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First Edition

Guide

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2011 GRE**

Geometry

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GEOMETRY

GRE Math Strategy Guide

This volume guides students through the intricacies of shapes, planes, lines, angles, and objects, illustrating every geometric principle, formula, and problem type tested on the GRE.

Geometry GRE Strategy Guide, First Edition

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September 1st, 2010

Dear Student,

Thank you for picking up one of the Manhattan GRE Strategy Guides—we hope that it refreshes your memory of junior-high school math that you haven't used in years. Maybe it will even teach you a new thing or two.

As with most accomplishments, there were many people involved in the book that you're holding. First and foremost is Zeke Vanderhoek, the founder of MG Prep. Zeke was a lone tutor in New York when he started the Company in 2000. Now, ten years later, the Company has Instructors and offices nationwide and contributes to the studies and successes of thousands of students each year.

Our Manhattan GRE Strategy Guides are based on the continuing experiences of our Instructors and our students. On the Company side, we are indebted to many of our Instructors, including but not limited to Jen Dziura, Stacey Koprince, David Mahler, Chris Ryan, Michael Schwartz, and Tommy Wallach, all of whom either wrote or edited the books to their present form. Dan McNaney and Cathy Huang provided their formatting expertise to make the books as user-friendly as possible. Last, many people, too numerous to list here but no less appreciated, assisted in the development of the online resources that accompany this guide.

At Manhattan GRE, we continually aspire to provide the best Instructors and resources possible. We hope that you'll find our dedication manifest in this book. If you have any comments or questions, please e-mail me at andrew.yang@manhattangre.com. I'll be sure that your comments reach Chris and the rest of the team—and I'll read them too.

Best of luck in preparing for the GRE!

Sincerely,

Andrew Yang
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Introduction, and How to Use Manhattan GRE's Strategy Guides

We know that you're looking to succeed on the GRE so that you can go to graduate school and do the things you want to do in life.

We also know that you might not have done math since high school, and that you may never have learned words like “adumbrate” or “sangfroid.” We know that it's going to take hard work on your part to get a top GRE score, and that's why we've put together the only set of books that will take you from the basics all the way up to the material you need to master for a near-perfect score, or whatever your score goal may be.

How a Computer Adaptive Test Works

On paper-based tests, top scores are achieved by solving a mix of easy and medium questions, with a few hard ones at the end. The GRE is totally different.

The GRE is a computer adaptive test (or “CAT”). That means that the better you do, the harder the material you will see (and the worse you do, the easier the material you will see). Your ultimate score isn't based on how many questions you got right—it's based on “testing into” a high level of difficulty, and then performing well enough to stay at that difficulty level. In other words, you *want* to see mostly hard questions.

This book was written by a team of test prep professionals, including instructors who have scored perfect 1600s repeatedly on the GRE, and who have taught and tutored literally thousands of students at all levels of performance. We don't just focus on “tricks”—on a test that adapts to your performance, it's important to know the real material being tested.

Speed and Pacing

Most people can sum up the numbers from 1–20, if they have enough time. Most people can also tell you whether 789×791 is bigger than 788×792 , if they have enough time. Few people can do these things in the 1–2 minutes per problem allotted on the GRE.

If you've taken a practice test (visit www.manhattangre.com for information about this), you may have had serious trouble finishing the test before time ran out. On the GRE, it is extremely important that you finish every question. (You also may not skip questions or return to any previously answered question). In these books, you'll find ways to do things fast—very fast.

As a reference, here's about how much time you should spend on each problem type on the GRE:

Analogies – **45 seconds**

Sentence Correction – **1 minute**

Problem Solving and Data Interpretation – **2 minutes**

Antonyms – **30 seconds**

Reading Comprehension – **1.5 minutes**

Quantitative Comparison – **1 min 15 seconds**

Of course, no one can time each question this precisely while taking the actual test—instead, you will see a timer on the screen that counts down (from 30 minutes on Verbal, and from 45 minutes on Quant), and you must keep an eye on that clock and manage time as you go. Manhattan GRE's strategies will help you solve questions extremely efficiently.

How to Use These Materials

Manhattan GRE's materials are comprehensive. But keep in mind that, depending on your score goal, it may not be necessary to “get” absolutely everything. Grad schools only see your overall Quantitative, Verbal, and Writing scores—they don't see exactly which strengths and weaknesses went into creating those scores.

You may be enrolled in one of our courses, in which case you already have a syllabus telling you in what order you should approach the books. But if you bought this book online or at a bookstore, feel free to approach the books—and even the chapters within the books—in whatever order works best for you. *For*

the most part, the books, and the chapters within them, are independent; you don't have to master one section before moving on to the next. So if you're having a hard time with something in particular, you can make a note to come back to it later and move on to another section. Similarly, it may not be necessary to solve every single practice problem for every section. As you go through the material, continually assess whether you understand and can apply the principles in each individual section and chapter. The best way to do this is to solve the Check Your Skills and Practice Problems throughout. If you're confident you have a concept or method down, feel free to move on. If you struggle with something, make note of it for further review. Stay active in your learning and oriented toward the test—it's easy to read something and think you understand it, only to have trouble applying it in the 1–2 minutes you have to solve a problem.

Study Skills

As you're studying for the GRE, try to integrate your learning into your everyday life. For example, vocabulary is a big part of the GRE, as well as something you just can't "cram" for—you're going to want to do at least a little bit of vocab every day. So, try to learn and internalize a little bit at a time, switching up topics often to help keep things interesting.

Keep in mind that, while many of your study materials are on paper (including ETS's most recent source of official GRE questions, *Practicing to Take the GRE General Test 10th Edition*), your exam will be administered on a computer. The testing center will provide you with pencils and a booklet of bound, light-blue paper. If you run out, you may request a new booklet, but you may only have one at a time. Because this is a computer-based test, you will NOT be able to underline portions of reading passages, write on diagrams of geometry figures, or otherwise physically mark up problems. So get used to this now. Solve the problems in these books on scratch paper. (Each of our books talks specifically about what to write down for different problem types).

Again, as you study stay focused on the test-day experience. As you progress, work on timed drills and sets of questions. Eventually, you should be taking full practice tests (available at www.manhattangre.com) under realistic timed conditions.

Changes to the Exam

Finally, you've probably heard that the GRE is changing in August, 2011. Look in the back of this book for more information about the switch—every one of these GRE books contains additional material for the 2011 GRE, and we'll be constantly updating www.manhattangre.com as new information becomes available. If you're going to take the test before the changeover, it's nothing to worry about.

Diving In

While we love standardized tests, we understand that your goal is really about grad school, and your life beyond that. However, you'll make your way through these books much more easily—and much more pleasantly—if you can stay positive and engaged throughout. Hopefully, the process of studying for the GRE will make your brain a more interesting place to be! Now let's get started!

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ALGEBRA IN
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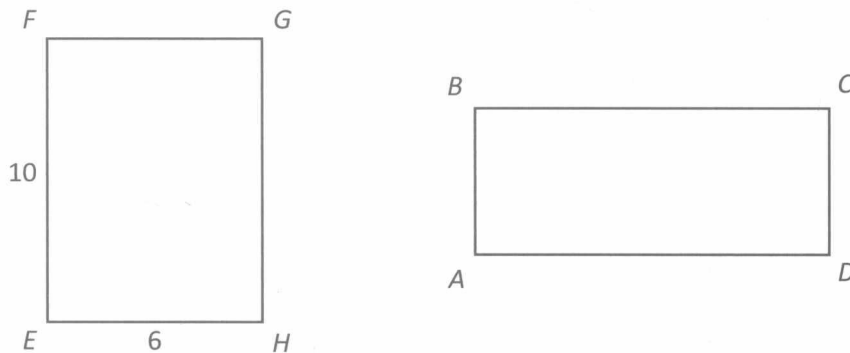
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- Using Equations to Solve Geometry Problems

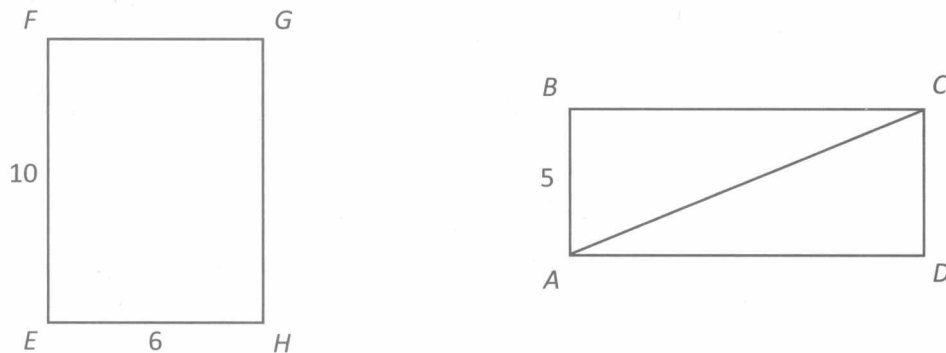
Using Equations to Solve Geometry Problems

Before we dive into the specific properties of the many shapes tested on the GRE, it's important to establish a foundation of translating the information presented in questions into algebraic equations. This will allow us to more easily, and quickly, solve even the most complex geometry problems. To start, let's do the following problem together.

Rectangles $ABCD$ and $EFGH$, shown below, have equal areas. The length of side AB is 5. What is the length of diagonal AC ?



The first step in any geometry question involving shapes is to draw your own copies of the shapes on your note paper and fill in everything you know. In this problem in particular, you would want to redraw both rectangles and add to your picture the information that side AB has a length of 5. Also, make note of what you're looking for—in this case we want the length of diagonal AC . So your new figures would look like this:



Now that we have redrawn our figures and filled in all the given information, it's time to begin answering the question. Realize that many geometry questions are similar to the word problems discussed in the Word Translations Strategy Guide. Both types of problems provide us with information that describes relationships that can be expressed mathematically. The only difference is that sometimes this information is stated in words, and sometimes it's presented visually.

So now the question becomes—has the question provided us any information that can be expressed mathematically? In other words, can we create equations? Well, they did tell us one thing that we can use—the two rectangles have equal areas. So we can say that $\text{Area}_{ABCD} = \text{Area}_{EFGH}$. But we can do better than that. The formula for area of a rectangle is $\text{Area} = (\text{length}) \times (\text{width})$. So our equation can be rewritten as $(\text{length}_{ABCD}) \times (\text{width}_{ABCD}) = (\text{length}_{EFGH}) \times (\text{width}_{EFGH})$.