

Example: The student spoke with *deference* to his master when discussing the proper application of a mixed martial arts technique.

Word: *degrade*

Part of Speech: verb

Definition: to treat or regard (someone) with contempt or disrespect

Example: The harsh note taped to the bulletin board in the employee breakroom was clearly meant to *degrade* those who were not clocking back in from breaks on time.

Word: *denounce*

Part of Speech: verb

Definition: to publicly declare to be wrong or evil

Example: The principal was expected to *denounce* graphic T-shirts as unacceptable school attire, but she surprised everyone when she stated that she considered them to be an important part of self-expression.

Word: *dispute*

Part of Speech: noun

Definition: a disagreement, argument, or debate

Example: A handshake, or verbal, agreement between employer and employee can lead to a *dispute* when one party does not follow through and there is no written documentation to resolve the matter.

Word: *divergent*

Part of Speech: adjective

Definition: tending to be different or develop in different directions

Example: Due to the unclear instructions, students took *divergent* paths in their papers, with some arguing multiple perspectives and some switching topics altogether.

Word: *dormant*

Part of Speech: adjective

Definition: having normal physical functions suspended or slowed down for a period of time; in or as if in a deep sleep

Example: Though the volcano once erupted randomly and violently for decades, it now lies *dormant* and is a popular tourist attraction.

Word: *eloquent*

Part of Speech: adjective

Definition: fluent or persuasive in speaking or writing

Example: Shakespeare's sonnets are considered some of the most *eloquent* poems in British literature.

Word: *evoke*

Part of Speech: verb

Definition: to bring or recall to the conscious mind

Example: A country's national anthem is meant to *evoke* feelings of pride in its citizens.

Word: *exert*

Part of Speech: verb

Definition: to make a physical or mental effort

Example: Math Olympiad competitors *exert* a tremendous amount of mental energy solving calculations while under a time limit.

Word: *explicit*

Part of Speech: adjective

Definition: stated clearly and in detail, leaving no room for confusion or doubt

Example: The teacher's classroom rules were *explicit*; they were written on a poster right above her desk.

Word: *imminent*

Part of Speech: adjective

Definition: about to happen

Example: The decreasing temperatures and darkening skies mean that a rainstorm is *imminent*.

Word: *impede*

Part of Speech: verb

Definition: to delay or prevent (someone or something) by obstructing; to hinder

Example: The city council attempted to *impede* the fast-food restaurant's efforts to install a drive-thru window.

Word: *implicit*

Part of Speech: adjective

Definition: implied but not plainly expressed

Example: The group had seen Sara's terrified reactions to horror movies and had an *implicit* understanding not to choose that genre for movie night.

Word: *impose*

Part of Speech: verb

Definition: to take advantage of someone by demanding attention or commitment

Example: The mayor has decided to *impose* a curfew upon residents of his town.

Word: *indifference*

Part of Speech: noun

Definition: lack of interest, concern, or sympathy

Example: Sam responded to the discussion of a road trip with *indifference*, as he would have been equally happy staying home.

Word: *inevitable*

Part of Speech: adjective

Definition: certain to happen; unavoidable

Example: Once the school mandated a dress code, it was *inevitable* that the students would test the limits of what they could get away with.

Word: *invoke*

Part of Speech: verb

Definition: to cite or appeal to (someone or something) as an authority for an action or in support of an argument

Example: The police captain's son would often *invoke* his father's name to get himself out of trouble.

Word: *ironic*

Part of Speech: adjective

Definition: happening in the opposite way from what is expected and typically causing amusement because of this

Example: It is *ironic* that the tech support company's website was listed as down for maintenance.

Word: *novel*

Part of Speech: adjective

Definition: new or unusual in an interesting way

Example: *Novel* ideas, such as Galileo's model for the Earth revolving around the Sun, usually take time to be accepted by those comfortable with traditional views.

Word: *obscure*

Part of Speech: adjective

Definition: not discovered or known about; uncertain

Example: John's pop culture references were so remarkably *obscure* that his friends could go for hours without knowing a single actor or movie he mentioned.

Word: *obsolete*

Part of Speech: adjective

Definition: no longer produced or used; out of date

Example: Zara was dismayed to learn her phone was considered *obsolete* just one year after she purchased it.

Word: *oppressive*

Part of Speech: adjective

Definition: unjustly inflicting hardship and constraint; weighing heavily on the mind or spirits

Example: The heat of the jungle was so *oppressive* that the expedition team took breaks twice as often as planned.

Word: *pervasive*

Part of Speech: adjective

Definition: spreading widely throughout an area or a group of people, especially in an unpleasant way

Example: The aging boat had holes in its hull and a *pervasive* smell of rotting wood.

Word: *prevalence*

Part of Speech: noun

Definition: the fact or condition of being prevalent; commonness

Example: The *prevalence* of transfer students on college football teams has made roster adjustments a year-round endeavor.

Word: *prominent*

Part of Speech: adjective

Definition: important; famous

Example: One of the most *prominent* American presidents, George Washington, is often noted as having set numerous presidential precedents.

Word: *provoke*

Part of Speech: verb

Definition: to stimulate or give rise to a reaction or emotion, typically a strong or unwelcome one in someone

Example: I knew I couldn't let Anthony *provoke* me into an argument again, as he often did.

Word: *reciprocate*

Part of Speech: verb

Definition: to respond to (a gesture or action) by making a corresponding one

Example: Jennifer was so touched by the Christmas gift she received from Isabelle that she made plans to *reciprocate* as soon as she could get to the mall.

Word: *reconcile*

Part of Speech: verb

Definition: to restore friendly relations between

Example: William texted Caleb an apology as a means to *reconcile* following their recent disagreement.

Word: *refute*

Part of Speech: verb

Definition: to prove (a statement or theory) to be wrong or false; disprove

Example: Scientists often publish papers meant to *refute* theories that they have disproven through experimentation.

Word: *renounce*

Part of Speech: verb

Definition: to formally declare one's abandonment of (a claim, right, or possession)

Example: In a shocking move, the king has decided to *renounce* his right to the throne, sending the country into a panic.

Word: *repression*

Part of Speech: noun

Definition: the restraint, prevention, or inhibition of a feeling, quality, etc.

Example: When citizens of a nation endure long periods of political *repression*, it can lead to verbal or physical altercations throughout that country.

Word: *retain*

Part of Speech: verb

Definition: to continue to have (something); keep possession of

Example: In an effort to *retain* her position as class president, Cynthia put up flyers asking for students' votes in the upcoming election.

Word: *skeptical*

Part of Speech: adjective

Definition: not easily convinced; having doubts or reservations

Example: Bryce was *skeptical* of his order's estimated arrival date: past orders from the same company had taken a week longer than advertised.

Word: *speculate*

Part of Speech: verb

Definition: to form a theory or conjecture about a subject without firm evidence

Example: The lawyer refused to *speculate* on the outcome of the trial, but she was hopeful that her client would be found innocent.

Word: *substantiate*

Part of Speech: verb

Definition: to provide evidence to support or prove the truth of

Example: The researcher ran a series of experiments hoping to *substantiate* her theory of engine mechanics before presenting it to her supervisor for review.

Word: *subtle*

Part of Speech: adjective

Definition: so delicate or precise as to be difficult to analyze or describe

Example: A slight cough from a friend can be a *subtle* indication that the friend wishes to depart from a social situation in which they feel uncomfortable.

Word: *supplement*

Part of Speech: noun

Definition: something that completes or enhances something else when added to it

Example: Milk is often considered the perfect *supplement* to cereal, though other liquids have become popular choices in recent years.

Word: *tenuous*

Part of Speech: adjective

Definition: very weak or slight

Example: With just seconds to go in the game, the team clung to a *tenuous* one-point lead.

Word: *undermine*

Part of Speech: verb

Definition: to lessen the effectiveness, power, or ability of

Example: Michael practically ran on his way to school, worried that a mark of tardy would *undermine* his perfect attendance record.

Word: *underscore*

Part of Speech: verb

Definition: to emphasize or draw attention to

Example: Margaux came to her presentation with a series of handouts for her colleagues, hoping this would *underscore* the amount of work she had put into her project.

Word: *unobtrusive*

Part of Speech: adjective

Definition: not conspicuous or attracting attention

Example: Garbage cans at Disney World are painted to be as *unobtrusive* as possible, often blending into their surroundings.

Word: *validate*

Part of Speech: verb

Definition: to check or prove the validity or accuracy of (something)

Example: The clerk refused to *validate* my license, noting that it expired one month ago.

Word: *verisimilitude*

Part of Speech: noun

Definition: the appearance of being true or real

Example: Despite being a work of fiction, the movie possessed such authentic characters and believable dialogue that critics praised it for its *verisimilitude*.

Word: *viable*

Part of Speech: adjective

Definition: capable of working successfully; feasible

Example: The hiring supervisor was pleased to find that so many *viable* candidates had applied for the position.

DOWN TO TWO (OR MORE): MASTERING POE

Sometimes, even when you find an amazing piece of evidence to highlight, you'll still have two (or more) appealing answers that have survived the initial POE process. Other times, the passage is difficult enough that you aren't able to pin down that one piece of evidence or aren't able to make an annotation. In these cases, all hope is not lost. Remember that every question has three wrong answers and that most, though not all, of these answers are traps. Understanding trap answers and *actively* looking for traps can earn you points at these critical moments!

As a reminder, here's the Process of Elimination criteria you saw in Chapter 6:

- **Opposite:** These answer choices have a single word or phrase that make the answer convey a tone, viewpoint, or meaning not intended by

the author. This can include a word such as “not” in the answer or a negative vocabulary word when the tone of the passage was positive.

- **Extreme Language:** These answers look just about perfect except for a word or phrase that goes too far beyond what the passage can support.
- **Recycled Language:** These answer choices repeat exact words and phrases from the passage but put the words together to say something that the passage didn’t actually say. They often establish relationships between the words and phrases that do not exist in the passage.
- **Right Answer, Wrong Question:** These answer choices are true based on the passage, but they don’t answer the question asked. They can also state *what* the author said when the question was asking *why* the author said it.
- **Beyond the Text:** These answers might initially look good because they make sense or seem logical based on outside reasoning, but they lack support within the passage itself.
- **Half-Right:** These answers address part but not all of the question task. They can also have one half of the answer address the question perfectly and the other half contain at least one of the traps mentioned previously.

The most critical question to ask if two or more answers remain once you’ve compared every answer to what you found in the passage is “Which answer is the trap?” This turns your focus away from justification and back to active Process of Elimination!

In the following exercises, you'll see that we've eliminated at least one answer already based on highlighting, annotating, or an answer being so completely inconsistent with the topic of the passage that it's no longer even worth displaying here.

Try to determine the remaining trap answer, or answers, on your own, then read through the explanation below in order to understand the most efficient way to use POE when two or more answers remain.

Mark for Review

1. The following text is from Jane Austen's 1818 novel *Northanger Abbey*. Catherine Morland, the main character, has recently been invited to spend the next six weeks on vacation in Bath, England.

In addition to what has been already said of Catherine Morland's personal and mental endowments, when about to be launched into all the difficulties and dangers of a six weeks' residence in Bath, it may be stated, for the reader's more certain information, lest the following pages should otherwise fail of giving any idea of what her character is meant to be, that her heart was affectionate; her disposition cheerful and open, without conceit or affectation of any kind—her manners just removed from the awkwardness and shyness of a girl; her person pleasing, and, when in good looks, pretty—and her mind about as ignorant and uninformed as the female mind at seventeen usually is.

Which choice best states the main purpose of the text?

- ☐ A To establish that Catherine is as naïve as expected of one her age

☐ B To describe Catherine’s personality and level of maturity prior to her trip

☒ C To convey Catherine’s disapproval towards the family that will host her in Bath

☐ D To explain the difficulties and dangers that Catherine will face in Bath

Which answer is the trap? The trap answer to this Purpose question is (A).

Why? This trap answer is **Right Answer, Wrong Question**. It’s completely supported by the final sentence of the passage, which states *and her mind about as ignorant and uninformed as the female mind at seventeen usually is*. The problem is that the question asks for the *main purpose* of the passage, and the rest of the passage doesn’t discuss Catherine’s naiveté at all!

So, which answer must be correct? By Process of Elimination, the correct answer is (B).

Why? Careful **highlighting** would show that the passage describes *Catherine Morland’s mental and personal endowments*, that *her heart was affectionate*, *her disposition cheerful and open*, *without conceit or affectation*, and *her person pleasing*, which are all just as important to the description as the naiveté from the last lines you saw earlier. A good **annotation** for the answer here would have been “describe how Catherine acts and thinks,” which is fairly consistent with (B).

 Mark for Review

2. Artificial sweeteners offer an appealing alternative to sugar, but they may carry unintended consequences for the body because of their effect on the gut microbiome. It has been demonstrated that the

bacteria that make up the gut microbiome affect glucose tolerance and appetite. Researchers at the Weizmann Institute of Science claim that the consumption of artificial sweeteners such as sucralose can lower glucose tolerance and increase appetite in humans. The researchers conducted a study comparing the glucose tolerance and appetite levels of people who had been fed sucralose against a control group who was not fed sucralose.

Which finding from the researchers' study, if true, would most directly support their hypothesis?

☐ A ~~Both the individuals who consumed sucralose and the control group had much higher glucose tolerance levels at the conclusion of the study.~~

☐ B At the conclusion of the study, individuals who consumed sucralose had lower glucose tolerance levels but also decreased appetite levels compared to the control group.

☐ C Individuals who consumed sucralose had lower glucose tolerance levels and increased appetite levels at the conclusion of the study compared to the control group.

☐ D ~~When individuals who consumed sucralose were interviewed, they were found to also have consumed large quantities of water, which is known to decrease appetite.~~

Which answer is the trap? The trap answer to this Claims question is (B).

Why? This trap answer is **Half-Right**. It looks incredibly solid, except for the very end when it mentions that the sucralose group had *decreased appetite levels compared to the control group*, while the passage states that sucralose should *increase appetite*. Most of the time, Half-Right answers will contain one of the other traps; in this case, the very end of the answer

contains information that is the **Opposite** of what's presented in the passage.

So, which answer must be correct? By Process of Elimination, the correct answer is (C).

Why? This answer is consistent with the researchers' claim from the passage, which should be **highlighted** when taking the test: *sucralose can lower glucose tolerance and increase appetite in humans*. Therefore, the group taking sucralose should present *lower glucose tolerance levels and increased appetite levels compared to the control group*, as (C) states.

Even if you eliminate just a single answer, or even no answers at all, through your highlighting and annotating, you can still efficiently use POE by comparing the answers to what you can see in the passage!

 Mark for Review

3. Barefoot running, the act of running without footwear, has increased in popularity since the year 2000, with exercise enthusiasts looking to reduce the repetitive stress injuries caused by padded running footwear. However, the practice dates back thousands of years, with some long-established Latin American and African groups utilizing barefoot running even up to the present day despite the availability of modern footwear in those regions. This suggests that before the year 2000, _____.

Which choice most logically completes the text?

A certain practitioners of barefoot running in different regions of the world may have already discovered the benefits of the practice.

☐ B barefoot running has made exercise more accessible to those who cannot afford expensive footwear.

☐ C barefoot running will soon surpass other methods of exercise as awareness of its benefits becomes more prevalent.

☐ D ~~footwear manufacturers could increase profits if they created region-specific running shoe designs.~~

Which answer is a trap? The first trap answer to this Conclusions question is (B).

Why? This trap answer is a **Beyond the Text** trap. Anytime you look at an answer and say, “Well, this is true” or “This makes sense,” you want to remind yourself that what makes an answer correct on the Digital SAT is that it is supported by the passage and that it answers the question. As logical as it is to assume that increased awareness of the benefits of barefoot running may decrease the barrier to exercise created by expensive footwear, the author never mentions anything regarding *expensive footwear* in the passage. If an answer is something you could only support if you had a chance to argue about it with someone, it’s probably a wrong answer.

Which remaining answer is also a trap? The second trap answer is (C).

Why? This answer is a type of **Extreme Language** trap. While it may not contain words like *only* or *most* which are more concretely extreme words, it still takes an opinion or claim made in the passage too far. The opening sentence states that *barefoot running...has increased in popularity*, but that doesn’t mean that barefoot running will *surpass other methods of exercise* as (C) states. The passage would need to state this bold prediction and not just offer a piece of evidence that may support such a prediction as if it were part of a much longer, much more detailed argument.

Answers that say something *will* happen are almost certainly wrong because they are Extreme Language. People can predict what is *likely* to happen, or what *may* happen, but no one can say what *will* happen.

So, which answer must be correct? By Process of Elimination, the correct answer is (A).

Why? This answer is consistent with the passage. In the opening line, the passage states that *barefoot running...has increased in popularity since the year 2000*. However, *the practice dates back thousands of years* for certain *Latin American and African groups*, who are described as still using the practice up to the present day *despite the availability of modern footwear in those regions*. This means that those Latin American and African groups have chosen to continue barefoot running even with the option to acquire modern footwear. While you can't know for sure that this means they *discovered* the *benefits* of barefoot running before the year 2000, the phrase *may have* is just loose enough to be supported by the passage. Remember, one more time, that the right answer for Conclusions questions will not always be directly stated or proven by the passage—it will be the *best supported* of the four answers.

POETRY: KEEPING YOUR COOL

Occasionally (likely no more than two times per module), your source passage on a literature-based question will be a poem or poetry excerpt. This is no reason to panic: College Board isn't expecting you to be a Poet Laureate or the next Shakespeare. Understand that poems still make claims and tell stories just as prose does, only the language follows a meter and/or rhyme scheme. Poetry often shows up on Claims questions, but we have seen it on Purpose, Retrieval, and Main Idea questions as well.

Before we dive into some poetry-based Digital SAT questions, let's see some common phrases as they appear in poetry and what those mean in modern English.

Poetic Contraction or Abbreviation	Modern English Word(s)
'tis	it is
'twas	it was
o'er	over
ne'er	never
ere	before
e'en	even
o'	of
an'	and

This may clear up some confusion, but the other key to understanding poetry is that poets often use more comparative literary devices than other writers do, most often comparing the person or thing that is the focus to some element from the natural or supernatural world. While you won't be asked to identify literary devices as part of a question, know that poems on the Digital SAT often use analogies, metaphors, and similes to enhance the impact of their language. The distinctions among these don't matter that much, as long as you understand that all of them are used to describe ideas by comparing them to other ideas.

- Example of an analogy: *Pain is our fire alarm. The sharpness of the alarm alerts us to an issue.*
- Example of a metaphor: *Our car sailed gracefully through the sea of traffic as we navigated the rough waters of the interstate with a captain's precision.*

- Example of a simile: *He's got a heart as warm as solid ice and a smile as pleasing as spoiled milk.*
-

 Mark for Review

4. The following text is from Archibald Lampman's 1899 poem "The Mystery of a Year." In this poem, the speaker is describing a woman whom he has known for some time.

A little while, a year ago, I knew her for a romping child,
A dimple and a glance that shone With idle mischief when she
smiled.

To-day she passed me in the press, And turning with a quick
surprise
I wondered at her stateliness, I wondered at her altered eyes.

Which choice best states the main idea of the text?

☐ A The speaker is reminiscing about a past romantic relationship with a woman.

☐ B The speaker is astonished at the changes within a certain individual.

☐ C The speaker is an expert in observing subtle changes in others.

☐ D The speaker uses intricate and complex thought processes to impress those around him.



Watch Us Crack It

Watch the step-by-step video explanation of how to answer this question in your Student Tools.

Here's How to Crack It

As you **Read the Question**, you can also **Identify the Question Type** as a Main Idea question when you see *main idea* in the question stem—we know, it's quite revolutionary!

As you **Read the Passage**, focus on the person, place, or thing the lines chiefly focus on.

The main focus of the passage is the woman the narrator is describing. **Highlight** *A little while, a year ago, I knew her for a romping child*. This indicates what the narrator thought of the woman in the past (he thought of her as a child). Also **Highlight** *To-Day she passed me in the press, And turning with a quick surprise, I wondered at her stateliness*. This indicates what the narrator thinks of her now (he is surprised by her growth and now thinks of her as a woman). You may wish to make an **annotation** to the effect of “girl narrator knew has changed” in your annotation box.

It's time to use **POE**. Only one of these answers will be consistent with the main idea we found, poetry or not.

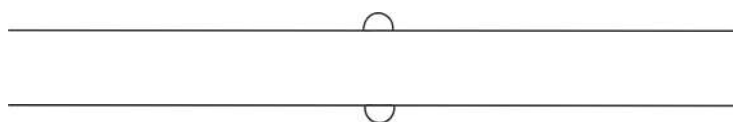
Choice (A) should be eliminated because there is no mention of a *romantic relationship* in the passage. It would be a **Beyond the Text** trap to assume there needs to be any romance between the narrator and the woman.

Choice (B) should be kept because while *astonished* is a fairly strong word, the mention of *surprise* and *wondered* within the passage are enough to keep this answer in play for now, and the narrator certainly notices *changes within a certain individual*, the woman.

Choice (C) should be eliminated because it is the **Opposite** of what the passage states. These are not *subtle* changes in the girl; they are quite stark, or obvious, changes. Additionally, the passage doesn't support that the narrator is an *expert* in noticing changes.

Choice (D) should be eliminated because it is a **Beyond the Text** trap and a fairly **Extreme** logical leap as well. One might assume *intricate and complex thought processes* to be part of poetry in general, but the narrator's thoughts are not described in the passage. Also, the passage doesn't state that the narrator uses these thoughts to *impress* anyone around him.

With three answers eliminated and only (B) remaining, you select (B) and celebrate the not-so-subtle positive changes in your own Digital SAT performance.



 Mark for Review

5. “A Ballad of Evesham” is a 1933 poem by Francis T. Palgrave. The poem demonstrates a character’s ignorance of a deception created by his enemy. _____.

Which quotation from the poem most effectively illustrates the claim?

A “Earl Simon on the Abbey tower / In summer sunshine
stood, / While helm and lance o’er Greenhill heights /

Come glinting through the wood.”

B ““My son!’ he cried, ‘I know his flag / Amongst a thousand
glancing’:— / Fond father! no!—’tis Edward stern / In
royal strength advancing.”

C “The Prince fell on him like a hawk / At Al’ster yester-eve,
/ And flaunts his captured banner now / And flaunts but to
deceive:—”

D “—Look round! for Mortimer is by, / And guards the
rearward river:— / The hour that parted sire and son / Has
parted them for ever!”

Here’s How to Crack It

As you **Read the Question**, you can also **Identify the Question Type** as a Claims question when you see *illustrates the claim* in the question stem.

As you **Read the Passage**, which is quite short, you can **Highlight** the claim you are meant to illustrate: *a character’s ignorance of a deception created by his enemy*.

Once again, it’s time to **Use POE**. Keep in mind that the right answer must address the entire claim, not just part of it.

Choice (A) should be eliminated because the answer only describes *Earl Simon* and what he observes approaching his tower. The answer doesn’t indicate anyone who has fallen for any type of deception.

Choice (B) should be kept because the first half of the answer has a character (*he*) believe the approaching figure is his *son* because he sees his son’s *flag*. However, another character in the second half of the answer, presumably another son of the Earl’s since he cries out “*Fond father*,”

warns the first person that the approaching individual is *Edward*, who is *advancing* his forces towards the tower.

Choice (C) should be eliminated because it is **Half-Right**: it more thoroughly explains the *deception* carried out by Edward, which makes the answer quite appealing. However, recall that the right answer here must also mention *a character's ignorance*, and in these lines, no one has fallen for the ruse as the character did in (B).

Choice (D) should be eliminated because it doesn't mention the deception by Edward nor the Earl's ignorance of that deception.

With three answers eliminated and only (B) remaining, you select (B) and won't be deceived by the Digital SAT's own clever tricks.

SENTENCE FUNCTION: UNDERSTANDING WHY SENTENCES ARE INCLUDED

Since you only have approximately 1 minute and 11 seconds per question, spending large amounts of time understanding the structure of each passage isn't practical. However, learning to understand the roles that sentences can perform will help you on Purpose, Dual Texts, Main Idea, Claims, and Conclusions question, as each of these question types tends to require you to find a main idea and/or the most likely reason the author would have included something. If you're finding it difficult to navigate a passage but can determine which role each sentence is performing, this can help you zero in on the one or two sentences you need in order to capture that main idea or understand the link between ideas. **Keep in mind that these sentence functions are much more common in non-literature passages (such as science) than in literature passages.**

The most common functions a sentence can perform on the Digital SAT are as follows:

Background: This sentence provides context or information regarding a topic that the author feels is necessary for the reader to understand before any arguments are made. Background sentences are usually factual in nature and often occur at the start of a story.

Claim: This sentence contains the author's, an individual's, or a group's main argument, theory, or opinion. A critical feature of a claim is that it is something that can be disagreed with and needs to be supported by evidence.

Objection: This sentence is a special type of claim in which someone in the passage argues against a claim, theory, or opinion made by someone else in the passage. It often includes words such as *but* or *however*.

Evidence: This sentence usually contains lots of details and is used to support Claims or Objections. While most evidence occurs after a claim or objection, it can also come before if the author has chosen to build up to their claim.

Consider the following passage:

With the initial growth of suburban communities in the mid-twentieth century, residential pools went from the domain of only the wealthiest individuals to attainable amenities for those with more modest incomes. However, this boon came with predictably negative consequences for local wildlife near these communities. Improper drainage of water in pools and spas used for personal recreation has led to widespread contamination that can cause immense environmental damage and even kill plant and animal life. A group of researchers has posited that proper drainage of pool water can help to reverse

the damage done to suburban environments. In a survey conducted on soil surrounding residential pools in various American suburbs, the researchers found the toxicity of soil surrounding pools in which the owner had followed the manufacturer's drainage instructions to be 46% lower than the toxicity levels of soil surrounding pools for which the instructions had been followed improperly.

This example is among the longest passages you'd ever see on the Digital SAT but actually only comprises five sentences, each with one of the four main sentence functions. For each sentence, try to determine which function the sentence is performing before looking at our explanation on the next page.

With the initial growth of suburban communities in the mid-twentieth century, residential pools went from the domain of only the wealthiest individuals to attainable amenities for those with more modest incomes.

How would you categorize Sentence 1: background, claim, objection, or evidence?

Sentence 1 gives **background information**. It states the historical context that helps the reader understand how residential pools became more prevalent, which contributes to the problem discussed in the passage. If you're looking for a claim or a main idea, you know to keep pushing your eyes forward to the next sentence.

However, this boon came with predictably negative consequences for local wildlife near these communities.

How would you categorize Sentence 2: background, claim, objection, or evidence?

Sentence 2 provides an **objection**. Note the presence of the word *However* at the start of the sentence. It may seem odd that an author can object to background information, but it's a very common way for authors to generate interest in their topic and call attention to an issue that has arisen from a prior decision. You now know that the author believes the prevalence of residential pools has been negative, so answers that express a positive attitude towards residential pools can be eliminated.

Improper drainage of water in pools and spas used for personal recreation has led to widespread contamination that can cause immense environmental damage and even kill plant and animal life.

How would you categorize Sentence 3: background, claim, objection, or evidence?

Sentence 3 is **evidence**. Authors shouldn't make claims or objections without backing them up. Here, the author needed to explain exactly how an increase in residential pools has harmed the environment. Make sure to read evidence carefully but not to over-analyze it. Unless you're dealing with a Retrieval question, you want to know why the evidence is there rather than deeply comprehend every last word in the evidence.

A group of researchers has posited that proper drainage of pool water can help to reverse the damage done to suburban environments.

How would you categorize Sentence 4: background, claim, objection, or evidence?

Sentence 4 is a **claim**. Words such as *believe*, *posit*, or *hypothesize* are dead giveaways that a claim or opinion is being stated in the passage. This is often the key thing you are looking for on Dual Texts, Main Idea, Claims, and Charts questions, and it's helpful as part of the answer to Purpose

questions as well. This is why reading the question carefully matters so much: does the question ask you to work with the researchers' claim from this sentence, or the author's view from sentence 2? You could easily see a Right Answer, Wrong Question trap that focuses on the wrong claim entirely.

In a survey conducted on soil surrounding residential pools in various American suburbs, the researchers found the toxicity of soil surrounding pools in which the owner had followed the manufacturer's drainage instructions to be 46% lower than the toxicity levels of soil surrounding pools for which the instructions had been followed improperly.

How would you categorize Sentence 5: background, claim, objection, or evidence?

Sentence 5 is **evidence**. As with the objection in sentence 2, the passage should offer some data that either supports or refutes the claim made previously. In this case, the data here supports that proper drainage would help reduce environmental damage, as the researchers claimed. You already know that this evidence supports the researchers' claim, so answers that contradict the researchers' claim can be eliminated right away.

Summary

- Studying the Vocabulary Greatest Hits 5–10 minutes a day is a straightforward but powerful way to help your RW score. You should study a blend of your own Greatest Hits discussed in Chapter 7 and the one included in this chapter.
- When down to two (or more) answers after comparing the answers to your highlighting and annotation, the critical question to ask is “Which of the remaining answers is a trap?” Aim to find a reason each answer is wrong, not justify an answer that you want to pick but that isn’t fully supported.
- As a reminder, the six trap answers are:
 - Opposite
 - Extreme Language
 - Recycled Language
 - Right Answer, Wrong Question
 - Beyond the Text
 - Half-Right
- On poetry questions, keep your cool—just because the lines follow a meter and rhyme doesn’t mean you can’t still find claims and statements. Be aware of poetic contractions and how poets use analogies, similes, and metaphors.
- In non-literature passages, most sentences serve as background information, a claim, an objection, or evidence. Understanding the role of each sentence can help you find the right information needed to answer your question even if you aren’t exactly sure what’s happening in the passage overall.

- Don't forget your POOD! It may be worth marking or even entering a random guess on a tough Vocabulary question, a tricky poem, a dense paragraph, or if you've simply spent too long debating two answers. There will be plenty of other questions in the module to use these skills on!

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Chapter 10

Comprehensive Reading Drill

Use your new reading comprehension and test-taking skills on the following drill, which features at least one of each of the eight question types. Remember to read *actively* and use the Reading Basic Approach for all 11 examples.

Comprehensive Reading Drill

Answers can be found starting on [this page](#).

 Mark for Review

1. While most fiction writers edit their stories and re-write them when faced with challenging narrative obstacles, Argentine author César Aira _____ the traditional revision process, choosing instead to construct creative solutions to tricky narrative problems rather than simply cut anything that he has already written.

Which choice completes the text with the most logical and precise word or phrase?

☐ A allows

☐ B avoids

☐ C embraces

☐ D integrates

 Mark for Review

2. While Navajo musician Klee Benally is perhaps best known for his role as lead vocalist and guitarist for the band Blackfire, he is also a documentary filmmaker and activist. One of his films, *The Snowball Effect*, cautioned against the possible _____ impact of a proposed ski resort on sacred tribal lands in Arizona.

Which choice completes the text with the most logical and precise word or phrase?

☐ A aesthetic

☐ B detrimental

☐ C economic

☐ D restorative

 Mark for Review

3. The following text is from Anne Virginia Culbertson's 1904 short story "How Mr. Terrapin Lost His Beard."

The "cook-house" stood at some little distance from the "big house," and every evening after supper it was full of light and noise and laughter. The light came from the fire on the huge hearth, above which hung the crane and the great iron pots which Eliza, the cook, declared were indispensable in the practice of her art. To be sure, there was a cook-stove, but 'Liza was wedded to old ways and maintained there was nothing "stove cooked" that could hope to rival the rich and nutty flavor of ash cake, or greens "b'iled slow an' long over de ha'th, wid a piece er bacon in de pot."

As used in the text, what does the word "practice" most nearly mean?

☐ A Amusement

☐ B Recital

☐ C Execution

☐ D Appraisal

 Mark for Review

4. Invented in 1775, Scheele's green (CuHAsO_3) is an acidic copper arsenite that creates a vivid emerald-green pigment and is dangerous to humans. Used in wallpaper and candles in Victorian-era England, the arsenite was completely phased out by the late 1800s, as the public gained knowledge of how toxic its vapors were. However, after the turn of the century, Scheele's green reappeared as an effective insecticide and, controversially, as a food dye to create bright green candy.

Which choice best describes the overall structure of the text?

- ☐ A It describes an invention and then gives specific reasons for its continued use.
- ☐ B It describes a hypothesis concerning a compound and then contradicts that hypothesis.
- ☐ C It introduces a product and then discusses both the uses and the dangers associated with that product.
- ☐ D It explains the initial purpose of an invention and then questions the ethics behind that invention.

 Mark for Review

Text 1

Binge-watching, or viewing multiple episodes of a show at once, became popular with the widespread availability of internet streaming services in the early twenty-first century. Clinical psychologist Dr. John Mayer explains that binge-watching can serve as a form of stress relief for viewers. According to Dr. Mayer, the experience of disconnecting from the real world through an extended viewing

session triggers the release of dopamine, a chemical, from the brain, which leads to feelings of relaxation and pleasure.

Text 2

Clinical psychologist Dr. Renee Carr warns that any activity that produces dopamine can potentially be dangerous if an individual engages in the behavior too frequently and becomes dependent on the desirable feelings it produces. She notes that while dopamine is not addictive in and of itself, a form of addiction can take hold whenever an individual develops a need for any activity, including binge-watching, no matter how harmless that activity might seem.

5. Based on the texts, how would Dr. Renee Carr (Text 2) most likely respond to Dr. John Mayer's observations (Text 1)?

☐ A She would argue that binge-watching can have very different effects on people depending on the subject matter being viewed.

☐ B She would point out that the long-term effects of binge-watching will be negative for streaming companies as well.

☐ C She would suggest that Dr. Mayer compare the dopamine effects of binge-watching to the dopamine effects experienced as the result of engaging in other kinds of pleasurable activities.

☐ D She would suggest that frequent binge-watching may not have an entirely positive effect upon an individual.

 Mark for Review

6. The following text is from the 1914 short story “A Mother” by James Joyce. Mrs. Kearney, the mother of local pianist Kathleen Kearney, is being discussed.

She had been educated in a high-class convent, where she had learned French and music. As she was naturally pale and unbending in manner she made few friends at school. When she came to the age of marriage she was sent out to many houses where her playing and ivory manners were much admired. She sat amid the chilly circle of her accomplishments, waiting for some suitor to brave it and offer her a brilliant life. But the young men whom she met were ordinary and she gave them no encouragement, trying to console her romantic desires by eating a great deal of Turkish Delight in secret.

According to the text, what is true about Mrs. Kearney?

- ☐ A Mrs. Kearney had certain standards regarding a potential husband.
- ☐ B Mrs. Kearney’s desperation to marry was obvious to those around her.
- ☐ C Mrs. Kearney was criticized for treating potential suitors rudely.
- ☐ D Mrs. Kearney sometimes disapproved of the behavior of her would-be suitors.

 Mark for Review

7. In one of their numerous studies on invasive species, researcher Satu Ramula and her team in Finland planted a mixture of North American and Finnish garden lupines (*lupinus polyphyllus*) into Finnish soil to

examine the impact of soil microbiota (bacteria that live in a plant's root system) on the plant's growth and development. One crop was planted into nutrient-poor soil that contained microbiota from local lupine populations, while the other crop was planted into nutrient-poor soil that contained no microbiota. Regardless of the country of origin, the crop of garden lupines in the soil containing microbiota not only grew much larger than the other crop's lupines, but also secreted a much stronger scent that is a natural deterrent to snails, the garden lupine's most common predator.

Which choice best states the main idea of the text?

☐ A It discusses the study by Ramula and her team to examine one possible reason that garden lupines are able to grow and thrive.

☐ B It details the study by Ramula and her team to critique other researchers for ignoring the impact of soil microbiota on garden lupines.

☐ C It argues that the effects of soil microbiota on garden lupines are often difficult to observe, as was the case with Ramula and her team's study.

☐ D It explains a significant threat to the environment caused by garden lupines that the study by Ramula and her team attempted to address.

 Mark for Review

Approximate Appearance Percentage for Three Blood Types in Four Regions

Region	O+	A+	B+
--------	----	----	----

Asia	37%	28%	25%
Americas	55%	28%	9%
Africa	47%	27%	17%
Oceania	42%	33%	11%

8. Blood is critical to the function of the human body, as it delivers nutrients to vital organs, exchanges carbon dioxide and oxygen, and moves white blood cells through the circulatory system to fight infections. Blood is often categorized by one of eight blood types, which are referred to first by a letter or letter combination (A, B, AB, or O) and then a positive or negative marker (such as O+ or AB-). Researcher Anshool Deshmukh compiled blood type data from thousands of individuals and reorganized the data by region to better understand the distribution of the blood types O+, A+, and B+ by region. His research shows that type O+ blood has the highest frequency of occurrence in all four regions researched, while type B+ blood in turn has the lowest frequency of occurrence. For example, whereas the approximate appearance percentage for type O+ blood in Asia was 37%, the approximate appearance percentage for _____.

Which choice most effectively uses data from the table to complete the example?

☐ A type O+ blood in the Americas was 55%.

☐ B type B+ blood in Africa was 17%.

☐ C type O+ blood in Oceania was 42%.

☐ D type B+ blood in Asia was 25%.

 Mark for Review

9. “John G.” is a 1918 short story by Katherine Mayo. In the story, the narrator describes a horse named John G. as dependable and well-behaved: _____.

Which quotation from “John G.” most effectively illustrates the claim?

☐ A “In the time that goes to saddling a horse, the detail rode into the storm, First Sergeant Price on John G., leading.”

☐ B “Delicately, nervously, John G. set his feet, step by step, till he had reached the centre of the second plank.”

☐ C “John G., on that diluvian night, was twenty-two years old, and still every whit as clean-limbed, alert, and plucky as his salad days had seen him.”

☐ D “And John G. is a gentleman and a soldier, every inch of him. Horse-show judges have affixed their seal to the self-evident fact by the sign of the blue ribbon, but the best proof lies in the personal knowledge of “A” Troop, soundly built on twelve years’ brotherhood.”

 Mark for Review

Obedience Rates After Training for 3 Behaviors in Dogs, by
Reinforcement Schedule

	Fixed ratio (FR)	Variable ratio (VR)	Fixed interval (FI)	Variable interval (VI)
Behavior				

Sitting on command	90%	71%	65%	60%
Fetching on command	86%	66%	54%	46%
Remaining quiet on command	78%	64%	63%	53%

10. Behavior modification through positive reinforcement, which is essentially the rewarding of desired behavior, can occur by means of four different reinforcement schedules: a fixed ratio (FR) schedule rewards behavior after a specific number of responses, a fixed interval (FI) schedule rewards behavior after a specific amount of time, a variable ratio (VR) schedule rewards behavior after a varying number of responses, and a variable interval (VI) schedule rewards behavior after a varying amount of time. An animal trainer compiled data that indicate that dogs will exhibit higher rates of obedience for a given behavior, such as sitting or fetching, when trained on a ratio schedule than when trained on an interval schedule for that same behavior. For example, whereas the average obedience rate for sitting after training on a VR schedule is 71%, the average obedience rate for _____.

Which choice most effectively uses data from the table to complete the example?

☐ A fetching after a VR schedule is 66%.

☐ B sitting after an FR schedule is 90%.

☐ C fetching after a VI schedule is 46%.

☐ D sitting after a VI schedule is 60%.

 Mark for Review

11. *Clostridium botulinum* (*C. botulinum*) is a spore-forming food-borne bacterium that releases a highly dangerous neurotoxin, often causing serious illness or death. Boiling food for 10 minutes will kill *C. botulinum* in the unlikely event that it is present, but this will also destroy many beneficial vitamins and minerals. Since *C. botulinum* is almost exclusively found in home-canned goods, some experts recommend eating only commercially-produced cans of food, consequently _____.

Which choice most logically completes the text?

☐ A avoiding the ingestion of *C. botulinum* without losing healthful nutrients.

☐ B making *C. botulinum* more vulnerable to the effects of boiling.

☐ C maximizing the many health benefits of *C. botulinum*.

☐ D enabling safe consumption of food tainted with *C. botulinum*.

COMPREHENSIVE READING DRILL

ANSWERS AND EXPLANATIONS

1. B

This is a Vocabulary question, as it's asking for a word that *completes the text with the most logical word or phrase*. Read the passage and highlight what can help fill in the blank. The passage states that *most fiction writers edit their stories and re-write them*, but the transition word *While* sets up a contrast, meaning that Aira does not edit his stories and re-write them as other writers do. Based on this, a good phrase to enter into the annotation box would be that Aira “stays away from” the traditional revision process.

- (A), (C), and (D) are wrong because they are the **Opposite** of “stays away from” in some way—they all deal with some form of acceptance or joining together.
- (B) is correct because *avoids* matches “stays away from.”

2. B

This is a Vocabulary question, as it's asking for a word that *completes the text with the most logical word or phrase*. Read the passage and highlight what can help to fill in the blank. The *impact* that the blank is describing is something that Benally *cautioned against*, so a good word for our annotation box would be “negative” or “harmful.”

- (A) and (C) are wrong because *aesthetic* and *economic* don't match with “negative.”
- (B) is correct because *detrimental* matches with “negative.”
- (D) is wrong because *restorative* is a positive word, which is the **Opposite** of “negative.”

3. C

This is a Vocabulary question, as it's asking for what a word *most nearly* means. Read the passage as if *practice* were not there and highlight what can help to fill in a word in its place. *Eliza, the cook, declared that the crane and the great iron pots were indispensable to her.* This most logically means that she must use them to cook (which is her “art”), so write “act of doing” in the annotation box.

- (A), (B), and (D) are wrong because *amusement*, *recital*, and *appraisal* don't match with “act of doing.”
- (C) is correct because *execution* matches with “act of doing.”

4. C

This is a Purpose question, as it asks for the *overall structure of the text*. Read the passage and highlight what can help understand the order of ideas within the passage. The first sentence introduces *Scheele's green* and notes that it is *dangerous to humans*. The second sentence states that Scheele's green was *Used in wallpaper and candles* but stopped being used when *the public gained knowledge of how toxic its vapors were*. The last sentence discusses Scheele's green used as an *insecticide* and a *food dye*. A good overall structure to enter into the annotation box would be “Scheele's green—the good and the bad.”

- (A) is wrong because the passage never gives any *specific reasons* as to why Scheele's green kept getting used, just what it was used for.
- (B) is wrong because the passage never mentions any *hypothesis*.
- (C) is correct because it's consistent with the highlighting and annotation.

- (D) is wrong because it's **Half-Right**: the passage implies that Scheele's green is first *Used for wallpaper and candles*, but the passage does not later question the *ethics* behind the invention of Scheele's green.

5. D

This is a Dual Texts question, as it asks how *Dr. Renee Carr* would *mostly likely respond to Dr. John Mayer's observations*. Read Text 1 and highlight Dr. John Mayer's observations, which are that *binge-watching...triggers the release of dopamine, a chemical, from the brain, which leads to feelings of relaxation and pleasure*. Read Text 2 and highlight what Dr. Renee Carr says about the same topic. She *warns that any activity that produces dopamine can potentially be dangerous* and that *a form of addiction can take hold*. Therefore, a good reply from Dr. Carr to enter into the annotation box would be "warn against too much dopamine."

- (A) is wrong because Text 2 never mentions the *subject matter being viewed* or why it would be important to the argument.
- (B) is wrong because Text 2 never mentions *streaming companies*.
- (C) is wrong because Text 2 never mentions *other kinds of pleasurable activities*, nor does Text 2 directly advise Dr. Mayer from Text 1 to compare anything.
- (D) is correct because it's consistent with the highlighting and annotation: *may not have an entirely positive effect* is the same as suggesting there may be negative effects.

6. A

This is a Retrieval question, as it says *According to the text*. Since the entire passage is about Mrs. Kearney and it may be difficult to

highlight a single correct answer in the passage, first read the passage and then compare the answer choices to the passage directly.

- (A) is correct because the third sentence states that Mrs. Kearney was *waiting for some suitor to brave it and offer her a brilliant life*, but the fourth sentence states that *the young men whom she met were ordinary and she gave them no encouragement*. This implies that Mrs. Kearney would not just accept any man as a husband.
- (B) is wrong because it's the **Opposite** of what is stated in the third and fourth sentences.
- (C) is wrong because the passage never states that anyone *criticized* Mrs. Kearney or that she was rude.
- (D) is wrong because the passage never states that Mrs. Kearney disapproved of her suitors' *behavior*—only that she found them *ordinary*.

7. A

This is a Main Idea question, as it says *main idea*. Read the passage and highlight the main phrases or lines that all of the other sentences seem to support. The author first states that Ramula and her team wanted to *examine the impact of soil microbiota on the growth and development of garden lupines*. Later in the passage, it's stated that *the crop of garden lupines in the soil containing microbiota not only grew much larger than the other crop's lupines, but also secreted a much stronger scent that is a natural deterrent to snails*, which are a predator of the garden lupines. This piece of evidence demonstrates the effect that Ramula and her team wanted to examine, so the correct answer should be consistent with both of these sentences.

- (A) is correct because it is consistent with the aim and outcome of Ramula and her team's study as described in the passage.
- (B) is wrong because no *other researchers* besides Ramula and her team are mentioned in the passage, nor does the author of the passage *critique* anyone.
- (C) is wrong because it is the **Opposite** of the passage: Ramula and her team don't seem to have any difficulty observing the *effects of soil microbiota on garden lupines*.
- (D) is wrong because it is a **Beyond the Text** trap answer: while *invasive species* normally do pose *environmental threats*, no threat from the garden lupines is mentioned in the passage.

8. D

This is a Charts question as it asks about *data from the table*. The table displays the distribution percentages of three different blood types over four different regions. Read the passage and highlight the claim or statement referencing as many of these ideas as possible. The second to last sentence states *His research shows that type O+ blood has the highest frequency of occurrence in all four regions researched, while type B+ blood in turn has the lowest frequency of occurrence*. The next sentence, which is meant to be an example of this claim, starts by mentioning that *the approximate appearance percentage for type O+ blood in Asia was 37%*. To complete this example, the correct answer must reference the other blood type from the claim, B+, and the same region to properly compare the frequencies of the two blood types.

- (A), (B), and (C) are wrong because each references the wrong region: to complete the example, they should mention the same region, Asia, which is in the first half of the example. Choices (A)

and (C) could also be eliminated for referencing the wrong blood type, O+, when that blood type has already been included in the first half of the example.

- (D) is correct because it is consistent with the claim and the table by completing the example, providing a statistic from the table that shows that *B+ blood* has the *lowest frequency of occurrence* in Asia.

9. D

This is a Claims question, as it asks for a quotation that would *most effectively illustrate the claim*. Read the passage and highlight the claim, which is that *the narrator describes a horse named John G. as dependable and well-behaved*. The correct answer will be as consistent as possible with this claim.

- (A), (B), and (C) are wrong because they do not describe John G. as *dependable and well-behaved*, even if they list other positive qualities about him.
- (D) is correct because the quotation calls John G. *a gentleman and a soldier* and states that John G.'s reputation is *soundly built on twelve years' brotherhood*.

10. D

This is a Charts question, as it asks for *data from the table to complete an example*. Read the title and variables in the table. Then, read the passage and highlight the claim and example being made in the passage. The animal trainer compiled data that indicates that *dogs will exhibit higher rates of obedience for a given behavior...when trained on a ratio schedule than when trained on an interval schedule for that same behavior*. The example begins with *the average obedience rate*

for sitting after training on a VR schedule is 71%. The correct answer will complete this example while remaining consistent with the claim as well as the table.

- (A) and (C) are wrong because *fetching* is the wrong behavior—the claim states that the comparison needs to be for *the same behavior*, and the example uses *sitting*, not *fetching*.
- (B) is wrong because the claim compares a *ratio schedule* (which is already in the example) to an *interval schedule*, but *FR* stands for *fixed ratio*, making it another ratio schedule.
- (D) is correct because it's consistent with the highlighting and table: it has both the right behavior, *sitting*, and an *interval schedule*, VI, or variable interval.

11. A

This is a Conclusions question, as it asks for an answer that *most logically completes the text*. Read the passage and highlight the main ideas. The first sentence states that *Clostridium botulinum...releases a highly dangerous neurotoxin*. The second sentence states that *Boiling food for 10 minutes will kill C. botulinum*, but this will also *destroy many beneficial vitamins and minerals*. The last sentence states that *C. botulinum is almost exclusively found in home-canned goods, so some experts recommend eating only commercially-produced cans of food*. Connecting these points together, if unlike home-canned goods, commercially-produced cans of foods are less likely to have *C. botulinum*, they are also less likely to require boiling for 10 minutes, which will avoid the potential loss of beneficial vitamins and minerals.

- (A) is correct because it's consistent with the highlighting and the flow of ideas within the passage.

- (B) is wrong because it's **Recycled Language**, misusing *boiling* from a different part of the passage.
- (C) is wrong because it's the **Opposite** of the passage: *C. botulinum* is *highly dangerous*. It does not have *many health benefits*.
- (D) is wrong because it's also the **Opposite** of the passage: commercially-produced cans are extremely unlikely to have *C. botulinum* in the first place.

Chapter 11

Introduction to Rules Questions

You can expect your test to contain 11–19 questions in a category that College Board calls Standard English Conventions. We simply call these Rules questions, as they test grammar and punctuation rules. In the next five chapters, you'll learn all the rules you need to know in order to ace these questions.

LEARN THE RULES AND FOLLOW THEM

Rules questions cover lots of different topics: punctuation, subject-verb agreement, pronouns and nouns, verb tense, sentence construction, apostrophes, and more. However, College Board does not categorize these topics separately from one another, as all of the Rules questions will appear in order of difficulty, with the topics mixed up. That means that, unlike every other portion of the Reading and Writing section, the Rules part does not group the questions by topic or type. Remember, you can identify Rules questions by their common question:

Which choice completes the text so that it conforms to the conventions of Standard English?

What's tricky about Rules questions is there's no way to know which rule is being tested by reading the passage. In fact, it may be difficult to understand the passage because some of the words that should be in a sentence have been replaced by a blank. What's a savvy student to do?

Rules Questions Basic Approach

1. Look at the answers to see what's changing and determine the topic.
2. Apply the rules associated with that topic.
3. Use Process of Elimination.

Following the Reading and Writing basic approach that we went over earlier, you should always be looking at the question to determine where you are in the section and what category of question you're dealing with. Once you find the standard question for Rules, look at the answer choices to see what's changing. That will allow you to figure out what the question is testing you on.

If all the words stay the same but punctuation changes, you know you're being tested on punctuation rules. If each answer choice contains the same verb but in a different tense, that's your cue to think about tense—and ignore anything else you might like to change in the sentence, as it's not being tested on that question. You may not even need to read all of the sentences in the passage if some of them don't pertain to what's being tested.

As you work through the chapters in the Rules section of this book, you may find that some categories of questions come more naturally to you. Perhaps you had a teacher who drilled subject-verb agreement into you or you don't have difficulty deciding between a semicolon and a comma. Or, perhaps you find that a topic that was previously challenging or unfamiliar now makes perfect sense after working through our lessons and exercises. Whatever the case may be, if you identify any topics that you tend to do well on, as well as any questions that you know you tend to struggle with, remember to follow your Personal Order of Difficulty. Even though the Rules questions are intended to follow a rough order of difficulty, the mix of topics means that you may find it benefits you to skip around and do the ones you find easier first.

TOOLS FOR RULES

Remember, if you decide to skip around within the Rules section, you'll be able to use the Mark for Review tool if you come across a question that probably does fall within your POOD but that you don't want to do right that second. Likewise, mark a question if you are stuck between two options or if you think you'd benefit from looking at the question a second time after a few minutes. Sometimes, an answer choice might sound perfectly fine, but when you read it again a little later you instantly spot an error.

Digital Tools

Remember, the online practice tests give you the opportunity to try out all the tools. Being familiar and comfortable with these tools on test day will give you a real leg up, as you won't have to waste time during the test getting used to them.

The Highlight and Annotate tools will also be extremely helpful on Rules questions. As you'll soon learn, consistency is key on grammar topics. Highlighting the words that the blank needs to be consistent with will help you to avoid making mistakes. You can also make annotations to remind yourself what type of word you're looking for (such as singular or plural).

Lastly, Process of Elimination using the Answer Eliminator tool will be extremely helpful on this portion of the test. You won't necessarily know what you are looking for in the answers to these questions, so eliminating answers that don't work will lead you to the one answer that does.

In the Writing chapters of this book, we don't mention using scratch paper, as we think the online tools are sufficient for our strategies. That being said, we always encourage students to find techniques that work for them. If you find that scratch paper is helpful for you on this section, go right ahead and use it to your heart's content. Just make sure your work is neat and organized, so you can come back to a question later if you need to.

In the following lessons, you'll learn all the rules that you need to apply when you see each topic appear in the answer choices. But first, try this exercise to practice identifying what's changing in the answers and therefore what the question is testing.

WHAT'S CHANGING IN THE ANSWERS EXERCISE

1.  Mark for Review

☐ A babies' favorite bottles

☐ B baby's favorite bottle's

☐ C babies' favorite bottles'

☐ D baby's favorite bottles

What's changing in the answer choices?

What is this question testing?

2.  Mark for Review

☐ A have done

☐ B has done

☐ C were doing

☐ D do

What's changing in the answer choices?

What is this question testing?

3.  Mark for Review

☐ A standing; with

☐ B standing. With

☐ C standing, with

☐ D standing with

What's changing in the answer choices?

What is this question testing?

[4.](#) Mark for Review

☐ A their

☐ B they're

☐ C it's

☐ D its

What's changing in the answer choices?

What is this question testing?

[5.](#) Mark for Review

☐ A approaches

☐ B had approached

☐ C was approaching

☐ D approached

What's changing in the answer choices?

What is this question testing?

[6.](#)  Mark for Review

☐ A today's experience of culture is largely shaped by dime novels.

☐ B we experience culture the way we do because of dime novels.

☐ C dime novels have shaped the way we experience culture today.

☐ D the shape of dime novels influences cultural experiences.

What's changing in the answer choices?

What is this question testing?

ANSWERS TO WHAT'S CHANGING IN THE ANSWERS EXERCISE

- [1.](#) Apostrophes with nouns; plural versus possessive nouns
- [2.](#) Verbs; verb tense and/or number
- [3.](#) Punctuation; how to connect clauses
- [4.](#) Apostrophes with pronouns; pronoun agreement and possessive pronouns versus contractions
- [5.](#) Verbs; verb tense and/or number
- [6.](#) Subjects of the phrases; modifiers

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Chapter 12

Rules Questions: Complete Sentences

Even though the Rules questions cover a variety of topics related to punctuation, grammar, and style, they all ultimately test you on how to properly construct a sentence. So, in this chapter we're going to start at the very beginning with how to write a basic sentence.

WHAT DOES A SENTENCE NEED?

At its most basic, a sentence needs a **subject** and a **verb**. Here are some examples with the subjects circled and the verbs underlined:

The dog eats. ✓

Malia will sing. ✓

Snow was falling. ✓

Throughout the Writing portion of the book, you'll see a ✓ or an x next to many of the example sentences so that you can easily tell whether they are correctly or incorrectly written.

Not all verbs can work in this structure, however. For example, a word like *give* or *want* requires an **object**, which is a word that in these examples would tell what someone gives or wants. It wouldn't make sense to say *Jackson wants*, would it? Here are two of the same examples but with objects added and put in boxes:

The dog eats peanut butter. ✓

Malia will sing the national anthem. ✓

An object typically follows a verb, and it answers the question *What does the dog eat?* or *What will Malia sing?*, for example.

You may remember learning about direct versus indirect objects in school, but this distinction isn't important for the Digital SAT.

As you already know, a sentence must end in a period. The exceptions are questions, which end in question marks, and exclamations or commands,

which can end with exclamation marks. Exclamation marks aren't tested on the Digital SAT, but questions occasionally are, so let's take a look at question construction.

QUESTION OR STATEMENT?

A topic that is occasionally tested on the Digital SAT is questions versus statements. The question will ask you to determine whether the blank should be a question or a statement. These ones can be pretty easy as long as you know the difference between questions and statements. A **statement** provides information. A **question** asks for information. Let's see an example.

 Mark for Review

1. Gammalsvenskby is a small Ukrainian village that experienced a mass migration of Swedes from Estonia around 1780. Historians wonder whether the mass migration was a punishment forced upon these people or _____.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A did it provide positive opportunities for them?

☐ B a choice that provided positive opportunities for them.

☐ C a choice that provided positive opportunities for them?

☐ D did it provide positive opportunities for them.

Here's How to Crack It

First, recognize based on the question that this is a Rules question, so look at the answers to see what's changing. Two answers end in question marks and two end in periods, so this is testing questions versus statements. Look at the passage to determine whether it's intended to be a question or a statement. The sentence starts with *Historians wonder*, so it's providing information and is therefore a statement, not a question. Eliminate (A) and (C). Next, determine which wording is correct. In a question, the verb comes first, and a two-word verb (like *did provide*) is split—just like (D). This shouldn't be a question, so (D) isn't phrased correctly. Thus, the correct answer is (B).

VERB FORMS IN COMPLETE SENTENCES

You saw earlier how every sentence needs a subject and a verb. Let's take a closer look at what those subjects and verbs can look like. A subject is usually a noun or pronoun: *dog*, *tree*, *Mya*, *they*, *swimming*. You might be thinking, "Hold on—I thought *swimming* was a verb!" Of course, it can be a verb in some contexts (*She is swimming*), but an *-ing* verb can also function as a noun. See the following example:

Swimming is my favorite sport. ✓

The word *swimming* in this context refers to an act or a *sport*, so it functions as a noun and is the subject of this sentence. So, subjects can be nouns, pronouns, or *-ing* verbs.

When an *-ing* verb functions as a noun, it's known as a gerund. But you don't need to know this term for the Digital SAT.

What about the verb in a sentence? As you know, a verb can come in different tenses—think *danced* versus *dances* versus *will dance*. But verbs

can also come in different forms, such as *dances*, *dancing*, and *to dance*. Not all of these can be “the verb” in a sentence, so it’s important to know which verbs can and can’t be. Now that we’ve established that a sentence must contain a subject and a verb, we’re going to call that verb the “main verb.” A sentence can have other verbs in it within different phrases or clauses, but it must have a main verb to go along with the subject. Here’s the rule to know for the Digital SAT:

An *-ing* or “to” verb cannot be the main verb in a sentence.

Let’s see some examples.

He dances after school on Fridays. ✓

He dancing after school on Fridays. ✕

He to dance after school on Fridays. ✕

Now that you’ve seen these examples, you can probably tell that you intuitively knew this rule, as the second and third sentences should sound really wrong. However, it won’t always be this obvious on the Digital SAT. Let’s see an example.

 Mark for Review

2. American inventor Otis Boykin’s mother died of heart failure when Boykin was a year old. He earned many patents for electronic control devices, including for artificial cardiac pacemakers. These pacemakers _____ electrical impulses to regulate a patient’s heartbeat.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A having used

☐ B using

☐ C use

☐ D to use

Here's How to Crack It

Start by identifying the category: Rules. Then, look at the answers to see what's changing. Since there is a “to” verb and an *-ing* verb, the question is testing verb forms. Start by identifying the subject: *pacemakers*. Then, look to see whether the sentence contains a main verb to go with this subject. There is no verb in the sentence other than *to regulate*, which can't be the main verb since it's in the “to” form. Thus, the blank must contain the main verb. Eliminate (A), (B), and (D) because neither an *-ing* verb nor a “to” verb can be the main verb in a sentence—they would not produce a complete sentence. Therefore, the correct answer is (C).

When this topic is tested, you will almost always see a “to” verb (known as the infinitive) and at least one *-ing* verb in the answer choices. That's how you can spot that the question is not testing you on tense but rather on complete sentences. When should you use the “to” form or the *-ing* verb? Here are some examples:

☐ I want **to ride** on the roller coaster. ✓

☐ They are on a mission **to find** double-stick tape. ✓

Emma wore her lucky sweater on test day, **thinking** it would give her an edge. ✓

As you can see, the “to” verb is not the main verb in the example sentences. In some cases, it follows the main verb idiomatically (meaning, as a set phrase), such as *want to*, *need to*, *have to*, *like to*, or *choose to*. In other cases, it’s used with a noun, such as *a mission to*, *a hope to*, *a wish to*, *courage to*, or *tendency to*. An *-ing* verb can be used within a separate phrase or clause that describes someone or something. In the example above, *thinking* isn’t the main verb in the sentence, but it begins a phrase that describes *Emma* (she is *thinking*).

Always check whether the sentence already has a main verb. If it does not, then the blank needs to provide the main verb. The “to” or *-ing* form can only be correct if the sentence already has a main verb.

It’s worth noting that an *-ing* verb can be part of the main verb in a sentence. Here are some examples:

He is jogging in the park. ✓

The competitors were preparing their notes. ✓

In these examples, there is another verb that is allowed to function as the main verb—*is* and *were*, respectively. Remember, if you see the *-ing* word by itself, it can’t be the main verb in the sentence.

A sentence can also have two or more verbs that either apply to the same subject or are part of a list:

The athletes are running laps, lifting weights, and studying technique. ✓

The job consists of **filing** papers, **taking** phone calls, and **assisting** clients. ✓

As you can see from these correct examples, the verbs must be in the same form when they are applied to the same subject or are part of a list. Here are some incorrect examples:

The athletes are running, lift weights, and to study techniques.
x

The job consists of **filing** papers, **to take** phone calls, and **assists** clients. x

Let's see how this could be tested on the Digital SAT.

 Mark for Review

3. Researchers were surprised to find white spruce trees growing in the Alaskan tundra. The spread of white spruce trees is part of Arctic greening, a phenomenon in which vegetation moves farther north as the region warms. White spruce seeds can travel long distances and _____ areas with little competition, leading to their rapid population increase.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A accessed

☐ B accessing

☐ C access

D accesses

Here's How to Crack It

Identify the category based on the question: Rules. Next, look at the answers to see what's changing: verb forms. When verbs are changing in the answer choices, always locate the subject of the sentence. Here, it's *white spruce seeds*. The sentence contains a verb for the subject, *can travel*, but notice that after that is the word *and*. There's no second subject after *and*, so the underlined portion must be another verb that goes with the same subject. Since the first verb is *can travel*, the underlined portion must be in the same form as *travel*. Eliminate (A), (B), and (D) because they aren't in the same form as *travel*. Choice (C) is in the correct form: with this answer, the sentence says *White spruce seeds can travel...and access...*which is consistent. The correct answer is (C).



Complete Sentences Drill

Answers can be found starting on [this page](#).

Time: 6 minutes

 Mark for Review

1. The Bumblebee Conservation Trust's BeeWalk project is a citizen science project where volunteers collect information about bumblebees. Researchers combine the citizen science data with land cover data to learn where bumblebees live. If the particular types of habitats bumblebees live in are identified, _____ That is the question that researchers like Dr. Penelope Whitehorn are trying to answer.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A conservation efforts could be more directed and successful?

☐ B conservation efforts could be more directed and successful.

☐ C could conservation efforts be more directed and successful?

☐ D could conservation efforts be more directed and successful.

 Mark for Review

2. Egyptologist Howard Carter led the excavations that discovered the tomb of the pharaoh Tutankhamun in 1922. At this time, the Egyptians had recently gained some independence from the British. The timings

of the discovery and these political changes led many to wonder _____.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A whether the Egyptians or the British should control access to the tomb?

☐ B should the Egyptians or the British control access to the tomb?

☐ C the Egyptians or the British to control access to the tomb.

☐ D whether the Egyptians or the British should control access to the tomb.

 Mark for Review

3. The idea of the Great American Novel, a novel that considers the national character and essence of the United States, dates from the 1800s. In the early 1900s, many _____ that the idea of the Great American Novel was out of date, but since the 1920s, this concept has re-emerged among literary circles.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A believed

☐ B believing

☐ C to believe

☐ D having believed

 Mark for Review

4. As one of the highest-ranking women working for the government in her time, Mary Margaret O'Reilly served as the Assistant Director of the United States Bureau of the Mint from 1924 through 1938. When her mandatory retirement came due in 1935, President Franklin D. Roosevelt felt she was too valuable and _____ adjustments to allow her to serve for three additional years.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A having made

☐ B making

☐ C to make

☐ D made

 Mark for Review

5. Ada Yonath is a crystallographer from Israel who focused on the structure of ribosomes. She identified the mechanisms surrounding how antibiotics attack ribosomes and then _____ the Nobel Prize in Chemistry, alongside Thomas A. Steitz and Venkatraman Ramakrishnan.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A receives

☐ B will receive

☐ receive

☐ received

COMPLETE SENTENCES DRILL ANSWERS AND EXPLANATIONS

1. C

In this Rules question, periods and question marks are changing in the answer choices, so it's testing questions versus statements. The following sentence states that *researchers like Dr. Penelope Whitehorn are trying to answer a question*, so the preceding sentence should be a question. Eliminate answers that aren't correctly written as questions.

- (A) is wrong because it has a question mark but is written as a statement.
- (B) and (D) are wrong because they are statements.
- (C) is correct because it's correctly written as a question.

2. D

In this Rules question, periods and question marks are changing in the answer choices, so it's testing questions versus statements. The beginning of the sentence provides a statement that says *The timings of the discovery and these political changes led many to wonder*, so the second part of the sentence should be a statement. Eliminate answers that aren't correctly written as statements.

- (A) and (B) are wrong because they are questions.

- (C) is wrong because, although it is a statement, it makes the sentence incomplete.
- (D) is correct because it's correctly written as a statement that makes the sentence complete.

3. A

In this Rules question, verb forms are changing in the answer choices, so it's testing sentence structure. In this case, the blank represents the main verb for the subject *many*. If the main verb is in the wrong form, the sentence won't be complete. Eliminate any answer that does not produce a complete sentence.

- (A) is correct because it's in the right form to make a complete sentence.
- (B) and (D) are wrong because an *-ing* verb can't be the main verb in a sentence.
- (C) is wrong because a "to" verb can't be the main verb in a sentence.

4. D

In this Rules question, verb forms are changing in the answer choices, so it's testing sentence structure. In this case, the blank represents a second main verb for the subject President Franklin D. Roosevelt. If the main verb is in the wrong form, the sentence won't be complete. Eliminate any answer that does not produce a complete sentence.

- (A) and (B) are wrong because an *-ing* verb can't be the main verb in a sentence.

- (C) is wrong because a “to” verb can’t be the main verb in a sentence.
- (D) is correct because it’s in the right form to make a complete sentence.

5. D

In this Rules question, verbs are changing in the answer choices, so it’s testing consistency with verbs. In this case, the verb is part of a list of two things that Yonath accomplished, the first of which is *She identified*. Highlight the word *identified*, which the verb in the answer should be consistent with. Eliminate any answer that isn’t consistent with *identified*.

- (A), (B), and (C) are wrong because *receives*, *will receive*, and *receive* aren’t consistent with *identified*.
- (D) is correct because *received* is in the same tense and form as *identified*.

Summary

- A complete sentence must have a subject and a verb.
- Statements provide information, while questions ask for information.
- Neither an *-ing* verb nor a “to” verb can be the main verb in a sentence.
- Two verbs that apply to the same subject must be in the same form.

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Chapter 13

Rules Questions: Describing Phrases

A writer is not always satisfied with a basic sentence like the ones we showed you in the last chapter. In this chapter, we'll take a look at common ways to include additional information in a sentence. Some of these pieces of information require commas, while others don't. In this chapter, you'll learn about Specifying and Extra Information and how to identify and correctly punctuate them.

WHO OR WHAT ARE YOU TALKING ABOUT?

We'll begin with the information that should not have commas separating it from other parts of the sentence. Here's our first example:

Mae Jemison became interested in space in part because of Lieutenant Uhura. ✓

This is a complete sentence, but it's not a great topic sentence. That's because it doesn't actually introduce who we're talking about. If you don't know who Mae Jemison or Lieutenant Uhura is, you may be wondering why we bothered to tell you this. So, let's add some additional details to make this sentence more meaningful:

Astronaut Mae Jemison became interested in space in part because of **Star Trek character** Lieutenant Uhura. ✓

This sentence makes a lot more sense, doesn't it? Digital SAT passages will not assume that you are familiar with the often obscure people and events they are describing, so you'll typically see titles and labels that appear before a person's name, a book title, or any other noun that needs to be explained. As you can see, these titles function like adjectives to describe the noun, so there is no punctuation used between the title and the name.

Labels that precede a person's name, a book title, or any other potentially unfamiliar noun are never followed by a comma.

Let's see an example of how this can be tested on the Digital SAT.

 Mark for Review

1. The understanding of cancer genomics was greatly expanded by _____ Bert Vogelstein, a doctor whose research on colorectal cancer has led to identifying numerous genes associated with cancer and new tools to diagnose cancer earlier.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A scientist,

☐ B scientist;

☐ C scientist:

☐ D scientist

Here's How to Crack It

First identify the category: Rules. In that case, look at the answers to see what's changing. The punctuation is changing, so the question is testing punctuation rules. The word *scientist* comes before a person's name. Is Bert Vogelstein a scientist? Yes, he's *a doctor* who has done *research*. Thus, the word *scientist* is a title that precedes Vogelstein's name. Remember, there's no need for punctuation in that case. Eliminate (A), (B), and (C). The correct answer is (D).

There are other kinds of phrases that are important enough in the sentence that they don't get commas. We call these phrases **Specifying Information**. Here's an example:

The person **who sold me my bike** offered to give me a discount.

✓

The person, **who sold me my bike**, offered to give me a discount. ✕

By separating the phrase from the sentence with commas, the second example implies that this information isn't essential to the sentence's meaning—as you'll learn later on, information that could be removed without affecting the sentence's meaning should be surrounded by commas, dashes, or parentheses. But if we remove the phrase, it says *The person offered to give me a discount*. Which person? While this is a complete sentence without the phrase, it's not clear who we are talking about. So, the phrase shouldn't be separated by punctuation. It specifies which person we are talking about. Here are some more examples of information coming after a noun that doesn't get commas:

The paper airplane **that travels farthest** will be the winner. ✓

The dog **sniffing the fence** is mine. ✓

That bakery offers discounts for anyone **who has taken a bus tour**. ✓

The backpack **on the floor** isn't hers. ✓

The girl **whose book I borrowed** told me not to write in it. ✓

In all of these examples, the phrase that comes after the noun or pronoun specifies *which* person or thing we're talking about. Which paper airplane? The one that travels farthest. Which dog? The one sniffing the fence. Which anyone (okay, that doesn't work grammatically, but you could say "Which people")? Those who have taken a bus tour. Which backpack? The one on the floor. Which girl? The one whose book I borrowed. All of this Specifying Information is used to specify which person or thing is being discussed.

As you can see from the examples above, Specifying Information can come in different forms. To make things a bit easier, we'll give you a couple of rules that will help with some of the questions that test this topic.

Specifying Information Rules

1. Phrases that begin with "that" are always Specifying and never get commas around them.
2. Prepositional phrases are usually Specifying and don't get commas unless they appear at the beginning of the sentence.

Let's take a closer look at that second rule. First, we need to define a **prepositional phrase**, which starts with the definition of **preposition**. A preposition is a small, directional word such as *in*, *of*, *for*, *by*, *with*, *on*, or *to*. So, a prepositional phrase is a phrase that begins with a preposition, such as *in the house*, *of my friends*, *for you*, or *by the tree*. Here's an example of how that works with commas:

Squirrels were playing *at the top of the tree*. ✓

At the top of the tree, squirrels were playing. ✓

Squirrels *at the top of the tree* were playing. ✓

The prepositional phrase here is *at the top of the tree* (actually, it's two prepositional phrases put together: *at the top* and *of the tree*). When it comes later in the sentence, this phrase is Specifying and isn't separated from the sentence with commas. However, when the prepositional phrase comes at the beginning of the sentence, it is followed by a comma. Without the comma, the sentence could be a bit confusing because it has *tree* and *squirrels* right in a row. If you read the sentence this way (*At the top of the*

tree squirrels were playing), it's easy to miss where the prepositional phrase ends and where the rest of the sentence begins. For that reason, (see what we did there?) prepositional phrases are usually followed by commas when they come at the beginning of the sentence, and they usually do not have commas when they come elsewhere.

Although this is a “usually” rule, it's not likely that College Board would test you on this in a way that isn't obvious. That's because this is one of the few comma rules that is actually reflected in how we speak. You would likely put a small pause after the prepositional phrase in the second example above, but you probably wouldn't have any pause in the other two examples. This will help you know when to use a comma in this context.

EXTRA! EXTRA! PUT PUNCTUATION AROUND IT!

We saw earlier that titles that precede a name never have commas. The exception to this rule is if the description contains the word “a” or “an.” Here's an example:

***An astronaut,** Mae Jemison became interested in space in part because of Star Trek character Lieutenant Uhura. ✓*

A description with “a” or “an” can go before or after the person's name, but it must always be separated from the name by commas. In that case, we call it **Extra Information**. Let's see some examples.

*Mae Jemison, **an astronaut,** became interested in space in part because of Lieutenant Uhura, **a Star Trek character.** ✓*

*Mae Jemison (**an astronaut**) became interested in space in part because of Lieutenant Uhura, **a Star Trek character.** ✓*

Mae Jemison, **an astronaut**, became interested in space in part because of Lieutenant Uhura—a **Star Trek character**. ✓

All of these examples are correctly punctuated. Both of the names in the sentence refer to specific people, so the information that follows the names can be removed without changing the meaning of the sentence. In that case, it's Extra Information, and it needs to be separated from the rest of the sentence using two commas, two parentheses, or two dashes. (Note that if the Extra Information comes at the beginning or end of the sentence, as in the case of *a Star Trek character* above, it only needs a single punctuation mark to separate it.)

Let's compare two sentences that are punctuated differently to understand what they mean:

An astronaut, Mae Jemison became interested in space in part because of Star Trek character Lieutenant Uhura. ✓

An astronaut, **Mae Jemison**, became interested in space in part because of Star Trek character Lieutenant Uhura. ✓

In the first sentence, *Mae Jemison* is the subject, and *an astronaut* is simply giving her a description. In the second sentence, *An astronaut* is actually the subject. Since *Mae Jemison* is separated with commas, it's Extra Information, which means that it could be removed from the sentence. This suggests that in the second example the point is that there was an astronaut whose interest in space was spurred in part by the *Star Trek* character, but her name isn't important to the author's point. The first example could be used if the author is telling us about Jemison. If the author is telling us about Lieutenant Uhura or *Star Trek*, however, the second example could be perfectly fine, as the author only wants us to know that an astronaut was inspired—who it was isn't important.

The fact that we just showed you an example of the same sentence with and without a comma may seem concerning, but don't worry. College Board will never give you two answer choices that can both work. You would not see both of these sentences in the answer choices since they could both be logical.

Another way to think of the phrase *An astronaut* in the first example above is that it is a describing phrase. We saw how describing phrases beginning with “a” or “an” are followed by a comma. We can call this a noun phrase because the “a” or “an” always comes before a noun.

There are many other kinds of describing phrases that get commas around them because they are Extra Information. Let's see another version of a noun phrase as well as some examples of other types of describing phrases.

A noun phrase: Summer, ***my favorite time of year***, is when I go to camp. ✓

A phrase beginning with an -ing verb: ***Having stayed up all night playing video games***, Isaiah was not surprised that he felt terrible the next day. ✓

A phrase beginning with an -ed verb or an irregular past participle (such as forgotten, known, begun, hidden, or kept): ***Located in Maryland***, Baltimore has a rich history. ✓

A phrase beginning with *which*, *who*, *whom*, or *whose* or that contains a preposition + one of those words (such as *of whom* or *in which*): Summer, ***which is my favorite time of year***, is when I go to camp. ✓

A clause with a “to be” verb removed: Ella timidly blew into the trumpet, ***the sound barely audible***. ✓

A definition or alternative term starting with *or*: The humerus, **or funny bone**, is an arm bone that runs from one's shoulder to one's elbow. ✓

In some cases, a describing phrase can come either before or after the person or thing it's describing. Here are some examples, which you can compare to the previous ones:

Isaiah, **having stayed up all night playing video games**, was not surprised that he felt terrible the next day. ✓

Baltimore, **located in Maryland**, has a rich history. ✓

My favorite time of year, summer is when I go to camp. ✓

Remember, most of these types of describing phrases can be either Specifying or Extra Information. For example, phrases with *who* are sometimes needed in order to specify which person is being discussed. You'll need to try removing the phrase from the sentence to see whether it's needed in order to specify who or what is being discussed. If it's not needed, it's Extra.

Lastly, note that transitions such as *however*, *in addition*, *moreover*, or *therefore* are always followed by a comma if they come at the beginning of a sentence, and they are surrounded by commas if they appear in the middle. These transitions are considered Extra Information because the sentence still works without them.

Let's see some examples of how the Specifying vs. Extra Information topic can be tested on the Digital SAT.

2. To measure the flow of pitch (highly viscous liquids which appear solid, such as asphalt), scientists use what is known as a pitch drop experiment. In this _____ a funnel filled with pitch allows the pitch to drop into a container below. In most pitch drop experiments, a single drop falls approximately once every ten years.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A experiment, the most famous of which was started in 1927 at the University of Queensland,

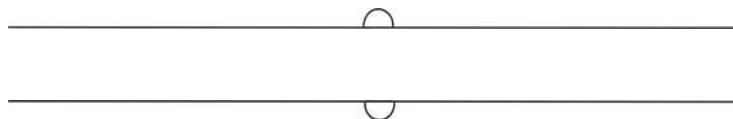
☐ B experiment, the most famous of which was started in 1927 at the University of Queensland

☐ C experiment the most famous of which was started in 1927 at the University of Queensland,

☐ D experiment the most famous of which was started in 1927 at the University of Queensland

Here's How to Crack It

Start by identifying the category, which is Rules, as evidenced by the question. As per the strategy, look to the answers to see what's changing: all the words are the same, but the commas change, and they seem to be surrounding the phrase *the most famous of which was started in 1927 at the University of Queensland*. If this is Extra Information, it does need commas before and after the phrase. To test, try removing the phrase from the sentence. Then it reads *In this experiment, a funnel filled with pitch allows the pitch to drop into a container below*. This is perfectly fine, so the phrase is Extra Information and thus needs punctuation before and after. Eliminate (B), (C), and (D) because they don't have a comma both before and after. The correct answer is (A).



 Mark for Review

3. In his writings, Vietnamese American poet and novelist Ocean Vuong combines the folkloric traditions and oral storytelling of Vietnam and experimentation with the English language to explore trauma and identity. His poetry collection _____ contains numerous poems about the Vietnam War and its effects, while his novel *On Earth We're Briefly Gorgeous* is written as a letter from a son to his mother and explores both personal and colonial histories.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A *Night Sky with Exit Wounds*:

☐ B *Night Sky with Exit Wounds*

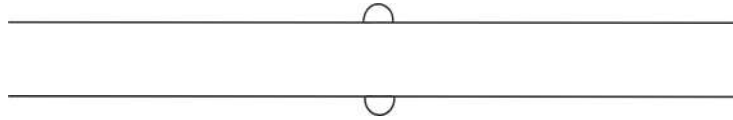
☐ C *Night Sky with Exit Wounds*,

☐ D *Night Sky with Exit Wounds*—

Here's How to Crack It

The question lets you know that this is a Rules question, and the answers reveal that it's testing punctuation. Start from the beginning of the sentence: it says *His poetry collection*, and the part after gives the name of the collection. This is a good clue that the question is testing Specifying versus Extra Information. If the phrase is Specifying, it will not have any punctuation around it, but if it's Extra, it will need matching punctuation before and after. Notice that the part before the blank doesn't have any punctuation, though. This proves that the phrase is Specifying, as there's no

way to put any punctuation before the phrase. Therefore, you can eliminate all of the answers with punctuation: (A), (C), and (D). The correct answer is (B).



 Mark for Review

4. A jazz cellist and composer known for her unique sounds and blend of musical _____ Tomeka Reid founded the Chicago Jazz String Summit in 2013 and continued to organize it as an annual event.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A traditions,

☐ B traditions;

☐ C traditions:

☐ D traditions

Here's How to Crack It

Look at the question to determine that the category is Rules, and look at the answers to determine that the topic is punctuation. Start at the beginning of the sentence: it says *A jazz cellist and composer known for her unique sounds and blend of musical traditions* and then gives a person's name. This is a describing phrase beginning with "A." According to the rule, these phrases should always get commas around them, as they are Extra Information. Eliminate (B), (C), and (D) as they don't have a comma after the phrase. The correct answer is (A).

If you feel a little iffy about this Extra versus Specifying Information idea, it's worth keeping in mind that while there are gray areas with this rule, those ambiguities aren't tested on the Digital SAT. On the test, it should be obvious whether the information is Extra or not if they give you the option of no punctuation versus matching punctuation before and after.

Extra Information Rules

1. Extra Information can come before or after the noun or pronoun it's describing.
2. Extra Information can be removed and produce a sentence with the same meaning, just a little less detail. It's not needed for specifying which person or thing you're talking about.
3. Extra Information must always have commas, dashes, or parentheses both before and after the phrase.
4. If you're not sure whether the information is Extra or Specifying, try removing it from the sentence. If it is Extra, its removal will not affect your understanding of who or what the sentence is about.

SPECIFYING VS. EXTRA INFORMATION EXERCISE

Determine whether each bolded phrase is Specifying or Extra Information. If it is Specifying, put a checkmark because no punctuation is needed. If it is Extra, add commas where they are needed. Answers are on [this page](#).

1. Composer and librettist Stephen Sondheim **who studied with Oscar Hammerstein and Milton Babbitt** was known for his creative

wordplay and tightly constructed musical ideas.

2. The person **who composed “Dies Irae”** is unknown.
3. **Intending to finish my homework before school** I set my alarm earlier than usual.
4. Intending **to do well** is not enough to succeed.
5. Senegal **a country in Africa** is the westernmost country in Africa, Europe, or Asia.
6. The tortoise **that lives in our backyard** hibernates during the winter.
7. Some careers **such as medicine and law** require education beyond a bachelor’s degree.
8. The chance for rain tomorrow **according to the weather station** is high.
9. My favorite book **kept away from me as punishment** was returned by my parents.
10. **British engineer** George Stephenson was known for his contributions to the improvement of railways.

s

A final topic that is occasionally tested on the Digital SAT is how to properly construct the describing phrases we went over earlier. Here’s an example.

 Mark for Review

5. Rachel Fuller Brown, a chemist, and Elizabeth Lee Hazen, a microbiologist, started working together to research fungi and bacteria. At the time, antibiotics would kill all bacteria, allowing fungus to grow out of control and cause diseases. Brown and Hazen began their project in 1948 and eventually created a drug called Nystatin, the first antifungal _____ cures fungal infections in humans.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A antibiotic, that

☐ B antibiotic

☐ C antibiotic that

☐ D antibiotic,

Here's How to Crack It

Start by looking at the question to determine that it's in the Rules category. Next, look at the answers to see what's changing. In this case, it's commas and the word *that*. This is a good clue that the question is testing the construction of describing phrases. Read from the beginning of the sentence: *Brown and Hazen began their project in 1948 and eventually created a drug called Nystatin* is already a complete sentence, also known as an independent clause. Then it's followed by a comma and a description of the drug.

Start with the options that don't contain *that*, (B) and (D). With (B), the second part of the sentence would say *the first antifungal antibiotic cures fungal infections in humans*. This is an independent clause, and it's not correct to link two independent clauses with only a comma (we'll talk much more about this in the next chapter). Thus, eliminate (B). Next, look at (D).

In this answer choice, *the first antifungal antibiotic* is Extra Information since it's separated with commas. So, if this is Extra, try reading the sentence without the phrase. It reads...*eventually created a drug called Nystatin cures fungal infections in humans*. The verb *cures* does not have a subject here—if it's referring to *Nystatin*, there would need to be a word such as *which* to refer back to *Nystatin*. This isn't a complete sentence with the extra verb, so eliminate (D).

Now that we recognize that *that* is needed, the hard part is finished. This is because we know that phrases beginning with *that* are always Specifying and don't get commas. So, eliminate (A). The correct answer is (C). This correctly completes the describing phrase.



Watch Us Crack It

Watch the step-by-step video explanation of how to answer this question in your Student Tools.

ANSWERS TO SPECIFYING VS. EXTRA INFORMATION EXERCISE

1. Extra—put commas before and after the bolded phrase
2. Specifying—correct as written
3. Extra—put a comma after the bolded phrase
4. Specifying—correct as written
5. Extra—put commas before and after the bolded phrase
6. Specifying—correct as written
7. Extra—put commas before and after the bolded phrase

- 8. Extra—put commas before and after the bolded phrase
- 9. Extra—put commas before and after the bolded phrase
- 10. Specifying—correct as written

Describing Phrases Drill

Answers can be found starting on [this page](#).

Time: 7 minutes

 Mark for Review

1. In 1965, farm workers participated in a labor strike against grape growers to protest exploitation of farm workers. The five-year strike was the first time many common strike tactics were used—boycotts, community organization, nonviolent resistance, and _____ and ultimately resulted in a victory for the farm workers.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A marches

☐ B marches—

☐ C marches;

☐ D marches,

 Mark for Review

2. Israeli poet and _____ has used his studies of ancient religions in his works *The Song of Tahira*, an epic about a fictional society's religion and customs, and *The Kingdom*, a novel about the life of King David.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A novelist, Amir Or

☐ B novelist Amir Or

☐ C novelist, Amir Or,

☐ D novelist Amir Or,

 Mark for Review

3. Ultrasound technology utilizes a form of sound waves and is used in medicine to generate images of areas of the human body. John J. _____ as the father of medical ultrasound, helped develop the technology with a focus on imaging cancerous cells.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A Wild, known

☐ B Wild known

☐ C Wild—known

☐ D Wild (known

 Mark for Review

4. By activating multiple pathways in the brain at once, scientists hope to treat neurological disorders. For example, _____ may be able to be treated by simultaneously stimulating brain cells devoted to hearing and brain cells devoted to pain.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A tinnitus, or ringing in the ears

☐ B tinnitus, or ringing in the ears,

☐ C tinnitus or ringing in the ears,

☐ D tinnitus or ringing in the ears

 Mark for Review

5. Gronk, born Glugio Nicandro, is a Chicano _____ shows his work not only in galleries but also in public spaces, going so far as to distribute flyers featuring his work at bus stops.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A artist,

☐ B artist

☐ C artist, which

☐ D artist who

 Mark for Review

6. Maki Kawai is a chemist from Japan who invented spatially selective single-molecule spectroscopy. She combined two forms of spectroscopy into this new _____ led to the detection of a novel reaction pathway on the superficial level of titanium dioxide.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A method

☐ B method, which

☐ C method, that

☐ D method,

DESCRIBING PHRASES DRILL ANSWERS AND EXPLANATIONS

1. B

In this Rules question, punctuation is changing in the answer choices. The first part of the sentence says *The five-year strike was the first time many common strike tactics were used—boycotts, community organization, nonviolent resistance, and marches*, which contains a dash. A pair of dashes can be used to indicate Extra Information. If the phrase *boycotts, community organization, nonviolent resistance, and marches* is Extra Information, it does need dashes before and after the phrase. To test, try removing the phrase from the sentence. Then it reads *The five-year strike was the first time many common strike tactics were used and ultimately resulted in a victory for the farm workers*. This is perfectly fine, so the phrase is Extra Information and thus needs matching punctuation before and after. Eliminate answers that do not have a dash.

- (A) is wrong because it doesn't have punctuation after the Extra Information.
- (B) is correct because it has a dash after the Extra Information, which matches the dash before the Extra Information.

- (C) and (D) are wrong because they don't use a dash after the Extra Information.

2. B

In this Rules question, punctuation is changing in the answer choices. The first part of the sentence says *Israeli poet and novelist Amir Or*. The word *novelist* is a title for *Amir Or*, so no punctuation should be used between *novelist* and *Amir Or*. The verb (*has used*) comes right after this. A single punctuation mark can't separate a subject and a verb. Eliminate answers that use punctuation.

- (A) and (C) are wrong because there should be no punctuation between *novelist* and *Amir*, since it's a title.
- (B) is correct because no punctuation should be used here.
- (D) is wrong because a single punctuation mark can't come between a subject and a verb.

3. A

In this Rules question, punctuation is changing in the answer choices. The first part of the sentence says *John J. Wild*, which is the subject. The phrase after the subject, *known as the father of medical ultrasound*, ends with a comma, which indicates it may be Extra Information. To test, try removing the phrase from the sentence. Then it reads *John J. Wild helped develop the technology with a focus on imaging cancerous cells*. This is perfectly fine, so the phrase is Extra Information and thus needs matching punctuation before and after. Eliminate answers that do not have a comma.

- (A) is correct because it has a comma before the Extra Information.

- (B), (C), and (D) are wrong because they don't separate the Extra Information with a comma before the phrase to match the one after.

4. **B**

In this Rules question, punctuation is changing in the answer choices. The first part of the sentence says *For example, tinnitus*. In the answer choices, commas appear around the phrase *or ringing in the ears*, indicating that it may be Extra Information. To test, try removing the phrase from the sentence. Then it reads *For example, tinnitus may be able to be treated by simultaneously stimulating brain cells devoted to hearing and brain cells devoted to pain*. This is perfectly fine, so the phrase is Extra Information and thus needs matching punctuation before and after. Eliminate answers that do not have commas before and after the Extra Information.

- (A) and (C) are wrong because they only have one comma, not a pair, around the Extra Information.
- (B) is correct because it has commas before and after the Extra Information.
- (D) is wrong because it doesn't separate the Extra Information with two commas.

5. **D**

In this Rules question, commas and the words *which* and *who* are changing in the answers, which suggests that the question is testing the construction of describing phrases. The first part of the sentence says *Gronk, born Glugio Nicandro, is a Chicano artist*, which is an independent clause. The second part of the sentence says *shows his work not only in galleries but also in public spaces, going so far as to distribute flyers featuring his work at bus stops*, which is a describing

phrase and needs to be properly constructed. Eliminate any answer that doesn't properly construct the describing phrase.

- (A) and (B) are wrong because the describing phrase needs a subject for the verb *shows*.
- (C) is wrong because *which* cannot be used with people.
- (D) is correct because *who* is used with people and is the subject of the verb *shows*.

6. **B**

In this Rules question, commas and the words *which* and *that* are changing in the answers, which suggests that the question is testing the construction of describing phrases. The first part of the sentence says *She combined two forms of spectroscopy into this new method*, which is an independent clause. The second part of the sentence says *led to the detection of a novel reaction pathway on the superficial level of titanium dioxide*. The second part of the sentence is a describing phrase and needs to be properly constructed. Eliminate any answer that doesn't properly construct the describing phrase.

- (A) and (D) are wrong because *led* is missing a subject.
- (B) is correct because *which* is the subject of *led* and properly constructs a describing phrase.
- (C) is wrong because a phrase starting with "that" is Specifying and never follows a comma.

Summary

- Specifying Information is needed in order to tell *which* person or thing the sentence is discussing.
- Specifying Information should never be separated from the rest of the sentence with punctuation. If it were removed, the meaning of the sentence would change and become unclear or nonsensical.
- Extra Information can be removed from the sentence without affecting the sentence's meaning.
- Extra Information must be separated from the sentence with commas, dashes, or parentheses both before and after, unless it appears at the beginning or end of the sentence.
- If you're not sure whether something is Specifying or Extra Information, try removing it from the sentence to see whether the meaning is affected.
- Use clues in the part of the sentence before and/or after the blank. If the phrase already has or does not have punctuation before or after it, then the blank simply needs to match.

Chapter 14

Rules Questions: Linking Independent Clauses

Now that you have learned how to construct a complete sentence, the next step is to see how two complete sentences, also known as independent clauses, can be combined. You'll also learn the various ways that they should never be combined so that you can eliminate the answers that make those mistakes.

HOW TO CONNECT INDEPENDENT CLAUSES

We've seen how a complete sentence is constructed. Of course, it's also possible to put two complete sentences together—in this case, we'll refer to the individual sentences as **independent clauses**. An independent clause is something that could stand alone as a sentence—that's why it's called independent! Next, we're going to look at how to put two independent clauses together in the same sentence. Let's take a look at a few different types of punctuation marks and how they are used.

Semicolons

A semicolon is a punctuation mark that functions like a period; it is used between two ideas that could be their own separate sentences. See how we did that? Anytime you see a semicolon in the answer choices, look to see whether you have two independent clauses, or ask yourself whether a period could be used there. If a period can be used, then a semicolon can be used. (There is an exception to this rule that involves lists, which will be covered in the next chapter.)

Commas

A comma can *never* link two independent clauses. A sentence that does this creates an error called a comma splice or a run-on sentence. A comma can be used with two independent clauses if there is a **coordinating conjunction**, also known as **FANBOYS**: For, And, Nor, But, Or, Yet, So. Earlier, we saw examples similar to this:

He brushed his teeth and went to bed. ✓

This sentence has a single subject and two verbs that go along with the one subject. What if we add a subject for the second verb? Then we'd have two independent clauses, and we'd need to put a comma before the coordinating conjunction. Here's how that looks:

He brushed his teeth, and he went to bed. ✓

Both of these sentences are perfectly fine. It simply depends on what you wish to write. When it comes to the Digital SAT, you'll need to know this rule:

You must put a comma before a coordinating conjunction (FANBOYS) if there are independent clauses both before and after the conjunction.

FANBOYS:

For

And

Nor

But

Or

Yet

So

Here are some examples of incorrect ways to write this sentence, at least when it comes to the Digital SAT.

He brushed his teeth, he went to bed. x

He brushed his teeth and he went to bed. x

These sentences might seem okay for casual writing, but when it comes to the rules that are tested on the Digital SAT, it's very important to remember that a comma by itself can never come in between two independent clauses, nor can the FANBOYS word on its own.

Colons and Dashes

Using a colon is a great way to make writing more concise. Here's an example:

For the test, we need to bring three items, which are a pencil, a calculator, and a ruler. ✓

For the test, we need to bring three items: a pencil, a calculator, and a ruler. ✓

A colon tells you that what comes after is going to elaborate on or explain what came before. In this case, it tells us that the *three items* are going to follow the colon. Here, we used a list after the colon, which you may be comfortable with. But colons can come before an explanation or a definition as well. Here's an example:

English punctuation is not always easy: there are often several possible ways to punctuate a sentence. ✓

In this case, the part after the colon is another independent clause, and it explains the first part—why punctuation *is not always easy*. You might be thinking that you would punctuate this sentence differently. If so, that's perfectly fine. Here are a few other ways this could be written:

English punctuation is not always easy. There are often several possible ways to punctuate a sentence. ✓

English punctuation is not always easy; there are often several possible ways to punctuate a sentence. ✓

English punctuation is not always easy—there are often several possible ways to punctuate a sentence. ✓

English punctuation is not always easy, for there are often several possible ways to punctuate a sentence. ✓

English punctuation is not always easy because there are often several possible ways to punctuate a sentence. ✓

Since we have two independent clauses, we could use either a semicolon or a period—remember that they are interchangeable in this context. We can also use a dash, which suggests the same thing a colon does and can be used the same way. It's also possible to add a coordinating conjunction (in this case, we used *for*) with a comma, since we have two independent clauses. Lastly, you could add a **subordinating conjunction** such as *because* to connect the ideas, which we will talk more about in the next chapter. It's important to keep in mind that College Board will *never* give you more than one answer that could be correct. You won't be asked to choose between two punctuation marks that both work in a given context.

It's worth noting that there is an incorrect way students might like to write sentences using colons. Here's an example:

My favorite colors are: silver, pink, and yellow. ✕

Here's how that should be written:

My favorite colors are silver, pink, and yellow. ✓

There's no need for a colon here. As we saw above, the part after the colon does not have to be an independent clause. However, when it comes to the Digital SAT, the part before the colon does need to be an independent clause. Therefore, another way to write that example is as follows:

I have three favorite colors: silver, pink, and yellow. ✓

A colon or a single dash can only come after an independent clause.

Let's put all of those rules together.

Two independent clauses can be joined with...

- A semicolon, anytime (;)
- A comma plus an appropriate coordinating conjunction (**FANBOYS**)
- A colon or a dash, if the second part of the sentence explains the first in some way (: or —)

Two independent clauses can NEVER be joined with...

- A comma without a coordinating conjunction
- A coordinating conjunction without a comma
- No punctuation to separate the independent clauses

Now that we have seen the different ways to connect independent clauses, let's try a few Digital SAT-style questions to put it all together.

 Mark for Review

1. American folk musician Mike Seeger came from a family of _____ parents, Ruth Crawford Seeger and Charles Louis Seeger, Jr., were composers and ethnomusicologists, and his half-brother Pete Seeger was also a folk singer.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A musicians, his

☐ B musicians, his,

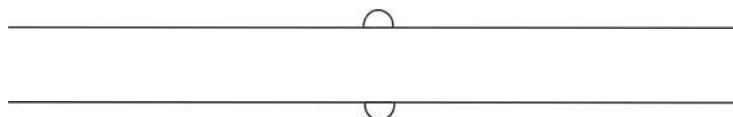
☐ C musicians his

☐ D musicians; his

Here's How to Crack It

Start by looking at the question to identify the question type: Rules. Next, look at the answer to see what's changing and determine what the question is testing. The punctuation after *musicians* is changing, so look for independent clauses. Start at the beginning of the sentence: *American folk musician Mike Seeger came from a family of musicians.* That's an independent clause. Take a look at the rest of the passage, including the first word in the answer choices: *His parents, Ruth Crawford Seeger and Charles Louis Seeger, Jr., were composers and ethnomusicologists, and his half-brother Pete Seeger was also a folk singer.* This is also an independent clause, so eliminate any answers that contain punctuation that creates a run-on sentence.

Eliminate (A), (B), and (C) because a comma without a coordinating conjunction and no punctuation at all are not correct ways to combine two independent clauses; they each create a run-on sentence. Choice (D) has a semicolon, which is an appropriate way to link two independent clauses. The correct answer is (D).



 Mark for Review

2. Physicist Edward Witten is known for his rigorous use of mathematics in his research. He was the first physicist to earn the Fields Medal from the International Mathematical Union. Witten earned his professional reputation as a _____ he was originally interested in politics, publishing articles in *The New Republic* and *The Nation* and working on George McGovern's presidential campaign.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A scientist, but

☐ B scientist,

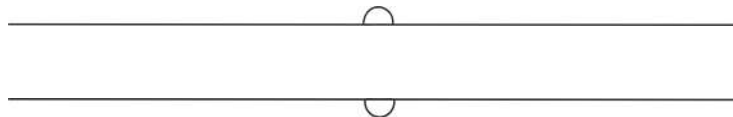
☐ C scientist but

☐ D scientist

Here's How to Crack It

Look at the question to see that this is in the Rules category, so check what's changing in the answers: commas with a coordinating conjunction. Look for independent clauses. The first part of the sentence says *Witten earned his professional reputation as a scientist*. That's an independent clause. Read the rest of the sentence as it is: *he was originally interested in politics, publishing articles in *The New Republic* and *The Nation* and working on George McGovern's presidential campaign*. This is also an independent clause. We know that a comma by itself or no punctuation at all can never go in between two independent clauses; that would create a run-on sentence. Eliminate (B) and (D).

Since there are two independent clauses, you can connect them with a coordinating conjunction if you use a comma as well. That knowledge allows you to eliminate (C), which has the coordinating conjunction but not the comma, which isn't okay when you have two independent clauses. The correct answer is (A).



 Mark for Review

3. Fordlandia is a district located in Brazil on the Tapajós river that was founded in 1928 to serve as a hub of _____ the goal was for the

10,000 inhabitants to generate rubber for the Ford Motor Company to use when making automobiles.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A industry while

☐ B industry

☐ C industry,

☐ D industry:

Here's How to Crack It

Identify that this is a Rules question, and then go to the answers to see that it's testing punctuation. Read from the beginning of the sentence and look for independent clauses. The first part says *Fordlandia is a district located in Brazil on the Tapajós river that was founded in 1928 to serve as a hub of industry*, which is an independent clause. Read the second part of the sentence without the word *while* in (A): *the goal was for the 10,000 inhabitants to generate rubber for the Ford Motor Company to use when making automobiles*. This is also an independent clause, so eliminate (B) and (C) because two independent clauses must be separated by some punctuation other than a comma alone.

Keep (D) because a colon can come after an independent clause if the second part of the sentence elaborates on the first. In this case, the second independent clause explains how the district would be a *hub of industry*, so the colon is appropriate. Consider (A) next. The word *while* isn't the appropriate connector in this case; *while* is used either to show a contrast, which isn't appropriate here, or to express two events happening at the same time, which also isn't the link between the clauses. Eliminate (A). The correct answer is (D).

PUNCTUATION WITH TRANSITIONS

A final, trickier way that College Board likes to test you on connecting independent clauses is to make you determine where the punctuation goes based on which part of the sentence gets a transition, which is a word or phrase such as *however*, *for example*, or *in addition* that shows the reader what direction the ideas are going to move in. Take a look at the next example.

 Mark for Review

4. Researchers at the University of Edinburgh have discovered a link between learning a musical instrument as a child and improved cognitive skills later in _____. emeritus Ian Deary warns that this effect was small and that it is difficult to prove that learning an instrument causes greater mental abilities.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A life. However, professor

☐ B life, however. Professor

☐ C life, however, professor

☐ D life, however: professor

Here's How to Crack It

Use the question to identify the category, Rules, and then the answers to determine the topic, punctuation. Notice that two options have periods—(A)

and (B)—but one has the period before the transition (*however*), and one has the period after. This means that in addition to punctuation, you're being tested on whether the transition belongs with the first or the second part of the sentence. Start by reading the first part, which says *Researchers at the University of Edinburgh have discovered a link between learning a musical instrument as a child and improved cognitive skills later in life*. This is an independent clause, but is it contrasting with something that came before? No, because there is nothing before. Thus, *however*, shouldn't go with the first part of the sentence, and (B), (C), and (D) can be eliminated.

To confirm, read the second part of the sentence: *professor emeritus Ian Deary warns that this effect was small and that it is difficult to prove that learning an instrument causes greater mental abilities*. This is also an independent clause, and it does provide a contrast—the first clause says there is *a link* between two things, but the second part *warns* that the *effect was small and difficult to prove*. Thus, it is appropriate for the contrast word to be in the second idea. The correct answer is (A).



As you saw in the last example, it's important to keep an eye out for questions in which the transition can go with one part of the sentence or the other. When you see this being tested, you will need to look back at the previous sentence, if there is one.

Linking Independent Clauses Drill

Answers can be found starting on [this page](#).

Time: 10 minutes

 Mark for Review

1. José Barreiro is a Cuban-American novelist who serves as an advocate for Indigenous culture and history for native communities in Guatemala, Cuba, and _____. Barreiro works with the Smithsonian Institution to ensure that the communities are recognized respectfully and accurately.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A Peru

☐ B Peru,

☐ C Peru and

☐ D Peru.

 Mark for Review

2. There are many proteins that control the cell cycle and when cells grow and divide. Sir Paul Maxime Nurse discovered one of these proteins in yeast _____. he was awarded the Nobel Prize in Physiology or Medicine alongside Leland Hartwell and Tim Hunt for identifying a similar protein in human cells.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A cells and

☐ B cells, and

☐ C cells

☐ D cells,

 Mark for Review

3. Since many of his works are sardonic, some of Chinese author Yan Lianke's stories have been viewed as controversial. Many of his works question reality and utilize twisted and complex _____ these personas often display apprehension and concern about the living conditions in China.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A characters and

☐ B characters

☐ C characters;

☐ D characters,

 Mark for Review

4. Jenny Tung is an evolutionary anthropologist who studies the connections between genomics, health, and social experiences in different populations of primates and monkeys. While studying a

population of Kenyan baboons, she found several factors that led to significantly shorter life _____ environmental conditions, such as droughts, isolation from other baboons, and lower social status within the community.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A spans:

☐ B spans

☐ C spans;

☐ D spans,

 Mark for Review

5. In 1984, Romanian poet and politician Ana Blandiana wrote her first protest poem against her country's communist _____ "Totul," which contrasted the government's official statements about life in Romania with her and others' lived experiences.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A government:

☐ B government;

☐ C government

☐ D government.

 Mark for Review

6. The oldest known surviving film is *Roundhay Garden Scene*, a short silent piece filmed by a French artist. The film has been preserved in multiple _____ it was copied onto glass plates from the original negative, and it was printed on 35 mm film.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A forms

☐ B forms:

☐ C forms, for example

☐ D forms,

 Mark for Review

7. Scientist Margaret S. Collins was the first African American female entomologist and was known as the “Termite Lady.” Starting in the 1970s, she began researching termites for the Smithsonian’s National Museum of Natural _____ in 1989, she discovered a new species of termite called *Neotermes luykxi* with her colleague David Nickle.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A History, then,

☐ B History,

☐ C History;

☐ D History then,

 Mark for Review

8. In languages, classifiers are used to describe a noun, such as how “cups” describes “coffee” in the phrase “three cups of coffee.” Unlike English, which only sometimes uses classifiers, Chinese languages use classifiers very frequently. Often, the specific classifier used is based on some quality of the _____ objects such as tables and paper use “zhāng,” whereas long, thin objects such as sticks and pens use “tiáo.”

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A noun, for example, flat

☐ B noun, for example. Flat

☐ C noun. For example, flat

☐ D noun for example flat

LINKING INDEPENDENT CLAUSES DRILL ANSWERS AND EXPLANATIONS

1. D

In this Rules question, punctuation is changing in the answer choices. The first part of the sentence says *José Barreiro is a Cuban-American novelist who serves as an advocate for Indigenous culture and history for native communities in Guatemala, Cuba, and Peru*, which is an independent clause. The second part says *Barreiro works with the Smithsonian Institution to ensure that the communities are recognized respectfully and accurately*, which is also an independent clause. Eliminate any answer that can’t correctly connect two independent clauses.

- (A) is wrong because it creates a run-on sentence.
- (B) and (C) are wrong because neither a comma alone nor a coordinating conjunction (FANBOYS) alone can connect two independent clauses.
- (D) is correct because two independent clauses can be two separate sentences.

2. B

In this Rules question, punctuation is changing in the answer choices. The first part of the sentence says *Sir Paul Maxime Nurse discovered one of these proteins in yeast cells*, which is an independent clause. The second part says *he was awarded the Nobel Prize in Physiology or Medicine alongside Leland Hartwell and Tim Hunt for identifying a similar protein in human cells*, which is also an independent clause. Eliminate any answer that can't correctly connect two independent clauses.

- (A) and (D) are wrong because neither a comma alone nor a coordinating conjunction (FANBOYS) alone can connect two independent clauses.
- (B) is correct because a comma + a coordinating conjunction (FANBOYS) can connect two independent clauses.
- (C) is wrong because it creates a run-on sentence.

3. C

In this Rules question, punctuation is changing in the answer choices. The first part of the sentence says *Many of his works question reality and utilize twisted and complex characters*, which is an independent clause. The second part says *these personas often display*

apprehension and concern about the living conditions in China, which is also an independent clause. Eliminate any answer that can't correctly connect two independent clauses.

- (A) and (D) are wrong because neither a comma alone nor a coordinating conjunction (FANBOYS) alone can connect two independent clauses.
- (B) is wrong because it creates a run-on sentence.
- (C) is correct because a semicolon can connect two independent clauses.

4. **A**

In this Rules question, punctuation is changing in the answer choices. Look for independent clauses. The first part of the sentence says *While studying a population of Kenyan baboons, she found several factors that led to significantly shorter life spans*, which is an independent clause. The second part of the sentence says *environmental conditions, such as droughts, isolation from other baboons, and lower social status within the community*, which is a list of the *factors*. Eliminate any option that doesn't correctly connect an independent clause with a list.

- (A) is correct because a colon is appropriate to connect an independent clause and a list.
- (B) and (D) are wrong because they don't make it clear that the second part lists the *factors*.
- (C) is wrong because a semicolon can only link two independent clauses.

5. **A**

In this Rules question, punctuation is changing in the answer choices. Look for independent clauses. The first part of the sentence says *In 1984, Romanian poet and politician Ana Blandiana wrote her first protest poem against her country's communist government*, which is an independent clause. The second part of the sentence says “*Totul,*” which contrasted the government's official statements about life in Romania with her and others' lived experiences, which is not an independent clause and tells what the *poem* was. Eliminate any option that doesn't correctly connect the independent clause with the explanation of the poem.

- (A) is correct because a colon is used when the first part is an independent clause and the second provides an explanation or definition.
- (B) is wrong because a semicolon can only link two independent clauses.
- (C) is wrong because the lack of punctuation doesn't make it clear that the second part gives the name and description of the poem.
- (D) is wrong because the second part isn't an independent clause and can't stand on its own.

6. **B**

In this Rules question, punctuation is changing in the answer choices. Look for independent clauses. The first part of the sentence says *The film has been preserved in multiple forms*, which is an independent clause. The second part of the sentence says *it was copied onto glass plates from the original negative, and it was printed on 35 mm film*, which is also an independent clause. Eliminate any answer that can't correctly connect two independent clauses.

- (A) is wrong because it creates a run-on sentence.
- (B) is correct because a colon can connect two independent clauses, and the second part explains the first.
- (C) and (D) are wrong because a comma without a coordinating conjunction (FANBOYS) can't connect two independent clauses.

7. C

In this Rules question, punctuation is changing in the answer choices. Look for independent clauses. The first part of the sentence says *Starting in the 1970s, she began researching termites for the Smithsonian's National Museum of Natural History*, which is an independent clause. The second part says *in 1989, she discovered a new species of termite called *Neotermes luykxi* with her colleague David Nickle*, which is also an independent clause. Some of the answers include *then* with the second part of the sentence, which does not change whether or not the second part is an independent clause. Eliminate any answer that can't correctly connect two independent clauses.

- (A), (B), and (D) are wrong because a comma without a coordinating conjunction (FANBOYS) can't connect two independent clauses.
- (C) is correct because a semicolon can connect two independent clauses.

8. C

In this Rules question, punctuation with a transition is changing in the answer choices. Look for independent clauses. The first part of the sentence says *Often, the specific classifier used is based on some quality of the noun*. There is an option to add *for example* to this

independent clause, but it's not an example of something. Eliminate options with *for example* in the first part.

- (A) and (D) are wrong because the clauses before and after *for example* are independent and can't be linked without punctuation or with a comma alone.
- (B) is wrong because it puts *for example* with the first independent clause.
- (C) is correct because *for example* is part of the second independent clause.

Summary

- An independent clause can stand on its own as a complete sentence.
- Two independent clauses can be put together in the same sentence using a semicolon.
- Two independent clauses can also be connected with a comma + an appropriate coordinating conjunction (FANBOYS—For, And, Nor, But, Or, Yet, So).
- A colon or a dash can be used when the second part of the sentence elaborates on the first. In this case, the first part of the sentence must be an independent clause, but the second part doesn't have to be.
- Two independent clauses can never be connected with a comma alone, a coordinating conjunction alone, or no punctuation at all.
- When transitions and punctuation are changing, determine whether the transition belongs with the first or the second part of the sentence.

Chapter 15

Rules Questions: Dependent Clauses, Lists, and No Punctuation

There are a few more punctuation-related topics that you are likely to see on the Digital SAT. In this chapter, you'll learn about dependent clauses and how to connect them to independent clauses, how to answer questions that involve complicated lists, and when no punctuation is needed at all.

DEPENDENT CLAUSES

You already know that an independent clause can stand on its own to be a sentence. Thus, a **dependent clause** can't be its own sentence. It "depends" on an independent clause to make a complete sentence. We've already seen examples involving the Independent Clause + Independent Clause combination and the different ways they can be joined. In this chapter, we'll see how a dependent clause can be joined with an independent clause. But first, let's recognize what a dependent clause looks like.

Knowing that an independent clause requires a subject and a verb, you might think that a dependent clause doesn't have one of these things. But actually, a dependent clause still has a subject and a verb. What usually makes a clause dependent is that it starts with a **subordinating word** (or phrase). Let's break down that term: *sub-* means "below," right? So, a subordinating word moves a clause to a lower level: in other words, it takes a clause from being independent to being dependent. Let's see some examples.

Independent: they wanted to watch a movie

Dependent: **because** they wanted to watch a movie

Dependent: **since** they wanted to watch a movie

Dependent: **that** they wanted to watch a movie

Dependent: **if** they wanted to watch a movie

Dependent: **though** they wanted to watch a movie

Dependent: **when** they wanted to watch a movie

Try the following drill to practice identifying independent and dependent clauses.

INDEPENDENT VS. DEPENDENT CLAUSES

EXERCISE

Circle whether each clause is independent or dependent. Answers are on [this page](#).

1. they sang

Independent / Dependent

2. until he pays her back for lunch

Independent / Dependent

3. where I put my socks

Independent / Dependent

4. as soon as I was elected captain of my team

Independent / Dependent

5. singing my friends' favorite songs is one of my favorite activities

Independent / Dependent

6. snow fell overnight in my neighborhood

Independent / Dependent

7. that you will be supporting me

Independent / Dependent

8. if she walks

Independent / Dependent

9. they will wash the dishes and take out the garbage

Independent / Dependent

10. if I decided to have dinner and play games with my roommate

Independent / Dependent

There are two ways to connect an independent clause and a dependent clause: Independent + Dependent or Dependent + Independent. In either case, the only punctuation that is allowed is a comma. Usually the Independent + Dependent combination will not have a comma, but the Dependent + Independent one will, though this is not a strict rule. Let's take a look at some correctly punctuated examples.

Because it was raining, I brought my umbrella. ✓

I brought my umbrella **because** it was raining. ✓

Even though the weather was cold, I didn't wear my heavy jacket. ✓

I didn't wear my heavy jacket **even though** the weather was cold. ✓

If you 're ready, we can leave the house now. ✓

We can leave the house now **if** you 're ready. ✓

While dogs need care more frequently, cats can be left alone for several days. ✓

Cats can be left alone for several days, **while** dogs need care more frequently. ✓

From the last example, you can see that a comma can sometimes be used when the dependent clause comes second. This would typically happen when there is a contrast or when the author wants to put a greater pause or separation between the ideas. That being said, remember that College Board won't test you on anything that is a gray area. Chances are, if you were to see a sentence like the last one above, there wouldn't be an option without a comma before *while*, since both ways could be acceptable.

Let's see a couple of examples of how this topic can be tested.

 Mark for Review

1. There were two volcanic eruptions that occurred in the U.S. during the 20th century. Lassen Peak erupted in 1915 and destroyed an area to the northeast of the _____ the eruption of Mount St. Helens in 1980 was a much more devastating event.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A peak. Though

☐ B peak: though

☐ C peak, though

☐ D peak; though

Here's How to Crack It

Use the question to identify the category, which is Rules. Then, look at the answer choices to see what's changing: punctuation. Start from the beginning of the sentence: *Lassen Peak erupted in 1915 and destroyed an area to the northeast of the peak*. That's an independent clause. The second part of the sentence reads *though the eruption of Mount St. Helens in 1980 was a much more devastating event*. This is a dependent clause since it begins with the subordinating word *though*. We know that the independent + dependent combination can only be connected with either a comma or no punctuation at all, so eliminate (A), (B), and (D). The correct answer is (C).

Remember, a period and a semicolon function the same way. Chances are, if you see both of them in the answer choices with no changes in wording, both answers are wrong.

 Mark for Review

2. Known for his headless, life-size sculptural figures, British-Nigerian artist Yinka Shonibare often uses so-called “African” fabric in his work. He has stated that he actually likes that this material is not authentically _____ it symbolizes how culture is artificially constructed.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A African because

☐ B African; because

☐ C African: because

☐ D African. Because

Here's How to Crack It

Look at the question to determine that this is a Rules question. Next, look at the answers to see that punctuation is changing. Start from the beginning of the sentence: *He has stated that he actually likes that this material is not authentically African* is an independent clause. The second part, *because it symbolizes how culture is artificially constructed*, is a dependent clause

since it starts with the subordinating conjunction *because*. The independent + dependent combination can only be connected with either a comma or no punctuation at all, so eliminate (B), (C), and (D). The correct answer is (A).

An independent clause and a dependent clause (in either order) can be joined with...

- A comma (,)
- No punctuation at all

An independent clause and a dependent clause (in either order) can NEVER be joined with...

- A period (.)
- A semicolon (;)
- A colon (:)
- A coordinating conjunction (**FANBOYS**)
- A dash, unless the dependent clause is Extra Info (—)

PUNCTUATING LISTS

As you probably remember from school, anytime you write a sentence that has a list of three or more things, you must put commas in between the items. Let's see some examples:

Do you prefer pumpkin pie, pecan pie, or apple pie? ✓

The professor's day consisted of teaching classes to undergraduate students, meeting with graduate student mentees, and editing an article for publication in a research journal. ✓

When it comes to the Digital SAT, and most of the time in real life, a list should always have *and* or *or* before the final item in the list. Many

publications, such as newspapers, don't bother putting a comma before the *and* or *or* in order to save space (much like how newspaper headlines leave out some words), although many style guides call for this comma to always be used. Since this is a disputed rule in punctuation, it isn't tested on the Digital SAT. The Digital SAT will put a comma before the *and* or *or* in the correct answer, but you won't be given an option without that comma that doesn't make some other mistake.

Let's see an example of how this could be tested.

 Mark for Review

3. L. Frank is an activist for Indigenous languages and art. One of her primary publications included a book called *First Families: Photographic History of California Indians*, which featured pictures of a traditional canoe being _____ and an expedition being completed along the coast of California.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A sailed a man performing a traditional funerary dance

☐ B sailed, a man performing a traditional funerary dance,

☐ C sailed a man performing a traditional funerary dance,

☐ D sailed, a man, performing a traditional funerary dance

Here's How to Crack It

Start by using the question to identify that this falls into the Rules category. Then, look to see what's changing in the answers: commas. Read the

sentence to determine how commas are being tested. The sentence explains what the book *featured* and contains the word *and* towards the end, so look for a list. In a list, all of the items must be in the same form. The first item after *pictures* is *a traditional canoe*, and the last item after *and* is *an expedition*, both of which are nouns, so the second item should start with a noun. The second and third words, *a man*, represent a noun, so try putting the comma before that to form the list. In this case, the list would consist of 1) *a traditional canoe being sailed*, 2) *a man performing a traditional funerary dance*, and 3) *an expedition being completed along the coast of California*. This makes sense because those are all in the same form and all are things that could be pictures.

Now that we've established that this question has a list of three or more things, we can use the rule that such a list must have commas in between. Eliminate (A) and (C) because they don't have a comma after *sailed*. Eliminate (D) because there is no reason to put a comma after *man*. The correct answer is (B).

The key is to notice when the sentence contains a list. In the example above, the word *and* appears in the original sentence, and the answer choices include some words that together aren't logical: *sailed a man*. This suggests that there is some need for punctuation, which can help you realize that the sentence contains a list.

There is also a more complicated, more unusual way that the Digital SAT may construct lists in a passage. Take a look at the following example.

The committee members are Alex, a parent, Taylor, a teacher, and Ali, a community member.

Can you spot what's a little confusing about that list? It's unclear whether the committee has three people on it (the ones with the names) or more

people, some of whose names aren't given. In this case, the intention is to provide the names and titles of the three committee members. We can make that clearer by doing this:

The committee members are Alex, a parent; Taylor, a teacher; and Ali, a community member. ✓

In this case, semicolons are used to visually separate the items in the list so that each item can have commas within it if needed. Earlier, we saw how semicolons function just like periods. This example illustrates the one exception: semicolons can separate a complicated list that includes commas within one or more of the list items. If you see multiple semicolons in the original sentence and the answers, that's a good sign that the question is testing this topic.

Let's see an example.

 Mark for Review

4. Throat singing is a technique that uses a guttural (as opposed to the more common chest or head) voice and produces a sound that is often perceived as including multiple pitches from one person. Throat singing is a feature of many musical traditions, including *Canto a _____* Buddhist chant, practiced in some monasteries in India and Tibet; and Inuit throat singing, used as a contest between two people in northern Canada.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A *tenóre*; a style of quartet singing from Sardinia, Italy,

☐ *tenóre*, a style of quartet singing from Sardinia, Italy,

☐ *tenóre*, a style of quartet singing from Sardinia, Italy;

☐ *tenóre*; a style of quartet singing from Sardinia, Italy;

Here's How to Crack It

Start by looking at the question to determine that this is in the Rules category. Then, look at the answer choices to see what's changing, which reveals that the question is testing commas and semicolons. Remember, there are two uses for a semicolon. It can work like a period to connect two independent clauses, or it can separate a complicated list that has commas within the items. Read the sentence to see which of those it has. Notice that the sentence already contains a semicolon near the end, but the part after the semicolon (*and Inuit throat singing, used as a contest between two people in northern Canada*) isn't an independent clause. Since the only other use of a semicolon is to connect independent clauses, this sentence must have a list separated with semicolons.

Use the third example to determine the structure of each item: Musical tradition, Comma, Use. Now, return to the first item in the list. After the musical tradition *Canto a tenóre*, there should be a comma in order to follow the pattern of the third item. Eliminate (A) and (D). The next place the punctuation changes is after *Italy*. This is the end of the first item, as the next thing is *Buddhist chant*, which is the second singing style. So, there must be a semicolon after *Italy* to separate it from the next item in the list. Eliminate (B). The correct answer is (C).

WHERE PUNCTUATION IS NOT NEEDED

Now you have learned about all of the different types of punctuation and when they should be used (besides apostrophes, which are coming up soon).

It's equally important to know when they should *not* be used. You might think that when College Board is asking you about punctuation, it's because the sentence needs some type of punctuation. However, sometimes the sentence doesn't need any punctuation at all. Let's see an example.

 Mark for Review

5. American physicist and educator Edward Alexander _____ the first African American to earn a Ph.D. in the United States, writing his dissertation in physics on the refractive indices of various glasses.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A Bouchet, was

☐ B Bouchet was

☐ C Bouchet: was

☐ D Bouchet. Was

Here's How to Crack It

Identify the category, Rules, based on the question. Then, notice that punctuation is changing in the answer choices. Start at the beginning of the sentence: *American physicist and educator Edward Alexander Bouchet*. This has given us the subject but not the verb. We can't separate the subject and verb with a single punctuation mark, since they are the most crucial components of the sentence, so eliminate (A), (C), and (D). No punctuation should be used, so the correct answer is (B).

We know that was pretty obvious since we basically implied that the correct answer wouldn't have punctuation. But let's go over a few rules related to this "no punctuation" topic.

"No Punctuation" Rules

1. Don't put punctuation where there is Specifying Information.
2. Never put a single punctuation mark in between a subject and its verb.
3. Don't put punctuation after a preposition.

Above all else, don't use punctuation unless you have a reason to do so.

We've already discussed Rule #1 above, so let's take a look at the second rule.

Astronaut Mae Jemison became interested in space in part because of Lieutenant Uhura, a Star Trek character. ✓

Mae Jemison, an astronaut, became interested in space in part because of Lieutenant Uhura, a Star Trek character. ✓

Here are some of our sentences from earlier. The subject is *Mae Jemison* and the verb is *became*. It is fine to put an Extra phrase in between the subject and verb as long as it has matching punctuation on both sides, in this case commas. However, what you can never do is put a *single* comma in between the subject and the verb (the same is true for any other punctuation mark). Here are some incorrect examples:

Astronaut Mae Jemison, became interested in space in part because of Lieutenant Uhura, a Star Trek character. ✕

Astronaut Mae Jemison: became interested in space in part because of Lieutenant Uhura, a Star Trek character. ✕

Astronaut Mae Jemison —became interested in space in part because of Lieutenant Uhura, a Star Trek character. ✕

Sometimes there is more distance between the subject and the verb. Still, make sure there isn't a single punctuation mark between them. Here is another incorrect example:

The sandwich I wanted to order, was no longer available. ✕

The subject is *sandwich* and the verb is *was*. This example puts a single comma in between, so it's wrong. No punctuation should be used here.

Finally, let's take a look at the third place that punctuation should not be used—after a preposition. Here are some incorrect examples:

The fundraising contest offered rewards of: giftcards, headphones, and sneakers. ✕

You should try to listen to the new album with—an open mind.
✕

Once again, no punctuation should be used other than the commas in the list in the first sentence above. College Board particularly likes to test this rule when there is a list. It helps to remember that while you might be tempted to use a colon when there is a list, the colon can only follow an independent clause, which won't be the case after a preposition.

ANSWERS TO INDEPENDENT VS. DEPENDENT CLAUSES EXERCISE

1. Independent
2. Dependent
3. Dependent
4. Dependent
5. Independent
6. Independent
7. Dependent
8. Dependent
9. Independent
10. Dependent

Dependent Clauses, Lists, and No Punctuation Drill

Answers can be found starting on [this page](#).

Time: 8 minutes

 Mark for Review

1. Stephen Pile's *The Book of Heroic Failures* describes a variety of instances of individual and group deficiency. For example, the chapter "Off Work" describes *English as She Is Spoke*, a guide to English conversation for Portuguese speakers. However, the phrases included in this book are typically inaccurate or _____ its author, Pedro Carolino, did not speak English and instead relied on two translation books: a Portuguese-to-French and a French-to-English.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A unidiomatic because

☐ B unidiomatic,

☐ C unidiomatic. Because

☐ D unidiomatic: because

 Mark for Review

2. Throughout his life, Indian musician Ram Narayan brought attention to the instrument *sarangi* _____ playing major music festivals as a solo artist, recording albums, and eventually touring internationally.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A by:

☐ B by—

☐ C by,

☐ D by

 Mark for Review

3. As suggested by the research of Lisa Espinosa of the Emotion Lab at the Karolinska Institute, the reason that people may have intrusive memories with neutral _____ is that the neutral content was paired with a negative experience in the past, such as seeing a picture of an umbrella while receiving a mild electric shock.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A content

☐ B content;

☐ C content:

☐ D content,

 Mark for Review

4. Diane E. Benson is a creative writer and actress from Alaska who also ran for governor. She first ventured into politics in _____ she ran

for office alongside Desa Jacobson, representing the first two Native women to share a ticket together.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A 2002, when

☐ B 2002,

☐ C 2002; when

☐ D 2002

 Mark for Review

5. Scientists have discovered that the area of the human brain responsible for self-serving choices is separate from the area that is responsible for altruistic choices. The hope is that this research will help scientists discover the motivation behind philanthropic behaviors, for instance, donating to charities, such as animal _____ such as recycling plastic and other materials; and helping strangers with tasks, such as holding the door for someone to walk through.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A shelters; adopting environmental habits,

☐ B shelters, adopting environmental habits;

☐ C shelters, adopting environmental habits,

☐ D shelters; adopting environmental habits;

 Mark for Review

6. The chemical composition of Jupiter's atmosphere is relatively well-known due to the observations made by the Galileo atmospheric probe in 1995. The ratios of helium to hydrogen and phosphorus to hydrogen in Jupiter's atmosphere are relatively close to the same ratios for the Sun. However, for other elements, Jupiter's atmosphere has a much greater abundance: the ratio of nitrogen to hydrogen in Jupiter is about 3.5 times as great as that of the Sun; carbon to _____ and krypton to hydrogen, 2.7 times as great.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A hydrogen 2.9 times as great;

☐ B hydrogen 2.9 times as great,

☐ C hydrogen, 2.9 times as great,

☐ D hydrogen, 2.9 times as great;

DEPENDENT CLAUSES, LISTS, AND NO PUNCTUATION DRILL ANSWERS AND EXPLANATIONS

1. A

In this Rules question, punctuation is changing in the answer choices. Look for independent clauses. The first part of the sentence says *However, the phrases included in this book are typically inaccurate or unidiomatic*, which is an independent clause. The second part of the sentence says *because its author, Pedro Carolino, did not speak English and instead relied on two translation books: a Portuguese-to-*

French and a French-to-English, which is a dependent clause.

Eliminate any option that doesn't correctly connect an independent + a dependent clause.

- (A) is correct because independent + dependent can be connected with no punctuation.
- (B) is wrong because eliminating *because* changes the second clause to an independent clause, and independent + independent can't be connected with a comma alone.
- (C) is wrong because a dependent clause can't stand alone as a sentence.
- (D) is wrong because independent + dependent cannot be connected with punctuation other than a comma.

2. D

In this Rules question, punctuation is changing in the answer choices. Look for independent clauses. The first part of the sentence says *Throughout his life, Indian musician Ram Narayan brought attention to the instrument sarangi by*, which ends with a preposition. There should not be punctuation after a preposition, so eliminate answers with punctuation.

- (A), (B), and (C) are wrong because punctuation cannot come after a preposition.
- (D) is correct because no punctuation should be used here.

3. A

In this Rules question, punctuation is changing in the answer choices. The first part of the sentence says *the reason that people may have*

intrusive memories with neutral content is that, and it contains the subject-verb pair *reason* and *is*. There should not be a single punctuation mark between the subject and verb, so eliminate answers with punctuation.

- (A) is correct because no punctuation should be used here.
- (B), (C), and (D) are wrong because a single punctuation mark cannot come between a subject and a verb.

4. A

In this Rules question, punctuation is changing in the answer choices. The first part of the sentence says *She first ventured into politics in 2002*, which is an independent clause. The second part of the sentence says *she ran for office alongside Desa Jacobson*, which is an independent clause; however, with the addition of *when*, it becomes a dependent clause: *when she ran for office alongside Desa Jacobson*. Eliminate any option that doesn't correctly connect the two clauses.

- (A) is correct because independent + dependent can be connected with a comma.
- (B) and (D) are wrong because without *when* the second clause is independent, and independent + independent cannot be connected with a comma by itself or no punctuation.
- (C) is wrong because independent + dependent cannot be connected with a semicolon.

5. A

In this Rules question, commas are changing in the answer choices. The sentence already contains a semicolon near the end, and the part after it is not an independent clause, which suggests that the sentence

contains a list separated by semicolons. Use the third example to determine the structure of each item: Philanthropic behavior, Comma, Example. Make an annotation of this pattern and eliminate any answer that doesn't follow it.

- (A) is correct because it follows the pattern of the third item.
- (B) and (C) are wrong because they don't have a semicolon after the second item.
- (D) is wrong because a comma, not a semicolon, should follow the philanthropic behavior.

6. **D**

In this Rules question, commas are changing in the answer choices. The sentence already contains a semicolon near the end, and the part after it is not an independent clause, which suggests that the sentence contains a list separated by semicolons. Use the third example to determine the structure of each item: Elements, Comma, Comparison. Make an annotation of this pattern and eliminate any answer that doesn't follow it.

- (A) and (B) are wrong because there is no comma between the elements and the comparison.
- (C) is wrong because it doesn't have a semicolon after the second item.
- (D) is correct because it follows the pattern of the third item.

Summary

- A dependent clause has a subject and a verb but begins with a subordinating word.
- A dependent clause can be connected to an independent clause in either order. In some cases a comma is used, and in other cases no punctuation is used.
- No other punctuation besides a comma can come between an independent and a dependent clause in either order.
- In a list of three or more things, there must be commas in between the items and before the word *and* or *or* before the last item.
- If one or more items in the list has a comma within it, the list will be separated by semicolons.
- Establish the pattern of a list by looking at a complete item in the passage.
- Never put a single punctuation mark between a subject and a verb.
- Don't use punctuation unless there is a reason to do so.

Chapter 16

Rules Questions: Grammar

The Rules category covers both punctuation and grammar. In this chapter, we'll look at the remaining topics (verbs, pronouns, nouns, and modifiers) and see how the Digital SAT tests consistency in these subject areas.

GRAMMAR AND CONSISTENCY

Now that you have learned everything there is to know about sentence construction on the Digital SAT, it's time to move on to the other component of the Rules questions: grammar. Don't worry, there are far fewer rules to know when it comes to this topic. In fact, we're going to boil it down to a single word: **Consistency**. All of the rules we are going to go over in this chapter tie back to Consistency. This means, for example, your verbs are consistent with each other in tense, your pronouns are consistent with the nouns they're replacing, and your describing phrases are consistent with the people or things they're describing. Let's take a look at the specific topics to which Consistency applies.

VERBS

You already learned a great deal about verbs in the sentence structure portion of this book. For instance, you learned that only certain types of verbs can be the main verb in a sentence (that is, not *-ing* verbs or “to” verbs), and you also learned that multiple verbs that are part of a list within a sentence must be in the same form. There are two additional, major ways that verbs are tested on the Digital SAT. The first one is **subject-verb agreement**.

You already know that every sentence must have a subject and a verb. Once we stop thinking about structure, though, we can take things a step further: the subject and verb must *agree*. As we know, subjects are usually nouns, and nouns can be either singular or plural. As it turns out, verbs can also be singular or plural. So, if your subject is singular, then your verb needs to be singular as well, and vice versa. Even if you haven't thought about this much, it's something you do every day when you speak or write. Let's see some examples.

The assignment is due on Friday. ✓

The assignments are due on Friday. ✓

In the first example, both the subject and the verb are singular. In the second example, both are plural. If we try to mix that up, your ear will probably tell you that it's wrong:

The assignment are due on Friday. ✕

The assignments is due on Friday. ✕

Of course, it would be great if the Digital SAT would give you sentences as simple as these. You'd have no trouble with such an obvious question (and once in a while you may get lucky with one of those on your test). Unfortunately, and probably to no one's surprise, College Board has some tricks to make subject-verb agreement a little more challenging. Let's see an example.

 Mark for Review

1. Susan Sontag was an American writer and activist who wrote extensively throughout her life. One of her many focuses _____ photography; in her book of essays, *On Photography*, she wrote about how photography influences people's relationship to the world.

Which choice completes the text so that it conforms to the conventions of Standard English?

A have been

B are

C was

D were



Watch Us Crack It

Watch the step-by-step video explanation of how to answer this question in your Student Tools.

Here's How to Crack It

Start by looking at the question to determine that this falls into the Rules category. Next, look at the answers to see that verbs are changing, so the question is testing consistency with verbs. Start by identifying and highlighting the subject. Although the word *focuses* comes right before the blank, be careful. The sentence is not saying that “her focuses were/are photography” (which doesn’t really make sense anyway since photography is only one thing). It’s describing photography as *one* of her focuses. So, the subject is *One*, which is singular. Highlight this word and write an annotation saying “singular.” In order to be consistent, you need to use a singular verb. Choices (A), *have been*; (B), *are*; and (D), *were*, are all plural. Eliminate them and the correct answer is (C), which is singular.



Most students would look at the answers on a question like the one above and assume that the question is testing verb tense. As it turns out, you didn’t need to worry about the tense at all. You could have spent a long time deciding whether you needed past or present tense and even trying to choose between two different options in similar tenses.

To save time, always find the subject before worrying about tense. We can’t promise this will always be the case, but most of the time, if not all the time, College Board does not test tense at the same time as testing number (which is the term for singular vs. plural). This means that once you

recognize that the question is testing number, you don't need to think about tense. You only need to find the subject and eliminate the answers that don't match.

Of course, in order to answer these questions correctly, you need to know the difference between singular and plural subjects and verbs. Let's see what those look like.

Singular subjects
• Most nouns that don't end in -s (dog, book, teacher, airplane, approval, bravery, person) • Nouns that end in -s but refer to only one thing (boss, dress, bus, gas, glass, happiness, success) • -ing verbs (swimming, running, watching, dancing) • Collective nouns (team, group, family, army) • Singular pronouns (she, he, it, this, each, everybody, anyone, nothing, everywhere)
Plural subjects
• Nouns that end in -s where the version without the -s or -es is singular (dogs, books, teachers, airplanes, teams, groups, families, bosses, dresses, buses, gases, glasses) • Irregular plurals that don't end in -s (children, mice, teeth, men, women, people, deer) • Plural pronouns (we, they, these, those, both, many) • Two or more things joined with <i>and</i> (my parents and I, Hallie and Amelia)

Like we said earlier, a lot of this will probably be intuitive. For instance, students often think the word *team* must be plural because a team must include more than one person. However, these same students would never say “The team are”—they say “The team is.” So, they do know the word is

singular because they match it correctly with *is*. In fact, this is the strategy we recommend when you're not sure whether a word is singular or plural:

If you're not sure whether the subject of a sentence is singular or plural, try putting "is" and "are" after the word. If it matches with "is," it's singular. If it matches with "are," it's plural.

Another aspect of this topic that can be tricky is determining whether a verb is singular or plural. You might assume a verb like "wants" is plural because it ends in -s. While we know that nouns ending in -s are usually plural, this isn't the case for verbs. In fact, it's usually the opposite. You would say "it wants" or "they want." Here's our trick for testing whether a verb is singular or plural:

If you're not sure whether a verb is singular or plural, try putting "it" and "they" before the verb. If it matches with "it," it's singular. If it matches with "they," it's plural.

The hardest part about subject-verb agreement on the Digital SAT actually isn't determining whether the subject or verb is singular or plural, especially once you know the strategies we just mentioned. The part students have the most difficulty with is finding the subject. In the previous chapters, we circled the subjects and underlined the verbs in the example sentences. You may have noticed that the subject almost always comes before the verb. This is where things get tricky: the subject is likely going to be before the verb, but it may not be *right* before the verb.

In Question 1 from this chapter, that was the case: the phrase *of her many focuses* separated the subject (*one*) from the verb (*was*). Let's take a closer look at that phrase. It starts with the word *of*, which you should remember as being a preposition, and therefore this is a prepositional phrase. Putting one or more prepositional phrases in between the subject and the verb is one of the most common ways the Digital SAT likes to try to trick you on subject-verb agreement questions. Let's see some examples.

The words *of the poem* were strange and hard to understand. ✓

Animals *in the wild* spend their days looking for food. ✓

The hall *of mirrors* makes people bump into the walls. ✓

Swimming *in the lake while wearing shoes* is a bad idea. ✓

In the examples above, College Board wants you to think that the word directly before the verb is the subject. Then you would say “poem was,” “wild spends,” “mirrors make,” and “shoes are,” respectively, and get all four questions wrong. This is why it's so important to correctly locate the subject.

There are other ways to separate the subject and the verb besides prepositional phrases:

Sewing *your own clothes* has become more expensive than buying clothes. ✓

A bicycle *that has three wheels* is actually called a tricycle. ✓

The person *watering the plants* lives over there. ✓

Prairie dogs, *which live in North America*, have elaborate societies. ✓

Once again, College Board would want you to think “clothes have,” “wheels are,” “plants live,” and “North America has,” respectively. But we’re sure you wouldn’t make that mistake now that you have learned subject-verb agreement! Just in case, though, try out the following drill to ensure that you can correctly find the subject for a given verb in a sentence.

SUBJECTS AND VERBS EXERCISE

Circle the subject of each underlined verb. Watch out for describing phrases between the subject and the verb. Answers are on [this page](#).

1. The collection of books, magazines, and movies available at the library covers a broad range of topics.
2. Fishes living in the lake include bass, crappie, and muskellunge.
3. Even if one may be embarrassed, dancing with your friends at a party is very fun.
4. Members of the jury have a serious responsibility to consider all the facts when deciding a case.
5. The jury, after deliberating in private, decides which side has won.
6. The United States has a history of success in international sports competitions.
7. Making one’s bed in the morning starts the day on the right foot.
8. A passport and a plane ticket are necessary in order to travel to another continent.
9. Games developed by Gary Gygax, such as *Chainmail* and *Dungeons and Dragons*, are among the most popular games played today.

10. In algebra, letters towards the end of the alphabet, such as x , y , and z , usually represent variables.

We mentioned earlier that questions that look like they are testing tense may actually be testing number. Of course, sometimes the question is testing tense. Let's see an example.

 Mark for Review

2. Broadcast stations, such as radio and television stations, are identified by their unique call signs. In the U.S., stations west of the Mississippi River use K as the first letter of their call signs. Those east of the Mississippi River _____ W .

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A will use

☐ B have used

☐ C were using

☐ D use

Here's How to Crack It

Start by looking at the question, which reveals that the topic here is Rules. In that case, consult the answers to see what's being tested. Verbs are changing in the answer choices, so the question is testing consistency with verbs. Start by finding the subject, which is *Those*. Highlight this word, which is plural, so try putting a plural word such as "They" before each

answer choice. “They will use,” “They have used,” “They were using,” and “They use” all work, so there isn’t an issue of subject-verb agreement.

Consider tense next, as the answers are in different tenses. The previous two sentences use present tense verbs: *are* and *use*. Highlight those verbs. In order to be consistent, this sentence should also be in present tense. Write an annotation that says “present tense.” Eliminate (A), which is future tense, (B), which isn’t exactly present tense, and (C), which is past tense. Choice (D) is in present tense, so it’s the correct answer. It’s consistent with *are* and *use* in the previous sentence, as there is no indication of a shift in tense.



You might be thinking that the last question seemed pretty easy. It’s usually not too hard to choose among past, present, and future tenses. But what about the different variations of those tenses? Let’s see another example.



 Mark for Review

3. The National Raisin Reserve was created in the U.S. after World War II. The reserve allowed the government to take a portion of raisins produced by farmers, thus limiting supply and increasing the price. A U.S. Supreme Court case _____ the reserve in 2015.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A ends

☐ B has ended

☐ C will end

D ended

Here's How to Crack It

Use the question to identify that this falls under the Rules category. Then, look at the answers to see that verbs are changing, so it's testing consistency with verbs. In that case, you need to check first for subject-verb agreement. Locate and highlight the subject, which is *U.S. Supreme Court case*. That's singular, but all of the answers work with "it," so the question isn't testing number.

Next, consider tense. Highlight the phrase *in 2015*, which indicates that this event happened in the past. Make an annotation that says "past tense." Eliminate (A) because it's present tense. Keep (B) because it could refer to something in the past. Eliminate (C) because it's future tense. Keep (D) because it's past tense.

Compare (B) and (D). The verb *has ended* should be used when referring to the present. If something *has ended* it means that by this point (now) it is over. However, the sentence does not go up to the present; it refers to an event that occurred *in 2015*. So, eliminate (B). Choice (D) is the only one in regular past tense, which is what we need here to refer to an event that occurred at a specific time in the past. The correct answer is (D).

Present Perfect vs. Past Perfect

The two tenses that students tend to have the most trouble with on the Digital SAT are present perfect and past perfect. Of course, you don't need to know these terms for the test. Let's take a look at some examples:

Past: *I went to the museum in 2017.*

Present perfect: *I have been to the museum before.*

Present perfect: *I have been to the museum several times.*

Past perfect: *I had been to the museum before the new wing opened.*

Past tense, or simple past tense, is used for an event that occurred at some time in the past. The first example occurred *in 2017*.

Present perfect always uses the helping verb *has* (singular) or *have* (plural). This tense implies something that happened at an indefinite time (*before*) or multiple times (*several times*) and suggests that it could happen again. In the two present perfect examples, the implication is that this person could go to the museum again.

Past perfect always uses the helping verb *had*. This tense suggests that something happened before something else that was also in the past. In our example, sometime in the past *the new wing opened*. Even before that, *I had been to the museum*. We use *had* to show that going to the museum happened before the other past tense verb.

Try the following drill to test your proficiency in verb tense.

VERB TENSE EXERCISE

Circle the correct tense based on the clue in each sentence. Answers are on [this page](#).

1. They *study* / *studied* / *have studied* every night this week.
2. Next year, after her birthday, she *visits* / *visited* / *will visit* her cousins.
3. Today, I *am* / *was* / *will be* ready to perform for my school.
4. I *was* / *am* / *had been* working on my project every day before it was finished.

5. Yesterday, he *goes* / *went* / *will go* to the park to watch birds.
6. The team *went* / *had gone* / *has gone* to the state championship last year.

When you see verbs changing in the answer choices...

1. If there is a “to” form and/or an *-ing* form, check for a complete sentence.
2. Otherwise, find the subject and eliminate any answers that aren’t consistent in number (singular/plural) with the subject.
3. If needed, check tense. Look for other verbs in the sentence or surrounding sentences, as well as time-change clues.

PRONOUNS

Let’s start with the basics: What is a pronoun? A pronoun is a word that stands in for a noun. It would sound very repetitive and annoying to say, “Sara brought Sara’s book to show Sara’s grandma,” wouldn’t it? Instead, we would say “Sara brought *her* book to show *her* grandma.” The pronoun *her* in this sentence refers back to Sara. Here are the personal pronouns in English:

	Singular	Plural
First person	I	We
Second person	You	You
Third person	He/she/it	They

While understanding first, second, and third person isn't crucial for success on the Digital SAT, it is important to understand which pronouns are singular and which are plural, especially for the most commonly tested ones—*it* and *they*. A lot of times students think that the difference between these pronouns is that *it* is for objects and *they* is for people. But if we think about that a little more, we'll realize that idea isn't true. Here's an example to illustrate:

The markers are on the table.

They are on the table.

We can use the word *they* to talk about a bunch of markers, right? So, *they* can be used for people and objects. The real difference between these two is that *they* is plural and *it* is singular. This can be difficult to remember because there are many places in real life that we use *they* when we are not referring to something plural. For example, let's say you went to the drugstore looking for your favorite brand of toothpaste and couldn't find it. It sounds perfectly natural to tell your family, "They were out of the toothpaste!" Who's *they*? The store? A store is really an "it," so you would want to say, "It was out of the toothpaste." Of course, we're well aware that that sentence sounds ridiculous. This just goes to show you that spoken English and written English are different.

In real life, some individuals prefer to use "they" as a personal pronoun. When it comes to the Digital SAT, however, "they" is always plural.

Remember, your goal here is to ace the Digital SAT. You don't necessarily need to follow these grammar rules when you speak, text, or write emails, but you do need to know them if you want to get the Writing questions correct on the Digital SAT.

Let's see an example of how this could be tested.

 Mark for Review

4. A carillon is a type of percussion instrument consisting of a keyboard and bells. The clappers of the bells are connected to the keyboard. To be classified as a carillon, the instrument must have at least 23 bells; if not, _____ considered a chime.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A it is

☐ B they are

☐ C those are

☐ D one is

Here's How to Crack It

First, look at the question to identify the category: Rules. Then, look to see that pronouns are changing in the answer choices, so it's testing consistency of pronouns. In that case, look for and highlight the noun that the pronoun refers back to, which is *the instrument* in the earlier part of the sentence. That's singular, so a singular pronoun is needed. Eliminate (B) and (C) because they are both plural.

While *one* is singular, it cannot refer back to *the instrument*, as that is a specific noun. We'll show you the correct use of *one* in a minute, but for now, eliminate (D). Choice (A) is singular and is appropriate to refer back to *the instrument*, so it's the correct answer.

It's important to keep in mind that the Digital SAT tests *it* versus *they* the vast majority of the time when pronouns are tested. You will never be asked to use a pronoun for a person who hasn't already been referred to using a pronoun. For example, if you were given a passage in which a person was referred to as "she," then College Board could ask you to choose a pronoun later on that would be consistent, such as *she*, *her*, or *herself*. But you will not be asked to fill in a pronoun for a person if one has not already been given.

Just Say No

On the Digital SAT, each question has to have four answer choices. However, sometimes College Board just wants to test *it* versus *they* or *them*. The writers still have to put in two more answer choices, so they will give you some weird pronoun options to round out the four choices. Let's take a look at when and why to eliminate them.

- The pronoun *you* is almost certainly going to be wrong, as College Board almost never writes passages that refer to the reader. Only use *you* if the passage has already used a form of this pronoun elsewhere in the passage. The same is true for *we*.
- The pronoun *one* by itself usually refers to a person (*One shouldn't wear wet socks*). It can refer back to a noun (*Mateo had a popsicle, but I didn't want one*), but only if that noun is nonspecific. It can't stand in for a noun introduced with "the." Neither of these situations is very likely to show up on the Digital SAT.
- The pronouns *this*, *those*, or *these* are also not likely to be correct. They are typically not going to be specific enough if they are not followed by a noun (*this idea*, *those paintings*, *these books*).

Pronouns and Apostrophes

The other common way pronouns are tested is with apostrophes. There are only two simple rules to know:

Apostrophes on pronouns represent contractions.

Possessive pronouns don't get apostrophes.

Let's try an example question.

 Mark for Review

5. The slow loris, a type of primate that lives in rainforests in South and Southeast Asia, is threatened by both habitat loss and the wildlife trade. The popularity of the slow loris as an exotic pet is due to _____ large eyes, which people view as charming.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A its

☐ B they're

☐ C their

☐ D it's

Here's How to Crack It

The question reveals that this is a Rules question. Look at the answers to see that pronouns and apostrophes are changing, so this question is testing possessive pronouns versus contractions as well as pronoun consistency. Start with the consistency part and highlight the word the pronoun refers back to. Whose *large eyes*? They belong to *the slow loris*. Highlight this

phrase, which is singular. Eliminate (B) and (C) because they are both plural.



Next, consider whether a contraction is needed. Choice (D) means “it is,” which isn’t correct here (“it is large eyes”). Eliminate (D). Choice (A), *its*, is the possessive form of *it*, which is appropriate because *the slow loris* is an *it*, and it possesses the *large eyes*. Therefore, (A) is correct.

A contraction is a shorter way of saying two words. The apostrophe stands in for the letter or letters that have been removed. Here are some common contractions and their meanings:

It’s	It is / It has
They’re	They are
You’re	You are
Who’s	Who is / Who has

Here are some common possessive pronouns and their meanings:

Its	Belonging to it
Their	Belonging to them
Your	Belonging to you
Whose	Belonging to whom

College Board loves to test *its/it’s* and *their/they’re*, as in the previous example. In fact, those are the only pronouns you’re likely to see tested with apostrophes. As long as you remember these simple rules, you’ll get those questions right every time.

When you see pronouns changing in the answer choices...

1. Look for and highlight the noun or pronoun that the blank refers back to.
2. Eliminate any answers that are not consistent with the noun or pronoun in terms of singular versus plural.
3. If apostrophes are changing, determine whether a contraction or a possessive pronoun is needed and use POE accordingly.

NOUNS

We just saw how apostrophes are tested with pronouns. Another apostrophe topic relates to nouns. Let's see an example.

 Mark for Review

6. N. K. Jemisin is an award-winning American science fiction and fantasy writer. The three books in her series *The Broken Earth Trilogy* each won a Hugo Award for Best Novel, making her the first author to win this award for each book in a trilogy and the first to win Best Novel awards for three consecutive years. Her _____ include environmental crises and social inequalities.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A books' subjects

☐ B books subjects

☐ books' subjects'

☐ books subjects'

Here's How to Crack It

Start by using the question to identify that this falls under the Rules category. Then, look at the answers to see what's changing: noun apostrophes. An apostrophe on a noun shows possession, so start with the first noun and consider whether it's possessing something. Does something belong to the *books*? Yes, it's the *subjects* of the books. So, there should be an apostrophe on *books*. Eliminate (B) and (D) because they don't have an apostrophe on that word.

Next, determine whether the *subjects* possess anything. The word after subjects is *include*, which is a verb, so it can't be possessed. Therefore, *subjects* shouldn't have an apostrophe. It's plural, not possessive. Eliminate (C). The correct answer is (A).

Unlike pronouns, nouns use apostrophes to show possession. For a singular noun, simply add an apostrophe + s to make the noun possessive. Here are some examples:

a hat's logo

the story's meaning

the dress's sleeves

As we saw earlier, most nouns take on an -s when they become plural. For most plural possessives, make the original noun plural by adding -s or -es and then add the apostrophe after. Here are some plural possessives:

hats' logos

the stories' meanings

the dresses' sleeves

For irregular plurals that don't end in -s, make the word plural and then add the apostrophe + s:

a woman's coat → women's coats

my tooth's root → my teeth's roots

the person's letter → the people's letter

When you see apostrophes on nouns changing in the answer choices...

1. Determine whether the first word is possessing anything. If not, eliminate options with apostrophes on that word.
2. Determine whether any additional words are possessing anything. Remember that a possessive noun must be followed by something that can be possessed (i.e., another noun).
3. Use POE.

It's possible but rare to have two words in a row with apostrophes. A noun can only have an apostrophe if the next word is a noun—in other words, it must be something that can be possessed.

MODIFIERS

Earlier in this book, you saw how describing phrases, such as noun phrases or those beginning with an *-ing* or *-ed* verb, are usually separated from the rest of the sentence with commas. Describing phrases, also known as modifiers, can also be tested in terms of wording, not just punctuation.

Consider the following sentence:

Made with organic oils and plant butters, [Noah] sold out of his natural soaps at the craft fair. x

Do you spot the error? While you might understand that the soap is *made with organic oils and plant butters*, the way the sentence is written, *Noah* is the one made with these ingredients, which sounds ridiculous once you realize it.

This grammar error is called a misplaced modifier. According to this rule, a describing phrase or “modifier” (in this case, *Made with organic oils and plant butters*) needs to come as close as possible to the thing it’s describing. Here are two ways the sentence above could be rewritten.

Made with organic oils and plant butters, Noah’s natural [soaps] sold out at the craft fair. ✓

[Noah] sold out of his natural soaps, made with organic oils and plant butters, at the craft fair. ✓

As you can see, the sentence can be rewritten so that the thing being described comes right before or after the modifying phrase.

Let’s see an example of how this could be tested on the Digital SAT.



 Mark for Review

7. Starting in 2008, over 50 U.S. embassies across 38 countries installed air monitors and regularly posted social media updates about the air quality at those locations. Studying the impact of these posts, _____.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ **A** researchers' findings were a reduction in fine particulate concentration levels in those locations.

☐ **B** researchers found a reduction in fine particulate concentration levels in those locations.

☐ **C** a reduction in fine particulate concentration levels in those locations was found by researchers.

☐ **D** there was a reduction in fine particulate concentration levels in those locations, according to researchers.

Here's How to Crack It

Begin by looking at the question, which reveals that this is a Rules question. Then, look at the answers to see what's changing. The answer choices seem to be starting with different subjects, which is a good clue that the sentence may be testing consistency with a modifier. Start at the beginning of the sentence to see if there is a modifying phrase. It starts with *Studying the impact of these posts*, which is a modifier as it would describe the person doing the studying. Highlight this phrase.

Next, look at the beginning of each answer choice to see whether it refers to someone who studies something. Eliminate (A) because it says *researchers' findings*, not *researchers*. The *findings* can't be *studying* something. Keep

(B) because *researchers* could study something. Eliminate (C) because *a reduction* can't study something. Eliminate (D) because *there was* doesn't refer to anything specific that would be studying something. Thus, (B) is the correct answer.

When this topic is tested on the Digital SAT, College Board will usually put the blank after the describing phrase. That means all you have to do is look at the first few words of each answer choice to see whether that's the person or thing that could be described by the modifier.

ANSWERS TO SUBJECTS AND VERBS EXERCISE

1. collection
2. Fishes
3. dancing
4. Members
5. jury
6. United States
7. Making (or Making one's bed)
8. A passport and a plane ticket
9. Games
10. letters

ANSWERS TO VERB TENSE EXERCISE

1. have studied (clue – *every night this week*)
2. will visit (clue – *Next year*)
3. am (clue – *Today*)
4. had been (clue – *before it was finished*)
5. went (clue – *Yesterday*)
6. went (clue – *last year*)

Grammar Drill

Answers can be found starting on [this page](#).

Time: 12 minutes

 Mark for Review

1. Several dwarf planets, including Pluto, _____ found in the Kuiper Belt, a region of space beyond Neptune's orbit. The Kuiper Belt contains many remnants from the solar system's early history and was first explored in 2015 by NASA's New Horizons mission.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ **A** has been

☐ **B** are

☐ **C** is

☐ **D** was

 Mark for Review

2. In 1991, American biologists Linda B. Buck and Richard Axel published a landmark paper on the olfactory system. The paper detailed the discovery of the location of odor receptors in the nose and led to a more comprehensive understanding of how humans smell. In 2004, _____ received the Nobel Prize in Physiology or Medicine for that research.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A we

☐ B one

☐ C they

☐ D some

 Mark for Review

3. Clifford Possum Tjapaltjarri is one of the most recognized and well-known Australian artists despite some confusion over the details of his life and the exact date of his death. His works are often predicted to raise large amounts at auctions and are often purchased by Australian galleries. The _____ may have been supported by the Australian government to avoid sending such important works internationally.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A galleries' purchases

☐ B galleries' purchase's

☐ C galleries purchases

☐ D galleries purchase's

 Mark for Review

4. Oglala Lakota poet, writer, and activist Layli Long Soldier published her first small poetry book, *Chromosomory*, in 2010, and her first full-

length volume of poetry, *Whereas*, in 2017. The poems in *Whereas* _____ the historical experience of native tribes in the U.S. as well as Soldier's personal experiences and relationships.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A explores

☐ B has explored

☐ C is exploring

☐ D explore



Mark for Review

5. “Kilroy was here” is a meme that gained popularity in graffiti art during World War II. The origin of the meme is debated, but some theories claim that German intelligence agents found the meme on American weaponry and therefore _____ Kilroy was a high-level American spy.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A had believed

☐ B believed

☐ C would believe

☐ D were believing



Mark for Review

6. Cockatoos in Australia are experts at opening trash bins. The white bird can grab the lid of the bin with _____ beak and push toward the hinge until the lid flips open. People have used various tools, such as bricks or rubber bands, to keep the bins closed, yet the birds are undeterred by these obstacles.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A their

☐ B they're

☐ C its

☐ D it's

 Mark for Review

7. In 1977, Emily Kame Kngwarreye, an Aboriginal Australian artist, learned an art technique from Indonesia called batik. Wanting to support other women interested in creating their own art, she founded the Utopia Women's Batik Group with other Aboriginal artists in 1978. The Utopia Women's Batik Group provided a space where the development of _____ was supported.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A artists' individual styles'

☐ B artist's individual styles

☐ C artists individual styles

☐ artists' individual styles

 Mark for Review

8. Kim Hyesoon is a poet from South Korea who currently teaches creative writing at an art institute in Seoul. Hoping to align with South Korea's strong movement of female poets in the 1990s, _____ and rose to fame as an author of numerous works.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ the works written by Hyesoon used imagery and experimental language

☐ Hyesoon used imagery and experimental language to create her pieces

☐ numerous works written by Hyesoon used imagery and experimental language

☐ there was a poet, Hyesoon, who used imagery and experimental language

 Mark for Review

9. Researchers found that some streaked shearwaters, a type of seabird, survive typhoons by flying into the storms. When stuck between land and a typhoon, the birds will fly toward the eye of the storm, potentially reducing _____ risk of crashing into land or hitting debris.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A its

☐ B their

☐ C it's

☐ D they're

 Mark for Review

10. NASA originally equipped astronauts with pencils to write in space, as ballpoint pens wouldn't work without gravity; however, pencils could smear, break, or catch fire. NASA eventually abandoned its own development of a space pen due to costs. However, a private company, the Fischer Pen Company, was working on its own space pen. Developed by Paul Fischer, _____.

Which choice completes the text so that it conforms to the conventions of Standard English?

☐ A the Fischer Space Pen's testing and approval by NASA led to its use in Project Apollo.

☐ B Project Apollo used the Fischer Space Pen after it was tested and approved by NASA.

☐ C NASA tested and approved the Fischer Space Pen for use in Project Apollo.

☐ D the Fischer Space Pen was tested and approved by NASA for use in Project Apollo.

GRAMMAR DRILL ANSWERS AND EXPLANATIONS

1. B

In this Rules question, verbs are changing in the answer choices, so it's testing consistency with verbs. Find and highlight the subject, *dwarf planets*, which is plural, so a plural verb is needed. Write an annotation saying "plural." Eliminate any answer that is not plural.

- (A), (C), and (D) are wrong because they are singular.
- (B) is correct because it's plural.

2. C

In this Rules question, pronouns are changing in the answer choices, so it's testing consistency with pronouns. Find and highlight the phrase the pronoun refers back to, *Linda B. Buck and Richard Axel*, which is plural, so a plural pronoun is needed. Write an annotation saying "plural." Eliminate any answer that isn't consistent with *Linda B. Buck and Richard Axel*.

- (A) is wrong because *we* is not consistent with *Linda B. Buck and Richard Axel*.
- (B) is wrong because *one* is singular.
- (C) is correct because *they* is plural and is consistent with *Linda B. Buck and Richard Axel*.
- (D) is wrong because *some* doesn't refer back to a specific thing.

3. A

In this Rules question, apostrophes with nouns are changing in the answer choices. Determine whether each word possesses anything. The *galleries* possess the *purchases*, but the *purchases* don't possess anything. Eliminate any answer that doesn't match this.

- (A) is correct because *galleries* is possessive and *purchases* is not.
- (B) is wrong because *purchases* should be plural, not possessive.
- (C) and (D) are wrong because *galleries* should have an apostrophe, as it is possessive.

4. D

In this Rules question, verbs are changing in the answer choices, so it's testing consistency with verbs. Find and highlight the subject, *poems*, which is plural, so a plural verb is needed. Write an annotation saying "plural." Eliminate any answer that is not plural.

- (A), (B), and (C) are wrong because they are singular.
- (D) is correct because it's plural.

5. B

In this Rules question, verbs are changing in the answer choices, so it's testing consistency with verbs. Find and highlight the subject, *German intelligence agents*, which is plural, so a plural verb is needed. All of the answers work with a plural subject, so look for a clue regarding tense. The previous part of the sentence uses a past tense verb: *found*. Highlight that verb, which is past tense, so write an annotation that says "past." Eliminate any answer not in past tense.

- (A) is wrong because *had* is used when two events occur in the past and one event is earlier.

- (B) is correct because it's past tense.
- (C) and (D) are wrong because *would believe* and *were believing* aren't consistent with *found*.

6. C

In this Rules question, pronouns and apostrophes are changing in the answer choices, so it's testing consistency with pronouns. Find and highlight the word or phrase that the pronoun refers back to: *The white bird*, which is singular, so in order to be consistent, a singular pronoun is needed. Write an annotation saying "singular." Eliminate any answer that isn't consistent with *bird* or is incorrectly punctuated.

- (A) and (B) are wrong because *they* is plural.
- (C) is correct because it is singular and possessive.
- (D) is wrong because it means "it is."

7. D

In this Rules question, apostrophes with nouns are changing in the answer choices. Determine whether each word possesses anything. The *artists* possess the *individual styles*, but the *individual styles* don't possess anything. Eliminate any answer that doesn't match this.

- (A) is wrong because *styles* shouldn't be possessive.
- (B) is wrong because *artist's* is used for one artist, but the passage discusses *Aboriginal artists*.
- (C) is wrong because *artists* should have an apostrophe, since it is possessive.

- (D) is correct because *artists* is plural and possessive, and *individual styles* is plural but not possessive.

8. **B**

In this Rules question, the subjects of the answers are changing, which suggests it may be testing modifiers. Look for and highlight a modifying phrase: *Hoping to align with South Korea's strong movement of female poets in the 1990s*. Whoever is *Hoping* needs to come immediately after the comma. Eliminate any answer that doesn't start with someone who can hope.

- (A) and (C) are wrong because *works* can't hope.
- (B) is correct because *Hyesoon* can hope.
- (D) is wrong because *there was* can't hope.

9. **B**

In this Rules question, pronouns and apostrophes are changing in the answer choices, so it's testing consistency with pronouns. Find and highlight the word that the pronoun refers back to: *birds*. This word is plural, so in order to be consistent, a plural pronoun is needed. Eliminate any answer that isn't consistent with *birds* or is incorrectly punctuated.

- (A) and (C) are wrong because *it* is singular.
- (B) is correct because it is plural and possessive.
- (D) is wrong because it means "they are."

10. **D**

In this Rules question, the subjects of the answers are changing, which suggests it may be testing modifiers. Look for and highlight a modifying phrase: *Developed by Paul Fischer*. Whatever was *Developed by Paul Fischer* needs to come immediately after the comma. Eliminate any answer that doesn't start with whatever was developed by Paul Fischer.

- (A) is wrong because *testing and approval* were done *by NASA*, not Paul Fischer.
- (B) is wrong because it was the *Fischer Space Pen*, not *Project Apollo*, that was developed by *Paul Fischer*.
- (C) is wrong because *NASA* was not developed *by Paul Fischer*.
- (D) is correct because *the Fischer Space Pen* was developed *by Paul Fischer*.

Summary

- When verbs are changing in the answer choices, find the subject, determine whether it is singular or plural, and eliminate any answers that aren't consistent. If there are still multiple answers remaining, look for clues to determine what tense is needed.
- When pronouns are changing in the answer choices, find the noun or other pronoun that the blank refers back to and determine whether it's singular or plural. Eliminate answers that aren't consistent.
- Apostrophes on pronouns represent contractions. Possessive pronouns don't have apostrophes.
- Apostrophes on nouns show possession. Nouns that are plural but not possessive don't get apostrophes.
- When the subjects of the answers are changing, look for a modifier. Eliminate answers that begin with something that couldn't logically be described by the modifier.

Chapter 17

Rhetoric Questions

This chapter covers the final category of questions on the Reading and Writing section: Rhetoric questions, which are based on the content of the ideas rather than rules or the structure of the sentences.

The last portion of each Reading and Writing module will include two types of questions: Transitions and Rhetorical Synthesis, in that order. We call these Rhetoric questions because they relate to the purpose or quality of the writing. These questions will not test your understanding of the rule-based punctuation and grammar topics. In fact, for these questions, all four answer choices will be or will produce complete sentences that are grammatically correct. Instead, you will need to consider the *content* of the writing and how the answers fulfill certain meaning-related or rhetorical goals. Let's take a look at the first type of question in this category.

TRANSITION QUESTIONS

Transition questions will be easy to spot. Let's look at an example.

Cynthia Leitch Smith is a member of the Muscogee Nation and a prolific author of books for children and young adults. She has written over a dozen books. _____ she is the author-curator of a Native-focused imprint, called Heartdrum, at the publishing company HarperCollins.

 Mark for Review

1. Which choice completes the text with the most logical transition?

☐ A On the other hand,

☐ B Still,

☐ C Eventually,

☐ D Additionally,

Like the question above, all transition questions will ask you the same question: *Which choice completes the text with the most logical transition?* As soon as you see that question, you'll know you're dealing with a transition question. Let's take a look at the basic approach for transition questions and apply it to this problem.

Transition Questions Basic Approach

1. Read the passage and highlight any ideas that support or contradict each other.
2. Make an annotation indicating whether the ideas surrounding the blank agree or disagree.
3. Eliminate any answers that go the wrong direction.
Then, use POE on any remaining options.

Here's How to Crack It

Highlight anything that is the same in the sentence with the blank and the sentences before or after. The first sentence states that Leitich Smith is a *prolific author*. The second sentence supports this by saying *She has written over a dozen books*. Then, this sentence says *she is the author-curator* at a publishing company. Highlight all of these phrases. These ideas agree, so make an annotation that says "agree." Then, eliminate any opposite-direction transitions since we need a same-direction transition here. Eliminate (A) and (B), which would both indicate a contrast.

Now, compare the remaining answers. *Eventually* is used when something is expected to happen in the future or did happen after a period of time. However, this sentence is in present tense, so *eventually* isn't consistent. Eliminate (C). This sentence builds on the previous idea, so *additionally* is an appropriate transition. Therefore, (see what we did there?) the correct answer is (D).

Let's try another example.

 Mark for Review

2. Camille Henrot's installation *The Pale Fox* is a collection of objects that at first glance appears to be random. For example, a sculpture of Buddha props up a copy of a modern magazine. There is an organization, _____ that is revealed as the audience spends time in the space.

Which choice completes the text with the most logical transition?

☐ A likewise,

☐ B specifically,

☐ C though,

☐ D rather,

Here's How to Crack It

Start by highlighting ideas that relate to each other. The first sentence says that the collection *at first glance appears to be random*. The third sentence says *There is an organization*. These ideas disagree, so write that in an annotation. Next, eliminate any same-direction transitions: (A) and (B). Compare (C) and (D). *Though* works well, so keep (C). While *rather* is an opposite-direction transition, it means something more like “instead,” so it doesn’t fit correctly in this sentence. The correct answer is (C).

Let's try one more.

 Mark for Review

3. Sandra Welner, a medical professor, wanted to make medical care more accessible for patients with disabilities. _____ she invented an examination table that could be lowered for easier access to and from a wheelchair and called it the Universally Accessible Examination Table.

Which choice completes the text with the most logical transition?

☐ A To that end,

☐ B Additionally,

☐ C Not surprisingly,

☐ D Rather,

Here's How to Crack It

First, highlight any phrases that draw a connection. The first sentence states that Welner *wanted to make medical care more accessible for patients with disabilities*. The second sentence says she *invented the Universally Accessible Examination Table*. These ideas agree, so make an annotation saying “agree” and eliminate any opposite-direction transitions. In this case, (D) can be eliminated.

Next, consider the link between the highlighted phrases. The first sentence states Welner's goal, while the second sentence states what she did. Use POE. Choice (A) is a good match because an *end* is a goal, and this transition essentially means “with that goal in mind.” Keep (A). Eliminate

(B) because *additionally* is used to add on to the previous point, but this would suggest that the sentences are two separate things, when instead the second sentence explains what she did in pursuit of her goal. Eliminate (C) because there is no evidence that her invention was *not surprising*; one could be surprised or not that she was able to accomplish her goal. The correct answer is (A).

RHETORICAL SYNTHESIS QUESTIONS

Now, let's move on to the other type of question in the Rhetoric category, the one that will appear at the very end of each verbal module: Rhetorical Synthesis. The word *synthesize* means “put together,” so these questions are asking you to put together two or more bullet points in order to fulfill a certain rhetorical goal. Let's see an example.

Mark for Review

4. While researching a topic, a student has taken the following notes:
- Robin Wall Kimmerer is a writer, educator, and scientist working in the field of biocultural restoration.
 - She is also a member of the Citizen Potawatomi Nation.
 - Her first book, *Gathering Moss*, published in 2003, contained a series of essays about mosses that mixed scientific writing and personal reflection together.
 - In her second book, *Braiding Sweetgrass*, Kimmerer's writing weaves together different types of knowledge: the Western scientific tradition, Traditional Ecological Knowledge, and lessons that plants themselves can teach.

The student wants to emphasize a similarity between the two books Kimmerer wrote. Which choice most effectively uses relevant information from the notes to accomplish this goal?

☐ *Gathering Moss* is about moss, and *Braiding Sweetgrass* is about lessons from plants.

☐ *Gathering Moss* and *Braiding Sweetgrass* both include scientific writing.

☐ *Gathering Moss* combines science and personal reflection, while *Braiding Sweetgrass* combines three different types of knowledge.

☐ Published in 2003, *Gathering Moss* was written by Robin Wall Kimmerer, who has worked in the field of biocultural restoration.



Watch Us Crack It

Watch the step-by-step video explanation of how to answer this question in your Student Tools.

Here's How to Crack It

First, identify the type of question. Rhetorical Synthesis questions are extremely easy to identify: they are the only question type to use bullet points instead of text in the form of a paragraph. Then, like with all Reading and Writing questions, determine what the question is asking. Rhetorical Synthesis questions always contain the same question: *Which choice most effectively uses relevant information from the notes to accomplish this goal?*

The key part to notice is *this goal*. You MUST read the sentence before the question to determine what the goal is.

Here, the stated goal is to *emphasize a similarity between the two books*. Now, your impulse might be to read the bullet points and identify a similarity. However, we've found that you probably don't need to do this. Instead, highlight the task or tasks of the question and then go straight to the answer choices and eliminate anything that doesn't completely fulfill the task. In this case, highlight *similarity* and *two books*. Any answer that does not mention *two books* or draw a comparison can be eliminated. Let's go to POE.

Choice (A) mentions the two books, and *moss* and *plants* are somewhat similar, so keep (A). Choice (B) mentions the two books and uses the word *both* to state a similarity. Keep (B). Choice (C) mentions both books, but the word *while* and the types of content in the books indicate a contrast, not a *similarity*. Eliminate (C). Choice (D) only mentions one of the books, so eliminate it because the question asked about *two books*.

Finally, compare (A) and (B). Choice (A) does not clearly state that this is a similarity between the two; it merely presents information about the content of both books. Eliminate (A). On the other hand, (B) clearly states that there is a similarity between the two books: they both contain *scientific writing*. Therefore, the correct answer is (B).

Of course, we can also confirm that this information is in the bullet points: the third bullet point states that *Gathering Moss* contains *scientific writing*, and the fourth bullet point mentions that the *Western scientific tradition* is part of the book's content, which clearly indicates that *scientific writing* is a component of the book.



Here's the basic approach for these questions:

Rhetorical Synthesis Basic Approach

1. Read the question and highlight each goal that is mentioned.
2. Eliminate any answer choice that does not completely fulfill the goal or goals.
3. Read the bullet points to confirm the answer if needed.

It's very unlikely that you will see an answer choice that is inconsistent with what is stated in the bullet points. That is, you won't see the kind of wrong answers that you will see on the Reading questions—ones that could be arrived at through misreading or making assumptions. Instead, the wrong answers will simply not completely fulfill the goal or goals stated in the question. This is why you can save yourself some time by not reading the bullet points first; you generally won't need to prove that the information is supported. It's also worth remembering that these questions do NOT test you on punctuation, grammar, style, being concise, or any other Rules topics. Focus on the content of the sentence in each answer choice and how well it does or does not fulfill the goal or goals.

Let's try another one.

Mark for Review

5. While researching a topic, a student has taken the following notes:
 - Large animals known as megafauna have substantial impacts on their environments.
 - However, many native megafauna are extinct, so their effects on the ecosystem are unknown.

- Bison are a type of megafauna that used to be dominant in the United States.
- Reintroducing bison to their native environments doubled plant diversity.
- The presence of cattle, a domesticated megafauna, in the same environments produced a significantly lower increase in plant diversity.

The student wants to present one impact that native megafauna have on their environments. Which choice most effectively uses relevant information from the notes to accomplish this goal?

☐ A Bison, a type of native megafauna, doubled plant diversity in their native environments.

☐ B Bison and cattle are two types of megafauna that live in the United States.

☐ C Although many native megafauna are extinct, bison were reintroduced to their native environment.

☐ D Native and domesticated megafauna can have impacts on their environments.

Here's How to Crack It

Once you've established that you're dealing with a Rhetorical Synthesis question, highlight the goal or goals in the question. Here, you should highlight *one impact that native megafauna have on their environments*. The correct answer should relate to *native megafauna* and a specific environmental *impact*. Move on to POE.

Choice (A) mentions *a type of native megafauna* and describes an environmental *impact* (*doubled plant diversity*), so keep (A). Choice (B)

mentions *megafauna*, but there's no environmental impact. Eliminate (B). Choice (C) mentions *native megafauna* but does not mention the *impact* of reintroducing bison; eliminate it. Choice (D) mentions *impacts* but does not *present one impact*; it's not specific about what that impact might be. Eliminate (D). The correct answer is (A).



Let's try one more.



 Mark for Review

6. While researching a topic, a student has taken the following notes:

- R. Murray Schafer was a Canadian composer, writer, and environmentalist.
- Schafer created many soundscapes during his career.
- Soundscapes are the sounds that arise from a location.
- Soundscapes include animal sounds, natural sounds such as weather, and human-created sounds.
- Schafer wrote *The Tuning of the World* and *The Soundscape*, which are books on soundscapes.

The student wants to introduce soundscapes to an audience familiar with Schafer. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- ☒ Canadian composer, writer, and environmentalist R. Murray Schafer created and wrote about the collections of animal sounds, natural sounds such as weather, and human-created sounds known as soundscapes.

☐ *The Tuning of the World* and *The Soundscape* were written by R. Murray Schafer, a Canadian composer, writer, and environmentalist.

☐ R. Murray Schafer, a Canadian composer, writer, and environmentalist, created many soundscapes during his career.

☐ Schafer wrote about and created soundscapes, which are sounds that arise from a location, including animal sounds, natural sounds such as weather, and human-created sounds.

Here's How to Crack It

Identify that this is a Rhetorical Synthesis question, and then highlight the goal or goals in the question. In this case, you should highlight *introduce soundscapes* and *audience familiar with Schafer*. It's common for Rhetorical Synthesis questions to specify whether the audience is familiar or unfamiliar with something. If the audience is unfamiliar, the answer should explain who or what the person or thing is, while if the audience is familiar, the answer should not. Let's go to POE.

Eliminate (A) because it describes Schafer—the audience is *familiar* with Schafer, so he should not be introduced. Eliminate (B) and (C) for the same reason. No description of Schafer is needed if the audience is familiar with him. Check (D). This answer does not describe Schafer, but it does *introduce soundscapes* by defining what they are. Therefore, this answer fulfills all parts of the question. The correct answer is (D).



Conclusion

While the term Rhetoric might have sounded scary initially, we hope you're feeling more confident now that you know how to approach the two types of questions in this category. Remember, you choose the order of questions—practice Rhetoric questions on the following drill and use the results to help determine when to attempt them.

Rhetoric Drill

Answers can be found starting on [this page](#).

Time: 14 minutes

 Mark for Review

1. People who are interested in reducing food waste are using banana peels in unique ways. _____ banana peels can be dried and ground into flour and used in baking. Researchers found that baking cookies with banana peel flour led to more healthful cookies.

Which choice completes the text with the most logical transition?

☐ A For instance,

☐ B Fortunately,

☐ C Still,

☐ D Moreover,

 Mark for Review

2. During the Apollo 14 mission in 1971, astronaut Stu Roosa carried 500 tree seeds into lunar orbit. Once back on Earth, the seeds were germinated and the majority of the trees were successfully planted around the world. The locations of the moon trees were not recorded, _____ until a renewed interest in them in 1996 led to the creation of a database of the rediscovered moon trees and their locations.

Which choice completes the text with the most logical transition?

☐ A moreover,

☐ B for instance,

☐ C still,

☐ D however,

 Mark for Review

3. Emmett Chappelle, a scientist who started working with NASA in the 1960s, discovered a way to detect extraterrestrial life. He found that mixing two chemicals found in fireflies, insects known for their bioluminescence, with adenosine triphosphate (ATP) produces light. ATP is present in all living organisms. _____ the presence of life can be confirmed if light is produced when the two firefly chemicals are applied to a sample.

Which choice completes the text with the most logical transition?

☐ A Still,

☐ B Therefore,

☐ C Nevertheless,

☐ D Though,

 Mark for Review

4. Larissa Behrendt's novel *After Story* tells the tale of Indigenous lawyer Jasmine and her mother Della as they take a literary tour of England. During their tour, a girl disappears, echoing the disappearance of Jasmine's older sister twenty-five years earlier.

_____ Jasmine reexamines her past, and family secrets come to light.

Which choice completes the text with the most logical transition?

☐ A Consequently,

☐ B In conclusion,

☐ C Similarly,

☐ D Despite this,



Mark for Review

5. Although street art is sometimes treated as commonplace graffiti or vandalism, Bright Tetteh Ackwerh has used the medium to represent his satirical views on religious and political issues in Ghana.

_____ his goal is to provoke spirited conversation about these topics after people view his works.

Which choice completes the text with the most logical transition?

☐ A As a rule,

☐ B Conversely,

☐ C Accordingly,

☐ D Subsequently,



Mark for Review

6. While researching a topic, a student has taken the following notes:

- Ferrofluid is a liquid created when magnetic nanoparticles are dissolved in a solvent.
- The shape of ferrofluid can be manipulated by magnetic fields.
- Sachiko Kodama is a Japanese artist who makes liquid sculptures with ferrofluid.
- Her sculptures include *Pulsate* and *Protrude, Flow*.

The student wants to introduce Sachiko Kodama and what her sculptures are made of. Which choice most effectively uses relevant information from the notes to accomplish this goal?

☐ **A** *Pulsate* and *Protrude, Flow* by Sachiko Kodama are made with ferrofluid, a type of liquid created when magnetic nanoparticles are dissolved in a solvent.

☐ **B** Sachiko Kodama is a Japanese artist who uses magnetic fields to change the shape of ferrofluid to create her sculptures.

☐ **C** Sachiko Kodama's ferrofluid sculptures include *Pulsate* and *Protrude, Flow*.

☐ **D** Ferrofluid is a magnetic liquid that can be manipulated into sculptures.

 Mark for Review

7. While researching a topic, a student has taken the following notes:

- Emmanuelle Charpentier, born in 1968, is a French scientist who studies microbiology, biochemistry, and genetics.
- Jennifer Doudna, born in 1964, is an American biochemist who studies biochemistry and molecular biology.

- Charpentier and Doudna met in 2011.
- They worked together and discovered that CRISPR-Cas9 technology could be used for genome editing in 2012.
- In 2020, they were both awarded the Nobel Prize in Chemistry.

The student wants to emphasize the results of Charpentier's and Doudna's working relationship. Which choice most effectively uses relevant information from the notes to accomplish this goal?

☐ A Charpentier and Doudna both study biochemistry.

☐ B Charpentier and Doudna met in 2011 and were awarded the Nobel Prize in 2020.

☐ C Charpentier and Doudna discovered how to use CRISPR-Cas9 for genome editing and were awarded the Nobel Prize in 2020.

☐ D Charpentier studies genetics, and Doudna studies molecular biology.

 Mark for Review

8. While researching a topic, a student has taken the following notes:

- Kolkata, also known as Calcutta, is in eastern India.
- The Kolkata Metro System was initially planned in the 1920s but construction didn't start until the 1970s.
- The Kolkata Metro System is a rapid transit system featuring two train lines.
- The Blue Line runs north-south, opened in 1984, and is 31.36 km long.

- The Green Line runs east-west, opened in 2020, and is 9.1 km long.

The student wants to compare the dates of opening and lengths of the lines of the Kolkata Metro System to an audience familiar with the Kolkata Metro System. Which choice most effectively uses relevant information from the notes to accomplish this goal?

☐ A The Kolkata Metro System opened its second line—the 9.1 km-long Green Line—in 2020.

☐ B The 31.36-km-long Blue Line opened in 1984, whereas the 9.1-km-long Green Line opened in 2020.

☐ C The Kolkata Metro System, which began construction in the 1970s, includes the 31.36-km-long Blue Line, which opened in 1984, and the 9.1 km-long Green Line, which opened in 2020.

☐ D Kolkata, also known as Calcutta, is located in eastern India and began construction on the Kolkata Metro System in the 1970s.

 Mark for Review

9. While researching a topic, a student has taken the following notes:

- Various vertebrate species, including honeybees, have the ability to judge numbers.
- Researchers were curious about whether bees organize numbers spatially from left to right, from smallest to largest.
- Humans organize numbers spatially from left to right, from smallest to largest.

- Martin Giurfa and his team trained bees to connect specific numbers with a sucrose reward.
- The bees organized the numbers from left to right based on magnitude.

The student wants to emphasize the aim of the research study. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- ☐ A The bees in the study by Martin Giurfa and his team were trained with sucrose rewards.
- ☐ B Martin Giurfa and his team wanted to see whether bees organize numbers spatially from left to right, similar to how humans organize numbers.
- ☐ C Various vertebrate species, such as humans and honeybees, organize numbers spatially from left to right.
- ☐ D Martin Giurfa and his team found that bees did organize numbers in a similar way to how humans do.

 Mark for Review

10. While researching a topic, a student has taken the following notes:

- Wolfram's red salt is an inorganic compound.
- Inorganic chemists in the 20th century were interested in Wolfram's red salt because it has a deep red color but its components are colorless.
- In 1935, inorganic chemists H. D. K. Drew and H. J. Tress hypothesized that the red color was due to the presence of platinum (3+) ions.

- In 1936, inorganic chemist K. A. Jensen proved that Wolfram's red salt did not have platinum (3+) ions.
- In 1956, inorganic chemists Yamada Shoichiro and Tsuchida Ryutaro discovered that the red color was due to chains of platinum (2+) and platinum (4+) ions.

The student wants to emphasize a similarity among the research to an audience familiar with Wolfram's red salt. Which choice most effectively uses relevant information from the notes to accomplish this goal?

A 20th-century research into Wolfram's red salt, a deep red inorganic compound made up of colorless components, focused on the presence of various platinum ions.

B While Drew and Tress hypothesized that Wolfram's red salt was red due to platinum (3+) ions, Jensen proved that Wolfram's red salt did not have platinum (3+) ions.

C 20th-century hypotheses and research into the color of Wolfram's red salt focused on the presence of various platinum ions.

D Wolfram's red salt is not deep red due to the presence of platinum (3+) ions, as Drew and Tress hypothesized, but rather due to chains of platinum (2+) and platinum (4+) ions, as discovered by Shoichiro and Ryutaro.

RHETORIC DRILL ANSWERS AND EXPLANATIONS

1. A

This is a transition question, so follow the basic approach. Highlight ideas that relate to each other. The first sentence says *using banana peels in unique ways*, and the second sentence says *banana peels can be dried and ground into flour and used in baking*. These ideas agree, so a same-direction transition is needed. Make an annotation that says “same.” Eliminate any answer that doesn’t match.

- (A) is correct because it is a same-direction transition, and the second sentence is an example of the first.
- (B) is wrong because the second sentence is an example, not a new idea.
- (C) is wrong because it is an opposite-direction transition.
- (D) is wrong because the second sentence is an example, not an additional point.

2. D

This is a transition question, so follow the basic approach. Highlight ideas that relate to each other. The first part of the sentence says *The locations of the moon trees were not recorded*, and the second part of the sentence says *until a renewed interest...led to the creation of a database of the rediscovered moon trees and their locations*. These ideas disagree, so an opposite-direction transition is needed. Make an annotation that says “opposite.” Eliminate any answer that doesn’t match.

- (A) and (B) are wrong because they are same-direction transitions.
- (C) is wrong because *still* suggests that the second part of the sentence is happening despite the first part of the sentence.

- (D) is correct because *however* is an opposite-direction transition.

3. B

This is a transition question, so follow the basic approach. Highlight ideas that relate to each other. The first sentence mentions *a way to detect extraterrestrial life*. The third sentence says *ATP is present in all living organisms*, and the final sentence says *the presence of life can be confirmed....* These ideas agree, so a same-direction transition is needed. Make an annotation that says “same.” Eliminate any answer that doesn’t match.

- (A), (C), and (D) are wrong because they are opposite-direction transitions.
- (B) is correct because *Therefore* is a same-direction transition, and the last sentence provides a conclusion.

4. A

This is a transition question, so follow the basic approach. Highlight ideas that relate to each other. The previous sentence says *echoing the disappearance of Jasmine’s older sister twenty-five years earlier*, and this sentence says *Jasmine reexamines her past, and family secrets come to light*. These ideas agree, so a same-direction transition is needed. Make an annotation that says “same.” Eliminate any answer that doesn’t match.

- (A) is correct because it is a same-direction transition, and the reexamination is a result of what happens on the tour.
- (B) is wrong because this sentence does not summarize the previous one.

- (C) is wrong because there is no *similar* reexamination in the previous sentence.
- (D) is wrong because it is an opposite-direction transition.

5. C

This is a transition question, so follow the basic approach. Highlight ideas that relate to each other. The first sentence says *Bright Tetteh Ackwerh has used [street art] to represent his satirical views*, and the second sentence says *his goal is to provoke spirited conversation about these topics*. These ideas agree, so a same-direction transition is needed. Make an annotation that says “same.” Eliminate any answer that doesn’t match.

- (A) is wrong because the second sentence is not a rule of the first sentence.
- (B) is wrong because it is an opposite-direction transition.
- (C) is correct because it is a same-direction transition, and the second sentence goes along with the idea in the first.
- (D) is wrong because the second sentence is not an event that follows the first sentence.

6. B

This is a Rhetorical Synthesis question, so follow the basic approach. Highlight the goal(s) stated in the question: *introduce Sachiko Kodama and what her sculptures are made of*. Eliminate any answer that doesn’t *introduce Sachiko Kodama* and describe *what her sculptures are made of*.

- (A) and (D) are wrong because they don't *introduce Sachiko Kodama*.
- (B) is correct because it introduces Kodama and says she uses *ferrofluid to create her sculptures*.
- (C) is wrong because it doesn't describe what Kodama's *sculptures are made of*.

7. C

This is a Rhetorical Synthesis question, so follow the basic approach. Highlight the goal(s) stated in the question: *emphasize the results of Charpentier's and Doudna's working relationship*. Eliminate any answer that doesn't *emphasize the results* of their *relationship*.

- (A) and (D) are wrong because they don't describe the *results of Charpentier's and Doudna's working relationship*.
- (B) is wrong because it doesn't clearly describe what *the relationship* was between Charpentier and Doudna.
- (C) is correct because it describes what Charpentier and Doudna worked on together and the *result* of this work.

8. B

This is a Rhetorical Synthesis question, so follow the basic approach. Highlight the goal(s) stated in the question: *compare the dates of opening and lengths of the lines of the Kolkata Metro System to an audience familiar with the Kolkata Metro System*. Eliminate any answer that doesn't *compare the dates of opening and lengths of the lines* and assume that the audience is *familiar with the Kolkata Metro System*.

- (A) and (D) are wrong because they don't provide a comparison between multiple *lines*.
- (B) is correct because it makes a comparison of the *dates of opening and lengths of the lines* and doesn't introduce the Metro System, since the audience is familiar.
- (C) is wrong because it explains the *Kolkata Metro System*, but the audience is already familiar.

9. B

This is a Rhetorical Synthesis question, so follow the basic approach. Highlight the goal(s) stated in the question: *emphasize the aim of the research study*. Eliminate any answer that doesn't *emphasize the aim of the research study*.

- (A), (C), and (D) are wrong because they don't mention the *aim*, or what the scientists were trying to do.
- (B) is correct because describes the *aim of the research study* by saying *wanted to see*.

10. C

This is a Rhetorical Synthesis question, so follow the basic approach. Highlight the goal(s) stated in the question: *emphasize a similarity among the research to an audience familiar with Wolfram's red salt*. Eliminate any answer that doesn't *emphasize a similarity* and assume that the audience is *familiar with Wolfram's red salt*.

- (A) is wrong because it explains what *Wolfram's red salt* is, but the audience is familiar.

- (B) and (D) are wrong because they don't *emphasize a similarity among the research*.
- (C) is correct because it emphasizes *a similarity among the research* (the focus) and doesn't explain *Wolffram's red salt*, since the audience is familiar.

Summary

- For transition questions, look at the previous sentence(s) for a clue that relates to something in the sentence with the blank. Highlight any clues.
- Determine whether the ideas agree or disagree, and write a note indicating which direction the answer should go.
- Eliminate answers that go the wrong direction, and then use POE with the remaining answers.
- For Rhetorical Synthesis questions, highlight the goal(s) stated in the question.
- Eliminate answers that don't completely fulfill the goal or goals.
- Read the bullet points if needed.

Part III

How to Crack the Math Section

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Chapter 18

Math Introduction

As you learned in Chapter 4, the Digital SAT isn't your typical school test. This goes for the Math section of the Digital SAT as well as the Reading and Writing section. This chapter will give you an overview of the Math section, show you what kind of math to expect, talk about applying the test-taking strategies you learned in Chapter 4 to the Math section, and introduce you to the only questions on the Digital SAT that are not multiple-choice.

THE MATH BREAKDOWN

The Math section of the Digital SAT is split into two modules. Each module contains 22 questions, of which 16 or 17 are multiple-choice questions and the rest are student-produced response questions (SPR), meaning that you fill in your own answer instead of choosing from four answers. Questions on the second module are, on average, easier or harder based on your performance on the first module. Each module has two “pre-test” questions that do not count towards your score, but they are not identified, so treat every question as if it counts.

No Need to Know

Here are a few things you won't need to know to answer Digital SAT Math questions: calculus, logarithms, and matrices. Essentially, the Digital SAT tests a whole lot of algebra and some arithmetic, statistics, and geometry.

The Math section is further broken down by question type and content area, as described below. Unlike the Verbal section, the question types and content areas do not go in any predictable order. Everything is mixed together, so you could see a trig question, then a word problem about averages, then a question about the vertex of a parabola. We'll cover these topics and many more in the next several chapters, so you'll be ready for all of it.

Question Type Breakdown

70% Problem Solving: 15–16 questions per module

30% Word Problems: 6–7 questions per module

Content Breakdown

35% Algebra: 7–8 questions per module

35% Advanced Math: 7–8 questions per module

15% Problem-Solving & Data Analysis: 3–4 questions per module

15% Geometry and Trigonometry: 3–4 questions per module

Fill-In Questions

Approximately 25% of the questions on the Math section of the Digital SAT are what College Board calls Student-Produced Response questions, or SPRs. These are the only questions on the test that are not multiple-choice. Instead of selecting the correct answer from among several choices, you will have to find the answer on your own and type it into a box. We call these fill-ins because you fill in your answer. The fill-in questions cover the same math topics as the multiple-choice questions do, and they fit within the order of difficulty of the module. The fill-in format has special characteristics, and we'll tell you more about them in Chapter 26.

You Don't Have to Finish

We've all been taught in school that when you take a test, you have to finish it. If you answered only two-thirds of the questions on a high school math test, you probably wouldn't get a very good grade. But as we've already seen, the Digital SAT is not at all like the tests you take in school. Most students don't know about the difference, so they make the mistake of trying to work all of the questions on both Math modules of the Digital SAT.

Because they have only a limited amount of time to answer all the questions, most students rush through the questions they think are easy in order to get to the harder ones as soon as possible. At first, it seems reasonable to save more time for the more challenging questions, but think about it this way. When students rush through a Math section, they're actually spending too little time on the easier questions (which they have a good chance of getting right), just so they can spend more time on the

harder questions (which they have less chance of getting right). Does this make sense? Of course not.

Here is the secret: on the Math section, you don't have to answer every question in each module. In fact, unless you are aiming for a top score, you should intentionally skip some harder questions. Most students can raise their Math scores by concentrating on correctly answering all of the questions that they think are easy or medium difficulty. In other words...

Quick Note

Remember, this is not a math test in school! It is not scored on the same scale your math teacher uses. You don't need to get all the questions right to get an above-average score.

Slow Down!

Most students do considerably better on the Math section when they slow down and spend less time worrying about the more complex questions (and more time working carefully on the more straightforward ones). Haste causes careless errors, and careless errors can ruin your score. In most cases, you can actually raise your score by answering fewer questions. That doesn't sound like a bad idea, does it? If you're shooting for an 800, you'll have to answer every question correctly. But if your target is 550, you should ignore the hardest questions in each module and use your limited time wisely.

POOD and the Math Section

The questions in both modules of the Digital SAT Math section are arranged in a loose order of difficulty. The earlier questions are generally easier and the last few are harder, but the level of difficulty may jump around a little. Furthermore, the second module might start with a question that feels much easier than the last question of the first module. Assessing the difficulty of a question is also complicated by the fact that in College Board's view,

“hard” on the Digital SAT means that a higher percentage of students tend to get it wrong, often due to careless errors or lack of time.

The two experimental questions in each module can also alter the order of difficulty. If you encounter a question that seems surprisingly easy or surprisingly hard based on the questions before and after, use your POOD to decide whether to do it, mark it for later, or enter a guess.

Because difficulty levels can go up and down a bit, don’t worry too much about how hard the test-writers think a question is. Focus instead on the questions that are easiest for you, and do your best to get those right—no matter where they appear—before moving on to the tougher ones. So which will be the easy ones for you? It is *personal* order of difficulty, but here are some things to consider:

- **Math knowledge:** Do you know the topic cold? Do you see exactly how to start solving it? Then the question is worth attempting, but read and work carefully!
- **SAT knowledge:** Is there a Princeton Review technique from this book that would be perfect for this question? Now is the time to put your skills to use.
- **Self-knowledge:** Do your eyes glaze over halfway through a word problem? Do you think, “More like trigoNometry” when you see a trig question? Then come back to that question later or just pick a random answer to select.
- **Take the first bite:** A great way to decide whether a question deserves your time is to think about Bite-Sized Pieces. If you know immediately how to start a question, there’s a good chance you’ll be able to finish it and get it right.

Don’t forget: Fill in answers for questions you decide to skip, use the Mark for Review tool to mark questions to

come back to later, and enter an answer for every question.

USING THE ONLINE TOOLS AND SCRATCH PAPER

Online Tools

Several of the built-in features of the Digital SAT will be useful on the Math section.

- Mark for Review tool to mark questions to come back to later
- Built-in calculator, which can be accessed at any time
- Reference sheet with common geometry formulas, which can be accessed at any time
- The Annotate tool is NOT available on the Math section, so you will not be able to underline or highlight parts of the question.

Scratch Paper

The proctor at the test center will hand out three sheets of scratch paper, and you can use your own pen or pencil. Plan ahead about how to use the scratch paper in combination with what's on the screen.

Use the Tools Effectively!



Online Tools

Eliminate wrong answers
Work steps on the calculator
Look up geometry formulas

Scratch Paper

Rewrite key parts of the question
Write out every calculation

Redraw geometric figures and label them
Rewrite answer choices as needed

Here's a question from your first practice test with an image of the testing app screen on the left and scratch paper on the right. On a question like this, use your scratch paper to rewrite parts of the question and translate them into math, and then use the Answer Eliminator tool to cross out answers that don't match that piece. Always include the question number next to your work on the scratch paper to keep yourself organized.

16

Stella had 211 invitations to send for an event. She has already sent 43 invitations and will send them all if she sends 24 each day for the next d days. Which of the following equations represents this situation?

(A)

$24d - 43 = 211$

Undo

(B)

$24d + 43 = 211$

(B)

(C)

$43d - 24 = 211$

Undo

(D)

$43d + 24 = 211$

Undo

16)

24 a day for d days
24d

add to 43 sent,
not subtract

Calculators

Calculators are permitted on every Math question on the Digital SAT. In addition, the testing app includes a built-in calculator with many, many features. Practice with the built-in calculator or the one you're planning to bring with you. We'll tell you more about calculators as we go along.

The Princeton Review Approach

We're going to give you the tools you need in order to handle the easier questions on the Digital SAT Math section, along with several great techniques to help you crack some of the more difficult ones. But you must

concentrate first on getting the easier questions correct. Don't worry about the questions you find difficult on the Math section until you've learned to work carefully and accurately on the easier questions.

When it does come time to look at some of the harder questions, use Process of Elimination to help you avoid trap answers and to narrow down your choices if you have to guess. You will learn to use POE to improve your odds of finding the answer by getting rid of answer choices that can't possibly be correct.

Generally speaking, each chapter in this section begins with the basics and then gradually moves into more advanced principles and techniques. If you find yourself getting lost toward the end of the chapter, don't worry. Concentrate your efforts on principles that are easier to understand but that you still need to master.

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Chapter 19

Digital SAT Math: The Big Picture

In this chapter, you'll see a few ways you can eliminate bad answer choices, avoid traps, improve your odds of answering correctly if you have to guess, and maximize your Math score. You'll also learn how to best make use of the built-in calculator, should you choose to use it instead of bringing your own.

THE BIG PICTURE AND IMPORTANT STRATEGIES

The Reading and Writing section of this book describes various ways to eliminate wrong answers. That idea comes into play on the Digital SAT Math section, as well. There are also ways to break down math questions and avoid trap answers. This chapter provides an overview of the strategies you should know in order to maximize your Math score.

BALLPARKING STRATEGY

One way to eliminate answers on the Math section is by looking for ones that are the wrong size, or that are not “in the ballpark.” We call this strategy **Ballparking**. Although you can use your calculator on the following question, you can also eliminate one answer without doing any calculations.

 Mark for Review

1. In a garden, the corn on the north edge of the garden is 30% shorter than that on the south edge. If the corn on the south edge of the garden is 50 inches tall, how tall is the corn on the north edge of the garden, in inches?

☐ A 30

☐ B 33

☐ C 35

☐ D 65

Here's How to Crack It

The question asks for the height of the corn on the north edge of the garden and states that the corn there is shorter than the corn on the south edge, which is 50 inches tall. You are asked to find the height of the corn on the north edge, so the correct answer must be less than 50. Eliminate (D), which is too high. Often, one or more of the bad answers on these questions is the result you would get if you applied the percentage to the wrong value. To find the right answer, take 30% of 50 by multiplying 0.3 by 50 to get 15; then subtract that from 50. The corn on the north edge is 35 inches tall. The correct answer is (C).

READ THE FINAL QUESTION STRATEGY



It's a bad idea to assume you know what a question is going to ask you to do. Make sure to always read the final question *before* starting to work on the question. Write key words or the entire final question on the scratch paper. Then, try to ballpark before you solve.

 Mark for Review

2. If $16x - 2 = 30$, what is the value of $8x - 4$?

☐ A 12

☐ B 15

☐ C 16

☐ D 28

Here's How to Crack It

The question asks for the value of an expression, but don't just dive in and solve for the variable. First, see if you can eliminate answers by Ballparking, which can also work on algebra questions. To go from $16x$ to $8x$, you would just divide by 2. Dividing 30 by 2 gives you 15, so 28 is way too big. Eliminate it. The correct answer is not likely to be 15, either, because that ignores the -2 and the -4 in the question.

To solve this one, add 2 to each side of the equation to get $16x = 32$. Divide both sides by 2, which gives you $8x = 16$. But don't stop there! The final question asks for $8x - 4$, so (C) is a trap answer. You have to take the last step and subtract 4 from both sides to find that $8x - 4 = 12$. The correct answer is (A).



RTFQ:
Read
The
Final
Question

Get started faster and avoid trap answers by reading and rewriting the actual question being asked.

BITE-SIZED PIECES STRATEGY

When dealing with complicated math questions, take it one little piece at a time. We call this strategy **Bite-Sized Pieces**. If you try to do more than one step at a time, especially if you do



it in your head, you are likely to make mistakes or fall for trap answers. After each step, take a look at the answer choices and determine whether you can eliminate any.

Try the following question.

 Mark for Review

3. A paper airplane is thrown horizontally from the top of a hill. It travels in a straight line, and as it moves forward, it also descends. The plane moves horizontally at 9 feet per second while descending one foot for every 3 feet traveled horizontally. After 5 seconds of travel, how many feet has the plane descended from the height at which it was thrown?

☐ A 3

☐ B 10

☐ C 15

☐ D 20



Bite-Sized Pieces:

Do one small, manageable piece at a time and keep writing things down.

Here's How to Crack It

The question asks how many feet the plane has descended after 5 seconds. There are a few things going on here. The plane is traveling horizontally, and it is also descending. Start by figuring out how far it travels horizontally. It moves in that direction at 9 feet per second for 5 seconds, so it moves horizontally $9 \times 5 = 45$ feet. It descends 1 foot for every 3 traveled horizontally. If it goes 45 feet horizontally, it will descend more than 3 feet, so eliminate (A). Now figure out how many “3 feet” are in 45 feet—for each one of them, the plane will descend 1 foot. Since $45 \div 3 = 15$, the plane descends 15 feet. The correct answer is (C).

You may also have noticed that all the numbers in the question are odd. This makes it unlikely that the answer would be 10 or 20, which are even. If you see things like that, use them as opportunities to eliminate.



Here’s another example.



 Mark for Review

$$(5ck^2 + 5c^2 - 2c^2k) - (ck^2 + 2c^2k + 5c^2)$$

4. Which of the following is equivalent to the expression above?

☐ A $4ck^2$

☐ B $4ck^2 - 4c^2k$

☐ C $5c^2k^4 - 10c^4k$

☐ D $8c^2k^3 + 7c^2k - 5c^2$

Here’s How to Crack It

The question asks for an expression that is equivalent to the difference of two polynomials. In math class, your teacher would want you to combine all like terms and show your work, but this isn't math class. Start with one tiny piece of this intimidating question. The first set of parentheses starts with a term containing ck^2 . Check the second set of parentheses for the same combination of variables and exponents. The first term there matches, so the first step to take is $5ck^2 - ck^2 = 4ck^2$. There are no other terms with ck^2 , so the correct answer must contain $4ck^2$. Eliminate (C) and (D). Now you have a fifty-fifty chance of getting it right, so you can guess and go, *or* you can do one more step to determine whether the answer is (A) or (B). The difference between the two answers is the $-4c^2k$ term, so focus on the terms in the expression that contain c^2k . In the first set of parentheses, you have $-2c^2k$, and then you subtract the $2c^2k$ term in the second set of parentheses to get $-2c^2k - 2c^2k = -4c^2k$. The correct answer is (B).

WORD PROBLEMS

The two strategies we just showed you—RTFQ and Bite-Sized Pieces—are a large part of the approach to word problems on the Digital SAT. The test-writers will try to make things difficult to understand by making a story out of the math. To make sure you have the best shot at reaching the correct answer quickly and accurately, follow this basic approach.

Word Problem Basic Approach

1. **Read the Final Question (RTFQ)**—Understand the actual question being asked. Write down key words.
2. **Let the answers point the way**—Use the answer type to help determine how to start working on the question.

3. **Work in bite-sized pieces**—Find one piece to start with, then work piece-by-piece until the final question has been answered.
4. **Use POE**—Check to see whether any answers can be eliminated after each bite-sized piece.

This approach can be helpful on questions that are “just” math, but they are vital on word problems. Here are some details about the word problem basic approach.

RTFQ—The final question will start with something like *Which of the following*, *What is*, or *How many*. Find the final question (it’s usually at the end) and write down key words. If the question asks for the value of a variable or the measure of an angle, write down which variable or which angle. If it asks for a specific part of a graph or a word problem, write down which part. Terms and units, such as *median*, *positive*, *minutes*, or *miles*, also go on the scratch paper.

Let the answers point the way—On multiple-choice questions, the answer type often gives a clue about how to approach the question. Do the answers have numbers? variables? equations? graphs? a bunch of words? Use that information to get started.

Work in bite-sized pieces—Rather than trying to plan the entire question up front, just get started. Work the question one bite-sized piece at a time, reading more along the way and making notes on the scratch paper. The final question and the answer types usually reveal the best approach. If it’s not obvious, either mark the question to come back to later or enter a guess.

Use POE—On some questions, it’s possible to eliminate answers along the way while working in bite-sized pieces. If the question asks about an equation representing a situation, for example, an answer that gets any piece of the equation wrong can be eliminated. Eliminate answers that don’t work

when you plug them in, answers that are clearly too big, too small, or have the wrong sign, and answers that contradict information given in the question.

THE CALCULATOR

You are allowed to use a calculator on every question in the Math section, although it doesn't help on every question. You have two calculator options:

- Use the built-in Desmos calculator within the testing app.
- Bring your own approved scientific or graphing calculator.

Whether you use the built-in calculator or your own, practice, practice, practice! A calculator can make some questions much easier to answer and will save you time on other questions. To practice with the built-in calculator, download the Bluebook app or just use the free version on the Desmos website.

Calculator Guide

Head to your Student Tools to read our Guide for the built-in calculator. There you will find basic information about opening and using the calculator, details about how to use the keypads and advanced functions, and instructions for getting the most out of the graphing calculator. This Guide also includes a number of questions from your first practice test with detailed instructions and screenshots to show you how to solve them using the built-in calculator.

Even if you are planning to use your own calculator, this Guide might help you think of ways to use it that you hadn't considered before.

Call on the Calculator

Practice using the built-in calculator in your Student Tools or your own throughout your test preparation. Use it for example questions in this book, use it while taking practice tests, and use it any time you're doing practice questions for the Digital SAT.

Personal Calculator

If you have a good calculator that you are familiar with and like using, you may take it with you and use it on the test. Make sure that your calculator is either a scientific or a graphing calculator and can perform the order of operations correctly. To test your calculator, try the following problem, typing it in exactly as written without hitting the ENTER or “=” key until the end: $3 + 4 \times 6 =$. The calculator should give you 27. If it gives you 42, it's not a good calculator to use.

If you do decide to use your own graphing calculator, keep in mind that it *cannot* have a QWERTY-style keyboard (like the TI-95). Most of the graphing calculators have typing capabilities, but because they don't have typewriter-style keyboards, they are perfectly legal. To see the full College Board calculator policy, visit satsuite.collegeboard.org/digital/what-to-bring-do/calculator-policy.

Also, you *cannot* use the calculator on your phone. In fact, on test day, you will have to turn your phone off and put it away.

The only danger in using a calculator on the Digital SAT is that you may be tempted to use it in situations in which it won't help you. Some students believe that their calculator will solve many difficulties they have with math. This type of thinking may even occasionally cause students to miss a question they might have otherwise answered correctly on their own. Remember that your calculator is only as smart as you are. But if you

practice and use a little caution, you will find that your calculator will help you a great deal.

What a Calculator Is Good at Doing

Here's a list of some of the things a calculator is good for on the Digital SAT:

- arithmetic
- decimals
- fractions
- square roots
- percentages
- graphs (if it is a graphing calculator)

We'll discuss the calculator's role in most of these areas in the next few chapters.

Calculator Arithmetic

Adding, subtracting, multiplying, and dividing integers and decimals is easy on a calculator. But, you need to be careful when you key in the numbers. A calculator will give you an incorrect answer to an arithmetic calculation if you press the wrong keys.

The main thing to remember about a calculator is that it can't help you find the answer to a question you don't understand. If you wouldn't know how to solve a particular problem using pencil and paper, you won't know how to solve it using a calculator either. Your calculator will help you, but it won't take the place of a solid understanding of basic Digital SAT mathematics.

Calculators Don't Think for You

A calculator crunches numbers and often saves you a great deal of time and effort, but it is not a substitute for your problem-solving skills.

Use Your Paper First

When you decide to use a calculator to help answer a question, the first step should be to set up the problem or equation on paper; this will keep you from getting lost or confused. This is especially important when solving the problem involves a number of separate steps. The basic idea is to use the scratch paper to make a plan, and then use your calculator to execute it.

Working on paper first will also give you a record of what you have done if you change your mind, run into trouble, or lose your place. If you suddenly find that you need to try a different approach to a question, you may not have to go all the way back to the beginning. This will also make it easier for you to check your work, if you have time to do so.

Don't use the memory function on your calculator (if it has one). Because you can use your scratch paper, you don't need to juggle numbers within the calculator itself. Instead of storing the result of a calculation in the calculator, write it on your scratch paper, clear your calculator, and move to the next step of the question. A calculator's memory is fleeting; scratch paper is forever.

Write Things Down

You have scratch paper, so make the most of it.
Keep track of your progress through each question
by writing down each step.

Order of Operations

In the next chapter, we will discuss the proper order of operations for solving equations that require several operations to be performed. Be sure you understand this information, because it applies to calculators as much as it does to pencil-and-paper computations. You may remember PEMDAS from school. PEMDAS is the order of operations. You'll learn more about it and see how questions on the Digital SAT require you to know the order of operations. You must always perform calculations in the proper order.

Fractions

Most scientific calculators have buttons that will automatically simplify fractions or convert fractions from decimals. (For instance, on the TI-81, TI-83, and TI-84, hitting “Math” and then selecting the first option, “Answer → Fraction,” will give you the last answer calculated as a fraction in the lowest terms.) Find out if your calculator has this function! If it does, you can use it to simplify messy fractions. This function is also very useful when you get an answer as a decimal, but the answer choices given are all fractions.

The Digital SAT Calculator Guide has details about working with fractions, along with other types of math and graphs. Pull up the Guide in your Student Tools and become an expert!

Batteries

Change the batteries on your calculator a week before the Digital SAT so that you know your calculator won’t run out of power halfway through the test. You can also take extra batteries with you, just in case. Although it isn’t very likely that the batteries will run out on your calculator on the day of the test, it could happen—so you want to be prepared.

Final Words on the Calculator

Remember that the test-writers are trying to test your ability to use your calculator wisely. As such, they have purposely created many questions in which the calculator is worthless. So be sure to read the final question—there may be some serious surprises in there. Practice your math skills *and* your calculator skills so you have options about how you solve questions.

Summary

- Look for ways to eliminate answer choices that are too big or too small. Ballparking can help you find the right answer without extensive calculations, avoid trap answers, and improve your chances of getting the question right even if you have to guess.
- Use the built-in tools as much as possible. The most useful ones on the Math section are the Calculator, Reference Sheet, and Answer Eliminator tool.
- Use your scratch paper constantly: number the work for each question, write down key words from the final question, redraw geometric figures, and write down every step of math. Even if you use a calculator, it's worth setting up the math on your scratch paper to stay organized and avoid mistakes.
- Utilize the Word Problem Basic Approach: Read the Final Question (RTFQ), Let the Answers Point the Way, Work in Bite-Sized Pieces, and use Process of Elimination (POE).
- Practice with the calculator you plan to use for the test: either the built-in Desmos calculator or your personal scientific or graphing calculator.
- If you are going to use the built-in calculator, read the Digital SAT Calculator Guide in your Student Tools to maximize its effectiveness.
- If you are going to use your own calculator, make sure it is on the approved list and has fresh batteries.
- Set up the question on the scratch paper before entering anything into a calculator. By doing so, you will eliminate the possibility of getting lost or confused.

- A calculator can't help you find the answer to a question you don't understand. Be sure to use your calculator as a tool, not a crutch.
- Whether you are using a calculator or not, you must always perform calculations in the proper order (PEMDAS).

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Chapter 20

Fun with Fundamentals

We'll show you which mathematical concepts are most important to know for the Digital SAT. However, this book relies on your knowledge of basic math concepts. If you're a little rusty, this chapter is for you. Read on for a quick review of the math fundamentals you'll need to know.

THE BUILDING BLOCKS

As you go through this book, you might discover that you're having trouble with stuff you thought you already knew—like fractions or square roots. If this happens, it's probably a good idea to review the fundamentals. That's where this chapter comes in. Our drills and examples will refresh your memory if you've gotten rusty. Always keep in mind that the math tested on the Digital SAT is different from the math taught in school. If you want to raise your score, don't waste time studying math that the Digital SAT never tests.

Keep in mind that calculators are allowed on every question in both Math modules. You can use the built-in calculator available to you in the testing app, and you can also bring your own. A calculator can perform many basic math operations for you, such as working with fractions and converting between fractions and decimals. However, a calculator only does exactly what you tell it to do, so read carefully and write things down rather than relying on a calculator too much. Learn the content in this chapter, but also practice with the calculator you plan to use on test day. Your brain, pencil, and calculator all work together to get questions right efficiently.

Let's talk first about what you should expect to see on the test.

The Instructions

Both of the Math modules on the Digital SAT begin with the same set of instructions. The clock starts right away, so you want to know the instructions cold before you go in. That way, you can click Close and start working right away. If you forget something about the instructions while you're working on the test, click the Directions button in the upper left corner. We've reprinted the instructions below. Be sure to familiarize yourself with them ahead of time.

The questions in this section address a number of important math skills.

Use of a calculator is permitted for all questions. A reference sheet, calculator, and these directions can be accessed throughout the test.

Unless otherwise indicated:

- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

For **multiple-choice questions**, solve each problem and choose the correct answer from the choices provided. Each multiple-choice question has a single correct answer.

For **student-produced response questions**, solve each problem and enter your answer as described below.

- If you find **more than one correct answer**, enter only one answer.
- You can enter up to 5 characters for a **positive** answer and up to 6 characters (including the negative sign) for a **negative** answer.
- If your answer is a **fraction** that doesn't fit in the provided space, enter the decimal equivalent.
- If your answer is a **decimal** that doesn't fit in the provided space, enter it by truncating or rounding at the fourth digit.
- If your answer is a **mixed number** (such as $3\frac{1}{2}$), enter it as an improper fraction ($7/2$) or its decimal equivalent (3.5).
- Don't enter **symbols** such as a percent sign, comma, or dollar sign.

Examples

Answer	Acceptable ways to enter answer	Unacceptable: will NOT receive credit
3.5	3.5 3.50 7/2	3 1/2 31/2
$\frac{2}{3}$	2/3 .6666 .6667 0.666 0.667	0.66 .66 0.67 .67
$-\frac{1}{3}$	-1/3 -.3333 -0.333	-.33 -0.33

The instructions have a lot to say about the fill-in questions. Don't worry: we'll show you everything you need to know about that question format in Chapter 26.

Standard Symbols

The following standard symbols are used frequently on the Digital SAT:

SYMBOL	MEANING
=	is equal to
≠	is not equal to
<	is less than
>	is greater than

$\leq$ is less than or equal to
 $\geq$ is greater than or equal to



Formulas and Definitions

Go to your online Student Tools for a complete list of the math terms and formulas that you'll need to know for the Digital SAT.

THE SIX ARITHMETIC OPERATIONS

There are only six arithmetic operations that you will ever need to perform on the Digital SAT:

1. Addition ($3 + 3$)
2. Subtraction ($3 - 3$)
3. Multiplication (3×3 or $3 \cdot 3$)
4. Division ($3 \div 3$ or $3/3$)
5. Raising to a power (3^3)
6. Finding a root ($\sqrt{9}$ and $\sqrt[3]{8}$)

If you're like most students, you probably haven't paid much serious attention to these topics since junior high school. You'll need to learn about them again if you want to do well on the Digital SAT. By the time you take the test, using them should be automatic. All the arithmetic concepts are fairly basic, but you'll have to know them cold. You'll also have to know when and how to use your calculator, which will be quite helpful.

What Do You Get?

You should know the following arithmetic terms:

- The result of addition is a *sum* or *total*.
- The result of subtraction is a *difference*.
- The result of multiplication is a *product*.
- The result of division is a *quotient*.
- In the expression 5^2 , the 2 is called an *exponent*.

ORDER OF OPERATIONS

The Six Operations Must Be Performed in the Proper Order

Very often, solving an equation on the Digital SAT will require you to perform several different operations, one after another. These operations must be performed in the proper order. In general, the questions are written in such a way that you won't have trouble deciding what comes first. In cases in which you are uncertain, you need to remember only the following sentence:

Please Excuse My Dear Aunt Sally; she walks from *left* to *right*.

That's **PEMDAS**, for short. It stands for **P**arentheses, **E**xponents, **M**ultiplication, **D**ivision, **A**ddition, and **S**ubtraction. First, do any calculations inside the parentheses; then take care of the exponents; then perform all multiplication and division, from *left* to *right*, followed by addition and subtraction, from *left* to *right*.

The following exercise will help you learn the order in which to perform the six operations. First, set up the equations on paper. Then, use your calculator for the arithmetic. Make sure you perform the operations in the correct order.

Do It Yourself

The Digital SAT's built-in calculator follows the order of operations. It will also rewrite division into fractions—pretty neat! However, as with all calculators, the built-in calculator will only calculate *exactly* what you put in. Furthermore, if you decide to use your own calculator, be sure to practice and use parentheses whenever necessary. Write out the steps on your scratch paper first to avoid entry errors.

Exercise 1

Solve each of the following problems by performing the indicated operations in the proper order. Answers can be found on [this page](#).

1. $107 + (109 - 107) =$

2. $(7 \times 5) + 3 =$

3. $6 - 3(6 - 3) =$

4. $2 \times [7 - (6 \div 3)] =$

5. $10 - (9 - 8 - 6) =$

Parentheses Can Help You Solve Equations

Using parentheses to regroup information in arithmetic problems can be very helpful. In order to do this, you need to understand a basic law that you have probably forgotten since the days when you last took arithmetic—the **Distributive Law**. You don't need to remember the name of the law, but you do need to know how to use it to help you solve problems.

Whichever Comes First

For addition and subtraction, solve from left to right. The same is true of multiplication and division. And remember: if you don't solve in order from left to right, you could end up with the wrong answer! Example:

$$24 \div 4 \times 6 = 24 \div 24 = 1$$

wrong

$$24 \div 4 \times 6 = 6 \times 6 = 36$$

right

The Distributive Law

If you're multiplying the sum of two numbers by a third number, you can multiply each number in your sum individually. This comes in handy when you have to multiply the sum of two variables.

If a question gives you information in “factored form”— $a(b + c)$ —then you should distribute the first variable before you do anything else. If you are given information that has already been distributed— $(ab + ac)$ —then you should factor out the common term, putting the information back in factored form. Very often on the Digital SAT, simply doing this will enable you to spot the answer.

Here are some examples:

$$\text{Distributive: } 6(53) + 6(47) = 6(53 + 47) = 6(100) = 600$$

$$\text{Multiplication first: } 6(53) + 6(47) = 318 + 282 = 600$$

You get the same answer each way, so why get involved with complicated arithmetic? If you use the Distributive Law for this problem, you don't even need to use your calculator.

The exercise below illustrates the Distributive Law.

Exercise 2

Rewrite each problem by either distributing or factoring and then solve. (Hint: For questions 1, 2, 4, and 5, try factoring.) Questions 3, 4, and 5 have no numbers in them; therefore, they can't be solved with a calculator. Answers can be found on [this page](#).

1. $(6 \times 57) + (6 \times 13) =$

2. $51(48) + 51(50) + 51(52) =$

3. $a(b + c - d) =$

4. $xy - xz =$

5. $abc + xyc =$

FRACTIONS

A Fraction Is Just Another Way of Expressing Division

The expression $\frac{x}{y}$ is exactly the same thing as $x \div y$. The expression $\frac{1}{2}$ means nothing more than $1 \div 2$. In the fraction $\frac{x}{y}$, x is known as the **numerator**, and y is known as the **denominator**.

Fractions and Calculators

It can be tempting to try to directly enter the information from the question into the calculator. The writers of the Digital SAT know this, so they write questions that will lead you to errors if you do so. Always start by writing out what you need to calculate on your scratch paper; only afterwards should you move to use the calculator.

On the Digital SAT's built-in calculator, fractions will appear as fractions. You can use arrow keys or a mouse to navigate between the numerator and denominator of a fraction.

The results will be given as a decimal. To get the results as a fraction, click the button next to the entry box that looks like this:



Adding and Subtracting Fractions with the Same Denominator

To add two or more fractions that all have the same denominator, simply add the numerators and put the sum over the common denominator. Consider the following example:

$$\frac{1}{100} + \frac{4}{100} = \frac{1+4}{100} = \frac{5}{100}$$

Subtraction works exactly the same way:

$$\frac{4}{100} - \frac{1}{100} = \frac{4-1}{100} = \frac{3}{100}$$

Adding and Subtracting Fractions with Different Denominators

In school you were taught to add and subtract fractions with different denominators by finding the common denominator. To do this, you have to multiply each fraction by a number that makes all the denominators the same. Most students find this process annoying.

Fortunately, we have an approach to adding and subtracting fractions with different denominators that simplifies the entire process. Use the example below as a model. Just multiply in the direction of each arrow, and then either add or subtract across the numerator. Lastly, multiply across the denominator.

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

$$\begin{array}{ccc} 2 & & 3 \\ \frac{1}{3} & \times & \frac{1}{2} \\ \hline & & 6 \end{array}$$

$$\frac{2+3}{6} = \frac{5}{6}$$

We call this procedure the **Bowtie** because the arrows make it look like a bowtie. Use the Bowtie to add or subtract any pair of fractions without thinking about the common denominator, just by following the steps above.

Call on the Calculator

Whether you are adding, subtracting, multiplying, or dividing fractions, a calculator can make it a snap. Keep the following things in mind:

1. Practice with whichever calculator you plan to use on test day.
2. Follow the order of operations and use parentheses to make sure the calculator does exactly what you want.
3. Learn the rules anyway. You might need them if, for example, the fractions include variables.

Multiplying All Fractions

Multiplying fractions is easy. Just multiply across the numerator; then multiply across the denominator.

Here's an example.

$$\frac{4}{5} \times \frac{5}{6} = \frac{20}{30}$$

When you multiply fractions, all you are really doing is performing one multiplication problem on top of another.

You should never multiply two fractions before looking to see if you can reduce either or both. If you reduce first, your final answer will be in the form that the test-writers are looking for. Here's another way to express this rule: *Simplify before you multiply.*

$$\begin{aligned} \frac{63}{6} \times \frac{48}{7} &= \frac{\overset{9}{\cancel{63}}}{6} \times \frac{48}{\cancel{7}_1} = \frac{\overset{9}{\cancel{63}}}{\cancel{6}_1} \times \frac{\overset{8}{\cancel{48}}}{\cancel{7}_1} = \\ \frac{9}{1} \times \frac{8}{1} &= \\ \frac{72}{1} &= 72 \end{aligned}$$

Dividing All Fractions

To divide one fraction by another, flip over (or take the reciprocal of) the second fraction and multiply.

Here's an example.

$$\begin{aligned} \frac{2}{3} \div \frac{4}{3} &= \\ \frac{2}{3} \times \frac{3}{4} &= \frac{6}{12} = \frac{1}{2} \end{aligned}$$



Just Flip It

Dividing by a fraction is the same thing as multiplying by the reciprocal of that fraction. So just flip over the fraction you are dividing by and multiply instead.

Be careful not to cancel or reduce until after you flip the second fraction. You can even do the same thing with fractions whose numerators and/or denominators are fractions. These problems look quite frightening, but they're actually easy if you keep your cool.

Here's an example.

$$\frac{4}{\frac{4}{3}} =$$

$$\frac{4}{1} \div \frac{4}{3} =$$

$$\frac{4}{1} \times \frac{3}{4} =$$

$$\frac{\cancel{4}}{1} \times \frac{3}{\cancel{4}} =$$

$$\frac{3}{1} = 3$$

Reducing Fractions

When you add or multiply fractions, you will very often end up with a big fraction that is hard to work with. You can almost always reduce such a

fraction into one that is easier to handle.

To reduce a fraction, divide both the numerator and the denominator by the largest number that is a factor of both. For example, to reduce $\frac{12}{60}$, divide both the numerator and the denominator by 12, which is the largest number that is a factor of both. Dividing 12 by 12 yields 1; dividing 60 by 12 yields 5. The reduced fraction is $\frac{1}{5}$.

If you can't immediately find the largest number that is a factor of both, find any number that is a factor of both and divide both the numerator and denominator by that number. Your calculations will take a little longer, but you'll end up in the same place. In the previous example, even if you don't see that 12 is a factor of both 12 and 60, you can no doubt see that 6 is a factor of both. Dividing numerator and denominator by 6 yields $\frac{2}{10}$. Now divide both numbers by 2. Doing so yields $\frac{1}{5}$. Once again, you have arrived at the answer.

**Start Small**

It is not easy to see that 26 and 286 have a common factor of 13, but it's pretty clear that they're both divisible by 2. So start from there.

Reducing fractions can be pretty easy on a calculator. Using the built-in calculator, click the button to the left of the entry field that toggles between fractions and decimals. When in fraction mode, the result will appear in its most reduced form. Take a look at the same fraction in decimal mode and fraction mode:



Converting Mixed Numbers to Fractions

A **mixed number** is a number such as $2\frac{3}{4}$. It is the sum of an integer and a fraction. When you see mixed numbers on the Digital SAT, you should usually convert them to ordinary fractions.

Here's a quick and easy way to convert mixed numbers.

- Multiply the integer by the denominator.
- Add this product to the numerator.
- Place this sum over the denominator.

For practice, let's convert $2\frac{3}{4}$ to a fraction. Multiply 2 (the integer part of the mixed number) by 4 (the denominator). That gives you 8. Add that to the 3 (the numerator) to get 11. Place 11 over 4 to get $\frac{11}{4}$.

The mixed number $2\frac{3}{4}$ is exactly the same as the fraction $\frac{11}{4}$. We converted the mixed number to a fraction because fractions are easier to work with

than mixed numbers.

Just Don't Mix

For some reason, the test-writers think it's okay to give you mixed numbers as answer choices. On fill-in questions, however, if you use a mixed number, you won't get credit. You can see why. In your fill-in box, $3\frac{1}{4}$ will look like $\frac{31}{4}$. See Chapter 26 for more about fill-in questions.

Exercise 3

Try converting the following mixed numbers to fractions. Answers can be found on [this page](#).

1. $8\frac{1}{3}$

2. $2\frac{3}{7}$

3. $5\frac{4}{9}$

4. $2\frac{1}{2}$

5. $6\frac{2}{3}$

Fractions Behave in Peculiar Ways

Fractions don't always behave the way you might want them to. For example, because 4 is obviously greater than 2, it's easy to forget that $\frac{1}{4}$ is

less than $\frac{1}{2}$. It's particularly confusing when the numerator is something other than 1. For example, $\frac{2}{7}$ is less than $\frac{2}{5}$. Finally, you should keep in mind that when you multiply one fraction by another, you'll get a fraction that is smaller than either of the first two. Study the following example:

$$\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$$

$$\frac{1}{8} < \frac{1}{2}$$

$$\frac{1}{8} < \frac{1}{4}$$

A Final Word About Fractions and Calculators

Throughout this section, we've given you some hints about using a calculator to work with fractions. The built-in calculator or your own can be a tremendous help if you know how to use it properly. Make sure you practice with the calculator you plan to use on test day so that working fractions on it becomes second nature before the test.

Exercise 4

Work these examples with the techniques you've read about in this chapter so far. Then work them again using a calculator. If you have any problems, go back and review the information just outlined. Answers can be found on [this page](#).

1. Reduce $\frac{18}{6}$.

2. Convert $6\frac{1}{5}$ to an improper fraction.

$$3. 2\frac{1}{3} - 3\frac{3}{5} =$$

$$4. \frac{5}{18} \times \frac{6}{25} =$$

$$5. \frac{3}{4} \div \frac{7}{8} =$$

$$6. \frac{\frac{2}{5}}{5} =$$

$$7. \frac{\frac{1}{3}}{\frac{3}{4}} =$$

DECIMALS

A Decimal Is Just Another Way of Expressing a Fraction

Fractions can be expressed as decimals. To find a fraction's decimal equivalent, simply divide the numerator by the denominator. (You can do this easily with a calculator.)

$$\frac{3}{5} =$$

$$3 \div 5 = 0.6$$

Adding, Subtracting, Multiplying, and Dividing Decimals

Manipulating decimals is easy with a calculator. Simply punch in the numbers—being especially careful to get the decimal point in the right place every single time—and read the result from the display. A calculator makes these operations easy. In fact, working with decimals is one area on the Digital SAT in which your calculator will prevent you from making careless errors. You won't have to line up decimal points or remember what

happens when you divide. The calculator will keep track of everything for you, as long as you punch in the correct numbers to begin with. Just be sure to practice carefully before test day.

Exercise 5

Calculate each of the answers to the following questions on paper with your pencil, rounding any awkward numbers to make the math easier to handle. Sometimes, estimating the answer is all you need to do to answer a multiple-choice question. Then use a calculator to find the exact answer. Answers can be found on [this page](#).

1. $0.43 \times 0.87 =$

2. $\frac{43 + 0.731}{0.03} =$

3. $3.72 \div 0.02 =$

4. $0.71 - 3.6 =$

EXPONENTS AND SQUARE ROOTS

Exponents Are a Kind of Shorthand

Many numbers are the product of the same value multiplied over and over again. For example, $32 = 2 \times 2 \times 2 \times 2 \times 2$. Another way to write this would be $32 = 2^5$, or “thirty-two equals two to the fifth power.” The little number, or **exponent**, denotes the number of times that 2 is to be used as a factor. In the same way, $10^3 = 10 \times 10 \times 10$, or 1,000, or “ten to the third power,” or “ten cubed.” In this example, the 10 is called the **base** and the 3 is called the **exponent**. (You won’t need to know these terms on the Digital SAT, but you will need to know them in order to understand our explanations.)

Warning #1

The rules for multiplying and dividing exponents do not apply to addition or subtraction:

$$2^2 + 2^3 = 12$$

$$(2 \times 2) + (2 \times 2 \times 2) = 12$$

It does not equal 2^5 or 32.

Multiplying Numbers with Exponents

To multiply two numbers with the same base, simply add the exponents.

For example, $2^3 \times 2^5 = 2^{3+5} = 2^8$.

Dividing Numbers with Exponents

To divide two numbers with the same base, simply subtract the exponents.

For example, $\frac{2^5}{2^3} = 2^{5-3} = 2^2$.

Raising a Power to a Power

When you raise a power to a power, you multiply the exponents. For example, $(2^3)^4 = 2^{3 \times 4} = 2^{12}$.

Warning #2

Parentheses are very important with exponents because you must remember to distribute powers to everything within them.

For example, $(3x)^2 = 9x^2$, not $3x^2$. Similarly,

$$\left(\frac{3}{2}\right)^2 = \frac{3^2}{2^2}, \text{ not } \frac{9}{2}.$$

But the Distributive Law applies only when you multiply or divide:

$$(x + y)^2 = x^2 + 2xy + y^2, \text{ not } x^2 + y^2.$$

MADSPM

To remember the exponent rules, all you need to do is remember the acronym **MADSPM**. Here's what it stands for:

- **M**ultiply → **A**dd
- **D**ivide → **S**ubtract
- **P**ower → **M**ultiply

Whenever you see an exponent question, you should think MADSPM. The three MADSPM rules are the only rules that apply to exponent operations.

Here's a typical Digital SAT exponent question.

 Mark for Review

1. For the equations $\frac{a^x}{a^y} = a^{10}$ and $(a^y)^3 = a^x$, if $a > 1$, what is the value of x ?

☐ A 5

☐ B 10

☐ C 15

☐ D 20

Here's How to Crack It

The question asks for the value of x , but it looks pretty intimidating with all those variables. In fact, you might be about to cry “POOD” and go on to the

next question. That might not be a bad idea, but before you skip the question, pull out those MADSPM rules.

For the first equation, you can use the Divide-Subtract Rule: $\frac{a^x}{a^y} = a^{x-y} = a^{10}$.

In other words, the first equation tells you that $x - y = 10$.

For the second equation, you can use the Power-Multiply Rule:

$(a^y)^3 = a^{3y} = a^x$. So, that means that $3y = x$.

Now, it's time to substitute: $x - y = 3y - y = 10$. So, $2y = 10$ and $y = 5$. Be careful, though! Don't choose (A). That's the value of y , but the question wants to know the value of x . Since $x = 3y$, $x = 3(5) = 15$. The correct answer is (C).

Exponents and Your Calculator

The built-in calculator has both an a^2 button (for squaring a value) and an a^b button (for other exponents). As with fractions, the built-in calculator shows you the operations in the same way you'd write them out on paper.

You could also do this question by using Plugging In the Answers, or PITA, which will be discussed in more detail later in this book. Of course, you still need to know the MADSPM rules to do the question that way.

The Peculiar Behavior of Exponents

Raising a number to a power can have quite peculiar and unexpected results, depending on what sort of number you start out with. Here are some

examples.

- If you square or cube a number greater than 1, it becomes larger. For example, $2^3 = 8$.
- If you square or cube a positive fraction smaller than one, it becomes smaller.

For example, $\left(\frac{1}{2}\right)^3 = \frac{1}{8}$.

- A negative number raised to an even power becomes positive. For example, $(-2)^2 = 4$.
- A negative number raised to an odd power remains negative. For example, $(-2)^3 = -8$.

See the Trap

The test-writers may hope you won't know these strange facts about exponents and throw them in as trap answers. Knowing the peculiar behavior of exponents will help you avoid these tricky pitfalls in a question.

You should also have a feel for relative sizes of exponential numbers without calculating them. For example, 2^{10} is much larger than 10^2 ($2^{10} = 1,024$; $10^2 = 100$). To take another example, 2^5 is twice as large as 2^4 , even though 5 seems only a bit larger than 4.

Square Roots

The radical sign ($\sqrt{}$) indicates the **square root** of a number. For example, $\sqrt{25} = 5$. Note that square roots cannot be negative. If the test-writers want you to think about a negative solution, they won't use the radical sign; instead they'll say $x^2 = 25$ because then $x = 5$ or $x = -5$.

The Only Rules You Need to Know

Here are the only rules regarding square roots that you need to know for the Digital SAT.

1. $\sqrt{x}\sqrt{y} = \sqrt{xy}$. For example, $\sqrt{3}\sqrt{12} = \sqrt{36} = 6$.

2. $\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}}$. For example, $\sqrt{\frac{5}{4}} = \frac{\sqrt{5}}{\sqrt{4}} = \frac{\sqrt{5}}{2}$.

3. $\sqrt{x}$ = positive root only. For example, $\sqrt{16} = 4$.

Note that rule 1 works in reverse: $\sqrt{50} = \sqrt{25} \times \sqrt{2} = 5\sqrt{2}$. This is really a kind of factoring. You are using rule 1 to factor a large, clumsy radical into numbers that are easier to work with. Rule 2 works in reverse as well. $\sqrt{75}$ divided by $\sqrt{3}$ looks complicated, but $\sqrt{\frac{75}{3}} = \sqrt{25} = 5$. And remember that radicals are just fractional exponents, so the same rules of distribution apply. We'll get to fractional exponents below.

Careless Errors

The Digital SAT will try to confuse you with the behavior of roots. Remember that the square root of a number between 0 and 1 is *larger* than the original number. For example, $\sqrt{\frac{1}{4}} = \frac{1}{2}$, and $\frac{1}{2} > \frac{1}{4}$.

Negative and Fractional Exponents

So far we've dealt with only positive integers for exponents, but they can be negative integers as well as fractions. The same concepts and rules apply, but the numbers just look a little weirder. Keep these concepts in mind:

- Negative exponents are a fancy way of writing reciprocals:

$$x^{-n} = \frac{1}{x^n}$$

- Fractional exponents are a fancy way of taking roots and powers:

$$x^{\frac{y}{z}} = \sqrt[z]{x^y}$$

Roots and the Calculator

The Digital SAT’s built-in calculator has a button for square roots right on the main ABC keypad. The calculator can do other roots, but College Board has hidden that function. Click the “funcs” button and scroll all the way down to the “NUMBER THEORY” section. There you’ll find the $\sqrt[n]{}$ button. As with other functions on the built-in calculator, both radicals will look the same as they would if you wrote them out yourself on paper.

If you don’t want to scroll through a menu, you can also use fractional exponents using the a^b button to do roots other than square roots, as well.

Here’s an example.



 Mark for Review

2. If $x > 0$, which of the following is equivalent to $\sqrt{x^3}$?

I. $x + x^{\frac{1}{2}}$

II. $\left(x^{\frac{1}{2}}\right)^3$

III. $\left(x^2\right)\left(x^{-\frac{1}{2}}\right)$

☐ A None

☐ B I and II only

☐ C II and III only

☐ D I, II, and III

Here's How to Crack It

The question asks for an equivalent form of a root and gives three expressions with exponents, so it really tests your knowledge of exponents. First, convert $\sqrt{x^3}$ into an exponent to more easily compare it to the choices in the Roman numeral statements. (Plus, exponents are easier to work with because they have those nice MADSPM rules.) According to the definition of a fractional exponent, $\sqrt{x^3} = x^{\frac{3}{2}}$. You want the items in the Roman numerals to equal $x^{\frac{3}{2}}$.

Now, it's time to start working with the Roman numerals. In (I), the test-writers are trying to be tricky. (There's a surprise.) There's no exponent rule for adding exponent expressions with like bases. So, $x + x^{\frac{1}{2}}$ does *not* equal

$x^{\frac{3}{2}}$. (If you want to be sure, you could try a number for x : if $x = 4$, then $\sqrt{4^3} = 8$, but $4 + 4^{\frac{1}{2}} = 4 + 2 = 6$.) So, cross off any answer that includes (I): (B) and (D) are gone.

Now, since you are down to either (A) or (C), all you really need to do is try either (II) or (III). If either one works, the answer is (C). Try (II). Use the Power-Multiply Rule: $\left(x^{\frac{1}{2}}\right)^3 = x^{\left(\frac{1}{2}\right)(3)} = x^{\frac{3}{2}}$. Since (II) works, (C) is the correct answer.

Notice that you didn't even need to check (III). Using POE on a Roman numeral question often means that you won't need to check all of the Roman numerals.

HOW TO READ CHARTS AND GRAPHS

Another basic math skill you will need for the Digital SAT is the ability to interpret data from charts, graphs, tables, and more. This section will cover the basics of reading these figures. How to answer questions related to charts and other figures in detail will be discussed in Chapter 24.

What's Up with All of These Figures?

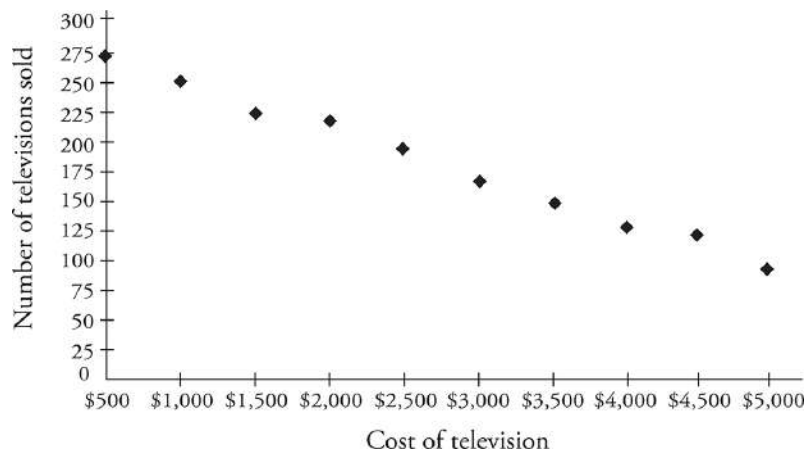
The Digital SAT includes charts, graphs, and tables throughout the test to present data for students to analyze. College Board believes this will better reflect what students learn in school and what they need to understand in the real world. Questions will typically include real-life scenarios, such as finance and business situations, social science issues, and scientific matters.

Since you'll be seeing graphics throughout the test, let's look at the types you may encounter and the skills you'll need to work with to analyze charts and graphs.

Types of Graphs

The Scatterplot

A **scatterplot** is a graph with distinct data points, each representing one piece of information. On the scatterplot below, each dot represents the number of televisions sold at a certain price point.



Here's How to Read It

To find the cost of a television when 225 televisions are sold, start at 225 on the vertical axis and look to the right until you hit a data point. Use the edge of your scratch paper as a ruler or, if you have a steady hand, drag the mouse pointer. Once you hit a point, visualize (again using your scratch paper or the mouse pointer to help) a straight line down from the point to the horizontal axis and read the number the line hits, which should be \$1,500. To determine the number of televisions sold when they cost a certain amount, reverse the steps—start at the bottom, look up until you hit a point, and then look left until you intersect the vertical axis.

Now try a question based on that scatterplot.

 Mark for Review

3. A certain store sells televisions ranging in price from \$500 to \$5,000 in increments of \$500. The scatterplot graph shows the total number of televisions sold at each price during the last 12 months. Approximately how much more revenue did the store collect from the televisions it sold priced at \$3,500 than it did from the televisions it sold priced at \$1,000?

☐ A \$175,000

☐ B \$250,000

☐ C \$275,000

☐ D \$350,000

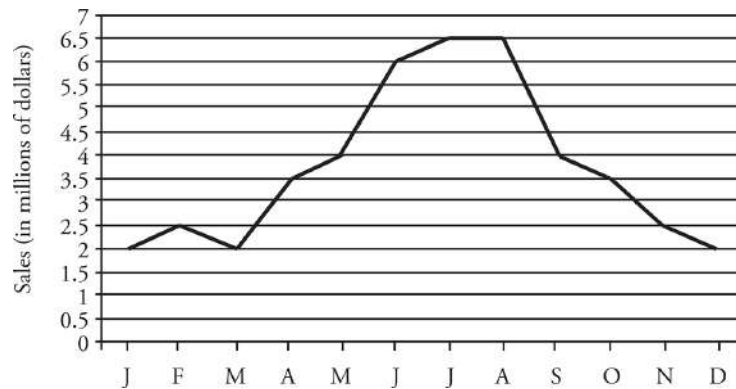
Here's How to Crack It

The question asks for the difference in revenue from selling televisions at two different prices. The revenue is the *cost of television* $\times$ *number of televisions sold*. You need the information from the graph only for the television that costs \$3,500 and for the television that costs \$1,000 in order to determine how much more revenue the \$3,500 television produced. There were 150 of the \$3,500 televisions sold, for a revenue of \$525,000. There were 250 of the \$1,000 televisions sold, for a revenue of \$250,000. The difference between the two is $\$525,000 - \$250,000 = \$275,000$. The correct answer is (C).

A scatterplot may also include a **line of best fit**. This is the line that best represents the data.

The Line Graph

A **line graph** is similar to a scatterplot in that it shows different data points that relate the two variables. The difference with a line graph, though, is that the points have been connected to create a continuous line.



Here's How to Read It

Reading a line graph is very similar to reading a scatterplot. Start at the axis that represents the data given, and use scratch paper or the mouse pointer to visualize a straight line up or to the right until you intersect the graph line. Then move left or down until you hit the other axis. For example, in February, indicated by an F on the horizontal axis, there were \$2.5 million in sales. Be sure to notice the units on each axis. If February sales were only \$2.50, rather than \$2.5 million, then this company wouldn't be doing very well!

Let's look at a question about this line graph.



 Mark for Review

4. The forecasted monthly sales of sunscreen are presented in the line graph. For which period are the forecasted monthly sales figures strictly decreasing and then strictly increasing?

☐ A January to March

☐ B February to April

☐ C June to August

☐ D September to November

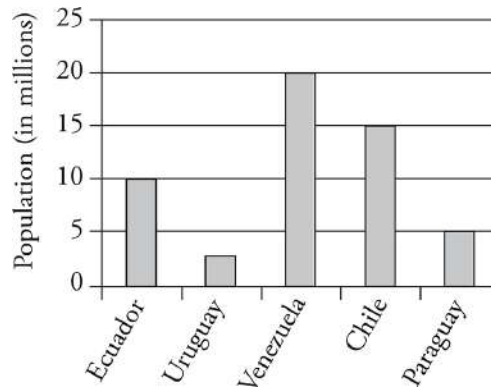
Here's How to Crack It

The question asks for a period during which the forecasted sales are decreasing and then increasing. Look up the values for each period in question and use Process of Elimination to get rid of those that don't fit. For (A), January sales are forecasted to be \$2 million, February \$2.5 million, and March \$2 million. This is an increase followed by a decrease, not the other way around, so eliminate (A). For (B), you already know sales decreased from February to March, so check for a following increase in April. The figure for April is \$3.5 million, which is an increase over the March figure. The correct answer is (B).



The Bar Graph (or Histogram)

Instead of showing a variety of different data points, a **bar graph** shows the number of items that belong to a particular category. If the variable at the bottom is given in ranges instead of distinct items, the graph is called a **histogram**, but you read it the same way.



Here's How to Read It

The height of each bar corresponds to a value on the vertical axis. In this case, the bar above Chile hits the line that intersects with 15 on the vertical axis, so there are 15 million people in Chile. Again, watch the units to make sure you know what the numbers on the axes represent. On this graph, horizontal lines are drawn at 5-unit intervals, making the graph easier to read. If these lines do not appear on a bar graph, use your scratch paper to determine the height of a given bar.

Here's an example of a bar graph question, which is based on the Populations of Countries graph above.

 Mark for Review

5. The populations of five countries are shown in the bar graph. If population density is defined as $\frac{\text{population}}{\text{area}}$, and the area of Paraguay is 400,000 square kilometers, what is the population density of Paraguay, in people per square kilometer?

☐ B 0.8

☐ C 1.25

☐ D 12.5

Here's How to Crack It

The question asks for the population density of Paraguay. Start by determining the population of Paraguay. The bar hits right at the horizontal line for 5, which is in millions, so there are 5 million people in Paraguay. Now use the definition of population density in the question.

$$\frac{\text{population}}{\text{area}} = \frac{5,000,000}{400,000}$$

Be very careful with the number of zeroes you put in the fraction—the answer choices are pairs that vary by a factor of 10, meaning the test-writers expect you to miss a zero. The answer must be greater than 1, since your numerator is bigger than your denominator, so eliminate (A) and (B). Choice (C) also seems too small, but check the math on your calculator (carefully). You should get 12.5 people per square kilometer. The correct answer is (D).

The Two-Way Table

A **two-way table** is another way to represent data without actually graphing it. Instead of having the variables represented on the vertical and horizontal axes, the data will be arranged in rows and columns. The top row will give the headings for each column, and the left-most column will give the headings for each row. The numbers in each box indicate the data for the category represented by the row and the column the box is in. This two-way table, for example, shows computer production arranged by days of the week and shift times.

	Morning Shift	Afternoon Shift
Monday	200	375
Tuesday	245	330
Wednesday	255	340
Thursday	250	315
Friday	225	360

Here's How to Read It

If you want to find the number of computers produced on Tuesday morning, you can start in the Morning Shift column and look down until you find the number in the row that says Tuesday, or you can start in the row for Tuesday and look to the right until you find the Morning Shift column. Either way, the result is 245. Some tables will give you totals in the bottom row and/or the right-most column, but sometimes you will need to find the totals yourself by adding up all the numbers in each row or in each column. More complicated tables will have more categories listed in rows and/or columns, or the tables may even contain extraneous information.

Give this one a try.



 Mark for Review

	Morning Shift	Afternoon Shift
Monday	200	375
Tuesday	245	330
Wednesday	255	340
Thursday	250	315

Friday	225	360
--------	-----	-----

6. Computer production at a factory occurs during two shifts, as shown in the chart above. If computers are produced only during the morning and afternoon shifts, on which of the following pairs of days is the greatest total number of computers produced?

☐ A Monday and Thursday

☐ B Tuesday and Thursday

☐ C Wednesday and Friday

☐ D Tuesday and Friday

Here's How to Crack It

The question asks for the pair of days on which the greatest number of computers was produced. This is a perfect calculator question. Just add the Morning Shift and the Afternoon Shift for each day to see which total is the greatest. Write each day and total on your scratch paper, so you don't have to keep track of it all in your head. Monday is $200 + 375 = 575$, Tuesday is $245 + 330 = 575$, Wednesday is $255 + 340 = 595$, Thursday is $250 + 315 = 565$, and Friday is $225 + 360 = 585$. According to these calculations, Wednesday and Friday have the two greatest totals, so the greatest number of computers is produced on those two days together. The correct answer is (C).



Figure Facts

Every time you encounter a figure or graphic on the Digital SAT, you should make sure you understand how to read it by checking the following:

- What are the variables for each axis or the headings for the table?
- What units are used for each variable?
- Are there any key pieces of information (numbers, for example) in the legend of the chart that you should note?
- What type of relationship is shown by the data in the chart? For instance, if the chart includes curves that show an upward slope, then the graph shows a **positive association**, while curves that show a downward slope show a **negative association**.
- You can use the edge of your scratch paper as a ruler to help you make sure you are locating the correct data in the graph. The mouse pointer on the screen can also help, as long as you trust yourself to move it in a straight line.

Surveys on the Digital SAT

Some Digital SAT math questions will appear to be about data, but there's no figure and the question has a lot of words about survey results. These questions are usually about a biased sample, meaning that the group doing the survey asked people who are likely to already be in favor of or opposed to the issue, but then drew a conclusion about a larger group. For example, we couldn't survey people who read this book to ask whether they read the final question and take bite-sized pieces and then assume that everyone who takes the Digital SAT does the same thing.

The best way to perform a survey is to ask a random sample rather than asking a group that's probably already picked a side. Questions about surveys might include numbers, and there's a chance that there is a problem with the sample size, meaning the survey asked too few people to get an

accurate result. But usually the number is a distraction, so focus on using POE and crossing out answers that don't fit the information given in the question.

Fundamentals Drill

Work these questions using the skills you've learned so far. Be sure to use a calculator when necessary to avoid careless calculation errors. Don't forget, though, that using it may slow you down when doing the math on paper would be faster. Answers and explanations can be found starting on [this page](#).

 Mark for Review

1. If 7 times a number is 84, what is 4 times the number?

☐ A 16

☐ B 28

☐ C 48

☐ D 56

 Mark for Review

2. If $3x = 12$, what is the value of $\frac{24}{x}$?

☐ A $\frac{1}{6}$

☐ B $\frac{2}{3}$

☐ C 4

☐ D 6

 Mark for Review

3. Which of the following represents the statement “the sum of the squares of x and y is equal to the square root of the difference of x and y ”?

☐ A $x^2 + y^2 = \sqrt{x - y}$

☐ B $x^2 - y^2 = \sqrt{x + y}$

☐ C $(x + y)^2 = \sqrt{x} - \sqrt{y}$

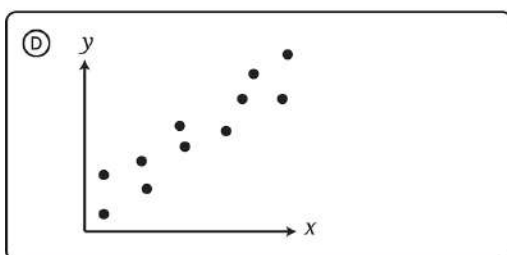
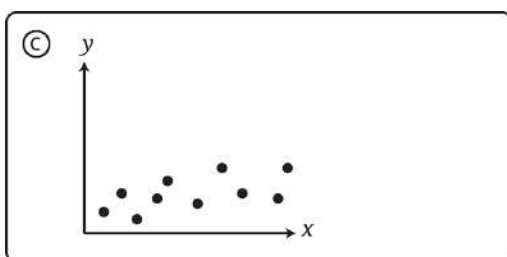
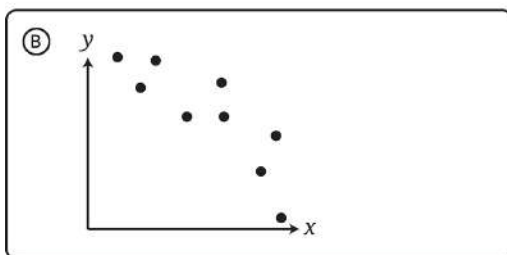
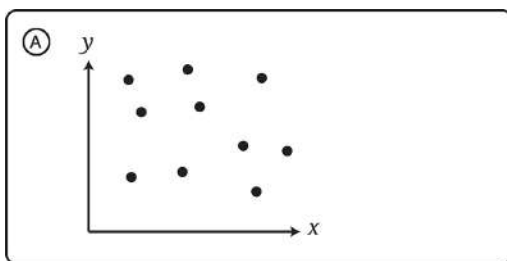
☐ D $\sqrt{x + y} = (x - y)^2$

 Mark for Review

4. If $a = -2$, then $a + a^2 - a^3 + a^4 - a^5 =$

 Mark for Review

5. Which of the following graphs shows a strong positive association between x and y ?



Mark for Review

6. If $9^{-2} = \left(\frac{1}{3}\right)^x$, what is the value of x ?

☐ A 1

☐ B 2

☐ C 4

☐ D 6

 Mark for Review

7. If $\sqrt{x} + 22 = 38$, what is the value of x ?

☐ A 4

☐ B 16

☐ C 32

☐ D 256

 Mark for Review

$$\frac{1}{8} + \frac{1}{10} = \frac{a}{b}$$

8. In the equation above, if a and b are positive integers and $\frac{a}{b}$ is in its simplest reduced form, what is the value of a ?

☐ A 2

☐ B 9

☐ C 18

☐ D 40

 Mark for Review

9. If $4^x \cdot n^2 = 4^{x+1} \cdot n$ and x and n are both positive integers, what is the value of n ?

Answers to Chapter Exercises

Exercise 1

1. 109

2. 38

3. -3

4. 10

5. 15

Exercise 2

1. $6(57 + 13) = 6 \times 70 = 420$

2. $51(48 + 50 + 52) = 51(150) = 7,650$

3. $ab + ac - ad$

4. $x(y - z)$

5. $c(ab + xy)$

Exercise 3

1. $\frac{25}{3}$

2. $\frac{17}{7}$

3. $\frac{49}{9}$

4. $\frac{5}{2}$

5. $\frac{20}{3}$

Exercise 4

1. 3

2. $\frac{31}{5}$

3. $-\frac{19}{15}$

4. $\frac{1}{15}$

5. $\frac{6}{7}$

6. $\frac{2}{25}$

7. $\frac{4}{9}$

Exercise 5

1. **Estimated Answer:** $0.4 \times 0.9 = 0.36$

Calculator Answer: 0.3741

2. **Estimated Answer:** $44 \div 0.03 = 1,466$

Calculator Answer: 1,457.7

3. **Estimated Answer:** $3.7 \div 0.02 = 185$

Calculator Answer: 186

4. **Estimated Answer:** $0.7 - 3.6 = -2.9$

Calculator Answer: -2.89

FUNDAMENTALS DRILL ANSWERS AND EXPLANATIONS

1. C

The question asks for the value of 4 times an unknown number. Translate the English into math, calling the number n , to get $7n = 84$. Divide both sides by 7 to get $n = 12$. Finally, $4n = 4(12) = 48$. The correct answer is (C).

2. D

The question asks for the value of $\frac{24}{x}$. First, solve for x . Divide both sides of the equation by 3, and you get $x = 4$. Then divide 24 by 4, which gives you 6. The correct answer is (D).

3. A

The question asks for an algebraic expression. Translate the English into math by taking it one phrase at a time. “Sum” means you will add two things. The “squares of x and y ” means to square x and square y , or x^2 and y^2 . Add these to get $x^2 + y^2$. Cross out any choice that does not have $x^2 + y^2$ as the first part of the equation. Eliminate (B), (C), and (D). The correct answer is (A).

4. 58

The question asks for the value of an expression for a certain value of the variable. Plug in the number given for a in the expression to find the value: $-2 + (-2)^2 - (-2)^3 + (-2)^4 - (-2)^5$. Remember PEMDAS, the order of operations. The first thing to do here is deal with the *Exponents*, then take care of the *Addition and Subtraction*: $-2 + 4 - (-$

$8) + 16 - (-32)$, which simplifies to $-2 + 4 + 8 + 16 + 32 = 58$. The correct answer is 58.

5. **D**

The question asks for the graph that shows a strong positive association between x and y . A “strong positive association” means that as one variable increases, the other one increases. This will be shown as a line that angles through the graph from the lower left to the upper right. These scatterplots don’t have any lines of best fit drawn on them, so imagine the line that would go through most of the points on each graph. In (A), the points are all over the place, so no line of best fit can even be drawn. Eliminate (A). In (B), the line that hits most of the points would go from the upper left to the lower right. This is a negative association, not a positive one, so eliminate (B). In (C), the line would go straight across, parallel to the x -axis. This is not a positive association, so eliminate (C). The correct answer is (D).

6. **C**

The question asks for the value of x in an equation with exponents. A negative exponent means to take the reciprocal and apply the positive exponent. So $9^{-2} = \left(\frac{1}{9}\right)^2 = \frac{1}{81}$. Now find what power of $\frac{1}{3}$ equals $\frac{1}{81}$. Because $3^4 = 81$, $\left(\frac{1}{3}\right)^4 = \frac{1}{81}$, and x must be 4. The correct answer is (C).

7. **D**

The question asks for the value of x . To solve this equation, get $\sqrt{x}$ by itself by subtracting 22 from both sides. The result is $\sqrt{x} = 16$, so

square both sides: $(\sqrt{x})^2 = 16^2$, so $x = 256$. The correct answer is (D).

8. **B**

The question asks for the value of a in an equation with fractions. The lowest number that both 8 and 10 are factors of is 40. Convert the fractions to a denominator of 40: $\frac{5}{40} + \frac{4}{40} = \frac{9}{40}$. There is no factor that 9 and 40 have in common, so the fraction cannot be reduced. The number in place of a in $\frac{a}{b}$ is 9. Be careful not to choose (D), which contains the value of b . The correct answer is (B).

9. **4**

The question asks for the value of n . First, simplify the equation $4^x \cdot n^2 = 4^{x+1} \cdot n$ by dividing both sides by n to get $4^x \cdot n = 4^{x+1}$, and then try an easy number for x . If $x = 2$, then $4^2 \cdot n = 4^{2+1}$. Since $16n = 4^3$, $16n = 64$ and $n = 4$. The correct answer is 4.

Summary

- There are only six arithmetic operations tested on the Digital SAT: addition, subtraction, multiplication, division, exponents, and square roots.
- These operations must be performed in the proper order (PEMDAS), beginning with operations inside parentheses.
- Apply the Distributive Law whenever possible. This is often enough to find the answer.
- A fraction is just another way of expressing division.
- You must know how to add, subtract, multiply, and divide fractions. Don't forget that you can also use your calculator or the built-in calculator on all questions.
- If any questions involving large or confusing fractions appear, try to reduce the fractions first. Before you multiply two fractions, for example, see if it's possible to reduce either or both of the fractions.
- If you know how to work out fractions on your calculator or the built-in calculator, use it to help you with questions that involve fractions. If you intend to use your calculator for fractions, be sure to practice. You should also know how to work with fractions the old-fashioned way with paper and pencil.
- A decimal is just another way of expressing a fraction.
- Use your calculator or the built-in calculator to add, subtract, multiply, and divide decimals.

- Exponents are a kind of shorthand for expressing numbers that are the product of the same factor multiplied over and over again.
- To multiply two exponential expressions with the same base, add the exponents.
- To divide two exponential expressions with the same base, subtract the exponents.
- To raise one exponential expression to another power, multiply the exponents.
- To remember the exponent rules, think MADSPM.
- When you raise a positive number greater than 1 to a power greater than 1, the result is larger. When you raise a positive fraction less than 1 to an exponent greater than 1, the result is smaller. A negative number raised to an even power becomes positive. A negative number raised to an odd power remains negative.
- When you're asked for the square root of any number, $\sqrt{x}$, you're being asked for the positive root only.
- Here are the only rules regarding square roots that you need to know for the Digital SAT:

$$\sqrt{x} \times \sqrt{y} = \sqrt{xy}$$

$$\sqrt{\frac{x}{y}} = \frac{\sqrt{x}}{\sqrt{y}}$$

- The rule for fractional exponents is this:

$$x^{\frac{y}{z}} = \sqrt[z]{x^y}$$

- The rule for negative exponents is this:

$$x^{-n} = \frac{1}{x^n}$$

- When you encounter questions with charts, carefully check the chart for important information. Remember that you can use your scratch paper or the mouse pointer to help yourself locate the information.

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Chapter 21

Algebra: Cracking the System

In the last chapter, we reviewed some fundamental math concepts featured on the Digital SAT. Many questions raise the difficulty by replacing numbers with variables, or letters that stand for unknown quantities. This chapter covers multiple ways to answer algebra questions, while the next chapter provides some ways to turn algebra questions back into arithmetic.

DIGITAL SAT ALGEBRA: CRACKING THE SYSTEM

The Digital SAT generally tests algebra concepts that you most likely learned in eighth or ninth grade. So, you are probably pretty familiar with the level of algebra on the test. However, the test-writers are fairly adept at wording algebra questions in a way that is confusing or distracting in order to make the questions more difficult than the mathematical concepts that are being tested.

In this way, the Digital SAT Math section is not only a test of your math skills, but also, and possibly even more important to your score improvement, your reading skills. It is imperative that you read the questions carefully and translate the words in the question into mathematical symbols.

ENGLISH	MATH EQUIVALENTS
is, are, were, did, does, costs	=
what (or any unknown value)	<i>any variable</i> (x, y, n)
more, sum	+
less, difference	−
of, times, product	$\times$ (<i>multiply</i>)
ratio, quotient, out of, per	$\div$

A Little Terminology

Here are some words that you will need to know to understand the explanations in this chapter. These words may even show up in the text of a question, so make sure you are familiar with them.

Term: An equation is like a sentence, and a **term** is the equivalent of a word. It can be just a number, just a variable, or a number multiplied by a variable. For example, 18, $-2x$, and $5y$ are the terms in the equation $18 - 2x = 5y$.

Expression: If an equation is like a sentence, then an **expression** is like a phrase or a clause. An expression is a combination of terms and mathematical operations with no equals or inequality sign. For example, $9 \times 2 + 3x$ is an expression.

Polynomial: A **polynomial** is any expression containing two or more terms. Binomials and trinomials are both examples of polynomials. Binomials have two terms, and trinomials have three terms.

FUNDAMENTALS OF DIGITAL SAT ALGEBRA

Many questions on the Digital SAT require you to work with variables and equations. In your math classes, you probably learned to solve equations by “solving for x ” or “solving for y .” To do this, you isolate x or y on one side of the equals sign and put everything else on the other side. The good thing about equations is that to isolate the variable you can do anything you want to them—add, subtract, multiply, divide, square—provided you perform the same operation to both sides of the equation.

Thus, the golden rule of equations:

Whatever you do to the terms on one side of the equals sign, you must do to the terms on the other side of it as well.

Let's look at a simple example of this rule, without the distraction of answer choices.

Problem: If $2x - 15 = 35$, what is the value of x ?

Solution: The question asks for the value of x , so you want to isolate the variable. First, add 15 to each side of the equation. Now you have the following:

$$2x = 50$$

Divide each side of the equation by 2. Thus, x equals 25.

The skills for algebraic manipulation work just as well for more complex equations. The following question is another example of the way the Digital SAT may ask you to manipulate equations. Don't panic when you see a question like this; just use the skills you already have and work carefully so you don't make an avoidable mistake in your algebra.

 Mark for Review

1. The wave velocity of a vibrating string can be determined using the formula $v = \sqrt{\frac{T}{\frac{m}{L}}}$, where T is the tension of the string, m is the mass of the string, and L is the length of the string. Which of the following expresses the length of the string in terms of v , T , and m ?

☐ A $L = \frac{T}{v^2 m}$

☐ B $L = \frac{v^2 m}{T}$

$$\boxed{\text{C}} \quad L = v\sqrt{\frac{m}{t}}$$

$$\boxed{\text{D}} \quad L = \sqrt{\frac{T}{vm}}$$

Find the Math

Word problems on the Digital SAT are full of, well, words. To stay focused on the math, always read the final question, work in bite-sized pieces, and use your scratch paper to write down important information. If there are words that don't help you work the problem—such as the explanation of the variables in this question—ignore them.

Here's How to Crack It

The question asks for an equation that expresses the length of a string, which is represented by L , so the goal is to get L by itself. Anything you do to one side of the equation, you must also do to the other side of the equation. Start by squaring both sides of the equation to get rid of the square root on the right side.

The equation becomes

$$v^2 = \frac{T}{\frac{m}{L}}$$

Next, multiply both sides by $\frac{m}{L}$ to get the fraction out of the denominator.

$$\frac{v^2 m}{L} = T$$

To finish isolating L , multiple both sides by L to get

$$v^2 m = TL$$

Now divide both sides by T to get L by itself.

$$\frac{v^2 m}{T} = L$$

The correct answer is (B).



SOLVING RADICAL EQUATIONS

Radical equations are just what the name suggests: an equation with a radical ($\sqrt{}$) in it. Not to worry, just remember to get rid of the radical first by raising both sides to that power.

Here's an example.



 Mark for Review

2. If $7\sqrt{x} - 24 = 11$, what is the value of x ?

☐ A $\sqrt{5}$

☐ B $\sqrt{7}$

☐ C 5

☐ D 25

Here's How to Crack It

The question asks for the value of x , so start by adding 24 to both sides to get $7\sqrt{x} = 35$. Now, divide both sides by 7 to find that $\sqrt{x} = 5$. Finally, square both sides to find that $x = 25$. The correct answer is (D).

SOLVING RATIONAL EQUATIONS

The built-in calculator or a calculator you bring with you can help on a lot of algebra questions. However, there are times when you will need to solve an equation algebraically by hand. Even when the calculator might help, you may find it more efficient to use your mathematical skills to answer a question. When a question asks you to solve for an expression, algebraic manipulation will often be the best way to answer the question.

Here's an example.

 Mark for Review

3. If $\frac{18}{r+10} = \frac{3}{r}$, what is the value of $\frac{r}{3}$?

☐ A $\frac{2}{3}$

☐ B $\frac{3}{2}$

☐ C 2

☐ D 3

Here's How to Crack It

The question asks for the value of $\frac{r}{3}$. Cross-multiply to get $18r = 3(r + 10)$ or $18r = 3r + 30$. Subtracting $3r$ from both sides gives you $15r = 30$, so $r = 2$. Finally, $\frac{r}{3} = \frac{2}{3}$. The correct answer is (A).

Extraneous Solutions

Sometimes solving an equation with a rational or radical expression makes funny things happen. Look at the following example.

 Mark for Review

$$\sqrt{t+4} = t-2$$

4. Which of the following contains all possible solutions to the equation above?

☐ A 0, 5

☐ B 0, 4, 5

☐ C 0

☐ D 5

Extra Answers

Any time you are solving for a variable, make sure your solutions actually work. If they do not, they are *extraneous*, or extra.

Here's How to Crack It

The question asks for the solution set to the equation, so solve it for t . Start by squaring both sides of the equation to get rid of the radical. The equation becomes

$$t + 4 = (t - 2)^2$$

Use FOIL (First, Outer, Inner, Last) to multiply the right side of the equation to get $t^2 - 2t - 2t + 4$ or $t^2 - 4t + 4$. Now the equation is

$$t + 4 = t^2 - 4t + 4$$

Subtract t and 4 from both sides to get

$$0 = t^2 - 5t$$

FOIL:
First
Outer
Inner
Last

The right side factors to $t(t - 5)$, so $t = 0$ or 5. Eliminate (B), since 4 is not a solution at all, extraneous or otherwise. Now plug 0 and 5 back into the original equation to see if they work. If both do, the answer is (A). If one of them does not, that one is an extraneous solution.

$$\underline{t = 0}$$

$$\sqrt{0 + 4} = 0 - 2$$

$$\sqrt{4} = -2$$

$$2 \neq -2$$

$$\underline{t = 5}$$

$$\sqrt{5 + 4} = 5 - 2$$

$$\sqrt{9} = 3$$

$$3 = 3$$

Since the equation is false when $t = 0$, eliminate (A) and (C). The correct answer is (D).

SOLVING FOR EXPRESSIONS

Some algebra questions on the Digital SAT ask you to find the value of an expression rather than the value of a variable. In most cases, you can find the value of the expression without finding the value of the variable.

 Mark for Review

5. If $4x + 2 = 4$, what is the value $4x - 6$?

☐ A -6

☐ B -4

☐ C 4

☐ D 8

Here's How to Crack It

The question asks for the value of an expression. This is where reading the final question (RTFQ) can save time. Since the question doesn't ask for the value of x , there may be a shortcut. The term $4x$ is in both expressions, so instead of solving for x , you can solve for $4x$. Subtract 2 from both sides of $4x + 2 = 4$ to get $4x = 2$. Now, plug $4x = 2$ into $4x - 6$ to get $(2) - 6 = -4$. The correct answer is (B).

This approach will save you time—provided that you see it quickly. So, while you practice, you should train yourself to look for these sorts of direct solutions whenever you are asked to solve for the value of an expression.

Here's another example.

 Mark for Review

6. If $\sqrt{5} = x - 2$, what is the value of $(x - 2)^2$?

☐ A $\sqrt{5}$

☐ B $\sqrt{7}$

☐ C 5

☐ D 25

Here's How to Crack It

The question asks for the value of an expression. If you were to attempt the math class way, you'd find that $x = \sqrt{5} + 2$ and then you would have to substitute that into the provided expression. There's got to be an easier way!

The question is much easier if you read the final question and look for a direct solution. Then, you notice that all the question wants you to do is to square the expression on the right of the equals sign. Well, if you square the expression on the right, then you'd better square the expression on the left too. Therefore, $(\sqrt{5})^2 = 5 = (x - 2)^2$, and the correct answer is (C). That was pretty painless by comparison.

SOLVING SYSTEMS OF EQUATIONS

Some Digital SAT questions will give you two or more equations involving two or more variables and ask for the value of an expression or one of the variables. These questions are very similar to the questions containing one variable. The test-writers would like you to spend extra time trying to solve for the value of each variable, but that is not always necessary.

Here's an example of this type of question as a fill-in. We'll look at fill-ins in more detail in Chapter 26.

 Mark for Review

7. If $4x + y = 14$ and $3x + 2y = 13$, what is the value of $x - y = ?$



Watch Us Crack It

Check out the Video Walkthroughs in your online Student Tools to watch a Princeton Review teacher work through this question step-by-step.

Here's How to Crack It

The question asks for the value of an expression. You've been given two equations here. But read the final question: instead of being asked to solve for a variable (x or y), you've been asked to solve for $x - y$. Why? Because there must be a direct solution.

Rather than solving for one variable and then substituting it to solve for the other variable, see if there's a faster way. Try stacking the two equations on top of each other and then adding or subtracting the two equations. There's a good chance that this shortcut will take you right to the answer. Let's try it.

Adding the two equations gives you this:

$$\begin{array}{r} 4x + y = 14 \\ + 3x + 2y = 13 \\ \hline 7x + 3y = 27 \end{array}$$

Unfortunately, that doesn't get you anywhere, so try subtracting:

$$\begin{array}{r} 4x + y = 14 \\ - (3x + 2y = 13) \end{array}$$

When you subtract equations, just change the signs of the second equation and add. So the equation above becomes

$$\begin{array}{r} 4x + y = 14 \\ + (-3x - 2y = -13) \\ \hline x - y = 1 \end{array}$$

The value of $(x - y)$ is precisely what you are looking for. The correct answer is 1.



Solving for Variables in Systems of Equations

Shortcuts are awesome, so take them whenever you can on the Digital SAT. But occasionally, you won't have the option of using a shortcut with a system of equations, so knowing how to solve for a variable is crucial.

Here's an example.

 Mark for Review

8. If $3x + 2y = 17$ and $5x - 4y = 21$, what is the value of y ?

Here's How to Crack It

The question asks for the value of y . Look for the most direct way to get there. In this case, the stack and solve method doesn't give you an immediate answer:

IF YOU ADD:

$$\begin{array}{r} 3x + 2y = 17 \\ + 5x - 4y = 21 \\ \hline 8x - 2y = 38 \end{array}$$

IF YOU SUBTRACT:

$$\begin{array}{r} 3x + 2y = 17 \\ + (-5x + 4y = -21) \\ \hline -2x + 6y = -4 \end{array}$$

Neither of these methods gives you the value of y . The best way to approach this question is to try to eliminate one variable. To do this, multiply one or both of the equations by a number that will cause the other variable to have a coefficient of 0 when the equations are added or subtracted.

Since the question is asking you to solve for y , try to make the x terms disappear. You want to make the coefficient of x zero so you can quickly find the value of y .

Use the coefficient of x in the second equation, 5, to multiply the first equation:

$$\begin{aligned} 5(3x + 2y) &= 5(17) \\ 15x + 10y &= 85 \end{aligned}$$

Then use the original coefficient of x in the first equation to multiply the second equation:

$$\begin{aligned} 3(5x - 4y) &= 3(21) \\ 15x - 12y &= 63 \end{aligned}$$

Now stack your equations and subtract (or flip the signs and add, which is less likely to lead to a mistake).

$$\begin{array}{r} 15x + 10y = 85 \\ + (-15x + 12y = -63) \\ \hline 0x + 22y = 22 \end{array}$$

Simplify your equation and you have your answer.

$$\begin{aligned} 22y &= 22 \\ y &= 1 \end{aligned}$$

Number of Solutions to a System of Equations

Some Digital SAT Math questions won't even ask you to solve for the solution(s) to a system of equations: they'll simply ask you how many solutions there are. A solution to a system is a point of intersection when the system is graphed, so the graphing calculator can help on these. If you know the rules of when two linear equations have zero, one, or infinitely many solutions, you can use that knowledge and a little algebra to answer the question.

Here's an example that can be solved algebraically or with a calculator.

9. Which of the following systems of equations has an infinite number of solutions?

$$\begin{aligned} \text{A} \quad x &= -5 \\ y &= 10 \end{aligned}$$

$$\begin{aligned} \text{B} \quad x &= 10y \\ y &= 10x \end{aligned}$$

$$\begin{aligned} \text{C} \quad y &= -4x - 10 \\ y &= -4x - 15 \end{aligned}$$

$$\begin{aligned} \text{D} \quad y &= \frac{1}{2}x + 5 \\ 4y &= 2x + 20 \end{aligned}$$

Here's How to Crack It

The question asks which system of equations has infinitely many solutions. A system of linear equations has infinitely many solutions when the two equations are identical. That means both equations represent the same line, so there are infinitely many points of intersection. The two equations in (A) do not represent the same line, so eliminate (A). The equations in (B) look similar, but rearrange them to check. Plug $y = 10x$ into the first equation to get $x = 10(10x)$, which becomes $x = 100x$. The only possible value of x is 0. Do the same thing with the second equation: substitute $x = 10y$ to get $y = 10(10y)$, which becomes $y = 100y$. The only possible value of y is 0. Thus, the two lines intersect only once, at $(0, 0)$, not infinitely many times. Eliminate (B). The equations in (C) have the same y -term and the same x -term, but different constants. This means the lines defined by the equations are parallel and have zero solutions. Eliminate (C). The equations in (D) don't look the same, but do a little algebra to make them look similar. Make the y -terms the same by multiplying the first equation by 4 to get $4y = 2x + 20$. It's the same equation! That means the two equations describe the same line, and the system has infinitely many solutions.

The other way to answer a question like this is to use a graphing calculator. To use the built-in calculator, test one answer at a time by entering each equation in an entry field and looking in the graphing area to see what the graphs look like. Graphing the equations in (A) shows two perpendicular lines that intersect once; eliminate (A). Graphing the equations in (B) shows two lines that intersect once at the origin; eliminate (B). Graphing the equations in (C) shows two parallel lines that never intersect; eliminate (C). Graphing the equations in (D) shows only one line. Click the equations one after another to see the line change color. This confirms that the exact same line was graphed twice, so the two equations have infinitely many solutions.

Using either algebra or the calculator, the correct answer is (D).



SOLVING INEQUALITIES

In an equation, one side equals the other. In an **inequality**, one side does not equal the other. The following symbols are used in inequalities:

SYMBOL MEANING

$>$	is greater than
$<$	is less than
$\geq$	is greater than or equal to; at least
$\leq$	is less than or equal to; no more than

Hungry Gator

Think of the inequality sign as the mouth of a hungry alligator. The alligator eats the bigger number.

Solving inequalities is pretty similar to solving equations. You can collect like terms, and you can simplify by performing the same operation to both sides. All you have to remember is that if you multiply or divide both sides of an inequality by a negative number, the direction of the inequality symbol changes.

For example, here's a simple inequality:

$$x > y$$

Now, just as you can with an equation, you can multiply both sides of this inequality by the same number. But if the number you multiply by is negative, you have to change the direction of the symbol in the result. For example, if you multiply both sides of the inequality above by -2 , you end up with the following:

$$-2x < -2y$$

When you multiply or divide an inequality by a negative number, you must reverse the inequality sign.

Here's an example of how an inequality question may be framed on the test.



 Mark for Review

10. If $-3x + 6 \geq 18$, which of the following must be true?

☐ A $x \leq -4$

☐ B $x \leq 8$

☐ C $x \geq -4$

☐ D $x \geq -8$

Here's How to Crack It

The question asks for a true statement based on the inequality, and the answers are all possible values of x . Isolate the x by simplifying the inequality as you would with any equation:

$$-3x + 6 \geq 18$$

$$-3x \geq 12$$

Remember to change the direction of the inequality sign!

$$x \leq -4$$

The correct answer is (A).



WRITING YOUR OWN EQUATIONS

Sometimes you'll be asked to take a word problem and create one or more equations or inequalities from that information. In general, you will not be asked to solve these equations/inequalities, so if you are able to locate and translate the information in the question, you have a good shot at getting the correct answer. Always start with the most straightforward piece of information. What is the most straightforward piece of information? Well, that's up to you to decide. Consider the following question.

 Mark for Review

11. Max uses a humidifier in his son's bedroom. The humidifier must be filled with 0.5 gallons of water before it starts running, and it has to be refilled with 0.07 gallons of water each week. Which of the following equations models the total gallons of water, g , needed to run the humidifier for w weeks?

☐ A $g = 0.07 + 0.5w$

☐ B $g = 0.07(0.5 + w)$

☐ C $g = 0.5(0.07 + w)$

☐ D $g = 0.5 + 0.07w$

When to translate

Start translating words into math in bite-sized pieces when you see the following:

- The question asks what “models” or “represents” a situation.
- The answers contain one or more equations or inequalities.

Here's How to Crack It

The question asks for an equation that models a situation. Find a straightforward piece of information, translate it into math, and eliminate answers that don't match. One piece of information is that the *humidifier must be filled with 0.5 gallons of water before it starts running*. If 0.5 is the starting value and not something that is added every week, it should not be multiplied by anything. Only (D) has 0.5 by itself, so it's the right answer.

What if you started with a different piece of information? The other piece of information is that the humidifier *has to be refilled with 0.07 gallons of water each week*. The question also states that w represents weeks. The number of gallons added each week must be multiplied by the number of weeks, which translates to $0.07w$. Eliminate (A) and (C) because they do not include this term, even after distributing. Although (B) includes the term $0.07w$ after you distribute, the other term becomes 0.035. This does not match any of the information in the question, so eliminate (B). Only (D) is left.

It doesn't matter which piece of information you start with. Just be sure to eliminate after each piece. In this case, either piece alone was enough to eliminate 3 answers, so the remaining answer is right. The correct answer is (D).

Sometimes you will need more than one bite-sized piece in order to eliminate all but one answer. This will often happen when the answers have systems of equations or inequalities rather than a single equation or inequality.

Here's one of those.

 Mark for Review

12. A tailor is ordering red and blue ribbon to use when creating a set of dresses. The tailor wants to include at least 200 meters of ribbon in her order, and she will order no more than 3 times as much blue ribbon as red ribbon. Each spool of red ribbon contains 22.86 meters, and each spool of blue ribbon contains 18.29 meters. If r and b are nonnegative integers and represent the number of spools of red and

blue ribbon, respectively, that the tailor will order, which of the inequalities below best represents this scenario?

☐ A $22.86r + 18.29b \geq 200$
 $3b \leq r$

☐ B $22.86r + 54.87b \geq 200$
 $3b \leq r$

☐ C $22.86r + 18.29b \geq 200$
 $b \leq 3r$

☐ D $22.86r + 54.87b \geq 200$
 $b \leq 3r$

Here's How to Crack It

The question asks for a system of inequalities that describes the situation. Start with the most straightforward piece of information and translate it into math. In this case, the most straightforward information is about the total meters of ribbon, 200 meters. However, all of the answers include ≥ 200 , so look for something else. The answers also all include $22.86r$ for the red ribbon, so work with the blue ribbon. The question states that *each spool of blue ribbon contains 18.29 meters* and that b represents the number of spools of blue ribbon. Therefore, the equation should include $18.29b$. Eliminate (B) and (D) because they have the wrong number multiplied by b .

Next, look at the relationship between the blue and red ribbon. The question states that *she will order no more than 3 times as much blue ribbon as red ribbon*. The phrase *no more than* is indicated by the symbol $\leq$, and the amount of blue ribbon is being compared to 3 times the amount of red ribbon. The correct inequality to depict this information is $b \leq 3r$. Eliminate (A). The correct answer is (C).



SIMPLIFYING EXPRESSIONS

If a question contains an expression that can be factored, it is very likely that you will need to factor it to solve the question. So, you should always be on the lookout for opportunities to factor. For example, if a question contains the expression $2x + 2y$, you should see if factoring it to produce the expression $2(x + y)$ will help you to solve the problem.

If a question contains an expression that is already factored, you should consider using the Distributive Law to expand it. For example, if a question contains the expression $2(x + y)$, you should see if expanding it to $2x + 2y$ will help.

Here are five examples that we've worked out:

$$1. 4x + 24 = 4(x) + 4(6) = 4(x + 6)$$

$$2. \frac{10x - 60}{2} = \frac{10(x) - 10(6)}{2} = \frac{10(x - 6)}{2} = 5(x - 6) = 5x - 30$$

$$3. \frac{x + y}{y} = \frac{x}{y} + \frac{y}{y} = \frac{x}{y} + 1$$

$$4. 2(x + y) + 3(x + y) = (2 + 3)(x + y) = 5(x + y)$$

$$5. p(r + s) + q(r + s) = (p + q)(r + s)$$

Something to Hide

Because factoring or expanding is usually the key to finding the answer on such questions, learn to recognize expressions that could be either factored or expanded. This will earn you more points. The test-writers will try to hide the answer by factoring or expanding the result.

Here's how this might be tested on the Digital SAT.

 Mark for Review

13. Which of the following is equivalent to $\frac{a^2}{b} + a$?

☐ A $a\left(\frac{a}{b} + 1\right)$

☐ B $a\left(\frac{a}{b} + a\right)$

☐ C $a^2 + ab$

☐ D $a^2\left(\frac{1}{b} + 1\right)$

Here's How to Crack It

The question asks for an equivalent form of an expression. Two of the answers have a factored, so try factoring a first. Rewrite each term as a times something else:

$$a\left(\frac{a}{b}\right) + a(1)$$

Then factor a out of both terms:

$$a\left(\frac{a}{b} + 1\right)$$

This matches (A), which is the correct answer. You can check by distributing a in (A) to confirm that it returns the expression to its original form.

Don't be tempted by (C). It looks plausible because both terms from the original expression have been multiplied by b . However, you cannot

multiply an expression by a value other than 1. That only works with equations because then you multiply both sides by the same value. Choice (C) is a trap answer based on not remembering the difference between an expression and an equation. The correct answer is (A).



Multiplying Binomials

Multiplying binomials is easy. Just be sure to use **FOIL** (First, Outer, Inner, Last).

$$\begin{aligned}
 (x+2)(x+4) &= (x+2)(x+4) \\
 &= (x \times x) + (x \times 4) + (2 \times x) + (2 \times 4) \\
 &\quad \text{FIRST} \quad \text{OUTER} \quad \text{INNER} \quad \text{LAST} \\
 &= x^2 + 4x + 2x + 8 \\
 &= x^2 + 6x + 8
 \end{aligned}$$

Combine Like Terms First

When manipulating long, complicated algebraic expressions, combine all like terms before doing anything else. In other words, if one of the terms is $5x$ and another is $-3x$, simply combine them into $2x$. Then you won't have as many terms to work with. Here's an example:

$$\begin{aligned}
 (3x^2 + 3x + 4) + (2 - x) - (6 + 2x) &= \\
 3x^2 + 3x + 4 + 2 - x - 6 - 2x &= \\
 3x^2 + (3x - x - 2x) + (4 + 2 - 6) &= \\
 3x^2 &
 \end{aligned}$$

TERMinology

Remember: A **term** is a number, variable, or a number *and* variable that are combined by multiplication or division. Consider the expression $6x + 10 - y$. In this expression, $6x$, 10 , and y are all terms. $6x + 10$, however, is not a term. It is two terms added together, which makes it an *expression*.

SOLVING QUADRATIC EQUATIONS

To solve quadratic equations, remember everything you've learned so far: look for direct solutions and either factor or expand when possible.

Here's an example.



Mark for Review

14. If $(x - 3)^2 = (x + 2)^2$, what is the value of x ?

Here's How to Crack It

The question asks for the value of x . Expand both sides of the equation using FOIL:

$$\begin{aligned}(x - 3)(x - 3) &= (x + 2)(x + 2) \\ x^2 - 6x + 9 &= x^2 + 4x + 4\end{aligned}$$

Now you can simplify. Eliminate the x^2 terms because they are on both sides of the equals sign. Now you have $-6x + 9 = 4x + 4$, which simplifies to

$$-10x = -5$$

$$x = \frac{1}{2}$$

Factoring Quadratics

To solve a quadratic, you might also have to factor the equation. Factoring a quadratic basically involves doing a reverse form of FOIL.

For example, suppose you needed to know the factors of $x^2 + 7x + 12$. Here's what you would do:

1. Write down 2 sets of parentheses and put an x in each one because the product of the first terms is x^2 .

$$x^2 + 7x + 12 = (x)(x)$$

2. Look at the number at the end of the expression you are trying to factor. Write down its factors. In this case, the factors of 12 are 1 and 12, 2 and 6, and 3 and 4.
3. To determine which set of factors to put into the parentheses, look at the coefficient of the middle term of the quadratic expression. In this case, the coefficient is 7. So, the correct factors will also either add or subtract to get 7. The only factors that work are 3 and 4. Write these factors in the parentheses.

$$x^2 + 7x + 12 = (x \quad 3)(x \quad 4)$$

4. Finally, determine the signs for the factors. To get a positive 12, the 3 and the 4 are either both positive or both negative. But, since 7 is also positive, the signs must both be positive.

$$x^2 + 7x + 12 = (x + 3)(x + 4)$$

Factoring

When factoring an equation like $x^2 + bx + c$, think “**A.M.**” Find two numbers that **A**dd up to the middle term (b) and **M**ultiply to give the last term (c).

You can always check that you have factored correctly by using FOIL on the factors to see if you get the original quadratic expression.

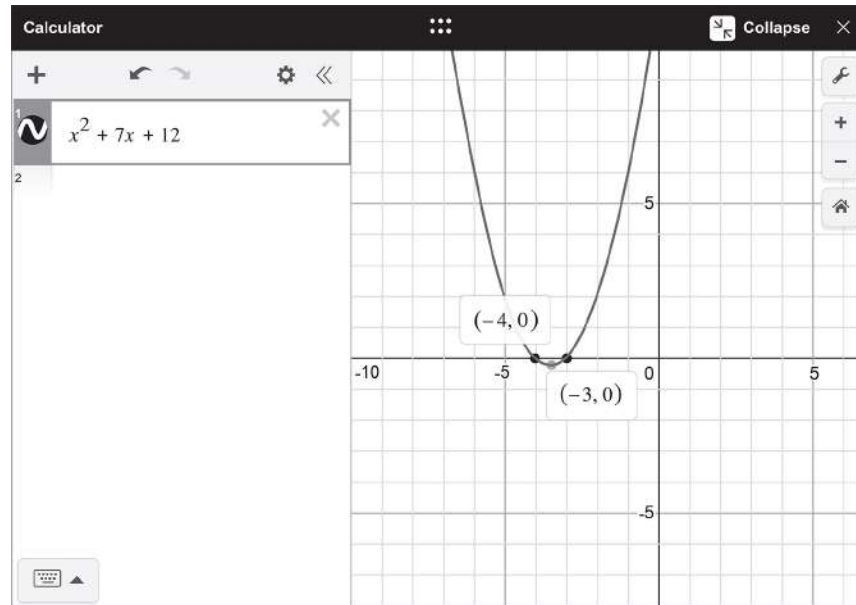
To find the solutions on paper, you would set each factor equal to zero and solve for x . This becomes $x + 3 = 0$ and $x + 4 = 0$, so $x = -3$ or -4 .

The built-in graphing calculator or your own calculator can also quickly provide the solutions to a quadratic. We’ll show you how to do it on the built-in calculator. If you’re planning to use your own, make sure you know how to do this.

Open the built-in calculator, then enter the quadratic into the first entry field. Let’s use the same one as above and enter $x^2 + 7x + 12$.

The graph shows three grey dots. One is the vertex, and the other two are the solutions, or x -intercepts. Hover over or click on one of the x -intercept dots to see the x -value for that point, and write it down. You can scroll and zoom to make it easier to see. Do the same for the other x -intercept dot.

The calculator will look like this on the screen:



The two points are $(-4, 0)$ and $(-3, 0)$, so the solutions to the quadratic are $x = -4$ and $x = -3$.

It's best to enter only the expression and *not* include " $= 0$ " when you enter a quadratic in the built-in graphing calculator. Try entering $x^2 + 7x + 12 = 0$, and the resulting graph is two parallel lines at $x = -4$ and $x = -3$. This still shows the solutions, but it isn't as easy to interpret as the graph of the parabola.

Try a Digital SAT question that is much easier to solve using a graphing calculator.



 Mark for Review

15. For the equation $12x^2 + 5x - 143 = 0$, what is one possible value of x ?

$-\frac{13}{4}$

$$\boxed{\text{B}} \frac{5}{12}$$

$$\boxed{\text{C}} \frac{13}{4}$$

$$\boxed{\text{D}} \frac{11}{3}$$

Here's How to Crack It

The question asks for a possible value of x in a quadratic equation. The values of x are also the solutions to the equation. This quadratic would not be fun to factor, even with the quadratic formula, so use a graphing calculator instead. Enter the left side of the equation into the first entry field, then click on each gray dot along the x -axis and write down the points. The points are $(-3.667, 0)$ and $(3.25, 0)$. Convert each answer choice into its decimal form, and eliminate any answer that is not one of these two values of x . Choice (A) becomes -3.25 . This does not match either solution, so eliminate (A). Choice (B) becomes 0.417 ; eliminate (B). Choice (C) becomes 3.25 . This matches one of the solutions, so keep (C). Choice (D) becomes 3.667 ; eliminate (D). Two of the trap answers have the right value but the wrong sign, so be very careful with positive versus negative solutions. The correct answer is (C).

Digital SAT Favorites

The test-writers play favorites when it comes to quadratic equations. There are three equations that they use often. You should memorize these and be on the lookout for them. Whenever you see a quadratic that contains two variables, it is frequently one of these three.

$$(x + y)(x - y) = x^2 - y^2$$

$$(x + y)^2 = x^2 + 2xy + y^2$$

$$(x - y)^2 = x^2 - 2xy + y^2$$

Here's an example of how these equations will likely be tested on the Digital SAT.

 Mark for Review

16. If $2x - 3y = 5$, what is the value of $4x^2 - 12xy + 9y^2$?

☐ A $\sqrt{5}$

☐ B 12

☐ C 25

☐ D 100

Here's How to Crack It

The question asks for the value of an expression. Since the expression seems kind of random, see if there is a way to get from the given equation to the expression.

In this case, work with $2x - 3y = 5$. If you square the left side of the equation, you get

$$(2x - 3y)^2 = 4x^2 - 12xy + 9y^2$$

That's precisely the expression for which you need to find the value. It's also the third of the equations from the box on the preceding page. Now, since you squared the left side, all you need to do is square the 5 on the

right side of the equation to discover that the expression equals 25. The correct answer is (C).

Did you notice that this question was just another version of being asked to solve for the value of an expression rather than for a variable? Quadratics are one of the test-writers' favorite ways to do that.



Solving Quadratics Set to Zero

Before factoring most quadratics, you need to set the equation equal to zero. Why? Well, if $ab = 0$, what do you know about a and b ? At least one of them must equal 0, right? That's the key fact you need in order to solve most quadratics.

Here's an example.



 Mark for Review

17. If $3 - \frac{3}{x} = x + 7$, and $x \neq 0$, which of the following is a possible value for x ?

☐ A -7

☐ B -1

☐ C 1

☐ D 3

Here's How to Crack It

The question asks for a possible value of x . Here, the test-writers have tried to hide that the equation is actually a quadratic. Start by multiplying both sides of the equation by x to get rid of the fraction.

$$x\left(3 - \frac{3}{x}\right) = x(x + 7)$$

$$3x - 3 = x^2 + 7x$$

Rearrange the terms to set the quadratic equal to 0. You'll get $x^2 + 4x + 3 = 0$. Now it's time to factor:

$$x^2 + 4x + 3 = (x + 1)(x + 3) = 0$$

At least one of the factors must equal 0. If $x + 1 = 0$, then $x = -1$. If $x + 3 = 0$, then $x = -3$. Only one of these values appears in the answer choices. The correct answer is (B).



The Quadratic Formula

In addition to asking you to solve easily factorable quadratics, the test-writers would also like to see you demonstrate your understanding of the quadratic formula. We know what you're thinking: "Not that thing *again!* Can't I just solve it with a graphing calculator?" Why yes, yes you can. However, once in a while there's a question that requires knowledge of the quadratic formula. Let's review it so you're prepared.

For a quadratic equation in the form $y = ax^2 + bx + c$, the quadratic formula is

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

To find the roots of a quadratic, or the points where $y = 0$, simply plug your values for a , b , and c into the quadratic formula.

Here's an example:

$$7x^2 - 5x - 17 = 0$$

So $a = 7$, $b = -5$, and $c = -17$. Plugging the constants into the quadratic equation, you get

$$x = \frac{5 \pm \sqrt{(-5)^2 - 4(7)(-17)}}{2(7)}$$

$$x = \frac{5 \pm \sqrt{25 + 476}}{14}$$

$$x = \frac{5 \pm \sqrt{501}}{14}$$

$$x = \frac{5}{14} + \frac{\sqrt{501}}{14} \text{ and } x = \frac{5}{14} - \frac{\sqrt{501}}{14}$$

The Signs, They Are a Changin'

The quadratic formula works for quadratics in the form $y = ax^2 + bx + c$. There is only addition in that form, so be careful when your quadratic has negative signs in it.

Let's put your quadratic skills to work with a question you may see on the Digital SAT.

 Mark for Review

18. What is the product of all the solutions to the equation $3z^2 - 12z + 6 = 0$?

☐ A $\sqrt{2}$

☐ B 2

☐ C 4

☐ D $4\sqrt{2}$

Here's How to Crack It

The question asks for the product of the solutions to a quadratic. The radicals in the answer choices are a clue that the quadratic may be hard to factor. Simplify the equation first by dividing both sides by 3 to get

$$z^2 - 4z + 2 = 0$$

To find the solutions using the quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$, you would do the following:

$$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(2)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16 - 8}}{2} = \frac{4 \pm \sqrt{8}}{2}$$

$$x = \frac{4 \pm \sqrt{4 \times 2}}{2} = \frac{4 \pm 2\sqrt{2}}{2}$$

$$x = 2 \pm \sqrt{2}$$

So $x = 2 + \sqrt{2}$ or $2 - \sqrt{2}$. “Product” means to multiply, so use FOIL to multiply $(2 + \sqrt{2}) \times (2 - \sqrt{2})$ to get $4 - 2\sqrt{2} + 2\sqrt{2} - (\sqrt{2})^2 = 4 - 2 = 2$. The correct answer is (B).

Call on the calculator

Don't forget that a graphing calculator is a fast way to find the solutions to a quadratic. To answer this question using the built-in graphing calculator, enter the left side of the quadratic, find the values of the two x-intercepts, and multiply them.

Wow, that was a lot of work! Wouldn't it be great if there were a shortcut? Actually, there is! When a quadratic is in the form $y = ax^2 + bx + c$, the product of the roots is equal to the value of c divided by the value of a . In this case, that's $6 \div 3 = 2$! It's the same answer for a lot less work. (See the inset “The Root of the Problems” for this and another handy trick—they're worth memorizing.)

The Root of the Problems

Sometimes you'll be asked to solve for the sum or the product of the roots of a quadratic equation. You can use the quadratic formula and then add or multiply the results, but it's quicker to just memorize these two expressions.

sum of the roots: $-\frac{b}{a}$

product of the roots: $\frac{c}{a}$