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Algebra I

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Mary Jane Sterling

*Author of Algebra Workbook For Dummies,
Algebra II For Dummies, and Algebra II
Workbook For Dummies*



Algebra I

FOR
DUMMIES®

2ND EDITION

by Mary Jane Sterling



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About the Author

Mary Jane Sterling has been an educator since graduating from college. Teaching at the junior high, high school, and college levels, she has had the full span of experiences and opportunities to determine how best to explain how mathematics works. She has been teaching at Bradley University in Peoria, Illinois, for the past 30 years. She is also the author of *Algebra II For Dummies*, *Trigonometry For Dummies*, *Math Word Problems For Dummies*, *Business Math For Dummies*, and *Linear Algebra For Dummies*.

Dedication

I dedicate this book to my husband, Ted, and my three children — Jon, Jim, and Jane — for their love, support, and contributions. They constantly either come up with suggestions for my writing or get themselves into interesting situations that I can write about. I also dedicate the book to two teachers, Catherine Kay and Alba Biagini, who are responsible for the professional path I've taken. And, finally, I dedicate the book to my nephew, Timothy, for his continuing demonstrations of courage and faith.

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Introduction

Let me introduce you to algebra. This introduction is somewhat like what would happen if I were to introduce you to my friend Donna. I'd say, "This is Donna. Let me tell you something about her." After giving a few well-chosen tidbits of information about Donna, I'd let you ask more questions or fill in more details. In this book, you find some well-chosen topics and information, and I try to fill in details as I go along.

As you read this introduction, you're probably in one of two situations:

- ✓ You've taken the plunge and bought the book.
- ✓ You're checking things out before committing to the purchase.

In either case, you'd probably like to have some good, concrete reasons why you should go to the trouble of reading and finding out about algebra.

One of the most commonly asked questions in a mathematics classroom is, "What will I ever use this for?" Some teachers can give a good, convincing answer. Others hem and haw and stare at the floor. My favorite answer is, "Algebra gives you *power*." Algebra gives you the *power* to move on to bigger and better things in mathematics. Algebra gives you the *power* of knowing that you know something that your neighbor doesn't know. Algebra gives you the *power* to be able to help someone else with an algebra task or to explain to your child these logical mathematical processes.

Algebra is a system of symbols and rules that is universally understood, no matter what the spoken language. Algebra provides a clear, methodical process that can be followed from beginning to end. It's an organizational tool that is most useful when followed with the appropriate rules. What *power!* Some people like algebra because it can be a form of puzzle-solving. You solve a puzzle by finding the value of a variable. You may prefer Sudoku or Ken Ken or crosswords, but it wouldn't hurt to give algebra a chance, too.

About This Book

This book isn't like a mystery novel; you don't have to read it from beginning to end. In fact, you can peek at how it ends and not spoil the rest of the story.

I divide the book into some general topics — from the beginning nuts and bolts to the important tool of factoring to equations and applications. So you can dip into the book wherever you want, to find the information you need.

Throughout the book, I use many examples, each a bit different from the others, and each showing a different *twist* to the topic. The examples have explanations to aid your understanding. (What good is knowing the answer if you don't know how to get the right answer yourself?)

The vocabulary I use is mathematically correct *and* understandable. So whether you're listening to your teacher or talking to someone else about algebra, you'll be speaking the same language.

Along with the *how*, I show you the *why*. Sometimes remembering a process is easier if you understand why it works and don't just try to memorize a meaningless list of steps.

Conventions Used in This Book

I don't use many conventions in this book, but you should be aware of the following:

- ✓ When I introduce a new term, I put that term in *italics* and define it nearby (often in parentheses).
- ✓ I express numbers or numerals either with the actual symbol, such as 8, or the written-out word: *eight*. Operations, such as +, are either shown as this symbol or written as *plus*. The choice of expression all depends on the situation — and on making it perfectly clear for you.

What You're Not to Read

The *sidebars* (those little gray boxes) are interesting but not essential to your understanding of the text. If you're short on time, you can skip the sidebars. Of course, if you read them, I think you'll be entertained.

You can also skip anything marked by a Technical Stuff icon (see "Icons Used in This Book," for more information).

Foolish Assumptions

I don't assume that you're as crazy about math as I am — and you may be even *more* excited about it than I am! I do assume, though, that you have a mission here — to brush up on your skills, improve your mind, or just have some fun. I also assume that you have some experience with algebra — full exposure for a year or so, maybe a class you took a long time ago, or even just some preliminary concepts.

If you went to junior high school or high school in the United States, you probably took an algebra class. If you're like me, you can distinctly remember your first (or only) algebra teacher. I can remember Miss McDonald saying, "This is an n ." My whole secure world of numbers was suddenly turned upside down. I hope your first reaction was better than mine.

You may be delving into the world of algebra again to refresh those long-ago lessons. Is your kid coming home with assignments that are beyond your memory? Are you finally going to take that calculus class that you've been putting off? Never fear. Help is here!

How This Book Is Organized

Where do you find what you need quickly and easily? This book is divided into parts dealing with the most frequently discussed and studied concepts of basic algebra.

Part 1: Starting Off with the Basics

The "founding fathers" of algebra based their rules and conventions on the assumption that everyone would agree on some things first and adopt the process. In language, for example, we all agree that the English word for *good* means the same thing whenever it appears. The same goes for algebra. Everyone uses the same rules of addition, subtraction, multiplication, division, fractions, exponents, and so on. The algebra wouldn't work if the basic rules were different for different people. We wouldn't be able to communicate. This part reviews what all these things are that everyone has agreed on over the years.

The chapters in this part are where you find the basics of arithmetic, fractions, powers, and signed numbers. These tools are necessary to be able to deal with the algebraic material that comes later. The review of basics here puts a spin on the more frequently used algebra techniques. If you want, you can skip these chapters and just refer to them when you're working through the material later in the book.