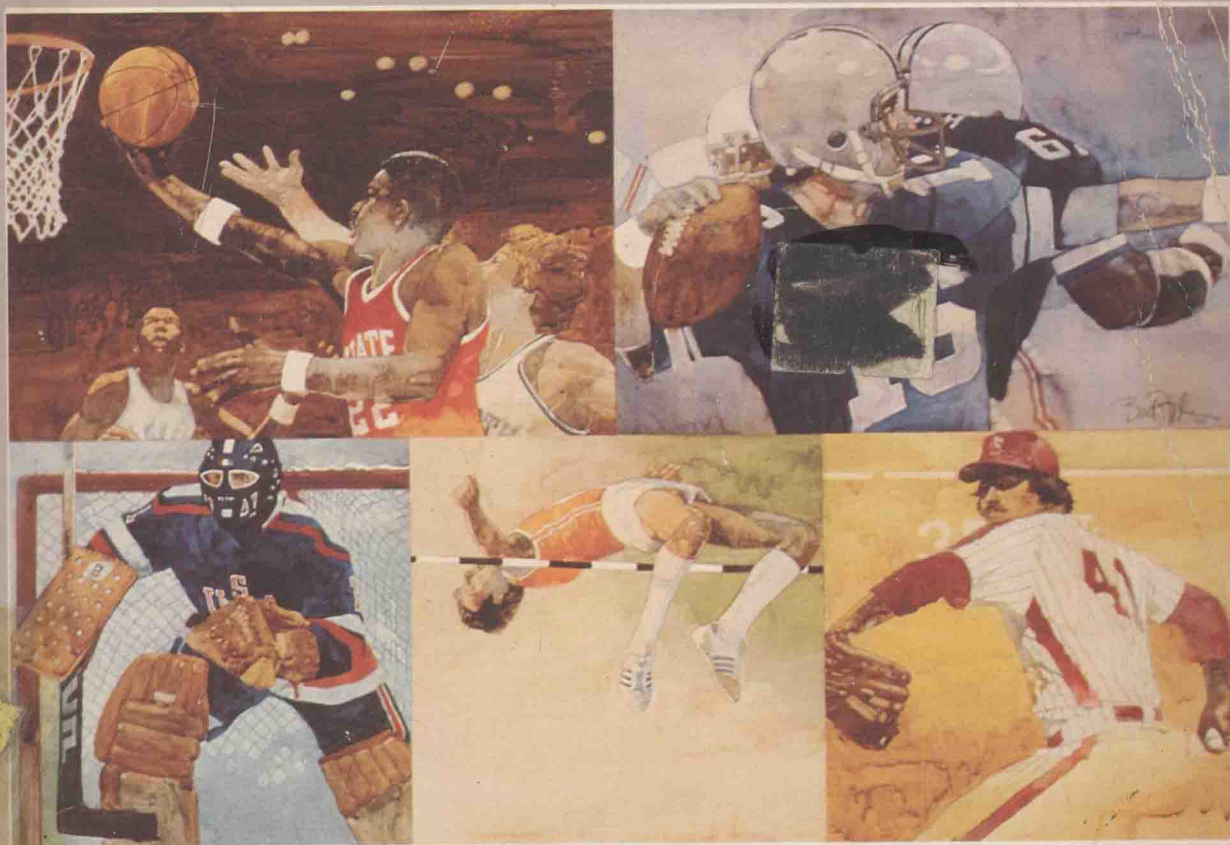

Essentials of

ATHLETIC TRAINING



Daniel D. Arnheim

Essentials of **ATHLETIC TRAINING**

DANIEL D. ARNHEIM, D.P.E., A.T., C.

*Fellow, American College of Sports Medicine;
Professor of Physical Education,
California State University, Long Beach*

Illustrated by

HELENE ARNHEIM, M.A.

FIRST EDITION

*With 314 illustrations and
122 photographs*



TIMES MIRROR/MOSBY COLLEGE PUBLISHING

ST. LOUIS TORONTO SANTA CLARA 1987

Executive editor Nancy K. Roberson
Developmental editor Michelle A. Turenne
Project editor Suzanne Seeley
Art director Kay Kramer
Editing and production Publication Services
Cover design Susan E. Lane

Cover art by Bart Forbes. Reprinted with permission from the
copyright owner, Bristol-Meyers Company © 1983, makers of VITALIS.

This text was based on the most up-to-date research and suggestions
made by individuals knowledgeable in the field of athletic training.
The author and publisher disclaim any responsibility for any adverse
effects or consequences from the misapplication or injudicious use of
information contained within this text. It is also accepted as judicious
that the coach and/or athletic trainer performing his or her duties is, at
all times, working under the guidance of a licensed physician.

Credits for all materials used by permission appear after the glossary.

Copyright © 1987 by Times Mirror/Mosby College Publishing

A division of The C.V. Mosby Company
11830 Westline Industrial Drive
St. Louis, Missouri 63146

All rights reserved. No part of this publication may be reproduced,
stored in a retrieval system, or transmitted, in any form or by any
means, electronic, mechanical, photocopying, recording, or otherwise,
without prior written permission from the publisher.

Printed in the United States of America

Library of Congress Cataloging-in-Publication Data

Arnheim, Daniel D.
Essentials of athletic training.

Includes bibliographies and index.

1. Sports—Accidents and injuries. 2. Sports—
Accidents and injuries—Prevention. 3. Physical
fitness.

I. Title. [DNLM: 1. Athletic Injuries.

2. Physical Education and Training. 3. Sports

Medicine. QT 260 A748e]

RD97.A76 1987 617'.1027 86-14533

ISBN 0-8016-0335-8

PS/VH/VH 9 8 7 5 4 3

03/A/377

Essentials of Athletic Training

PREFACE

Purpose of Text

The first edition of *Essentials of Athletic Training* is to provide the reader with the most current information possible on the subject of prevention and basic care of sports injuries.

Who is it Written For?

Essentials of Athletic Training is designed as a primary text for the student going into the field of coaching and/or physical education. Its major thrust is toward injury prevention and the immediate care of the most common sports injuries. Basic foundations are also provided for the student interested in more substantive areas of rehabilitation.

Organization and Coverage

Essentials of Athletic Training was created from the foundations established by the sixth edition of *Modern Principles of Athletic Training*. Where *Modern Principles of Athletic Training* serves as a major text for athletic trainers and those individuals interested in sports medicine, *Essentials of Athletic Training* is written for the coach and physical educator.

The general approach to the text is that adverse physical problems arising from sports participation should be prevented whenever possible. Secondly, when adverse problems do arise, quick and proper care can reduce their seriousness.

Essentials of Athletic Training is divided into three parts: Foundations; Sports Injury Causation, Response, and Management; and Sports Conditions. Overall, this text is designed to take the beginning student from general to more specific concepts. As the student progresses from the first to the last chapter, understanding of the prevention and care of athletic injuries will occur.

Part One, Foundations, consists of five chapters. It explores the origin of athletic training, the current status of sports injuries, and athletic training and sports medicine. It also presents the relationship of proper physical conditioning and protective equipment to the prevention of injury as well as application of good taping, bandaging, and emergency care to injury.

Part Two, Sports Injury Causation, Response, and Management, includes three chapters. These chapters provide an understanding of how the body is susceptible to traumatic musculoskeletal injuries and how these injuries are classified, recognized, and evaluated. Chapter 8 discusses the body's response to musculoskeletal injuries and provides a foundation for basic management.

Part Three, Sports Conditions, includes eight chapters covering major sports injuries that occur to the different body regions. Each of these chapters present related anatomy, methods of prevention, and immediate and follow-up care. Where appropriate, chapters contain taping techniques that may be used as a means of achieving injury prevention or protective support following an injury. Chapter 17, the last chapter, covers a number of health-related conditions that may adversely affect the athlete.

Pedagogical Features

A number of teaching devices have been included in this text:

1. *Chapter objectives* Objectives are presented at the beginning of each chapter to reinforce important learning goals.
2. *Color throughout the text* A second color appears throughout the text to enhance the overall appearance and accentuate illustrations.
3. *Boxed material within chapters* Important information such as special taping techniques have been boxed to make key information easier to find and to enhance the text's usefulness.
4. *Illustrations* The text includes 122 photographs and 314 line drawings. All illustrations are presented to increase the student's comprehension of injury prevention and athletic training.
5. *Margin information* For greater emphasis, key concepts, selected definitions, helpful training tips, salient points, and some illustrations have been placed in the margin throughout the text. These increase ease of reading and improve upon the teaching/learning process.
6. *Review questions and class activities* A list of questions and suggested class activities follow each chapter to review and apply the concepts learned.
7. *References* All chapters have a bibliography of pertinent references that includes the most complete and up-to-date resources available.
8. *Annotated bibliography* As an additional aid to learning, relevant and timely articles, books, and topics from the current literature have been annotated to provide additional resources.
9. *Glossary* An extensive list of key terms and their definitions are presented to assist students in applying the content learned.
10. *Appendix* The appendix provides the student with a conversion table for units of measure.

Ancillaries for the Instructor

Instructor's Manual An Instructor's Manual is provided that keys the content and organization of *Essentials of Athletic Training with Modern Principles of Athletic Training*. Practical features include:

- Brief chapter overviews
- Learning objectives
- Key terminology
- Discussion questions
- Class activities
- Appendixes include answer keys, additional resources, and transparency masters
- Perforated format, ready for immediate use

In addition, approximately 2000 examination questions are included. Each chapter contains true-false, multiple choice, and completion test questions. Worksheets including matching, short answer, listing, and essay questions can be used as self-testing tools for students or as additional sources for examination questions. The appendix includes part tests that can be used in evaluating student knowledge for each of the three parts of the text.

A special note of appreciation must be given to Marcia Anderson, M.S., A.T., C., Director of the Athletic Training program, Bridgewater State College, Bridgewater, Massachusetts, for her enthusiastic contribution in preparing the Instructor's Manual.

Transparencies Twenty-four acetate transparencies are available to maximize the teaching and learning process. These can be used with either *Essentials of Athletic Training* or *Modern Principles of Athletic Training*.

Acknowledgments

It is with great pleasure that I acknowledge those individuals who helped to make this project possible. With deep appreciation to my wife, Helene, whose help in all aspects of this project, as in the past, has been immeasurable. A special thanks is extended to the manuscript reviewers whose critical suggestions have been very helpful and are present in every chapter:

Doris E. Flores, California State University at Sacramento

Ron Pfeiffer, Boise State University

James G. Nespor, Iowa State University

Teresa E. McHugh, Monmouth College (N. J.)

Bobby Patton, Southwest Texas State University

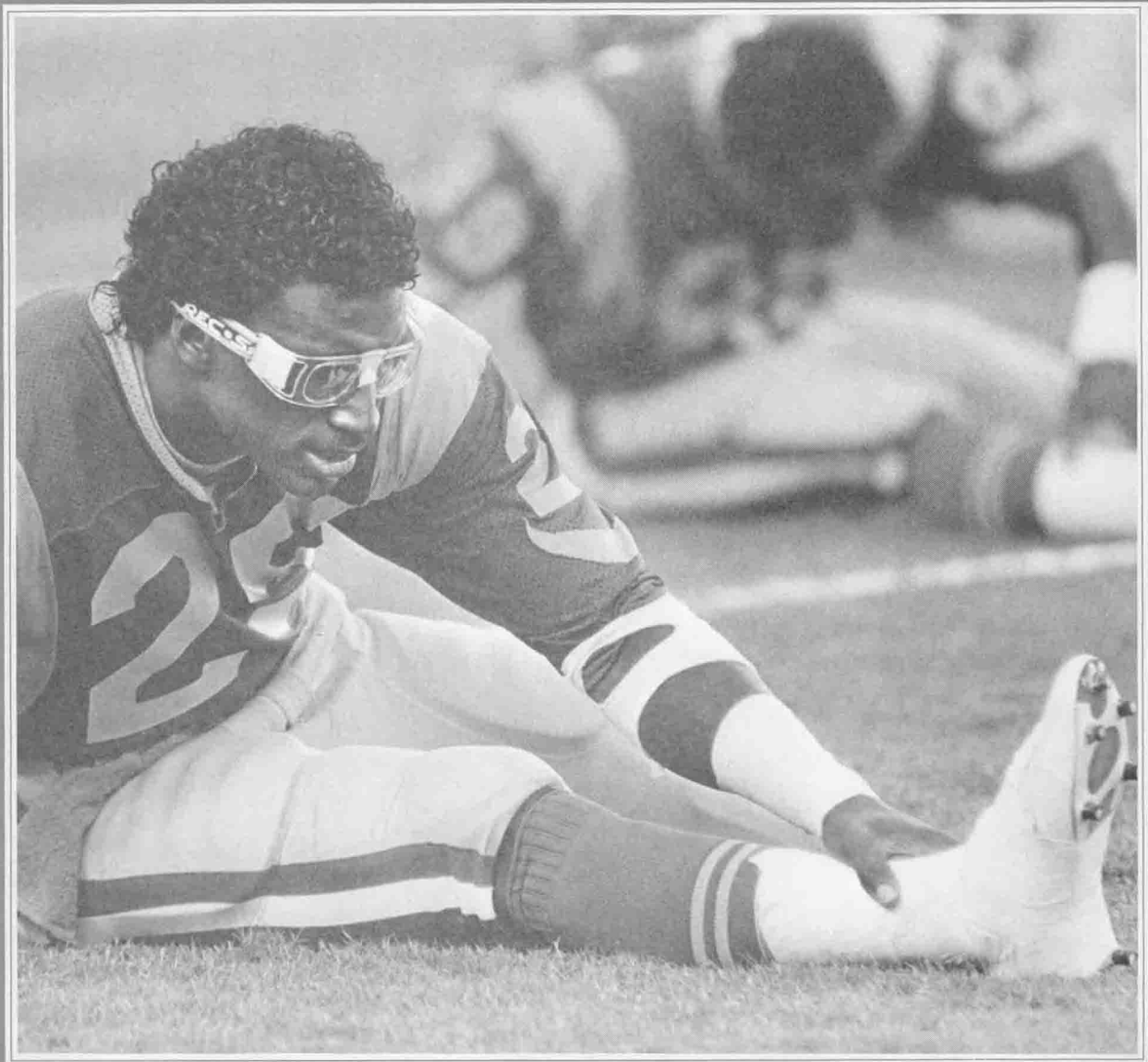
Suzanne Shoemaker, Pennsylvania State University

Lowell C. Bailey, Jr., Phoenix College

Finally, gratitude must be expressed to Nancy K. Roberson, Editor, who initiated *Essentials of Athletic Training* and has provided a constant basis of support throughout its development. Special thanks is also extended to Michelle Turenne, my Developmental Editor at Times Mirror/Mosby College Publishing. Once again she has guided me through turbulent waters.

Daniel D. Arnheim

Essentials of Athletic Training



CONTENTS

Part One

FOUNDATIONS

1 Introduction to Athletic Training, 2

- Modern sports medicine and athletic training, 2
- The athlete's health and safety, 3
 - The coach, 3
 - The athletic trainer, 4
 - The team physician, 5
 - Other specialists concerned with athletic health, 6
- The training program, 9
 - The training facility, 9
- Sustaining sports injuries, 10
 - Sports classification, 11
 - Sports injury information, 11
- Summary, 14
- Review questions and class activities, 14

2 Injury Prevention: Physical Conditioning, Nutrition, and Psychological Considerations, 18

- Conditioning and training, 18
 - Conditioning seasons, 19
 - The ten cardinal conditioning principles, 19
 - Foundations of conditioning, 20
 - Neuromuscular coordination, 40
 - Special conditioning approaches, 40
- Nutrition, 42
 - Basic nutritional guidelines, 42
- Psychological considerations of injury prevention, 45
 - The athlete's level of aspiration, 45
 - Sports participation as a stressor, 45
- Training and competition in childhood, 46
- Summary, 47
- Review questions and class activities, 48

3 Protective Sports Devices, 50

Head protection, 51

Football helmets, 51

Ice hockey helmets, 53

Baseball batting helmets, 53

Face protection, 53

Face guards, 54

Mouth guards, 54

Ear guards, 55

Eye protection devices, 55

Body protection, 57

Shoulder protection, 57

Breast protection, 58

Knee, foot, and ankle protection, 59

Socks, 59

Shoes, 59

Hand protection, 62

Specialized protective devices, 62

Ankle supports, 62

Knee supports and protective devices, 63

Abdominal and low back supports, 63

Shoulder restraint braces, 64

Other elastic pads and supports, 64

Pads and orthoses, 64

Types of devices, 64

Construction of protective and supportive devices, 65

Summary, 66

Review questions and class activities, 67

4 Wound Dressing, Taping, and Bandaging, 70

Wound dressings, 70

Wound description, 71

Training room practices in wound care, 72

Materials, 72

Taping in sports, 73

Tape usage, 73

Linen adhesive tape qualities, 74

Using adhesive tape in sports, 75

Adhesive tape and injury prophylaxis, 78

Tape as an adjunct to conditioning and rehabilitation, 79

Common types of bandages used in sports medicine, 79

 Triangular and cravat bandages, 79

 Roller bandages, 80

Summary, 87

Review questions and class activities, 88

5 Emergency Procedures in Sports, 89

Legal implications of school sports, 89

 Liability, 90

 Assumption of risk, 91

 Torts, 91

 Negligence, 92

 Medical diagnoses, 92

Recognizing vital signs, 92

 Pulse, 92

 Respiration, 93

 Temperature, 93

 Skin color, 93

 Pupils, 94

 State of consciousness, 94

 Movement, 94

 Abnormal nerve stimulation, 94

 Blood pressure, 95

Emergency evaluation of the conscious athlete, 95

Emergency evaluation of the unconscious athlete, 95

 The first steps of CPR, 96

Emergency care of acute musculoskeletal injuries, 101

 Injury recognition and evaluation, 102

 Hemorrhage, inflammation, muscle spasm, and pain management, 103

 Emergency splinting, 105

 Handling the injured athlete, 106

Special emergency conditions, 111

 Hemorrhage, 111

 Shock, 113

 The emergency plan, 114

 Environmental stress, 114

Summary, 121

Review questions and class activities, 121

*Part Two***SPORTS INJURY CAUSATION, RESPONSE, AND MANAGEMENT****6 Physical Susceptibility and Mechanisms of Sports Injuries, 126**

Tissue and body structural characteristics, 127

Soft tissues, 127

Joints, 128

Bone structural characteristics and susceptibility to fracturing, 134

Postural deviations and injury potential, 135

Common postural problems, 136

Abnormal repetitive stress and microtraumas, 137

Summary, 137

Review questions and class activities, 140

7 Classifying Exposed and Unexposed Injuries, 142

Causative factors of sports injuries, 142

Acute anatomical factors, 143

Exposed skin injuries, 143

Unexposed injuries, 143

Chronic conditions, 151

Summary, 154

Review questions and suggested activities, 154

8 Healing and Rehabilitation, 156

Healing, 156

Soft tissue, 156

Fracture healing, 158

Pain perception, 160

Foundations of superficial therapy, 161

Cold and heat, 162

Exercise rehabilitation, 167

Muscular strength and endurance, 168

Exercise instruction, 170

Rehabilitative exercise phases, 171

The exercise rehabilitation plan, 172

Fitting and using the crutch or cane, 173

Fitting the athlete, 173

Walking with the crutch or cane, 173

Summary, 174

Review questions and class activities, 175

SPORTS CONDITIONS

9 The Foot, 180

The foot, 180

Skin trauma of the foot, 180

Acute foot injuries, 184

Chronic and overuse foot conditions, 188

Exercise rehabilitation of the foot, 194

Summary, 196

Review questions and class activities, 196

10 The Ankle and Lower Leg, 198

The ankle, 198

Prevention of ankle injuries, 198

Acute ankle injuries, 202

Chronic ankle injuries, 213

The lower leg, 213

Acute leg injuries, 214

Chronic leg injuries, 216

Exercise rehabilitation of the ankle and lower leg, 218

Summary, 219

Review questions and class activities, 219

11 The Knee and Related Structures, 221

The knee, 221

Prevention of injuries, 224

Acute conditions, 225

Evaluation of the injured knee joint, 227

Acute medial knee sprains, 228

Acute lateral knee sprains, 231

Internal knee joint conditions, 231

Kneecap (patellar) and related conditions, 234

Patellar fracture, 234

Acute patellar subluxation or dislocation, 235

Pain related to the kneecap and femoral groove, 236

Other extensor mechanism problems, 236

Reconditioning of the knee region, 238

Summary, 239

Review questions and class activities, 240

- 12 The Thigh, Hip, and Pelvis, 242**
- The thigh region, 242
 - Thigh injuries, 242
 - Acute femoral fracture, 248
 - Thigh rehabilitative exercise, 249
 - The hip and pelvic region, 249
 - Groin strain, 251
 - Trochanteric bursitis, 252
 - Conditions of the hip joint, 252
 - Immature hip joint problems, 253
 - Snapping hip phenomenon, 254
 - Pelvic conditions, 254
 - Hip rehabilitative exercise, 255
 - Summary, 257
 - Review questions and class activities, 257
- 13 The Abdomen, Thorax, and Low Back, 259**
- The abdomen, 259
 - Abdominal injuries, 259
 - The thorax, 265
 - Thoracic injuries, 265
 - The low back, 269
 - Preventing initial low back injuries in sports, 269
 - Mechanisms of low back pain in the athlete, 269
 - Conditions causing low back pain, 271
 - Coccyx injuries, 273
 - Rehabilitation of low back conditions that cause pain, 276
 - Summary, 276
 - Review questions and class activities, 277
- 14 The Upper Spine, Head, and Face, 279**
- Thoracic spine, 279
 - Thoracic spine injuries, 279
 - Cervical spine, 281
 - Cervical spine injuries, 281
 - Evaluation of neck injuries, 282
 - Causes of injury, 282
 - Neck rehabilitation, 287
 - The head, 288
 - Cerebral injuries, 288
 - Evaluation of cerebral injuries, 290

The face, 292

Facial injuries, 292

Dental injuries, 296

Nasal injuries, 297

Ear problems, 298

Eye injuries, 300

Summary, 303

Review questions and class activities, 304

15 The Shoulder Complex, 306

Preventing shoulder injuries, 306

Shoulder complex injuries, 308

Contusions and strains, 308

Injuries from the throwing motion, 308

Sprains, 311

Subluxations and dislocations, 314

Shoulder bursitis, 316

Fractures of the shoulder complex, 317

Upper arm conditions, 317

Contusions, 317

Strains, 318

Fractures, 318

Rehabilitation of the shoulder complex, 319

Ball squeeze, 319

Codman's pendular exercise, 320

Finger wall climb, 320

Shoulder wheel, 320

Self-stretching, 320

Dumbbell exercises, 321

Bench presses, 321

Upright rowing, 322

Light-resistance shrugs, 322

Upright rowing with light resistance, 322

Push-ups, 323

Dips and pull-ups, 323

Summary, 323

Review questions and class activities, 324

16 The Elbow, Forearm, Wrist, and Hand, 327

The elbow joint, 327

Injuries to the elbow region, 327

Rehabilitation of the elbow, 331

- The forearm, 332
 - Injuries to the forearm, 333
- The wrist and hand, 335
 - Injuries to the wrist, 335
 - Injuries to the hand, 339
 - Rehabilitation of the forearm, wrist, and hand, 343
- Summary, 345
- Review questions and class activities, 345

- 17 Other Health Conditions and the Athlete, 347.**
 - Skin infections, 347
 - Viral infections, 347
 - Bacterial infections, 347
 - Fungal infections, 348
 - Sexually transmitted diseases, 348
 - Respiratory tract conditions, 350
 - The common cold (coryza), 351
 - Sore throat (pharyngitis), 351
 - Asthma, 352
 - Hay fever (pollinosis), 353
 - Common communicable viral diseases, 354
 - Common gastrointestinal complaints, 354
 - Indigestion, 355
 - Diarrhea, 356
 - Constipation, 356
 - Diabetes mellitus, 356
 - Management of the diabetic coma and insulin shock, 357
 - Convulsive disorders (epilepsy), 357
 - Management of the epileptic seizure, 358
 - Menstrual irregularities, 358
 - Summary, 359
 - Review questions and class activities, 360
- Appendix, 363**
- Index, 365**
- Glossary, 379**
- Credits, 383**