Teaching a Lesson

Introduction

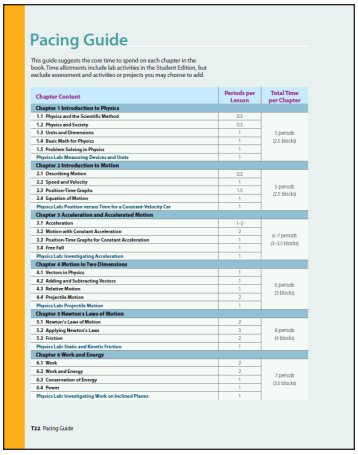
This guide explores the teaching resources that help you plan for instruction and effectively implement the Pearson Physics by Walker program. It also examines various program features to help you teach your lessons.

Planning for Instruction

Plan your instruction on both the chapter and lesson levels using the tools in the Teacher's Edition and on MasteringPhysics.com. Use the Pacing Guide and Teacher Guides as at-a-glance references for long-term planning. Use the resources on MasteringPhysics.com for more detailed day-to-day lesson planning.

Pacing Guide

Locate the Pacing Guide in the front matter of your Teacher's Edition. Notice suggestions for the amount of core time to spend on each chapter. If you teach on a block schedule, note the amount of block time for each chapter given in the parentheses. Also, note the amount of time you should expect for each lesson.



Pacing Guide

This guide suggests the core time to spend on each chapter in the book. Time allotments include lab activities in the Student Edition, but exclude assessment and activities or projects you may choose to add.

Chapter Content	Periods per Lesson	Total Time per Chapter
Chapter 1 Introduction to Physics		
1.1 Physics and the Scientific Method	0.5	5 periods (2.5 blocks)
1.2 Physics and Society	0.5	
1.3 Units and Dimensions	1	
1.4 Basic Math for Physics	1	
1.5 Problem Solving in Physics	1	
Physics Lab: Measuring Devices and Units	1	
Chapter 2 Introduction to Motion		
2.1 Describing Motion	0.5	5 periods (2.5 blocks)
2.2 Speed and Velocity	1	
2.3 Position-Time Graphs	1.5	
2.4 Equation of Motion	1	
Physics Lab: Position versus Time for a Constant-Velocity Car	1	
Chapter 3 Acceleration and Accelerated Motion		
3.1 Acceleration	1–2	6–7 periods (3–3.5 blocks)
3.2 Motion with Constant Acceleration	2	
3.3 Position-Time Graphs for Constant Acceleration	1	
3.4 Free Fall	1	
Physics Lab: Investigating Acceleration	1	
Chapter 4 Motion in Two Dimensions		
4.1 Vectors in Physics	1	6 periods (3 blocks)
4.2 Adding and Subtracting Vectors	1	
4.3 Relative Motion	1	
4.4 Projectile Motion	2	
Physics Lab: Projectile Motion	1	
Chapter 5 Newton's Laws of Motion		
5.1 Newton's Laws of Motion	2	8 periods (4 blocks)
5.2 Applying Newton's Laws	3	
5.3 Friction	2	
Physics Lab: Static and Kinetic Friction	1	
Chapter 6 Work and Energy		
6.1 Work	2	7 periods (3.5 blocks)
6.2 Work and Energy	2	
6.3 Conservation of Energy	1	
6.4 Power	1	
Physics Lab: Investigating Work on Inclined Planes	1	

T22 Pacing Guide

Find pacing for labs, activities, and assessments that support each chapter.

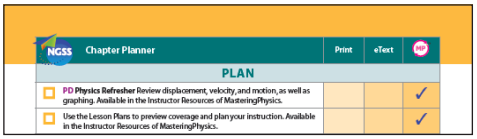
Teacher Guide

Locate the Teacher Guide at the beginning of each chapter. Review the key standards addressed in the chapter, listed on the top left side of the page.

Examine the Building Scientific Literacy feature to find tips on how to build students' scientific literacy and support their reading, writing, and mathematics skills. Find suggested activities to help your students make connections to other fields and increase their learning.

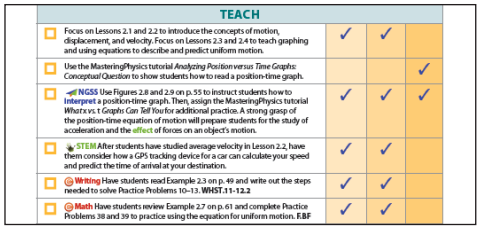
Scan the diagrams that relate to important concepts in the chapter.

Use the Chapter Planner as a detailed guide for the upcoming content. Follow the suggestions in the Plan section to review information on upcoming concepts and to plan your instruction.



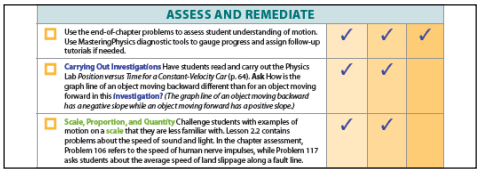
NGSS Chapter Planner	Print	eText	MP
PLAN			
☐ **PD Physics Refresher** Review displacement, velocity, and motion, as well as graphing. Available in the Instructor Resources of MasteringPhysics.			✓
☐ Use the Lesson Plans to preview coverage and plan your instruction. Available in the Instructor Resources of MasteringPhysics.			✓

Incorporate the suggestions in the Teach section to highlight key concepts and engage students in appropriate activities for each lesson.



TEACH			
☐ Focus on Lessons 2.1 and 2.2 to introduce the concepts of motion, displacement, and velocity. Focus on Lessons 2.3 and 2.4 to teach graphing and using equations to describe and predict uniform motion.	✓	✓	
☐ Use the MasteringPhysics tutorial *Analyzing Position versus Time Graphs: Conceptual Question* to show students how to read a position-time graph.			✓
☐ NGSS Use Figures 2.8 and 2.9 on p. 55 to instruct students how to interpret a position-time graph. Then, assign the MasteringPhysics tutorial *What π vs. t Graphs Can Tell You* for additional practice. A strong grasp of the position-time equation of motion will prepare students for the study of acceleration and the effect of forces on an object's motion.	✓	✓	✓
☐ STEM After students have studied average velocity in Lesson 2.2, have them consider how a GPS tracking device for a car can calculate your speed and predict the time of arrival at your destination.	✓	✓	
☐ Writing Have students read Example 2.3 on p. 49 and write out the steps needed to solve Practice Problems 10–13. **WHST.11-12.2**	✓	✓	
☐ Math Have students review Example 2.7 on p. 61 and complete Practice Problems 38 and 39 to practice using the equation for uniform motion. **F.BF**	✓	✓	

Use the Assess and Remediate section to plan assessments that provide insight into student understanding. Then, use the suggestions for differentiation and support in this section to enhance your teaching.

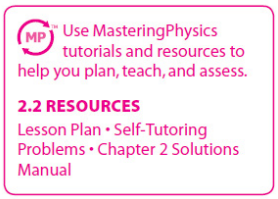


ASSESS AND REMEDIATE			
☐ Use the end-of-chapter problems to assess student understanding of motion. Use MasteringPhysics diagnostic tools to gauge progress and assign follow-up tutorials if needed.	✓	✓	✓
☐ Carrying Out Investigations Have students read and carry out the Physics Lab *Position versus Time for a Constant-Velocity Car* (p. 64). **Ask** How is the graph line of an object moving backward different than for an object moving forward in this investigation? *(The graph line of an object moving backward has a negative slope while an object moving forward has a positive slope.)*	✓	✓	
☐ Scale, Proportion, and Quantity Challenge students with examples of motion on a scale that they are less familiar with. Lesson 2.2 contains problems about the speed of sound and light. In the chapter assessment, Problem 106 refers to the speed of human nerve impulses, while Problem 117 asks students about the average speed of land slippage along a fault line.	✓	✓	

Look to the right-hand columns to find the location of any resources mentioned in the planner.

Planning Resources on MasteringPhysics®

Notice that the Teacher Guide provides suggestions for MasteringPhysics® tutorials and resources at the beginning of each chapter section. Review the suggested resources as you plan.



MP Use MasteringPhysics tutorials and resources to help you plan, teach, and assess.

2.2 RESOURCES

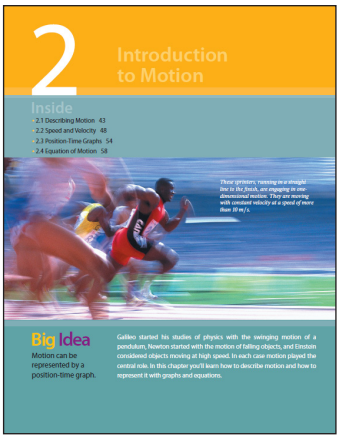
Lesson Plan • Self-Tutoring Problems • Chapter 2 Solutions Manual

Each Lesson Plan details the objectives and the resources available for that lesson. Begin the lesson with the Guiding Question. Conclude by having students write down their answer to the Guiding Question as a quick assessment.

Use the presentation slides to highlight the key ideas and examples of each lesson. Review the Teach section of the Lesson Plan for activity suggestions and tips for teaching and differentiating.

Chapter Features

Each chapter begins with a chapter opener page that highlights the Big Idea, provides section titles, and includes information on the overarching concept of the chapter. Direct students' attention to this page to prepare them for upcoming concepts and relate these concepts to real-world situations.



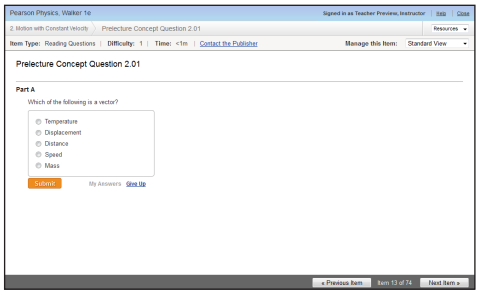
Use the Inquiry Lab at the beginning of each chapter to allow students to explore the upcoming concepts and connect their prior knowledge. Assess students' understanding and skills with the Physics Lab at the end of each chapter.

Direct your attention to the Key Questions as you plan a lesson. These questions highlight important concepts in each section. Find the answers to these questions in bold print within the text.

Lesson Overview

Each lesson offers various opportunities for your students to engage, explain, explore, and evaluate the content.

Encourage students to read the chapter section, and prompt them to consider the concepts before class by assigning the Prelecture Reading Questions on MasteringPhysics®.



Now, take a look at how your lessons incorporate doing science, learning science, and making connections within science and across disciplines.

Engage

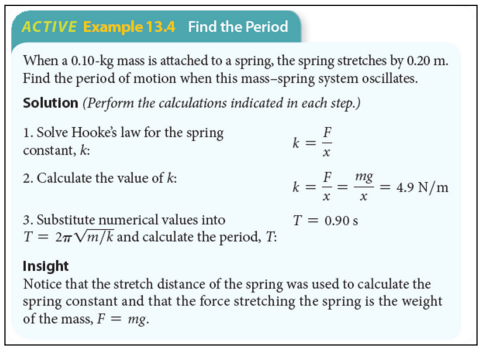
Provide students with an opportunity to consider the upcoming lesson by engaging them in a discussion about the section's opening paragraph. This paragraph provides an opportunity to probe students' understanding and review prior knowledge of the upcoming concepts.

For example, engage students in a discussion of the *x*-*y* coordinate system at the beginning of a lesson that includes graphing.

Notice the vocabulary listed in the side margins. Use the teacher notes and the Reading Support features to help you preteach these concepts.

Explain

Utilize the text, Key Questions, and examples within each lesson to help students understand the main ideas. Refer to the suggested activities in the margins to start a conversation, use visuals, address misconceptions, and make connections to prior concepts and real-world contexts. The example problems model how to use new equations and units, provide detailed explanations to questions, and offer opportunities to think through and solve problems.



Whenever possible, make the lesson more student-centered and interactive by engaging students in thinking about and discussing the concepts in these sections.

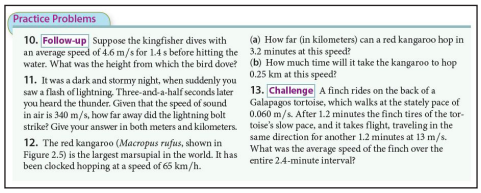
Explore

Engage students in explorations and activities to help them understand the concepts and make connections between the ideas and real-world problems. Review the Lesson Plan on MasteringPhysics® to determine appropriate labs and activities to incorporate into your lesson.

You can find appropriate labs in the Laboratory Manual or in the textbook. Use these labs and activities once students have an understanding of the main concept and skills required to successfully complete the activity. Incorporate as many labs and activities as possible to provide opportunities for students to engage in hands-on investigation and exploration.

Evaluate

Use the Practice Problems throughout the chapter section to formatively assess students' understanding of the new concepts.



Practice Problems

10. Follow-up Suppose the kingfisher dives with an average speed of 4.6 m/s for 1.4 s before hitting the water. What was the height from which the bird dove?

11. It was a dark and stormy night, when suddenly you saw a flash of lightning. Three-and-a-half seconds later you heard the thunder. Given that the speed of sound in air is 340 m/s, how far away did the lightning bolt strike? Give your answer in both meters and kilometers.

12. The red kangaroo (*Macropus rufus*, shown in Figure 2.5) is the largest marsupial in the world. It has been clocked hopping at a speed of 65 km/h.
(a) How far (in kilometers) can a red kangaroo hop in 3.2 minutes at this speed?
(b) How much time will it take the kangaroo to hop 0.25 km at this speed?

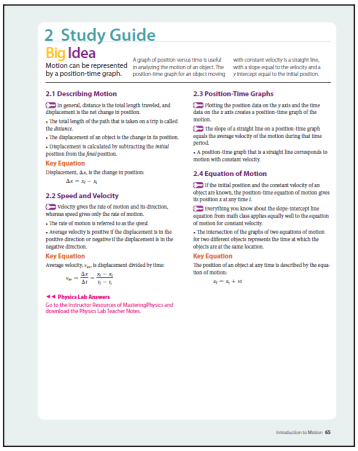
13. Challenge A finch rides on the back of a Galapagos tortoise, which walks at the stately pace of 0.060 m/s. After 1.2 minutes the finch tires of the tortoise's slow pace, and it takes flight, traveling in the same direction for another 1.2 minutes at 13 m/s. What was the average speed of the finch over the entire 2.4-minute interval?

Close each lesson by asking students to write an answer to the Guiding Question for the lesson. Have students complete the Lesson Check, which offers additional practice of the lesson concepts, either online at MasteringPhysics.com or on paper.

Use the results of these assessments to differentiate support for students by assigning the online tutorials and coaching activities on MasteringPhysics®.

Chapter Wrap-Up

Review the lessons' main concepts with the Study Guide at the end of each chapter.



2 Study Guide

Big Idea

Motion can be represented by a position-time graph.

A graph of position versus time is useful in analyzing the motion of an object. The position-time graph for an object moving with constant velocity is a straight line, with a slope equal to the velocity and a *y* intercept equal to the initial position.

2.1 Describing Motion

In general, distance is the total length traveled, and displacement is the net change in position.

- The total length of the path that is taken on a trip is called the distance.
- The displacement of an object is the change in its position.
- Displacement is calculated by subtracting the initial position from the *final* position.

Key Equation

Displacement, Δx, is the change in position:

$$\Delta x = x_f - x_i$$

2.2 Speed and Velocity

Velocity gives the rate of motion and its direction, whereas speed gives only the rate of motion.

- The rate of motion is referred to as the speed.
- Average velocity is positive if the displacement is in the positive direction or negative if the displacement is in the negative direction.

Key Equation

Average velocity, v_{av}, is displacement divided by time:

$$v_{av} = \frac{\Delta x}{\Delta t} = \frac{x_f - x_i}{t_f - t_i}$$

◀◀ Physics Lab Answers

Go to the Instructor Resources of MasteringPhysics and download the Physics Lab Teacher Notes.

2.3 Position-Time Graphs

Plotting the position data on the *y* axis and the time data on the *x* axis creates a position-time graph of the motion.

The slope of a straight line on a position-time graph equals the average velocity of the motion during that time period.

- A position-time graph that is a straight line corresponds to motion with constant velocity.

2.4 Equation of Motion

If the initial position and the constant velocity of an object are known, the position-time equation of motion gives its position x at any time t.

Everything you know about the slope-intercept line equation from math class applies equally well to the equation of motion for constant velocity.

- The intersection of the graphs of two equations of motion for two different objects represents the time at which the objects are at the same location.

Key Equation

The position of an object at any time is described by the equation of motion:

$$x_f = x_i + vt$$

Introduction to Motion 65

Assign problems from the Assessment, which are arranged according to the section of the chapter and the type of problem, to offer students additional skills and problem-solving practice.

Use the Standardized Test Prep to offer practice with multiple-choice and extended-response questions.

Review

This guide explored the teaching resources that help you plan for instruction and effectively implement the Pearson Physics by Walker program. It also examined various program features to help you teach your lessons.