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SAT Basics

What is the SAT?
According to the College Board, the SAT is "a measure of the critical thinking skills you will need for academic success in college." The SAT is popularly perceived—or as we see it, misperceived—as a measure of intelligence, reasoning abilities, and scholastic aptitude.

What is the SAT really?
The SAT may proxy for many things, but the only thing the exam really measures is how good you are at taking the test itself.

Every time the SAT is administered, it uses the same format, the same questions, and the same traps to test the exact same small set of concepts that the test makers think are important. Thus the most useful way to think of the SAT is not as a test of broad knowledge but as a narrowly defined game with simple and predictable rules.

Our experience is that students who do well on the SAT do so not because they are better at "reasoning" or have more "aptitude" than their peers, but because they understand the concepts that the exam covers, are familiar with each of the question-types used to test them, and possess specific strategies that make those questions easy to answer correctly.

ревОlУtiОn iNSiGhT
Doing well on the SAT isn’t about being smart. It’s about knowing how to take the test!

Why does the SAT matter?
If the only thing the SAT really tests is how good you are at taking the SAT, why is it such a big deal?

The answer is simple: because colleges say it is!

Admissions officers at almost every college in the United States use applicants’ test scores as one of the primary criteria in making their admissions decisions. In fact, at most schools, SAT scores are the single strongest predictor of admissions success next to high school grades. Many schools even use them to decide how much merit-based financial aid students receive.

If you find it disturbing that colleges place more weight on a single test than things like extracurricular leadership, community service, or personal qualities, you’re not alone. But since it is such a critical factor, our goal at Revolution Prep is to ensure that your SAT scores will drive your success and not hold you back. You can trust our curriculum team who have repeatedly beat the tests to know exactly what it takes to make your scores an asset.

ревОlУtiОn iNSiGhT
The SAT should be important to you for one reason and one reason alone: because, next to high school grades, it is the most important criterion used in college admissions decisions.

Why is the SAT an opportunity?
At Revolution Prep, we view the SAT as an opportunity to gain a strategic advantage in the college admissions process. Why? Because the SAT is the part of your college application that can be improved most dramatically in the least amount of time.

Think about it: Your high school grades count for half of your college admissions outcome, but they are the result of over 4,000 hours that you’ll spend in school by the time you apply to college. The SAT, on the other hand, is worth almost as much as your grades, yet it is a 4-hour test that most students spend less than 20 hours preparing for.

To gain an advantage in the college admissions process by raising your GPA you would need to put hundreds of hours of extra work into your classes. To gain an advantage on the SAT, all you have to do is be better prepared than the person sitting next to you on test day (since the SAT is a curved test). Given that the average student does 10 hours of preparation, that’s not a very high bar to surpass!
The SAT is an opportunity to get maximum “bang for your buck.” 34 hours of test prep (the number of hours in a Revolution Prep Hybrid Course) will do more toward improving your college admissions chances than 340 hours of extra time spent on your schoolwork!

What is the best way to get ready for the SAT?
Rule #1: Don’t reinvent the wheel. Your first step in beating the SAT should be to learn from those who have already done it—that is, from real students who used real strategies to raise their scores.

At Revolution Prep, this is what we’ll help you do. All Revolution Prep instructors are graduates from top universities who scored in the 99th percentile on the SAT. The Revolution Prep curriculum, meanwhile, leverages the insights of some of the top test-takers in the world to break the SAT down.

Combine superior instructors with an unmatched curriculum and multiple full-length practice tests and you have a recipe for SAT success.

The SAT is divided into three parts: Critical Reading, Math, and Writing. Let’s take a closer look at what each part of the exam covers and what sections they each include:

Critical Reading (70 minutes total)
The Critical Reading sections of the SAT test your basic reading comprehension skills and a little bit of vocabulary. Notice we said “a little”: Vocabulary is NOT the key to Critical Reading success!

Math (70 minutes total)
The Math sections of the SAT test very basic math concepts in sometimes tricky ways. You’ll need to know the big ideas from Arithmetic, Algebra, and Geometry, almost nothing from Advanced Algebra, and nothing at all from Trigonometry.

Writing (60 minutes total)
The Writing portion of the SAT includes an essay and two multiple-choice sections. The multiple-choice sections test basic grammar that you learned in middle school (again, in sometimes tricky ways) and the essay tests whether you can make a compelling and well-organized argument in 25 minutes.
2. Predictable exam sections

Each part of the SAT is divided into three sections ranging in length from 10 to 25 minutes:

- Critical Reading = two 25-minute sections + one 20-minute section = 70 minutes total
- Math = two 25-minute sections + one 20-minute section = 70 minutes total
- Writing = one 25-minute essay + one 25-minute section + one 10-minute section = 60 minutes total

It might seem logical to put sections from the same part of the test together, but that’s not what the SAT test-makers do. Instead, they mix the sections up. Fortunately, they do this in a predictable way:

- The essay always comes first.
- The five 25-minute sections always come second (in any order).
- The two 20-minute sections always come third.
- The 10-minute Writing section always comes last.

Below is a section-by-section breakdown of a typical SAT:

<table>
<thead>
<tr>
<th>Section</th>
<th>Type</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Essay</td>
<td>25 minutes</td>
</tr>
<tr>
<td>2</td>
<td>Math</td>
<td>25 minutes</td>
</tr>
<tr>
<td>3</td>
<td>Critical Reading</td>
<td>25 minutes</td>
</tr>
<tr>
<td>4</td>
<td>Writing (multiple-choice)</td>
<td>25 minutes</td>
</tr>
<tr>
<td>5</td>
<td>Math</td>
<td>25 minutes</td>
</tr>
<tr>
<td>6</td>
<td>Critical Reading</td>
<td>25 minutes</td>
</tr>
<tr>
<td>7</td>
<td>Math</td>
<td>20 minutes</td>
</tr>
<tr>
<td>8</td>
<td>Critical Reading</td>
<td>20 minutes</td>
</tr>
<tr>
<td>9</td>
<td>Writing (multiple-choice)</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3 hours and 20 minutes</td>
</tr>
</tbody>
</table>

REVOLUTION INSIGHT

The easiest way to think of the SAT is as three mini-tests: Critical Reading, Math, and Writing. Each is just over an hour long.

3. Predictable question types

The three parts of the SAT always use the exact same question types. We’ll go into more detail on each of these question types shortly. For now, we’ll just summarize:

- Critical Reading (67 total questions)
  - Sentence Completion (19 questions)
  - Passage-based Reading (48 questions)

- Math (54 total questions)
  - Standard multiple-choice (44 questions)
  - Grid-ins (10 questions)

- Writing (49 total questions + 1 essay)
  - Essay (25 minutes)
  - Standard multiple-choice - (49 questions)

Scoring the SAT

Calculating your raw score

The first thing you need to know to understand the scoring of the SAT is the difference between your raw score and your scaled score. Every question that you answer correctly on the SAT earns you one raw point. Every question that you answer incorrectly subtracts one-fourth of a raw point (this is the infamous SAT “guessing penalty”). Finally, every question that you don’t answer at all earns you zero points. Sound confusing? Here it is one more time:
> Correct answer = +1 raw point
> Incorrect answer = -¼ raw point
> Omitted answer = 0 raw points

When your actual SAT is scored, all of your correct, incorrect, and omitted answers are added up using this formula to yield your raw score for each part of the test. The total number of raw points possible for each part of the test is just the number of questions on that part:

> Math = 54 questions = 54 raw points possible
> Critical Reading = 67 questions = 67 raw points possible
> Writing = 49 questions = 49 raw points possible

All this may seem a little confusing, so let’s run through a quick example to make it more concrete. Say that on the Critical Reading you answered 40 questions correctly, 16 questions incorrectly, and omitted 1 question out of the 67 total questions. Your raw score would be 40 − ¼(16) = 36.

Calculating your scaled score

Once you have calculated your raw score on each part of the SAT, you’re ready to figure out your scaled score, which is the score out of 800 points that colleges will be looking at. To calculate your scaled SAT score, the College Board uses a magical – or not so magical – table to translate your raw score on each part of the exam into a scaled score out of 800. Take a look:

<table>
<thead>
<tr>
<th>Critical Reading</th>
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<th>Writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw</td>
<td>Scaled</td>
<td>Raw</td>
</tr>
<tr>
<td>17 – 27</td>
<td>420 – 480</td>
<td>4 – 14</td>
</tr>
<tr>
<td>7 – 17</td>
<td>340 – 420</td>
<td>0 – 4</td>
</tr>
</tbody>
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The actual table that the test-makers use is obviously more detailed. It also varies slightly with each test, but the summary above should give you a good sense of how the translation process works. Based on the analysis above, you should now understand why the SAT is out of 2400 points. You can score a possible 800 Critical Reading points, 800 Math points, and 800 Writing points. An average score on the SAT is around 1500 (500 Math + 500 Critical Reading + 500 Writing).

If we pick up on our raw scoring example, you can use a more detailed version of the score conversion table above to show that a raw score of 36 scaled SAT Critical Reading score of 540. Not bad.

More on the SAT “guessing penalty”

Many students wonder why you lose a fraction of a point for answering questions incorrectly on the SAT but not for omitting questions. The reason for the SAT “guessing penalty” is to neutralize any potential advantage to random guessing on the test.

How does this work? There are five answer choices on each multiple-choice question. This means that if you guess randomly on five questions, on average you would get one out of the five questions right and four of them wrong. If there were no guessing penalty, that means that you would end up with one raw point for the correct answer and zero raw points for the four incorrect answers—just for random guessing. But with the SAT guessing penalty, you would lose four quarters of a point for the wrong answers and gain one point for the correct answer. The net result? Zero points—the same as if you hadn’t answered any of the questions! This is exactly what the SAT test-makers think you deserve since randomly guessing doesn’t show any more skill or knowledge than simply omitting a question.

Fortunately, there is a glitch in the test-makers’ trap. If you can eliminate at least one answer choice (meaning that there are four or fewer possible answers instead of five), then probability will actually be on your side. Answer four questions like this and you will on average get three wrong and one correct, for a net gain of one-fourth of a point. In other words, the guessing penalty becomes a guessing reward when you use process of elimination first!

The SAT “guessing penalty” means that if you have no idea what a question is asking, skip it. However, if you can eliminate at least one answer choice with certainty, it is to your advantage to guess.
The Beginner’s Guide to SAT Game Theory

Beating the SAT means different things to different people. Maybe beating the SAT for you means getting a perfect score. Or maybe you’ll feel like you beat the SAT if you can just make it through with a score that is above average. Regardless of what your absolute score goals are, we find that a lot of our students have the relative score improvement goal of 100 points per part of the test (i.e., Math, Critical Reading, Writing). In working with over 200,000 students during the last four years, we’ve found that with the right preparation, 100 points per part of the SAT is a very reachable goal.

How hard is it to raise your score 100 points on one part of the test? Not as hard as you think. Consider the SAT Writing Test, which contains 49 multiple-choice questions. A score of 500 (the national average) on the SAT Writing corresponds to about 22 questions answered correctly. That’s fewer than half correct. A score of 600, meanwhile, corresponds to about 31 questions answered correctly, or 9 more correct answers than a 500.

One of the things you will learn shortly is that SAT Writing tests about 15 grammar rules roughly three times apiece. This means that you can think of a 100-point improvement as the benefit that comes from mastering just three new grammar rules that you didn’t know before (three rules tested three times each)!

In practice, most Revolution Prep students improve their Writing scores by more than 100 points. This shouldn’t be much of a surprise now that you know how little it actually takes to get there. In the next section we’re going to show you the secret to doing it: SAT Game Theory.

What’s the secret to doing it: SAT Game Theory?

What does it mean to “beat” the SAT

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Revolution Insight

Improving your SAT score by 100 points on each part of the test is easier than you think. 100 points on the Writing Test, for example, corresponds to just 9 more questions correct.

What is SAT Game Theory?

SAT Game Theory is a revolutionary approach to test-taking developed by perfect scorers at Harvard University. SAT Game Theory is unique because it replaces the typical framing of the SAT as an “aptitude test” with the belief that in most important respects, the SAT is a game.

Like any game, the SAT has consistent rules that always apply. Like any game, it involves the use of a limited number of skills over and over. And, of course, like any game, if you learn those skills and practice them enough, the SAT can be beaten.

Below are the five strategies that comprise the core of the Game Theory approach to beating the SAT. These strategies are woven throughout every Revolution Prep course and tutoring program and represent the shared insights of some of the best SAT test-takers in the world.

Strategy 1. Have a system

The most important thing that all top SAT scorers have in common is that they approach each section of the exam the same way every time they take the test. In other words, they have a system.

Revolution Prep courses teach the systems that have worked for top test-takers on each section of the SAT, but you shouldn’t feel bound to our systems alone. As you practice, try to figure out what mix of strategies works best for you. Decide which strategies will form the core of your system and which ones will play smaller roles, which strategies you have a tendency to forget and which provide you with the most bang for your buck.

How will you know when you have a system for a given section of the exam? When you can explain it. Very simply, if someone were to ask you, “How do you handle the passages on the Reading section of the SAT?” you should be able to give them an answer—and an exact one. The more deliberate your strategy, the more effective it will be.

Revolution Insight

Great test-takers approach the SAT systematically. For each part of the test, you should have a concrete system for moving through the sections. The more deliberate your system, the higher (and more consistent) your scores will be.
Strategy 2. Organize the content

If there were only one or two concepts covered on the SAT, this wouldn’t be an issue. But the SAT has three distinct parts and numerous Content Areas within each. With so much information being tested, you need a foolproof organization system to be successful.

Enter information hierarchies. The idea of an information hierarchy is to take a large amount of information and then successively organize it along greater and greater levels of detail. The reason that information hierarchies are so useful is that they allow our minds to compartmentalize the information being remembered. Each level in the hierarchy is an additional layer of detail. By remembering the levels and then remembering what belongs in each level, you can avoid the difficulty of trying to recall too much information at once.

Revolution Prep courses break the SAT down into an information hierarchy with three layers: Exam Parts, Core Content Areas, and Concepts.

**REVOLUTION INSIGHT**

By organizing the questions on the SAT into a content taxonomy, you will enable yourself to recognize what an SAT question is testing the moment you see it and recall the similar questions you’ve solved correctly in the past.

Strategy 3. Manage your time effectively

Time is your most precious resource on the SAT. Every time you take the test, you will have the same amount of time. One way to think about raising your score is as increasing your points/time ratio. In layman’s terms: Use your time effectively!

Watch your clock

To manage your time effectively, it is essential that you always know how much time you have left on the section you’re working on. This is a tough thing to do if you are constantly having to do mental math to calculate your time from a wall clock in your classroom. (It’s even more difficult to do if the only clock in the room is directly behind you – which teachers love to do!) For this reason, we strongly recommend that you use your own digital stopwatch each time you take the SAT.

Many students think they need to keep track of not only how much time they have left, but how much time they have left per question. We do NOT recommend this. First, because the questions get harder at the end, keeping perfect pace in terms of “average time per question” will often leave your running out of time at the end. More importantly (and more obviously) calculating average time per question is itself very time consuming!

Instead, keep an eye on the clock and use your practice exams to get a sense of how quickly you tend to move through each section, where you usually run into problems, and what sections are likely to put you in a time crunch. Pay attention to these tendencies so that you can adjust for them and improve your testing efficiency before test day.

**REVOLUTION INSIGHT**

Spend your time on the questions you know you can get right

It’s a simple fact that some questions on each section will be easier than others. It’s also a fact that you do not get any more points for answering a difficult question than for answering an easy one.

The conclusion is obvious: Don’t waste time working on difficult questions at the expense of easy ones! If the five minutes you spend on Question 11 could have been used to answer 12, 13, and 14, you shouldn’t be doing 11 unless you know you’ll have time to get to 12, 13 and 14. Similarly, if you know that the last four questions in each Math section are very difficult, you shouldn’t be racing through 1-16 (and likely making silly mistakes along the way) just so that you can waste time on one or two questions that you might get wrong anyway.

**REVOLUTION INSIGHT**

Easy and hard questions are worth the same number of points on the SAT. It is better to slow down and make sure you get easy and medium questions right than spend your time on hard questions that you aren’t likely to answer correctly anyway.

Strategy 4. Use your pencil

One of the things we emphasize over and over at Revolution Prep is the importance of making things explicit when you are taking a standardized test - have a system, pay attention, focus, etc.

One of the best tricks we know of for forcing yourself to be explicit is to use your pencil to guide your thoughts. Here are some of the things you should use your pencil for:

- **Reading questions**: Use your pencil to circle key words and make sure you are understanding the big ideas that the question is getting at. After you read a question, always ask yourself, “What is this question really asking?” You should be able to answer this in your own words.
- **Zeroing in on important parts of answers**: As you read an answer, underline or circle the parts that seem
important. Often, individual phrases or even single words can be the difference between a wrong answer and a right answer.

> Crossing out answers: Use your pencil to cross out answers as you determine that they are incorrect. This will have two benefits. First, it will help you keep momentum as you move through the answer choices. More importantly, crossing out answers will keep you focused on the answers you are still considering instead of the ones you've already eliminated, which saves you time.

> Marking your answer book: One of the most important things that high scorers on the SAT do is skip questions they are struggling with and come back to them later. If you don’t use a marking system in your answer booklet when you do this, you will forget what questions to come back to. We recommend a three-mark system. If you skip a question and do not answer it at all, put a circle around the number on your answer sheet so that you know that it is blank. If you answered a question but are unsure whether it is correct, put a small question mark to the left of the number. If you answered it and are VERY unsure, put two question marks. This three-mark system will allow you to prioritize your time once you come to the end of a section and want to return to the questions that gave you trouble.

**REVOLUTION INSIGHT**

Using your pencil to read questions, cross out answers, and mark your answer book will help you to stay focused, eliminate silly mistakes, and manage your time more efficiently.

**Strategy 5. Get passionate about the SAT**

How many people do you know who are good at something they don’t like? Probably not many. Your friends who are good at sports probably enjoy them. Your friends who are good at math like math. Etc. Most people assume that this is because people like things they are good at. More often, the chain of causality actually runs in the other direction. People get good at things because they like them.

The SAT is no different than any other skill in this respect. If your attitude every time you sit down to do some practice is “Why do I have to do this? I hate the SAT,” you won’t improve. The human brain has a remarkable screening mechanism: It learns what it finds interesting and filters out everything else.

**Here are a few tips for how to actually get excited about the SAT:**

> Ban negative thinking. Most students’ internal monologues about the SAT are litanies of negativity. “This sucks.” “I hate the SAT.” “This is so boring.” “I’m never going to get better so how can I at least get it done with?” You get the idea. These kinds of internal monologues are the road to SAT failure. From now on, when you catch yourself thinking negatively about the SAT, stop yourself. Put a ban on negative thinking.

> Pretend the SAT really is a game. Everyone has gotten addicted to a video game at some point - Tetris, Pong, Pac Man, Mario Kart, Halo, Snood, whatever. Think of the SAT the same way you thought of that stupid game on your computer that you couldn’t stop playing. Every time you sit down to practice or study, get pumped up about improving your skills, getting to the next level, beating your “old record.”

> Get into the zone. You have probably heard great athletes talk about the “zone,” a state of heightened mental and physical awareness where they are entirely focused on the task at hand. Whenever you sit down to study for the SAT, focus on getting yourself into the zone. Close your door, clear your desk, turn your cell phone off, and shut down your computer. Try to be 100% focused on what you are doing and nothing else. You will be amazed at how much more you get done – and how much your score improves as a result!
Getting passionate about the SAT is where it all starts. If you can psych yourself up to beat the test, the rest will fall into place. As the old saying goes, “Where there is a will, there is a way.”
2. The Essay (25 minutes)

Game Theory Tips

> The essay will always be about a topic that is general and that “anyone” can write about.
> Make sure you know exactly what the prompt is asking you to address before you begin writing.
> Your essay should be a single argument. Don’t try to do too much!
> Brainstorm some examples from your personal experience, including literary sources you’ve read, historical events you’ve studied, etc. Some of these should be a good fit to support your argument, no matter the prompt.
> Structure and organization are just as important as content.

Example Prompt

Directions: Think carefully about the issue presented in the following excerpt and the assignment below.

The principle is this: each failure leads us closer to deeper knowledge, to greater creativity in understanding old data, to new lines of inquiry. Thomas Edison experienced 10,000 failures before he succeeded in perfecting the light bulb. When a friend of his remarked that 10,000 failures was a lot, Edison replied, “I didn’t fail 10,000 times, I successfully eliminated 10,000 materials and combinations that didn’t work.”

Myles Brand, “Taking the Measure of Your Success”

Assignment: What is your view on the idea that it takes failure to achieve success? Plan and write an essay in which you develop your point of view on this issue. Support your position with reasoning and examples taken from your reading, studies, experience, or observations.

3. Critical Reading - Sentence Completion (19 questions)

Game Theory Tips

> Find key words and director words in the sentence.
> If you don’t know what a word in the answer choices means, think about what it “could” mean.

Examples

1. Biologist Geraldine Rodriguez has spent her career studying “immortal” cells, that is, cells that reproduce by dividing ----.
   (A) indefinitely    (B) occasionally    (C) conclusively    (D) periodically    (E) precisely

2. The subject of this ancient painting seems ----, as if the artist sought to portray an unconquerable Greek spirit.
   (A) ephemeral    (B) indomitable    (C) mundane    (D) lithe    (E) morose

3. The unusually green trees are difficult to study because they are found only in ---- areas.
   (A) fertile    (B) hospitable    (C) inaccessible    (D) opulent    (E) extensive

4. The salad was ---- of many vegetables: lettuce, tomato, avocado, and corn.
   (A) a conflagration    (B) a distillation    (C) a concordance    (D) an amalgamation    (E) an aberration

5. Hoping to ---- the dispute, the United Nations proposed a compromise that they felt would be ---- to both countries.
   (A) enforce . . useful    (B) end . . divisive    (C) overcome . . unattractive    (D) extend . . satisfactory    (E) resolve . . acceptable
4. Critical Reading - Passage-based Reading (48 questions)

Game Theory Tips

> Focus on the questions, not the passage.
> Use the format to your advantage (questions go in the order that their answers appear in the passage).
> Read actively (use your pencil).
> Don’t be afraid to read a question more than once.
> Remember that sometimes finding wrong answers is easier than finding right answers!

Examples

Questions 9-10 are based on the following passage.

In between school days, we gathered hazelnuts, fished, had long deer-hunting weekends, went to powwows, beaded on looms, and made quilts. I did not question the necessity or value of our school education, but somehow I grew up knowing it wasn’t the only education I would need. I’m thankful for those experiences of my Anishinaabe heritage, because now I know by heart not only the national anthem, but the ancient song of the loon. I recognize not only the alphabet and the parts of an English sentence, but the intricate language of a beaver’s teeth and tail.

9. The main idea of the passage is that the author
(A) preferred certain academic subjects over others
(B) succeeded in learning to speak many foreign languages
(C) valued knowledge of the natural world more than book learning
(D) loved both family trips and tribal activities
(E) learned many important things both in and out of school

10. The author’s overall tone in this passage is best described as one of
(A) jubilation  (B) frustration (C) curiosity  (D) appreciation  (E) uncertainty

5. SAT Math (54 Questions)

Core Content Areas Covered

> Arithmetic
> Algebra
> Geometry
> Advanced Algebra

Game Theory Tips

> The directions tell you all the formulas you need to know.
> Questions in each section go in order from easiest to hardest.
> Read carefully - 40 percent of all questions the average test-taker gets wrong are "silly mistakes," not knowledge errors.
> Don’t use algebra if you don’t have to (plug in!).

Examples

1. The figure above is a right triangle. What is the value of \( 49 + x^2 \)?
   (A) 50  (B) 51  (C) 72  (D) 98  (E) 100

Solution: The key thing on this question is to notice first that the figure is a right triangle and second, that the
hypotenuse has length 10. Right away, you should remember your 6-8-10 Triangle (a simple multiple of the 3-4-5 Triangle). If you look at the other two sides, you’ll notice that if $x$ is 1, you’ll get your 6-8-10 relationship. Thus the answer is (A). If you didn’t notice that you had a 6-8-10 Triangle, you’d have to solve this question by walking through the entire Pythagorean Theorem.

Concept: Special Right Triangles

2. In the figure above, the two circles are tangent at point B and $\triangle ABC \sim 6$. If the circumference of the circle with center C is twice the circumference of the circle with center A, what is the length of $BC$?

(A) 1  (B) 2  (C) 3  (D) 4  (E) 6

Solution: Start with your definition of circumference: $2\pi r$. If the circumference of the circle with center C is twice as large as the circumference of the circle with center A, then we can write the relationship as $2\pi r_c = 2 \times (2\pi r_a)$. If we cancel the $2\pi$ on both sides, we are left with $r_c = 2r_a$. If $AC = 6$, then it’s not hard to see that this means that $AB = 2$ and $BC = 4$ will satisfy our relationship between the radii of the two circles. Thus our answer is (D).

Concept: Circles

3. If $x$ is divisible by 3 and $y$ is divisible by 5, which of the following must be divisible by 15?

I. $xy$
II. $3x + 5y$
III. $5x + 3y$

(A) I only  (B) II only  (C) I and II only  (D) I and III only  (E) I, II, and III

Solution: This is a perfect example of a question where you shouldn’t use Algebra if you don’t have to. All you have to do is substitute. First, pick numbers that satisfy the conditions in the question. For $x$, we could pick 6 (divisible by 3) and for $y$ we can pick 10 (divisible by 5). Now we just test our numbers in each of the answer choices. For (I), $6 \times 10 = 60$. That works: 60 is divisible by 15. How about (II)? $(3 \times 6) + (5 \times 10) = 68$. This is not divisible by 15. And III: $(5 \times 6) + (3 \times 10) = 60$. That works. So your answer is (D), (I) and (III) only.

Concepts: Number Properties, Substitution

4. If $n \neq 0$, then which of the following must be true?

I. $n^2 > n$
II. $2n > n$
III. $n + 1 > n$

(A) I only  (B) II only  (C) III only  (D) I and III only  (E) I, II, and III

Solution: This question begs for substitution, but be careful! In this case, they are asking for which of the statements is always true. Whenever this happens, you have to consider the numbers that tend to be exceptions: 0, 1, negatives, and fractions between 0 and 1. In this case, since we are told that $n$ is not zero, we check fractions, negative numbers, and 1. (I) isn’t true for 1, and (II) isn’t true for negative numbers. Only (III) passes the test for all of these numbers. Thus the answer is (C).

Concepts: Number Properties, Substitution

5. If $n = \frac{1}{3}$, what is the value of $\frac{1}{n} + \frac{1}{n-1}$?

(A) 5  (B) 1  (C) 3  (D) 2  (E) 3

Solution: This is a classic example of the SAT’s testing of specific concepts in very well defined ways. In this case, you’re just being tested on your ability to substitute a number for a variable and then divide fractions. As long as you remember that dividing by a fraction is the same as multiplying by its reciprocal, you’ll be all set.

$\frac{1}{\frac{1}{3}} + \frac{1}{\frac{1}{3} - 1} = 3 + \frac{1}{-\frac{2}{3}} = 3 - \frac{3}{2} = \frac{3}{2}$.

Concepts: Substitution, Dividing Fractions

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