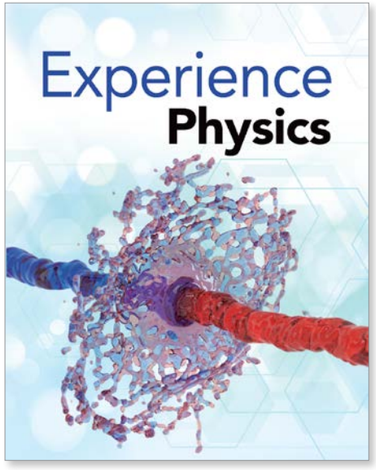
New!

Experience Physics ©2022



It's the science of doing!

Students best learn science when they do science. *Experience Physics* is a modern program that puts the focus on the student experience. Learning is based on hands-on investigation of real, compelling phenomena.

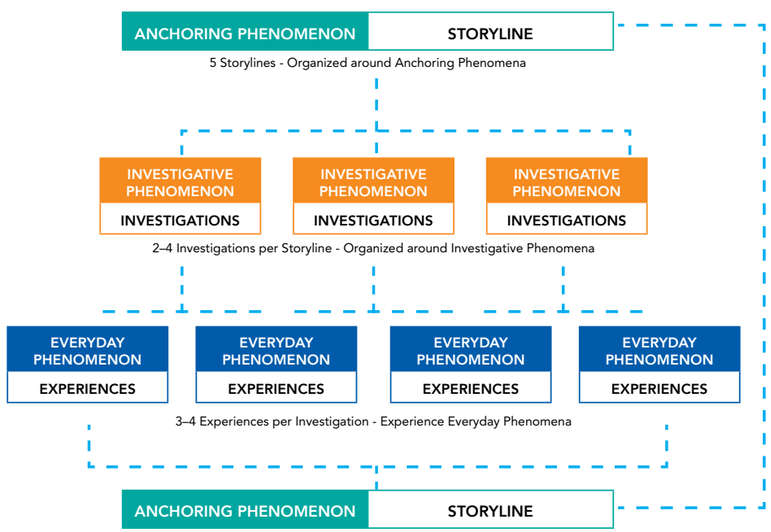
This new program implements a learning model that:

- Organizes learning around phenomena, giving students an authentic, real-world experience.
- Includes a variety of hands-on and digital activities designed to reach every learner.
- Partners with Flinn Scientific to deliver high-quality inquiry labs, engineering workbenches, and performance assessments.
- Allows instructors to personalize their course by selecting from our activities or embedding their own.

A Phenomenal Experience

Phenomena organization maximizes student engagement.

Phenomenon-based NGSS Organization



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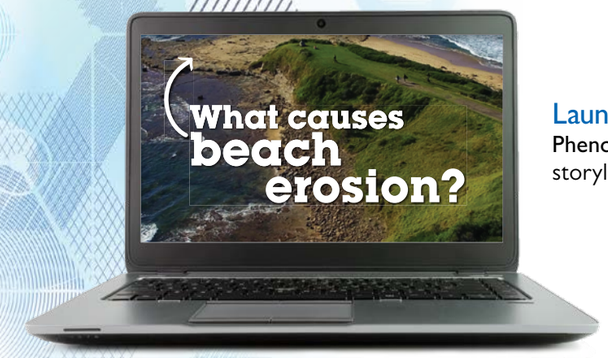
Professional Learning resources available.
See page 47.



Launch the Phenomenon

Phenomenon Video sets a clear storyline for studying the core concept.

Phenomenon Demonstrations

Provide students with a hands-on experience.

ANCHORING PHENOMENON DEMONSTRATION

Shake a spring toy up and down to show waves that look like the ones i the picture.

Ask "How is the shaking of the spring similar to the phenomenon?" (Stu should note the similar shape of the waves.)

Anchoring Phenomenon Discussion Use the class discussion about the Anchoring Phenomenon Video to prompt students to record claims abo they observed. Students will come back to these claims later on, at the each investigation.

Ask "How does this phenomenon resemble other things that you have observed?" (Some students may see connections to waves in the ocean another body of water.)

Revisit

INVESTIGATIVE PHENOMENON

ONLINE **CLAIM EVIDENCE REASONING** Go online to revisit your **Investigative Phenomenon CER** with the new information you have learned about Properties of Waves.

These questions will help you apply what you learned in this experience to the Investigative Phenomenon.

18 **SEP Use Mathematics** At the beach, you time the wave crests hitting the shore and determine there is 20 seconds between crests. Determine the frequency of the wave. Would you expect this frequency to change if you made your measurement further out from the shore?

19 **SEP Analyze and Interpret Data** After determining the frequency, you then use a handheld sonar system to determine the ocean depth at 10 m increments from the shore. The data is shown in the table. Complete the table and construct a graph of the wave speed as a function of the depth.

Distance (m)	Depth (m)	Speed (m/s)	Wavelength (m)

Revisit the Phenomenon

Students revisit the phenomenon repeatedly as more knowledge is uncovered to broaden their understanding.

Alternative Phenomenon

Looking for more ideas? The Teacher Guide offers alternative suggestions for Anchoring, Investigative, and Everyday Phenomena.

RELATED PHENOMENA

In addition to quantum corrals, consider using other phenomena as anchoring events for Storyline 4.

Imaging Inside the Body Search for an ultrasound image, of a kidney with kidney stones. Students can explain how waves are employed to provide information about what's happening inside the body.

Animals That See Beyond Visible Light Explain to students that many living things are

Flinn Scientific: Our Partner in Inquiry

Experience Physics is the science of doing. An exclusive partnership with Flinn Scientific embeds engaging Flinn Scientic Labs, Engineering Workbenches, and activities throughout the program.

EXPLORE

Mechanical Waves

Inquiry Lab In this lab, students use spring toys and ropes to model transverse and longitudinal waves, describe their properties, and explore the mathematical relationships among amplitude, wavelength, frequency, and speed [SEP-5].

Background Read the background for information on waves and wave properties and how the spring toys and ropes can be used to model waves.

Lab Overview Video Watch the video for advice on materials and preparation.

Choose your version Open-ended (O), Guided (G), Shortened (S), or Advanced (A).

Materials Meter stick, nylon string (10 cm per group), spring toy, timer, scientific calculator, wave motion rope (optional)

Inquiry Labs

- Explore concepts with an inquiry lab in every learning experience.
- Differentiate instruction with four versions of every lab: Open-Ended, Guided, Shortened, and Advanced.
- Customize the labs on the Savvas Realize™ platform to fit your unique classroom needs.

Engineering Workbench

Students design, test, and evaluate solutions that mimic the real-world activities of engineers. Activities are connected to related careers on the Using Physics Today Hook & Inspire site accessible through Realize.

ENGINEERING WORKBENCH

Plastic from Biowaste

After lunch, your school cafeteria's trash may be full of plastic bottles, plastic forks, and other plastic packaging. You are concerned about all this plastic, as you know it takes thousands of years for traditional petroleum-based plastics to breakdown. You know that they are polluting the oceans and land. At the same time, plastics are convenient and useful. What if you could engineer a plastic that is derived from plants? Can you imagine a plastic made from banana or orange peels? You will develop a polymer made from plant materials that is also biodegradable.

Focus on Engineering Practices

ENGINEERING PERFORMANCE TASK

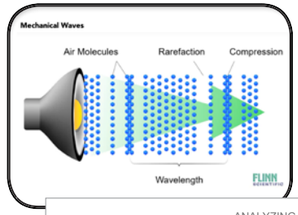
Electricity and Wind Energy

How much electricity can you harness from the wind alone? In this lab, you will design and build a miniature wind turbine to see how much electricity it can produce. It will be up to you and your partner(s) to determine which of the provided materials to use and how to put them together to produce the greatest amount of power. The voltage and amperage of the spinning rotor will be measured with a multimeter to determine the amount of generated power.

Focus on Science Practices

Performance-based Assessments

Students demonstrate NGSS mastery by applying their understanding to a new situation at the end of every Investigation.



Videos

Engaging Overview and Summary Videos introduce the lab and connect to phenomena.

ANALYZING DATA

Greenhouse Gas Emissions and Climate Change

Greenhouse gases like carbon dioxide and methane gas are naturally found in the atmosphere. Human activities, such as burning fossil fuels or raising livestock release greenhouse gases into the atmosphere. Oceans absorbs dissolved carbon dioxide which reacts with the water to form carbonic acid. **Figure 1** shows the trend in global anthropogenic greenhouse gas emissions from 1990 to 2016. **Figure 2** shows atmospheric carbon dioxide levels (CO_2) and the ocean composition including the CO_2 and pH levels of the water near the NOAA Mauna Loa Observatory in the North Pacific during the same time.

Data Set Activities

Students develop mathematical fluency using data sets that connect physics concepts to real-world issues.

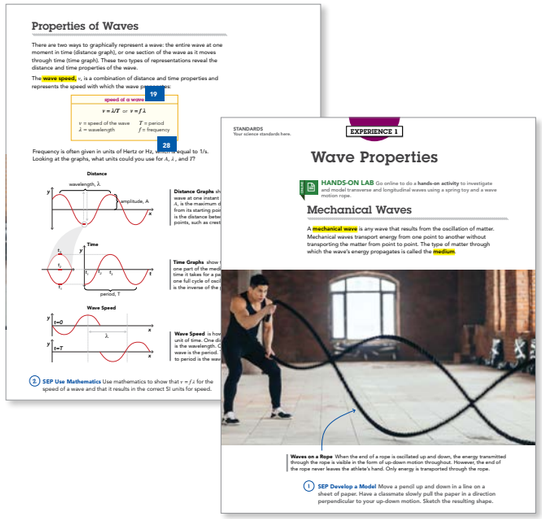
Lab Kits

Simplify lab setup and solution preparation with readily accessible kits aligned to Flinn Scientific labs, activities, and assessments.

Hands-on Explorations

- Give all students access to phenomena in compelling **Virtual Labs.**
- Improve visual and media literacy while watching **BoClips videos.**
- **PhET™ simulations** engage students in an intuitive, game-like environment. Accompanying worksheets connect the simulations to the content.
- **Modeling Activities** provide opportunities for students to model, describe, and predict the behavior of a range of different phenomena.
- Promote collaboration and engage students in science discourse with **Peer Review** and **Discussion rubrics.**
- Students improve science literacy skills with **Analyzing Data** and **Writing About Science** activities.
- Write, defend, and revisit arguments in **Claim-Evidence Reasoning** exercises that accompany the **Investigative Phenomena.**
- **Hook & Inspire Using Physics Today** demonstrates the realworld application of physics careers.

PhET™ is a registered trademark owned by The Regents of the University of Colorado



Student Experience Handbook

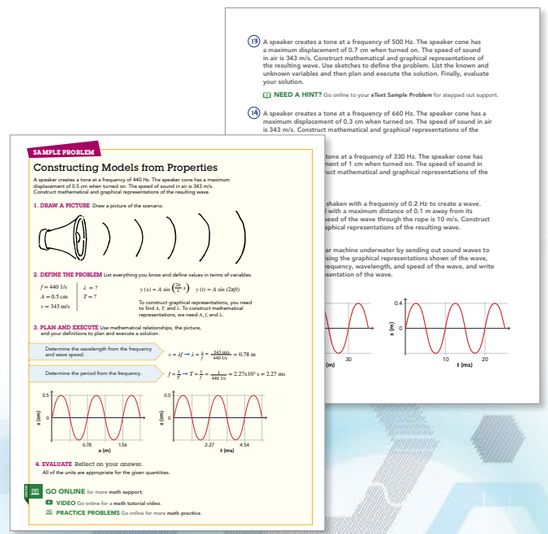
Experience Physics follows the 5E model. The first time students interact with their Student Experience Handbook is during the Explain section.

Only after students have interacted with phenomena and explored through hands-on science activities do they complete the readings and math practice in the Student Experience Handbook. This allows the content to present a real-world application to students, while providing necessary information for them to continue with the more in-depth Elaborate activities and Evaluations.

More Math Practice

Students interact with math problems, math related science, and engineering practices to become more proficient with math and physics concepts.

- **Physics and Math Skills Workbook** includes four pages of review and practice problems for every learning experience.
- Students explore math through the **Desmos** calculator as they work thorough physics problems.
- **Stepped-out examples** break down sample problems for clarity and process guidance.
- **Problem Banks** on the Savvas Realize™ platform provide students with additional problems to build mathematical fluency.
- **Analyzing Data Activities** provide opportunities for students to apply mathematical concepts in real-world contexts.
- **Lab analysis** puts science and engineering skills into practice using collected data and mathematical models.
- **Math Tutorial Videos** reinforce mathematical processes, making them perfect for remediation and differentiating instruction.



Students Demonstrate Understanding

Multiple modes of assessment make it easier for students to demonstrate understanding of the NGSS.

Storyline Level
- Problem-Based Learning Experience
- End-of-Year tests

Investigation Level Assessment
- Performance-Based Assessments
- Engineering Workbench
- 3-Dimensional Assessments
- Revisit the Anchoring Phenomenon

Experience Level Assessment
- Interactive online quizzes
- Assess-on-the-Spot
- Revisit Investigative Phenomenon
- Practice Problem Bank

Pre-Testing
- Math readiness test

Experience Physics Professional Learning

Visit **pd.savvas.com** to see all PL offerings!

my SAVVAS Training

Ask about our Program Activation Services!
Our activation services provide you with an orientation to the program components and design, in order to prepare you for the first day in the classroom.

Experience Physics ©2022: Implementation Essentials

Experience Physics Implementation Essentials is designed to support educators in implementing the program with fidelity. Participants dig into the components, instructional design, and structure of the program. Participants will practice applying specific features and design elements (including instructional philosophy, lesson structure, and content) to classroom practice through hands-on activities and observation of a demonstrated lesson. Participants will receive a prescriptive, week-by-week implementation training plan to use following the workshop that can be customized to their needs.

ISBN: 0000125051

Experience Physics ©2022: Job-Embedded Services

Job-Embedded Services for *Experience Physics* provide different levels of coaching to focus on the effective implementation of the program. These on-site, shoulder-to-shoulder services provide teachers and leaders with varying levels of support, both in and out of the classroom to increase levels of understanding and strengthen instruction with the program. Focus areas are customized based on individual need and typically support instruction through the use of product tools and resources. By way of practical application, teachers can reinforce what they have learned in prior curriculum program professional development.

Participant size will vary depending on the type of support provided.

ISBN: 0000125050

Experience Physics ©2022

Description	13 Digit ISBN	Price
Student Resources		
Student Edition (print) **+ Savvas Realize™ Digital Courseware**		
6-year student license	9781418345877	129.97
1-year student license	9781418345860	109.97
Student Handbook (print only)	9781418333966	99.47
Teacher Resources		
Teacher Guide (print)	9781418333973	187.47

Description	13 Digit ISBN	Price
Digital Courseware on Savvas Realize		
Realize Digital Standalone		
6-year student license	9781418345891	99.97
1-year student license	9781418345884	29.97

Prices and availability are effective 10/01/20 and are subject to change without notice