

Making Everything Easier!™

Technical Math **FOR** **DUMMIES®**

Learn to:

- Understand mathematical concepts used in the skilled trades and by health care, culinary, and technical professionals
- Use fundamental formulas and methods to excel in the workplace, classrooms, and on job sites
- Apply algebra, geometry, and trigonometry to solve on-the-job problems

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Technical Math For Dummies®

Table of Contents

[Introduction](#)

[About This Book](#)

[Conventions Used in This Book](#)

[What You're Not to Read](#)

[Foolish Assumptions](#)

[How This Book Is Organized](#)

[Part I: Basic Math, Basic Tools](#)

[Part II: Making Non-Basic Math Simple and Easy](#)

[Part III: Basic Algebra, Geometry, and Trigonometry](#)

[Part IV: Math for the Business of Your Work](#)

[Part V: The Part of Tens](#)

[Icons Used in This Book](#)

[Where to Go from Here](#)

[Part I: Basic Math, Basic Tools](#)

[Chapter 1: Math that Works as Hard as You Do](#)

[Discovering the Benefits of a Technical Math Book](#)

[The Basics Are Basically Basic](#)

[Meeting Measurement and Conversions and Studying Story Problem Strategies](#)

[Using Workhorse Math](#)

[Building Your Knowledge of the Branches of Math](#)

[Life Math Isn't Classroom Math](#)

[Chapter 2: Discovering Technical Math and the Tools of the Trades](#)

[Busting Myths about Math](#)

["I don't need to use it."](#)

["It's too hard."](#)

["I have a phobia."](#)

[Remember: Somebody Else Already Did the Hard Work](#)

[The Trades, They Are A-Changing](#)

[Math Devices That Can Help You Do Your Job](#)

[Pocket \(or phone, or computer\) calculators](#)

[Specialty calculators](#)

[Thermometers and sphygmomanometers](#)

[Micrometers, calipers, and gauges](#)

[Automotive tools](#)

[Carpentry tools](#)

[Bricklaying tools](#)

[Chapter 3: Zero to One and Beyond](#)

[Looking at the Numbers that Count: Natural Numbers](#)

[Integers: Counting numbers with extras](#)

[Zero: Making math easier](#)

[Going Backward: Negative Numbers](#)

[Working with negative numbers](#)

[Traveling down the number line](#)

[Getting Between the Integers: Fractions, Decimals, and More](#)

[Our fractional friends](#)

[The rational numbers\(and their irrational friends\)](#)

[Taking a Look at the Lesser-Known Numbers](#)

[Real numbers](#)

[Imaginary numbers](#)

[Complex numbers](#)

[Nominal numbers](#)

[Handling Numerical Story Problems](#)

[Example: Automotive tech — a slippery task](#)

[Example: Getting the order right](#)

[Chapter 4: Easy Come, Easy Go: Addition and Subtraction](#)

[Making Everything Add Up](#)

[Adding numbers in a column](#)

[Adding zero](#)

[Adding negative numbers](#)

[Carrying the extra](#)

[Checking your work](#)

[Subtraction: Just Another Kind of Addition](#)

[Subtracting a positive is the same as adding a negative](#)

[Subtracting negative numbers](#)

[Subtracting zero](#)

[Subtracting multiple items](#)

[Borrowing when you have to](#)

[Checking your work](#)

[Example: Flour Power](#)

[Example: Sheep on Trucking](#)

Chapter 5: Multiplication and Division: Everybody Needs Them

Go Forth and Multiply!

Mastering multiplication terminology

Memorizing multiplication tables: Faster than a calculator

Doing Simple Multiplication Like Your Grandfather Did It

Checking your work

Easy Street: Multiplying by 0, 1, and 10

A zero pulse: Multiplying by 0

One is the loneliest number: Multiplying by 1

Multiplying by 10

Divide and Conquer

Dealing with division definitions

Dividing by using the inverse

Doing short division

Going long (division)

Checking your work

Shortcuts: Dividing into 0 and by 0, 1, 10, and the dividend

Example: In the Machine Shop

Chapter 6: Measurement and Conversion

Main (And Not So Main) Systems of Measurement

The metric system

The American system

The imperial system, or the modern English system

Troy weight: Just for bullets and bullion

Apothecaries' system: Not a grain of value any more

Other legitimate but specialized measurements

Converting Length, Weight, and Volume

The rules of conversion

American units to American units

American to metric and back again

Converting metric to metric

Example: Don't Get Bored by Board Feet

Example: Getting the Dosage Right

Chapter 7: Slaying the Story Problem Dragon

Removing the Mystery from Story Problems

How to approach a story problem: A real-life example

The secret formula inside every story problem

The Step-by-Step Story Problem Solution

1. Read the problem

2. List the facts

3. Figure out exactly what the problem is asking for

4. Eliminate excess information

5. See what information is missing

6. Find the keywords

7. Pay attention to units

8. Convert information supplied into information needed

9. Draw a diagram

10. Find or develop a formula

11. Consult a reference

12. Do the math and check your answer to see whether it's reasonable

Example: Furring Strips

Example: And Now, from the Banks of the Nile

Part II: Making Non-Basic Math Simple and Easy

Chapter 8: Fun with Fractions

Meeting the Numerator and Denominator: Best Friends Forever

Taking a look at numerators

Defining denominators

Dealing with special cases

Tackling the Different Types of Fractions

Proper and improper fractions

Mixed numbers

Ratios

Performing Math Operations with Fractions

Multiplying fractions

Dividing fractions

Adding fractions

Subtracting fractions

Example: Dividing and Selling a Cheesecake

Pricing your cake wholesale

Pricing your cake retail

Example: Cutting Fire Stops for Framing Carpentry

Chapter 9: Decimals: They Have Their Place

Diving into Decimal Basics

Pointing out decimal points and places

Precision, pennies, and parsing

The Four Ops: Working with Decimals in Four Math Operations

Adding excitement

Subtraction gives satisfaction

[Multiply with abandon](#)

[Division is an important decision](#)

[Decimal Conversion](#)

[Converting fractions to decimals](#)

[Converting decimals to fractions](#)

[Round, Round, Get Around, I Get Around](#)

[Making Change and Charging Sales Tax](#)

[Making change](#)

[Charging sales tax](#)

[Example: A Journey to Office Supply Heaven](#)

[Chapter 10: Playing with Percentages](#)

[Pinpointing Percentages: Half a Glass Is Still 50 Percent Full](#)

[A percentage is a fraction, but the denominator never changes](#)

[A percentage is a ratio, too](#)

[Percentages Are Good Converts](#)

[Converting percentages to decimals](#)

[Turning decimals into percentages](#)

[Going from percentages to fractions](#)

[Transforming fractions to percentages](#)

[Calculating Percentage Increases and Decreases](#)

[Percentage increases: You get 10 percent more!](#)

[Percentage decreases: You save 10 percent!](#)

[The 100 percent increase: You must be 100 percent satisfied!](#)

[Dividing a Pie Using Percentages](#)

[Example: The World of Pralines](#)

[Example: Oily to Bed and Oily to Rise](#)

Chapter 11: Tackling Exponents and Square Roots

Exponentiation: The Power of Powers

The basics of the base

Moving beyond 2 or 3

Different faces of special bases

Exponentiation math

Getting Back to Your(Square)Roots

Square roots the hard way

Square roots the easy way

Square roots the effortless way

Example: Finding the Bytes On a Disk

Part III: Basic Algebra, Geometry, and Trigonometry

Chapter 12: Algebra and the Mystery of X

Variables: Letters Represent Numbers, but the Math Is the Same

Understanding variables

Corralling constants

Examining expressions

Getting a handle on equations

Taking time for terms

Variable Relationships: X and Her Friends

Best friends forever: The constant and the variable

Simplifying variables: Variables of a feather flock together

Math Operations with Variables

Adding variables

Subtracting variables

[Multiplying variables](#)

[Dividing variables](#)

[Example: How Many Oranges Are in that Orange Juice?](#)

[Example: Medications In the Pillbox](#)

[Chapter 13: Formulas \(Secret and Otherwise\)](#)

[Following the Formula for Building a Formula](#)

[Property A: Associativity](#)

[Property C: Commutativity](#)

[Property D: Distributivity](#)

[Working from a Formula to a Solution](#)

[Applying the same operation on both sides of the equal sign](#)

[Converting units with a special multiplication rule](#)

[Calculating Speed, Time, and Distance: Three Results from One Formula](#)

[Solving for speed](#)

[Solving for time](#)

[Solving for distance](#)

[Example: Cement Masonry — Pouring City Sidewalks](#)

[Example: Lunch Time — Buying Burgers and Fries](#)

[Chapter 14: Quick-and-Easy Geometry: The Compressed Version](#)

[Looking at Geometry's Basic Parts](#)

[No snakes on this plane: Cartesian coordinates](#)

[What's the point?](#)

[What's your line?](#)

[What's your angle?: Acute, obtuse, and right angles](#)

[Examining Simple Geometric Shapes](#)

[The square and the rectangle](#)

[The triangle: Just because it isn't a right triangle doesn't mean it's wrong](#)

[The polygon](#)

[The circle](#)

[Learn It Once and Forget It: The Pythagorean Theorem](#)

[Example: Don't Fence Me In](#)

[Example: The Pen Is Mightier Than the Paddock](#)

[Chapter 15: Calculating Areas, Perimeters, and Volumes](#)

[Area: All That Space in the Middle](#)

[Calculating the area of rectangles and squares](#)

[Figuring the area of a parallelogram \(a bent-over long rectangle\)](#)

[Determining the area of a trapezoid \(a trapewhat?\)](#)

[Calculating the area of a triangle](#)

[Computing the area of a circle](#)

[Perimeters: Along the Edges](#)

[Understanding perimeters: What goes around comes around](#)

[Calculating the perimeters of polygons](#)

[A perimeter by any other name: Finding a circle's circumference](#)

[Volume: The Third Dimension](#)

[Getting a handle on American volume units](#)

[Calculating the volume of cuboids \(also known as boxes\)](#)

[Finding the volumes of spheres and cylinders](#)

[Example: Bore and Stroke for the Auto Guy](#)

[Example: Yard Area, the Landscaper's Nightmare](#)

[Chapter 16: Trigonometry, the "Mystery Math"](#)

[Handling Triangles: More Angles than a Cornfield Maze](#)

[By Their Sines Shall Ye Know Them: Using Trigonometric Functions](#)

[Sine, cosine, and tangent: Three great relationships](#)

[Cosecant, secant, and cotangent: Three so-so relationships](#)

[The law of sines](#)

[Example: Surveying a River](#)

[Example: Locating a Wildfire](#)

[Part IV: Math for the Business of Your Work](#)

[Chapter 17: Graphs Are Novel and Charts Are Off the Chart](#)

[Defining Charts and Graphs and Their Advantages](#)

[Paying Tables Their Proper Respect](#)

[Introducing the Three Most Important Types of Charts](#)

[Walking the line graph](#)

[Sidling up to the bar graph](#)

[Getting a piece of the pie chart](#)

[Reading Charts and Graphs \(And Recognizing a Bad One\)](#)

[For a start, the parts of a chart](#)

[The good, the bad, the ugly, and the inaccurate](#)

[Making Charts and Graphs](#)

[Creating line graphs](#)

[Building bar graphs](#)

[Putting together pie charts](#)

[Example: Tracking Weight and Height in a Pediatric Practice](#)

[Example: Cost of Materials in Residential Construction](#)

[Chapter 18: Hold on a Second: Time Math](#)

[Dividing Time into Hours, Minutes, and Seconds](#)

[There's a Time for Us, Somewhere a Time for Us: Time Notation Systems](#)

[12-hour notation](#)

[24-hour notation](#)

[Greenwich mean time \(GMT\)](#)

[UTC and Zulu time](#)

[Swahili time](#)

[Bible time](#)

[Converting Time](#)

[Going from minutes to seconds and back again](#)

[Changing hours to minutes and back again](#)

[Working with time as a fraction](#)

[Time Math: Calculating Time](#)

[Addition](#)

[Subtraction](#)

[Multiplication](#)

[Division](#)

[Example: The Timesheet for All Trades](#)

[Example: Microwave Magic](#)

[Chapter 19: Math for Computer Techs and Users](#)

[Try a Bit of This Byte: Understanding Basic Computer Terms](#)

[The Sum of the \(Computer\) Parts, and the Numbers Involved](#)

[Disk capacity](#)

[Flash memory](#)

[Rama lama ding dong: RAM memory](#)

[Speed out of the gate: Processor rate](#)

[The Internet is running on “slow” today: Network speed](#)

[Burn, baby, burn: DVD write speed](#)

[Example: Total Capacity of a Mass Storage System](#)

[Part V: The Part of Tens](#)

[Chapter 20: Ten Tips for Solving Any Math Problem](#)

[Figure Out Exactly What the Problem Asks For](#)

[List the Facts](#)

[Convert Supplied Information into Needed Information](#)

[Determine What Information You're Missing](#)

[Eliminate Excess Information](#)

[Draw a Diagram](#)

[Find or Develop a Formula](#)

[Consult a Reference](#)

[Pay Attention to Units](#)

[Check Your Answer to See whether It's Reasonable](#)

[Chapter 21: Ten Formulas You'll Use Most Often](#)

[Area of a Square, Rectangle, or Triangle](#)

[Area of a Circle](#)

[Feet to Meters and Inches to Centimeters](#)

[Miles to Kilometers and Kilometers to Miles](#)

[Pounds to Kilograms and Ounces to Grams](#)

[Gallons to Liters and Liters to Gallons](#)

[Temperature Conversions](#)

[Hours to Minutes and Minutes to Hours](#)

[Distance, Time, and Speed](#)

[Volts, Amps, and Watts](#)

[Chapter 22: Ten Ways to Avoid Everyday Math Stress](#)

[Get Help with Your Checkbook](#)

[Use Grocery Shopping to Build Confidence](#)

[Practice Reading Analog Clocks](#)

[Play Games](#)

[Memorize Math Signs, Symbols, and Formulas](#)

[Make the Multiplication Table a Mantra](#)

[Use Paper Maps and Practice Navigating](#)

[Try to Estimate Distances](#)

[Take Up Music](#)

[Integrate Math with Nonmath Skills](#)

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by Barry Schoenborn and Bradley Simkins



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About the Authors

Barry Schoenborn lives in Nevada City, California. He's a longtime technical writer with over 30 years' experience. He's written hundreds of user manuals and (in the early days) worked dozens of part-time jobs that required practical math. He has been a carpenter for the movies, a stage electrician, a movie theater manager, a shipping clerk, an insurance clerk, and a library clerk. He has a bachelor's degree in theatre from California State University, Fullerton.

Recently, his company worked with the California Integrated Waste Management Board to teach scientists and administrators how to write clearly. Barry is the coauthor of *Storage Area Networks: Designing and Implementing a Mass Storage System* (Pearson Education). He was a movie reviewer for the L.A. Herald-Dispatch and wrote a monthly political newspaper column for *The Union of Grass Valley, California*, for seven years. Barry's publishing company, Willow Valley Press, published *Dandelion Through the Crack*, which won the William Saroyan International Prize for Writing.

Bradley Simkins was born and raised in Sacramento, California, and became a sixth-generation journeyman plasterer. But it didn't take long (after many hours on construction sites) before he figured out that it was easier to use his brain than his muscles. He has a master's degree in mathematics from California State University, Sacramento. He has taught, assisted, and tutored at the Multimedia Math Learning Center at American River College in Sacramento. He and his family live in Sacramento, where he owns Book Lovers Bookstore, an independent bookstore.

Dedications

Barry: To my teachers at San Juan High School in Citrus Heights, California: Mr. N. E. (Norm) Andersen (math); Mrs. Eada Silverthorne (English); Ms. Susan A. Schwarz (English); Mr. Norman E. Allen (physics); Mr. A. J. Crossfield (chemistry); and Mr. James C. Harvey (biology). They would be surprised and (maybe) pleased.

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Introduction

Technical careers require technical mathematics (technical math). That's why we wrote *Technical Math For Dummies*. Whether you're currently working in a technical trade or studying in school, you have probably made the discovery that most jobs require some math.

Most parts of technical math are simple. You may think some parts are hard, but look closer. After you read them, you'll hit your forehead with the heel of your palm and say, "Yes! Of course! I sorta knew that all along, but now I really get it!" We think we've filled a gap in the world of math guides, and we hope you enjoy the book.

About This Book

This book is a reference. It's also a repair manual that can help you fill voids you may have in your math background. It's different from other math books in three major ways:

It's all about practical math. You won't find anything about symplectic geometry or sigma-algebra here. Our focus is on math for technical careers — it looks at problems you may deal with every day and the math skills you need to handle them. But we also include general principles when necessary.

It's comprehensive. It covers all major math concepts; other math books are about individual concepts (for example, algebra, geometry or trigonometry).

It's not dull (we hope) as other math books often are. One of us (Barry) is a long-time technical writer, and he's written far too many deadly dull user manuals. That nonsense stops here. Because it's a *For Dummies* book, you can be sure it's easy to read and has touches of humor.

Technical Math For Dummies applies basic math to basic tasks in many careers. You get practical examples, and most of them are based on real-life experiences. And in what other book can you work with math and also find out how to make 90 dozen pralines or figure the distance from a fire watch tower to a wildfire? You can also apply a lot of this math to your personal life as well as your work life.

At the risk of sounding like a late-night infomercial, we want to point out a couple of this book's unique features. We gar-on-tee you won't find them anywhere else.

Conventions Used in This Book

We designed this book to be user-friendly, maybe even user-affectionate. If it were any friendlier, it would drive itself to your house and bring coffee and doughnuts. To help you get the most out of your new friend, we use the following conventions:

Italic type highlights new terms. We follow each term with a short and often informal definition. Occasionally, we give you clues about how to pronounce difficult words.

Web addresses are in monofont. They're usually very short and shouldn't break across two lines of text. But if they do, we haven't added any extra characters (such as a hyphen) to indicate the break. Just type in what you see.

Although our English teachers would cringe at our breaking the rules, we usually write numbers as numerals, not words. For example, the text may say "add 9 to 3 to get 12," not "add nine to three to get twelve." We think this setup makes the ideas clearer in a math book.

What You're Not to Read

We'd love for you to read every word in this book in the order it appears, but life is short. You don't have to read chapters that don't interest you. This reference book is designed to let you read only the parts you need.

You don't have to read anything with a Technical Stuff or Did You Know? icon. That text is there to give you overly technical or trivial info. *Sidebars* (that's what they're called in publishing) are the shaded blocks of text you find every so often throughout the book. They're interesting (we think) but not critical to your understanding of the main text, so you can skip 'em if you want.

Foolish Assumptions

Although we know what happens when you assume, we went ahead and made a couple of presumptions about

you anyway:

We assume that you went to elementary and middle school, where you were exposed to math fundamentals. Why don't we include high school? Because high school is where many people get bored, dazed, or frustrated with mathematics. You may have been in class, but maybe your mind was somewhere else.

We assume you have access to a computer and the Internet. It's not essential, but it's very handy. Use a good search engine to find out more about any topic in this book.

How This Book Is Organized

Technical Math For Dummies has five parts, moving from simpler topics (such as counting) to more complex topics (such as trigonometry). Here's how it's set up.

Part I: Basic Math, Basic Tools

In this part, you get math basics (and we do mean basics). Chapter 1 gives you an overview of broad technical math concepts. Chapter 2 dispels myths about math and provides some history about technical careers. Technical professions are very old and go back (at least) to making arrowheads and spear points. And with all due respect to art history and library science majors,

stonemasons built the pyramids. You also learn about the tools of the trades in this chapter.

The remaining chapters in this part are a complete review of basics — numbers, addition, subtraction, multiplication, division, measurement, and conversion. You see how to do these operations faster and better. We also tackle something that everybody says fills them with fear and loathing — the notorious word or story problem. Story problems can be filled with tricks and traps, but in this chapter you see how easily you can deal with them all.

Part II: Making Non-Basic Math Simple and Easy

In Part II, you review the workhorses of technical math, the processes that are a simple step above arithmetic. Most careers can't function without them.

Part III: Basic Algebra, Geometry, and Trigonometry

You may think some topics (algebra, geometry, and trigonometry) are tough, but in this part you find out that they aren't. The basic techniques are easy to understand, and those are the techniques you need. Now that's a happy coincidence!

This part removes the mystery from formulas and shows you how to make your own custom formulas. It's also filled with practical applications for areas, perimeters, and volume, as well as a little theory.

Part IV: Math for the Business of Your Work

In Part IV, we point out the obvious: “Life math” is different from “classroom math.” Although the previous parts have direct application to your technical work, this part brings some math concepts to the business side of your job.

In this part, you see how to use graphs and charts to your advantage for both problem solving and presenting information to management and clients. We also present a chapter on time math, which we hope clears up a few mysteries about the basic questions “What time is it?” and “How long will it take?”

The last chapter deals with computer math, and it’s a simple mini-education in what’s going on with your computer and your Internet connection. This chapter may help make you a smarter shopper when you’re buying computers, smartphones, MP3 players, and digital instruments for your business or your home.

Part V: The Part of Tens

For Dummies books always have a Part of Tens, and this book is no exception. The world loves lists of ten things, and in these chapters you find a large amount of information in a small space.

Chapter 20 has ten principles for solving any common math problem. Its partner is Chapter 21, which contains the ten most commonly used formulas. It also has some formula variations and some estimating shortcuts. Finally,

Chapter 22 shows you ten easy ways to get good at math while doing everyday tasks. Finally, we also include a glossary of terms that you may or may not see in the text but that may pop up in your work.

Icons Used in This Book

We use several *icons* (the little drawings in the margins of the book) to call out special kinds of information and enhance your reading experience — that’s just the kind of people we are. Here’s a breakdown:



A Tip is a suggestion or a recommendation that usually points out a quick and easy way to get things done.



This icon represents a key idea that’s worth remembering — the information may come in handy later.



Technical Stuff contains information that’s interesting but overly technical and not vital to your understanding the topic.



Text with this icon contains odd facts (such as a legislature trying to regulate the value of pi), pieces of pop culture, strange bits of history, or bizarre terms.