Physics
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Program Overview

Introduction

This guide explores the Savvas Physics by Walker program. It reviews the program philosophy, organization, and core program components. It also examines how the program addresses the Next Generation Science Standards* and supports the Common Core State Standards (CCSS).

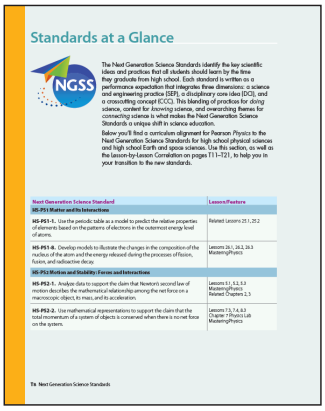
Follow along with your Savvas Physics Teacher's Edition textbook and Laboratory Manual.

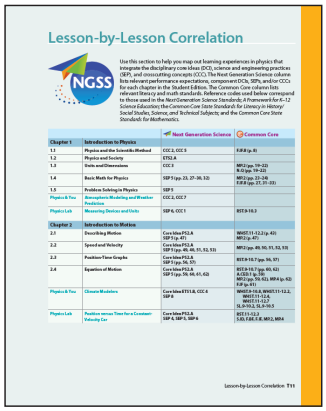
Program Philosophy

The Next Generation Science Standards describe the key concepts and practices that students should learn and be able to do. Each standard is a performance expectation that integrates science and engineering practices, disciplinary core ideas, and crosscutting concepts. The standards' goal is to create scientifically proficient students who engage in science practices during authentic conceptual experiences. Savvas Physics blends the practices for doing science, the content for knowing science, and the overarching themes for connecting science to build students' scientific literacy.

In addition, Savvas Physics supports students' literacy and mathematical understanding as described in the CCSS.

View the Standards at a Glance feature and the Lesson-by-Lesson Correlation pages in the front of the Teacher's Edition to see where the lessons address the standards.





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Program Components

Savvas Physics offers an array of print components in addition to various online elements. In print, find the Teacher's Edition and student edition of both the textbook and the Laboratory Manual.

Online, find the eText through the MasteringPhysics® platform at MasteringPhysics.com—the online component of Savvas Physics.

Download the Savvas eText app for mobile access to the text.

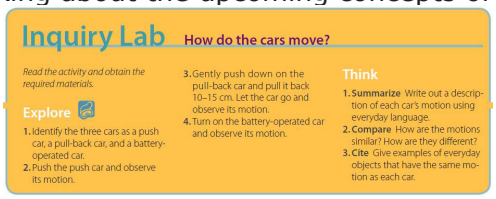
Additional online resources are available through MasteringPhysics®. Find instructor resources, such as lesson plans, exams, presentations, and notes for the labs. Support your students by assigning the various tutorials, coaching activities, and practice problems.

Learn more about MasteringPhysics® later in this guide.

Doing Science

Savvas Physics is built around the understanding that students need to do science, learn scientific concepts, and make connections within science and to real-world contexts. Use the text features to help students build a solid, integrated understanding of what science encompasses.

Provide an opportunity for students to engage in the simple Inquiry Lab to begin thinking about the upcoming concepts of the chapter.



Inquiry Lab How do the cars move?

Read the activity and obtain the required materials.

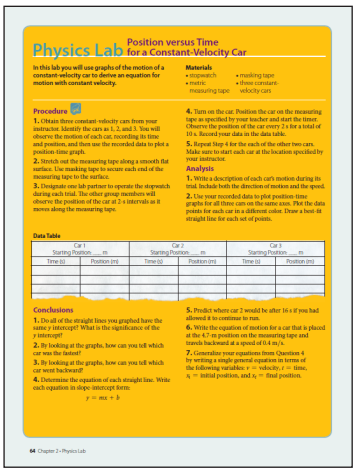
Explore

1. Identify the three cars as a push car, a pull-back car, and a battery-operated car.
2. Push the push car and observe its motion.
3. Gently push down on the pull-back car and pull it back 10–15 cm. Let the car go and observe its motion.
4. Turn on the battery-operated car and observe its motion.

Think

1. **Summarize** Write out a description of each car's motion using everyday language.
2. **Compare** How are the motions similar? How are they different?
3. **Cite** Give examples of everyday objects that have the same motion as each car.

Then, have students summarize the chapter concepts by using the Physics Labs, which is located at the end of each chapter. These single-page, traditional labs use easy-to-find materials. Employ the Inquiry Labs and Physics Labs to provide your students with the experience of doing science.



Physics Lab Position versus Time for a Constant-Velocity Car

In this lab you will use graphs of the motion of a constant-velocity car to derive an equation for motion with constant velocity.

Materials
- stopwatch
- metric measuring tape
- masking tape
- three constant-velocity cars

Procedure

1. Obtain three constant-velocity cars from your instructor. Identify the cars as 1, 2, and 3. You will observe the motion of each car, recording its time and position, and then use the recorded data to plot a position-time graph.
2. Stretch out the measuring tape along a smooth flat surface. Use masking tape to secure each end of the measuring tape to the surface.
3. Designate one lab partner to operate the stopwatch during each trial. The other group members will observe the position of the car at 2-s intervals as it moves along the measuring tape.
4. Turn on the car. Position the car on the measuring tape as specified by your teacher and start the timer. Observe the position of the car every 2 s for a total of 10 s. Record your data in the data table.
5. Repeat Step 4 for the each of the other two cars. Make sure to start each car at the location specified by your instructor.

Analysis

1. Write a description of each car's motion during its trial. Include both the direction of motion and the speed.
2. Use your recorded data to plot position-time graphs for all three cars on the same axes. Plot the data points for each car in a different color. Draw a best-fit straight line for each set of points.

Data Table

Car 1 Starting Position ___ m		Car 2 Starting Position ___ m		Car 3 Starting Position ___ m	
Time (s)	Position (m)	Time (s)	Position (m)	Time (s)	Position (m)

Conclusions

1. Do all of the straight lines you graphed have the same y intercept? What is the significance of the y intercept?
2. By looking at the graphs, how can you tell which car was the fastest?
3. By looking at the graphs, how can you tell which car went backward?
4. Determine the equation of each straight line. Write each equation in slope–intercept form.

$$y = mx + b$$

5. Predict where car 2 would be after 16 s if you had allowed it to continue to run.
6. Write the equation of motion for a car that is placed at the 4.7-m position on the measuring tape and travels backward at a speed of 0.4 m/s.
7. Generalize your equations from Question 4 by writing a single general equation in terms of the following variables: v = velocity, t = time, x_i = initial position, and x_f = final position.

64 Chapter 2 • Physics Lab

Learning Science Concepts

Point students to the Big Idea at the beginning of each chapter to bring awareness to the chapter's overarching concept.

Note the Key Questions feature that brings attention to important concepts in the text section. Use the questions as you plan to highlight key ideas to discuss.

Direct your students to the Math HELP boxes in the side margins of the text when they need additional mathematics support.

Example problems are woven throughout the text and are designed to help you meet your students' diverse set of needs.

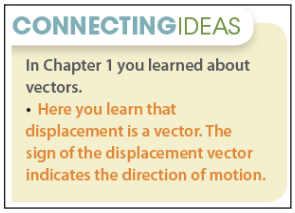
Use the Quick Examples to show simple and concise solutions that model how to use equations and measurement units. Explore the Conceptual Examples to investigate an interesting question and the reasoning and physics behind the answer.

Prompt students to solve problems by thinking through the logic described and then to check their solution paths with the Active Examples. Use the Guided Examples to help students learn how to approach and solve problems.

Utilize these examples to explore a method for approaching the problem, study the key concepts that apply to it, and investigate a detailed step-by-step solution path.

Connecting Science

Students must have a connected understanding of science to be scientifically proficient. Note the Connecting Ideas feature in the side margins. Use this feature to support your students to make explicit connections between new and previously learned scientific concepts.

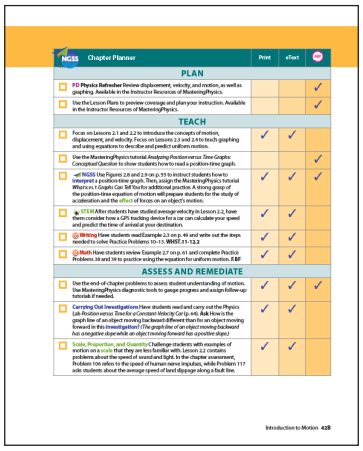


Encourage students to read the Physics & You pages. This feature explains the physics behind interesting technologies and the impact of the concepts on society and various careers.

Teacher Support

Savvas Physics offers several in-text supports to help you plan and teach. Use the Teacher Guide at the beginning of each chapter as you plan your upcoming lessons.

Find information on how to build students' skills and important concepts to know. Use the Chapter Planner before you start each unit. Review details on the main idea of each lesson, suggested activities, tutorials, and additional resources to support your teaching.



Chapter Planner

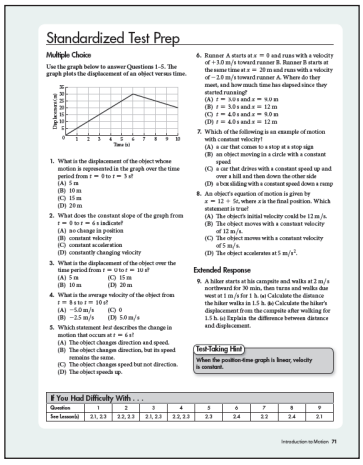
PLAN

TEACH

ASSESS AND REMEDIATE

Notice the pink text, which provides answers to problems, suggestions for teaching, and information on resources that you can use.

Use the Lesson Check at the end of each section to assess students' understanding. The Assessment pages at the end of each chapter offer additional assessment problems, which are categorized according to the section and type of problem. Assign the Standardized Test Prep problems to provide students with practice for standardized exams.



Standardized Test Prep

Multiple Choice

Extended Response

Test-Taking Hint

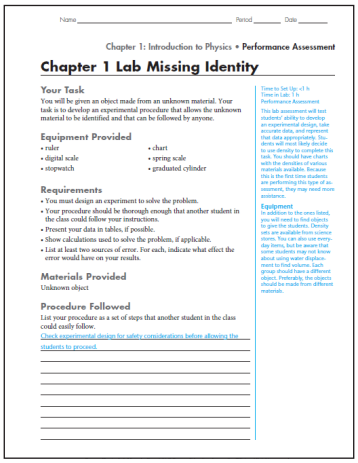
If You Had Difficulty With . . .

Laboratory Manual

The Laboratory Manual provides seventy-five additional lab investigations to support classroom instruction. Introduce concepts through hands-on exploration, and identify students' preconceptions with the qualitative labs. Have students engage in the quantitative lab activities to build upon the qualitative labs. Students use numbers, equations, and graphs as they make measurements, collect and analyze data, draw conclusions, and communicate their results.

Assess students' ability to apply their knowledge through the performance assessment labs. These labs require students to design a procedure to experimentally determine an unknown quantity as they solve a problem.

Review the blue text in the Teacher's Edition Laboratory Manual for solutions as well as tips and information about the lab.



Name _____ Period _____ Date _____

Chapter 1: Introduction to Physics • Performance Assessment

Chapter 1 Lab Missing Identity

Your Task

You will be given an object made from an unknown material. Your task is to develop an experimental procedure that allows the unknown material to be identified and that can be followed by anyone.

Equipment Provided

- ruler
- digital scale
- stopwatch
- chart
- spring scale
- graduated cylinder

Requirements

- You must design an experiment to solve the problem.
- Your procedure should be thorough enough that another student in the class could follow your instructions.
- Present your data in tables, if possible.
- Show calculations used to solve the problem, if applicable.
- List at least two sources of error. For each, indicate what effect the error would have on your results.

Materials Provided

Unknown object

Procedure Followed

List your procedure as a set of steps that another student in the class could easily follow.

Check experimental design for safety considerations before allowing the students to proceed.

Time to Set Up: <1 h
Time in Lab: 1 h
Performance Assessment

This lab assessment will test students' ability to develop an experimental design, take accurate data, and represent that data appropriately. Students will most likely decide to use a balance to complete this task. You should have charts with the densities of various materials available. Because this is the first time students are performing this type of assessment, they may need more assistance.

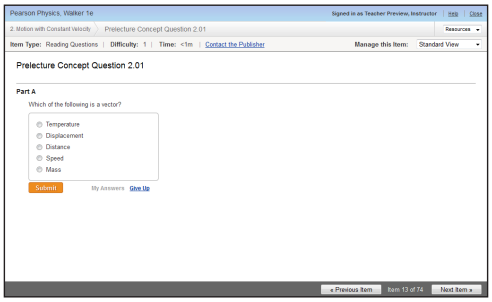
Equipment

In addition to the ones listed, you will need to find objects to give the students. Density sets are available from science stores. You can also use everyday items, but be aware that some students may not know about using water displacement to find volume. Each group should have a different object. Preferably, the objects should be made from different materials.

Both versions of the Laboratory Manual have perforated pages. Tear the pages from the manual to combine the labs with your teaching plans at point of use using a three-ring binder. Direct students to write in the manual; tear out the pages; and add them to their three-ring binders for a complete record of their learning.

MasteringPhysics®

Enhance your instruction with MasteringPhysics®. Assign the Prelecture Reading Questions at the beginning of each section to encourage students to read the text and to prepare for class.



Take advantage of the online assessments, tutorials, and coaching activities. These online resources ask questions and pose problems that directly relate to the concepts that you're teaching in the classroom. Have students use the hints when they get stuck on a problem and the personalized feedback to adjust their strategies and thinking when they answer incorrectly.

Use the Gradebook to keep track of students' progress through a variety of reports. Learn which students are having difficulties, identify how much time students are spending on problems, and see the grade distribution of your class. Drill down to an individual student level to see how long she worked on a problem, which hints she used, and the answers that she provided.

Find a variety of additional resources, including Lesson Plans for each section, a Course Calendar, and a Study Area that provides additional student support.

Review

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