

PHYSICS A WINDOW

THIRD EDITION

ON OUR WORLD

JAY BOLEMON

IN STEREO

PHYSICS A WINDOW

THIRD EDITION

ON OUR WORLD

Jay Bolemon

*The University
of Central Florida*



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***For the curious and enthusiastic
students who inspired this work***

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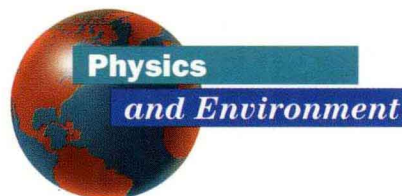
FOR THE STUDENT

Since you are almost certainly not a science major, you may be worried that physics will be really hard to understand. After all, topics which are candy for students of one major can be very sticky hurdles for others. But this book was written for you, with input from many students like yourself, and its principal goal is to help you understand the concepts and ideas of physics. It is about descriptions, how physics describes the things you see around you. (While physicists use equations to describe nature, the calculations here serve more to show how physics works, how it makes predictions. Don't worry, this text won't try to turn you into a physics major!) Everyday experience makes you familiar with some of the ideas of physics, and we use your experiences as starting points whenever we can.

This book, then, is about appreciating the things you see around you in terms of what physicists have discovered over the years. Along the way we will discuss many topics with environmental applications, flagged by an earth icon. Physics gives you a unique perspective of your environment—a window on your world, as the title suggests—that is important to everyone today.

How to Learn from This Book

Here are a few tips on how to study. You'll want to read the chapters several times to be sure you get the vocabulary and the concepts down. Read the chapter quickly the first time, don't spend time with any formula, and stop after reading the summary. Then put the book down for an hour or even a day. The words, definitions, and examples will be more familiar the next time you read through. When you reread the chapter, go more slowly and read everything. After you feel comfortable with the chapter material, you are ready for the Concept Checks. The true-false answers for these are at the back of the book. If you can't answer them correctly, go back to the chapter for help. You'll retain more of the ideas each time you read it. Next, try some of the exercises under Applying the Concepts. Exercises with numbers in orange have answers at the back of the book. Sometimes these are related to things not in your background, and you'll learn from reading the answers. If you are asked to do calculation exercises, save for last those marked with a calculator icon. If the calculation uses one of the equations in the chapter, the icon color sends you to the equation with the icon of matching color. The problems in this text use only addition, subtraction, multiplication, and division, the math you use to balance a checkbook or figure the miles per gallon a car gets during a trip. But before you do these problems, *study Appendix I of this text*, which has examples with powers of ten, significant figures, and changing units of measurement.



The Learning Guide for this text, which comes with computer simulation software, is also valuable for reviewing and preparing for exams. It contains a quick review of each section of the text, with extra conceptual examples and extra calculation examples as well. In addition, it has a practice exam of conceptual questions and another with calculation problems, with detailed answers provided for both. In this guide you'll also find narrative answers for the Concepts Checks.

A last tip: The sooner you start, the better, because last minute studying doesn't work well in physics courses. Begin sooner and you'll learn more. Happy studying!

About the 3D Drawings and Photos

You'll find approximately forty pairs of stereo images throughout the book. Sometimes these will be photographic, and others will be illustrations. The stereo views offer an extra way to visualize the most difficult spatial topics in the book, and we hope you think they're fun to look at! Every copy of the book has a Stereopticon viewer attached to the inside back cover. Remove the viewer from the envelope, and follow the directions printed on it to assemble it (this is really a snap). By placing the viewer between the stereo pairs with the solid side of the viewer nearest you, the viewer will create a 3D image. If you lose your stereo viewer, you can also try a different technique. Hold the book close to you face with your nose between the image pair (close enough so the images are blurry). Then, relax your eyes by pretending to look across the room while you slowly move the book away from your face. This is tricky—but with practice you should be able to see the image in 3D about arms length away from your face. If you enjoy looking at these, your professor may have other stereo pairs that you can view.

TO THE INSTRUCTOR

The new name of this text, *Physics: A Window on Our World*, reflects the major changes in its third edition. As before, its goal is to teach students about physics principally through explanations of topics they can relate to from their own experiences. Its shortened and refined coverage makes it easier for students to study and understand, and its new, colorful format makes it easier to stay with during study sessions. The revision began more than four years ago with comments solicited from hundreds of students who used the second edition. Becky Jakubcin and Shannon Pack, study group leaders in one of the author's classes who became familiar first-hand with where students had difficulty understanding topics, critiqued the second edition for level of presentation and interest. Tino Wright acted as the ultimate "student advocate" who not only criticized the second edition but two versions of manuscript produced in the first two years of the revision. Because of her valued advice and editorial skill, the level of presentation is more even and understandable than before. During the second two years of the revision my editor, Ray Henderson, gathered the comments of many instructors on the manuscript, improving the accuracy of the physics descriptions on many subtle and some not-so-subtle points. Ray also sculpted the new format, fine-tuning its appearance and delivery even during production for interest and ease of understanding. Irene Nunes was the developmental editor during the last year, and she strove for clarity in every sentence. Mike Steffancin helped with the research for this edition, reviewed all the galleys line-by-line, and wrote the excellent Learning Guide for the text. Thomas Kimble drafted the 3D line drawings, often improving on the author's ideas. Dale Nichols furnished many beautiful photographs and suggested others, and Rhoda Sidney tracked down the author's photo requests, not an easy job. Andy Graham of Appalachian State University helped with some of the technical photos. Further assistance was given by Paula Adams, Tim Bandy, Mildred Bolemon, Faylla Chapman, Frank Diefenderfer, Paul Doherty, Freddie Flake, Ralph Llewellyn, Allen Mathews, Bob Miller, Gary Patterson, Wendy Rivers, Mary Louise Schmid, Barry Schroder, and Cynthia Turbeville. Susan Fisher expertly took the text through an extremely complicated production, maintaining a sense of humor under difficult conditions—none of which were the author's fault, of course! The labors of these people have improved the value of the text for students enormously. In the last stages a sabbatical granted by the University of Central Florida saw the book through to completion. Inspirational sustenance for the author was provided by the Louisiana Purchase in Banner Elk, North Carolina and by Pebbles and Cordon Bleu, both of Winter Park, Florida. Finally the author is immensely grateful to Sally, partner *extraordinaire* and patron of science education. Her support, encouragement, and help in improving the manuscript were essential.

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My thanks to you all!
 Jay Bolemon
 Syzygy, North Carolina

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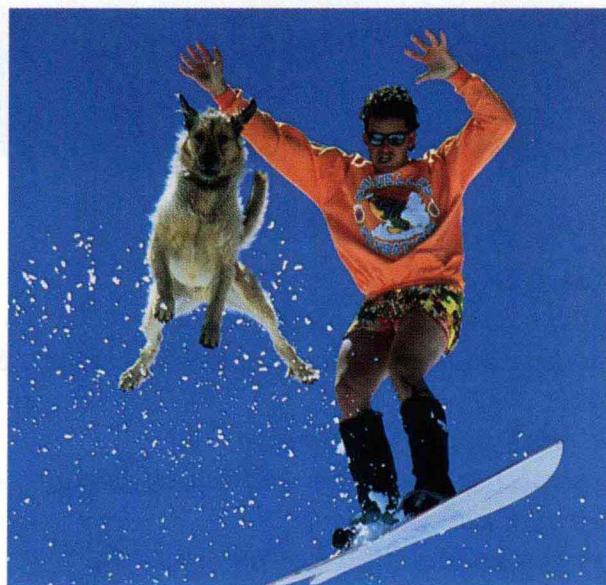


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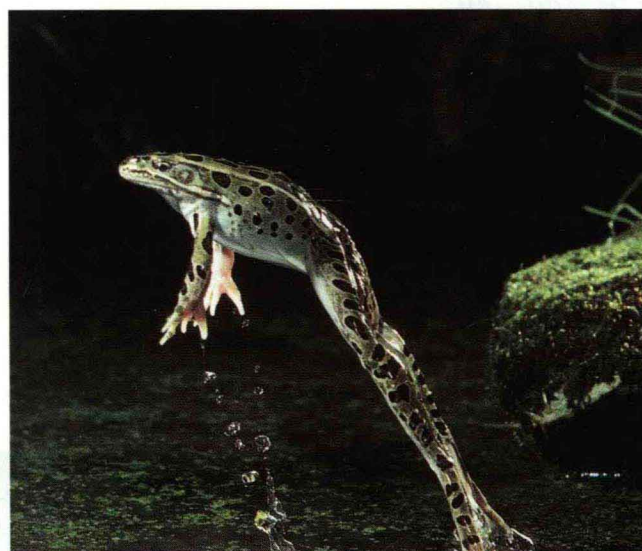


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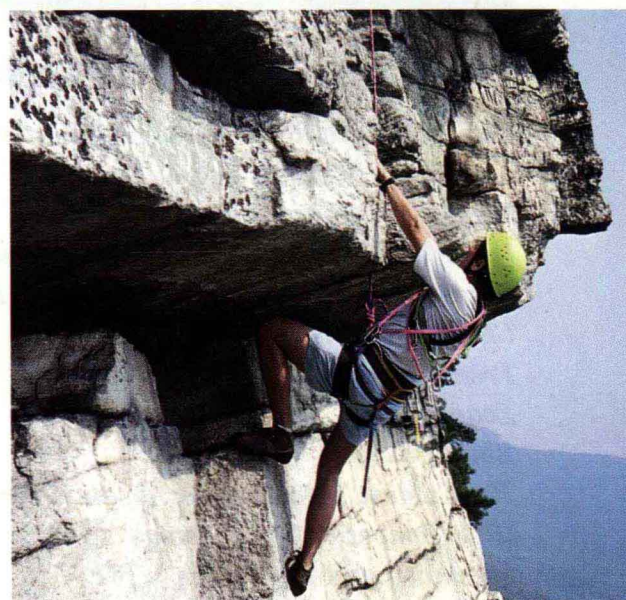


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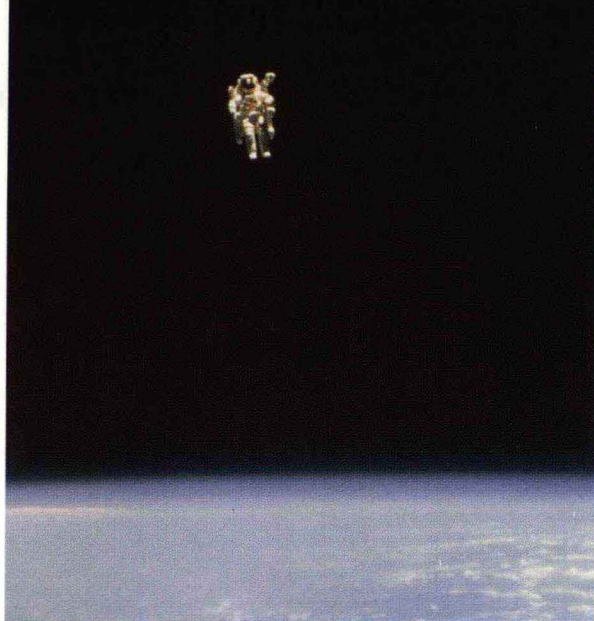
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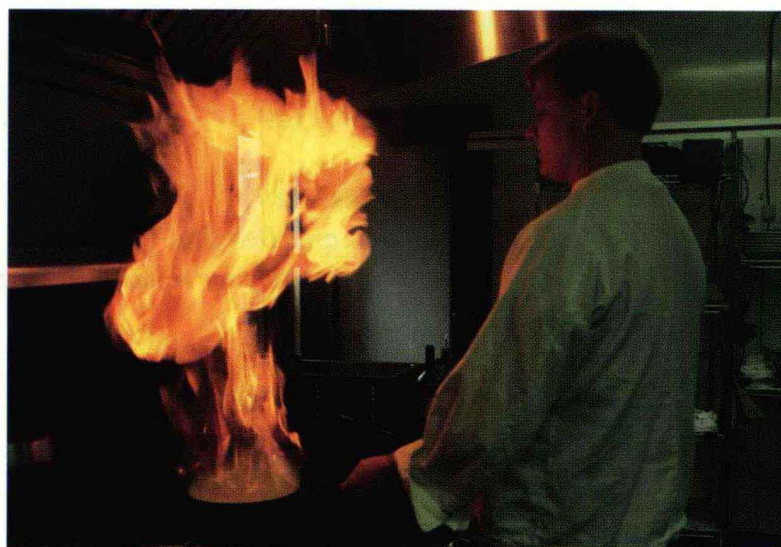


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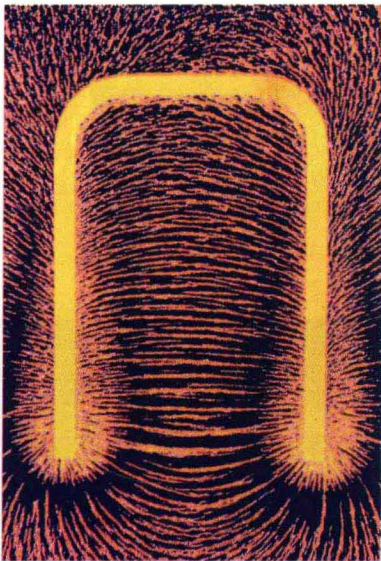
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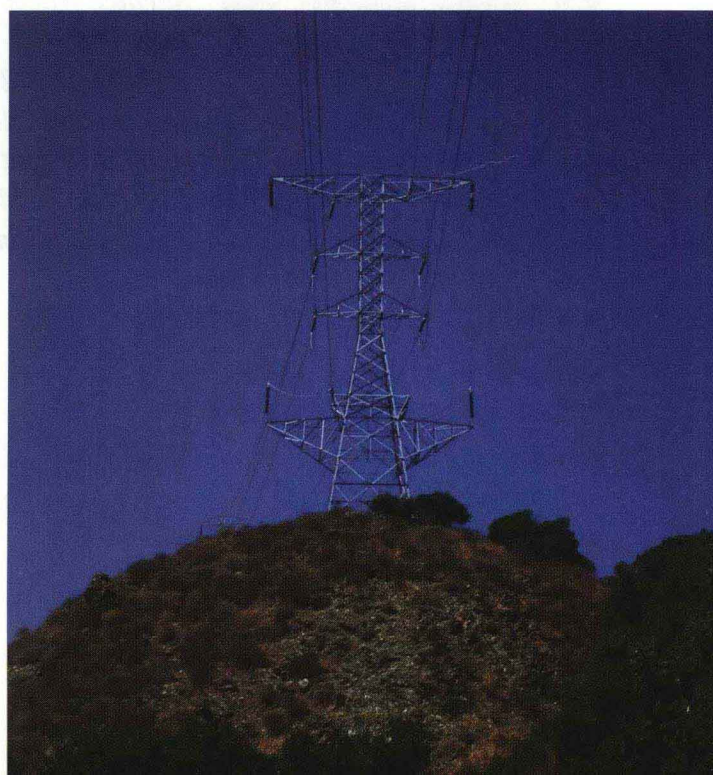


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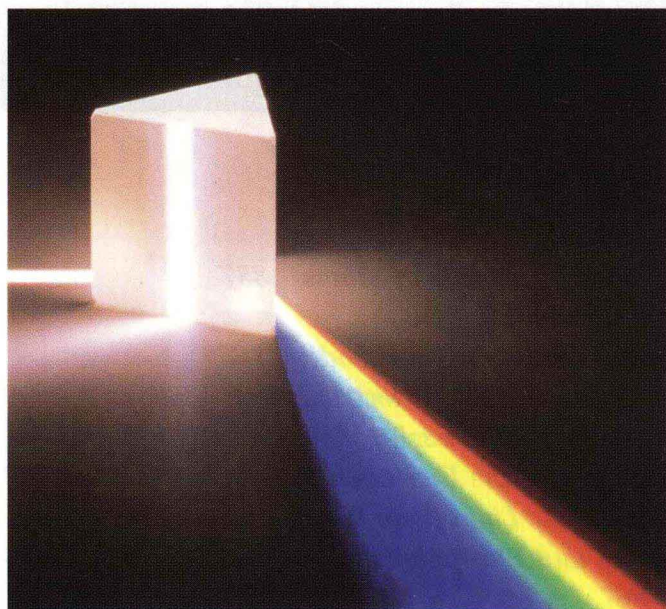
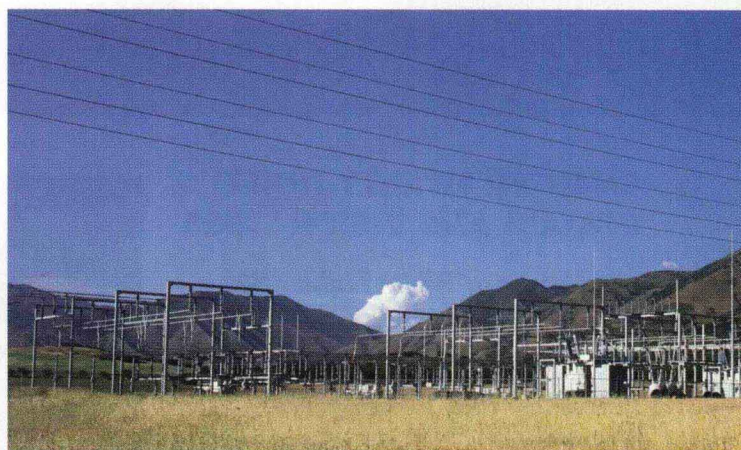


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