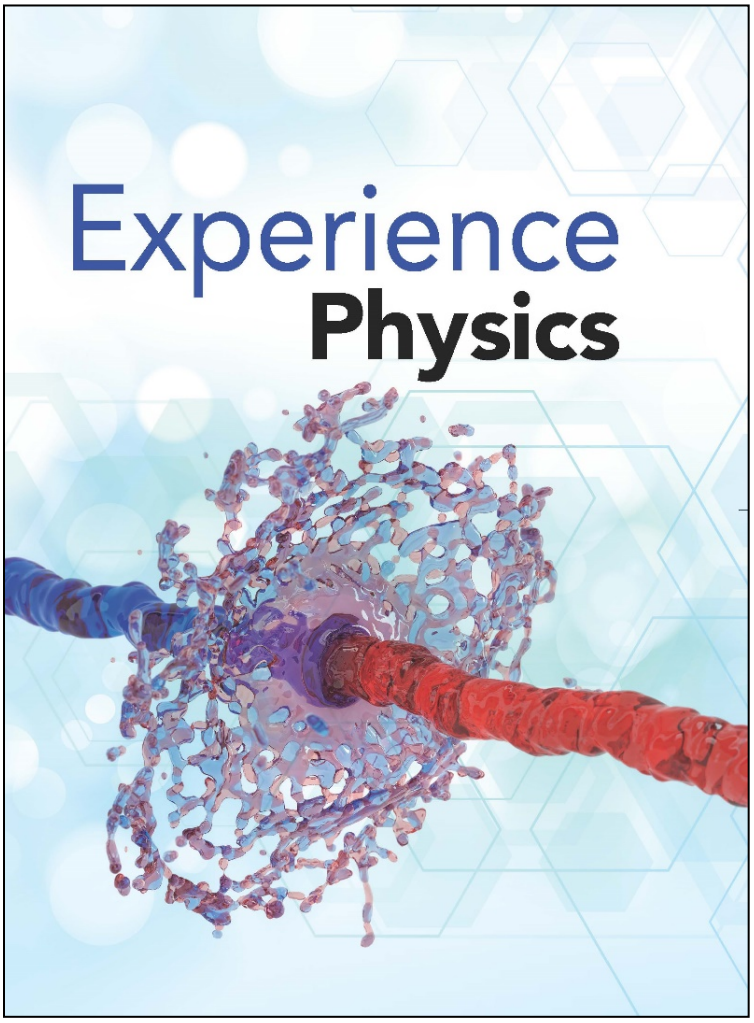

To the

Arizona
Science Standards 2018
High School Physics

Prepared by Savvas Learning Company, formerly Pearson K12 Learning

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High School Physics

Introduction

This document demonstrates how ***Experience Physics*** **©2022** supports the Arizona Science Standards 2016 for High School Physics. Correlation references include the Experience Notebook, Teacher Guide, and online digital assets.

Savvas Learning Company is excited to introduce ***Experience Physics***!

Students best learn science when they *do* science! Therefore, ***Experience Physics*** puts the focus on the student experience. This modern program implements a learning model that organizes learning around phenomena giving students an authentic, real-world experience. ***Experience Physics*** includes a variety of hands-on and digital activities designed to reach every learner, and partners with Flinn Scientific to deliver high-quality inquiry labs, engineering workbenches, and performance assessments.

Phenomenal Experiences Begin with a relevant and engaging phenomenon. Learning is organized around learning around phenomena, giving students an authentic, real-world experience. ***Experience Physics*** includes a variety of hands-on and digital activities designed to reach every learner, encouraging students to ask and answer questions, gather evidence, and organize their reasoning as they experience the concepts of physics firsthand.

Flinn Scientific Partnership Labs, Engineering Workbenches, dataset activities, and performance tasks enhance the student experience and encourage your class to do more science! Hands-on inquiry labs are available in open-ended, guided, shortened, and advanced versions, perfect for meeting the needs of every student.

Personalize Instruction The Teacher Guide allows instructors to personalize their course by selecting from our activities or embedding their own. Enhance instructional plan with Got More Time? Activities, or substitute with Related Phenomena when you want to make a change! Additionally, storyline and Investigation Planners use the 5E model to streamline your prep time.

Build Mathematical Fluency Stepped-out examples in the Experience Handbook break down sample problems for clarity and process guidance, while math tutorial videos reinforce mathematical processes. The Physics and Math Skills Workbook includes four pages of review and practice problems for every learning experience. These activities and more guide students as they become more proficient with math and physics concepts.

Savvas Realize™ Award-Winning Digital Platform Access all your digital content, virtual labs, simulations, assessments, and student data in ONE location. Savvas Realize has offline accessibility, so students can study from anywhere.

A Correlation of Experience Physics ©2022 to the
Arizona Science Standards 2018
High School Physics

Table of Contents

A Correlation of Experience Physics ©2022 to the Arizona Science Standards 2018 High School Physics

Arizona Science Standards 2018 High School Physics	Experience Physics ©2022
(HS.P2) Objects can affect other objects at a distance.	
Motion & Stability–Forces & Interactions	
(Essential HS.P2U1.5) Construct an explanation for a field's strength and influence on an object (electric, gravitational, magnetic).	**Student Experience Notebook:** Sample Problem: Earth and the Moon, 120 Acceleration Due to Gravity, 125 Sample Problem: The International Space Station, 126 Sample Problem: Geosynchronous Orbits, 134 Modeling Multiple Magnets, 205 Magnetic Fields from Moving Charges, 206 Force on a Moving Charge, 207 SEP Construct an Explanation, 393 SEP Design a Solution, 393 Electric Potential Field, 414 Point Charges, 415 Superposition, 416 Potential Due to Pint Charges, 417 Equipotential Surfaces, 418 Potential Difference, 419 Alternating Current Generators, 436 Direct Current Generators, 437 Motors, 439 Induction Devices, 442–443 **Teacher Guide:** **Inquiry Labs:** Electric Motors and Generators, Magnetic Force and Separation Distance, **Digital Activities:** Electromagnetic Energy, Energy in Electric Circuits, Series and Parallel Circuits, Power Generation, Properties of Electric Motors, Magnetic Forces, Magnetism, Geomagnetic Polarity Reversal, Breaking Magnets, Magnetic Fields, Combining Magnetic Fields **Performance-Based Assessment:** Build a DC Motor

A Correlation of Experience Physics ©2022 to the Arizona Science Standards 2018 High School Physics

Arizona Science Standards 2018 High School Physics	Experience Physics ©2022
(Plus HS+Phy.P2U1.1) Plan and carry out investigations to design, build, and refine a device that works within given constraints to demonstrate that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.	**Student Experience Notebook:** Magnetic Force on a Wire, 213–215 SEP Plan an Investigation, 214 Modeling a Simple Motor, 219 Current and Magnetic Fields, 220–222 **Teacher Guide:** **Inquiry Labs:** Electromagnets and Magnetism, Induction of Electrical Current, Electric Motors and Generators **Digital Activities:** Generator Testing, Magnetic Fields, Inducing Current **Engineering Workbench:** Build a Flashlight Without Batteries **Performance-Based Assessment:** Build a DC Motor
(HS.P3) Changing the movement of an object requires a net force to be acting on it.	
Motion & Stability–Forces & Interactions	
(Essential HS.P3U1.6) Collect, analyze and interpret data regarding the change in motion of an object or system in one dimension, to construct an explanation using Newton's Laws.	**Student Experience Notebook:** Force Causes an Acceleration, 54 Sample Problem: Mowing the Lawn, 55 Modeling Force, 60-61 Writing Force-Acceleration Equations, 61 SEP Analyze and Interpret Data, 66 SEP Use Mathematics, 72 Solving Two-Dimensional Force Problems, 73 **Teacher Guide:** **Inquiry Lab:** Forces and Motion **Digital Activities:** Force, Mass, and Acceleration; Sliding Down **Performance-Based Assessment:** Force, Mass, and Acceleration

A Correlation of Experience Physics ©2022 to the Arizona Science Standards 2018 High School Physics

Arizona Science Standards 2018 High School Physics	Experience Physics ©2022
(Plus HS+Phy.P3U1.2) Develop and use mathematical models of Newton's law of gravitation and Coulomb's law to describe and predict the gravitational and electrostatic forces between objects.	**Student Experience Notebook:** What Causes Free Fall?, 116 Gravitational Force, 118 Electric Charge, 156 Electrons, Protons, and Neutrons, 157 Electric Force, 158 Electric Force and Vectors, 160 Coulomb Forces Between Atoms, 251 Covalent Bonds, 252 **Teacher Guide:** **Inquiry Lab:** Electric Charges and Coulomb's Law **Performance-Based Assessment:** Build and Test and Electroscope
(Plus HS+Phy.P3U1.3) Develop a mathematical model, using Newton's laws, to predict the motion of an object or system in two dimensions (projectile and circular motion).	**Student Experience Notebook:** Speed and Velocity, 13 SEP Analyze and Interpret Data, 13 Speed and Velocity Graphs, 15 SEP Argue from Evidence, 15 SEP Analyze and Interpret Data, 20 Graphs of Changing Velocity, 22 Acceleration, 23 SEP Analyze and Interpret Data, 34 Projectile Motion, 38 Force Causes an Acceleration, 54 Momentum, 56 Representing Forces, 58 Mowing the Lawn, 55 Writing Force-Acceleration Equations, 61 SEP Analyze and Interpret Data, 64 SEP Analyze and Interpret Data, 66 SEP Use Mathematics, 72 **Teacher Guide:** **Inquiry Labs:** Motion Plots, Free Fall Acceleration, Model Projectile Motion **Digital Activities:** Acceleration, Fast Cars, Satellites in Circular Orbits, Types of Forces, Vehicle Stopping Distance, Coin Drop **Performance-Based Assessment:** Speed, Acceleration, and Trajectory

A Correlation of Experience Physics ©2022 to the Arizona Science Standards 2018 High School Physics

Arizona Science Standards 2018 High School Physics	Experience Physics ©2022
(Plus HS+Phy.P3U1.4) Engage in argument from evidence regarding the claim that the total momentum of a system is conserved when there is no net force on the system.	**Student Experience Notebook:** SEP Argue from Evidence, 331 Conserving Momentum in Space, 332 Conserving Angular Momentum, 333 SEP Use Models, 333 Impulse-Momentum Theorem, 336 Impulse and Momentum in Collisions, 338 SEP Use Mathematics, 343 A Ballistic Pendulum, 344 Inelastic Collision, 346 **Teacher Guide:** **Digital Activity:** Minimizing Car Crash Injuries
(Essential HS.P3U2.7) Use mathematics and computational thinking to explain how Newton's laws are used in engineering and technologies to create products to serve human ends.	**Student Experience Notebook:** Sample Problems, 63 Revisit Anchoring Phenomenon, 111 **Teacher Guide:** **Digital Activity:** Minimizing Car Crash Injuries **Engineering Workbench:** Egg Supply Drop, Design a Roller Coaster **Performance-Based Assessment:** Build Your Own Egg-Transport Vehicle, Rocket Launch; Design, Build, and Refine a Wind-Turbine Rotor
(Plus HS+Phy.P3U2.5) Design, evaluate, and refine a device that minimizes or maximizes the force on a macroscopic object during a collision.	**Student Experience Notebook:** SEP Construct an Explanation, 347 Investigation Assessment, 363 **Teacher Guide:** **Digital Activity:** Minimizing Car Crash Injuries **Engineering Workbench:** Egg Supply Drop **Performance-Based Assessment:** Build Your Own Egg-Transport Vehicle

Arizona Science Standards 2018 High School Physics	Experience Physics ©2022
(HS.P4) The total amount of energy in a closed system is always the same but can be transferred from one energy store to another during an event.	
Energy & Waves	
(Essential HS.P4U1.8) Engage in argument from evidence that the net change of energy in a system is always equal to the total energy exchanged between the system and the surroundings.	**Student Experience Notebook:** Kinetic Energy and the Work-Energy Theorem, 288 SEP Use Mathematics, 288 Energy Bar Charts, 289 Sample Problem: Work Done on a Book, 290-291 SEP Use Mathematics (20), 293 Mechanical Energy Bar Charts, 303 Sample Problem: Bowling Ball Bounce, 304-305 Energy - A Conserved Quantity, 309 Modeling Systems, 311 Expanded-Work Energy Theorem, 312 Sample Problem: Roller Coaster Energy, 314-315 **Teacher Guide:** **Inquiry Labs:** Gas Particles and Work **Performance-Based Assessments:** Rocket Launch

Arizona Science Standards 2018 High School Physics	Experience Physics ©2022
(Essential HS.P4U3.9) Engage in argument from evidence regarding the ethical, social, economic, and/or political benefits and liabilities of energy usage and transfer.	**Student Experience Notebook:** Energy Use, Population, and Impact, 446 Impacts on the Biosphere, 447 Impact Reduction, 448 Human Power Needs, 449-450 Energy Storage Technologies, 451 Costs and Benefits, 452 Costs and Benefits of Renewable Energy, 453 Costs and Benefits: Oil, Gas, and Coal, 454 Costs and Benefits: Wind, Solar, and Biomass, 455 Costs and Benefits: Hydroelectric, Geothermal, Tides, and Waves, 456 Costs and Benefits: Nuclear Power, 457 Sustainable Energy Future, 458–459 Energy from the Sun, 558 **Teacher Guide:** **Inquiry Labs:** Converting Sunlight to Electricity, Natural Resource Management **Digital Activities:** Resource Use and Biodiversity Trade Offs, Operate a Nuclear Fission Reactor **Engineering Workbench:** Design an Airdrop System, Egg Supply Drop, Earthquake-Resistant Structures **Performance-Based Assessment:** Build Your Own Egg-Transport Vehicle, Minimizing Car Crash Injuries **Problem-Based Learning:** Staying Fit to Mars and Back, Ultraviolet Radiation
(Plus HS+Phy.P4U1.6) Analyze and interpret data to quantitatively describe changes in energy within a system and/or energy flows in and out of a system.	**Student Experience Notebook:** Average Kinetic Energy of Gas Particles, 369 SEP Use Mathematics, 369 Transferring Energy Through Heating, 374-375 SEP Analyze Data, 375 SEP Use Mathematics, 376 SEP Use Mathematics, 380 **Teacher Guide:** **Inquiry Labs:** Kinetic Energy; Heat Transfer **Digital Activities:** Thermal Equilibrium and Heat Flow **Performance-Based Assessments:** Heating Curve of Water

Arizona Science Standards 2018 High School Physics	Experience Physics ©2022
(Plus HS+Phy.P4U2.7) Design, evaluate, and refine a device that works within given constraints to transfer energy within a system.	**Student Experience Notebook:** SEP Design a Solution, 206 SEP Design a Solution, 212 SEP Design a Solution, 238 Engineering Performance-Based Assessment, 363 **Teacher Guide:** **Inquiry Labs:** Build a Battery, Electric Motors and Generators **Engineering Workbench:** Design a Roller Coaster **Performance-Based Assessment:** Design, Build, and Refine a Wind-Turbine Rotor
(Plus HS+Phy.P4U1.8) Use mathematics and computational thinking to explain the relationships between power, current, voltage, and resistance.	**Student Experience Notebook:** Current, 187 Conductivity and Resistivity, 188 Series and Parallel Resistance, 190-191 What Causes Current?, 421 Ohm's Law, 422 SEP Use Mathematics, 422 Voltage-Current Relationship, 423 Circuit Elements and Diagrams, 424-425 Analyzing a Circuit, 431 Sample Problem: Applying Kirchoff's Junction Rule, 432-433 SEP Construct an Explanation, 434 SEP Use Mathematics, 444 **Teacher Guide:** **Inquiry Labs:** Build a Battery, Electric Motors and Generators

A Correlation of Experience Physics ©2022 to the Arizona Science Standards 2018 High School Physics

Arizona Science Standards 2018 High School Physics	Experience Physics ©2022
(Essential HS.P4U1.10) Construct an explanation about the relationships among the frequency, wavelength, and speed of waves traveling in various media, and their applications to modern technology.	**Student Experience Notebook:** Properties of Waves, 467 SEP Analyze Data, 467 SEP Use Mathematics, 467 Transverse Waves, 468–470 SEP Analyze and Interpret Data, 469 Wave Speed at an Interface, 471 SEP Argue from Evidence, 471 Longitudinal Waves, 472–474 Modeling Waves, 475 Moving Wave Source, 480–481 Standing Waves, 485–487 Energy in Waves, 490–492 Storing Pictures in Digital Code, 543 Storing Sounds in Digital Code, 544 Investigating Phenomenon, 548 Audio Information, 549 Visual Information, 550–551 Medical Imaging, 552–553 Antennas, 554–555 **Teacher Guide:** **Inquiry Lab:** Mechanical Waves, Binary Logic **Digital Activities:** Making Waves, Properties of Waves, Waves and Shallow Water **Performance-Based Assessment:** Send Messages with a Telegraph