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Share: Tweet Facebook LinkedIn Pinterest Book Table of Contents Author Ancillaries Excerpts A standout among introductory biomechanics texts, *Biomechanics of Sport and Exercise, Fourth Edition With Web Resource*, takes a unique approach to introducing exercise and sport biomechanics. Using simple terms, the book presents mechanics before functional anatomy, helping students first understand external forces and their effects on motion; then explores how the musculoskeletal system responds and generates its own internal forces to maintain position; and finally shows how to apply biomechanical principles to analyze movement and ultimately improve performance. The fourth edition expands its commitment to enabling students to discover the principles of biomechanics through observation. Easy-to-understand experiments are presented for students to try in the classroom or on their own. Sample problem sidebars guide students through choosing the appropriate equation to determine the forces acting or motion occurring in a specific scenario and then helps them solve the equation. This practical approach—combining clear illustrations, sample calculations, and encouragement for active learning—helps students develop a deeper understanding of the underlying mechanical concepts. In addition to careful updates throughout the book, other new enhancements in the fourth edition include the following: New content explores the technologies and devices available to coaches, athletes, and the general public to measure aspects of athletes' movements. New full-color art and diagrams enhance the text and help students visualize mechanics in real-world scenarios. Explanations of the equations used in the text make the content more accessible to students. New concept application boxes provide deeper analysis of the field use of biomechanics, with topics such as the Magnus effect in baseball pitching, the wetsuit effect in triathlons, power output in cycling, centripetal acceleration when running a curve, and the work-energy principles in modern shot putting. Other learning aids include bold key terms, chapter objectives, and a guide to key equations and abbreviations. The chapters include a total of 18 sample problems that students can solve using a step-by-step process. A companion web resource offers additional review questions and problem sets. *Biomechanics of Sport and Exercise, Fourth Edition*, introduces the biomechanics of human movement in a clear and concise manner while promoting an active, engaged learning experience. Students will discover the principles of mechanics for themselves, resulting in a strong understanding of the subject matter. Audience: Text for undergraduate biomechanics courses for students studying kinesiology, exercise science, physical education, or other human movement fields; reference for sport biomechanists, exercise scientists, athletic trainers and therapists, and sport physical therapists. Introduction. Why Study Biomechanics? What Is Biomechanics? What Are the Goals of Sport and Exercise Biomechanics? The History of Sport Biomechanics The Organization of Mechanics Basic Dimensions and Units of Measurement Used in Mechanics Summary Part I. External Biomechanics: External Forces and Their Effects on the Body and Its Movement Chapter 1. Forces: Maintaining Equilibrium or Changing Motion What Are Forces? Classifying Forces Friction Addition of Forces: Force Composition Resolution of Forces Static Equilibrium Summary Chapter 2. Linear Kinematics: Describing Objects in Linear Motion Motion Linear Kinematics Uniform Acceleration and Projectile Motion Summary Chapter 3. Linear Kinetics: Explaining the Causes of Linear Motion Newton's First Law of Motion: Law of Inertia Conservation of Momentum Newton's Second Law of Motion: Law of Acceleration Impulse and Momentum Newton's Third Law of Motion: Law of Action-Reaction Newton's Law of Universal Gravitation Summary Chapter 4. Work, Power, and Energy: Explaining the Causes of Motion Without Newton Work Energy The Work-Energy Principle Power Summary Chapter 5. Torques and Moments of Force: Maintaining Equilibrium or Changing Angular Motion What Are Torques? Forces and Torques in Equilibrium What Is Center of Gravity? Summary Chapter 6. Angular Kinematics: Describing Objects in Angular Motion Angular Position and Displacement Angular Velocity Angular and Linear Velocity Angular Acceleration Angular and Linear Acceleration Anatomical System for Describing Limb Movements Summary Chapter 7. Angular Kinetics: Explaining the Causes of Angular Motion Angular Inertia Angular Momentum Angular Interpretation of Newton's First Law of Motion Angular Interpretation of Newton's Second Law of Motion Angular Impulse and Angular Momentum Angular Interpretation of Newton's Third Law of Motion Summary Chapter 8. Fluid Mechanics: The Effects of Water and Air Buoyant Force: Force Due to Immersion Dynamic Fluid Force: Force Due to Relative Motion Summary Part II. Internal Biomechanics: Internal Forces and Their Effects on the Body and Its Movement Chapter 9. Mechanics of Biological Materials: Stresses and Strains on the Body Stress Strain Mechanical Properties of Materials: The Stress-Strain Relationship Mechanical Properties of the Musculoskeletal System Summary Chapter 10. The Skeletal System: The Rigid Framework of the Body Bones Joints Summary Chapter 11. The Muscular System: The Motors of the Body The Structure of Skeletal Muscle Muscle Action Muscle Contraction Force Summary Chapter 12. The Nervous System: Control of the Musculoskeletal System The Nervous System and the Neuron The Motor Unit Receptors and Reflexes Summary Part III. Applying Biomechanical Principles Chapter 13. Qualitative Biomechanical Analysis to Improve Technique Types of Biomechanical Analysis Steps of a Qualitative Biomechanical Analysis Sample Analyses Summary Chapter 14. Qualitative Biomechanical Analysis to Improve Training Biomechanics and Training Qualitative Anatomical Analysis Method Sample Analyses Summary Chapter 15. Qualitative Biomechanical Analysis to Understand Injury Development Mechanical Stress and Injury Tissue Response to Stress Mechanism of Overuse Injury Individual Differences in Tissue Threshold Intrinsic and Extrinsic Factors Affecting Injury Sample Analysis: Overuse Injuries in Running Summary Chapter 16. Technology in Biomechanics Quantitative Biomechanical Analysis Measurement Issues Tools for Measuring Biomechanical Variables Summary All ancillaries are free to adopting instructors and available online. Instructor guide. Includes chapter summaries, lecture ideas and sample lecture outlines, suggestions for student assignments and activities, and teaching tips for every chapter in the text. Solutions to sample problems are worked out in the author's own handwriting. Test package. This bank of more than 350 questions includes true-false, fill-in-the-blank, essay and short-answer, and multiple-choice formats. The test package is available for use through multiple formats, including learning management system, Respondus, and rich text. Presentation package plus image bank. Includes PowerPoint slides of text, artwork, and tables from the book that can be used for class discussion and presentation. The slides in the presentation package can be used directly within PowerPoint or printed for distribution to students. Instructors can easily add, modify, and rearrange the order of the slides. The companion image bank includes most of the figures, images, and tables from the text, sorted by chapter. These can be used in developing a customized presentation based on specific course requirements. Web resource. Guides students step by step through the process of solving 18 sample problems, and includes 200 review questions and 120 problem sets to provide an opportunity for practical application of concepts. The web resource is also available for purchase separately • ISBN 978-1-4925-9232-7 Share: Tweet Facebook LinkedIn Pinterest Please note: This web study guide is for use with the third edition of the text, which was replaced by a fourth edition. This version is available only for students using the third edition and will be discontinued at the end of the semester. *Biomechanics of Sport and Exercise, Third Edition With Web Resource and MaxTRAQ Educational 2D Software Access*, is supplemented with two companion resources that will help students better comprehend the material. The web resource includes all of the problems from the book, separated by chapter, plus 18 sample problems that guide students step by step through the process of solving. The web resource is available packaged with the print book or the e-book. To purchase it separately, click on the "Add to Cart" button at the top of this page. Once the purchase is complete, log in to the web resource at www.HumanKinetics.com/BiomechanicsOfSportAndExercise. In addition to the web resource, this text is enhanced with access to MaxTRAQ Educational 2D software for Windows. MaxTRAQ Educational 2D software enables students to analyze and quantify real-world sport movements in video clips and upload their own video content for analysis. The software supplements the final section of the text that bridges the concepts of internal and external forces with the application of biomechanics; it also provides an overview of the technology used in conducting quantitative biomechanical analyses. Access to MaxTRAQ Educational 2D software is available packaged with the print book, or with an e-book or web resource package purchased from a bookstore. To purchase it separately to supplement used books and e-books ordered online, visit www.motionanalysisproducts.com/Books/PM-BSE-R3.html.

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