Ultimate SAT Study Guide

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Answering the SAT

Guessing/Skipping

- The SAT test does not have a guessing penalty. Therefore, you should bubble an answer for every question even if it's a completely random guess filled in at the last minute.
- However, that does not mean you should not prioritize. As you practice for the exam, you will discover which question types are easiest for you and which ones are more challenging. As you make these discoveries and are working from the lower end of the score range to the higher end, you might plan to spend time thoroughly working some of the items and saving a minute or so to randomly guess on the others you don't have time to look at
- If you're able to eliminate one or more answer choices, you should pick from what you have left. This is known as an educated guess.
- If you cannot eliminate any answer choices, you should still make a random guess. Go into the test with a designated random guess letter.
- This way, you will not waste time making a choice when guessing randomly. Additionally after testing, you will more clearly be able to see where you ran out of time if your string of random guesses is one particular letter.
- Particularly with the writing exam do not choose the first bubble as a random letter as you may end up with too many no change responses

The SAT Reading Section

Overview

- The reading section is the first of four sections on the SAT standardized test.
- There are 52 questions in this section and we are given 65 minutes to complete them , meaning approximately 1 minute and 15 seconds should be spent on each question
- There is no order of difficulty- the most crucial thing is to get through all 52 questions!
- The reading questions will be presented in a logical order with more general, non-line directed questions about major parts of the passage and how they fit together as a whole appearing first , followed by a string of “targeted” questions that are line or paragraph directed

Structure

- There are 52 questions to be completed in 65 minutes
- The test itself consists of 5 passages, 4 single passages and 1 double passage
- Of the passages 2 are about Natural Science , 2 are about History / Social Studies , and 1 is about U.S. and World Literature
- 19% of the Reading section, or approximately 10 questions on the exam are Words in Context questions
- 3-7% of the Reading section, or approximately 2-4 questions , will involve the interpretation of information provided by a graphic (table ,chart ,graph, etc)
- 19% of the Reading section, or approximately 10 questions, 2 per passage, are Command of Evidence questions

Assessing Passage Difficulty

- As you begin to take practice tests , you will notice the test includes some variety in the difficulty level of the passages. Some are written at a 9th or 10th grade level. Others are post-secondary (college) level. Consider flipping through the reading section prior to beginning reading the passages, and doing the passages that are lower level/easier first so that you will have more time to spend on the harder, more complex passages.
- You can easily get an idea of which passages will be the most difficult by:
    - Consulting introductory material (the line or two of text before the actual passage begins.) These lines may give you information about the time period in which the passage was written. If a passage was written more than 100 years ago , it is likely to present a challenge.
    - Reading a few lines of the passage to see how easy it is to “digest”. You may have to do this if you can't determine the passage’s difficulty from the introductory material alone.
- Don't spend more than two minutes scouting the passages. Once you know which ones are easy and which ones are hard, you might choose to complete the hard ones first or save them for last, depending on your “reading personality.”

General Approaches Beneficial for all 5 Passages

- When you begin each passage start by plotting line directed questions, questions that target a certain portion of the passage and have line numbers present in the question.
- Plotting can be done by simply writing the question number next to the line number or section it corresponds to in the actual passage, by doing so you will be able to answer questions as their relevant details come up in the passage
- After plotting your questions, read each passage quickly, marking and labeling as you go finding relevant details and context regarding the question that has been plotted in the section you’re reading
- Once you have completely read the passage you can turn to the questions. You want to spend the majority of your time on the questions rather than on reading the passage
- Answer all line directed questions first as as they can be answered once their correlating portion of the passage has been read
- After answering all line directed questions, focus on the non line directed questions as they tend to focus on the passage as a whole and tend to take longer to answer

Know What To Focus On

- When reading a narrative try to focus on : theme, mood, tone, and characterization
- There will be one narrative passage per test. Questions about literature passages are likely to focus on theme, mood, tone, and characterization.
- Theme = repeated idea / moral of the story
- Mood = tone words, descriptions, overall atmosphere
- Tone = author's attitude towards passage
- Characterization = tone of narrator towards characters

Use your Time Wisely

- There is no guessing penalty, so you should never leave any items blank.
- Even though you aren't answering every item, you should still prioritize your time. Don't let anyone question bog you down for too long.
- You can take a guess, flag it with a question mark , and return to it if time allows

Using the QUICK Method

- The QUICK method should be used to break down each of the 5 passages in order to fully comprehend the passage and both efficiently and correctly answer the corresponding questions
- This method stands for
  Q- Let the Question guide you
  U- Underline key words in the passage and answers
  I- Identity a match (or a lack thereof) between the passage and the answer choices
  C- Cross out specific word(s) that make answer choices incorrect
  K- Keep the answer that best matches the main idea and tone of the designated area

How to Use Each Step of the QUICK Method

The Questions

- Not all questions will be "plottable". The first few questions will often be general in nature and refer to the passage as a whole or the gist of an argument. Then a string of more specific questions will appear in the order of the passage.
- When plotting questions , quickly scan for line numbers and/or paragraph numbers
  An Example-
  The author suggests that "resistance" (line 31)

- Do not read the entire question or any of the answer choices yet; you are just looking for line or paragraph numbers
- Write the question number in the margin next to the line number(s) it references

If the question gives you:	You will need to consult:
No specific line #'s	Introductory lines and first and last paragraphs (answer after you have finished the line-directed questions)
Multiple-line reference(s)	Entire paragraph
One specified sentence	Specified sentence and surrounding sentences

Marking and Labelling

- Marking and/or labelling will enable you to find the answers more quickly. You will be able to match your marked words and labels with key terms in the question to narrow down where to search for answers. This will save you time.

What You Should Mark and Label

- Proper Nouns
- Dates
- Repeated or Related Terms
- Tone Words
- Shifters (but, however, despite, etc.)
- Some people find it helpful to write a two or three word "label" next to each paragraph, indicating its main idea.

- If you are having trouble with a line-directed or paragraph directed questions, concentrate on answers that most closely match what was discussed in the referenced area of the passage

Underlining Keywords and Identifying a Match

- Start by choosing just one word of the answer choice to underline. If you had to save that answer as a document on the computer and we're limited to a 1 word file name, what word would you choose ?
- While you may underline more than one word, avoid underlining too much. Concentrate more on the main idea than the tone at first. You can evaluate tone as you are narrowing down the choices.
- Revisit the designated area of the passage so that you can confirm if that area is even talking about the word(s) you underlined in an answer choice. If it is, you can look more closely at that choice. If not, you can eliminate it.
- When you read the targeted area of the passage, you need to look for a match. You are seeking an answer choice that closely matches specific words from the passage.

- Some sets of answer choices are harder to underline because they are lengthy. You may have to underline a few more words on these while sticking to the essence of each choice. Additionally, some sets of answer choices are harder to underline because several choices share many of the same words. Focus on what makes the answer choices unique and different from one another to aid in elimination

Crossing Out Specific Words

- If something in an answer choice is not a match to the passage, cross out the specific word or words that make the answer choice wrong
- When you eliminate an answer choice, you want to be confident about that decision. Show your work.
- Mark out the specific word(s) that make an answer choice incorrect. This does not have to be a word that you have previously underlined.
- Mark out the letter once you have eliminated a choice
- Do not cross through the entire choice as you may want to reference it later

Keep the Answer that Best Fits

- You will usually be left with at least two answer choices that are worthy of consideration
- Keep the answer that best matches the main idea and tone of the designated area
- This may require careful comparison between the last two remaining choices

Words In Context Questions

- On the reading exam some questions will begin with the prefix , "As used in line … " followed by a particular word for which you will have to select the synonym that best matches its use and connotation given its context in the line it is present in. These types of questions are known as Words In Context Questions.

An Example-

As used in line 9, "account" most nearly means

A. Ledger
B. Chronicle
C. Deposit
D. Basis

- Many words have multiple meanings. They may even be used as different parts of speech
- Words in context questions on the Reading test will ask about the meaning of a fairly basic word with multiple meanings. Be sure to pick the answer that best fits what the word means in context of the passage, which is often not its most common definition. All of the answer choices will be the same part of speech

How To Answer These Questions

- Read the specified and surrounding sentences, underline the word in question, and replace the word in question with your own word. Find the best match for your word among the answer choices
- Alternatively, you can replace the word in question with each of the answer choices. Eliminate answers that do not fit the main idea and tone of that area of the passage

- Remember that the correct answer is not necessarily the one that sounds best to your ear, but rather the best match in meaning

Double Words In Context Questions

- Sometimes the test may use the word differently in two different contexts and ask you to compare how it is used in each case.

How To Answer These Questions

- You can do this; just work them one at a time and eliminate. Beware of the order of the answer choices

An Example-

As used in line 15 and line 22 respectively, 'green' most nearly means

A. immature .. ecologically aware
B. Environmentally friendly .. naive
C. Verdant .. unripe
D. Appearing nauseous .. developing

Informational Graphics

- Information cannot only be conveyed by text but also by informational graphics. Obtaining information from a graphic is a unique reading skill. Reporting the information you gleaned from a graphic can also be tricky

How To Answer These Questions

- When approaching these types of questions gather information. What are the chart headings and axis labels? What trends do the numbers or line directions indicate? Upwards, downwards, stagnant?
- Pay attention to what you are directed to read or what seems necessary to consult (text, chart 1, table 2, etc). If the question references both the passage and the graphic, you will need information from both to solve it. It is also possible that two graphics will be presented, requiring you to obtain information from both
- The test is using informational graphics to test your ability to analyze and assess science and social science topics

The Question Types

What Questions

- Many test questions are simply asking you **what** the author said in a particular area of the passage.

How To Answer These Questions

- These types of questions can be efficiently solved by utilizing the QUICK method outlined above

Why and How Questions

- Other questions are more complicated in that they require you to answer **why** the author included a material or **how** a piece of evidence is used.
- You won't,however, treat a why question any differently than a how question, so the distinction between the two is unimportant. You do, however, need to realize they are both more complex than a mere what question.
- It is common for why/how questions to use phrasing like: "in order to," "function to," "serve as," "intended to," "primarily," or "mainly." Questions that also ask about a piece of the passage in relation to the passage "as a whole" or "in context" also tend to fall in this same vein of more intricate questions.

How To Answer These Questions

- For these questions you will use the QUICK method, though it will likely require more time, especially on the K step. Deciding what to keep will be harder as there will likely be two very close answer choices on these types of questions. The second best choice will have more of a what value while that correct answer will truly answer the why/how element

Inference Questions

- Be aware of words that indicate a question is requiring you to make an inference
- While "what" questions tend to be more basic, they can also present challenges when they come in the form of Inference of Command of Evidence questions. Luckily, these questions can easily be spotted due to their phrasing
- Inference questions use words like:
    - Imply
    - Infer
    - Suggest
    - Assume

Command of Evidence Questions

- Command of evidence questions are easy to spot because the answer choices are all line references. These are asking you what the best evidence is. This requires sizing up one answer to another and more critically than a basic what question.
- The test requires you to not only answer questions but also understand information in the passage, its structure, and the function of each part. This skill is called Command of Evidence.
- On the reading test, these questions will require you to justify your answer by selecting specific lines from the passage that provide support
- Most, but not all, of these questions will be part of a pair. You will be asked a question and provided with answer choices. The next question will ask you to pick specific lines from the passage that support your answer to the previous question. Those lines may or may not be in the vicinity of any lines designated in the first question of the pair. You must check all the answers and eliminate those that do not adequately match the previous answer

How To Answer These Questions

- As you answer the first question in the pair, mark the evidence for your choice that you found in the passage, the words that prompted you to pick the answer
- Identify the essence of each answer option by bracketing it and underlining its keywords. These do not need to be plotted before reading as they are spread out
- If your evidence is not an answer choice, pick the choice that best mimics your evidence
- If you find yourself bogged down, randomly guess (or choose from what you have left if you were able to eliminate some choices), flag the question with a question mark, and return to it if time allows

Common Patterns in Answers

- Use patterns in the answers to your advantage
- Questions are often linked, and there will often be a common thread between correct answers. Use this to your advantage

Pair of Related Answers

- The answer is often one of the pair

An Example-

The opening sentence in the passage is used primarily to suggest the

A. Number of volumes that were required to cover a topic
B. Background and development of Edward Curtis
C. Comprehensive nature of Edward Curtis's work
D. Laboriousness of completing a publication

Notice how answer choice B and C answer the question using similar wording, but B mentions Curtis's background and development as a person, whereas C mentions his work

Pairs of Pairs

- Determine which pair is more viable based on the passage. Older/traditional? Narratives/fiction? Then decide within the pair which is the better match to the designated area of the passage

An Example-

The reference to "deceptively smooth narrative of events" (lines 42-43) primarily implies that

A. Older techniques of historical inquiry might not be as accurate as once believed
B. Practitioners of traditional inquiry maliciously lie about what they find in sources
C. Narratives are the best form of historical description
D. Fiction writing and historical retelling are essentially the same

Notice how answer choice A and B answer the question using similar wording, but B is more extreme in wording. Similarly the same can be noted in answer choice C and D as they both mention historical description and storytelling, but imply two different outcomes, C praising narratives as the best form (an extreme) and D contrasting two types of literature.

More of the Same

- Concentrate on what's different to make sense of each choice

An Example-

The author of Passage 2 uses the phrase "astounds me the most" (line 31) to refer to

A. The disclosure of Nash's chronic instability
B. The obstacles that Nash faced and overcame
C. The length of time that Nash was hospitalized
D. An unusual disclaimer made by Nash himself

Notice how all the answer choices mention either an obstacle or hindrance in Nash's life, this means that we will have to focus on the differences between all 4 answer choices in order to answer the question. Answer choice A mentions disclosing Nash's chronic instability. Answer choice B mentions the obstacles in Nash's life and his path to overcoming them. Answer choice C mentions that Nash was hospitalized , alluding that his instability and obstacles may stem from this. Answer choice D mentions that Nash has made an unusual disclaimer, something he normally would never share or disclose. Following reading the line provided in the question and evaluating the meaning, the question can be answered.

Lack of a Pattern

- Concentrate on what's different to make sense of each choice

An Example-

A "historian" (line 44) is more likely than an archeologist to

A. Focus his studies on the accomplishments of leaders
B. Explore the day to day existence of everyday people
C. Be compelled by political means
D. Study the art of many cultures

Notice how all four answer choices lack a common pattern, meaning that after reading the line provided in the question and evaluating its context in the passage as a whole, you can easily choose an answer choice without worrying about common patterns that might be used to deter you.

Common Distractors In Answer Choices

- Beware of common distractors among the answer choices
- Since 75% of answers are wrong, your primary task is to identify and eliminate answer choices
- Incorrect answers often contain one or more of the following traps:

1. **Opposite statement.** The passage describes the mother as an honest woman. What's wrong with the following answer choice?

   Illustrate the mother's lack of integrity.

   The mother's honest and caring traits are not represented in this answer choice, which describes her as lacking integrity, an opposite to the statement made in the passage. There for this answer choice is incorrect

2. **Wrong tone.** If the passage is positive about the assembly line in early automobile factories, then which of the answer choices can be eliminated because of the wrong tone?

   A. Emphasize the benefits of this method of production
   B. Discredit Ford's ideas
   C. Show the extent of factories' influence on America
   D. Suggest the enormous commercial potential of better organizing production

   B should be eliminated as it has the wrong tone. It belittles Ford's ideas and takes from the positive tone present in the passage making it incorrect

3. **Absolute words.** Unless an author uses absolutes in the passage, answer choices that contain these traps are wrong. What is wrong with the following answer choice?

   Only the Cherokee would be permitted to exhibit tribal murals as works of art

   Only is an absolute word and limits the answer choice, thus it is incorrect as the author of the passage doesn't use absolutes in the passage.

4. **Extreme language.** Unless an author uses extreme language in the passage, answer choices that contain these traps are wrong. What is wrong with the following answer choice?

   It would be deadly for a person to try the new method

   The word deadly is an extreme word and is not used by the author in the passage, therefore this answer choice is wrong as it alludes to an extreme which was not intended by the author.

Absolutes	Extremes	Intensifiers
• All • Must • Never • Should • None • Always • Only	• Scorn • Jubilant • Idealistic • Drastic • Contempt • Reverence • Global	• More • Too • Extremely • Seldom • Most • Very • Merely

5. **Random answer.** If the passage is about a girl remembering her father, which answer choices do not deal with the main idea and should be eliminated?

    A. Her mother had repeatedly talked about those fashions
    B. Her father had worn three piece suits when her sister was young
    C. She had a distinct image of her father as a well-dressed man
    D. She is associates those garments with her father

    Answer Choice A is incorrect as it mentions the girl's mother, when the focus of the passage is on the girl's father. Therefore this answer choice is incorrect as it is a random answer and does not deal with the main idea.

6. **A correct statement that does not answer the specific question.** For example, suppose the primary purpose of the passage is to present theories on when and why human beings have allergic reactions. While the passage explains where the physical reaction might appear, this is not the main point of the passage. Then, for a main idea question, what is wrong with the following answer choice?

    Hives may it appear all over the body

    This answer choice is incorrect as the purpose of the passage is to present theories on when and why humans have allergic reactions, the passage does not focus on physical reactions that might appear, therefore this answer choice is not suitable to answer a main idea question, as physical reactions are not the main idea.

7. **Half-correct answer.** Watch the end of the answer choice! For example, if the passage is about the enthusiasm of MP3 users, then what is wrong with the following answer choice?

    Illustrate some of the exaggerated claims made by vitamin manufacturers

    This answer choice is incorrect as , though it does mention enthusiasm by using the word exaggerated, it does not mention the enthusiasm of MP3 users, instead it mentions the claims made by vitamin manufacturers. Because the question is asking about MP3 users in particular, this answer choice would not be suitable.

8. **Your opinion.** If the passage did not discuss taxes, just government support of work programs, then what is wrong with the following answer choice?

   Taxes will be greatly increased if the government supports work programs.

   This answer choice is incorrect as, though it does mention government support of work programs, the passage has no mention of taxes, therefore this answer choice must be incorrect as it focuses on a topic that was not highlighted in the passage.

9. **Faulty comparison.**This is an answer choice that falsely compares two ideas. Watch for the " more … than" construction. For example, suppose the passage discusses autobiographical recollections but never mentions writing them down. Then, what would be wrong with the following answer choice?

   Experimental data is significantly more accurate than anecdotal records.

   This answer choice is incorrect as it mentions that anecdotal data has been recorded. After reading the passage it can be observed that the autobiographical recollections were not written down, because of this, the comparison being made between experimental data and anecdotal records would be false in the context of the passage.

10. **The Goldilocks answer.** The answer choice is "too big" or "too small." You want the answer choice that is "just right." If the passage talked about the global appeal of a product, what would be wrong with this answer choice?

    The company successfully launched the product in Toledo, Ohio.

    This answer choice is incorrect as it only mentions the company being established within a single city in Ohio, unlike the global aspect of the company and its products detailed in the passage. Because of the small nature of the company described in the answer choice, this answer can be labelled as "too small" for the extent of the company detailed in the passage.

The Double Passage

- Each test will have one double passage. Two texts will be presented that share a topic. You will be asked questions about each passage individually as well as questions that ask about both passages in terms of similarities, differences, and points of view.
- Before reading passage 2 you may already have an idea of what the author is going to say. As you read passage 2, focus on how the two passages are similar and different

How to Approach the Double Passage

1. Survey the questions before reading either passage
    - Plot the question number in the margin next to the designated area for each line or paragraph directed question
    - Label each question with either a "1" refers only to Passage 1) , a "2" (refers only to Passage 2) , or a "B" (requires information from both passages)
2. Read the introductory lines carefully. Information about the authors may help you understand the point(s) of view
3. Read Passage 1. Chart main idea and Tone
4. Answer those questions that specifically refer to Passage 1
5. Eliminate any answer choices on "B" questions that don't work for Passage 1. You will find this easiest to do on the "B" questions that ask about similarities or differences between the passages. You may need to wait until after reading Passage 2 to eliminate questions that concern point of view.
6. Read Passage 2. Focus on the specific similarities and differences found in the two passages. Chart main idea and tone
7. Answer questions that specifically refer to Passage 2
8. Complete "B" questions. Questions about both passages can be difficult. Remember , there are three subtypes of Both questions: those that focus on similarities, those that underscore differences, and those that ask you to answer from a particular point of view

Compare/Contrast Questions In the Double Passage

- Compare/contrast questions require the most information to answer because you must clearly understand the tone and main idea of both passages.

How To Answer These Questions

- To clear up any confusion, determine which passage is being addressed in the question and mark the point of view from which you should answer. Try focusing on the last paragraph to verify the author's ultimate point of view.

A Critical Reading Cheat Sheet

Passage

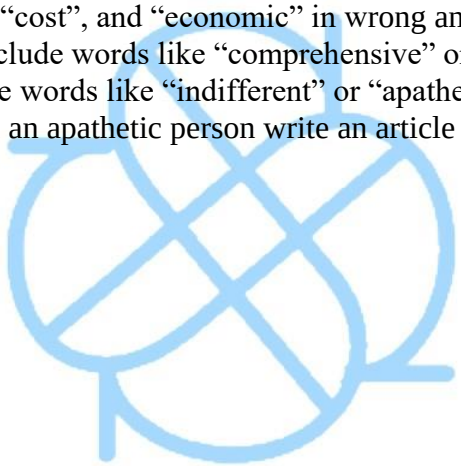
- About a minority person/group will be positive or neutral towards that person/group
- The SAT test passages may negatively characterize historians (e.g. Western historians) as ethnocentric
- Dialogue is designed to be confusing. Keep track of who is speaking
- Narratives about a child are told from an adult's point of view

Questions

- General questions are asked first, then the more specific, line-directed items go in the order of the passage (on single passages)
- Many questions will tell you where to look in the passage
- The questions will not be in order of difficulty
- Questions are often linked. The answer to one question may lead you to other answers
- The information needed to answer the questions will be found in the passage. This is true even for the inference questions
- you can expect questions about the following items when they appear in a passage:
    - Metaphors
    - Offset quotations
    - Words inside quotation marks

Answers

- Many answers simply paraphrase the information in the passage
- If dates are used in the passage, the answer may try to confuse you (i.e. the 1800's are not the eighteenth century)
- Answers about money are generally wrong unless it is the topic of the passage. Look for words like "financial", "cost", and "economic" in wrong answer choices
- Answer choices that include words like "comprehensive" or "global" are often wrong
- Answer choices that use words like "indifferent" or "apathetic" to describe the author do not make sense. Would an apathetic person write an article on the given topic ?



The SAT Writing and Language Section

Overview

- The writing section is the second of four sections on the SAT standardized test.
- There are 44 questions in this section and we are given 35 minutes to complete them , meaning approximately 1 minute and 25 seconds should be spent on each question
- You should plan to spend about 9 minutes reading and answering questions for each passage
- The test itself consists of four passages
- Each passage requires you to answer 11 questions
- There is no order of difficulty- the most crucial thing is to get through all 44 questions!
- The Writing and Language portion of the SAT requires that you apply your knowledge of standard grammatical English and correct punctuation. The test is designed to assess your ability to recognize correctly constructed sentences using your understanding of the rules of rhetoric (effective use of language)

Structure

- There are 44 questions to be completed in 35 minutes
- The 4 passages present different writing styles (Argument, Informative/Explanatory Text, Nonfiction Narrative) and cover topics related to Careers, Social Studies, Humanities, and Science
- The Writing and Language section on the SAT is designed to assess your mastery of Expressions of Ideas and Standard English Conventions
- Expression of Ideas items require you to understand developmental organization and effective language use
- The questions that assess Standard English Conventions require you to understand sentence structure, usage, and punctuation
- There will be about 20 questions covering Standard English Conventions (45% of the section)
- There will be about 24 questions covering Expression of Ideas
- Words In Context questions make up about 18% of the SAT Writing section (8 questions)
- Informational Graphic related questions make up about 2-5% of the SAT Writing section (1-2 questions)

Top Seven Tips for The Writing Section

1. Read the entire sentence with the underlined word or phrase. First, find its subject (who/what) and the verb (action). For some items you may need to read slightly more. Answer questions as you read; **do not** wait until you get to the end of the passage
2. The correct answer will be "NO CHANGE" for approximately 20% of the items in the Writing and Language section. A reasonable number of "NO CHANGE" is to select 6 to 9. Mark "NO CHANGE" in your booklet with a * so you can keep a count as you work
3. Once you have determined the underlined material is wrong, eliminate the (A) NO CHANGE answer choice. Move directly to the next answer choice and continue eliminating each wrong answer

4. The answer choices may reveal the skills that are being assessed. Pay attention to how the answer choices differ
5. Many students stumble on Expression of Ideas questions. You may want to consider working all of the Standard English Conventions questions for a passage then going back and answering its Expression of Ideas items
6. Bubble an answer for every question. There is no guessing penalty on the SAT test
7. determine your personal speed! You will have 35 minutes to complete the Writing and Language section, which contains four passages with 11 questions each. You should plan to spend no more than 9 minutes per passage

Words In Context

- Per College Board specifications, these questions " measure students' ability to apply knowledge of words, phrases, and language in the context of an extended prose passage." College Board specifications go on to note that the words and phrases used are either " neither highly obscure nor specific to any one domain. They are words and phrases whose specific meaning and rhetorical purpose are derived in large part through the context in which they are used."
- Selecting the appropriate word in context involves:
    - Making distinctions between **subtle differences** in meaning
    - Selecting the word that conveys meaning with **precision**
    - Selecting the best **stylistic choice** based on the context and audience
    - Avoiding unnecessary repetition (**concision**)
    - Understanding the differences between **frequently confused words**
    - Considering the possibility that **no change** in needed

Subtle Differences in Meaning

- Read the sentence in question as well as surrounding sentences as needed for understanding
- Mark context clues as you read
- Mark tone clues as you read

An Example-

Imagine you are in charge of organizing a bake sale that your club will hold over the weekend. Later, when your family asks you what you did, will you say that you "collected donations and recruited volunteers" or that you "recruited donations and collected volunteers"?

Clearly the first option sounds better, but why? "Collected" and "recruited" have similar definitions.

Collect: to bring together or gather
Recruit: to form or build a group

Recruit is used when you are bringing people together, whereas collect is the preferred term for bringing objects together

Precision

An Example-

If you described your middle-aged science teacher as having “youthful enthusiasm” he would probably be flattered that he related so well to his students. If you said that the same teacher behaved in a “juvenile manner” he would likely be offended by your comment. But, don't “youthful” and “juvenile” both relate to having childlike qualities? What is the difference between these terms?

If you were trying to get away from a ferocious bear chasing you through the woods would you “sprint” or “jog?” They both mean to run, but how do they differ?

Stylistic Choices

- Pay attention to voice and determine the purpose/intended audience as you read
- There are instances in which slang is appropriate, but a formal essay is not one of those occasions. Conversely, formal language can make what was supposed to be casual commentary seem stilted. Continuing the voice of the passage (i.e. first person or third person, active versus passive) is also important

An Example-

The Palace’s media team would probably not issue a statement that the Queen was “chilling out and taking selfies,” just as you would not suggest to your friends that you and your family “ pose for candid photographs during a moment of repose.”

Concision

- Identify needless repetition as you read. Watch out for unnecessary use of synonyms
- Information should be conveyed succinctly. Avoid needless repetition. A non underlined portion of the sentence may contain information similar to that which is underlined, or the underlined portion itself may be repetitive.

An Example-

Every evening, I read the newspaper **nightly**

There is no need to include nightly in the sentence as it has already been clarified that you read the newspaper every evening.

Frequently Confused Words

- Sometimes two words may be confused for one another not because their definitions are related but because they share similar spelling or pronunciation. The best defense in this situation is to be forewarned and forearmed. Familiarize yourself with these pairs/groups of words and their definitions

Examples-

abjure/adjure	cite/site	emigrant/immigrant/migrant
accept/except	collaborate/corroborate	eminent/immanent/imminent
adverse/averse	commend/condemn/condone	enervate/energize
advice/advise	compliment/complement	flaunt/flout
affect/effect	concurrent/consecutive	gambit/gamut
allusion/illusion	content/contentious	ingenious/ingenuous
alternate/alternative	council/counsel	precede/proceed
ascent/assent	descent/dissent	principal/principle
capital/capitol	discomfit/discomfort	stanch/staunch
censure/censor	discreet/discrete	stationary/stationery
chafe/chaff	disinterested/uninterested	tortuous/torturous
	elicit/illicit	venal/venial

The "No Change" Option

- Consider the possibility that the original statement is correct as written. If you can't come up with a specific rationale for making a change, mark the item "NO CHANGE"
- Historically on the SAT writing section, approximately 20% of items are correct as written. Out of 44 items, it is reasonable that 6-9 items should be marked "NO CHANGE"
- Keep track of the number of "NO CHANGE" responses you are choosing as you take the test to make sure you are selecting a reasonable number (20% or less).

Informational Graphics

- You will be asked to translate information from a graphic into text. **Grammar is not the issue**. The meaning of each option will be different, so you must determine which correctly interprets the graphic.
- Look at the graphic to gather information
- Identify the option that best conveys the information related by the graphic without distorting the meaning

Standard English Conventions (SEC):

Sentence Structure

- Run-ons/Fragments
- Subordination/Coordination
- Parallelism
- Misplaced Modifiers
- Shift in Verb Voice
- Shifts in Verb Tense or Mood
- Shifts in Pronoun and Number

Usage

- Pronoun Clarity
- Pronoun Agreement
- Subject/Verb Agreement
- Noun Agreement
- Possesive Determiners
- Frequently Confused Words
- Logical Comparison
- Conventional Expression

Punctuation

- End of Sentence
- Within Sentence
- Possessive Nouns and Pronouns
- Items in a Series
- Nonessential and Parenthetical Elements
- Unnecessary Punctuation

Most Frequently Used Strategies for Standard English Conventions

- Look for similarities and differences in the answer choices. Ask yourself what makes an answer choice wrong
- Mark out the error in the original sentence. Eliminate answers that repeat this error or introduce a new error. Remember that NO CHANGE is an option

Sentence Structure

- Mark the subject and verb. Be sure each sentence conveys one complete thought and is not a run-on or comma splice.

Fragments

- A fragment occurs when the sentence or thought is incomplete. Fragments are not necessarily short sentences. Sometimes, removing a word creates a complete thought

Examples

Spot the Error

1. The horses, which look alike in terms of coloration and musculature
   The comma and the word "which" should be removed as they create a fragment

2. Unloading their rucksacks after a long day of hiking the trail
   The word "unloading" should be changed to "unloaded" as the without the change a fragment is created

3. As the brothers in Suzan-Lori Parks' Pulitzer Prize winning drama , Lincoln and Booth, expressing themselves fluently and with great fervor
   The comma should be removed and the word "expressing" should be changed to "express" as without the changes a fragment is created

Run-ons and Comma Splices

- Two or more complete thoughts (independent clauses) become a run-on sentence if there is no proper punctuation and / or conjunction between the two complete thoughts. A comma splice error occurs when a run-on has been "corrected" by adding a comma between the two complete thoughts.
- Run ons and comma splices are not necessarily long sentences. The second clause of a run-on or comma splice usually starts with a noun or pronoun

How to Correct a Run-On Sentence

- There are four basic ways to correct a run-on sentence
  I want to pass the class I need to study

1. **Separate the run-on into two sentences**
   I want to pass the class. I need to study

2. **Use a semicolon, either with or without a conjunctive adverb and a comma. If you use a semicolon, both clauses must be independent**
   I want to pass the class ; I need to study.
   I want to pass the class; therefore , I need to study.

3. **Use a coordinating conjunction preceded by a comma**
   I want to pass the class, so I need to study.

4. **Use a subordinating conjunction**
   Because I want to pass the class, I need to study.

- Of course there are other ways to restructure a run-on sentence, but these methods are some of the easiest. You can also make one of the clauses dependent or restructure the entire sentence

Conjunctive Adverbs	Coordinating Conjunctions	Subordinating Conjunctions
; nevertheless, ; however, ; therefore, ; consequently, ; furthermore,	, for , and , nor , but , or , yet , so	When As While Since Because Although

Examples

1. John F. Kennedy's assassination was a catastrophic event that drastically altered American history the impact of these shots reverberates more than forty years later.

   A new sentence should begin after "history" and the "the" that begins the newly created sentence should be capitalized in order to end the run-on sentence present.

2. The Greenwich Village Orchestra is known for its support of avant-garde music it plays cutting edge compositions with cacophonous melodies.

   A semicolon should be placed following the word "music" as it separates two independent clauses and ends the run-on sentence present

3. Tennis is an amazing sport that is fun for all ages it can be played individually against a single opponent or with a partner against a team of two.

   A period should be placed after the word "ages" in order to form a new sentence. Because of this revision the "it" at the beginning of the newly created sentence should be capitalized in order to end the run-on sentence present

Verb Tense Errors

- To verify that the sentence maintains correct verb tense, be sure the tense of the underlined verb is consistent with the tense of the other verbs in the sentence. Also pay attention to time references because they indicate past ,present , or future action. Consider aspect, how an action relates to the flow of time. Is the event bounded, continuous, or repetitive?
- Use time clues

Examples

1. Last year, my soccer team will win the tournament

   "will win" should be replaced with "won" as the tournament happened in the past , not in the future.

2. An establishment located in Kaifeng,China, is assumed to be the world's oldest restaurant; it was purported to commence operation in 1153 AD.

   The word "have" should be placed before the word "commence" in order to correctly match the past tense of the verb.

Mood

- Conditional mood uses words like "might," "could," and "would." Think about these actions as hypothetical situations
- First person is told from the speaker's point of view (POV)
- Second person involves the reader's POV
- Third person is not told from the speaker's or reader's POV; refers to other people
- Avoid shifts in pronoun person or number

	First Person Pronouns	Second Person Pronouns	Third Person Pronouns
Singular	I, me	you	he, she, it, him, her
Plural	we, us	you	they, them

Examples

1. During the course of the drawing, some villagers mentioned that they have heard of other nearby villages giving up our lotteries.

   Because the sentence is talking about other villages giving up their lotteries, the word "our" should be replaced with "their"

2. If John ate the poisoned food, he is dead

   Because the sentence is talking about the skunk, the word "is" should be changed to "could be" as that satisfies the hypothetical situation that has been created, using conditional mood.

3. If you went to sleep earlier, you are not as tired

   Because the sentence is talking about you, the words "are not" should be replaced with "would not be" as it correctly satisfies the hypothetical situation that has been created by using conditional mood.

Usage

Pronoun Clarity

- Pronouns must clearly refer to their antecedents
- Attempt to draw an arrow from the pronoun to its antecedent. If you cannot do so, its antecedent is non-existent or unclear

An Example

1. When redecorating a room, they must also understand the room's function, determine lighting needs, and have an appreciation of color preference.
   The word "they" must be replaced with the word "one" as the pronoun being used is singular, whereas the pronoun "they" is plural. Because of this the pronoun does not match the antecedent so is non-existent or unclear in the current sentence.

Possessive Determiners

Possessive pronouns show ownership	Contractions consolidate two words
Its = belongs to it Your = belongs to you Their = belongs to them Whose = that which belongs to whom	It's = it is You're = you are They're = they are Who's = who is

- The adverb " there" indicates a place
- Make sure you know the difference between possessive pronouns, contractions, and adverbs

An Example

1. Tornadoes destroy power lines and damaged homes and other property; their responsible for dozens of deaths every year
   The word "their" needs to be replaced with the contraction "they're" as the intention of including the word is to consolidate two words.

Pronoun Antecedent Agreement

- If the underlined portion contains a pronoun, look there first to find the error. The pronouns must agree in number and gender with the noun or pronoun to which it refers (its antecedent)

Subject-Verb Agreement

- Be sure that singular subjects are paired with singular verbs and that plural subjects are paired with plural verbs. Subjects and verbs must ALWAYS agree. When a subject is a singular indefinite pronoun, be sure to use a singular verb.

Singular Indefinite Pronouns

Anyone Someone Everyone No One Each	Anybody Somebody Everybody Nobody Either	Anything Something Everything Nothing Neither

- **Prepositional Phrases May Create a Trap.** A favorite trick of the writers of the SAT is to insert a prepositional phrase (or several prepositional phrases) between the subject and the verb. The trap occurs when the verb agrees with the object of the preposition instead of the subject. Other tricks include the use of an inverted subject pattern, a prepositional phrase set off by commas, or compound subjects.

Noun Agreement

- Nouns must agree in number

Examples

1. Dogs have been taught to notice signs of cancer, Parkison's disease, or diabetes and alert it's owners accordingly.

   The word "it's" should be replaced with the word "their" so that the pronoun agrees with the plural noun.

2. All seven of my children became a top student.

   The word "a" should be removed from the sentence and the word "student" should be made plural into "students" so that the noun matches the number of people being mentioned in the sentence.

3. I noticed a stain on my jeans, but fortunately there were a clean pair of jeans in the closet.

   The word "were" should be replaced with the word "was" so that singular noun in the sentence is correctly represented in number.

Logical Comparison

- Compare like items. When writers compare unlike items, sentences become illogical and confusing

An Example

1. Looking in the mirror for the last time, Dinah decided she liked her prom dress more than Susie.

   The word "dress" should be added after the word "Susie" in order to show a comparison between the two girl's dresses. Additionally an "'s" needs to be added to the word "Susie" to show that she owns the dress.

Conventional Expressions

- Be able to identify cases in which a given expression is not consistent with standard written English.
- Know when to use gerunds and when to use infinities. Gerunds are verb forms that always act as nouns and end in -ing. Infinitives are to + verb construction and are often used as nouns
- If you need to use an action as a subject, use a **GERUND**

  ACTING is my favorite thing to do.
  ACTING is Brent's passion.

- If you need to use an action as an object, use an **Infinitive**

  I like TO ACT
  His dream was TO ACT

Prepositions

- A prepositional phrase begins with a preposition and ends with a noun or pronoun. The prepositional phrase acts like an adjective or adverb, modifying nouns, pronouns, or verbs

This list includes the prepositions that are used most often.

About For On At In	To By Of With From

- Remember, the use of prepositions is often idiomatic. For example, the word "agree" needs different prepositions in different contexts:

  The producer agreed with the director about the hiring decision.
  The actor and his agent agreed to the terms of the contract.
  The investors agreed on the budget issue.

Examples

1. Consumers are increasingly choosing to spend their money for experiences rather than on material goods.

   The word "for" should be changed to the preposition "on" as it clarifies the object of the subject and provides a direct comparison.

Punctuation

End of Sentence Punctuation

- A sentence can end with a period (most typically), an exclamation point (to show excitement or great emphasis) or a question mark (if a query is being made). Choose the correct mark based on the content of the statement
- Know the function of colons, semicolons, dashes, and apostrophes

Within-Sentence Punctuation

- Colons, semicolons, and dashes can be used to indicate sharp breaks in sentences
- A complete sentence precedes a **colon** in modern American English usage, while a list , description, explanation, or definition follows it. The elements that follow the colon may or may not be a complete thought. Because the colon is preceded by an independent clause, it is a complete sentence whether what follows the colon is another sentence or not.

- Though best known as part of a "winky face" a **semicolon** can serve other purposes. A semicolon can be used between two closely related independent clauses that are not already joined by a coordinating conjunction; the information on both sides of the semicolon mst be able to stand alone
- A **dash** is a less formal way to indicate a sharp break in a sentence - it might as well be a colon. Dashes can also be used to set off nonessential information.

Possessive Nouns and Pronouns

- Possessives indicate ownership. Apostrophes are used to indicate possession or form a contraction

Singular Possessive
The actor's performance awarded him with an Emmy nomination

Plural Possessive
The actors' children were busy playing basketball.

- No apostrophe needed with possessive pronoun
The actor loved to eat oranges; they were his favorite food

Items in a Series

- Items in a series are typically separated by commas. However, if the items themselves contain commas, semicolons are used to indicate separation.

To be a successful makeup artist, you must be dependable, detail-oriented, and creative.

New York, New York; Los Angeles, California; Austin, Texas; and Seattle, Washington are the most popular cities for U.S. filmmakers.

Non-Essential Elements and Parenthetical Elements

- Commas, parentheses, and dashes can be used to set off non-essential and parenthetical sentence elements. They should function in like pairs, or the comma or dash can be used on its own if the offset information is immediately followed by the end punctuation.

Many actors, including Gary Sinise, Edward Norton, and Russell Crowe, were considered for the part of "Wolverine" before Hugh Jackman signed on for the role.

Many actors- Gary Sinise, Edward Norton, and Russell Crowe among others - were considered for the part of "Wolverine" before Hugh Jackman signed on for the role.

Many actors (among them Gary Sinise, Edward Norton, and Russell Crowe) were considered for the part of "Wolverine" before Hugh Jackman signed on for the role.

An Example

1. James McBride - journalist, musician, and son , explores his mother's past as well as his own upbringing and heritage in a poignant and powerful debut memoir, The Color of Water.

   A dash should be added after the word "son" as the dash after "McBride" functions in a pair, and adding another dash will allow for the introduction of McBride to be separated from the main objective of the sentence, allowing all parts of the sentence to flow together.

Unnecessary Punctuation

- Unnecessary punctuation almost always appears as commas. The passage may include commas that should be deleted, or answer options may add unnecessary commas. If a comma creates basic logic problems, disturbs the flow of the sentence, suggests an unnecessary pause, or is determined to be unnecessary based on careful reading of a complicated sentence, it should be deleted.

  Unnecessary commas may …

  ...appear after the main clause when a dependent clause follows it (only need to show extreme contrast).

  She was late to the location, because her plane was delayed. (incorrect)

  The actress was still quite respected, although she had been accused of stealing expensive clothes from the wardrobe department. (correct because of the extreme contrast; clauses with "although" always require a comma)

  ...separate the subject from the verb.

  A romantic comedy, is considered a subtype of a comedy-drama. (incorrect)

  ... appear between two verbs or verb phrases in a compound predicate

  The director made notes about the scene, and called for another rehearsal. (incorrect)

  ... appear between two nouns, noun phrases or noun clauses in a compound subject or compound object.

  The lead actor; and the producer went to film school together. (incorrect)

  ... appear before prepositional phrases, subordinate conjunctions, or modifiers

  She gave her ticket, to the usher at the entrance to the theater. (incorrect)

Examples

1. Joanne, played chess, but she could not win any competition.

   The comma after "Joanne" should be removed as its use is unnecessary and grammatically incorrect as it creates a false pair of commas , creates an unnecessary pause, and disrupts the flow of the sentence.

Expression of Ideas

- Expression of Ideas items address development, organization, and effective language use. **Most Expression of Ideas items can be spotted easily because a question is usually listed above the answer choices;**however, some Standard English Conventions items may pose a question as well. Also, a few Expression of Ideas items will not list a question. **It is crucial to underline the key words in any question.**

Development

- Add, edit, or retain ideas, claims, counter arguments,topic sentences, etc. to convey ideas, arguments, and information in a clear and effective manner
- Supplement, edit, or retain information and ideas intended to support claims or points in the passage
- Add, edit, retain, or omit information and ideas in keeping with the topic and purpose
- Convey information presented quantitatively in graphs, tables, charts, etc. to information presented in the text

Organization

- Edit text to achieve the most logical order
- Revise introductions, conclusions and transitions to effectively connect information and ideas

Effective Language Use

- Edit text as needed to improve precision in word choice based upon the content of the passage
- Edit text as needed to improve concision
- Edit text as needed to ensure consistency of style and tone

Sentence Structure

- Use a variety of sentence structures to match syntax and achieve rhetorical purpose
- Correct faulty comparison, illogical coordination, subordination, faulty parallelism, and misplaced modifiers

Development

- Delete sentences that either do not match the topic and/or style of the paragraph in question or repeat information that is given elsewhere
- Do not add sentences that are redundant or diverge from the purpose of the paragraph
- Mark the keywords in the question when asked to choose between several options for an addition
- Consider the whole passage when asked about introductions and conclusions. Read the topic sentence of each paragraph to get the "big picture"
- If you are asked to choose the best opening sentence for a passage, making that choice will require having read much of the passage, so you should save those questions for last
- You will often be asked to revise conclusions as well, but you will naturally have read the bulk of the passage by the time you reach those
- Introductions and conclusions are different than a topic sentence for a body paragraph as they must not only pertain to the paragraph but also cover the passage as a whole

Organization

- Sometimes you will be asked to edit text so that it flows in the most logical order. You will also be asked to revise transitions. These two skills work hand-in-hand
- Use context to determine the appropriate transition
- Use transition words, pronouns, actions, and time clues to identify the most logical sequence

Common Transitions and Their Purposes

Purpose	Transition Words
Addition	furthermore, moreover, besides
Contrast	notwithstanding, nevertheless, conversely, but
Consequence	hence, therefore, because
Comparison/Similarity	likewise, similarly
Emphasis	indeed, certainly, surely
Details	especially, in particular
Examples	for instance, to illustrate
Summary	in conclusion
Suggestion	to this end, with this in mind
Concession	although, even though, in spite of, of course, while ,however
Time	before,then, once, next, last
Space	above, over, next to

How To Answer These Questions

- Pick an appropriate transition word/phrase from the chart above, or use one of your own. Ask yourself, am I trying to show a **difference**, indicate a **cause and effect**, **compare** two things, give the **next step**, ect.

Illogical Coordination and Subordination

- Items or phrases in the sentence must fit together in a way that makes sense. If a sentence has two separate thoughts, there must be a logical progression from one thought to the other
- Be sure the coordinating or subordinating conjunction accurately conveys the development of two word thoughts

Coordinating Conjunctions	Subordinating Conjunctions
,for ,and ,nor ,but ,or ,yet ,so	When As While Since Because Although

An Example

1. Writing a college admissions essay is very important, but many students spend hours revising their pieces before submitting them to their dream colleges.

   The coordinating conjunction "but" should be replaced with the coordinating conjunction "so" as it shows a continuation and justification of why so many hours are spent on revision.

Faulty Parallelism

- Ideas of equal importance should be expressed in repeated patterns to maintain parallel structure. Sentences should maintain the same pattern in verb tenses, phrases, and use of prepositions

An Example

1. The gala's host sought out dazzling decorations, food that was delicious, and engaging entertainment for the event

   The phrase "food that was delicious" should be replaced with the phrase "delicious food" as this matches the parallelism present in the sentence (an adjective alongside a noun) and maintains a common pattern throughout the sentence.

Misplaced Modifiers

- A modifier describes a noun or pronoun in the sentence. A misplaced modifier has been placed too far away from the noun or pronoun it describes. This can create confusion and add unintentional meaning to the sentence
- The first noun or pronoun after the coma must be modified by the introductory phrase
- Avoid passive voice unless it is required to fix a misplaced modifier. While dangling modifiers are the type most frequently tested, modifiers may be misplaced elsewhere in the sentence. A modifier can be a single word, a phrase, or a clause

An Example

1. Covered in butter and syrup, my cousins feasted on pancakes the next morning.
   The sentence should be written, "The next morning my cousins feasted on pancakes that were covered in butter and syrup."

Voice

- Active voice has the subject acting. Passive voice has something else acting on the subject. Writers consider the active voice more forceful and tend to avoid passive voice unless they really need it (as in the case of fixing a misplaced modifier).

An Example

1. The cottage was lovingly decorated by my great aunt many years ago.

   The sentence should be written, "My great aunt lovingly decorated the cottage many years ago."

Sentence Combining

- The test will also ask you to edit to achieve a variety of sentence structures to match syntax and achieve rhetorical purpose. This will often be assessed through questions about sentence combining.

How To Answer These Questions

- When considering whether sentences should be combined or how to combine them, ask yourself:

Do the sentences share a subject or verb?

- Omit a repeated subject
- Omit repeated subjects and verbs and use adjectives
- Omit repeated subjects and verbs and use adverbs

Do the sentences contain ideas of equal importance?

- Use a coordinating conjunction preceded by a comma
- Join the sentences with a semicolon
- Join the sentences by using a semicolon with a conjunctive adverb and a comma

Do the sentences contain ideas of unequal importance?

- Join them by subordination (making one or more ideas in a sentence depend on the most important)
- Use a comma if you place the dependent clause before the independent cause
- Do not use a comma if you position the dependent clause after the independent clause

Conjunctive Adverb	Coordinating Conjunctions (FANBOYS)	Subordinating Conjunctions
;nevertheless, ;however, ;therefore, ;consequently, ;furthermore,	,for ,and ,nor ,but ,or ,yet ,so	When As While Since Because Although

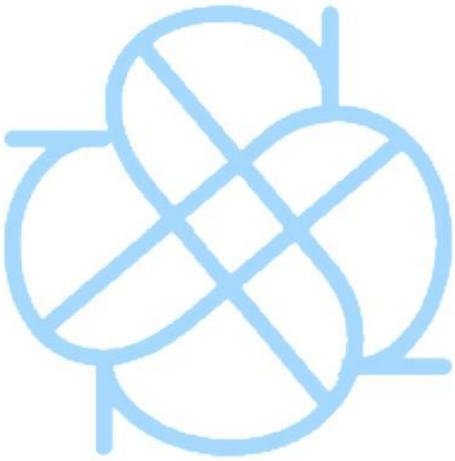
Some wrong answer choices will introduce:

- wordiness/repetition
- illogical coordination
- passive voice
- misplaced modifiers

Vocabulary on the Exam

- While the words in context questions focus on relatively easy words used in a variety of ways, more challenging vocabulary, while perhaps not asked about directly, will still be an important part of the exam. You will navigate the passage much more easily if you are familiar with the vocabulary throughout the exam.
- This will especially be important for getting through the founding documents such as a constitution that test makers have indicated they may utilize for material
- The test will use Tier 2 words from the Common Core Standards on both the Reading and Writing and Language Tests. These are words that may be challenging but are not obscure. They are used in informational, technical , and literary texts

A Detailed List of SAT Vocabulary Words with Definitions and Examples Can Be Found At https://blog.prepscholar.com/sat-vocabulary-words



The SAT Math Sections

Overview

- The math sections are the third and fourth sections on the SAT standardized test. They appear after the reading and writing sections.
- There are 20 questions on the non calculator section (section 3 on the exam) and we are given 25 minutes to solve them. There are 15 multiple choice questions and 5 grid-in questions
- There are 38 questions on the calculator section (section 4 on the exam) and we are given 55 minutes to solve them. There are 30 multiple choice questions and 8 grid in questions

Structure

- 4-6 questions on the exam are answerable using the answers provided
- 4-7 questions on the exam are answerable using the Plug-In Technique
- 20-25 questions on the exam involve word problems
- 0-1 question on the exam can be solved partially
- 5-7 questions on the exam involve systems of equations
- 5-7 questions on the exam involve fractions
- 13 questions on the exam will be Grid-In
- 2-3 questions on the exam involve scatter plot graphs
- 2-3 questions on the exam involve bar graphs
- 0-1 question on the exam involves histograms
- 3-5 questions on the exam involve tables
- 2-4 questions on the exam involve investigating features of graphs
- 0-1 question on the exam involves a graphical representation of a system of equations
- 2-4 questions on the exam involve coordinate geometry
- 3-4 questions on the exam involve inequalities
- 0-1 question on the exam involves absolute value
- 0-1 question on the exam involves direct and inverse variation
- 6-10 questions on the exam involve quadratic and polynomial equations
- 0-2 questions on the exam involve rate problems
- 6-9 questions on the exam involve ratios, percents, and probability
- 2-3 questions on the exam involve unit conversions
- 2-4 questions on the exam involve statistics
- 0-2 questions on the exam involve evaluating data
- 2-3 questions on the exam involve exponents and radicals
- 3-5 questions on the exam involve functions
- 6-10 questions on the exam involve quadratics
- 4-5 questions on the exam involve nonlinear equations
- 0-1 question on the exam involves lines, angles, and polygons
- 1-3 questions on the exam involve triangles
- 0-1 question on the exam involves trigonometry
- 2-3 questions on the exam involve circles
- 1-2 questions on the exam involve 3D figures
- 0-1 question on the exam involves complex numbers
- 4-5 questions on the exam involve geometry

Basic Definitions and Formulas

- These are the properties, definitions, and formulas you need to have memorized

Definitions and Properties

- Adjacent angles on a line add up to 180°
- Vertical angles are congruent (they are of equal measure)
- Bisect means to split into two equal parts (angles or segments)
- Perpendicular lines form 90° angles
- A regular polygon has equal sides and equal angles
- A diagonal is a segment that connects two non-consecutive vertices of a polygon
- The diagonals of a square, rhombus, or kite are perpendicular to each other
- The sum of the measures of the interior angles of a triangle is 180°
- The sum of interior angles of any polygon is 180 (n-2), where n is the number of sides (or angles) of the polygon
- The sum of the exterior angles of any polygon is 360°
- In similar figures, corresponding angles are congruent and corresponding sides are proportional
- In congruent figures, all corresponding parts are equal size
- Equilateral triangles have three congruent sides and three congruent angles (60° each)
- Isosceles triangles have at least two congruent sides and at least two congruent angles
- Scalene triangles have no congruent sides and no congruent angles
- Opposite angles of a parallelogram are congruent and consecutive angles are supplementary
- 1°=($\boldsymbol{\pi}$/180) radians, 180°=$\boldsymbol{\pi}$ radians, 360°=2$\boldsymbol{\pi}$ radians

Formulas

Triangle	$A=\frac{1}{2}bh$
Rectangle	$A=bh$
Parallelogram	$A=lw$
Equilateral Triangle	$A=\frac{s^2\sqrt{3}}{4}$
Square	$A=s^2$ $A=\frac{d^2}{2}$ * d is diagonal length * s is side length
Trapezoid	$A=\frac{b_1+b_2}{2}h$
Circle	$C=2\pi r$ or πd Area Length = $\frac{x}{360}2\pi r$ $A=\pi r^2$ Area of a Sector = $\frac{x}{360}\pi r^2$ * x is the central angle of the sector
Rectangular Prism	$V=lwh$
Cube	$SA = 6s^2$ $V = s^3$
Cone	$V=\frac{1}{3}\pi r^2 h$
Cylinder	$V=\pi r^2 h$
Sphere	$V=\frac{4}{3}\pi r^3$
Pyramid	$V=\frac{1}{3}lwh$

No Calculator Section

- On the SAT, Section 3 will be a non calculator math section. Because you're not allowed to use a calculator in this section, the questions will not require a large math calculations, but rather will tend to focus on fundamental math concepts and theories.
- There are many different topic areas that may be tested in the section some of which are listed below. While this list is fairly comprehensive , it does not include every topic that may appear in the non calculator section
    - Calculating the slope of a line in the xy-coordinate plane
    - Expressing equations in terms of different variables
    - Solving linear equations
    - Solving systems of equations
    - Factoring and solving quadratic equations
    - Manipulating complex numbers
    - Using the equation of a circle
    - Identifying trigonometric equivalencies
    - Describing what variables mean in the context of an equation / situation
- The key to non-calculator problems is to clearly identify what concept is being tested. Think about what formula / rules apply to that concept and verify that your answer makes logical sense given that information

Grid-Ins

- Grid-in problems appear in both section 3 and 4 of the SAT. These problems do not provide any answer choices, but rather require the student to "grid in" a free response. They are generally more straightforward than the multiple choice problems.
- Be familiar with the rules for answering a grid-in question
    - No answers are negative
    - The correct answer will fit in the space provided
- If a question contains the word "possible", there is more than one solution; solve for only one answer
- Think about the concept being tested and what restrictions might exist given that concept. Make sure to guess a value that is within the restricted limit (sin and cos are between 0 and 1, and angle in a triangle is between 0 and 180, the probability that an event occurs is between 0 and 1)
- The correct answer tends to be a whole number rather than a decimal

An Example

If $x^2 - 5x - 14 = 0$ and x > 0, what is the value of x ?

Possible answers include x=7 and x=-2

Actions

- No matter how confusing or difficult a problem may seem, there is always a basic truth : it is asking you to solve for something, it told you something, and the solution requires connecting those two things! If you consistently follow these actions, you will give yourself the best chance to quickly and accurately move through the math sections

1. **Understand**

- Identify and underline important information and terms
- Simplify and rephrase the problem
- Circle what the question is asking you to solve for
- Understand what you are being asked to solve for
- Ask yourself "what formula(s) might apply?"
- Ask yourself "how have I seen this concept tested before?"

2. **Solve**

- Pick an Approach (Answers, Plug-In, Do the Math)
- Write the information from the problem in an organized way by using tables, pictures, or equations
- Look for ways to connect the information given to the information requested and the answer choices, and then solve

3. **Answer**

- Eliminate unreasonable answer choices
- Make sure your solution answers the question
- Mark your test booklet AND your bubble sheet

Using the Answers

- Answer choices are provided for most test questions. Strong test takers use the process of elimination to save time and avoid mistakes

How to Answer These Questions

- When the question asks, "Which of the following … ?" read your answers before solving the problem
- The answers are usually in increasing or decreasing order. If the questions ask for the largest value or smallest value, start with the corresponding answer A or D; otherwise start with answer choice C
- Using the strategy above , you try a maximum of two answers to determine the correct answer response

Case Questions

- A case question presents you with three cases (I, II, and III). You must determine which of the cases are true/false
- On a case question, it is often possible to eliminate more than one answer at a time. If the case is TRUE, then eliminate all answers that DO NOT include that case. If the case is FALSE, then eliminate all answers that DO include the case

How To Answer These Questions

- If applicable, start by testing a case that appears in exactly two answer choices. If it's true, eliminate the other two choices. If it is false, eliminate the two choices in which it appears. This guarantees you will have two choices left to analyze
- Examine the remaining answers and choose another case to test. Sometimes, if you pay close attention to the answer choices, you may not have to test all three cases.

Plug In Technique

- Some problems have more variables than equations. Other problems seem complicated because the problem uses variables instead or values. The plug in technique allows you to choose your own values for one (or more) of the variables in the problem.
- Use the plug in technique when:
    - There are variables in the answer choices (most common scenario)
    - There are more variables than equations
    - There is an undefined quantity that you could assign a value to

How To Answer These Questions

- Let the problem be your guide. Pick numbers that make sense based on what the problem says.
    - Choose numbers that are easy to work with.
    - If a problem asks for the least possible value, make everything else as large as possible.
    - If a problem asks for the greatest possible value, make everything else as small as possible
    - If the problem involves fractions, try plugging in a common denominator
- The number(s) you plug in for the variable(s) in the problem will give you a certain value as your solution. When you plug that same number into the answer choices, just look for the one that gives you that same value.
- Make sure you check every answer choice, because on a rare occasion, more than one answer choice may work given the number you picked. In that case, just try a second set of numbers, and you should be able to eliminate one of the remaining choices

Solving Word Problems

- The test will ask general word problem questions that may be linear, quadratic, polynomial, or exponential. They may involve unit conversion, equation set up, general math knowledge, rates, and proportions, and/or basic logic. You may only have to identify the best equation or you may have to create an equation or system of equations then solve.

How To Answer These Questions

- When word problems are involved:
    - Translate words into operations or equations
    - Make sure you note any unit changes
    - Often, you can plug and check answers
    - Check the reasonableness of your solution to verify it makes sense
    - One you have figured out part of the equation, eliminate obviously wrong answer choices

Systems of Equations

- A system of equations involves using multiple equations to solve for multiple variables. There are two basic methods for solving systems of linear equations: substitution and elimination
- Both strategies involve combing the equations in such a way that one equation with only one variable remains

Substitution Method

5x-2y=7
x=y-1

Replace x in the first equation with y-1 and solve

5 (y-1) - 2y = 7
5y - 5 - 2y = 7
3y - 5 = 7
3y = 12
y = 4

Next, solve for x by plugging 4 in for y in the second equation. You will get x = 3. Thus, the solution is (3,4).

Elimination Method

- To simplify a system of linear equations, add (or subtract) equations to (from) each other. First arrange the equations so like variables line up in the columns

An Example

10x + 4y = 30
6x - 4y = 18
16x = 48
x = 3 , y = 0

- If one of the variables cannot be eliminated by simply adding (or subtracting), multiply one or both equations by a constant (be sure to multiply every term) and then add (or subtract).

An Example

(3a + b = 20) x2 6a + 2b = 40
2a - 2b = 8 2a - 2b = 8
8a = 48
a = 6 , b = 2

Solving Partially

- When you are asked to solve for the value of an expression rather than the value of the individual variables, try to find a direct link between the information given and the information requested. Save time by not solving equation(s) completely.

An Example

If 10c + 15d = 12 , what is the value of 60c + 90d

A. 48
B. 60
C. 72
D. 84

- If you are given a word problem that asks you to solve for one variable in terms of another variable, don't read the entire question. Instead, skip down to the answer choices to see which variable you are solving for and solve for that variable

Fractions

Cross Multiplication

$\frac{a}{b} = \frac{c}{d} \rightarrow ad = cb$

Least Common Denominator

- In order to find the least common denominator, look for the smallest multiple or variable that the denominators have in common

$\frac{ab}{cd} = \frac{ef}{c}$

- Multiply both sides by the least common multiple
  $cd(\frac{ab}{cd}) = cd(\frac{ef}{c}) \rightarrow ab=def$

- When working with algebraic functions, eliminate the fraction by :
  - Cross multiplying
  - Finding the least common multiple for both sides of the equation and multiplying both sides

Scatterplot Graphs

- Some problems will involve analyzing data and answering questions from a scatterplot graph. Many scatterplots will have multiple questions from the same data set
- When looking at a graph or scatter plot, recognize that the vertical axis corresponds to the y value and the horizontal axis corresponds to the x value. A line of best fit is a line that best represents the data on a scatter plot. It is typically given in y=mx+b form, where m is the slope and b is the y intercept

Bar and Line Graphs

- Many students miss graph problems because they simply do not read each axis carefully before answering
- With a bar or line graph, make sure you understand what is represented on each axis and what units are being used. To be as accurate as possible with the specified value, draw one line from the vertical axis and one line for the horizontal axis and mark the point of intersection of the two lines

Histograms

- A histogram is a particular type of bar graph that depicts the frequency of a certain event or trait. Sometimes the bottom axis of the histogram will show ranges of values. In that case, all options within that range of values can represent some or all of the frequency
- Since histograms show frequency, they often lead to questions about statistical measures, Look to define the mean or median of the data set that you are shown depending one which measure you are asked to find

Tables

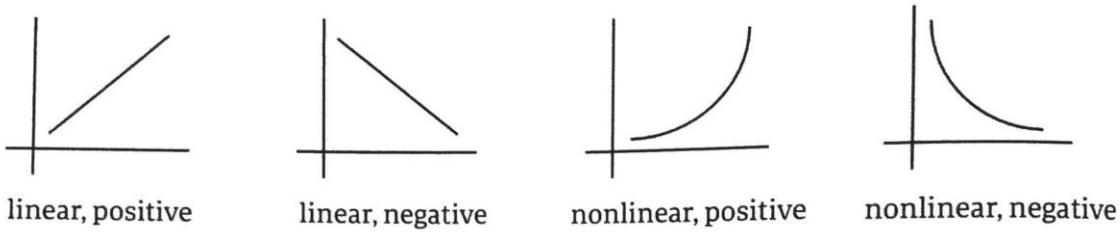
- You will be required to use a two-way table to express probability, summarize data, or estimate population parameters, These questions generally result in a fraction, percent, or decimal. Recognize that while you have the total number of elements in the table, there are also multiple sub-categories. Some question ask about whole group, but some questions focus on one of the smaller groups instead
- When given a table, circle the cells that contain the info requested in the question. Make sure what you circle matches the question asks

Investigating Features of Graphs

- Some problems will ask you to match a graph with the equation that it represents or to choose the best graphic model for a specific situation. These problems can involve either linear or nonlinear equations

How To Answer These Questions

- When asked to choose an equation/graph/situation that best models the information provided:
    - Make a general table of values using the equation
    - Use general knowledge or basic reasoning to choose or eliminate answers
    - Graph the equations in your calculator
    - Plug in known points into the equations (be sure to check more than one point)
- When given a description and asked to choose the best graph, underline the key words used
    - Note key words like : linear, nonlinear, and exponential
    - Positive correlation, increasing, and directly related (or direct variation) all mean that the graph is going up from left to right
    - Negative correlation, decreasing, and inversely related (or inverse variation) all mena that the graph is going down from left to right



Graphical Representation of a System of Equations

- When a system of equations is graphed in the xy-plane, an (x, y) solution to that system is a point where the graphical representations of those equations intersect

How to Answer These Questions

- When asked about the graph of a system of equations:
  - if a graph is not provided, draw one
  - if a graph is provided, visually inspect the graph to obtain the information requested
  - if equations are provided, graph them in your calculator and look at the tables for the information requested

Coordinate Geometry

Distance Formula

- The distance between points $(x_1 y_1)$ and $(x_2 y_2)$ is :

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

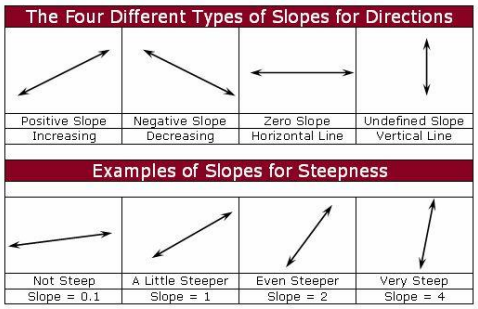
- This is really just an extension of the Pythagorean Theorem $a^2 + b^2 = c^2$

Midpoint

- The point midway between points $(x_1 y_1)$ and $(x_2 y_2)$ is :
  $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ = (average x, average y)

Slope

- There are four ways to approach slope, depending on the problem:
  - Slope is "rise over run."
  - Slope can be found using the slope formula: $\frac{Y_2 - Y_1}{X_2 - X_1} = \frac{\Delta y}{\Delta x}$
  - Slope is m for equations in slope-intercept form: y=mx+b
  - Slope can be found using the formula $m = -\frac{A}{B}$for eautions in the standard form if Ax+By=C



How To Solve These Questions

- To determine slope:
  - Look at the appearance of the line
  - Use the slope formula $\frac{Y_2-Y_1}{X_2-X_1}=\frac{\Delta y}{\Delta x}$
  - The slopes of parallel lines are equal
  - The slopes of perpendicular lines are opposite reciprocals
  - If a system of linear equations mentions either no solution or an infinite number of solutions, then the slopes are equal

Intercepts

- The y intercept of a line is found by plugging in x=0 into the equation and solving for y. The y-intercept is also the value of b in the y=mx+b format
- The x intercept of a line is found by plugging y=0into the equation and solving for x
- If you don't know the equation of the line, but you know the slope and one point that lies on the line, plug in the x & y coordinates from that point to find b using the y=mx+b formula
- When an equation is in standard form, Ax+By=C, the x intercept is $\frac{C}{A}$and the y intercept is $\frac{C}{B}$

Interpreting Equations

- A topic related to coordinate geometry is interpreting equations within context. This type of question would describe a situation or context, provide an equation, and then ask what some element of the equation means in the context of the problem. The equations given the problems are frequently linear equations and will often test the concepts of slopes and intercepts.

How to Answer These Questions

- When questions ask what a certain number or variable represents:
  - Write your own equation without looking at the one given and see which part of your equation matches the number or variable you are being asked to find
  - In a linear equation, the number by itself represents a constant restarting amount, the coefficient in front of the variable is a rate of change, and the variable that the equation is set equal is an output or the total amount

Inequalities

- When solving inequalities, use the same types of steps as when solving quotations
- When graphing an inequality on a number line, not the difference between a solid dot and an open dot :
    - A closed circle means ≤or ≥
    - An open circle means < or >
- When graphing an inequality on a coordinate grid:
    - A solid line means ≤or ≥
    - A dashed line means < or >
    - Replace the inequality sign with an equal sign and solace the equation enough to graph the line. If it's y ≤or < , then shade below the line ; if it's ≥ or > , then shade above the line
- When working with inequalities:
    - Switch the direction of the inequality symbol(s) if you multiply or divide by a negative number
    - When dealing with a compound inequality (an inequality with 2 inequality symbols), make sure you perform the operation on all three parts or separate it into two problems

An Example

If $-3 < -2x + 5 \leq 2$, how many integer solutions exist for x ?

A. 0
B. 1
C. 2
D. 3

Absolute Value

- The absolute value of a function is denoted by two vertical lines surrounding a number or an expression. The absolute value of a number is its distance from zero on the number line

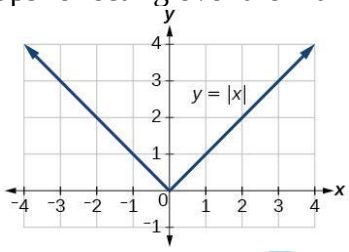
$$|-3| = |3| = 3$$

- If there is an expression inside the absolute value bars, then the question is asking for values that make the expression a certain distance away from zero
- While the absolute value of a number is never negative, there can be negative solutions to absolute value equations

If the math shows	then it is asking...
$\|x\| = 6$	Which numbers are 6 units from 0 ?
$\|x - 2\| = 6$	Which numbers are 6 units from 2 ?
$\|x + 2\| = 6$	Which numbers are 6 units from -2 ?
$\|x - b\| = a$	Which numbers are a units from b ?

Graphing Absolute Value Functions In Two Variables

- Remember that the graph of $y=|x|$ is the shape of the letter V. If you are asked to graph the absolute value functions, think about translations, moving right,left, up , or down, and perhaps reflecting over the x-axis



Graphing Absolute Value Functions With One Variable

- Sometimes you will be asked to graph an absolute value inequality such as $|2x - 3| > 4$. You will want to do this as you were taught in algebra, but after looking to eliminate any incorrect answers, break the problem into two cases and simplify

  2x-3 > 4 or 2x-3 < 4 2x > 7 or 2x < 7 x > $\frac{7}{2}$ or x < $-\frac{1}{2}$

- If a similar problem has a leading coefficient of 1, the problem can be done by finding the midpoint and variance
- When working with ranges of numbers in the inequality $|x - b| < a$, b refers to the midpoint of the range and a refers to the distance from the midpoint

$$|x - midpoint| < variance$$

Direct/Inverse Variation

Direct Variation

- Direct variation is indicated by the phrases:
  - x varies directly as y
  - x and y change proportionally
  - x and y are in proportion
- In other words, x and y increase or decrease together and y=kx for some positive constant k
- On a direct variation problem, set up a proportion:
  - Ratio = Ratio or $\frac{x_1}{y_1} = \frac{x_2}{y_2}$

Inverse Variation

- Inverse variation is indicated by the phrases:
  - x varies inversely as y
  - x and y are in inverse proportion
  - x and y vary inversely
- In other words, if x increases then y decreases, and if x decreases then y increases, and $y=\frac{k}{x}$ for some positive constant k
- On an inverse variation problem, set up an equation that compares two products to each other:
  - Product = Product or $X_1Y_1 = X_2Y_2$

Quadratics and Polynomials

- When an expression or equation has non-negative integer exponents, then it's a polynomial. If the largest power of the variable is 2, then it is a quadratic
- Remember that the terms **x intercept, zero, root,** and **solution** all refer to the same thing: the x value where the graph crosses the x axis. This is true not only for quadratic but also for polynomials

Factoring

Easy Factoring

Find the roots (solutions or x intercepts) of the equation $3x^2 + 12x - 36 = 0$

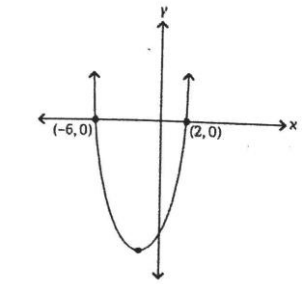
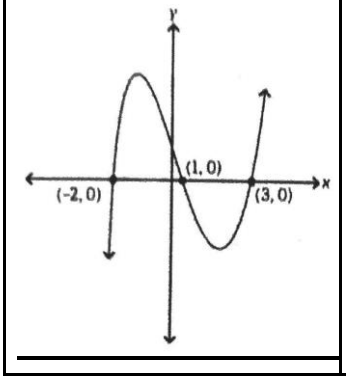
Step 1	Divide by 3	$x^2 + 4x - 12 = 0$
Step 2	Factor	(x + 6)(x - 2) = 0
Step 3	Set factors equal to zero	x + 6=0 or x - 2 = 0
Step 4	Solve	x = -6 or x = 2

More Complex Factoring

If $x^3 - 4x^2 + 3x - 12 = 0$

Step 1	Factor constants and/or variables to produce a common factor	$x^2(x - 4) + 3(x - 4) = 0$
Step 2	Re-factor	$(x^2 + 3)(x - 4) = 0$
Step 3	Set factors equal to zero	$x^2 + 3 = 0$ or x - 4 = 0
Step 4	Solve	x^2 = -3 or x = 4 *since x = $\sqrt{-3}$ is not real, then x = 4 is the real solution*

Graphing

	**Quadratics** If you are given the equation x^2+ 4x - 12 = 0, you can replace 0 with *y* and graph y =x^2+ 4x - 12 . Remember the graph of a quadratic equation is symmetric about its axis
	**Polynomials** On polynomial questions, you usually won't have to determine the zeros or solutions, but you will have to sometimes identify those solutions or use them to determine the correct graph. For example, if you are given the graph shown that has zeros at -2,1 and 3 on the x-axis, then the equation representing this graph is y = (x + 2)(x - 1)(x - 3)

Perfect Square Binomials and Difference of Squares

$$(a+b)^2 = (a+b)(a+b) = a^2 + 2ab + b^2$$
$$(a-b)^2 = (a-b)(a-b) = a^2 - 2ab + b^2$$
$$(a+b)(a-b) = a^2 - b^2$$

- You may need to apply the FOIL method technique to expand factors
- In a quadratic equation that is in standard form $Ax^2 + Bx + C = 0$, the sum of the roots is $-\frac{B}{A}$and the product of the roots is $\frac{C}{A}$
- If you see $(x+y)^2 or\ (x-y)^2$, expand it
- When you see the difference of squares $x^2 - y^2$in a problem, factor it
- When given a polynomial that seems difficult, use the information provided to find a convenient point to plug in to the equation, then solve

Rate Problems

- Distance, rate, time problems on the test can be made easier by creating a table. With the help of the table you can create an equation with one variable and quickly solve for *D*, *R*, or *T*.
- You must make sure that the time units mentioned for both rate and time are the same.

Remember the formula D = R * T

- This idea also applies to work problems

  Work = rate * time

- Although average rate problems aren't on the test very often, if you are asked to find an average rate you must use the formula :

  Average Rate = $\frac{Total\ Distance}{Total\ Time}$

- Some rate problems in the test involve going to a place and back. In these cases , the two distances will be equal
  - When two parties work together at their respective rates to complete a job the formula is:

    $\frac{1}{A}+\frac{1}{B}=\frac{1}{T}$, where A and B are two individual times and T is the time they work together

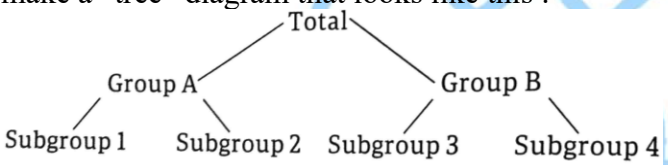
- On DRT problems:
  - If you're given two trips of the same distance, set up a system of equations
  - Make sure you account for different units
  - If the problem asks for average rate, DO NOT average the two individual rates together

Ratios, Percents, and Probability

- A ratio is a comparison between two numbers that can be expressed as a fraction, colon, or with the word "to"
- The value of a ratio remains the same when all numbers are multiplied (or divided) by the same amount. In other words, ratios work like fractions. Unlike fractions, however, ratios consist of more than 2 numbers
- To find probability you set up a fraction with $\frac{\#\ of\ desired\ outcomes}{\#\ of\ possible\ outcomes}$
- To find compound probability (the likeliness of two independent events occurring), you multiply the probability of the first event times the probability of the second event. Probability answers can be expressed as percents, decimals, or fractions and are often based on the information in a table
- If a problem involves only 2 units , set up a proportion
- If the problem involves ratios with more than 2 components, then you can
  - Set up an algebraic equation
  - Use a RMA table

	1st Item	2nd Item	...	Total
Ratio				
Multiplier				
Actual				

- If a percent problem does not refer to any actual values, try plugging in 100
- In problems involving multiple percent changes because your value will not change from step to step
- Percent change often involves a formula
  Percent Change = $\frac{difference}{original}$* 100
- If you are increasing a value by a given percent, you can multiply by 1 plus the percent (for an increase of 25% multiply by 1.25)
- If you are decreasing a value by a given percent, you can multiply by 1 minus the percent (for a decrease of 10% multiply by 0.9)
- If a problem involves multiple ratios, you may plug in your own values. For the total, use a number that's a common multiple of the TOTALS of each ratio. It's often helpful to make a "tree" diagram that looks like this :



- This strategy also works when the problem is given in terms of percentages. Just use 100 or 1000 as your total and work the problem in decimals instead of fractions

Unit Conversion

- You will be tested on your ability to convert various kinds of units. In some problems they will give parts of the information in one unit and other parts in different units and you must recognize that you need to incorporate unit conversion in your solution. In other problems the only objective will be to perform unit conversions
- When performing unit conversions , set up fractions that are equivalent to 1 (for example 1 foot/ 12 inches).
- Intentionally set up fractions in a manner that the units will drive out when the fractions are multiplied. It is often helpful to construct the first fraction with the quantity you are being asked to find on top. Keep multiplying until the units left are what you want

Statistics

- When the problem provides information about the average but does not provide actual values, try one of the following:
  - Find the sum of the numbers by reworking the average formula
    (sum of elements = average * number of elements)

Average

- The average set of numbers is calculated by adding the elements and dividing this sum by the number of elements in the set

Median

- The median is the **middle** value of an ordered list. If there is an even number of elements, the median is the average of the **two** middle values

Mode

- The mode is the **most frequently occurring** number in a set of numbers. If no number appears more than once, there is no mode. If there is a tie, there may be more than one mode

Range

- The range of a set of data is the difference between the largest and smallest values

Sample Size

- The sample size is the number of observations made, units to be studied, people who were surveyed, etc.

Parameter

- A parameter is a characteristic, feature, or measurable factor that helps define a system (for example, the "number of people who voted for Bob" is a population parameter)

Correlation / Association

- A correlation or association is a relationship or connection between two or more things. It does **not** imply cause and effect

Positive Correlation

- A positive correlation occurs when two variables act in tandem (when one increases, the other also increases **or** when one decreases, the other also decreases)

Negative Correlation

- A negative correlation means when one variable increases, the other decreases and vice versa

Margin of Error

- The median is the **middle** value of an ordered list.
- If there is an even number of elements, the median is the average of the **two** middle values

Standard Deviation

- Standard deviation is a measure that expresses the amount of variation in data.
- A standard deviation of 0 means that all values are equal to the mean; a higher standard deviation means that the data is more spread out (farther from the mean).

Box Plot

- A box plot is a graph that shows 5 measures : the minimum, the lower quartile (the median of the lower half of the data set), the median, the upper quartile (the median of the upper half of the data set), and the maximum

Evaluating Data

- Some questions will ask you to evaluate data in order to summarize information, draw conclusions and assess collection methods
- When asked to predict and population parameter , set up a proportion and make sure you are comparing similar items

Exponents and Radicals

Laws	**Generalization**
Product of Powers	$a^x * a^y = a^{x+y}$
Quotient of Powers	$a^x / a^y = a^{x-y}$
Power of Powers	$(a^x)^y = a^{xy}$
Power of Product or Quotient	$(ab)^x = a^x b^x$
Zero Exponent Definition	$a^0 = 1$
Negative Exponent	$a^{-b} = \frac{1}{a^b}$
Fractional Exponent	$a^{b/c} = \sqrt[c]{a^b}$

- The final row shows how exponents and radicals are related. Occasionally you might be asked to simplify or manipulate a radical expression. Remember that the root you are taking determines how many times a number must appear under the radical before it can be extracted

$$\sqrt{18} = 18^{1/2} = \sqrt{2 * 9} = \sqrt{2 * 3 * 3} = 3\sqrt{2}$$

- Raising a number to the power of ½ is the same as taking the square root.
- A common mistake is multiplying exponents when they should be added
  $2^3 * 2^2 = 2 * 2 * 2 * 2 * 2 = 2^5$ **BUT** $(2^3)^2 = (2 * 2 * 2)(2 * 2 * 2) = 2^6$
- When the bases of exponential terms are different, make them the same. Then the exponents can be directly added to each other, subtracted from each other, or set equal to each other
- Rewrite radical expressions by breaking down the radicand and taking out any perfect squares

$$\sqrt{x} \rightarrow radicand \rightarrow \#\, inside\ radicand$$

- Whenever a square root symbol is present in the problem it implies that the root can only be a positive value

- When given an equation with a radical, follow these four steps:
    - Isolate the radical on one side
    - Square both sides, making sure you square EVERYTHING
    - Continue to solve normally
    - Check all solutions in the original equation because squaring can create extraneous solutions
    - Plugging in the answer choices is often a viable option

Functions

- A function relates an input with an output (an x with a y)
- The input = the number or variable inside the parentheses
- The output = the value of the function f(x) = y
- The input and output of a function can be represented in coordinate pairs. Therefore, f(x) = 8 and g(5) = 7 can be represented as (x,8) and (5,7)
- To find the value of an input or output if a function from a table, start with one of the values and find the corresponding input or output
- The terms roots, solutions, and zeros often refer to the x intercepts of a function, which are the points at which the function crosses the x axis
- To evaluate a function, substitute in known values:
    - If f(x) = $3x^2 + 1$, then f(2) = 3(2^2) + 1 = 13
    - If g(r) = 5r - 5 and g(r) = 35, then 5r - 5 = 35, meaning r = 8

Algebraic Transformations

- Visually check the movements of functions. For c > 0 :
    - g(x) = f(x+c) means *f* is shifted c units to the left
    - g(x) = f(x+c) means *f* is shifted c units to the right
    - g(x) = -f(x) means to reflect (flip) the graph over the x axis
    - g(x) = f(x)+c means means *f* is shifted c units upwards
    - g(x) = f(x)-c means means *f* is shifted c units downwards
- You perform the transformation in this order:
    - Left/right shift
    - Reflections
    - Up/down shift
- A transformation follows the rules of PEMDAS: do inside the parentheses first, then multiply (reflection), then add or subtract

Quadratics

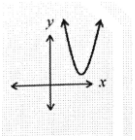
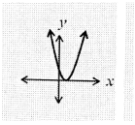
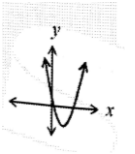
- Remember that if $a^2 + bx + c = 0$, then the sum of the roots is $-\frac{b}{a}$ and their products is $\frac{c}{a}$
- Any equation of the form shown above can be solved using the **quadratic formula:**
  - $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$
- The **x-coordinate of the vertex** and the **axis of symmetry** of a parabola (the figure obtained by graphing a quadratic equation) can be found using the following : $x = \frac{-b}{2a}$
- The **vertex form** of a parabola is : $y = a(x-h)^2 + k$, where a is a constant and (h,k) is the vertex. If a is negative, it opens downwards. If a is positive, it opens upward
- When solving a problem involving a quadratic equation, look at the answer choices. If they are rational, try to factor the equation. If they are not rational, use the quadratic formula or graph it on your calculator and look for solutions in the table or on the graph itself

Discriminant

- The discriminant is the value under the radical in the quadratic formula

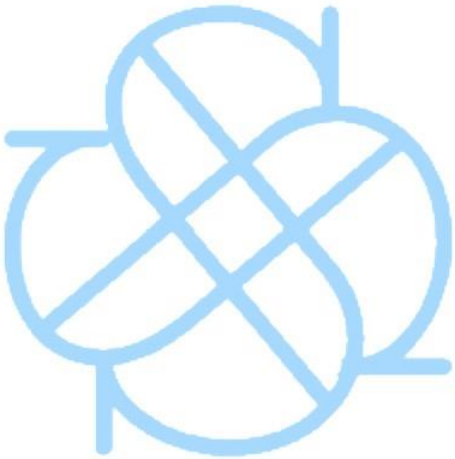
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

- Check the relationships between the discriminant and 0 to determine the number of real solutions and x intercepts

Discriminant	# Real Solutions	# X-Intercepts	Example Graph
$b^2 - 4ac < 0$	0	0	
$b^2 - 4ac = 0$	1	1	
$b^2 - 4ac > 0$	2	2	

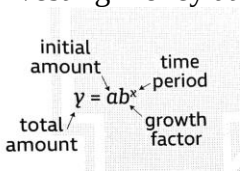
Long Division

- If you encounter a long division problem involving variables and you are comfortable doing so, solve it algebraically. Otherwise, use the plug in technique.
- If the question asks which of the following expressions is equivalent to $\frac{4x^2+5x+4}{4x+1}$, do long division and get $x + 1 + \frac{3}{4x+1}$, or you could just plug in x = 2 to see that both equations equal $3\frac{1}{3}$



Non-Linear Equations

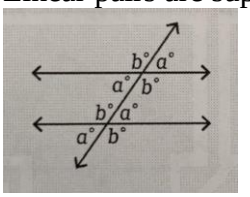
- When considering nonlinear equations, you will be required to interpret graphs, solve systems, and choose the best representation. Nonlinear equations can be identified by having exponents that are not equal to 1 or exponents on more than 1 variable
- The test may ask you to interpret an exponential equation. Keep in mind the basic ideas for exponential equations. For example, you might be given the equation $y = ab^x$ for investing money at a certain interest rate



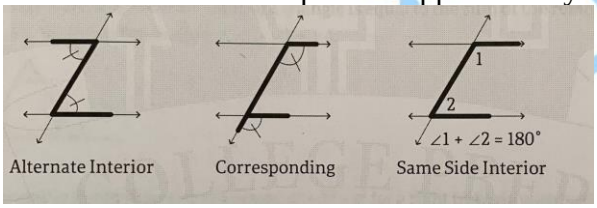
- When presented with a nonlinear equation, consider:
  - Choosing numbers to plug in and creating a table of values
  - Graphing it on a calculator
  - Substituting if it's in a system of equations

Lines, Angles, and Polygons

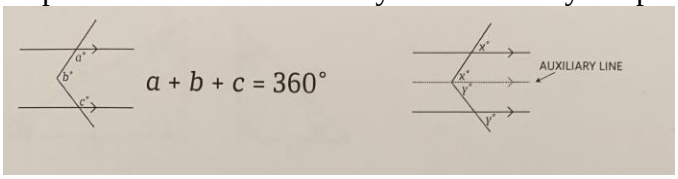
- If two parallel lines are cut by a transversal, then four of the eight angles formed are congruent to each other and the other four are also congruent to each other.
- Linear pairs are supplementary, so a+b = 180°



- Use the Z or F technique to find congruent angles on multiple transversals and parallel lines. Use the C technique for supplementary angles

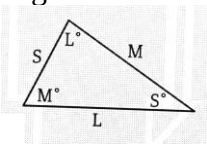


- On incomplete transversals, the three interior angles have a sum of 360 °. Sometimes it is helpful to draw in an auxiliary line to modify the picture before solving the problem

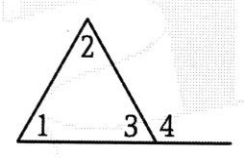


Triangles

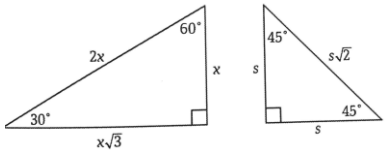
- On the exam you will only be provided with the 30-60-90 and 45-45-90 triangles as reference information
- Remember that in a scalene triangle the longest side is opposite the largest angle, the middle side is opposite the middle angle and the shortest side is opposite the smallest angle. Mark the triangle with S, M, L on the sides and angles to show their comparison



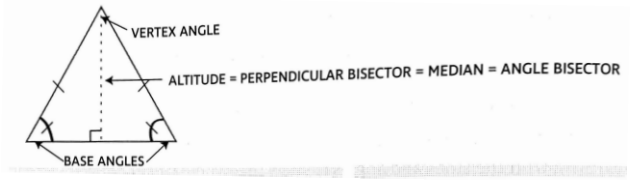
- If any triangle, any side must be shorter than the sum of the other two sides and longer than their distance
- The measure of an exterior angle is equal to the sum of the remote interior angles. So, in the figure shown, **angle 1 + angle 2 = angle 4**



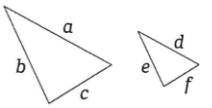
- Remember the Pythagorean Theorem : $a^2 + b^2 = c^2$ for a right triangle with a hypotenuse c
- The rules for special right triangles, such as 30-60-90 and 45-45-90, are extensions of the Pythagorean Theorem



- The altitude from the vertex angle to the base of an isosceles or equilateral triangle is the perpendicular bisector of the base, the median of the triangle and the angle bisector of the vertex angle. It divides the triangle into two congruent right triangles. The altitude of an equilateral triangle divides the triangle into two 30-60-90 triangles



- Look for angles on lines and angles in triangle that add up to 180∘(or quadrilaterals that add up to 360∘)
- If the problem or answer contains $\sqrt{2}, \sqrt{3}, 30^\circ, 60^\circ, 45^\circ$,a square or an equilateral triangle , then look for a special right triangle
- On triangle congruency problems:
  - Mark the congruent sides and angles
  - Remember the triangle congruency theorems (SSS, SAS, AAS, ASA, HL)
- When presented with a problem that involves triangle similarity:
  - Mark the congruent angles
  - Make sure the side length proportions are matched up correctly
  - Redraw the diagrams so the sides are oriented correctly

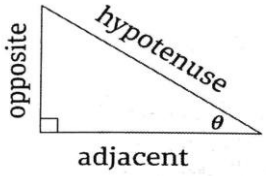


$\frac{a}{b}=\frac{d}{e}$ or $\frac{a}{d}=\frac{b}{e}$ or $\frac{a}{c}=\frac{d}{f}$ or $\frac{f}{c}=\frac{d}{a}$

Trigonometry: Geometry Level

- You'll be tested on knowledge of the three basic trigonometric functions: sine, cosine, and tangent. These functions related side lengths and angles in right triangles

  Remember the basic trig equations: SOH CAH TOA



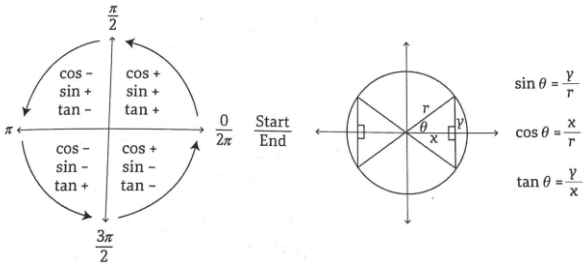
sin θ	$\frac{opposite}{\boldsymbol{h}ypotenouse}$
cos θ	$\frac{adjacent}{\boldsymbol{h}ypotenouse}$
tan θ	$\frac{opposite}{adjacent}$

Helpful tip: sin(x) is equivalent to cos(90-x)

- When analyzing the right triangle in a trig problem:
  - If only two of its three side lengths are shown, be sure to check if it is a Pythagorean triple
    - Commonly appearing Pythagorean triples include 3-4-5, 5-12-13, 7-24-25, 8-15-17, and 9-40-41
  - Use the Pythagorean Theorem to calculate the missing third if not a triple
  - Draw a picture if one isn't provided

Trigonometry: Pre-Cal Level

- Unlike in geometry , where angles are measured in degrees, in trig, angles are often measured in radians and are positioned on the xy-coordinate plane
- The triangle that is drawn is known as a reference triangle and must be positioned in only one of the four quadrants as shown below. One leg is on the x-axis and $\theta$is at the vertex of the triangle at (0,0)



- πradians = 180∘
- tan $\theta = \frac{sin\ \theta}{cos\ \theta}$
- Complementary angles in radian measure must add up to $\frac{\pi}{2}$
- sin x∘= cos (90 - x)∘
- sin θ= cos ($\frac{\pi}{2}$-θ)

- If given a trig problem with no drawing, no obvious solution, negative numbers, or a range of value like

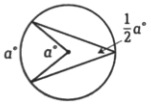
$$\frac{\pi}{2} < \theta < \pi$$

  - Draw an xy-coordinate plane
  - Draw a right triangle in the proper quadrant
  - Do the Pythagorean Theorem if possible
  - Use the ideas of reflection and/or trig rules to solve

Circles

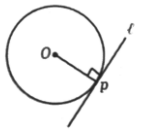
Definitions

- An **arc** is a fraction of the circumference of the circle
- **Measure** of a circle means degrees
- A **semicircle** is half of a circle
- A **central angle** is an angle with its vertex at the center of the circle and has a measure equal to the measure of its intercepted arc
- An **inscribed angle** is an angle with its vertex on the on the circle and has a measure equal to half the measure of its intercepted arc

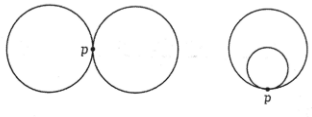


- Any **sector** (pie-piece) of a circle is a fraction of the circle's area

- A line **tangent** to a circle intersects the circle at exactly one point; the radius to this point of tangency is perpendicular to the tangent line



- Circles may also be tangent to each other



Equation of Circle

- The equation of a circle has two forms:
  - **Standard Form** :$(x-h)^2+(y-k)^2=r^2$, where the center is located at (h,k) and the radius of the circle is r
  - **General Form** : $x^2+y^2+Dx+Ey=F$, where neither the center nor radius is obvious
- When the equation is provided in general form it will be necessary to convert it into standard form by completing the square as modeled below:

Given	$x^2+y^2-10x+4y=7$
Change the order of terms	$x^2-10x+y^2+4y=7$
Take half of the coefficient of the linear term(s), square it and add it to both sides of the equation	$x^2-10x+25+y^2+4y+4 = 7+25+4$
Factor the newly formed quadratic(s)	$(x-5)^2+(y+2)^2=36$

Now you can see the circle has a **center at (5, -2)** and a **radius of 6**

- On problems that involve circles, consider the relationships in a circle:
    - When a wheel rolls one full revolution (360∘), it moves a distance equal to its circumference
    - To solve arc length or sector area problem, set up a proportion

$$\frac{\text{sector area}}{\text{circle area } (\pi r^2)} = \frac{\text{arc length}}{\text{circumference } (2\pi r)} = \frac{\text{central angle}}{360^\circ} = \frac{\text{part}}{\text{whole}}$$

3-D Figures

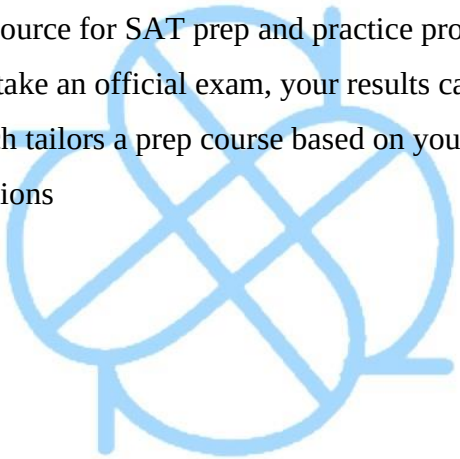
- Three dimensional figure problems will involve surface area or volume concepts. Use the appropriate formula and plug in the given information to find the solution.
- When working with density of an object, density = $\frac{mass}{volume}$

Complex Numbers

- The imaginary number *i* is a value used to represent $\sqrt{-1}$, so $i^2 = -1$. Also $i^3 = -i$, and $i^4 = 1$
- A complex number is complex because it has both a real term (a) and an imaginary number term (bi)
- The terms ($a+bi$) and ($a-bi$) are called conjugates. When you multiply conjugates, you get a real number
- To simplify $\frac{c+di}{a+bi}$, multiply by $\frac{a-bi}{a-bi}$
- Treat the *i* like a variable when adding or subtracting complex numbers
- Use the FOIL method when multiplying complex number
- If you get an i^2term, plug -1 in for it
- Simplify further if possible

Tips For the Exam

- Try to learn/ get familiar with the definitions of at least 24 SAT Vocabulary words each month, doing so will tremendously help you when taking the Verbal portion of the exam (Reading and Writing sections). There is a list at end of the Writing section of this study guide, but additional words can be found online or in any SAT Prep course book
- Aim to take at least one full length practice exam every month. Not only will this familiarize you with the format and length of the exam as a whole, it will also allow you to track your progress and determine areas of weakness to focus on prior to your next exam. Full length practice exams can be found for free on College Boards website
- Attempt at least one practice problem (can be from any section) daily, not only will these keep your skills sharp, but it will also allow you to try questions of easy,medium, and harder intensities. A great app to do daily practice on is the Daily Practice SAT app
- Another amazing free source for SAT prep and practice problems is Khan Academy. Additionally once you take an official exam, your results can be linked to your Khan Academy account which tailors a prep course based on your individual weak areas throughout all four sections
- Lastly good luck !!!



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