

Physics For Scientists Engineers Knight 2nd Edition

Right here, we have countless book **Physics For Scientists Engineers Knight 2nd Edition** and collections to check out. We additionally find the money for variant types and plus type of the books to browse. The suitable book, fiction, history, novel, scientific research, as without difficulty as various further sorts of books are readily welcoming here.

As this Physics For Scientists Engineers Knight 2nd Edition , it ends up instinctive one of the favored book Physics For Scientists Engineers Knight 2nd Edition collections that we have. This is why you remain in the best website to see the amazing ebook to have.

University Physics with Modern Physics - Wolfgang Bauer 2011

University Physics, 1/e by Bauer and Westfall is a comprehensive text with rigorous calculus coverage incorporating a consistently used 7-step problem solving method. The authors include a wide variety of everyday contemporary topics as well as research-based discussions. Both are designed to help students appreciate the beauty of physics and how physics concepts are related to the development of new technologies in the fields of engineering, medicine, astronomy and more.

College Physics - Randall D. Knight 2012-04 Building on the research-proven instructional techniques introduced in Knight's "Physics for Scientists and Engineers, " the most widely adopted new physics text in more than 30 years, "College Physics: A Strategic Approach" set a new standard for algebra-based introductory physics--gaining widespread critical acclaim from professors and students alike. For the Second Edition, Randy Knight, Brian Jones, and Stuart Field continue to apply the best results from educational research and refine and tailor them for this course and the particular needs of its students. New pedagogical features (Chapter Previews, Integrated Examples, and Part Summary problems) and fine-tuned and streamlined content take the hallmarks of the First Edition--exceptionally effective conceptual explanation and problem-solving instruction-to a new level. More than any other book, College Physics leads you to proficient and long-lasting problem-solving skills, a deeper and better-

connected understanding of the concepts, and a broader picture of the relevance of physics to your chosen career and the world around you. College Physics Technology Update, Second Edition, is accompanied by a significantly more robust MasteringPhysics(R)--the most advanced, educationally effective, and widely used online physics tutorial and homework system in the world. Additionally, more than 100 QR codes appear throughout the textbook, enabling you to use your smartphone or tablet to instantly watch interactive videos about relevant demonstrations or problem-solving strategies. 0321815114 / 9780321815118 College Physics: A Strategic Approach Technology Update with MasteringPhysics(R) Package consists of: 0321636600 / 9780321636607 MasteringPhysics(TM) with Pearson eText Student Access Kit for College Physics: A Strategic Approach 0321815408 / 9780321815408 College Physics: A Strategic Approach Technology Update **Physics for Scientists & Engineers (Chapters 1-37) [RENTAL EDITION]** - Douglas C. Giancoli 2019-01-04

Student Solutions Manual, Chapters 1-19 - Randall D. Knight 2007-11

These solutions manuals contain detailed solutions to more than half of the odd-numbered end-of-chapter problems from the textbook. Following the problem-solving strategy presented in the text, thorough solutions are provided to carefully illustrate both the qualitative and quantitative steps in the

problem-solving process.

College Physics - Randall D. Knight 2016-01-04

University Physics - Samuel J. Ling 2017-12-19
University Physics is designed for the two- or three-semester calculus-based physics course. The text has been developed to meet the scope and sequence of most university physics courses and provides a foundation for a career in mathematics, science, or engineering. The book provides an important opportunity for students to learn the core concepts of physics and understand how those concepts apply to their lives and to the world around them. Due to the comprehensive nature of the material, we are offering the book in three volumes for flexibility and efficiency. Coverage and Scope Our University Physics textbook adheres to the scope and sequence of most two- and three-semester physics courses nationwide. We have worked to make physics interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. With this objective in mind, the content of this textbook has been developed and arranged to provide a logical progression from fundamental to more advanced concepts, building upon what students have already learned and emphasizing connections between topics and between theory and applications. The goal of each section is to enable students not just to recognize concepts, but to work with them in ways that will be useful in later courses and future careers. The organization and pedagogical features were developed and vetted with feedback from science educators dedicated to the project.

VOLUME I Unit 1: Mechanics Chapter 1: Units and Measurement Chapter 2: Vectors Chapter 3: Motion Along a Straight Line Chapter 4: Motion in Two and Three Dimensions Chapter 5: Newton's Laws of Motion Chapter 6: Applications of Newton's Laws Chapter 7: Work and Kinetic Energy Chapter 8: Potential Energy and Conservation of Energy Chapter 9: Linear Momentum and Collisions Chapter 10: Fixed-Axis Rotation Chapter 11: Angular Momentum Chapter 12: Static Equilibrium and Elasticity Chapter 13: Gravitation Chapter 14: Fluid Mechanics Unit 2: Waves and Acoustics Chapter 15: Oscillations Chapter 16: Waves Chapter 17: Sound

Advanced Uvm - Brian Hunter 2015-12-11

Since its introduction in 2011, the Universal Verification Methodology (UVM) has achieved its promise of becoming the dominant platform for semiconductor design verification. Advanced UVM delivers proven coding guidelines, convenient recipes for common tasks, and cutting-edge techniques to provide a framework within UVM. Once adopted by an organization, these strategies will create immediate benefits, and help verification teams develop scalable, high-performance environments and maximize their productivity. "Written by an experienced UVM practitioner, this book contains lots of great tips on using UVM effectively and example code that actually works!" John Aynsley, Doulos "In 'Advanced UVM', Mr. Hunter, based on his company's real world experiences, provides excellent resources, a well-tested reference verification environment, and advanced best practices on how to apply UVM. If you are ready to move beyond a UVM introduction, this should be the book you add to your library." George Taglieri, Director Verification Product Solutions, Synopsys, Inc.

Physics for Scientists and Engineers - Randall Dewey Knight 2004

Built from the ground up on our new understanding of how students learn physics, Randall Knight's introductory university physics textbook leads readers to a deeper understanding of the concepts and more proficient problem-solving skills. This authoritative text provides effective learning strategies and in-depth instruction to better guide readers around the misconceptions and preconceptions they often bring to the course. The superior problem-solving pedagogy of *Physics for Scientists and Engineers* uses a detailed, methodical approach that sequentially builds skills and confidence for tackling more complex problems. Knight combines rigorous quantitative coverage with a descriptive, inductive approach that leads to a deeper student understanding of the core concepts. Pictorial, graphical, algebraic, and descriptive representations for each concept are skillfully combined to provide a resource that students with different learning styles can readily grasp. A comprehensive, integrated approach introducing key topics of physics, including

Newton's Laws, Conservation Laws, Newtonian Mechanics, Thermodynamics, Wave and Optics, Electricity and Magnetism, and Modern Physics. For college instructors, students, or anyone with an interest in physics.

Physics - James S. Walker 2006-08-29

The print study guide provides the following for each chapter: Objectives Warm-Up Questions from the Just-in-Time Teaching method by Gregor Novak and Andrew Garvin (Indiana University-Perdue University, Indianapolis) Chapter Review with two-column Examples and integrated quizzes Reference Tools & Resources (equation summaries, important tips, and tools) Puzzle Questions (also from Novak & Garvin's JITT method) Select Solutions for several end-of-chapter questions and problems

Physics for scientists and engineers - Douglas C. Giancoli 2008

Key Message: This book aims to explain physics in a readable and interesting manner that is accessible and clear, and to teach readers by anticipating their needs and difficulties without oversimplifying. Physics is a description of reality, and thus each topic begins with concrete observations and experiences that readers can directly relate to. We then move on to the generalizations and more formal treatment of the topic. Not only does this make the material more interesting and easier to understand, but it is closer to the way physics is actually practiced. Key Topics: ELECTRIC CHARGE AND ELECTRIC FIELD, GAUSS'S LAW, ELECTRIC POTENTIAL, CAPACITANCE, DIELECTRICS, ELECTRIC ENERGY STORAGE, ELECTRIC CURRENTS AND RESISTANCE, DC CIRCUITS, MAGNETISM, SOURCES OF MAGNETIC FIELD, ELECTROMAGNETIC INDUCTION AND FARADAY'S LAW, INDUCTANCE, ELECTROMAGNETIC OSCILLATIONS, AND AC CIRCUITS, MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVES, LIGHT: REFLECTION AND REFRACTION, LENSES AND OPTICAL INSTRUMENTS, THE WAVE NATURE OF LIGHT; INTERFERENCE, DIFFRACTION AND POLARIZATION, Market Description: This book is written for readers interested in learning the basics of physics.

Student Workbook for Physics for Scientists and Engineers - Randall D. Knight 2007-09-24
These popular and proven workbooks help

students build confidence before attempting end-of-chapter problems. They provide short exercises that focus on developing a particular skill, mostly requiring students to draw or interpret sketches and graphs.

University Physics - Samuel J. Ling 2016-09-29

"University Physics is a three-volume collection that meets the scope and sequence requirements for two- and three-semester calculus-based physics courses. Volume 1 covers mechanics, sound, oscillations, and waves. This textbook emphasizes connections between theory and application, making physics concepts interesting and accessible to students while maintaining the mathematical rigor inherent in the subject. Frequent, strong examples focus on how to approach a problem, how to work with the equations, and how to check and generalize the result."--Open Textbook Library.

Student Workbook for Physics for Scientists and Engineers - Randall D. Knight 2007-09-27

These popular and proven workbooks help students build confidence before attempting end-of-chapter problems. They provide short exercises that focus on developing a particular skill, mostly requiring students to draw or interpret sketches and graphs.

Student's Workbook for Physics for Scientists and Engineers - Randall D. Knight 2016-01-03

These popular and proven workbooks help students build confidence before attempting end-of-chapter problems. They provide short exercises that focus on developing a particular skill, mostly requiring students to draw or interpret sketches and graphs. New to the Fourth Edition are exercises that provide guided practice for the textbook's Model boxes.

Physics - Raymond A. Serway 2012

Building upon Serway and Jewetta's solid foundation in the modern classic text, *Physics for Scientists and Engineers*, this first Asia-Pacific edition of *Physics* is a practical and engaging introduction to Physics. Using international and local case studies and worked examples to add to the concise language and high quality artwork, this new regional edition further engages students and highlights the relevance of this discipline to their learning and lives.

Physics for Scientists and Engineers - Randall

Dewey Knight 2008

These popular and proven workbooks help students build confidence before attempting end-of-chapter problems. They provide short exercises that focus on developing a particular skill, mostly requiring students to draw or interpret sketches and graphs.

Five Easy Lessons - Randall Dewey Knight 2002

This widely admired standalone guide is packed with creative tips on how to enhance and expand your physics class instruction techniques. It's an invaluable companion for novice and veteran professors teaching any physics course.

University Physics for Life Sciences [rental Edition] - Randall Dewey Knight 2021-02

"University Physics for the Life Sciences has been written in response to the growing call for an introductory physics course explicitly designed for the needs and interests of life science students anticipating a career in biology, medicine, or a health-related field"--

Student Solutions Manual for Physics for Scientists and Engineers - Randall Dewey Knight 2012-01-15

These solutions manuals contain detailed solutions to more than half of the odd-numbered end-of-chapter problems from the textbook. Following the problem-solving strategy presented in the text, thorough solutions are provided to carefully illustrate both the qualitative and quantitative steps in the problem-solving process.

The Big Picture - Sean Carroll 2016-05-10

The instant New York Times bestseller about humanity's place in the universe—and how we understand it. "Vivid...impressive....Splendidly informative."—The New York Times "Succeeds spectacularly."—Science "A tour de force."—Salon Already internationally acclaimed for his elegant, lucid writing on the most challenging notions in modern physics, Sean Carroll is emerging as one of the greatest humanist thinkers of his generation as he brings his extraordinary intellect to bear not only on Higgs bosons and extra dimensions but now also on our deepest personal questions: Where are we? Who are we? Are our emotions, our beliefs, and our hopes and dreams ultimately meaningless out there in the void? Do human purpose and meaning fit into a scientific

worldview? In short chapters filled with intriguing historical anecdotes, personal asides, and rigorous exposition, readers learn the difference between how the world works at the quantum level, the cosmic level, and the human level—and then how each connects to the other. Carroll's presentation of the principles that have guided the scientific revolution from Darwin and Einstein to the origins of life, consciousness, and the universe is dazzlingly unique. Carroll shows how an avalanche of discoveries in the past few hundred years has changed our world and what really matters to us. Our lives are dwarfed like never before by the immensity of space and time, but they are redeemed by our capacity to comprehend it and give it meaning. The Big Picture is an unprecedented scientific worldview, a tour de force that will sit on shelves alongside the works of Stephen Hawking, Carl Sagan, Daniel Dennett, and E. O. Wilson for years to come.

Physics - Randall D. Knight 1997

Physics for Scientists and Engineers, Volume 2 - Raymond A. Serway 2013-01-01

Achieve success in your physics course by making the most of what PHYSICS FOR SCIENTISTS AND ENGINEERS has to offer. From a host of in-text features to a range of outstanding technology resources, you'll have everything you need to understand the natural forces and principles of physics. Throughout every chapter, the authors have built in a wide range of examples, exercises, and illustrations that will help you understand the laws of physics AND succeed in your course! Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Calculus-Based Physics I - Jeffrey W. Schnick 2009-09-01

Physics for Scientists and Engineers - Paul M. Fishbane 1996

This textbook for a calculus-based physics course for non-physics majors includes end-of-chapter summaries, key concepts, real-world applications, and problems.

The Algorithm Design Manual - Steven S Skiena 2009-04-05

This newly expanded and updated second edition

of the best-selling classic continues to take the "mystery" out of designing algorithms, and analyzing their efficacy and efficiency. Expanding on the first edition, the book now serves as the primary textbook of choice for algorithm design courses while maintaining its status as the premier practical reference guide to algorithms for programmers, researchers, and students. The reader-friendly Algorithm Design Manual provides straightforward access to combinatorial algorithms technology, stressing design over analysis. The first part, Techniques, provides accessible instruction on methods for designing and analyzing computer algorithms. The second part, Resources, is intended for browsing and reference, and comprises the catalog of algorithmic resources, implementations and an extensive bibliography.

NEW to the second edition:

- Doubles the tutorial material and exercises over the first edition
- Provides full online support for lecturers, and a completely updated and improved website component with lecture slides, audio and video
- Contains a unique catalog identifying the 75 algorithmic problems that arise most often in practice, leading the reader down the right path to solve them
- Includes several NEW "war stories" relating experiences from real-world applications
- Provides up-to-date links leading to the very best algorithm implementations available in C, C++, and Java

Physics for Scientists and Engineers - Randall D. Knight 2008

Physics for Scientists & Engineers with Modern Physics - Douglas C. Giancoli 2008

Key Message: This book aims to explain physics in a readable and interesting manner that is accessible and clear, and to teach readers by anticipating their needs and difficulties without oversimplifying. Physics is a description of reality, and thus each topic begins with concrete observations and experiences that readers can directly relate to. We then move on to the generalizations and more formal treatment of the topic. Not only does this make the material more interesting and easier to understand, but it is closer to the way physics is actually practiced.

Key Topics: INTRODUCTION, MEASUREMENT, ESTIMATING, DESCRIBING MOTION: KINEMATICS IN ONE DIMENSION,

KINEMATICS IN TWO OR THREE DIMENSIONS; VECTORS, DYNAMICS: NEWTON'S LAWS OF MOTION , USING NEWTON'S LAWS: FRICTION, CIRCULAR MOTION, DRAG FORCES , GRAVITATION AND NEWTON'S6 SYNTHESIS , WORK AND ENERGY, CONSERVATION OF ENERGY, LINEAR MOMENTUM, ROTATIONAL MOTION, ANGULAR MOMENTUM; GENERAL ROTATION, STATIC EQUILIBRIUM; ELASTICITY AND FRACTURE, FLUIDS, OSCILLATIONS, WAVE MOTION, SOUND, TEMPERATURE, THERMAL EXPANSION, AND THE IDEAL GAS LAW, KINETIC THEORY OF GASES, HEAT AND THE FIRST LAW OF THERMODYNAMICS, SECOND LAW OF THERMODYNAMICS

Market Description: This book is written for readers interested in learning the basics of physics.

Matter and Interactions - Ruth W. Chabay 1999

Treatment Wetlands, Second Edition - Robert H. Kadlec 2008-07-22

Completely revised and updated, Treatment Wetlands, Second Edition is still the most comprehensive resource available for the planning, design, and operation of wetland treatment systems. The book addresses the design, construction, and operation of wetlands for water pollution control. It presents the best current procedures for sizing these systems, and describing the intrinsic processes that combine to quantify performance. The Second Edition covers: New methods based on the latest research Wastewater characterization and regulatory framework analyses leading to detailed design and economics State-of-the-art procedures for analyzing hydraulics, hydrology, substrates and wetlands biogeochemistry Definition of performance expectations for traditional pollutants such as solids, oxygen demand, nutrients and pathogens, as well as for metals and a wide variety of individual organic and inorganic chemicals Discussion of methods of configuration, construction, and vegetation establishment and startup considerations Ancillary benefits of human use and wildlife habitat Specific examples of numerous applications Extensive reference base of current information The book provides a complete reference that includes: detailed information on wetland ecology, design for consistent

performance, construction guidance and operational control through effective monitoring. Case histories of operational wetland treatment systems illustrate the variety of design approaches presented allowing you to tailor them to the needs of your wetlands treatment projects. The sheer amount of information found in *Treatment Wetlands, Second Edition* makes it the resource you will turn to again and again.

Physics for Scientists and Engineers with Modern Physics, Books a la Carte Edition - Randall D. Knight 2012-01

This edition features the exact same content as the traditional book in a convenient, three-hole-punched, loose-leaf version. Books a la Carte also offer a great value for your students—this format costs 35% less than a new textbook. As the most widely adopted new physics book in more than 50 years, Knight's *Physics for Scientists and Engineers* was published to widespread critical acclaim from professors and students. In the Third Edition, Knight builds on the research-proven instructional techniques he introduced in the first and second editions, as well as national data of student performance, to take student learning even further. Knight's unparalleled insight into student learning difficulties, and his impeccably skillful crafting of text and figures at every level—from macro to micro—to address these difficulties, results in a uniquely effective and accessible book, leading students to a deeper and better-connected understanding of the concepts and more proficient problem-solving skills. For the Third Edition, Knight continues to apply the best results from educational research, and to refine and tailor them for this course and its students. New pedagogical features (Chapter Previews, Challenge Examples, and Data-based Examples), end-of-chapter problem sets enhanced through analysis of national student metadata, and fine-tuned and streamlined content take the hallmarks of the previous editions—exceptionally effective conceptual explanation and problem-solving instruction—to a new level. This package contains: *Books a la Carte for Physics for Scientists and Engineers with Modern Physics, Third Edition*

Trees of Delhi - Pradip Krishen 2006

College Physics - Paul Peter Urone 1997-12

Physics for Scientists and Engineers, Chapters 1-39 - Raymond A. Serway

2012-02-01

As a market leader, PHYSICS FOR SCIENTISTS AND ENGINEERS is one of the most powerful brands in the physics market. However, rather than resting on that reputation, the new edition of this text marks a significant advance in the already excellent quality of the book. While preserving concise language, state of the art educational pedagogy, and top-notch worked examples, the Eighth Edition features a unified art design as well as streamlined and carefully reorganized problem sets that enhance the thoughtful instruction for which Raymond A. Serway and John W. Jewett, Jr. earned their reputations. Likewise, PHYSICS FOR SCIENTISTS AND ENGINEERS will continue to accompany Enhanced WebAssign in the most integrated text-technology offering available today. In an environment where new Physics texts have appeared with challenging and novel means to teach students, this book exceeds all modern standards of education from the most solid foundation in the Physics market today. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Physics for Scientists and Engineers - Randall Dewey Knight 2012-01-01

As the most widely adopted new physics book in more than 50 years, Knight's *Physics for Scientists and Engineers* was published to widespread critical acclaim from professors and students. In the Third Edition, Knight builds on the research-proven instructional techniques he introduced in the first and second editions, as well as national data of student performance, to take student learning even further. Knight's unparalleled insight into student learning difficulties, and his impeccably skillful crafting of text and figures at every level—from macro to micro—to address these difficulties, results in a uniquely effective and accessible book, leading students to a deeper and better-connected understanding of the concepts and more proficient problem-solving skills. For the Third Edition, Knight continues to apply the best results from educational research, and to refine and tailor them for this course and its students. New pedagogical features (Chapter Previews,

Challenge Examples, and Data-based Examples), end-of-chapter problem sets enhanced through analysis of national student metadata, and fine-tuned and streamlined content take the hallmarks of the previous editions--exceptionally effective conceptual explanation and problem-solving instruction--to a new level. This package contains: *Physics for Scientists and Engineers: A Strategic Approach, Standard Edition* (Chs. 1-36), Third Edition

Physics for Scientists and Engineers - Robert Hawkes 2018-01-25

Physics is all around us. From taking a walk to driving your car, from microscopic processes to the enormity of space, and in the everchanging technology of our modern world, we encounter physics daily. As physics is a subject we are constantly immersed in and use to forge tomorrow's most exciting discoveries, our goal is to remove the intimidation factor of physics and replace it with a sense of curiosity and wonder. *Physics for Scientists and Engineers* takes this approach using inspirational examples and applications to bring physics to life in the most relevant and real ways for its students. The text is written with Canadian students and instructors in mind and is informed by Physics Education Research (PER) with international context and examples. *Physics for Scientists and Engineers* gives students unparalleled practice opportunities and digital support to foster student comprehension and success.

Physics for Scientists and Engineers - Douglas Giancoli 2008

This Value Pack consists of *Physics for Scientists & Engineers, Vol. 1* (Chapters 1-20), 4/e by Douglas C. Giancoli (ISBN 9780132273589) and *MasteringPhysics™ Student Access Kit for Physics for Scientists and Engineers, 4/e* (ISBN 9780131992269)

College Physics - Randall D. Knight 2012-04 Building on the research-proven instructional techniques introduced in Knight's *Physics for Scientists and Engineers*, the most widely adopted new physics text in more than 30 years, *College Physics: A Strategic Approach* set a new standard for algebra-based introductory physics--gaining widespread critical acclaim from professors and students alike. For the Second Edition, Randy Knight, Brian Jones, and Stuart Field continue to apply the best results from

educational research and refine and tailor them for this course and the particular needs of its students. New pedagogical features (Chapter Previews, Integrated Examples, and Part Summary problems) and fine-tuned and streamlined content take the hallmarks of the First Edition--exceptionally effective conceptual explanation and problem-solving instruction--to a new level. More than any other book, *College Physics* leads you to proficient and long-lasting problem-solving skills, a deeper and better-connected understanding of the concepts, and a broader picture of the relevance of physics to your chosen career and the world around you. *College Physics Technology Update, Second Edition*, is accompanied by a significantly more robust *MasteringPhysics(R)*--the most advanced, educationally effective, and widely used online physics tutorial and homework system in the world. Additionally, more than 100 QR codes appear throughout the textbook, enabling you to use your smartphone or tablet to instantly watch interactive videos about relevant demonstrations or problem-solving strategies. 0321815114 / 9780321815118 *College Physics: A Strategic Approach Technology Update with MasteringPhysics(R) Package* consists of: 0321636600 / 9780321636607 *MasteringPhysics(TM) with Pearson eText Student Access Kit for College Physics: A Strategic Approach* 0321815408 / 9780321815408 *College Physics: A Strategic Approach Technology Update An Introduction to Mechanics* - Daniel Kleppner 2014

This second edition is ideal for classical mechanics courses for first- and second-year undergraduates with foundation skills in mathematics.

Conceptual Integrated Science - Paul G Hewitt 2015-10-08

From the author of the number one textbooks in physical science and physics comes the eagerly awaiting new text, *Conceptual Integrated Science*. Hewitt's critically acclaimed conceptual approach has led science education for 30 years and now tackles integrated science to take student learning to a new level. Using his proven conceptual approach, accessible writing, and fun and informative illustrations, Hewitt and his team of science experts have crafted a text that

focuses on the unifying concepts and real-life examples across physics, chemistry, earth science, biology, and astronomy. The book includes best-selling author Paul Hewitt's proven pedagogical approach, straight-forward learning features, approachable style, and rigorous coverage. The result is a wide-ranging science text that is uniquely effective and motivational. Conceptual Integrated Science is accompanied by an unparalleled media package that combines interactive tutorials, interactive figures, and

renowned demonstration videos to help students outside of class and instructors in class.

Instructor Solutions Manual for Physics for Scientists and Engineers - Randall D. Knight

2007-10-18

These comprehensive solutions manuals contain complete solutions to all end-of-chapter questions and problems. All solutions follow the Model/Visualize/Solve/Assess problem-solving strategy used in the textbook for the quantitative problems.