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* SAT Math

FOR

DUMMIES®

Learn to:

- Score high on the mathematics sections of the SAT
- Identify question types (including those designed to confuse you)
- Manage your time during the exam
- Perfect your skills with three practice tests

Mark Zegarelli

Math tutor and author of *Calculus II For Dummies* and *Basic Math & Pre-Algebra For Dummies*

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*SAT Math For Dummies®

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Do Something Fun the Day Before the Test

Don't Study for More Than 20 Minutes the Night Before the Test

Pack Everything You Need the Night Before

Do Something Relaxing before Bed

Get a Good Night's Sleep

Wear Several Layers of Clothing

Arrive at the Test Site Extra Early.

Spend Your Time Just before the Test However You Please

Remember to Breathe

Skip Over Any Questions That Throw You

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Mark Zegarelli



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About the Author

Mark Zegarelli is the author of *LSAT Logic Games For Dummies* (Wiley) plus four other *For Dummies* books on basic math and pre-algebra, Calculus II, and logic. He holds degrees in both English and math from Rutgers University and is an SAT teacher and tutor.

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

Dedication

This is for my dear friend Simon Stanley Marcus, with much gratitude for your boundless wisdom and presence.

Author's Acknowledgments

This is my sixth For Dummies book, and again I enjoy the privilege of working with an editorial team that continues to inspire and call me to my best. Thank you to my Wiley editors: Chrissy Guthrie, Danielle Voirol, and Lindsay Lefevere. More thanks for my technical editors, Amy Nicklin and Benjamin Wyss, for setting me on a better course whenever $2 + 2 = 5$.

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Introduction

Just like the senior prom or getting a driver's license, the SAT is one of those milestones in the life of a high school student. I wish I could say it was as much *fun* as those other things, but if I did, you probably wouldn't believe anything else I say in the rest of the book.

But any way you slice it, the SAT is still there, scheduled for some Saturday morning a few weeks or months from now. Most colleges require you to submit an SAT score as part of your application process. So because there's no getting around it and it's not going away, your best bet is to do some preparation and get the best possible SAT score you can.

That's where this book comes in. The entire book you have in your hot little hands right now is devoted to refining the math skills you need most to succeed on that all-important SATurday.

About This Book

A lot of SAT prep books divide their attention among all three sections of the SAT: critical reading, writing, and mathematics. This is fine as far as it goes, because you probably want to boost all three scores. But in this book, I focus exclusively on *math*, *math*, and more *math* to help you achieve the best score you can on this — what can I say? — most often dreaded part of the test.

The SAT covers a variety of areas, including arithmetic, algebra, geometry, functions and graphs, and statistics

and probability. But it doesn't require the quadratic formula or anything you'd cover after that in an algebra class, so you don't need to know trig or calculus. This book focuses on SAT topics and helps you get used to problem-solving so that you can turn facts and formulas into useful tools.

I wrote this book to give you the best possible advantage at achieving a good score on the math portion of your SAT. There's no shortcut, but most of what you need to work on comes down to four key factors:

Know the basics inside and out.

Get comfortable using your calculator.

Strengthen SAT-specific math skills.

Practice answering SAT questions.

For that last point, *every* example and problem here is written in SAT format — either as a multiple-choice question or as a student-produced grid-in question. From Chapter 3 to Chapter 8, every chapter contains math skills that are essential to the SAT, with dozens of SAT examples followed by a set of 20 practice problems. And to give you that test-day experience, this book also includes three practice tests. That's hundreds and hundreds of questions designed to strengthen your "SAT muscle," so to speak.

Conventions Used in This Book

Following are a few conventions to keep in mind:

New terms introduced in a chapter, as well as variables, are in *italics*.

Keywords in lists and numbered steps are in **boldface**.

Any Web sites appear in monofont.

The final answers to problems appear in **bold**. For multiple-choice questions, that's a letter from **(A)** to **(E)**. For grid-in questions, I write the answer as you'd fill it in on the

test. So as a test answer, I give $\frac{7}{9}$ as **7/9** or **.777** or **.778**, which are all acceptable ways

to write it on your answer sheet.

Foolish Assumptions

This is an SAT prep book, so my first assumption is that you or someone you love (your son or daughter, mom or granddad, or perhaps your cat) is thinking about taking the SAT sometime in the future. If not, you're still welcome to buy the book.

My second assumption is that you're currently taking or have in your life at some point taken an algebra course, even if you feel like it's all a blur. Now, I *wish* I could tell you that algebra isn't very important on the SAT — oh, a mere trifle, hardly a thought. But this would be like saying you can play NFL football without getting rushed at by a bunch of 250-pound guys trying to pulverize you. It just ain't so.

But don't worry — this book is all about the blur and, more importantly, what lies beyond it. Read on, walk through the examples, and then try out the practice problems at the end of each chapter. I can virtually guarantee that if you do this, the stuff will start to make sense.

How This Book Is Organized

This book is organized into five parts, taking you from an overview of SAT math through the nitty-gritty skills you need to get the best possible score. Here's a look at what's waiting for you in these chapters.

Part I: Making Plans for This SATurday: An Overview of SAT Math

Part I introduces you to the SAT in general and the math sections in particular. Chapter 1 provides you with the most basic and important information about SAT math. You see the general areas of math that you need to focus on: arithmetic, algebra, geometry, coordinate geometry, plus a few additional scattered topics.

In Chapter 2, I talk about the two types of questions you face on the SAT: multiple-choice questions and grid-in questions. I go over some of the “fine print” information that the test-makers, in their infinite wisdom, provide to

make the test fair. I also touch upon the list of formulas that you don't have to memorize because you'll have them on the test. I discuss when and how to use your calculator, and I provide some advice on strengthening a few mental math skills so you can answer questions quickly and confidently.

Part II: Did They Really Cover This Stuff in School? A Review of Math Skills

In Part II, I review the basic skills you need to remember from your math classes before sitting for your SAT. I also provide lots of practice problems in SAT style so that you can strengthen these skills.

In Chapter 3, I discuss topics in arithmetic, such as integers, digits, the number line, divisibility, percents, ratios, and more. Chapter 4 covers algebra, from simplifying and factoring to solving systems of equations, working with inequalities, and answering SAT questions that give you new, unfamiliar notations to work with. In Chapter 5, the focus is on geometry, including the basics about lines, angles, circles, and the ever-important right triangle. To finish up, I give you a few important formulas in solid geometry and tips on questions that test your geometric perception. In Chapter 6, you look at functions and coordinate geometry, which is geometry on the xy -plane.

Chapter 7 is a grab bag of topics you'll probably see on your SAT but that don't fit neatly into any of the other

chapters. It includes number sequences, set theory, statistics, graphs of data, and more.

Part III: Your Problems Are Solved! SAT Problem-Solving Techniques

Part III takes a step forward, showing you how to pull together the set of skills from Part II to answer more-complicated SAT questions. In Chapter 8, you concentrate on word problems.

Chapter 9 takes a wide view of SAT strategy, giving you a few perspectives on how to approach the questions. I discuss how problems are arranged by difficulty and show you how to match the skills in your math toolbox to each question as you face it. I also show you how to read a question and anticipate the formulas that may be helpful to answer it.

Part IV: Practice Makes Perfect: SAT Math Practice Tests

Part IV gives you three opportunities to practice your SAT skills under timed conditions. Each practice test also comes with an accompanying chapter that provides the answers to the questions, along with explanations to help you understand why the correct answers are correct.

Part V: The Part of Tens

In this part, I give you the best ways to utilize your study time between now and the big day. I also identify ten smart but simple things you can do just before the test to help boost your score.

Icons Used in This Book

In this book, I use these four icons to signal what's most important along the way:



This icon points out important information that you need to focus on. Make sure you understand this information fully before moving on. You can skim through these icons when reading a chapter to make sure you remember the highlights.



Tips are hints that can help speed you along when answering a question. See whether you find them useful when working on practice problems.



This icon flags common mistakes that students make if they're not careful. Take note and proceed with caution!



Each example is a formal SAT-style question followed by a step-by-step solution. Work through

these examples and then refer to them to help you solve the practice problems at the end of the chapter.

Where to Go from Here

This book is organized so that you can safely jump around and dip into every chapter in whatever order you like. You can strengthen skills you feel confident in or work on those that need some attention.

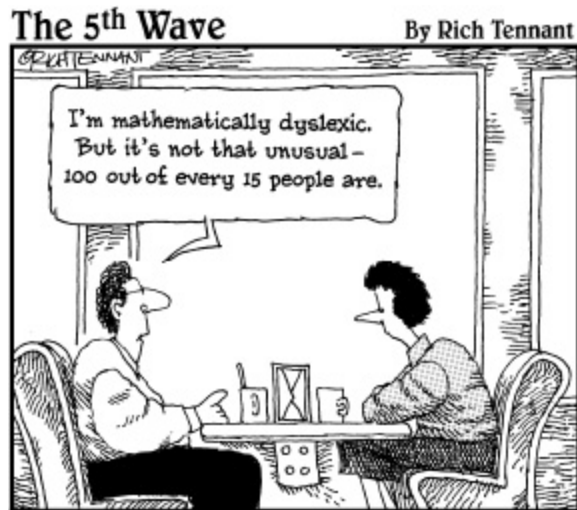
If this is your first introduction to SAT math, I strongly recommend that you start out by reading Chapters 1 and 2. There, you find some simple but vital SAT-specific information that you need to know before you sit down with pencil in hand to take the test.

If it's been a while since you've taken a math course, read the math-skills chapters (Chapter 3 to Chapter 7) in order. Chapter 3, which focuses on arithmetic, can get your math brain moving again, and you may find that a lot of this stuff looks familiar as you go along.

Finally, if you read through a few chapters and feel that the book is moving more quickly than you'd like, go ahead and pick up my earlier book, *Basic Math & Pre-Algebra For Dummies* (Wiley). There, I adopt a more leisurely pace and spend more time filling in any gaps in understanding you may find along the way.

Part I

Making Plans for This SATurday: An Overview of SAT Math



In this part . . .

Part I gives you an overview of SAT math. I introduce you to multiple-choice and grid-in questions, discuss when and how to use your calculator, and give you some time-saving mental math skills.

Chapter 1

SAT Math Basics

In This Chapter

Overviewing the three SAT math sections

Knowing what's covered and what's not covered on the SAT

Understanding some basic SAT problem-solving skills

SAT math — what joy, what utter bliss! Well, all right — back on Earth you probably have some work to do before you reach that stage. I promise to do everything in my power to make your study time as painless and productive as possible. All I ask is that you trust in yourself: You already know more than you think you do.

If you've taken algebra in school, much of this book may seem like review. The task at hand is to focus your work on the skills you need to get the best SAT score you can. So in this chapter, I give you a road map to rediscovering the math you know, getting clear on the math you're sketchy on, and preparing to take on some new and useful skills in time for the test.

I start off with an overview of the SAT math sections. I then go over the specific math skills you need to focus on, which I cover in detail in Part II. Then I set your mind at ease by mentioning a few areas of math that you don't have to worry about because they're *not* on the test. Finally, I talk a bit about problem-solving and applying all those math skills.

Getting an Overview of the SAT Math Sections

Your total SAT *composite score* is a number from a lowest possible score of 600 to a highest possible score of 2,400. Out of that, your mathematics score ranges from 200 to 800, based on your performance on the three mathematics sections of the test.

Here's an overview of the three math sections of the SAT:

A 25-minute section containing 20 multiple-choice questions, which require you to choose the right answer among five choices, (A) through (E)

A 25-minute section containing 18 questions: 8 multiple-choice questions and 10 grid-in questions (also called *student-produced response questions*), which require you to record the right answer into a special grid

A 20-minute section containing 16 multiple-choice questions

Generally speaking, questions within each section of the SAT get progressively more difficult. Early questions usually test you on a single basic skill. In the middle of the section, the questions get a bit more complicated. By the end of the test, you usually need a variety of math skills to answer a question.

In Chapter 2, I discuss the two types of questions (multiple-choice and grid-in) in more detail. I also give you some guidelines on writing your answers for grid-in questions. Later, each of the three practice tests in Part IV

(Chapters 10 through 15) gives you three math sections that mirror the ones you'll face when you sit for your SAT.

Knowing What's In: The Math You Need for the SAT

The SAT covers math up to and including the first semester of Algebra II. A good rule of thumb is that SAT math

Includes the quadratic *equation* ($ax^2 + bx + c = 0$) and everything covered before it

Excludes the quadratic *formula* ($x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$) and everything covered after it

In this section, I give you an overview of some important math topics that are part of the SAT, in each case focusing on the specific skills I cover in each chapter.

Calculating with arithmetic questions

In this section, I cover the arithmetic skills you need most on the SAT. You can flip to Chapter 3 for more detail.

Digital computing

The number system uses ten digits — 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9 — from which all other numbers are built. Some SAT questions require you to figure out the value of a number based on the values of its digits. For example,