INTRODUCTION

What will it really take for you to improve your score on the SAT? Look, you're a teenager, you're busy, and you probably have what feels like way too much on your plate already. You've got sports, clubs, a job, community service, stacks of schoolwork, friends, and family, and you don't have a minute to waste on anything, let alone SAT prep that isn't going to pay off. Maybe you even have college applications on your mind.

I know you. I talk to and teach students like you every day. Of course you want a higher SAT score, but not at the expense of what feels like your last few hours of freedom during the week. Believe me, we're on the same page.

So here's the truth: maximizing your score on the SAT takes effort, no matter what your score already is. Fortunately for us, the SAT is not a test of everything you were ever taught in high school. In fact, the SAT tests a relatively short list of specific skills. Even the questions themselves are fairly predictable. You will see incredible score gains if you master these specific skills and become familiar with the test's different types of questions. If you're an average student, I can help you brush up on skills that may always have been tough for you, show you what this test is really all about, and bump your total score a good 200 to 300 points. If you're one of those naturally good standardized test takers, I can help you get well into the 700s on each section. (Perfection? I leave that to you.)

We'll go through the process together. Here's the plan: This book is written as though I were sitting right next to you during a series of private tutoring sessions. Since my end of the bargain is to show you everything you need to know and expect on the test, I've tried to make sure the book directly reflects what I would teach you and the sort of notes we would generate if we were to meet and work together. Just like I would if we were hanging out at your kitchen table, I've broken up the material into smaller lessons and taken the time to explain the most important details of each topic. Looking at each topic individually can completely change how you see, understand, and answer its questions.

Still, for your score to increase, you need to hold up your end of the bargain. Merely owning this book or sleeping with it under your pillow the night before test day isn't going to cut it. But don't worry: most likely you won't have to read the book cover to cover, either. Since this book is written for students from all sorts of different schools and backgrounds, you're bound to find topics with which you're already comfortable. I do not expect you to pore over things you already know. Instead, your best bet is to grab a highlighter and mark the stuff that *is* new to you (even those concepts that are explained differently than you originally learned them)—then follow through and review! I want you treat this book like it's a personal notebook, not the Holy Grail of standardized test prep. Make it your own. Scribble. Highlight. Circle. After all, this is *your* SAT.

You may use this book either by itself or concurrently with the sample tests in *The Official SAT Study Guide*. While I have no affiliation with the College

Board, I strongly recommend that you use their material for real SAT sample problems.

What's most important is that you *believe* you can do this. This process and these ideas *will work*. They always do. Be patient. Keep going. Good luck.

Fast Facts on All Things SAT

- **Fact:** You should prepare for this test the way you're going to take it. Before we even begin, I should warn you not to hang out in your room watching TV with your cat and talking on the phone while you try to study. You can be flexible while you start to learn new math concepts or study vocabulary, but be sure you take at least one full, timed practice SAT before test day.
- **Fact:** Every question on the SAT is worth 1 raw point, regardless of how difficult it is. On the Critical Reading section, it's possible to earn 67 raw points; on the Math section, you can earn a possible 54 raw points; and the Writing section contains a possible 49 raw points. These raw points are then weighted based on the difficulty of the question, then converted to a score between 200 and 800 for each section (with your essay score influencing your final Writing score).
- **Fact:** Each correct answer earns you 1 point, each incorrect answer deducts ¼ point, and omitting an answer does nothing to your score. It's like making a $1 deposit in the bank every time you're correct, keeping all your money if you omit, and losing a quarter if you make a mistake.
- **Fact:** SAT scoring is calibrated so that, overall, 500 is generally the average score on each section of the test. A 500 is earned by having a raw score that is half of the total raw points available on that section. This means if you answer half of the questions on each section and get each of them correct, you'll get at least a 500 on each section, or a 1,500 total.
- **Fact:** Each question is assigned a level of difficulty between 1 and 5. I'll refer to difficulty levels throughout the book so you can easily see which problems are particularly challenging and focus on working your way up to them.
- **Fact:** You are permitted to write in your test booklet, but only answers that appear on your bubble sheet are reviewed and scored.
- **Fact:** You may want to practice using the bubble sheets that the College Board provides with their sample tests. If and when you skip a question—any question—you always run the risk of improperly filling out your answer sheet—a frustrating and heartbreaking scenario

for any well-prepared test taker. I once had a student who consistently scored nearly perfectly on each practice SAT, but when he actually took the test he noticed in the last two minutes that he had 26 questions bubbled in a section with only 24 questions. Needless to say, he cancelled his scores. Pay careful attention when you choose to skip questions.

- **Fact:** You have 72 hours after the SAT to cancel your scores.
- **Fact:** I have an unusual guessing strategy. Statistically, randomly guessing when you can eliminate some answer choices should increase your score. However, those statistics are based on *completely random* guesses. On the SAT, I find that my students don't guess randomly; instead they develop a hunch about an answer, usually because it "sounds like" some other word, and frequently find that they guess incorrectly. Personally, I guess incorrectly nearly *every time*, so my rule for myself is always to omit. This philosophy is unorthodox, I know, but I'm just telling you what I tell the kids I work with. In short: if you're a lucky guesser, by all means, don't let me hold you back. If you're like me, you might want to consider leaving the answer bubble blank instead of guessing incorrectly and being penalized.
- **Fact:** The SAT is extremely long. It breaks down like this:

  One 25-minute Essay portion
  Six 25-minute sections (two Math, two Critical Reading, one Writing, one Experimental)
  Two 20-minute sections (one Math, one Critical Reading)
  One 10-minute Writing portion

  Additionally, the folks who proctor the SAT are not people sent out by the College Board; they're hired especially for the occasion. That means that your proctors may be proctoring for the first time, and it may take them a little time to get going. This comes with the territory. The latest I've ever gotten out of the test is around 1 P.M.
- **Fact:** The already tedious SAT is made even longer by the inclusion of what is lovingly known as *the Experimental Section of Despair*. OK, no—it's only known as the "Experimental section," but I consider it cause for despair. Here's the scoop: because you've already agreed to sit through an entire SAT test, the College Board takes advantage of your commitment by including an extra, unscored section on the test. Do they tell you which section is unscored beforehand? No. You're expected to do an extra, full 25-minute section giving 100 percent effort so that the College Board can measure the fairness of potential test questions (for example, if you're an average scorer and you

ace the experimental section, they'll know something's up). Even if you think you can tell which section is experimental, don't be so sure you're right and cop out. If you just happen to have an unusual set of math problems or a difficult reading passage and you blow it off, you could destroy your score.

- **Fact:** You must bring something to eat during each of the lightning-fast 5-minute breaks. By this I do not mean a donut and a cola. In all seriousness, your brain needs food to function, so you'll need some protein and some carbohydrates. A banana, some peanut butter crackers, and a bottle of water will do. Oh, you're also not allowed to have any beverages on your desk while you're working and all your snacks need to be in your bag, hidden from sight.

- **Fact:** It's new policy that you're not even allowed to *bring* a cell phone with you on test day. I once had a proctor who made everyone drop his or her cell into a shopping bag to be held during the test. Unless you want to—at best—put your cell into a giant grab bag and pray you get it back or—at worst—be turned away from the test center, you really should leave it at home.

- **Fact:** If you write your essay in pen it will not be graded because the machine supposedly can't scan it. Why, in the twenty-first century, is this the case? I have *no* idea. Nevertheless, for the entire SAT, old-school #2 pencils are the only way to go. The rules also say that you're not supposed to use mechanical pencils. I know, "They are just like #2 pencils," you'll say; well, the risk is yours, but I wouldn't do it. You never know.

- **Fact:** If a licensed psychologist has diagnosed you with a learning disability, you likely qualify for extra time on the test. You'll need a *Student Eligibility Form* that should be available in your local high school guidance counselor's office. Please be aware that you need to apply several months in advance to allow time for processing; you can find more information at www.collegeboard.com/ssd/student/index.html.

One last thought: It's really pretty difficult to get an 800 on any of the sections, if only because we're all human, which means we have a tendency to make mistakes. Imagine my anguish last October when I earned a score of 790 on the Critical Reading because *I forgot to turn the page and accidentally omitted the last two questions in the final section*! The lesson? If it can happen to me, it can happen to anyone. Make sure you've at least *seen* all the questions—don't get robbed!

Now, let's get going!

Perhaps you're one of those students for whom learning Geometry was a lost cause. Maybe you struggled to remember the difference between complementary and supplementary angles and hid behind your book when it was time to construct proofs in class. Well, let me be the first to tell you that you can relax; SAT geometry never requires you to know terminology or proofs. Furthermore, most of the geometry you'll be responsible for fits into neat chunks of information. We'll start by talking about angle measurements in the most basic situations and work our way up to exploring how to solve the most outlandish scenarios you may encounter.

Basic Lines and Enclosed Forms

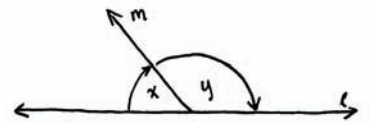
WHAT YOU NEED TO KNOW

Before we get into more complicated stuff, let's review some line basics.

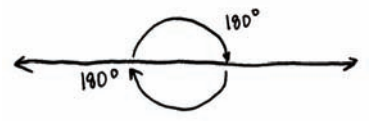
Angles on a Line

All of the angles on a line add up to 180°.

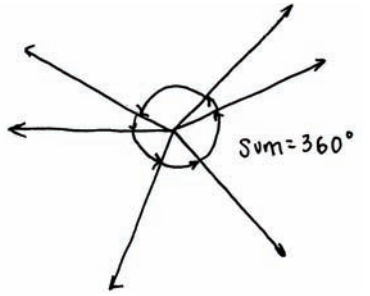
Granted, there aren't any angles to see in a drawing of a single line. Sometimes it's easier to see with another line thrown into the mix.



Here, you can probably imagine yourself getting out your protractor and measuring the number of degrees from line l up to line m (and getting $x°$) and then measuring from m back down to l (and getting $y°$). Your protractor will tell you that you've traveled 180°, and that's how we know that in this diagram, $x + y = 180°$, because, again, they are the sum of the angles on a line.



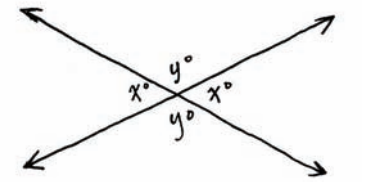
When we travel across the top of line *l* and then travel underneath it, we measure 180° twice. Basically, we've gone 360° and measured a circle.



Any time a circle can be drawn around a bunch of lines so that they look like the spokes of a wheel, the sum of their angles will be 360°.

I don't necessarily have to have a straight line to measure "around," specifically. However, as I measure from angle to angle, I get the same circle as I did when I just measured across the top of the line and then across the bottom.

Another thing you need to know about simple line drawings is the concept of vertical angles. For starters, any time 2 lines intersect in a big X, the angles that lie directly opposite each other are equal. You'll find a pair on the top and bottom and a pair that lie left and right of each other. This is true for any intersecting lines, even if there are 5 or 6 lines that intersect to form a circle. Provided you know that they're complete lines, the opposite angles are always equal.



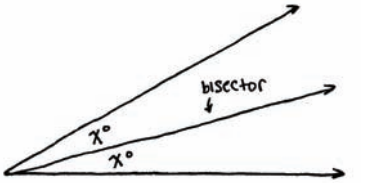
By the way, just like in these line drawings, $x + y = 180°$ because they are angles on a line. Again, $x + x + y + y = 360°$ because we're measuring a circle, just as we did when we only had a single line on the previous page.

Bisecting and Perpendicular Lines

You'll also need to know 2 terms: *bisect* and *perpendicular*.

Bisecting Lines

When a line *bisects* an angle, it splits that angle into two equal sections.

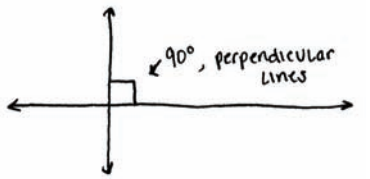


You can identify a bisected angle 2 ways: either the angles will already be labeled equal to each other or the word part of the problem will read "segment

LM bisects angle C" (or whatever variables the problem uses). If it's not spelled out for you, you may see something like "$\overline{LM}$ bisects $\angle$ C".

Perpendicular Lines

When 2 lines are *perpendicular* to each other, they intersect at a 90° angle to each other.



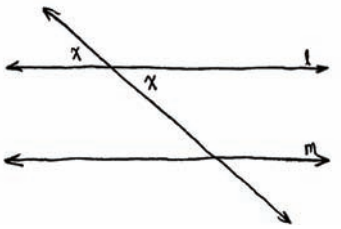
Again, you'll either be told that 1 segment is perpendicular to another or you'll see the following symbol: $\perp$ (that is, $\overline{LM} \perp \overline{XZ}$). The next section takes a closer look at perpendicular lines' cousins, parallel lines.

Parallel Lines

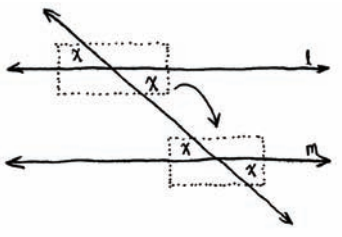
Parallel lines never intersect and are always the same distance apart from each other. The symbol for parallel lines is $\parallel$. Let's take a look at how to label the angles on a typical parallel line drawing.

Even if you remember terms like *alternate interior* from your geometry class, the SAT never tests students on the names of theorems or other rules—they just want to make sure you know how to implement them. Because the SAT doesn't require them, I proceed as though they don't exist. Instead, I just use vertical angles to label these things every time. That being said, let's look at my first step in labeling this drawing.

Say we start with the *x* on the left. We label the second angle *x* because it is vertical to the *x* that we were given.

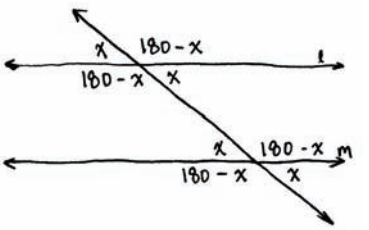


Next, let me show you something about the ways parallel line drawings "match." Basically, if we put a picture frame around our given *x* and its vertical angle and then slide it down to frame the intersection below it, we create matching pictures:



Because we create matching pictures, we can label the angles in a "matching" pattern. This matching happens with every pair of parallel lines. We're halfway there and so far we've used only two rules: (1) Vertical angles are equal to each other. (2) Parallel lines contain matching minipictures.

To label the other 4 angles in our drawing, let's remember that angles on a line add up to 180°. Sure, we could label the other angle *y* and put 4 of them into our drawing, but it's always a good idea to use the variables you already have rather than bring new things into the mix. This way, you keep all elements in relation to each other. When labeling the supplementary angles on any figure, it is always a better idea to call it "180 minus the first variable" rather than making up a new label.

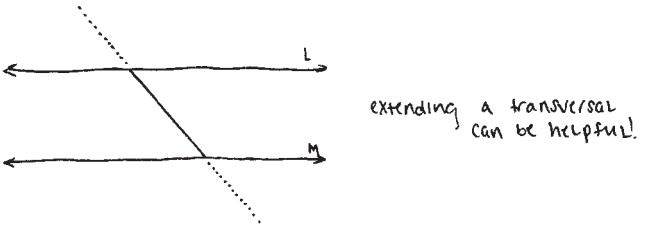


Just like that, the whole drawing has been labeled and we only had to use 1 more fact: (3) Angles on a line add up to 180°.

Transversal Line

In the parallel lines example we saw a transversal (a line that crosses two parallels) that was extended beyond those two parallel lines.

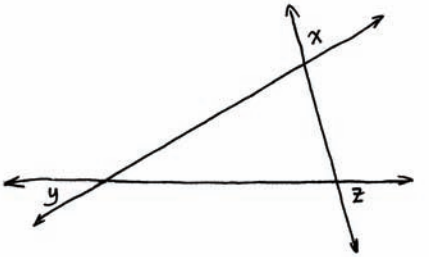
You'll see this in plenty of problems. Sometimes the transversal looks cut off and can be confusing, but rest assured that the angles inside can be labeled just as if the lines were extended. Sometimes I extend the ends of the line on the drawing in my test booklet so it looks like the figures we labeled above—just to make it easier.



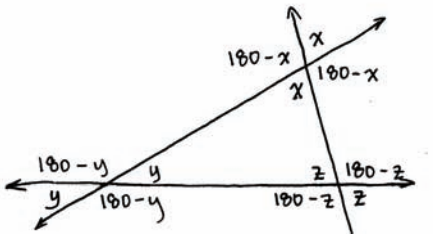
Multiple Intersections

So far we've looked at plain line drawings and lines that are parallel to each other. Another style of SAT problem uses an arrangement of a bunch of lines that intersect in multiple places. It's just another labeling challenge, but these intersections often start to form closed figures, and the enclosures will always be the key to the problem.

To label this drawing, you don't need any more information than you used to label the parallels.



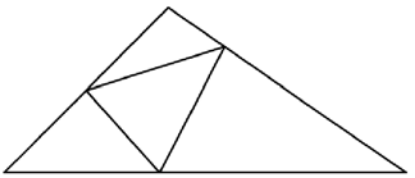
If you're given *x*, *y*, and *z*, you can label the rest of the drawing using vertical angles and the tip about defining supplementary angles as 180° (180 – *x*).



The other thing that's important about this drawing is that the lines create a triangle, so 9 times out of 10 the key to the answer will be in setting the sum of those angles to 180°. (For more info on that, check out the triangle section.) In this drawing, $x + y + z = 180°$.

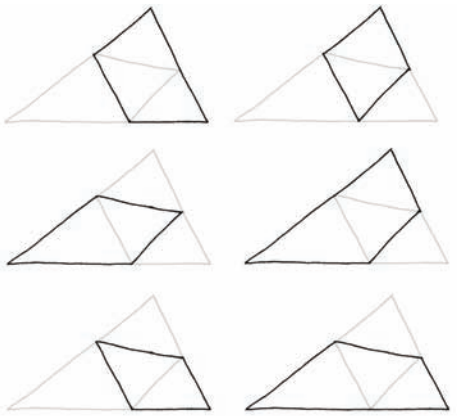
Enclosed Forms

It may not look like it, but this next form is just a souped-up multiple intersection image.



However, rather than having all those lines extending infinitely, this form is entirely enclosed. Rest assured that you'll be using triangles and polygons to get to your answer. It's pretty easy to find the 5 triangles in the drawing, so the test maker will challenge you and ask you something that demands finding and using the angles in a polygon within the figure.

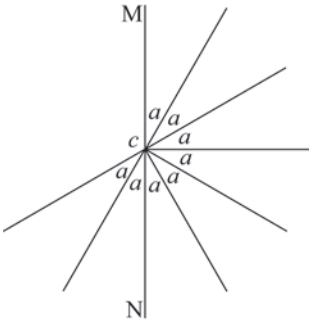
If you can find the following quadrilaterals in the preceding figure, you're in good shape. Just remember to look for them when you see problems with drawings like this!



HOW THEY ASK THE QUESTIONS

Line Questions

EXAMPLE 1: LEVEL 2



In the figure above, what is the value of c?

What's key in this problem is the segment labeled $\overline{MN}$. We're going to zero in particularly on that piece of info particularly (remember, the SAT never gives you any unnecessary info). To the right of line $\overline{MN}$ are 6 $\angle a$'s. Because these are "angles on a line," we know that those 6 a's add up to 180°.

$6a = 180$

$a = 30$

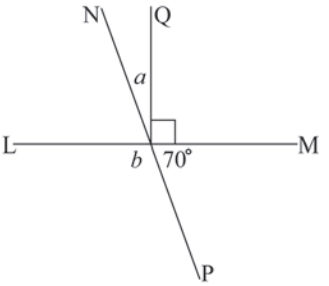
Now that we know that $a = 30°$, we can look to the left of line $\overline{MN}$ and see that 2 a's and 1 c add up to 180°. Well, if $a = 30°$, we can do quick algebra again:

$2(30) + c = 180$

$60 + c = 180$

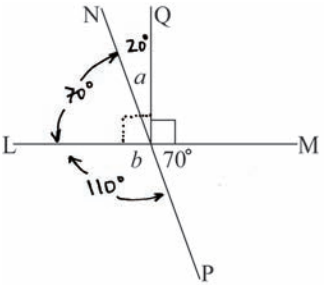
$c = \boxed{120°}$

EXAMPLE 2: LEVEL 3



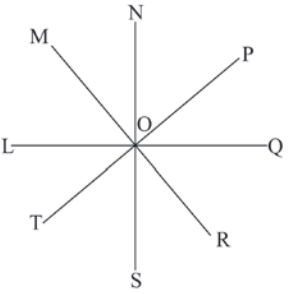
The figure above shows $\overline{LM}$ intersecting $\overline{NP}$ and perpendicular to the segment containing point Q. What is the value of $a + b$?

Well, let's start by labeling what we know: if the stuff on the right is perpendicular, the stuff on the left must be perpendicular. Also, because of the vertical angle rule, we know that angle opposite the 70° must also be 70°.



Super. The reason they didn't just label that 70° in the first place is because they wanted you to *figure it out.* (These problems are so straightforward that they need all the jazzing up they can get.) Let's figure out the value of a first: if it's part of the 90° angle and the rest of the angle is 70° . . . bingo, $a = 20°$. Now, you should also notice that b and that 70° on the bottom are *angles on a line*, so they must add up to 180°. Quick algebra: $b + 70° = 180°$ so $b = 110°$. If the question wants to know the value of $a + b$, we just add 'em up: $20° + 110° = \boxed{130°}$.

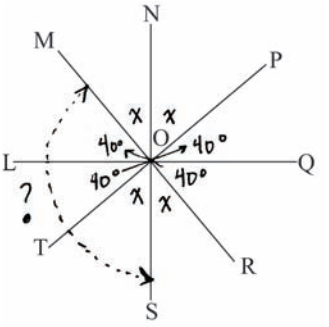
EXAMPLE 3: LEVEL 3



Note: figure not drawn to scale.

In the figure above, $\overline{LQ}, \overline{MR}, \overline{NS}$, and $\overline{PT}$ intersect at point O. If $\angle LOT$ and $\angle QOR$ are each equal to 40° and $\overline{NS}$ bisects $\angle MOP$, what is the value of $\angle MOS$?

Again, the first thing we do is label:



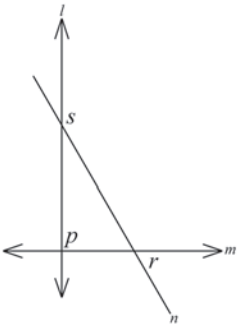
Once we've labeled, we can rely on all these intersecting lines to quickly lead us to our answer. Remember, what we're looking for is $\angle MOS$, so we'll have 2 40°s and 1 of the unknowns. If you want, you can label each of those unknown angles *x*. I'm going to focus on line LQ, knowing—again—that all the angles on a line add up to 180°. That means that

$$40 + x + x + 40 = 180$$
$$2x + 80 = 180$$
$$2x = 100$$
$$x = 50$$

Now then, if $\angle MOS$ is made up of two 40°s and an *x*, then we know that

$$\angle MOS = 40 + 40 + 50 \rightarrow \boxed{\angle MOS = 130^\circ}$$

EXAMPLE 4: LEVEL 3

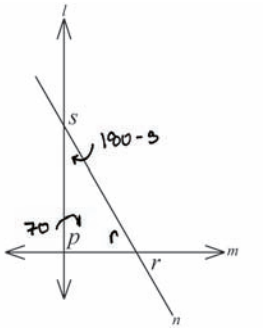


Note: figure not drawn to scale.

In the figure above, if $p = 70°$, what is the value of $s - r$?

Be careful with problems like these: sometimes they're labeled right on the drawing, and sometimes values are given in the text of the problem. You *must* read!

The first thing you should notice here is that triangle in the middle—it's there for a reason. Right now the *s*, *p*, and *r* have nothing in common, but we can relate them by that triangle easily (all the angles inside a triangle add up to 180°). Let's label the interior angles of the triangle. Because I need my answers in terms of *s* and *r*, it makes the most sense to just use them:



Because all those angles in there add up to 180°, I'm not going to overthink things; I'm just going to add 'em up and solve for $s - r$.

$$70 + (180 - s) + r = 180$$
$$70 + 180 - s + r = 180$$
$$250 - s + r = 180$$
$$-s + r = -70$$
$$-1(-s + r = -70)$$
$$s - r = \boxed{70}$$