

Making Everything Easier!™

# ACT<sup>®</sup> Math

FOR

# DUMMIES<sup>®</sup>

## Learn to:

- Score high on the mathematics section of the ACT
- Prepare for exam day with helpful tips and strategies
- Grasp algebra, geometry, and trigonometry
- Take three practice tests modeled from questions off the latest ACT tests

**Mark Zegarelli**

*Math tutor and author of SAT Math For Dummies*



**ACT<sup>®</sup> Math**  
FOR  
**DUMMIES<sup>®</sup>**

**by Mark Zegarelli**



WILEY

Wiley Publishing, Inc.

**ACT® Math For Dummies®**

Published by  
**Wiley Publishing, Inc.**  
111 River St.  
Hoboken, NJ 07030-5774  
[www.wiley.com](http://www.wiley.com)

Copyright © 2011 by Wiley Publishing, Inc., Indianapolis, Indiana

Published simultaneously in Canada

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, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 646-8600. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at <http://www.wiley.com/go/permissions>.

Trademarks: Wiley, the Wiley Publishing logo, For Dummies, the Dummies Man logo, A Reference for the Rest of Us!, The Dummies Way, Dummies Daily, The Fun and Easy Way, Dummies.com, Making Everything Easier, and related trade dress are trademarks or registered trademarks of John Wiley & Sons, Inc. and/or its affiliates in the United States and other countries, and may not be used without written permission. ACT is a registered trademark of ACT, Inc. All other trademarks are the property of their respective owners. Wiley Publishing, Inc., is not associated with any product or vendor mentioned in this book.

**LIMIT OF LIABILITY/DISCLAIMER OF WARRANTY: THE PUBLISHER AND THE AUTHOR MAKE NO REPRESENTATIONS OR WARRANTIES WITH RESPECT TO THE ACCURACY OR COMPLETENESS OF THE CONTENTS OF THIS WORK AND SPECIFICALLY DISCLAIM ALL WARRANTIES, INCLUDING WITHOUT LIMITATION WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. NO WARRANTY MAY BE CREATED OR EXTENDED BY SALES OR PROMOTIONAL MATERIALS. THE ADVICE AND STRATEGIES CONTAINED HEREIN MAY NOT BE SUITABLE FOR EVERY SITUATION. THIS WORK IS SOLD WITH THE UNDERSTANDING THAT THE PUBLISHER IS NOT ENGAGED IN RENDERING LEGAL, ACCOUNTING, OR OTHER PROFESSIONAL SERVICES. IF PROFESSIONAL ASSISTANCE IS REQUIRED, THE SERVICES OF A COMPETENT PROFESSIONAL PERSON SHOULD BE SOUGHT. NEITHER THE PUBLISHER NOR THE AUTHOR SHALL BE LIABLE FOR DAMAGES ARISING HEREFROM. THE FACT THAT AN ORGANIZATION OR WEBSITE IS REFERRED TO IN THIS WORK AS A CITATION AND/OR A POTENTIAL SOURCE OF FURTHER INFORMATION DOES NOT MEAN THAT THE AUTHOR OR THE PUBLISHER ENDORSES THE INFORMATION THE ORGANIZATION OR WEBSITE MAY PROVIDE OR RECOMMENDATIONS IT MAY MAKE. FURTHER, READERS SHOULD BE AWARE THAT INTERNET WEBSITES LISTED IN THIS WORK MAY HAVE CHANGED OR DISAPPEARED BETWEEN WHEN THIS WORK WAS WRITTEN AND WHEN IT IS READ.**

For general information on our other products and services, please contact our Customer Care Department within the U.S. at 877-762-2974, outside the U.S. at 317-572-3993, or fax 317-572-4002.

For technical support, please visit [www.wiley.com/techsupport](http://www.wiley.com/techsupport).

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

Library of Congress Control Number: 2011927309

ISBN: 978-1-118-00154-7

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1



## ***About the Author***

**Mark Zegarelli** is the author of *Basic Math and Pre-Algebra For Dummies* (Wiley), *SAT Math For Dummies* (Wiley), and five other books on basic math, calculus, and logic. He holds degrees in both English and math from Rutgers University and is a math tutor and teacher.

Mark lives in San Francisco, California, and Long Branch, New Jersey.

## ***Dedication***

For my good friend David Feaster — as always, with love, laughter, and light.

## ***Author's Acknowledgments***

This is my seventh *For Dummies* book, and my seventh positive experience working with a first-rate team of editors who make the process of writing so very pleasurable and productive. Thanks so much to my Wiley editors Chrissy Guthrie, Jessica Smith, and Lindsay Lefevere. More thanks to technical editors Sarah Weaver and Amy Nicklin for keeping me on track, accurate, and finely tuned to the needs of readers who are studying for the ACT.

And thanks to Annie Koziol, Steven Satyricon, and all the rest of the friendly folks at Maxfield's House of Caffeine for their contribution in helping to make this book good to the last drop.

## ***Publisher's Acknowledgments***

We're proud of this book; please send us your comments at <http://dummies.custhelp.com>. For other comments, please contact our Customer Care Department within the U.S. at 877-762-2974, outside the U.S. at 317-572-3993, or fax 317-572-4002.

Some of the people who helped bring this book to market include the following:

### ***Acquisitions, Editorial, and Media Development***

**Senior Project Editor:** Christina Guthrie  
**Executive Editor:** Lindsay Lefevere  
**Copy Editor:** Jessica Smith  
**Assistant Editor:** David Lutton  
**Editorial Program Coordinator:** Joe Niesen  
**Technical Editors:** Amy Nicklin, Sarah Weaver  
**Editorial Manager:** Christine Meloy Beck  
**Editorial Assistants:** Rachelle Amick, Alexa Koschier  
**Cover Photos:** © iStockphoto.com/design 56  
**Cartoons:** Rich Tennant ([www.the5thwave.com](http://www.the5thwave.com))

### ***Composition Services***

**Project Coordinator:** Sheree Montgomery  
**Layout and Graphics:** Carrie A. Cesavice,  
Corrie Socolovitch, Christin Swinford  
**Proofreaders:** Lindsay Amones, Sossity R. Smith  
**Indexer:** Potomac Indexing, LLC  
**Special Help:** Caitie Copple

---

### ***Publishing and Editorial for Consumer Dummies***

**Diane Graves Steele**, Vice President and Publisher, Consumer Dummies  
**Kristin Ferguson-Wagstaffe**, Product Development Director, Consumer Dummies  
**Ensley Eikenburg**, Associate Publisher, Travel  
**Kelly Regan**, Editorial Director, Travel

### ***Publishing for Technology Dummies***

**Andy Cummings**, Vice President and Publisher, Dummies Technology/General User

### ***Composition Services***

**Debbie Stailey**, Director of Composition Services

# Contents at a Glance

<b>Introduction</b> .....	<b>1</b>
<b>Part I: Getting into the Act: An Overview of ACT Math Basics</b> .....	<b>5</b>
Chapter 1: Reviewing ACT Math Basics .....	7
Chapter 2: Boosting Your Test-Taking Skills .....	17
Chapter 3: Discovering Some Problem-Solving Strategies .....	25
<b>Part II: Building Your Pre-Algebra and Elementary Algebra Skills</b> .....	<b>37</b>
Chapter 4: Starting with the Basics: Pre-Algebra .....	39
Chapter 5: It's Elementary Algebra, My Dear Watson .....	65
Chapter 6: Practice Problems for Pre-Algebra and Elementary Algebra .....	85
<b>Part III: Digging In to Intermediate Algebra and Coordinate Geometry</b> .....	<b>101</b>
Chapter 7: Moving to Intermediate Algebra .....	103
Chapter 8: Coordinating a Path through Coordinate Geometry .....	125
Chapter 9: Practice Problems for Intermediate Algebra and Coordinate Geometry .....	147
<b>Part IV: Visualizing Plane Geometry and Trigonometry</b> .....	<b>167</b>
Chapter 10: Plain Talk about Plane Geometry .....	169
Chapter 11: Trig and Beyond: ACT Advanced Math Topics .....	193
Chapter 12: Practice Problems for Geometry, Trig, and Advanced Math .....	213
<b>Part V: Tracking Your Progress with Practice Tests</b> .....	<b>233</b>
Chapter 13: Practice Test 1 .....	235
Chapter 14: Practice Test 1: Answers and Explanations .....	251
Chapter 15: Practice Test 2 .....	267
Chapter 16: Practice Test 2: Answers and Explanations .....	283
Chapter 17: Practice Test 3 .....	301
Chapter 18: Practice Test 3: Answers and Explanations .....	317
<b>Part VI: The Part of Tens</b> .....	<b>331</b>
Chapter 19: Ten Key Differences Between the ACT and the SAT .....	333
Chapter 20: Ten Items to Check Off before Taking the ACT .....	337
<b>Index</b> .....	<b>341</b>

# Table of Contents

<b>Introduction .....</b>	<b>1</b>
About This Book .....	1
Conventions Used in This Book .....	2
Foolish Assumptions .....	2
How This Book Is Organized .....	2
Part I: Getting into the Act: An Overview of ACT Math Basics .....	2
Part II: Building Your Pre-Algebra and Elementary Algebra Skills .....	3
Part III: Digging In to Intermediate Algebra and Coordinate Geometry .....	3
Part IV: Visualizing Plane Geometry and Trigonometry .....	3
Part V: Tracking Your Progress with Practice Tests .....	4
Part VI: The Part of Tens .....	4
Icons Used in This Book .....	4
Where to Go from Here .....	4
<b>Part I: Getting into the Act: An Overview of ACT Math Basics .....</b>	<b>5</b>
<b>Chapter 1: Reviewing ACT Math Basics .....</b>	<b>7</b>
Getting an Overview of ACT Math .....	7
Taking Four Key Steps to ACT Success .....	8
Sharpening your basic math skills .....	8
Getting comfortable with your calculator .....	9
Solidifying your ACT-specific math skills .....	9
Taking practice tests under timed conditions .....	9
What Should I Study? Knowing What's on the ACT .....	9
Taking care of the basics in pre-algebra .....	10
Basic arithmetic .....	10
Number sequences .....	10
Factors and multiples .....	10
Percents, ratios, and proportions .....	10
Powers (exponents) and square roots (radicals) .....	10
Data and graphs .....	11
Basic statistics and probability .....	11
Moving on to elementary algebra .....	11
Evaluating, simplifying, and factoring expressions .....	11
Solving equations with one or more variables .....	12
Focusing on intermediate algebra .....	12
Taking a look at inequalities .....	12
Working with systems of equations .....	12
Understanding direct and inverse proportionality .....	13
Examining quadratic equations .....	13
Finding information about functions .....	13





Working with coordinate geometry.....	13
Graphing linear functions .....	13
Recognizing quadratic functions .....	14
Transforming functions.....	14
Grappling with higher-order polynomial functions and circles.....	14
Reviewing plane geometry.....	14
Lines and angles .....	14
Triangles.....	14
Quadrilaterals .....	15
Circles.....	15
Solid geometry.....	15
Dealing with trigonometry and other advanced topics .....	15
Trigonometry.....	15
Matrices.....	15
Logarithms .....	15
Imaginary and complex numbers.....	16
You're Off the Hook: Discovering What the ACT Doesn't Cover .....	16
<b>Chapter 2: Boosting Your Test-Taking Skills .....</b>	<b>17</b>
Two-Timing the Test: Taking Two Passes to Answer Questions.....	17
To Guess or Not to Guess .....	18
Answering Multiple-Choice Questions.....	19
Considering the five answer choices.....	19
Plugging and playing .....	20
Calculating Your Way to Success: Calculators and the ACT .....	21
When should I use a calculator? .....	22
What kind of calculators can I use? .....	22
What kind of calculators can't I use?.....	23
How do I use my calculator? .....	23
<b>Chapter 3: Discovering Some Problem-Solving Strategies.....</b>	<b>25</b>
Identifying Basic Math Skills You Need to Know .....	25
Knowing how the four basic operations operate .....	26
Keeping your negatives straight .....	26
Evaluating with the order of operations .....	27
Making peace with fractions.....	28
Getting Comfortable with Formulas .....	28
Reviewing the formulas you need to know.....	28
Pre-algebra .....	29
Elementary algebra .....	29
Intermediate algebra.....	29
Coordinate geometry.....	29
Plane geometry.....	30
Trigonometry and other topics.....	31
Working with your arsenal of formulas.....	32
Solving for a missing value .....	32
Using two different formulas to solve one problem .....	33
Working with unfamiliar formulas .....	33
Sorting Through Word Problems .....	34
Jotting down the numbers.....	34
Sketching out problem information .....	35

## **Part 11: Building Your Pre-Algebra and Elementary Algebra Skills..... 37**

### **Chapter 4: Starting with the Basics: Pre-Algebra.....39**

Getting Back to Basics: Answering Basic Arithmetic Questions .....	39
Reviewing the four basic operations.....	39
Following along with number sequences .....	40
Checking out inequalities .....	41
Evaluating a number's absolute value .....	42
Understanding Factors and Multiples.....	43
Finding factors.....	44
Generating lists of multiples.....	45
Perfecting Your Knowledge of Percents.....	46
Knowing basic percent conversions .....	46
Taking advantage of a quick trick for calculating some percents .....	47
Calculating straightforward percent problems .....	47
Untangling complex percent problems.....	48
Handling the ups and downs of percent increase and decrease.....	49
Using Ratios and Proportions to Compare Quantities .....	50
Working with Powers and Square Roots .....	52
Harnessing the power of exponents.....	52
Be square: Squaring and square roots .....	53
Squares .....	53
Square roots .....	53
Real-World Math: Studying Statistics.....	54
Presenting data in tables and graphs.....	54
Organizing information in tables.....	54
Representing data with graphs .....	55
Getting a better-than-average grasp of averages.....	57
Finding the meaning of the mean.....	57
Centering on the median.....	59
Discovering what's so popular about the mode .....	59
Looking at Likelihood: Probability .....	60
Learning to count.....	60
Counting the outcomes of independent events .....	60
Counting the outcomes of dependent events .....	61
Determining probability.....	61

### **Chapter 5: It's Elementary Algebra, My Dear Watson .....65**

Knowing the Two Big Ideas of Algebra .....	65
Every step you take: Keeping equations balanced.....	65
Walkin' a lonely road: Isolating the variable .....	66
Discovering Six Choice Words about Algebra .....	67
Express Yourself: Working with Algebraic Expressions.....	68
Evaluating expressions .....	68
Simplifying expressions .....	69
Combining like terms.....	69
Removing parentheses.....	69
Getting FOILed.....	70
Simplifying expressions with exponents.....	71
Factoring expressions .....	71
Finding common factors .....	72
Unearthing three useful ways to factor squares and cubes .....	72

Solving Everything but the Kitchen Sink .....	74
Approaching rational equations rationally .....	74
Rooting out ways to solve square root equations .....	75
Gaining absolute confidence with absolute value .....	76
Exposing variables in the exponent .....	78
Taking extra care with extra variables .....	80
Lost in Translation: Translating Words into Equations .....	82
<b>Chapter 6: Practice Problems for Pre-Algebra and Elementary Algebra .....</b>	<b>85</b>
Practice Problems .....	85
Solutions to Practice Problems .....	92
 <b>Part III: Digging In to Intermediate Algebra and Coordinate Geometry .....</b>	 <b>101</b>
<b>Chapter 7: Moving to Intermediate Algebra .....</b>	<b>103</b>
Knowing More or Less about Inequalities .....	103
Becoming a pro at inequalities .....	104
Separate but unequal: Solving inequalities with absolute value .....	106
Beating the System: Dealing with Systems of Equations .....	108
Solving systems of equations systematically .....	108
Finding values with substitution .....	109
Combining equations .....	109
Working word problems using a system of equations .....	111
Keeping Things in Proportion: Direct and Inverse Proportionality .....	114
Maintaining a balance with direct proportions .....	114
Turning things around with inverse proportions .....	115
Working with Quadratic Equations and the Roots of Polynomials .....	116
Factoring to solve quadratic equations .....	117
Choosing the quadratic formula when all else fails .....	118
Making Connections with Functions .....	119
Using functions as models .....	119
Defining relationships with functional notation and evaluation .....	122
Getting to know domain and range .....	123
Arriving at the domain event .....	123
Feeling at home with the range .....	124
<b>Chapter 8: Coordinating a Path through Coordinate Geometry .....</b>	<b>125</b>
Reviewing Some Basics of Coordinate Geometry .....	125
Graphing Linear Functions .....	126
Lining up some line segment skills .....	126
Finding coordinates with the midpoint formula .....	127
Going the whole ten yards with the distance formula .....	127
Measuring the slope of a line .....	128
Applying the slope-intercept form .....	130
Working with parallel and perpendicular lines .....	132
Giving Your Quads a Workout: Graphing Quadratic Functions .....	133
Searching for the qualities of a quadratic .....	134
Trick 1: Checking the direction of your parabola .....	134
Trick 2: Looking at your parabola's vertex .....	135
Trick 3: Keeping an eye on variable $c$ .....	136

Calculating two features of parabolas.....	138
Accessing the axis of symmetry.....	138
Changing direction at the vertex.....	139
Solving and graphing quadratic inequalities.....	139
Recognizing Three Transformations.....	140
Reversing graphs with reflections.....	141
Movin' on up (or down): Vertical shift.....	142
Shifting horizontally.....	142
Taking on Advanced Equations.....	143
Raising the bar with higher-order polynomials.....	143
Going 'round and 'round with circles.....	146
<b>Chapter 9: Practice Problems for Intermediate Algebra and Coordinate Geometry.....</b>	<b>147</b>
Intermediate Algebra and Coordinate Geometry Practice Problems.....	147
Solutions to Intermediate Algebra and Coordinate Geometry Practice Problems.....	158
<b><i>Part IV: Visualizing Plane Geometry and Trigonometry.....</i></b>	<b>167</b>
<b>Chapter 10: Plain Talk about Plane Geometry.....</b>	<b>169</b>
Knowing Your Angles.....	169
Angles around one point.....	170
Angles and parallel lines.....	171
Interior angles in a polygon.....	172
Working with Triangles.....	173
Finding the area of a triangle.....	173
Answering questions containing right triangles.....	175
Taking advantage of the Pythagorean theorem.....	175
Recognizing some common right triangles.....	176
Breezing through Your Work with Quadrilaterals.....	178
Squares.....	179
Rectangles.....	180
Parallelograms.....	181
Trapezoids.....	182
Wheeling and Dealing with Circles.....	183
Rounding up the basic circle formulas.....	183
Understanding tangent lines.....	184
Making sense of arc length.....	185
Striking a few chords.....	187
Examining Solid Geometry.....	188
Focusing on cubes and boxes.....	188
Incorporating spheres into your geometric repertoire.....	190
Figuring the volume of other solids (prisms, cylinders, pyramids, and cones)...	191
Prisms and pyramids.....	191
Cylinders and cones.....	192
<b>Chapter 11: Trig and Beyond: ACT Advanced Math Topics.....</b>	<b>193</b>
Trigonometry: Watching the Sines and Taking a Few Tangents.....	193
Picking out the opposite, the adjacent, and the hypotenuse.....	194
Knowing how to SOH CAH TOA.....	195
Feeling radiant with radian measure.....	197
Graphing trig functions.....	198
Identifying trig identities.....	200

Reloading the Matrix.....	201
Adding and subtracting matrices .....	201
Making sense of matrix multiplication.....	203
Multiplying a matrix by a real number .....	203
Multiplying two matrices .....	203
Determining the meaning of determinants.....	206
Logging Some Hours with Logarithms.....	207
Imagining the Possibilities with Imaginary Numbers .....	209
<b>Chapter 12: Practice Problems for Geometry, Trig, and Advanced Math .....</b>	<b>213</b>
Geometry, Trig, and Advanced Math Practice Problems.....	213
Solutions to Geometry, Trig, and Advanced Math Practice Problems.....	223
 <b>Part V: Tracking Your Progress with Practice Tests .....</b>	<b>233</b>
 <b>Chapter 13: Practice Test 1 .....</b>	<b>235</b>
Mathematics Test Answer Sheet .....	237
Mathematics Test .....	239
<b>Chapter 14: Practice Test 1: Answers and Explanations .....</b>	<b>251</b>
Mathematics Test .....	251
Answer Key for Practice Test 1.....	265
<b>Chapter 15: Practice Test 2.....</b>	<b>267</b>
Mathematics Test Answer Sheet .....	269
Mathematics Test .....	271
<b>Chapter 16: Practice Test 2: Answers and Explanations .....</b>	<b>283</b>
Mathematics Test .....	283
Answer Key for Practice Test 2.....	299
<b>Chapter 17: Practice Test 3.....</b>	<b>301</b>
Mathematics Test Answer Sheet .....	303
Mathematics Test .....	305
<b>Chapter 18: Practice Test 3: Answers and Explanations .....</b>	<b>317</b>
Mathematics Test .....	317
Answer Key for Practice Test 3.....	330
 <b>Part VI: The Part of Tens.....</b>	<b>331</b>
 <b>Chapter 19: Ten Key Differences Between the ACT and the SAT.....</b>	<b>333</b>
 <b>Chapter 20: Ten Items to Check Off before Taking the ACT.....</b>	<b>337</b>
 <b>Index.....</b>	<b>341</b>



# Introduction

---

**A**lmost half of all graduating students in the United States (an estimated 45 percent) take the ACT. If you're among this lucky bunch, you may be looking toward the future with a combination of anticipation and dread. You're anticipating college, with its new experiences and first tastes of freedom, but you're dreading the hoops you have to jump through to get there. Of course, the ACT is one of these hoops. If you do well on this test, you're propelled to your first-choice college; if you do poorly, maybe not.

You're not alone. And I'm here to help. As the author of *Basic Math and Pre-Algebra For Dummies* (Wiley) and *SAT Math For Dummies* (Wiley), I've already helped thousands of would-be college students get through the arduous testing process and move into the exciting life that awaits them in college.

If you're willing to keep the faith and do the work in front of you, I'm confident that you can be among those who succeed on the ACT and take one step forward into your dreams. Let this book be your guide.

## About This Book

Although you certainly want to do well on all four sections of the ACT (as well as the optional writing test), this book focuses exclusively on math. The reason I'm playing favorites is simple: For many students (and possibly you, too), math is the toughest section of the test. Because your composite score on the ACT is based in part on your math score, you don't want math to drag down an otherwise good score.

The math you need to know to do well on the ACT is basically what's covered in high school: pre-algebra, elementary algebra, intermediate algebra, coordinate geometry, plane geometry, and trigonometry. If you're thinking of college, the good news is that you've probably studied a lot of this material already. The bad news is that you may have forgotten it or never felt entirely comfortable with it in the first place.

This situation is perfectly normal, and most students who aren't math geniuses feel roughly the same as you. So your task is to find a realistic strategy to pull together the stuff you already know — even if you're not currently confident that you know it — and tie in the more advanced topics that may have eluded you. Luckily, you've come to the right place.

Everything in this book is designed to take the small amount of math you may remember and build on it so you can use it to tackle typical questions that appear on the ACT. If you've laid the groundwork in school and you're willing to practice, I'll get you through the test.

My approach in this book is simple: practice, practice, and more practice. The focus is specifically on the types of questions that appear over and over again on the ACT. Even if math isn't your strong suit, when you become comfortable with this core material, you stand a much better chance of getting the kind of ACT score you want to see. And the best part is that you don't necessarily have to read this book from cover to cover. You can hop and skip around to whatever topics you need to work on most.

## Conventions Used in This Book

Here are a few conventions to keep in mind as you make your way through this book:

- ✓ Variables (such as  $x$  and  $y$ ) and newly defined terms are in *italics*.
- ✓ Keywords in bulleted lists, action parts of numbered steps, and answers in the practice tests are in **bold**.
- ✓ Web sites are in monofont.
- ✓ I alternate the range of the answer choices throughout the book. In one question, you see Choices (A), (B), (C), (D), and (E), and then in the one after it you see Choices (F), (G), (H), (J), (K). Because the ACT itself uses this pattern, I want you to become familiar with it before test day. And, yes, test-designers skip the letter *I*. Why? Probably to avoid confusion because it looks like the number 1.

## Foolish Assumptions

I'm going out on a limb here, but if you've bought this book, my first assumption is that you or somebody you know is thinking about taking the ACT. If not, you can certainly use it to improve your knowledge of high school math. And beyond that, it also makes a useful door-stop or something to stick under the leg of a *very* wobbly table.

My second assumption is that you've taken a year of algebra, whether in high school, junior college, or some other place. You don't actually have to feel like you *know* algebra. In fact, the point of this book is to build these very skills. But if you've at least sat through an algebra class, you probably know a lot more than you think you know. Really!

## How This Book Is Organized

*ACT Math For Dummies* is divided into six parts, each of which focuses on a different math topic you may encounter on the ACT. In this section, I give you a basic overview of these parts so you have a better idea of where you'd like to begin.

### ***Part I: Getting into the Act: An Overview of ACT Math Basics***

Chapter 1 provides an introduction to ACT math, giving you the most basic information about the test. It also includes a road map of the rest of the book. In Chapter 2, I discuss test-taking skills that aren't strictly math-related but are still necessary to do well on the ACT. In particular, I focus on some ways to work with multiple-choice questions, including plugging in answers. I also show you how to use your calculator to your advantage, rule out answers and guess wisely, and know when to jump over questions that look long or difficult.

In Chapter 3, I discuss a variety of problem-solving strategies. These include looking for a pattern by drawing a chart or picture, memorizing basic math ideas, working with math formulas, setting up word problems, and making a plan to answer difficult questions.

## ***Part II: Building Your Pre-Algebra and Elementary Algebra Skills***

In Part II, I begin helping you build your math skills. In Chapter 4, for example, you review the basics of pre-algebra: number sequences; inequalities; absolute value; factors and multiples; percents, ratios, and proportions; powers and square roots; tables and graphs; basic statistics; and probability.

In Chapter 5, you focus on elementary algebra (Algebra I), including the following: understanding basic algebra concepts and vocabulary; evaluating, simplifying, and factoring expressions; solving a variety of equations, including rational equations and equations with absolute values, square roots, and exponents; and working with equations that have more than one variable.

Chapter 6 provides 30 practice questions, covering the material from Chapters 4 and 5. Each question includes a detailed explanation of how to answer that question.

## ***Part III: Digging In to Intermediate Algebra and Coordinate Geometry***

Part III adds on to the math skills you gain in Part II. Chapter 7 discusses intermediate algebra (Algebra II). You study these topics: inequalities, systems of equations, direct and inverse proportionality, quadratic equations, and functions.

Chapter 8 covers coordinate geometry, which usually is introduced in Algebra I and is continued in Algebra II. I discuss the following topics: graphing points and lines, the distance and midpoint formulas, the slope-intercept form of a line, parallel and perpendicular lines, quadratic functions, transformations, higher-order polynomial functions, and circles on the  $xy$ -graph.

Chapter 9 offers 30 practice questions focusing on the topics covered in Chapters 7 and 8, along with answers and step-by-step explanations for each.

## ***Part IV: Visualizing Plane Geometry and Trigonometry***

Part IV completes the math skills you need to know to get a good score on the ACT. Chapter 10 focuses on plane geometry: lines and angles; triangles, including the area formula and the Pythagorean theorem; quadrilaterals such as squares, rectangles, parallelograms, and trapezoids; circles, including the formulas for area and circumference, tangents, arc length, and chords; and solid geometry.

In Chapter 11, I cover a variety of advanced math topics: trigonometry, including trig ratios, radian measure, the graphing of trig functions, and basic identities; matrices, including matrix operations and determinants; logarithms; and imaginary and complex numbers.

Chapter 12 tests your understanding of the math you discover in Chapters 10 and 11 with 30 practice questions and fully worked-out explanations.



## Part V: Tracking Your Progress with Practice Tests

Part V includes three full-length ACT mathematics tests. Chapters 13, 15, and 17 each contain a different test. Each has 60 questions that should be completed in 60 minutes. In Chapters 14, 16, and 18, you find the answer keys and detailed explanations of how to answer each question.

## Part VI: The Part of Tens

In Part VI, I present two top-ten lists that provide useful information about the ACT. In Chapter 19, I outline ten key differences between the ACT and the SAT. And in Chapter 20, I give you a checklist of small but vital things to remember leading up to your test day.

## Icons Used in This Book

Throughout this book, I use the following four icons to help you keep track of the different kinds of information. Here's what each icon means:



This icon highlights essential information that you need to know, such as key ideas or formulas. Spending a few extra minutes studying these important points is time well spent. You also can use these icons to skim through a chapter you've already studied. Doing so helps solidify your understanding.



Each tip provides an insightful way to approach a question. You may find it especially helpful as a quick way to cut through a seemingly complicated problem.



This icon is like a flashing red light, drawing your attention to a sticky or subtle point that may trip you up if you're not aware of it. Take an extra moment to slow down and make sure you understand the point being made so it doesn't trip you up on the test.



When you see this icon, you know you're ready to put pencil to paper. This book includes dozens of examples of ACT questions, showing you how to answer them from start to finish. Use these examples to better understand a specific type of problem and then refer to them when answering the practice questions.

## Where to Go from Here

I've written this book as a complete reference to ACT math. You can start anywhere you like, dip in, clarify your understanding, and then hop back out with ease.

If you're completely unfamiliar with the ACT, I recommend that you begin with Chapter 1 before branching out. In that chapter, I outline the basics of the math portion of the ACT and provide an overview of the topics that are covered on the test.

If you're ready to get studying, flip to whatever chapter discusses the topic you need help with most. Chapters 4 through 12 provide a thorough review of the specific math skills that the ACT covers. You can focus on these chapters until you feel ready to take one of the practice tests in Part V. Alternatively, you can take a practice test first to find out which types of questions you can answer easily and which hang you up.