



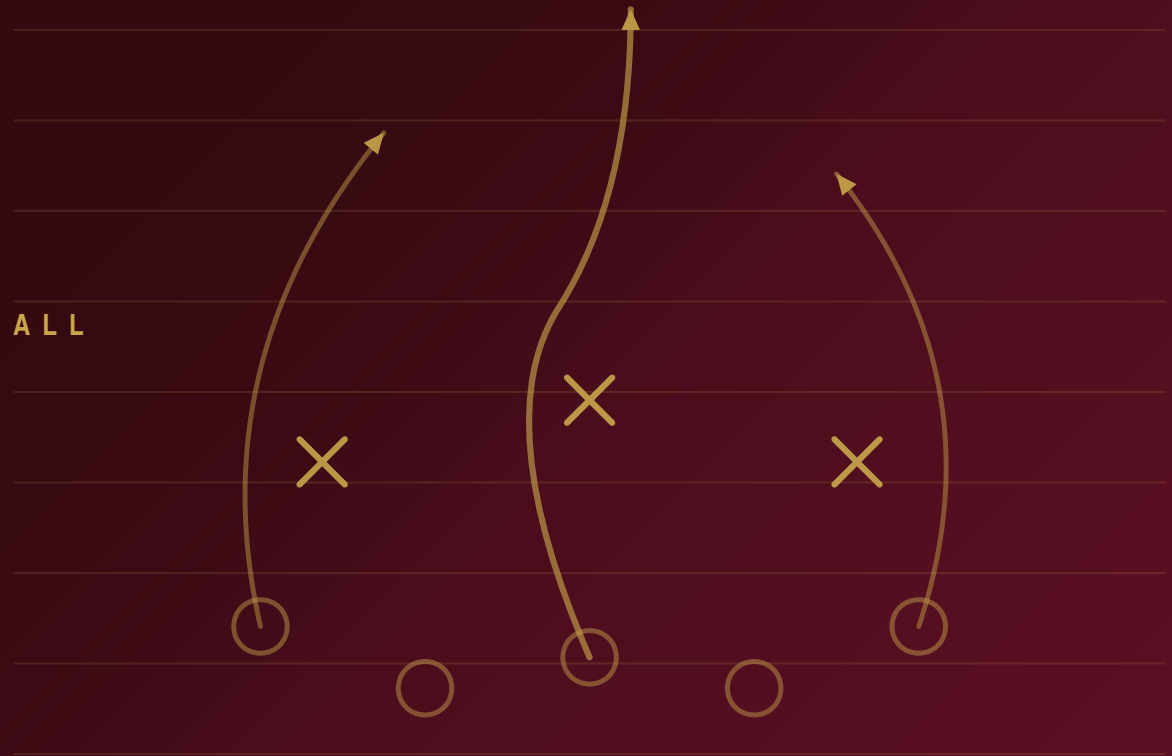
JOSEF AIDEN DURAND · VERITAS HALL

The SAT Playbook

The Gladiator System for 1500+. Every skill, 690 original drills, a full practice test, and the free official practice that goes with them.

FIRST EDITION · 2026

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The SAT Playbook

First edition, 2026.

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About the practice material. Every drill, example and practice-test question in this book is original. Named historical figures and well-known facts are real; the

other people, studies, data and stories in practice passages were written for practice and are not real reports. The practice test follows the published structure of the digital SAT, but it is not an official test, and its scoring guide gives estimates only. For official practice, use the free resources described in “Where to Practice,” and take full-length practice tests in Bluebook.

Test facts in this book reflect College Board’s published specifications as of 2026. Tests change: check satsuite.collegeboard.org for the current format, dates and policies.

No guarantees. This book describes a method that has worked for many students. Scores depend on each student’s preparation, and no book can promise a particular result.

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FROM THE AUTHOR

The SAT is not a test of intelligence.



JOSEF AIDEN DURAND
HARVARD COLLEGE '14
FOUNDER, VERITAS HALL

I've taught the SAT for more than a decade, in math and in reading, from Beijing to California. The single most important thing I've learned is the thing most students never hear: the SAT does not measure how smart you are. It measures how well you play a game whose rules almost nobody explains.

The real opponent isn't the math or the passage. It's the test-maker, who writes three wrong answers for every right one and designs them to look right to a student who is searching for the right one. So we stop searching. We hunt the wrong answers instead, with a Shield and six weapons, like a gladiator in the Colosseum. That's the Golden Mindset Shift, and it changes everything.

The rest is discipline: the right practice, evaluated honestly, every week. This book gives you all of it. Seventy-four one-page lessons covering every skill on the test. Six hundred ninety original drills. A full-length practice test. And a map to the free official practice from College Board and Khan Academy, so you never run out of real questions.

A 1500 doesn't get anyone admitted on its own. But it moves an application from the floor to the table, where everything else gets read. Every score this system produces is earned. Now step into the arena.

Dominate on three. One, two, three... Dominate!

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Every lesson page is followed by its drill page. Lesson codes run in order within each Part: GL, RW, GM, then MS, AL, AM, DA and GT.

BEFORE YOU START

How to Use This Book

Fourteen weeks, one game week at a time, one page at a time.

THE PLAN IN ONE PARAGRAPH

Take a full practice test in Bluebook. Find your rung on the Score Ladder (Part I). Learn the Gladiator System (Part II) first. Then study the lessons your misses point to, one page at a time, and do each lesson's drill. Practice the same skill with free official questions. Evaluate every miss. Take the practice test in Part VII when you're ready, and then every remaining Bluebook test, one a week, before your official date.

EVERY LESSON IS TWO PAGES

The lesson: the rule, the patterns, worked examples, the traps, a drill habit and a short Try It. **The drill:** eight to ten original questions with answers, plus exactly where to practice that skill for free.

THE WEEK

The game week: Monday film (30 minutes redoing old misses), install days on Tuesday and Thursday (45 minutes: one lesson, then drills and official practice), a timed module on Saturday, and Sunday film (30 minutes reviewing every miss). Run the same week for fourteen weeks.

Where to Practice, Free

This book teaches the method. Official practice builds the volume.

RESOURCE	WHAT IT IS	HOW TO USE IT WITH THIS BOOK
Bluebook bluebook.collegeboard.org	College Board's testing app, with free full-length adaptive practice tests and the built-in Desmos calculator	Your diagnostic (SAT-1) and your weekly scrimmages in the final month (SAT-26). Save some tests for the end.
Khan Academy khanacademy.org/test-prep	Official Digital SAT Prep, free: SAT Reading and Writing and SAT Math courses, organized as Foundations, Medium and Advanced units in each domain	Every drill page names the matching unit. Rungs 1–2: Foundations. Rung 3: Medium. Rungs 4–5: Advanced (and Reading and Writing's Challenge unit).
SAT Suite Question Bank satsuitequestionbank.collegeboard.org	Thousands of official questions, filterable by domain, skill and difficulty, with answer explanations	Every drill page names the domain and skill to filter. Choose Easy, Medium or Hard by your rung. Tutors can use the educator version to export sets.
This book	74 lessons, 690 original drills, one original practice test	The method and the first reps. The free official practice is where you build volume.

KEEP OFFICIAL TESTS FRESH

When filtering the Question Bank, exclude questions that appear in Bluebook practice tests, so your full tests stay new for scrimmages.

ALL OF IT IS FREE

Bluebook, Khan Academy and the Question Bank cost nothing. Nobody needs to pay for questions to prepare well.

ALWAYS EVALUATE

Every miss, from any source, goes on the Film Sheet (REF-3). That's where scores move.

Welcome to the Colosseum



JOSEF AIDEN DURAND
FROM THE AUTHOR

Picture Russell Crowe in *Gladiator*: the sand, the gates, the roar. Now picture yourself on test morning. Different arena, same stakes. Every wrong answer on the SAT is an opponent built to take points from you, and points are what decide where you go to college, what you study, and, statistically, what you earn for the rest of your life. That isn't drama. That's the math.

Here's the good news. Your opponents are predictable. The test-maker writes three wrong answers for every right one, and most of them are built the same few ways: the opposite of the truth, half the truth, the truth exaggerated, a true statement that answers a different question, something the passage never said, or the passage's own words twisted out of shape. Six tricks. You're about to get six weapons, one for each.

And here's the shift that changes everything: stop looking for the right answer. When you search for the right answer, your brain starts justifying every choice, and every trap starts to look reasonable. When you hunt the wrong answers instead, you see them for what they are. The right answer is simply what's left standing when the fighting stops.

So step into the arena switched on. Not panicked: alert. Your heart may beat a little faster. Good. Use it. Ask one question of every answer choice you meet, from the first question to the last: **How can I attack this answer?**

Gladiators, I salute you. Let's go to work.

PART I

The Game

What the SAT really measures, the Score Ladder, and the rules everything else is built on.

The SAT Is Not a Test of Intelligence



JOSEF AIDEN DURAND
FROM THE AUTHOR

I've watched brilliant students score 1150 and average students score 1500. The difference was never intelligence. It was preparation for a very specific game.

The SAT measures whether you can do certain things, under time pressure, the way the test-maker expects: read short texts literally, apply a fixed set of grammar rules, solve a known menu of math problems, and avoid a predictable set of traps. Every one of those can be learned. None of them is a measure of your worth, your potential, or your future.

If you believe the SAT measures intelligence, every low score feels like a verdict, and verdicts make people quit. If you believe it measures a learnable system, a low score is just a map: here's what to learn next. Students with the second belief keep climbing. Students with the first stop at their first plateau.

So meet your real opponent. It isn't the test; it's the test-maker, a person at a desk with a deadline, writing four answers for every question and making three of them wrong in the quickest ways available. Human nature is predictable. So are their traps. That's why this book teaches you their playbook before it teaches you anything else.

"I'm not a reader" is a trait. "I miss inference questions" is a plan. Choose the plan.

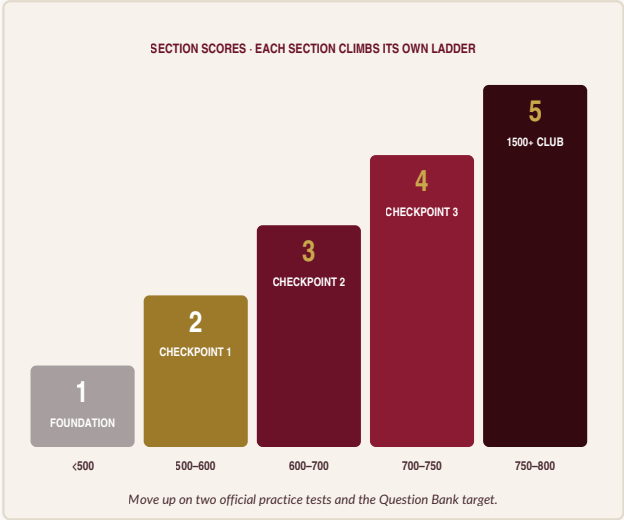
Rules of the Game

Eight rules the whole system is built on.

- 01 Hunt the wrong answers.**
Stop searching for the right answer. Attack all four choices; the right one is what you can't kill (the Golden Mindset Shift).
- 02 Shield before sword.**
Predict the answer before you look at the choices, every time. No Shield, and every choice looks right.
- 03 The text is the only witness.**
Only the evidence in the passage counts. Read literally, and choose the answer you can point to (the Lawyer in the Courtroom).
- 04 Grammar by rule, not by ear.**
On conventions questions, name the rule the choices are testing. What sounds right is often wrong.
- 05 Every miss gets a film session.**
A question you miss and don't evaluate is a question you'll miss again. Evaluate it, log it, redo it.
- 06 Official questions first.**
Practice on College Board material (Bluebook and the Question Bank). It's free, and it's the real test's question style.
- 07 Train like it's test day.**
Timed, in Bluebook, with the built-in Desmos and real breaks. Practice the way you'll play.
- 08 Every score is earned.**
No shortcuts, no leaked questions, no one else's help on test day, ever. The only score worth having is your own.

The Score Ladder

Five rungs from below 1000 to 1500+, climbed one section at a time.



HOW THE LADDER WORKS

Each section (Reading and Writing, Math) is scored 200–800, and each climbs its own ladder. A student can be on Rung 4 in Math and Rung 3 in Reading and Writing. The diagnostic places each section (SAT-1); the next goal is always the next rung (SAT-2).

HOW YOU MOVE UP

A rung is cleared when the student hits the Question Bank accuracy target for that rung and scores in the rung’s range on two official Bluebook practice tests. Higher rungs need harder questions: the adaptive test only shows its hardest questions to students who did well on Module 1.

WHAT 1500+ MEANS

A 1500 is around the 97th–98th percentile of SAT takers, by College Board’s user percentiles. It takes near-perfect accuracy on Easy and Medium questions and most of the Hard ones, in both sections.

RUNG	SECTION	TOTAL	THE STUDENT...	QUESTION BANK TARGET	FOCUS
1 · Foundation	below 500	below 1000	Is learning the format and the core rules; leaves blanks or runs out of time.	80% on Easy	GL-1 to GL-3 · core content
2 · Checkpoint 1	500–600	1000–1200	Gets most Easy questions; loses points to traps and missing content.	90% on Easy · 60% on Medium	The six weapons · algebra · grammar rules
3 · Checkpoint 2	600–700	1200–1400	Gets Easy and most Medium questions; Hard questions are mostly guesses.	85% on Medium · 40% on Hard	Evidence, inference · Advanced Math · Desmos
4 · Checkpoint 3	700–750	1400–1500	Rarely misses Medium; misses come from hard traps and careless errors.	95% on Medium · 70% on Hard	Best of the last two · careless-error protocol
5 · The 1500+ Club	750–800	1500–1600	Wins the hard Module 2; misses are rare and evaluated within a day.	85%+ on Hard	Hard reps · full scrimmages · mental game

Foundation: Below 500

Learn the format, the method and the core rules.

STRAND	WHAT TO STUDY	EXIT CAN-DO
Reading	The format (RW-1); the Four-Step Attack and the Shield (GL-2, GL-3); central ideas (RW-6); words in context with gut predictions (RW-2).	Predicts before looking on every question; 80% on Easy reading questions.
Grammar	Don't trust your ear (GM-1); joining sentences (GM-2); subject-verb agreement (GM-8); possessives (GM-11). Extra English-language practice where needed.	Names the rule on every conventions question; 80% on Easy.
Expression	Transitions by relationship (RW-12); student notes by goal (RW-13).	85% on Easy transitions and synthesis.
Algebra	Linear equations (AL-1), slope and linear functions (AL-2), two-variable equations (AL-3).	Solves one-variable linear equations in under 40 seconds; 80% on Easy.
Advanced Math	Exponent rules (AM-1); factoring basics (AM-2); function notation (AM-8).	70% on Easy Advanced Math.
Data + Geometry	Ratios and rates (DA-1); percentages (DA-2); area and volume (GT-1).	80% on Easy data and geometry.
Strategy + Mind	The Golden Mindset Shift (GL-1); the math section (MS-1); the Three Rounds (MS-8); it's not an intelligence test (SAT-22).	No blanks; finishes every module.

WHO

Students scoring below 500 in a section, often newer to the test or still building English.

LENGTH

One season; often the biggest point gains come here.

THE WEEK

The game week: film, two install days, a Saturday scrimmage (one timed module), film.

MATERIALS

Bluebook practice tests; College Board Question Bank (Easy); Official Digital SAT Prep on Khan Academy.

EXIT CHECK

Two Bluebook practice tests at 500+ in the section, and the Question Bank target.

MINDSET

The SAT is a game with rules. You're learning the rules (SAT-22).

Checkpoint 1: 500 to 600

Stop falling for traps. Fill the content gaps.

STRAND	WHAT TO STUDY	EXIT CAN-DO
Reading	All six weapons (GL-4 to GL-9); the Lawyer in the Courtroom (GL-10); purpose and function (RW-3, RW-4); literature (RW-10).	Writes a trap code for every eliminated choice; 90% on Easy, 60% on Medium.
Grammar	Semicolons and colons (GM-3, GM-4); extra information (GM-5); pronouns and tense (GM-9, GM-10).	Uses the finger test on boundaries; 90% on Easy.
Expression	Transitions and synthesis at speed (RW-12, RW-13).	Under 45 seconds each; 90% on Easy and Medium.
Algebra	Systems (AL-4) and inequalities (AL-5); word problems into equations.	Translates word problems before solving; 90% on Easy, 60% on Medium.
Advanced Math	Quadratics (AM-3), parabolas (AM-4), exponential models (AM-5).	Factors and uses the discriminant; 60% on Medium.
Data + Geometry	Data (DA-3), scatterplots (DA-4), probability (DA-5); angles and triangles (GT-2, GT-3).	Picks the right denominator in two-way tables; 60% on Medium.
Strategy + Mind	One move, swap in numbers, work backward, sketch it (MS-2 to MS-5); film review (SAT-7).	Evaluates every miss within 48 hours.

WHO

Sections scoring 500–600: content mostly in place, points lost to traps and gaps.

LENGTH

One season.

THE WEEK

The game week; the error log reviewed on film days (SAT-8).

MATERIALS

Question Bank (Easy, Medium); Bluebook practice tests; this Lesson Book.

EXIT CHECK

Two practice tests at 600+ in the section; Question Bank target met.

MINDSET

Mistakes are data, not verdicts (SAT-24).

Checkpoint 2: 600 to 700

Win the Medium questions. Unlock the hard module.

STRAND	WHAT TO STUDY	EXIT CAN-DO
Reading	Evidence (RW-7, RW-8), inference (RW-9), cross-text (RW-5), science texts (RW-11).	Points to the proof for every answer; 85% on Medium, 40% on Hard.
Grammar	Commas that never go (GM-6), modifiers (GM-7), parallel structure (GM-12), concision (GM-13).	30 seconds per conventions question; 90% on Medium.
Expression	Transitions with subtle relationships; synthesis goals with two parts.	95% on Medium.
Algebra	Solution counts and parameters; systems shortcuts.	Answers “how many solutions” without solving; 85% on Medium.
Advanced Math	Rational and radical equations (AM-6, AM-7); functions and transformations (AM-8); nonlinear systems (AM-9).	Checks for extraneous solutions; 40% on Hard.
Data + Geometry	Samples and margin of error (DA-6); study design (DA-7); trigonometry (GT-4); circles (GT-5).	85% on Medium.
Strategy + Mind	Desmos power moves (MS-6); typed answers (MS-7); best of the last two (GL-12).	Uses Desmos on every messy question.

WHO

Sections scoring 600–700: solid on Easy, inconsistent on Medium, guessing on Hard.

LENGTH

One season.

THE WEEK

The game week, with one install day spent on a Hard-only set.

MATERIALS

Question Bank (Medium, Hard); Bluebook practice tests.

EXIT CHECK

Two practice tests at 700+ in the section; Question Bank target met.

MINDSET

Recovery: one question at a time (SAT-23).

Checkpoint 3: 700 to 750

Close the gap: hard traps and careless errors.

STRAND	WHAT TO STUDY	EXIT CAN-DO
Reading	Hard inference and evidence; old literature; best of the last two (GL-12).	Names the one word that separates the last two; 70% on Hard.
Grammar	Conventions review (GM-14) at speed; rare rules.	Zero conventions misses on practice tests.
Expression	Hard synthesis goals; transitions with concession.	Zero misses on practice tests.
Algebra	Hard word problems; parameters and constants.	95% on Medium; 70% on Hard.
Advanced Math	Polynomial zeros (AM-10); hard quadratics and exponentials; Desmos sliders.	70% on Hard.
Data + Geometry	Hard statistics and circle questions; similar figures.	70% on Hard.
Strategy + Mind	Careless-error protocol (SAT-19); timing anxiety (SAT-24); focus and fatigue (SAT-25).	Careless misses down to one or fewer per test.

WHO

Sections scoring 700–750: the content is there; the last points are traps and errors.

LENGTH

One season, often overlapping with test dates.

THE WEEK

The game week; every other scrimmage is a full practice test.

MATERIALS

Question Bank (Hard); every remaining Bluebook practice test.

EXIT CHECK

Two practice tests at 750+ in the section.

MINDSET

Every choice is guilty until proven innocent (GL-10).

The 1500+ Club: 750 to 800

Win the hard module. Repeat it on test day.

STRAND	WHAT TO STUDY	EXIT CAN-DO
Reading	The hardest Module 2 question types; reading like a lawyer under time pressure.	85%+ on Hard.
Grammar	Perfect execution.	Zero misses.
Expression	Perfect execution.	Zero misses.
Algebra	Speed: Easy and Medium in under 45 seconds to bank time.	Zero Easy or Medium misses.
Advanced Math	The last two questions of Module 2: Desmos, working backward, a fresh angle.	85%+ on Hard.
Data + Geometry	Hard multi-step problems.	85%+ on Hard.
Strategy + Mind	Full scrimmages (SAT-26), the final month (SAT-27), the Colosseum (SAT-29).	Finishes each module with time to check flagged questions.

WHO

Sections scoring 750+, aiming for 1500–1600 total.

LENGTH

The final weeks before the official test.

THE WEEK

A full practice test every week; two Hard-only sets; one review session.

MATERIALS

Question Bank (Hard); all Bluebook practice tests, retaken if needed.

EXIT CHECK

The official score.

MINDSET

The Colosseum: calm, alert, attacking every answer (SAT-21).

PART II

The Gladiator System

Six weapons, one Shield, and a four-step attack for every question on the test.

The Golden Mindset Shift

Hunt the wrong answers, not the right one.

THE RULE

Stop looking for the right answer. Every question has one right answer and three wrong ones, and the wrong ones are written to look right to a student who is searching. **Attack the wrong answers instead;** the right answer is the one left standing.

SEARCHING FOR THE RIGHT ANSWER

Your brain goes into justification mode: every choice “sort of” works

One target, hidden among four

Stuck between two, choosing by feel

Slow and anxious

Playing the test-maker’s game

HUNTING THE WRONG ANSWERS

Your brain attacks: every choice must survive

Three targets, out in the open

Each choice dies for a reason you can name

Faster, with time left to check

Using the test to take the test

REMEMBER The one question to ask of every single choice: “How can I attack this answer?” If you can’t attack it, leave it standing and move on to the next choice. Don’t select it yet.

WORKED EXAMPLES

- Read choice A. Ask: what’s wrong with it? Find the flaw and cross it out.
- Read choice B. No flaw? Leave it standing, but don’t select it yet.
- Attack C and D the same way.
- One choice left standing: that’s your answer. Two left: use GL-12.

TRAPS

- ✗ “A looks good. I’ll pick it.” ✓ “What’s wrong with A?”
- ✗ Reading the choices before you know the question ✓ Stem first, then text, then choices (GL-2)
- ✗ Picking the choice that feels most right ✓ Picking the choice you couldn’t kill

DRILL HABIT

On your next 10 practice questions, write a reason next to every choice you eliminate, using the six weapon codes from GL-4 to GL-9 (OPP, HALF, EXT, RAWQ, OOS, REC). No reason, no elimination.

TRY IT

- 1 True or false: a random choice is three times more likely to be wrong than right.
- 2 What question do you ask about every choice?
- 3 You can’t find a flaw in B. Do you select it right away?
- 4 What do you do before you look at any choices?

ANSWERS 1 True · 2 How can I attack this answer? · 3 No: attack the rest first · 4 Predict the answer (the Shield, GL-3)

The Golden Mindset Shift: Drill

8 original questions. Answer all of them before checking.

- 1 Text: “The 2018 survey found that most residents supported the new park, though many worried about parking.” Which choice is **wrong**, and why? (A) Most residents backed the park. (B) Residents unanimously backed the park.
- 2 Same text. Name the weapon that kills: “Residents opposed the park because of parking.”
- 3 Same text. Name the weapon that kills: “The park reduced parking problems in the town.”
- 4 Text: “Bats use echolocation to hunt, and some species also use vision at dusk.” Which survives?
(A) All bats hunt only by vision. (B) Bats cannot see. (C) Echolocation was discovered at dusk. (D) Some bats use both echolocation and vision.
- 5 True or false: if you can’t find a flaw in a choice, you should select it immediately.
- 6 Text: “The novelist wrote mostly at night, a habit she later said made her prose quieter.” Which survives?
(A) Night writing improves all prose. (B) She believed writing at night affected her style. (C) She wrote only at night. (D) Her prose was loud.
- 7 How many of the four choices on a typical question are wrong?
- 8 Text: “Early results suggest the vaccine lowers infection rates in adults.” Which survives?
(A) The vaccine may reduce infections among adults. (B) The vaccine prevents all infections. (C) The vaccine works best in children. (D) The vaccine raises infection rates.

WHERE TO PRACTICE • FREE

Khan Academy • SAT Reading and Writing • any Reading and Writing unit

College Board Question Bank • any Reading and Writing domain • any skill; apply the method to every question

Rungs 1–2: Foundations units • Question Bank: Easy
Rung 3: Medium units • Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) • Question Bank: Hard

ANSWERS

- 1 B • Trident: “unanimously” claims 100%; the text says most.
- 2 Gladius (and Pugio) • Most supported it; parking was a worry, not opposition.
- 3 Mace • Nothing in the text says what the park did to parking.
- 4 D • A: Trident + Gladius • B: Gladius • C: Axe (recycles “dusk”).
- 5 False • Leave it standing and attack the other choices first (GL-1).
- 6 B • C: Trident (“only” vs. “mostly”) • A: Mace + Trident • D: Gladius.
- 7 Three • Three targets, out in the open: hunt them.
- 8 A • B: Trident • D: Gladius • C: Mace.

The Four-Step Attack

One process for every question on the test.

GL-2

LESSON

THE RULE

Run the same four steps on every question: **1** read the question stem, then the passage. **2** Predict the answer (your Shield). **3** Eliminate with the six weapons. **4** Select from what's left.

STEP	WHAT YOU DO	WHY
1 • Stem, then text	Read exactly what's asked, then read the text to answer it	You read with a purpose, and the Fist (GL-7) can't land
2 • Predict	Answer it in your own words before you look at the choices	A Shield stops every choice from looking right
3 • Eliminate	Attack each choice with the six weapons	Three wrong answers are easier to find than one right one
4 • Select	Choose what survives; if two survive, the one that answers the stem better	"Best" and "most" in a stem warn you it may come down to two

REMEMBER On math, step 2 is your setup or estimate, and step 3 is checking the choices against it or plugging them in (MS-4). Student-produced responses have no choices: solve, then check by substituting.

WORKED EXAMPLES

- Stem: "Which choice best states the main purpose of the text?"
→ read for purpose, not details.
- Prediction in five words: "shows the old theory fails."
- Kill: a choice describing one detail the text mentions (a Fist).
- Keep: the choice that means "shows a theory fails."

TRAPS

- ~~X Reading the passage first, slowly, twice~~ ✓ **Stem first: know what to read for**
- ~~X Looking at the choices before predicting~~ ✓ **Predict, then look**
- ~~X Skipping step 3 when a choice "jumps out"~~ ✓ **Attack it first: it's often the trap**

DRILL HABIT

Say the four steps out loud before every question for one full practice module, until you do them without thinking.

TRY IT

- 1 What do you read first?
- 2 When do you make your prediction?
- 3 Two choices survive. What decides?
- 4 Which stem words hint it may come down to two?

ANSWERS 1 The question stem · 2 Before looking at the choices · 3 Which one answers the stem better · 4 "best" and "most"

The Four-Step Attack: Drill

8 original questions. Answer all of them before checking.

- 1 Put the four steps in order: Select • Predict • Stem, then text • Eliminate.
- 2 Stem: “Which choice best describes the function of the underlined sentence?” What are you reading the text for?
- 3 Stem: “Which finding, if true, would most directly weaken the researcher’s claim?” What must you underline first?
- 4 A choice “jumps out” as right before you finish reading the others. What do you do?
- 5 Stem contains “most logically completes the text.” What step 2 action fits?
- 6 Two choices survive. The stem asks for the main purpose. One describes the whole text; one describes paragraph 2. Which?
- 7 On a math question with number choices, what are steps 2 and 3?
- 8 Which word in a stem warns that it may come down to two choices?

WHERE TO PRACTICE • FREE

Khan Academy • SAT Reading and Writing • any Reading and Writing unit

College Board Question Bank • any Reading and Writing domain • any skill; apply the method to every question

Rungs 1–2: Foundations units • Question Bank: Easy

Rung 3: Medium units • Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) • Question Bank: Hard

ANSWERS

1 Stem, then text → Predict → Eliminate → Select • The Four-Step Attack (GL-2).

2 The sentence’s job • Function = what it does, not what it says.

3 The claim, and “weaken” • Know exactly what is asked before reading the choices.

4 Attack it, then attack the rest • The choice that jumps out is often the trap.

5 Write your own ending first • Your ending is the Shield for an inference question.

6 The whole text • Main purpose covers the whole text (GL-12).

7 Estimate or set up; then check or plug in the choices • The attack works on math too (MS-4).

8 “best” or “most” • The better of the last two is the best of the four.

The Shield: Predict First

Know what you're looking for before the choices tell you.

GL-3

LESSON

THE RULE

Before you look at any choice, answer the question yourself in a few plain words. That prediction is your **Shield**: it protects you from choices built to sound right.

QUESTION TYPE	HOW TO PREDICT
Words in context	Cover the blank and fill it with your own simple word. Your gut is good here.
Main purpose or idea	Finish "The author wrote this to..." in under ten words
Function of a sentence	Name its job: introduces, illustrates, contrasts, concludes
Inference (completes the text)	Write the ending yourself, using only the text's logic
Support or weaken a claim	Describe the finding that would prove, or hurt, the claim
Transitions	Name the relationship: adds, contrasts, causes, example, sequence
Math	Estimate: about how big? Positive or negative?

REMEMBER Grammar is the exception: **don't trust your gut on grammar**. Predict the rule being tested (boundary, agreement, tense) instead of what sounds right (GM-1).

WORKED EXAMPLES

- "Though the results seemed ____, they in fact confirmed the theory." Shield: "wrong." (A) unprecedented (B) contradictory (C) ambiguous (D) rigorous → B
- "A shirt costs \$40 after a 20% discount." Shield: the original is a bit more than \$40. \$50 fits; \$32 can't.
- Function of a sentence starting "For example,..." → Shield: "gives an example of the claim before it."
- Main idea of a text with a "however" turn → Shield: the point after the turn.

TRAPS

- ~~X No prediction: all four choices look plausible~~ ✓ **A ten-second prediction, then attack**
- ~~X A prediction from outside knowledge~~ ✓ **A prediction from the text only (GL-10)**
- ~~X Predicting grammar by ear~~ ✓ **Predicting the rule being tested**

DRILL HABIT

For one full module, write a 1–5 word prediction for every question before you look at the choices. Count how often your prediction matched the right answer.

TRY IT

- 1 Predict a word: "The critic's review was so ____ that the director framed it and hung it in her office."
- 2 Predict the relationship: "The bridge was old. ____, it carried more traffic than ever."
- 3 Estimate: 19% of 412 is about...?

ANSWERS 1 positive / glowing (e.g., laudatory) • 2 contrast (Nevertheless, Even so) • 3 about 80 (exactly 78.28)

The Shield: Predict First: Drill

8 original questions. Answer all of them before checking.

GL-3

DRILL

- 1 Predict a word: "The mayor's plan was so ___ that even her rivals praised it."
- 2 Predict: "Although the fossil was tiny, its discovery had ___ consequences for the field."
- 3 Predict the relationship: "The ferry was cheap. ___, it took three hours."
- 4 Predict the purpose: a text describes a widely held belief, then two studies that contradict it.
- 5 Estimate: 31% of 598 is about...?
- 6 Predict a word: "The scientist was ___ about the result, insisting it be repeated three times before announcing it."
- 7 Grammar question: choices differ only in "its / it's / their / they're." What do you predict?
- 8 Estimate: a \$79 coat is 25% off. About what's the sale price?

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ANSWERS

- 1 excellent / sensible • Even rivals praised it → strongly positive.
- 2 large / major • "Although tiny" sets up a contrast.
- 3 Contrast (However) • Cheap is good; three hours is bad.
- 4 To challenge a common belief • Setup → contrary evidence.
- 5 About 180 • $0.3 \times 600 = 180$ (exactly 185.38).
- 6 cautious • Repeating three times → careful.
- 7 The rule: pronoun or contraction • On grammar, predict the rule, not the sound.
- 8 About \$60 • $0.75 \times 80 = 60$ (exactly \$59.25).

The Gladius: Opposite

Weapon 1: the answer that says the reverse.

GL-4

LESSON

THE RULE

The fastest way to write a wrong answer is to flip the right one: add a *not*, swap *increase* for *decrease*, *supports* for *undermines*. Nearly every question has an Opposite. Kill it first. Code: **OPP**.

SIGNAL	THE TEXT SAYS	THE OPPOSITE TRAP SAYS
Direction	rainfall rose	rainfall fell
Attitude	the author admires the plan	the author doubts the plan
Relationship	supports the hypothesis	weakens the hypothesis
Negation	was effective	was not effective / was ineffective
Cause	heat caused the change	the change caused the heat
Comparison	more than the control group	less than the control group

REMEMBER Opposites hide in small words and prefixes: **not**, **un-**, **in-**, **dis-**, **except**, **least**, **never**. Read every choice word by word, and re-read the stem for “least” or “except.”

WORKED EXAMPLES

- Text: “Contrary to earlier claims, the 2019 survey found that bee populations in the region had stabilized.”
- Question: What did the survey find?
- ✓ Bee populations stopped declining.
- ✗ Gladius: Bee populations continued to decline. (the earlier claim, which the text rejects)

TRAPS

- ✗ ~~“The data undermine the claim” when they support it~~ ✓ **Check direction: support or undermine?**
- ✗ ~~Missing the “not” in a long choice~~ ✓ **Underline negatives in every choice**
- ✗ ~~Reading “least” as “most” in the stem~~ ✓ **Re-read the stem before choosing**

DRILL HABIT

Take five questions you got right. For each, write the Opposite trap yourself. Writing traps teaches you to see them.

TRY IT

- 1 Text: “The new alloy proved lighter but less durable than steel.” Which is the Opposite trap? (A) The alloy is less durable than steel. (B) The alloy is more durable than steel. (C) The alloy is lighter than steel.
- 2 Text: “Few critics expected the novel to succeed.” Complete the Opposite trap: “Most critics predicted the novel would ____.”
- 3 Which small words should you underline?

ANSWERS 1 B · 2 succeed · 3 not, un-, in-, dis-, except, least, never

The Gladius: Opposite: Drill

8 original questions. Answer all of them before checking.

- 1 Text: "Sales of the paper edition rose after the digital edition launched." Gladius trap?
(A) The digital edition launched. (B) Sales of the paper edition fell. (C) Sales of the paper edition rose. (D) Both editions existed.
- 2 Text: "The critic admired the film's music but disliked its plot." Gladius trap?
(A) The critic praised the music. (B) The critic reviewed the film. (C) The critic disliked the plot. (D) The critic disliked the music.
- 3 Text: "Warmer water increased coral bleaching." Gladius trap?
(A) Warmer water reduced bleaching. (B) Water temperature mattered. (C) Bleaching rose with warmer water. (D) Coral was studied.
- 4 Stem: "Which finding would **weaken** the claim that bees prefer blue flowers?" Which choice is a Gladius for this stem?
(A) Bees avoided blue flowers. (B) Bees visited blue flowers most. (C) Bees visited yellow flowers most. (D) Bees visited all colors equally.
- 5 Text: "The plan was not without critics." Meaning?
(A) The critics wrote the plan. (B) The plan had no critics. (C) Everyone opposed the plan. (D) The plan had some critics.
- 6 Which small words most often hide an Opposite?
- 7 Text: "Unlike the first trial, the second showed a clear effect." Gladius trap?
(A) The trials differed. (B) The second trial showed an effect. (C) The first trial showed a clear effect. (D) There were two trials.
- 8 Stem: "All of the following are supported EXCEPT..." What must you find?

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ANSWERS

- 1 B • Reverses "rose."
- 2 D • Reverses the attitude toward the music.
- 3 A • Reverses the direction.
- 4 B • It supports the claim: the opposite of what's asked.
- 5 D • "Not without" = with. "No critics" is the Gladius.
- 6 not, un-, in-, dis-, except, least, never • Underline them in every choice.
- 7 C • Swaps which trial showed the effect.
- 8 The one unsupported choice • Re-read "EXCEPT": the target flips.

The Pugio: Half-Right

Weapon 2: *half true is all false.*

GL-5

LESSON

THE RULE

A Half-Right choice starts with something true from the text, then adds a part that's wrong, missing or made up. **One wrong word kills the whole choice.** Code: **HALF**.

HOW IT'S BUILT	EXAMPLE (TEXT: "Mice given the drug slept longer but ate less.")
True + false	Mice slept longer and ate more.
True + outside the text	Mice slept longer, which improved their memory.
True + too strong	Mice slept longer and stopped eating.
True + invented cause	Mice slept longer because they ate less.
Both halves true (survivor)	Mice slept longer and ate less.

REMEMBER Read every choice to the last word. The bad half usually comes after *and*, *but*, *because*, *which* or a comma, and it usually carries a second weapon: Opposite, Extreme or Out of Scope.

WORKED EXAMPLES

- Split long choices in two at *and*, *because* or *which*.
- Check each half against the text separately.
- Both halves must be supported. One unsupported half: eliminate.
- Correct SAT answers are usually modest and fully supported.

TRAPS

- ~~X~~ Choosing a choice because its first half matches ✓ **Checking the second half too**
- ~~X~~ "Partly right, so maybe" ✓ **Partly right = wrong**
- ~~X~~ Reading until you recognize words ✓ **Reading to the period**

DRILL HABIT

On ten Reading questions, draw a slash in each long choice where the halves meet, and mark each half ✓ or X.

TRY IT

- 1 Text: "The festival drew record crowds, though vendors reported lower sales." Half-Right or supported? "The festival drew record crowds and vendors made record sales."
- 2 Same text: "Attendance was high, yet vendors sold less than usual."
- 3 Where does the bad half usually hide?

ANSWERS 1 Half-Right (sales were lower) · 2 Supported · 3 After *and*, *but*, *because*, *which* or a comma

The Pugio: Half-Right: Drill

8 original questions. Answer all of them before checking.

- 1 Text: "The town grew quickly after the railroad arrived, but its river port declined." Half-Right?
(A) The railroad arrived. (B) The port declined. (C) The town grew and its port thrived. (D) The town grew after the railroad came.
- 2 Text: "Owls hunt at night and rest during the day." Half-Right?
(A) Owls are nocturnal hunters. (B) Owls hunt at night. (C) Owls rest by day. (D) Owls hunt at night, which helps them avoid hawks.
- 3 Where does the bad half usually hide?
- 4 Text: "The drug reduced pain in 60% of patients but caused nausea in some." Half-Right?
(A) The drug reduced pain in most patients. (B) Some patients had nausea. (C) The drug helped a majority. (D) The drug reduced pain and had no side effects.
- 5 Text: "Her first album sold poorly; her second made her famous." Half-Right?
(A) Her albums had different results. (B) Her first album sold poorly and made her famous. (C) She released at least two albums. (D) Her second album brought her fame.
- 6 A choice is 90% supported, with one unsupported word. Keep or kill?
- 7 Text: "The bridge was built in 1932 and repaired in 1990." Half-Right?
(A) The bridge was built in 1932 because of a flood. (B) The bridge was built in 1932. (C) The bridge was repaired in 1990. (D) The bridge was repaired after it was built.
- 8 Text: "Most of the volunteers were students; a few were retirees." Half-Right?
(A) Most volunteers were students, and none were retirees. (B) Most volunteers were students. (C) Volunteers included students and retirees. (D) Some volunteers were retirees.

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ANSWERS

- 1 C • First half true; "port thrived" is false.
- 2 D • Second half is invented (Pugio + Mace).
- 3 After and, but, because, which, or a comma • Split long choices there.
- 4 D • "No side effects" contradicts the text.
- 5 B • Joins true + false.
- 6 Kill • One wrong word kills the whole choice.
- 7 A • Cause is invented.
- 8 A • "None were retirees" is false.

The Trident: Extreme Language

Weapon 3: *always, never, all, none, proves.*

GL-6

LESSON

THE RULE

Extreme words claim 100% or 0%: *always, never, all, none, every, only, completely, proves.* One exception makes them false. Correct answers are usually qualified: *may, some, often, suggests, partly.* Code: **EXT.**

EXTREME (USUALLY WRONG)	QUALIFIED (USUALLY SAFER)
always / never	often / rarely
all / none / every	many / few / some
proves / disproves	suggests / supports / challenges
completely / entirely	partly / largely
only / solely	mainly / among other things
must / certainly	may / likely
the first / the best	an early / one of the best

REMEMBER Extreme isn't automatically wrong: if the text itself says *all* or *never*, the answer can too. The real rule: **a choice can never be stronger than its evidence.**

WORKED EXAMPLES

- Text: "The results suggest the vaccine reduces infection."
- **X** "The results prove the vaccine prevents all infection." (proves, all)
- **✓** "The results indicate the vaccine may lower infection rates."
- Text: "Every sample tested positive." → "All the samples tested positive" is fine: the text is extreme too.

TRAPS

- X** ~~"The study proves..." after one experiment~~ **✓** "The study supports..."
- X** ~~Eliminating "all" when the text says "all"~~ **✓** **Match the strength of the text**
- X** ~~"The author completely rejects" when she has doubts~~ **✓** "The author questions..."

DRILL HABIT

Circle every extreme word in the choices of your next 20 questions. For each one, ask: does the text go that far?

TRY IT

- 1 Text: "Some historians now doubt the letter is authentic." Extreme trap or fine? "Historians agree the letter is fake."
- 2 Same text: "The letter's authenticity has been questioned."
- 3 Name three qualifiers common in correct answers.

ANSWERS 1 Extreme trap (some ≠ all; doubt ≠ fake) · 2 Fine · 3 may, suggests, some, often, partly, likely

The Trident: Extreme Language: Drill

8 original questions. Answer all of them before checking.

- 1 Text: "Many historians now question the letter's authenticity." Trident trap?
(A) All historians agree the letter is fake. (B) Historians have questions about the letter. (C) The letter's authenticity is debated. (D) Some scholars doubt the letter.
- 2 Text: "The results suggest that sleep may aid memory." Best answer style?
(A) Sleep may support memory. (B) Sleep always improves memory. (C) Sleep proves memory improves. (D) Memory requires sleep.
- 3 Text: "Every sample tested positive for the mineral." Is "All samples contained the mineral" a trap?
- 4 Name three qualifiers that often appear in right answers.
- 5 Text: "The study found a link between exercise and mood in teenagers." Trident trap?
(A) Mood and exercise were related. (B) The study involved teenagers. (C) Exercise was linked to mood. (D) Exercise completely determines mood.
- 6 Text: "Rarely did the composer revise her scores." Trident trap?
(A) She never revised her scores. (B) She seldom revised. (C) Revisions were uncommon. (D) She revised infrequently.
- 7 Text: "The new method is one of the fastest available." Trident trap?
(A) The method is the fastest ever invented. (B) Few methods are faster. (C) The method is very fast. (D) The method is among the quickest.
- 8 Text: "Some critics found the ending confusing." Trident trap?
(A) Critics universally rejected the ending. (B) The ending drew mixed reactions. (C) The ending puzzled some critics. (D) Not every critic understood the ending.

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ANSWERS

- 1 A · "All" and "fake" go far beyond "many question."
- 2 A · Matches the text's qualified strength.
- 3 No · The text itself says every: match its strength.
- 4 may, some, suggests (also: often, partly, likely) · Right answers rarely go further than the evidence.
- 5 D · "Completely determines" overstates a link.
- 6 A · "Never" ≠ "rarely."
- 7 A · "The fastest ever" overstates "one of."
- 8 A · "Universally rejected" overstates.

The Fist: Right Answer, Wrong Question

Weapon 4: true, but not what was asked.

GL-7

LESSON

THE RULE

This choice is accurate: it really is in the text. But it answers a different question from the one in the stem. Reading the stem first, and checking every survivor against it, is the only defense. Code: **RAWQ**.

THE STEM ASKS FOR...	THE FIST GIVES YOU...
The main purpose	a true detail from one sentence
What the researcher concluded	what the researcher assumed at the start
Why the author mentions X	what X is
Evidence for this claim	true evidence for a different claim
How Text 2 responds to Text 1	what Text 2 says on its own
What the table shows	a fact from the passage the table doesn't show

REMEMBER Before you select, ask your survivor: “Does this answer **THIS** stem?” True isn’t enough. The standard is true *and* responsive.

WORKED EXAMPLES

- Stem: “Which choice best states the main purpose of the text?”
- **X** “To describe how sea otters use rocks as tools.” (a detail: true, not the purpose)
- **✓** “To argue that tool use is more widespread among animals than once believed.”
- A choice that summarizes Text 2 alone, when asked how Text 2 responds to Text 1, is a Fist.

TRAPS

- X** ~~Picking a choice because you remember reading it~~ **✓ Checking it against the stem**
- X** ~~Answering “what” when the stem asks “why”~~ **✓ Underline the question word**
- X** ~~Choosing true data for the wrong claim~~ **✓ Re-read the claim in the stem**

DRILL HABIT

Before choosing, say the stem as a question out loud (“Why does the author mention X?”), then say your answer as a reply to it.

TRY IT

- 1 Stem: “Which choice best describes the function of the underlined sentence?” Fist or not? “It states that coral reefs cover less than 1% of the ocean floor.” (The sentence says this.)
- 2 Stem: “Why does the author mention the 1906 earthquake?” Which word decides?
- 3 What two tests must a survivor pass?

ANSWERS 1 Fist: it restates the content, not the function · 2 Why · 3 True to the text, and answers this stem

The Fist: Right Answer, Wrong Question: Drill

GL-7

DRILL

8 original questions. Answer all of them before checking.

- 1 Stem: "Why does the author mention the 1906 earthquake?" Fist trap?
(A) The earthquake destroyed much of the city. (B) To give background for the reforms that followed. (C) To explain why the city rebuilt its water system. (D) To show how the city's planning changed.
- 2 Stem: "Which choice best states the main purpose?" The text is about a scientist's method; one choice repeats a statistic from sentence 3. Weapon?
- 3 Stem: "Which finding would support the claim that crows recognize faces?" Fist trap?
(A) Crows are among the most intelligent birds. (B) Crows avoided only the people who had harmed them.
(C) Crows scolded people who had captured them earlier. (D) Crows ignored unfamiliar people.
- 4 Two-text question: "How would the author of Text 2 respond to Text 1?" A choice summarizes Text 2 alone. Weapon?
- 5 What question do you ask every survivor before selecting it?
- 6 Stem: "What did the researchers conclude?" A choice states what they assumed at the start. Weapon?
- 7 Stem: "Which choice best describes the table's data?" A choice states a fact found only in the passage. Weapon?
- 8 Stem: "Which choice best describes the function of the third sentence?" Fist trap?
(A) It qualifies the claim in sentence 2. (B) It introduces a counterargument. (C) It states that otters use rocks as tools. (D) It gives an example of the claim in sentence 2.

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ANSWERS

- 1 A • A true fact, but it says what, not why.
- 2 Fist • True detail, wrong question.
- 3 A • Possibly true, but not evidence for face recognition.
- 4 Fist • It doesn't relate Text 2 to Text 1.
- 5 "Does this answer THIS stem?" • True isn't enough; it must answer what was asked.
- 6 Fist • Assumption ≠ conclusion.
- 7 Fist (and Mace for the table) • The stem asks about the table.
- 8 C • It restates content, not function.

The Mace: Out of Scope

Weapon 5: beyond the text.

GL-8

LESSON

THE RULE

If the text doesn't say it or clearly support it, it can't be the answer, even if it's true in real life. The passage is finite; everything outside it is out of scope. Code: **OOS**.

OUT-OF-SCOPE TYPE	EXAMPLE (TEXT ABOUT ONE BEE SPECIES IN CHILE)
Too broad	All pollinators worldwide are declining.
New topic	Pesticides should be banned.
Outside knowledge	Einstein warned about bee loss.
Future prediction	The species will be extinct by 2040.
Unstated cause	The decline is caused by climate change.
Recommendation never made	Farmers should plant more wildflowers.

REMEMBER True in the world, wrong on the SAT: if you know it from school or the news but not from this text, eliminate it. Check every noun in a choice: is it in the passage?

WORKED EXAMPLES

- Text: "The Andean condor population in the study area grew 12% after a ban on lead ammunition."
- **X** Mace: "Lead ammunition should be banned worldwide." (a recommendation, and worldwide)
- **X** Mace: "Condors are the largest flying birds." (not in the text)
- **✓** "The condor population increased after a change in hunting rules."

TRAPS

X ~~Choosing what you learned in biology class~~ **✓** **Choosing what this text says**

X ~~A claim broader than the text's sample~~ **✓** **Same place, group and time**

X ~~A cause the text never names~~ **✓** **Only causes the text states or clearly implies**

DRILL HABIT

For each choice you eliminate as Out of Scope, point to the exact word that isn't in the passage. If you can't point to one, look again.

TRY IT

- 1 The text studies 40 students at one school. Out of Scope? "Students nationwide learn better with music."
- 2 Text: "The bridge was completed in 1932." Out of Scope? "The bridge was finished in the early 1930s."
- 3 What should you check for every noun in a choice?

ANSWERS 1 Yes (too broad) · 2 No: same fact in new words · 3 That the text states or clearly supports it

The Mace: Out of Scope: Drill

8 original questions. Answer all of them before checking.

GL-8

DRILL

- 1 Text studies 50 farms in Kenya. Mace trap?
(A) The method was tested in Kenya. (B) The farms in the study benefited. (C) Farmers worldwide should adopt the method. (D) Some farms improved yields.
- 2 Text: "The comet was first recorded in 1682." Mace trap?
(A) The comet was seen before 1700. (B) Halley predicted the comet's return. (C) The comet was observed in the 1600s. (D) A record exists from 1682.
- 3 Text describes a drought's effect on wheat. Mace trap?
(A) Yields dropped in dry years. (B) Wheat yields fell during the drought. (C) The drought was caused by climate change. (D) The drought affected wheat.
- 4 Text: "The violinist practiced six hours a day as a teenager." Mace trap?
(A) Her teenage practice was long. (B) She practiced intensively in her teens. (C) She practiced daily. (D) She will win the next competition.
- 5 What should you check for every noun in a choice?
- 6 Text about a museum's new wing. Mace trap?
(A) The new wing opened. (B) Museums should charge lower fees. (C) The wing added gallery space. (D) The museum expanded.
- 7 True or false: an answer that is true in real life can still be wrong on the SAT.
- 8 Text: "The tortoise lived 150 years, the longest recorded for its species." Mace trap?
(A) It lived 150 years. (B) The tortoise was unusually long-lived for its species. (C) Tortoises live longer than all other animals. (D) It set a record for its species.

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ANSWERS

- 1 C • Too broad + a recommendation the text never makes.
- 2 B • Outside knowledge, even if true.
- 3 C • Unstated cause.
- 4 D • Future prediction.
- 5 That it appears in, or is clearly supported by, the text • Point to it or kill it.
- 6 B • New topic.
- 7 True • Only the text counts (GL-10).
- 8 C • Too broad: all animals.

The Axe: Recycled Language

Weapon 6: same words, wrong meaning.

GL-9

LESSON

THE RULE

A Recycled choice copies exact words from the passage but changes their meaning, order or connection. Matching words is not matching meaning. Correct answers usually **paraphrase**; traps often **copy**. Code: **REC**.

TEXT	RECYCLED TRAP	CORRECT PARAPHRASE
"Light pollution disrupts the migration of birds."	"Birds cause light pollution during migration."	"Artificial light interferes with how birds migrate."
"The poet's early work was ignored; her later work, celebrated."	"The poet's early work was celebrated."	"Recognition came late in the poet's career."
"Prices fell as supply rose."	"Supply fell as prices rose."	"Greater supply lowered prices."

REMEMBER Be suspicious of a choice that looks just like the passage. Read for meaning: who did what to whom, in what order, with what result.

WORKED EXAMPLES

- Underline the words a choice shares with the passage.
- Ask: in the passage, do these words connect the same way?
- Same words, different connection: Axe it.
- Different words, same meaning: a likely survivor.

TRAPS

- ~~X The choice with the most passage words~~ ✓ **The choice with the same meaning**
- ~~X Rejecting a paraphrase because it's "not in the text"~~ ✓ **Paraphrase is how the SAT writes right answers**
- ~~X Matching a rare word from the passage~~ ✓ **Rare-word matches are bait**

DRILL HABIT

Rewrite each sentence of a passage in your own words without reusing any key word. Then compare with the right answers you got: they look like your rewrites.

TRY IT

- 1 Text: "The committee rejected the proposal because it lacked funding." Trap or paraphrase? "The proposal lacked a committee."
- 2 Same text: "The plan was turned down for financial reasons."
- 3 Do correct answers more often copy or paraphrase?

ANSWERS 1 Recycled trap · 2 Paraphrase (likely correct) · 3 Paraphrase

The Axe: Recycled Language: Drill

8 original questions. Answer all of them before checking.

- 1 Text: "Noise from ships disrupts how whales communicate." Axe trap?
(A) Ships are noisy. (B) Ship noise interferes with whale communication. (C) Whales communicate with ships using noise. (D) Whales are affected by sound.
- 2 Text: "The poet's early work was ignored; her later work was celebrated." Axe trap?
(A) Her later poems were praised. (B) Her early work was celebrated. (C) Her early poems went unnoticed. (D) Recognition came late in her career.
- 3 Do correct answers more often copy or paraphrase the text?
- 4 Text: "Prices fell as supply rose." Axe trap?
(A) Supply increased. (B) Prices dropped. (C) Supply fell as prices rose. (D) More supply meant lower prices.
- 5 Text: "The committee rejected the proposal because it lacked funding." Axe trap?
(A) The proposal lacked a committee. (B) The proposal was turned down for financial reasons. (C) The committee said no. (D) Funding was an issue.
- 6 Text: "Volcanic ash blocked sunlight, cooling the planet." Axe trap?
(A) Ash in the air lowered global temperatures. (B) The planet cooled. (C) Sunlight blocked volcanic ash. (D) Ash reduced sunlight.
- 7 What do you underline to spot an Axe?
- 8 Text: "Children who read for pleasure scored higher on vocabulary tests." Axe trap?
(A) Pleasure reading was associated with higher vocabulary scores. (B) Scores differed among children. (C) Vocabulary tests made children read for pleasure. (D) Some children read for pleasure.

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Rung 3: Medium units • Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) • Question Bank: Hard

ANSWERS

- 1 C • Same words, new meaning.
- 2 B • Recycles "early" and "celebrated" in the wrong order.
- 3 Paraphrase • Copying is bait.
- 4 C • Same words, reversed connection.
- 5 A • Recycled words, nonsense meaning.
- 6 C • Who did what to whom is reversed.
- 7 The words a choice shares with the passage • Then check they connect the same way.
- 8 C • Reverses the relationship.

The Lawyer in the Courtroom

Only the evidence in front of you counts.

GL-10

LESSON

THE RULE

Treat each question as its own court case. The only admissible evidence is the passage, the note above it and the stem. Read everything literally, and choose the answer you could defend by **pointing to words in the text**.

A LAWYER...	ON THE SAT, YOU...
Uses only evidence admitted in court	Use only this question's passage and data
Takes testimony literally	Read literally: "some" means some
Rejects hearsay	Reject outside knowledge, even if it's true
Can point to the exhibit	Can point to the line that proves the answer
Tries each case separately	Treat every question as a separate case

REMEMBER A standardized test must have exactly one defensible answer, or it couldn't be scored fairly. That's why the right answer is always supported by the text, and why your job is to find the support, not to interpret creatively.

WORKED EXAMPLES

- Before choosing, point to the words that prove your answer.
- Can't point to anything? You're about to choose an Out-of-Scope answer.
- Inference questions too: the answer must *follow* from the text, not just be possible.
- The note above a passage (author, date, context) is evidence too.

TRAPS

- ~~X "Logically, the author probably also believes..."~~ ✓ **"The text says..."**
~~X Using what you studied in history class~~ ✓ **Using only this passage**
~~X Choosing what could be true~~ ✓ **Choosing what must be true, given the text**

DRILL HABIT

For your next 15 Reading and Writing questions, write the quote that proves each answer. If you can't find one, mark the question as a guess and review it.

TRY IT

- 1 Text: "Many residents opposed the dam." Can you conclude most residents opposed it?
- 2 Text: "The painting was sold in 1910 to a private collector." Can you conclude it's in a private collection today?
- 3 Is the note above a passage admissible evidence?

ANSWERS 1 No: many ≠ most • 2 No: only that it was sold to one in 1910 • 3 Yes

The Lawyer in the Courtroom: Drill

8 original questions. Answer all of them before checking.

GL-10

DRILL

- 1 Text: "Several residents opposed the dam." Can you conclude most residents opposed it?
- 2 Text: "The painting was sold in 1910." Can you conclude who owns it today?
- 3 Is the note above a passage (author, date, context) admissible evidence?
- 4 Text: "The team's new design used 30% less steel." Lawyer's answer?
(A) The design used less steel than before. (B) The design was cheaper. (C) The design was safer. (D) Steel is expensive.
- 5 Text: "Most of the letters were written in French." Can you conclude some were not?
- 6 What should you be able to do before choosing any Reading and Writing answer?
- 7 Text: "The study observed 20 students at one school." Can you conclude the finding applies to all teenagers?
- 8 Text: "The explorer reached the river in May and the coast in July." Must-be-true?
(A) The river led to the coast. (B) She traveled by boat. (C) She reached the coast after the river. (D) She arrived in summer both times.

WHERE TO PRACTICE • FREE

Khan Academy • SAT Reading and Writing • any Reading and Writing unit

College Board Question Bank • any Reading and Writing domain • any skill; apply the method to every question

Rungs 1–2: Foundations units • Question Bank: Easy

Rung 3: Medium units • Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) • Question Bank: Hard

ANSWERS

- 1 No • Several ≠ most.
- 2 No • Only the 1910 sale is in evidence.
- 3 Yes • It's part of the question.
- 4 A • Only "used less steel" can be pointed to in the text.
- 5 Yes • "Most" implies not all.
- 6 Point to the words that prove it • No pointing, no choosing.
- 7 No • Only that school's 20 students.
- 8 C • The others could be true; only the order of arrival must be.

Active Reading: Ask “Why?”

Read for the job of every sentence.

GL-11

LESSON

THE RULE

Active reading means reading while thinking, not just looking at words. For every sentence, ask **why it’s there**: does it introduce, give an example, contrast, explain a cause, or conclude?

SIGNAL WORDS	THE SENTENCE’S JOB
For example, for instance, such as	illustrates a claim
However, but, yet, although, in contrast	turns or contrasts
Because, since, as a result, therefore	gives a cause or an effect
Some argue, it was long believed	sets up a view to challenge
Thus, in short, ultimately	concludes
Moreover, also, in addition	adds support
Recent research, new evidence	introduces a finding

REMEMBER Ask “Why?” two or three times: why this sentence, why here, why this word? Digital SAT passages are short (about 25 to 150 words), so every sentence earns its place.

WORKED EXAMPLES

- “Scientists long assumed X.” Why? → To set up a view the text will challenge.
- “However, new data show Y.” Why? → The turn: the author’s point.
- “In one trial, Z happened.” Why? → Evidence for Y.
- Now the purpose writes itself: to show X is wrong because of Y.

TRAPS

- ~~X Reading every word with the same weight~~ ✓ **Slowing down at turns: however, but, yet**
- ~~X Treating the first sentence as the main idea~~ ✓ **The point often comes after the turn**
- ~~X Finishing the text with no summary~~ ✓ **Summarize in five words before the choices**

DRILL HABIT

Label each sentence of five passages with one word: SETUP, CLAIM, TURN, EVIDENCE, EXAMPLE or CONCLUSION.

TRY IT

- 1 Job? “Earlier studies, however, relied on very small samples.”
- 2 Job? “For instance, the octopus can open screw-top jars.”
- 3 After “It was long believed that...”, what usually comes next?

ANSWERS 1 Contrasts with, or challenges, earlier studies · 2 Gives an example · 3 A turn that challenges the belief

Active Reading: Ask “Why?”: Drill

8 original questions. Answer all of them before checking.

GL-11

DRILL

- 1 Job? “For instance, some octopuses carry coconut shells as shelters.”
- 2 Job? “It was long believed that birds descended from crocodiles.”
- 3 Job? “However, recent fossils point to a different ancestor.”
- 4 Job? “As a result, the lake froze earlier each decade.”
- 5 Job? “Thus, the evidence favors the second explanation.”
- 6 Where does the author’s point usually appear in a text with a “however” turn?
- 7 Job? “Moreover, the method is cheaper.”
- 8 Label each sentence: (1) Scientists assumed X. (2) A 2020 study found not-X. (3) In one trial, Y happened. (4) So X needs revision.

WHERE TO PRACTICE • FREE

Khan Academy • SAT Reading and Writing • any Reading and Writing unit

College Board Question Bank • any Reading and Writing domain • any skill; apply the method to every question

Rungs 1–2: Foundations units • Question Bank: Easy
Rung 3: Medium units • Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) • Question Bank: Hard

ANSWERS

- 1 Example • Illustrates a claim.
- 2 Sets up a view to challenge • “Long believed” signals a coming turn.
- 3 Turn / contrast • The author’s point usually follows.
- 4 Effect • “As a result” signals a consequence.
- 5 Conclusion • “Thus” concludes.
- 6 After the turn • Slow down at however, but, yet.
- 7 Adds support • Same direction as the previous point.
- 8 SETUP, TURN, EVIDENCE, CONCLUSION • The purpose writes itself.

Best of the Last Two

When two survive, the stem decides.

GL-12

LESSON

THE RULE

Sometimes only two choices die. Then go back to the stem and the text: the better answer matches the stem more exactly and has no word you can attack. Stems with *best* or *most* tell you this can happen.

COMPARE THE TWO ON...

THE WINNER...

The stem's exact task	does that task (purpose, function, support), not a neighbor of it
Scope	covers the whole text for main idea; one part when asked about one part
Strength	is no stronger than the evidence
Every word	has no word you can point to as unsupported
Your Shield	is closer to the prediction you made before looking

REMEMBER Don't revive a choice you already killed for a reason, and don't flip-flop. Decide with the checklist, mark it, and move on: two minutes on one question costs points elsewhere.

WORKED EXAMPLES

- Last two for main purpose: one covers the whole text, one covers sentence 3 → the whole-text one.
- Last two for support: one shows the effect; the other shows it *only in the treated group*, as the claim requires → the second.
- Last two differ by one word: "suggests" vs. "proves" → the weaker, supported one.
- Still unsure after about 30 seconds? Pick, flag, move on, return if time allows.

TRAPS

- ~~X Choosing by gut between the last two~~ ✓ **Choosing by the checklist**
- ~~X Reviving a choice you eliminated with a reason~~ ✓ **Trusting your earlier elimination**
- ~~X Spending three minutes on one question~~ ✓ **Flag it and come back**

DRILL HABIT

Collect every question where you were stuck between two. For each, write the one word that made the right answer better. Patterns will appear within two weeks.

TRY IT

- 1 Main idea stem. C summarizes the whole text; D describes one example. Which?
- 2 Two choices: "may contribute to" vs. "is the primary cause of." The text says "is one factor in." Which?
- 3 How long should you spend between the last two before picking and flagging?

ANSWERS 1 C · 2 "may contribute to" · 3 About 30 seconds

Best of the Last Two: Drill

8 original questions. Answer all of them before checking.

GL-12

DRILL

- 1 Main idea stem. B summarizes the whole text; D describes its first example. Which?
- 2 Text says the policy “is one factor in” lower crime. Last two: “contributed to” vs. “was the main cause of.” Which?
- 3 Last two differ by one word: “describes” vs. “criticizes.” The text is neutral. Which?
- 4 How long between the last two before you pick, flag and move on?
- 5 You eliminated C for a reason; now it looks good again. What do you do?
- 6 Last two for a function question: one states what the sentence says, one states what it does. Which?
- 7 Last two for “support the claim that only saplings responded.” One shows saplings responded; one shows saplings responded and old ones didn’t. Which?
- 8 Which is closer to the right answer: the survivor that matches your Shield, or the one that sounds more impressive?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · any Reading and Writing unit

College Board Question Bank · any Reading and Writing domain · any skill; apply the method to every question

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 B · Main idea covers the whole text.
- 2 “contributed to” · No stronger than the evidence.
- 3 “describes” · Match the tone.
- 4 About 30 seconds · Don’t spend three minutes on one question.
- 5 Trust the earlier elimination · Don’t revive a choice you killed for a reason.
- 6 What it does · The other is a Fist.
- 7 The second · It matches “only.”
- 8 The one that matches your Shield · Impressive isn’t evidence.

PART III

Reading and Writing

Every question type on the Reading and Writing section, decoded.

The Psychology of Trap Answers



JOSEF AIDEN DURAND
FROM THE AUTHOR

Every trap answer is built on a bet: that you'll be in a hurry, that you'll be looking for the right answer, and that you'll grab the first choice that seems close enough. Close enough is exactly what traps are designed to be.

The test-maker knows you remember the passage's words, so the Axe recycles them. The test-maker knows you like answers that sound confident, so the Trident adds "always" and "proves." The test-maker knows you'll read the first half of a long choice and nod, so the Pugio hides the poison in the second half.

That's why pattern recognition is the elite scorer's real advantage. After a few hundred evaluated questions, you stop seeing four answer choices; you see one survivor and three familiar faces. "That's an Opposite. That's Out of Scope. That one's recycling the passage." The traps don't change. You do.

So don't just do questions. Name every trap you eliminate, and name the trap you fell for every time you miss. Do that for six weeks, and the test starts to feel like a rerun. You've seen this episode before. You know how it ends.

Inside Reading and Writing

54 questions, two modules, one short text each.

RW-1

LESSON

THE RULE

Two modules of 27 questions, 32 minutes each (64 minutes total). Every question has its own short text (about 25 to 150 words) or a pair of texts.

Module 2 adapts: a strong Module 1 unlocks a harder Module 2, which is where 1500+ scores come from.

DOMAIN	SHARE	QUESTION TYPES
Craft and Structure	about 28%	Words in context · text structure and purpose · cross-text connections
Information and Ideas	about 26%	Central ideas and details · command of evidence (textual and quantitative) · inferences
Standard English Conventions	about 26%	Boundaries (punctuation) · form, structure and sense (agreement, tense, pronouns)
Expression of Ideas	about 20%	Transitions · rhetorical synthesis (student notes)

REMEMBER Questions come grouped by type in a similar order every module. Pace: 32 minutes for 27 questions is about **70 seconds each**. Bank time on grammar and transitions (fast) for evidence and inference questions (slow).

WORKED EXAMPLES

- Module 1 is the gate: full care, every question.
- No penalty for wrong answers: never leave a blank.
- Use Bluebook's answer eliminator to cross out choices as you run POE (GL-1).
- A few questions are unscored pretest items; you can't tell which, so treat all as real.

TRAPS

- ~~X Rushing Module 1 to save energy for Module 2~~ ✓ **Full care on Module 1**
- ~~X Leaving blanks when time runs low~~ ✓ **Guess on every question**
- ~~X Three minutes on one inference question~~ ✓ **Flag at about 90 seconds; return later**

DRILL HABIT

Take one timed module in Bluebook. Note the clock at questions 7, 14 and 21. Target: no more than about 8, 16 and 24 minutes used.

TRY IT

- 1 How many minutes per Reading and Writing module?
- 2 About how many seconds per question?
- 3 Is there a penalty for guessing?
- 4 Which module decides how hard the second module is?

ANSWERS 1 32 · 2 About 70 · 3 No · 4 Module 1

Inside Reading and Writing: Drill

8 original questions. Answer all of them before checking.

- 1 How many Reading and Writing questions are in each module?
- 2 How many minutes per Reading and Writing module?
- 3 Average seconds per Reading and Writing question?
- 4 Which module determines the difficulty of Module 2?
- 5 Is there a penalty for wrong answers?
- 6 Name the four Reading and Writing domains.
- 7 Which question types should take about 30–45 seconds?
- 8 At about how many seconds should you flag a stuck question?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · About the SAT

College Board Question Bank · all four domains · a full module of 27, timed

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 27 · 54 in two modules.
- 2 32 · 64 total.
- 3 About 70 · $32 \times 60 \div 27 \approx 71$.
- 4 Module 1 · Full care on Module 1.
- 5 No · Never leave a blank.
- 6 Craft and Structure; Information and Ideas; Standard English Conventions; Expression of Ideas · See RW-1's table.
- 7 Conventions, transitions, synthesis · Bank time for evidence and inference.
- 8 About 90 · Flag, guess, return later.

Words in Context

Fill the blank with your gut, then match.

RW-2

LESSON

THE RULE

These questions ask for the most logical and precise word or phrase for a blank, or what a word means as used. Unlike grammar, **your gut is a good predictor here**: read the text, fill the blank with your own simple word, then find the match.

STEP DO THIS

- 1 Read the whole text: the clue is often after the blank
- 2 Find the clue: a contrast (but, although), a restatement (that is), or a cause
- 3 Fill the blank with your own simple word; is it positive, negative or neutral?
- 4 Eliminate choices that don't match your word's meaning and charge
- 5 Put the survivor in the sentence: precise, not just related

REMEMBER Hard questions use hard words. Never eliminate a choice just because you don't know it: eliminate the ones you know are wrong and choose from what's left. A growing vocabulary widens the set you know.

WORKED EXAMPLES

- “Although critics initially ___ the design, it is now considered a landmark.” Clue: although → contrast with “landmark.” Shield: criticized → disparaged.
- “The scientist’s ___ approach, testing every assumption twice, slowed the project but made its results reliable.” Shield: careful → meticulous.
- As used: “The board will table the proposal until spring.” table = postpone.
- Charge first: positive, negative or neutral? That alone often kills two choices.

TRAPS

- ~~X A word related to the topic~~ ✓ **The word that fits the logic**
- ~~X The common meaning of a word with two meanings~~ ✓ **The meaning in this sentence**
- ~~X Eliminating an unknown word~~ ✓ **Eliminating known wrong words**

DRILL HABIT

Daily: 10 words-in-context questions from the College Board Question Bank. Keep a card for every unknown word with the sentence it appeared in.

TRY IT

- 1 “The senator’s speech was ___: in just three minutes she addressed every concern.” (A) verbose (B) concise (C) evasive (D) tentative
- 2 “Despite the team’s ___ start, losing its first five games, it won the championship.” (A) promising (B) dismal (C) steady (D) celebrated
- 3 “The museum will retire the exhibit next month.” Retire most nearly means: (A) sleep (B) withdraw (C) stop working (D) rest

ANSWERS 1 B • 2 B • 3 B

Words in Context: Drill

8 original questions. Answer all of them before checking.

RW-2

DRILL

- 1 “The documentary was ___: it covered a century of history in just ninety minutes yet felt complete.”
(A) tedious (B) incomplete (C) efficient (D) meandering
- 2 “Far from being ___, the new tax was welcomed by most small businesses.”
(A) resented (B) popular (C) modest (D) temporary
- 3 “The researcher’s ___ notes, filled with dates and measurements, let others repeat her work exactly.”
(A) vague (B) hasty (C) casual (D) meticulous
- 4 As used here, “The general’s plan hinged on surprise,” hinged most nearly means:
(A) closed (B) attached (C) depended (D) swung
- 5 “Initially ___, the committee later embraced the proposal after seeing the data.”
(A) enthusiastic (B) skeptical (C) unanimous (D) absent
- 6 “The singer’s voice was so ___ that it filled the hall without a microphone.”
(A) faint (B) resonant (C) delicate (D) hoarse
- 7 As used here, “The museum will acquire three paintings,” acquire most nearly means:
(A) learn (B) obtain (C) copy (D) admire
- 8 “Although the treaty was ___ celebrated, its terms were rarely enforced.”
(A) secretly (B) widely (C) never (D) barely

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Craft and structure

College Board Question Bank · Craft and Structure · Words in Context

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 C · Covering a lot quickly and completely → efficient.
- 2 A · “Far from” + welcomed → the opposite of welcomed.
- 3 D · Dates and measurements → careful.
- 4 C · Hinged on = depended on.
- 5 B · Later embraced → initially doubtful.
- 6 B · Filled the hall → resonant.
- 7 B · Acquire paintings = obtain.
- 8 B · “Although...rarely enforced” contrasts with wide celebration.

Text Structure and Purpose

Why was this text written, and how is it built?

RW-3

LESSON

THE RULE

Purpose questions ask why the author wrote the whole text. Structure questions ask how it's organized. Find the turn and the author's point, then name the purpose with a verb: **argue, explain, describe, challenge, compare.**

IF THE TEXT...	THE PURPOSE IS USUALLY TO...
Presents a view, then evidence against it	challenge or complicate a view
Describes a process step by step	explain how something works
Tells about a person's work and its impact	describe or highlight a contribution
Presents a puzzle, then a proposed answer	present a possible explanation
Compares two approaches	contrast two ideas
Makes a claim and supports it	argue for a claim

REMEMBER The verb matters: *describe* is neutral, *argue* takes a side, *criticize* is negative. Match the author's tone. Kill choices that fit one sentence (Fist) or go too far (Trident).

WORKED EXAMPLES

- Text: astronomers believed X; a 2021 study found Y; the finding changes how galaxies are dated. Purpose: to present a finding that challenges an earlier view.
- Structure: "It introduces a belief, presents evidence against it, then states an implication."
- Tone check: the text praises → "highlight," not "criticize."
- Scope check: the purpose covers the whole text, not just the example.

TRAPS

- ~~X A purpose that fits only the example~~ ✓ **A purpose that fits the whole text**
- ~~X "To criticize" for a neutral explanation~~ ✓ **"To explain"**
- ~~X "To prove" when the text suggests~~ ✓ **"To suggest" or "to propose"**

DRILL HABIT

After every passage this week, say "The author wrote this to..." before you look at the question.

TRY IT

- 1 A text describes the common belief that octopuses are solitary, then a study of octopuses sharing dens. Main purpose? (A) To describe octopus anatomy (B) To present evidence that complicates a common belief (C) To argue that octopuses should be protected (D) To explain why all octopuses live in groups
- 2 Which verb fits a neutral text explaining how glaciers form: argue, explain or criticize?

ANSWERS 1 B (A, C: Out of Scope; D: Extreme) · 2 explain

Text Structure and Purpose: Drill

8 original questions. Answer all of them before checking.

RW-3

DRILL

- 1 A text explains, step by step, how monarch butterflies navigate using the sun. Purpose?
(A) To explain how monarchs navigate (B) To compare monarchs and moths (C) To criticize earlier research
(D) To argue monarchs are endangered
- 2 A text presents a common belief about Neanderthal diets, then new evidence of fish-eating. Purpose?
(A) To prove Neanderthals ate only fish (B) To describe fishing tools (C) To complicate a common view (D) To argue for more excavation
- 3 A text praises an engineer's bridge designs and their lasting influence. Purpose?
(A) To list all her projects (B) To highlight her contributions (C) To criticize modern bridges (D) To explain bridge physics
- 4 Which verb fits a text that takes a side: describe, argue, or explain?
- 5 A text: a puzzle (why do some lakes glow?), then a proposed answer (bacteria). Structure?
- 6 A text compares two approaches to teaching reading and notes strengths of each. Purpose?
(A) To describe one classroom (B) To reject both approaches (C) To contrast two approaches (D) To prove one is best
- 7 Trap check: a purpose choice says "to describe the octopus's eight arms" when the text is about octopus intelligence. Weapon?
- 8 A neutral text about tides. Which verb is too strong: explain, describe, condemn?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Craft and structure

College Board Question Bank · Craft and Structure · Text Structure and Purpose

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 A · Step-by-step process → explain.

2 C · Belief + contrary evidence.

3 B · Praise + influence → highlight.

4 argue · Argue = takes a position.

5 Presents a puzzle, then a possible explanation · Puzzle → explanation.

6 C · Neutral comparison.

7 Fist · A detail, not the purpose.

8 condemn · Match the tone.

Function of a Sentence

What job does this sentence do?

RW-4

LESSON

THE RULE

Function questions point to one sentence and ask what it does in the text. Answer with its **job and its connection**: it gives an example of the claim before it; it introduces the view challenged later; it explains a cause.

POSITION OR SIGNAL	LIKELY FUNCTION
First sentence: "It was once believed..."	introduces a view the text will challenge
After a claim: "For example..."	illustrates the claim
After a finding: "This suggests..."	states an implication of the finding
Starts with "However"	introduces a contrasting point
Last sentence	states a conclusion or broader significance
Gives a number or a date	provides specific evidence

REMEMBER What a sentence **says** is not what it **does**. A choice that restates the sentence's content is a Fist (GL-7). Look for job verbs: introduces, illustrates, qualifies, counters, concludes.

WORKED EXAMPLES

- Text: "Bees navigate using the sun. On cloudy days, they rely on polarized light instead. This flexibility..."
- Function: qualifies the first claim by describing an exception.
- **X** Fist: "It states that bees use polarized light." (says, not does)
- Read one sentence before and one after the underlined sentence.

TRAPS

- X** A summary of what the sentence says ✓ **What it does for the text**
- X** Ignoring the sentences around it ✓ **One before, one after**
- X** A function bigger than the sentence ("states the main argument") ✓ **Check the sentence really does that much**

DRILL HABIT

In five passages, underline one sentence each and write its function with a job verb: introduces, supports, illustrates, contrasts, qualifies, concludes.

TRY IT

- 1 Text: "Many assume deserts are lifeless. Yet a single square meter of Sonoran Desert soil can hold millions of microbes."
Function? (A) It describes desert climate. (B) It offers evidence against an assumption. (C) It concludes that deserts are crowded. (D) It explains how microbes survive heat.

ANSWERS 1 B (A, D: Out of Scope; C: Extreme and Recycled)

Function of a Sentence: Drill

8 original questions. Answer all of them before checking.

RW-4

DRILL

- 1 Text: "Most deserts receive little rain. The Atacama, for example, has places where no rain has been recorded for decades." Function?
(A) Concludes the text (B) Introduces a counterargument (C) Defines a desert (D) Gives an extreme example of the first claim
- 2 Text: "Scientists once thought sharks were solitary. Tagging studies, however, show some species travel in groups." Function?
(A) Describes shark anatomy (B) States a hypothesis (C) Supports the earlier view (D) Challenges the earlier view with evidence
- 3 Text: "The vote was close. As a result, the council called for a recount." Function?
(A) Gives a consequence (B) Gives an example (C) Introduces a new topic (D) Restates the first sentence
- 4 What does a function answer describe: what the sentence says, or what it does?
- 5 Text: "Bamboo grows fast. Some species add nearly a meter in a single day." Function?
(A) Qualifies the claim (B) Contradicts the claim (C) Introduces a new plant (D) Provides specific evidence for the claim
- 6 Text: "Cities have tried many ways to cut traffic. Few have worked as well as congestion pricing." Function?
(A) Rejects congestion pricing (B) Lists every approach (C) Defines traffic (D) Narrows the focus to one approach the text will discuss
- 7 Last sentence: "These findings may change how vaccines are stored worldwide." Function?
(A) States a broader implication (B) Introduces the researchers (C) Gives a counterexample (D) Describes the method
- 8 How many sentences around an underlined sentence should you read?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Craft and structure

College Board Question Bank · Craft and Structure · Text Structure and Purpose

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 D · "For example" illustrates.

2 D · "However" + evidence.

3 A · "As a result."

4 What it does · Content = Fict.

5 D · A specific figure supports.

6 D · Sets up the focus.

7 A · Last sentence → significance.

8 At least one before and one after · Function depends on context.

Cross-Text Connections

Two texts: how would one answer the other?

RW-5

LESSON

THE RULE

You get two short texts on one topic and a question like “How would the author of Text 2 most likely respond to Text 1?” State each text’s claim in five words, then decide: **agree, disagree, or agree with a limit.**

STEP DO THIS

- 1 Text 1’s claim in five words
- 2 Text 2’s claim in five words
- 3 The relationship: agrees, disagrees, adds a limit, offers a cause, calls it incomplete
- 4 Predict Text 2’s response before the choices
- 5 Kill choices about only one text (Fist) or that overstate the disagreement (Trident)

REMEMBER Most pairs disagree in part, not totally: Text 2 often accepts Text 1’s data but rejects its conclusion, or says it’s true only under certain conditions.

WORKED EXAMPLES

- Text 1: Remote work raised productivity (one firm’s data).
- Text 2: Gains fade after a year; early studies were too short.
- Relationship: Text 2 says Text 1’s conclusion is premature.
- X Trap: “Remote work lowers productivity in all firms.” (Extreme, Out of Scope)

TRAPS

- X Summarizing Text 2 alone ✓ **How Text 2 relates to Text 1’s claim**
- X “Text 2 completely rejects...” ✓ **Usually “questions” or “qualifies”**
- X Mixing up which text is which ✓ **Label T1 and T2 in your notes**

DRILL HABIT

For each pair this week, write one sentence: “Text 2 would say Text 1 is right / wrong / incomplete because...”

TRY IT

- 1 Text 1: A new drug reduced symptoms in 80% of patients. Text 2: The trial had no placebo group, so it can’t show the drug caused the improvement. Text 2 would most likely call Text 1’s conclusion: (A) proven (B) premature (C) irrelevant (D) dishonest

ANSWERS 1 B (A: Opposite; C: Out of Scope; D: Extreme)

Cross-Text Connections: Drill

8 original questions. Answer all of them before checking.

RW-5

DRILL

- 1 Text 1: A new reading app raised test scores at one school. Text 2: Gains disappeared after the novelty wore off. Text 2 calls Text 1's conclusion:
(A) confirmed (B) irrelevant (C) dishonest (D) premature
- 2 Text 1: Dinosaurs were cold-blooded. Text 2: Bone growth rings suggest some were warm-blooded. Relationship?
- 3 Text 1: Remote work boosts productivity. Text 2: It boosts productivity for focused tasks but hurts teamwork. Relationship?
- 4 A "both texts" choice is true of Text 2 only. Weapon?
- 5 Text 1: Bees prefer blue flowers. Text 2: Bees prefer whatever color has given them nectar before. How would the Text 2 author respond?
(A) Bees have no color vision. (B) Text 1 is entirely correct. (C) Bees prefer red. (D) Blue preference may reflect past rewards, not color itself.
- 6 What do you write before looking at cross-text choices?
- 7 Text 1 praises a novel's realism. Text 2 says its realism hides a weak plot. Do they disagree completely?
- 8 Which extreme word in a cross-text choice is usually a trap: "questions" or "completely rejects"?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Craft and structure

College Board Question Bank · Craft and Structure · Cross-Text Connections

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 D · Accepts the data, questions the conclusion.
- 2 Text 2 challenges Text 1 (at least for some dinosaurs) · Partial disagreement.
- 3 Text 2 qualifies Text 1 · Agrees with a limit.
- 4 Pugio (Half-Right) · Must be true of both.
- 5 D · Offers another cause.
- 6 Each text's claim in five words, and the relationship · Prediction = Shield.
- 7 No: they agree it's realistic · They differ on whether that's enough.
- 8 "completely rejects" · Most pairs disagree in part.

Central Ideas and Details

What's the point, and what does the text actually say?

RW-6

LESSON

THE RULE

Central idea questions ask for the main point of the whole text. Detail questions ask what the text says about one thing. Both are answered by what's written, usually in different words.

QUESTION	STRATEGY
"Which choice best states the main idea?"	Find the turn and the point after it; predict in one sentence
"According to the text..."	Find the exact lines; the answer paraphrases them
Main idea of a poem or story	Track the speaker's or character's feelings and where they change
19th-century language	Translate each sentence into plain modern English first (RW-10)

REMEMBER Main idea means the whole text. A true detail is still wrong if it covers only part of the text (Fist), and a big claim is wrong if the text doesn't go that far (Trident).

WORKED EXAMPLES

- Text: city birds sing at a higher pitch than rural birds; the author explains this may help them be heard over traffic.
- Main idea: city noise may be changing how birds sing.
- ~~X~~ Detail only: "The researcher recorded birds in two cities."
- ~~X~~ Too broad: "Noise harms all wildlife."

TRAPS

- ~~X~~ A true detail as the main idea ✓ The idea that covers the whole text
- ~~X~~ Skipping hard old-fashioned sentences ✓ Paraphrasing them line by line
- ~~X~~ The choice that sounds most important ✓ The choice the text supports

DRILL HABIT

After every passage, write a one-sentence main idea before answering. Grade yourself against the correct answer: match, close or miss.

TRY IT

- 1 A 1900s architect believed buildings should blend with nature; his houses used local stone and low roofs that echoed the prairie. Main idea? (A) He used stone because it was cheap. (B) His designs reflected his belief that buildings should fit their landscape. (C) All 1900s architects built low roofs. (D) Prairie houses are the best style.

ANSWERS 1 B (A: Out of Scope; C, D: Extreme)

Central Ideas and Details: Drill

8 original questions. Answer all of them before checking.

RW-6

DRILL

- 1 Text: Urban gardens lower nearby temperatures; the author notes they also cut stormwater runoff. Main idea?
(A) Temperatures are rising. (B) Runoff is a problem everywhere. (C) Urban gardens may offer several environmental benefits. (D) Gardens are popular in cities.
- 2 A detail choice that is true but covers one sentence. Main idea or not?
- 3 Text: A potter learned glazes from her grandmother and now teaches them to her students. Main idea?
(A) Her students dislike glazing. (B) A tradition is passed across generations. (C) Pottery is difficult. (D) Glazes are colorful.
- 4 “According to the text...” — where is the answer?
- 5 Poem: the speaker moves from mourning a friend to remembering their laughter. Main idea?
(A) Grief turns toward fond memory. (B) The speaker is angry. (C) Laughter is unhealthy. (D) The friend moved away.
- 6 Text: “The fresco survived the fire only because its wall was stone.” Detail question: why did it survive?
(A) Firefighters saved it. (B) Its wall was stone. (C) It was moved. (D) It was painted recently.
- 7 Too broad: the text is about one coral reef in Belize. A choice says “Coral reefs worldwide are recovering.” Weapon?
- 8 Old text: “She bore the news with remarkable composure.” Paraphrase.

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Information and ideas

College Board Question Bank · Information and Ideas · Central Ideas and Details

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 C · Covers both points.
- 2 Not · Main idea = the whole text.
- 3 B · The arc of the text.
- 4 In the text, usually paraphrased · Find the lines.
- 5 A · Track the shift.
- 6 B · Stated directly.
- 7 Mace (and Trident) · Beyond the text.
- 8 She stayed calm when she heard the news. · Translate before answering.

Command of Evidence: Textual

Which finding would support, or weaken, the claim?

RW-7

LESSON

THE RULE

You get a claim or hypothesis and four findings or quotations. Choose the one that most directly supports (or weakens, or illustrates) it. Restate the claim precisely first: **every part of it must be matched.**

CLAIM	EVIDENCE THAT SUPPORTS IT
X causes Y	Groups with X show more Y than similar groups without X
X happens only under condition C	X appears with C and not without C
A works better than B	A outperforms B under the same conditions
A trait helps survival	Animals with the trait survive more than those without
A poem expresses longing	The quotation that shows longing most directly

REMEMBER To **weaken**, find the result that contradicts the claim. Kill choices that are true but unrelated, match only half the claim, or support the opposite. Underline the claim's key words in the stem.

WORKED EXAMPLES

- Claim: "The fertilizer increased tomato yield only in sandy soil."
- ✓ Sandy plots with fertilizer: higher yield; clay plots with fertilizer: no change.
- ✗ Half: "Fertilized plots produced more tomatoes overall." (misses "only in sandy soil")
- ✗ Out of Scope: "Clay soil holds more water."

TRAPS

- ✗ ~~Evidence for a similar but different claim~~ ✓ **Evidence for the exact claim**
- ✗ ~~Ignoring "only" or "more than"~~ ✓ **Every condition must be matched**
- ✗ ~~Choosing weaken when the stem says support~~ ✓ **Re-read: support or weaken?**

DRILL HABIT

Write each evidence claim as a formula, "X → Y, only if C," then test every choice against every part of the formula.

TRY IT

- 1 Claim: Students who sleep 8 or more hours remember more vocabulary than those who sleep less. Which supports it? (A) Students enjoyed the vocabulary tests. (B) Students sleeping 8+ hours recalled 30% more words than those sleeping under 6. (C) Sleep is important for health. (D) Students who studied more slept less.

ANSWERS 1 B

Command of Evidence: Textual: Drill

8 original questions. Answer all of them before checking.

RW-7

DRILL

- 1 Claim: "Students who handwrite notes remember more than those who type." Best support?
(A) All students took notes. (B) Students preferred typing. (C) Handwriters recalled 25% more facts a week later than typists. (D) Typing is faster.
- 2 Claim: "The fertilizer helped only in dry years." Best support?
(A) Dry years had lower yields. (B) Yields rose with fertilizer. (C) Yields rose with fertilizer in dry years but not in wet years. (D) Farmers liked the fertilizer.
- 3 Claim: "Noise reduces bird song complexity." Which would WEAKEN it?
(A) Birds in noisy and quiet areas sang equally complex songs. (B) Birds sang louder near roads. (C) Birds sang in the morning. (D) Birds near highways sang simpler songs.
- 4 Claim: "The poet expresses longing for home." Best quotation?
(A) "The winter was long." (B) "I would trade every lamp here for my mother's doorway." (C) "The train left at six." (D) "The city lights are bright tonight."
- 5 What must you do with every part of a claim?
- 6 Claim: "Older trees store more carbon than saplings." Best support?
(A) Old trees stored twice the carbon per hectare of saplings in the same forest. (B) Trees store carbon. (C) Older trees are taller. (D) Saplings grow faster.
- 7 A choice supports a similar but different claim. Weapon?
- 8 Claim: "The vaccine is effective in adults over 65." Which supports?
(A) Adults over 65 who got it had 70% fewer infections than those who didn't. (B) It was approved in 2020. (C) It worked in children. (D) Most adults got it.

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Information and ideas

College Board Question Bank · Information and Ideas · Command of Evidence (textual)

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 C · Compares the two groups on memory.
- 2 C · Matches "only."
- 3 A · No difference = weakens.
- 4 B · Most direct longing.
- 5 Match it in the evidence · Including "only," "more than," conditions.
- 6 A · Direct comparison, same conditions.
- 7 Fist · True evidence, wrong claim.
- 8 A · Right group, right comparison.

Command of Evidence: Quantitative

Read the graph like a lawyer.

RW-8

LESSON

THE RULE

These questions pair a text with a table or graph and ask which choice uses the data to complete or support a claim. Read the title, axes, units and key first, then find **only the cells the claim needs**.

STEP	DO THIS
1	Read the stem and the claim the data must support
2	Read the title, axis labels, units and key
3	Find the bars, points or cells the claim mentions
4	Predict what the data should show
5	Check every number and comparison in each choice

REMEMBER Traps: a true data point that doesn't address the claim (Fist), reversing which group is higher (Gladius), and the wrong year or group. True data can still be the wrong answer.

WORKED EXAMPLES

- Claim: "Solar adoption grew faster in Country A than in Country B from 2015 to 2020."
- ✓ "A rose from 2% to 14%; B rose from 3% to 6%."
- ✗ "In 2020, B produced more wind power than A." (wrong question)
- ✗ "A rose from 2% to 6%." (misread)

TRAPS

- ✗ ~~A correct number for the wrong year~~ ✓ **The years the claim names**
- ✗ ~~Data with no comparison when the claim compares~~ ✓ **Include the comparison**
- ✗ ~~The text's numbers when asked about the graph~~ ✓ **The graph's numbers**

DRILL HABIT

For every data question, write the two numbers that matter before you choose. If you can't name them, you haven't found the evidence yet.

TRY IT

- 1 Table: seedling survival — shade 72%, partial sun 81%, full sun 54%. Claim: "Seedlings survived best with some sun but not full sun." Which completes it? (A) Full sun: 54%. (B) Partial sun had the highest rate, 81%, above shade (72%) and full sun (54%). (C) Shade: 72%. (D) Most seedlings survived in every condition.

ANSWERS 1 B (D is true but doesn't support the claim)

Command of Evidence: Quantitative: Drill

8 original questions. Answer all of them before checking.

RW-8

DRILL

- 1 Table — Library visits: 2019: 40,000; 2020: 12,000; 2021: 31,000. Claim: “Visits fell sharply and then partly recovered.” Which completes it?
(A) Visits never changed. (B) Visits fell to 12,000 in 2020, then rose to 31,000 in 2021. (C) Visits were highest in 2021. (D) Visits were 40,000 in 2019.
- 2 Same table. A choice: “Visits rose every year.” Weapon?
- 3 Graph: plant growth at 3 light levels: low 4 cm, medium 9 cm, high 7 cm. Claim: “Growth peaked at medium light.” Which supports?
(A) Medium light produced the most growth, 9 cm, above low (4 cm) and high (7 cm). (B) High light: 7 cm.
(C) Low light: 4 cm. (D) All plants grew.
- 4 What four things do you read on every graph first?
- 5 Table: average commute — City A 22 min, City B 35 min. Claim: “Commutes in City B were notably longer.” Which supports?
(A) City B is larger. (B) Both cities have commuters. (C) City B’s 35-minute average was 13 minutes longer than City A’s. (D) City A: 22 min.
- 6 A choice cites the right number for the wrong year. Weapon?
- 7 Graph shows survival rates by species for 2010 only. A choice describes a change over time. Weapon?
- 8 Claim: “Most respondents preferred option C.” Table: A 20%, B 25%, C 55%. Which completes it?
(A) A was least popular. (B) Options differed. (C) B was chosen by 25%. (D) C was chosen by 55% of respondents.

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Information and ideas

College Board Question Bank · Information and Ideas · Command of Evidence (quantitative)

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 B · Shows fall and partial recovery.
- 2 Gladius · Misreads the trend.
- 3 A · Includes the comparison.
- 4 Title, axes, units, key · Then only the cells the claim needs.
- 5 C · Right numbers, comparison.
- 6 Fist · True data, wrong claim.
- 7 Mace · The graph shows one year.
- 8 D · 55% is most.

Inferences: Completing the Text

Finish the thought the text started.

RW-9

LESSON

THE RULE

The text ends with a blank. Choose the ending that most logically follows from everything before it. It must be **supported**, not **just possible**. Write your own ending before you look.

LOGIC IN THE TEXT	THE ENDING USUALLY...
Theory predicted X; data showed not-X	says the theory needs revision or is incomplete
Two possible causes; one ruled out	names the remaining cause
Effect seen only in group A	points to A's distinctive feature
Earlier dating assumed Y; new evidence contradicts Y	says the date may be different
A claim needs one more condition	states the missing condition

REMEMBER The best ending is usually modest: *suggests*, *may*, *could*. If a choice also needs outside facts to be true, eliminate it (Mace).

WORKED EXAMPLES

- Text: researchers thought a river dried up 5,000 years ago, but shells dated to 3,000 years ago were found in its bed, from animals that live only in flowing water. This suggests that ____.
- Shield: the river flowed more recently than thought.
- ✓ “the river may have flowed until at least 3,000 years ago.”
- ✗ “the shells were carried there by people.” (possible, unsupported)

TRAPS

- ✗ ~~A possible but unsupported ending~~ ✓ **The ending that must follow**
- ✗ ~~An ending that repeats the text~~ ✓ **An ending that completes its logic**
- ✗ ~~“Proves” endings~~ ✓ **“Suggests” endings**

DRILL HABIT

Cover the choices and write your own ending for every inference question. Aim for your sentence to mean the same as the right answer 8 times out of 10.

TRY IT

- 1 A plant grows in two regions. Where deer live, its leaves have sharp spines; where there are no deer, its leaves are smooth. This suggests that _____. (A) deer prefer smooth leaves (B) the spines may protect the plant from deer (C) the deer-free region gets more rain (D) all plants grow spines near deer

ANSWERS 1 B (A: unsupported; C: Out of Scope; D: Extreme)

Inferences: Completing the Text: Drill

8 original questions. Answer all of them before checking.

RW-9

DRILL

- 1 Plants near the factory had stunted roots; identical plants 5 km away grew normally. This suggests that ____.
(A) all plants near factories die (B) the distant plants were watered more (C) something near the factory may affect root growth (D) the factory makes fertilizer
- 2 A fossil of a sea creature was found on a mountaintop. This suggests that ____.
(A) sea creatures climbed mountains (B) mountains are new (C) the fossil is fake (D) the area may once have been under water
- 3 Children who learned two languages performed better on attention tasks; the researchers controlled for income. This suggests ____.
(A) income explains the difference (B) attention causes bilingualism (C) bilingualism may be linked to attention skills (D) bilingual children are smarter in every way
- 4 An ending that is possible but needs outside facts. Weapon?
- 5 Researchers expected the drug to work in all mice; it worked only in mice with gene G. This suggests that ____.
(A) all mice have gene G (B) the drug is useless (C) the researchers made errors (D) gene G may be needed for the drug to work
- 6 A manuscript was dated 1450, but its paper contains fibers first produced in 1520. This suggests ____.
(A) the paper is from 1450 (B) the manuscript may have been written after 1520 (C) it was written in 1450 (D) the fibers are fake
- 7 Which ending style is usually right: “proves” or “suggests”?
- 8 A beetle population dropped only on islands where a lizard was introduced. This suggests ____.
(A) the lizard may have contributed to the decline (B) islands are unhealthy (C) lizards eat all beetles (D) beetles moved to the mainland

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Information and ideas

College Board Question Bank · Information and Ideas · Inferences

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 C · Modest, supported.
- 2 D · One small step.
- 3 C · Income is ruled out by the control.
- 4 Mace · Must follow from the text.
- 5 D · Points to the distinctive feature.
- 6 B · The date may be wrong.
- 7 “suggests” · Modest beats extreme.
- 8 A · Effect only in group A → A’s feature.

Literature, Poetry and Old Language

Same skills, harder English.

RW-10

LESSON

THE RULE

Some texts come from novels, poems, plays or speeches, often more than 100 years old. The questions are the same; the extra step is **translating old language into plain modern English**, sentence by sentence.

CHALLENGE	STRATEGY
Long 1800s sentences	Find the subject and verb first; set aside phrases between commas
Unfamiliar old words	Use context; positive or negative is often enough
Poetry	Read the intro note; track the speaker's feeling and where it shifts
Characters' feelings	Use actions and descriptions, not just stated emotions
Irony or humor	Ask whether the narrator means the opposite of what's said

REMEMBER The intro note (author, year, context) is part of the evidence: it often says who is speaking and what's happening. Read it first.

WORKED EXAMPLES

- “It was with no small degree of reluctance that she consented to the journey.” → She agreed, but didn't want to go.
- Poem moves from winter darkness to a single lit window → from despair to hope.
- “He folded the letter twice and put it in the fire.” → rejection, without saying so.
- “The countenance of the stranger was grave.” → The stranger's face was serious.

TRAPS

- ~~X~~ Skipping sentences you don't understand ✓ Paraphrasing each one
- ~~X~~ Over-reading symbolism ✓ Only what the text supports
- ~~X~~ Ignoring the intro note ✓ Reading it first

DRILL HABIT

Twice a week, read a page of a 19th-century novel (free in the public domain) and paraphrase every sentence aloud in modern English.

TRY IT

- 1 Paraphrase: “Her mirth was of short duration.”
- 2 Paraphrase: “He was not insensible to the honor bestowed upon him.”
- 3 A speaker moves from “I fear the night” to “I wait for dawn.” What changes?

ANSWERS 1 Her happiness didn't last long. • 2 He was aware of, and appreciated, the honor. • 3 From fear to hope

Literature, Poetry and Old Language: Drill

RW-10

DRILL

8 original questions. Answer all of them before checking.

- 1 Paraphrase: "His countenance betrayed no emotion."
- 2 Paraphrase: "She was not unacquainted with grief."
- 3 Poem moves from "ice locks the river" to "the first green bends to the light." Shift?
- 4 "He tore the invitation in half and dropped it in the stove." What does the action suggest?
- 5 "It is a truth universally acknowledged..." and the narrator then describes a foolish neighbor. Possible irony?
- 6 Where should you look first on a literary passage?
- 7 Paraphrase: "The prospect filled him with no small apprehension."
- 8 A choice claims a symbol means freedom; the text never connects it to freedom. Weapon?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Information and ideas

College Board Question Bank · Information and Ideas · Central Ideas and Details (literary texts)

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 His face showed no feeling. · Countenance = face.

2 She had known grief. · Double negative = positive.

3 From winter/stillness to spring/renewal · Track the images.

4 Rejection (anger or refusal) · Actions show feelings.

5 Yes: the narrator may mean the opposite of "universal truth" · Watch for irony.

6 The intro note · Who, when, what's happening.

7 The idea made him quite nervous. · "No small" = large.

8 Mace · Only what the text supports.

Science and History Texts

Don't learn the topic. Learn the logic.

RW-11

LESSON

THE RULE

Science and social-science texts describe studies: a question, a method, a result and a conclusion. You need no background knowledge; you need to track **who studied what, what they found, and what it means.**

PART OF A STUDY	ASK
Hypothesis	What did they expect, and why?
Method	What did they compare: groups, places, times?
Result	What happened, and in which group?
Conclusion	What do the researchers say it means?
Limitation	What can't this study show?

REMEMBER Jargon is just a name. Replace a long term with a letter ("mycorrhizal fungi" = M), then follow what M does. Correlation in a text isn't proof of cause unless the text says the study shows it (DA-7).

WORKED EXAMPLES

- "Ecologist Ana Ruiz hypothesized that..." → the hypothesis to support or weaken.
- "...compared nests near roads with nests far from roads" → the comparison.
- "...found 40% fewer chicks near roads" → the result.
- "The study did not measure noise directly" → limitation: noise isn't proven to be the cause.

TRAPS

- ~~X~~ ~~Getting stuck on scientific terms~~ ✓ **Renaming them with letters**
- ~~X~~ ~~Mixing up hypothesis and conclusion~~ ✓ **Labeling each part**
- ~~X~~ ~~Assuming a correlation proves a cause~~ ✓ **Letting the text decide what's proven**

DRILL HABIT

For five science texts, fill a four-box card: HYPOTHESIS, METHOD, RESULT, CONCLUSION.

TRY IT

- 1 A team hypothesized that coral bleaching depends on water temperature, compared reefs at different temperatures, and found more bleaching on warmer reefs. What is the method? What is the result?

ANSWERS Method: comparing reefs at different temperatures • Result: more bleaching on warmer reefs

Science and History Texts: Drill

8 original questions. Answer all of them before checking.

RW-11

DRILL

- 1 “Ecologist Mira Patel hypothesized that wolves change river shapes by reducing elk grazing.” What role does this sentence play?
- 2 “She compared riverbanks inside and outside wolf territory.” Role?
- 3 “Banks inside wolf territory had 40% more willow growth.” Role?
- 4 “The study did not measure elk numbers directly.” Role?
- 5 Replace “arbuscular mycorrhizal fungi” with what to read faster?
- 6 A study found people who drink tea live longer (observational). Does tea cause longer life?
- 7 Hypothesis: “Coral grows faster in shaded water.” Result: coral grew faster in sunny water. Supports or weakens?
- 8 Which part of a study is a frequent source of correct inference answers?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Information and ideas

College Board Question Bank · Information and Ideas · Command of Evidence; Inferences (science texts)

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 Hypothesis · What was expected.
- 2 Method · What was compared.
- 3 Result · What happened.
- 4 Limitation · What it can’t show.
- 5 A letter, like M · Jargon is just a name.
- 6 Not shown · Correlation ≠ cause unless randomized (DA-7).
- 7 Weakens · Result contradicts the hypothesis.
- 8 The limitation · What the study can’t yet conclude.

Transitions

Name the relationship, then choose the word.

RW-12

LESSON

THE RULE

Transition questions ask for the most logical word or phrase connecting two ideas. Cover the choices, **name the relationship** between the sentences, then choose.

RELATIONSHIP	TRANSITIONS
Adds (same direction)	additionally, furthermore, moreover, similarly, likewise
Contrast	however, nevertheless, by contrast, on the other hand, still
Cause and effect	therefore, thus, consequently, as a result, accordingly
Example	for example, for instance, specifically
Sequence	first, then, subsequently, finally, later
Emphasis or restatement	in fact, indeed, that is, in other words
Concession, then point	admittedly... still · granted... nonetheless

REMEMBER Two choices that mean the same thing (“however” and “nevertheless”) can’t both be the only right answer, so the answer is in another category. Read the sentence **before** the blank as carefully as the one after.

WORKED EXAMPLES

- “The bridge was designed for 5,000 cars a day. ____, it now carries 20,000.” → contrast: Nevertheless.
- “The drug lowered blood pressure. ____, it reduced heart attacks.” → adds: Moreover.
- “Rainfall dropped by half. ____, crop yields fell.” → result: Consequently.
- “Many animals use tools. Crows, ____, bend wire into hooks.” → example: for instance.

TRAPS

- ~~X “However” because it sounds smart~~ ✓ **The relationship decides**
- ~~X Reading only the sentence after the blank~~ ✓ **Reading both sides**
- ~~X “Therefore” for things that just happen next~~ ✓ **“Then” or “subsequently” for sequence**

DRILL HABIT

Make one flashcard per relationship with five transitions each. Daily: 10 transition questions, naming the relationship aloud before looking.

TRY IT

- 1 “Sales rose 40% in March. ____, the company hired 200 workers.” (A) Nevertheless (B) As a result (C) For example (D) In contrast
- 2 “The method is slow. ____, it is the most accurate one available.” (A) Similarly (B) Therefore (C) Still (D) For instance
- 3 “Many birds migrate. The arctic tern, ____, travels from pole to pole each year.” (A) however (B) for example (C) consequently (D) likewise

ANSWERS 1 B · 2 C · 3 B

Transitions: Drill

8 original questions. Answer all of them before checking.

RW-12

DRILL

- 1 “The team trained all summer. ___, they lost the opener.”
(A) Similarly (B) For example (C) Therefore (D) Nevertheless
- 2 “Lightning heats the air rapidly. ___, the air expands and we hear thunder.”
(A) In contrast (B) For instance (C) As a result (D) However
- 3 “Many mammals hibernate. Bears, ___, can sleep for months.”
(A) consequently (B) for example (C) nevertheless (D) however
- 4 “The museum is free on Sundays. ___, it offers free tours.”
(A) However (B) Instead (C) Additionally (D) Therefore
- 5 “First, the clay is shaped. ___, it is fired in a kiln.”
(A) For example (B) However (C) Then (D) Nevertheless
- 6 “The road was closed. ___, we took the ferry.”
(A) For example (B) Consequently (C) Nonetheless (D) Likewise
- 7 “Some critics called the film slow. ___, it won three awards.”
(A) Similarly (B) Still (C) Thus (D) For instance
- 8 “The drug reduced fever. ___, it shortened recovery time.”
(A) For example (B) In contrast (C) Furthermore (D) Instead

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Expression of ideas + standard English conventions

College Board Question Bank · Expression of Ideas · Transitions

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 D · Contrast.
- 2 C · Cause → effect.
- 3 B · Example.
- 4 C · Adds.
- 5 C · Sequence.
- 6 B · Result.
- 7 B · Concession → contrast.
- 8 C · Adds a second benefit.

Rhetorical Synthesis: Student Notes

Do exactly what the goal says.

RW-13

LESSON

THE RULE

You get bulleted notes and a goal: “The student wants to emphasize a similarity,” “introduce the study to an unfamiliar audience.” Ignore what sounds best. The right answer **accomplishes the stated goal using the notes**.

THE GOAL SAYS...	THE ANSWER MUST...
Emphasize a similarity or difference	mention both things and say how they’re alike or different
Introduce X to an unfamiliar audience	say what X is (a brief description)
Present the study’s aim	state what the researchers wanted to find out
Explain an advantage of X	name the advantage
Specify a date, place or title	include that specific fact

REMEMBER Read the goal first and underline it. A choice can be accurate and well written and still be wrong because it doesn’t meet the goal (a Fist). Once you trust the goal, these are some of the fastest points on the test.

WORKED EXAMPLES

- Goal: emphasize a difference in two bridges’ lengths.
- ✓ “While the Akashi Kaikyō Bridge’s main span is 1,991 meters, the Golden Gate’s is 1,280.”
- ✗ “Both bridges are suspension bridges.” (similarity, not difference)
- ✗ “The Golden Gate opened in 1937.” (accurate, no comparison)

TRAPS

- ✗ ~~The most detailed, impressive sentence~~ ✓ **The sentence that meets the goal**
- ✗ ~~Meeting half the goal (one bridge only)~~ ✓ **Every part of the goal**
- ✗ ~~Reading all the notes first~~ ✓ **The goal first, then the notes**

DRILL HABIT

For every synthesis question, read only the goal, predict what the sentence must contain, and only then read the choices. Target: under 45 seconds each.

TRY IT

- 1 Notes: Maya Lin designed the Vietnam Veterans Memorial; she was a 21-year-old student; her design was chosen from 1,421 entries. Goal: emphasize how competitive the selection was. (A) Maya Lin designed a memorial. (B) Lin was a 21-year-old student. (C) Lin’s design was chosen from 1,421 entries. (D) The memorial honors veterans.

ANSWERS 1 C

Rhetorical Synthesis: Student Notes: Drill

RW-13

DRILL

8 original questions. Answer all of them before checking.

- 1 Notes: Lake A is 300 m deep; Lake B is 1,600 m deep. Goal: emphasize the difference in depth.
(A) Lake B is far deeper than Lake A: 1,600 m vs. 300 m. (B) Lake B is in Asia. (C) Lake A is 300 m deep. (D) Both are lakes.
- 2 Notes: Octavia Butler wrote *Kindred* (1979); she won a MacArthur grant. Goal: introduce Butler to an unfamiliar audience.
(A) The novel is famous. (B) She won a grant. (C) *Kindred* was published in 1979. (D) Octavia Butler, a MacArthur-winning novelist, wrote *Kindred*.
- 3 Notes: Study aimed to test whether noise affects sleep. Goal: present the study's aim.
(A) The study had 50 participants. (B) Researchers wanted to know whether noise affects sleep. (C) Noise is common. (D) Sleep is important.
- 4 Notes: Solar panels cut bills; they need sunny roofs. Goal: explain an advantage of solar panels.
(A) Solar panels need sunny roofs. (B) Solar panels can lower electricity bills. (C) Roofs vary. (D) Panels are made of silicon.
- 5 What do you read first on a synthesis question?
- 6 Notes: Both the Nile and the Amazon exceed 6,000 km. Goal: emphasize a similarity.
(A) Both the Nile and the Amazon are over 6,000 km long. (B) The Amazon carries more water. (C) The Nile is in Africa. (D) Rivers are long.
- 7 A choice is accurate and elegant but doesn't meet the goal. Weapon?
- 8 Notes: The bridge opened in 1883; designed by John Roebling. Goal: specify the opening year.
(A) John Roebling designed it. (B) The bridge opened in 1883. (C) It is a suspension bridge. (D) It spans a river.

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Expression of ideas + standard English conventions

College Board Question Bank · Expression of Ideas · Rhetorical Synthesis

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 A · Compares both.
- 2 D · Says who she is.
- 3 B · States the aim.
- 4 B · Names the advantage.
- 5 The goal · Then predict what the sentence must contain.
- 6 A · States the similarity.
- 7 Fist · Must accomplish the goal.
- 8 B · Includes the fact.

PART IV

Grammar

Standard English Conventions: seven rules that cover the whole category.

Grammar Rule One: Don't Trust Your Ear

Name the rule, then apply it.

GM-1

LESSON

THE RULE

On Standard English Conventions questions (“...conforms to the conventions of Standard English?”), what sounds right is often wrong. **Look at what the choices differ on**, name the rule being tested, then apply it.

IF THE CHOICES DIFFER IN...	THE RULE	LESSON
Periods, commas, semicolons, colons, dashes	Sentence boundaries	GM-2 to GM-6
is / are, has / have	Subject-verb agreement	GM-8
was / had been / is	Tense and form	GM-10
it / they, its / their	Pronoun agreement	GM-9
's / s' / s	Possessives and plurals	GM-11
What comes right after an opening phrase	Modifier placement	GM-7
Entirely different words	Not grammar: transitions or words in context	RW-2, RW-12

REMEMBER On grammar questions, scan the choices **first**: the differences tell you the rule. Then read the sentence with that rule in mind.

WORKED EXAMPLES

- “trees, they / trees; they / trees they / trees, and, they” → boundaries.
- “has / have / having / to have” → agreement or form.
- “its / it's / their / they're” → pronoun or possessive.
- If two choices are grammatically identical, neither can be the answer.

TRAPS

- ~~X Choosing what sounds natural when spoken~~ ✓ **Choosing what follows the rule**
- ~~X Reading the whole text before checking what changes~~ ✓ **Scanning the choices first**
- ~~X Adding commas where you would pause~~ ✓ **Commas follow rules, not breaths**

DRILL HABIT

For 20 conventions questions, write the rule name in the margin (BOUNDARY, AGREEMENT, TENSE, PRONOUN, POSSESSIVE, MODIFIER) before answering.

TRY IT

- 1 Choices differ: was / were / has been / being. Which rule?
- 2 Choices differ: city, the / city; the / city the / city, and the. Which rule?
- 3 Choices differ: dog's / dogs' / dogs / dogs's. Which rule?

ANSWERS 1 Agreement or tense (GM-8, GM-10) • 2 Boundaries (GM-2) • 3 Possessives (GM-11)

Grammar Rule One: Don't Trust Your Ear: Drill **GM-1**

10 original questions. Answer all of them before checking.

DRILL

- 1 Choices: "was / were / has been / being." Which rule is tested?
- 2 Choices: "river, it / river; it / river it / river, and, it." Which rule?
- 3 Choices: "its / it's / their / they're." Which rule?
- 4 Choices: "Having studied the data, the team... / ...the data was... / ...the team's..." Which rule?
- 5 Choices: "However / Therefore / For example / Similarly." Grammar question?
- 6 Choices: "the poet Rita Dove / the poet, Rita Dove, / the poet, Rita Dove / the poet Rita Dove," Which rule?
- 7 Should you predict a grammar answer by what sounds right?
- 8 Choices: "scientist's / scientists / scientists' / scientist." Which rule?
- 9 Choices: "discovered / discovers / had discovered / discovering." Which rule?
- 10 Two choices are grammatically identical. Can either be the only right answer?

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Khan Academy · SAT Reading and Writing · SAT grammar practice

College Board Question Bank · Standard English Conventions · Boundaries; Form, Structure, and Sense

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 Agreement or tense · GM-8, GM-10.
- 2 Boundaries · GM-2.
- 3 Pronoun / possessive · GM-9, GM-11.
- 4 Modifier placement · GM-7.
- 5 No: a transition question · RW-12.
- 6 Commas (essential title) · GM-5, GM-6.
- 7 No · Name the rule instead.
- 8 Possessives and plurals · GM-11.
- 9 Tense and form · GM-10.
- 10 No · Eliminate both.

Boundaries: Joining Independent Clauses

The most tested rule on the SAT.

GM-2

LESSON

THE RULE

Two independent clauses (each could be a sentence) can be joined only four ways: a **period**, a **semicolon**, a **comma + FANBOYS**, or a **colon or dash** when the second explains the first. A comma alone is a splice; nothing at all is a run-on.

JOIN	EXAMPLE	OK?
Period	The tide rose. The boats floated.	✓
Semicolon	The tide rose; the boats floated.	✓
Comma + FANBOYS	The tide rose, and the boats floated.	✓
Colon (second explains first)	The tide rose quickly: the moon was full.	✓
Comma alone	The tide rose, the boats floated.	✗ splice
Nothing	The tide rose the boats floated.	✗ run-on
Comma + however	The tide rose, however, the boats floated.	✗ splice

REMEMBER The finger test: put your finger on the punctuation. Can the words before it stand alone? Can the words after? If both are yes, you need one of the four legal joins.

WORKED EXAMPLES

- “The study took a decade, its results changed the field.” ✗ → “decade; its results” or “decade, and its results.”
- “..., however, the results...” between two sentences ✗ → “; however,” or “. However,”
- “Although the study took a decade, its results...” ✓ dependent + independent: a comma.
- “The study took a decade and changed the field.” ✓ one subject, two verbs: no comma.

TRAPS

✗ A comma between two sentences ✓ A semicolon, period, or comma + FANBOYS

✗ A semicolon after a dependent clause (“Although...;”) ✓ A comma

✗ A comma before “and” joining two verbs (“She ran, and won.”) ✓
No comma: one subject

DRILL HABIT

Do 15 boundary questions using the finger test out loud: “Stand alone? Yes. Stand alone? Yes. Legal join needed.”

TRY IT

- 1 “The museum reopened in May ___ visitors lined up for hours.” (A) May, (B) May; (C) May (D) May, however,
- 2 “Because the river flooded ___ the town canceled the fair.” (A) flooded; (B) flooded, (C) flooded. (D) flooded:
- 3 “She studied the data ___ she found an error.” (A) data, she (B) data she (C) data, and she (D) data, however, she

ANSWERS 1 B · 2 B · 3 C

Boundaries: Joining Independent Clauses: Drill GM-2

10 original questions. Answer all of them before checking.

DRILL

- 1 "The storm passed ___ the sky turned pink."
(A) passed; the (B) passed, the (C) passed, however, the (D) passed the
- 2 "Although the storm passed ___ the roads stayed flooded."
(A) passed; the (B) passed, the (C) passed. The (D) passed: the
- 3 "She tested the samples ___ and she recorded the results."
(A) samples: (B) samples, (C) samples (D) samples;
- 4 "The museum reopened ___ visitors returned in record numbers."
(A) reopened, and (B) reopened (C) reopened, (D) reopened, however,
- 5 "He wrote the essay ___ revised it twice."
(A) essay, (B) essay, and (C) essay; and (D) essay and
- 6 "The price rose sharply ___ demand stayed strong."
(A) sharply, demand (B) sharply, nevertheless demand (C) sharply; nevertheless, demand (D) sharply demand
- 7 "The data were clear ___ the hypothesis was wrong."
(A) clear the (B) clear: the (C) clear, the (D) clear, and, the
- 8 "When the bell rang ___ students left."
(A) rang the (B) rang. The (C) rang; the (D) rang, the
- 9 "The bridge is old ___ it is safe."
(A) old, however it (B) old, but it (C) old, it (D) old it
- 10 "Researchers studied the reef for years ___ they found three new species."
(A) years. They (B) years they (C) years, they (D) years, however, they

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College Board Question Bank · Standard English Conventions · Boundaries

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 A · Two independent clauses: semicolon.
- 2 B · Dependent + independent: comma.
- 3 B · Comma + FANBOYS joins two clauses.
- 4 A · Comma alone splices; however can't join.
- 5 D · One subject, two verbs: no comma.
- 6 C · Semicolon before the transition, comma after.
- 7 B · Colon: second clause explains the first.
- 8 D · Introductory dependent clause: comma.
- 9 B · Comma + FANBOYS.
- 10 A · Period is one of the four legal joins.

Semicolons

A semicolon is a period in disguise.

GM-3

LESSON

THE RULE

A semicolon works like a period: **both sides must be independent clauses.**

The one exception: separating list items that already contain commas.

USE	EXAMPLE
Two related independent clauses ✓	Copper conducts heat well; silver conducts it even better.
Before a transition between clauses ✓	The test was hard; nevertheless, most students passed.
List items that contain commas ✓	The tour visits Lima, Peru; Quito, Ecuador; and Bogotá, Colombia.
Before a dependent clause ✗	She smiled; because she won.
Before a list ✗	He packed three things; a map, a tent, and food.
Before a phrase ✗	The fox ran; across the field.

REMEMBER Test: replace the semicolon with a period. If both halves are full sentences, the semicolon is right. Avoid “; and” unless the list exception applies.

WORKED EXAMPLES

- “The forest burned; within a year, new shoots appeared.” ✓
- “The forest burned; leaving only ash.” ✗ the second half is a phrase: use a comma.
- “The vote was close; however, the bill passed.” ✓
- “Members came from Austin, Texas; Reno, Nevada; and Salem, Oregon.” ✓

TRAPS

- ✗ “...; and she left.” ✓ “..., and she left.” or “...; she left.”
- ✗ “Since it rained; we stayed in.” ✓ “Since it rained, we stayed in.”
- ✗ “She had one goal; to win.” ✓ “She had one goal: to win.”

DRILL HABIT

Write five pairs of sentences about your day joined by semicolons. Read each half alone to prove it’s a full sentence.

TRY IT

- 1 “The orchestra tuned ___ the audience fell silent.” (A) tuned; (B) tuned, (C) tuned (D) tuned; and
- 2 “The scientist made a discovery ___ a new species of frog.” (A) discovery; (B) discovery: (C) discovery, and (D) discovery and
- 3 Right or wrong? “Because the bridge was closed; we took the ferry.”

ANSWERS 1 A • 2 B • 3 Wrong: use a comma after a dependent clause

Semicolons: Drill

10 original questions. Answer all of them before checking.

- 1 “The lake froze early ___ skaters arrived by December.”
(A) early (B) early, (C) early; (D) early; and
- 2 “The team had one goal ___ to finish first.”
(A) goal: (B) goal, (C) goal; and (D) goal;
- 3 “The tour visits Kyoto, Japan ___ Seoul, South Korea ___ and Taipei, Taiwan.”
(A) — — (B) , , (C) : : (D) ; ;
- 4 “Because the road was icy ___ the bus was late.”
(A) icy: (B) icy (C) icy, (D) icy;
- 5 “The results were mixed ___ however, the method worked.”
(A) mixed; (B) mixed: (C) mixed (D) mixed,
- 6 “He packed everything ___ shoes, a tent, and maps.”
(A) everything, (B) everything; (C) everything; and (D) everything;
- 7 “The vote passed ___ few expected it.”
(A) passed (B) passed; (C) passed; and, (D) passed,
- 8 Right or wrong? “She left early; to catch the train.”
- 9 “The ink faded ___ the paper survived.”
(A) faded, (B) faded; (C) faded (D) faded; but,
- 10 Test for a semicolon?

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Rungs 1–2: Foundations units • Question Bank: Easy

Rung 3: Medium units • Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) • Question Bank: Hard

ANSWERS

- 1 C • Two independent clauses.
- 2 A • Colon introduces an explanation; semicolon needs a clause after.
- 3 D • List items with internal commas.
- 4 C • Dependent clause: comma, not semicolon.
- 5 A • Semicolon before a transition joining clauses.
- 6 D • Colon before a list after a full sentence.
- 7 B • Two clauses.
- 8 Wrong • “to catch the train” isn’t a clause: no semicolon.
- 9 B • Two clauses.
- 10 Replace it with a period: both halves must be sentences • The period test.

Colons and Dashes

Introduce it, or set it apart.

THE RULE

A **colon** follows a complete independent clause and introduces what comes next: a list, an explanation or a quotation. **Dashes** set off extra information (a pair, like a pair of commas) or add emphasis at the end (one dash).

MARK	RULE	EXAMPLE
Colon ✓	A complete sentence before it	The recipe needs three spices: cumin, clove, and saffron.
Colon ✓	The second part explains the first	The result was clear: the method worked.
Colon ✗	After a verb or preposition	The spices are: cumin and clove.
Dash pair ✓	Extra information in the middle	The author—a former chemist—wrote it in a year.
Single dash ✓	Emphasis or explanation at the end	She had one fear—failure.
Mixed pair ✗	Opened with a dash, closed with a comma	The author—a former chemist, wrote it...

REMEMBER Be consistent: extra information opened with a dash closes with a dash; opened with a comma, closes with a comma. The SAT loves this mismatch.

WORKED EXAMPLES

- “The study reached one conclusion: sleep improves memory.” ✓
- “The study concluded that: sleep improves memory.” ✗ no colon after “that.”
- “Ada Lovelace—the first programmer—worked with Babbage.” ✓
- “Ada Lovelace—the first programmer, worked...” ✗ mismatch.

TRAPS

- ✗ ~~“such as: apples and pears”~~ ✓ **“such as apples and pears”**
- ✗ ~~A dash, then a comma, around one interruption~~ ✓ **Two dashes or two commas**
- ✗ ~~“The winners were: Ana and Li.”~~ ✓ **“There were two winners: Ana and Li.”**

DRILL HABIT

Set off the extra information in ten sentences three ways: commas, dashes, parentheses. Keep each pair matched.

TRY IT

- 1 “The coach gave one piece of advice ___ never stop running.” (A) advice; (B) advice: (C) advice, (D) advice that:
- 2 “The painting—which hung in the hall for a century ___ was sold.” (A) century, (B) century— (C) century; (D) century
- 3 Right or wrong? “Her favorite cities are: Paris and Hanoi.”

ANSWERS 1 B · 2 B · 3 Wrong: no colon after “are”

Colons and Dashes: Drill

10 original questions. Answer all of them before checking.

GM-4

DRILL

- 1 “The recipe needs one rare spice ___ saffron.”
(A) spice that: (B) spice, (C) spice; (D) spice:
- 2 “The spices include ___ cumin and clove.”
(A) include (B) include— (C) include: (D) include;
- 3 “The architect ___ a former sculptor ___ designed the library.”
(A) , — (B) ; ; (C) — — (D) , ,
- 4 “She had one fear ___ heights.”
(A) fear; (B) fear that (C) fear— (D) fear,
- 5 “The result was clear ___ the method worked.”
(A) clear that: (B) clear (C) clear: (D) clear,
- 6 “The painting ___ which hung in the hall for a century ___ was sold.”
(A) — , (B) — — (C) ; ; (D) , —
- 7 Right or wrong? “The winners are: Ana and Kofi.”
- 8 “The study answered one question ___ does sleep affect memory?”
(A) question: (B) question, (C) question; (D) question
- 9 “The festival—held every June ___ draws thousands.”
(A) June; (B) June (C) June, (D) June—
- 10 “There were three finalists ___ Lee, Okafor, and Ruiz.”
(A) finalists, and (B) finalists: (C) finalists (D) finalists;

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College Board Question Bank • Standard English Conventions • Boundaries

Rungs 1–2: Foundations units • Question Bank: Easy

Rung 3: Medium units • Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) • Question Bank: Hard

ANSWERS

- 1 D • Colon after a full sentence introduces it.
- 2 A • No colon after a verb.
- 3 C • Matching pair.
- 4 C • Dash for emphasis at the end.
- 5 C • Second clause explains the first.
- 6 B • Opened with a dash, close with a dash.
- 7 Wrong • Words before a colon must be a full sentence.
- 8 A • Colon introduces the question it explains.
- 9 D • Close the dash pair.
- 10 B • Full sentence + list.

Commas Around Extra Information

Nonessential gets commas; essential doesn't.

GM-5

LESSON

THE RULE

Information the sentence could live without (nonessential) is set off by a **pair** of commas, dashes or parentheses. Information needed to identify who or what (essential) gets **no** commas.

TYPE	EXAMPLE
Nonessential clause	My sister, who lives in Hanoi, is a doctor.
Essential clause	The student who won the prize is my cousin.
Nonessential appositive	Toni Morrison, a Nobel laureate, wrote <i>Beloved</i> .
Title or description before a name: no commas	The novelist Toni Morrison wrote <i>Beloved</i> .
Introductory element	In 1969, astronauts landed on the moon.
One comma only ✗	My sister, who lives in Hanoi is a doctor.

REMEMBER The SAT's favorite traps: **no comma between a title or description and the name that follows** ("biologist Rachel Carson"), and no single comma between a subject and its verb. Test extra information by deleting it: does the sentence still work and mean the same thing?

WORKED EXAMPLES

- "Physicist Chien-Shiung Wu disproved a law of physics." ✓ title + name: no commas.
- "Chien-Shiung Wu, a physicist, disproved..." ✓ appositive after the name: a pair.
- "The experiment that Wu designed..." ✓ essential: which experiment.
- "Wu's experiment, which took months, ..." ✓ extra information.

TRAPS

- ✗ "Author, Amy Tan, wrote..." ✓ "Author Amy Tan wrote..."
- ✗ Opening a comma without closing it ✓ **Commas in the middle come in pairs**
- ✗ "The book, that I read, ..." ✓ "The book that I read..."

DRILL HABIT

Read each sentence without the part between commas. If it still makes sense, the commas are right; if it breaks, remove them.

TRY IT

- 1 "The architect ___ Zaha Hadid ___ designed the stadium." (A) , , (B) no commas (C) comma before Zaha only (D) comma after Hadid only
- 2 "The Amazon ___ which crosses several countries ___ is home to pink river dolphins." (A) , , (B) no commas (C) — , (D) ; ;
- 3 "The scientist ___ who discovered penicillin was Alexander Fleming." (A) , (B) no comma (C) ; (D) :

ANSWERS 1 B · 2 A · 3 B

Commas Around Extra Information: Drill

GM-5

DRILL

10 original questions. Answer all of them before checking.

- 1 "The novelist ___ Chinua Achebe ___ wrote *Things Fall Apart*."
(A) , , (B) no commas (C) comma after novelist only (D) comma after Achebe only
- 2 "Chinua Achebe ___ a Nigerian novelist ___ wrote *Things Fall Apart*."
(A) no commas (B) ; ; (C) — , (D) , ,
- 3 "The student ___ who won the prize ___ is my cousin."
(A) , , (B) — — (C) no commas (D) ()
- 4 "My father ___ who works nights ___ sleeps until noon."
(A) , (none) (B) , , (C) no commas (D) (none) ,
- 5 "In 1969 ___ astronauts landed on the moon."
(A) 1969, (B) 1969; (C) 1969: (D) 1969
- 6 "The Danube ___ which flows through ten countries ___ is Europe's second-longest river."
(A) — , (B) , ; (C) no commas (D) , ,
- 7 "The painter ___ Frida Kahlo was born in 1907."
(A) painter (B) painter; (C) painter, (D) painter:
- 8 "The book ___ that I borrowed ___ is overdue."
(A) ; ; (B) — — (C) , , (D) no commas
- 9 Test for extra information?
- 10 "Physicist Lise Meitner ___ a pioneer of nuclear fission ___ was born in Vienna."
(A) , (none) (B) no commas (C) — , (D) , ,

WHERE TO PRACTICE · FREE

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College Board Question Bank · Standard English Conventions · Boundaries

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 B · Title + name: no commas.

2 D · Appositive after the name: a pair.

3 C · Essential: which student.

4 B · Nonessential: I have one father.

5 A · Introductory phrase.

6 D · Extra information.

7 A · Title + name.

8 D · "That" clause: essential.

9 Delete it; if the sentence still works and means the same, use a pair of commas · The deletion test.

10 D · Appositive after the name: a pair.

Commas: Where They Never Go

Many comma questions are won by deleting commas.

GM-6

LESSON

THE RULE

The SAT tests unnecessary commas as often as missing ones. **Never** put a single comma between a subject and its verb, a verb and its object, a preposition and its object, or before “that” starting an essential clause.

NEVER BETWEEN...	X WRONG	✓ RIGHT
Subject and verb	The results of the study, were surprising.	The results of the study were surprising.
Verb and object	She discovered, a new comet.	She discovered a new comet.
Preposition and object	The bridge spans, the river.	The bridge spans the river.
Before “that” (essential)	He argued, that the law was unfair.	He argued that the law was unfair.
Two items joined by “and”	rice, and beans	rice and beans
Title and name	the poet, Langston Hughes, wrote	the poet Langston Hughes wrote

REMEMBER Long subjects tempt you to pause: “The large number of birds that migrate through the valley each spring is...” No comma, however long. When in doubt, the choice with fewer commas is right more often.

WORKED EXAMPLES

- “The scientists who led the project, published a paper.” X → remove the comma.
- “Researchers found, that the virus mutates.” X → “found that”
- “The museum’s collection of ancient coins is rare.” ✓ long subject, no comma.
- “She studied physics, and later became a pilot.” X → no comma (one subject).

TRAPS

- X A comma after a long subject ✓ No comma before the verb
- X A comma before “that” ✓ No comma
- X Commas around an essential title (“the artist, Kahlo,”) ✓ No commas (“the artist Kahlo”)

DRILL HABIT

On 15 comma questions, test the choice with the fewest commas first. Prove it wrong before considering more commas.

TRY IT

- 1 “The paintings in the east wing ___ restored last year.” (A) wing, were (B) wing were (C) wing; were (D) wing: were
- 2 “The study showed ___ the drug worked.” (A) showed, that (B) showed that (C) showed: that (D) showed; that
- 3 “The artist ___ Frida Kahlo painted many self-portraits.” (A) artist, (B) artist (C) artist; (D) artist:

ANSWERS 1 B · 2 B · 3 B

Commas: Where They Never Go: Drill

10 original questions. Answer all of them before checking.

GM-6

DRILL

- 1 “The results of the long study ___ surprised everyone.”
(A) study; (B) study, (C) study (D) study:
- 2 “She argued ___ that the law was unfair.”
(A) argued; (B) argued: (C) argued, (D) argued
- 3 “They bought rice ___ and beans.”
(A) rice (B) rice: (C) rice; (D) rice,
- 4 “The bridge spans ___ the river.”
(A) spans, (B) spans; (C) spans (D) spans:
- 5 “The singer ___ Nina Simone recorded the song.”
(A) singer— (B) singer; (C) singer (D) singer,
- 6 “The large number of birds that migrate through the valley each spring ___ remarkable.”
(A) spring, is (B) spring; is (C) spring: is (D) spring is
- 7 “He studied chemistry ___ and later became a chef.”
(A) chemistry; (B) chemistry (C) chemistry, (D) chemistry:
- 8 “The team found ___ a new species of frog.”
(A) found: (B) found (C) found, (D) found;
- 9 When unsure on a comma question, which choice should you test first?
- 10 “Researchers in Peru ___ discovered the ruins.”
(A) Peru: (B) Peru, (C) Peru (D) Peru;

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ANSWERS

- 1 C · No comma between subject and verb.
- 2 D · No comma before an essential “that.”
- 3 A · Two items: no comma.
- 4 C · No comma between verb and object.
- 5 C · Title + name.
- 6 D · Long subject, still no comma.
- 7 B · One subject, two verbs.
- 8 B · Verb + object.
- 9 The one with the fewest commas · Prove it wrong first.
- 10 C · Subject + verb.

Modifiers: Dangling and Misplaced

Describe the right noun, right away.

GM-7

LESSON

THE RULE

A descriptive phrase at the start of a sentence must be followed **immediately** by the noun it describes. If the phrase is “Born in 1882,” the next words must name the person born in 1882.

OPENING PHRASE	X DANGLING	✓ CORRECT
Born in Ohio,	Born in Ohio, the Wright brothers' plane flew...	Born in Ohio, the Wright brothers built...
Known for her poetry,	Known for her poetry, Angelou's memoir...	Known for her poetry, Angelou also wrote...
After testing the samples,	After testing the samples, the results showed...	After testing the samples, the team found...
A former teacher,	A former teacher, the book by Li...	A former teacher, Li wrote the book...

REMEMBER Ask: **who or what** is the opening phrase describing? That must be the first noun after the comma. Watch possessives: “Angelou’s memoir” makes the memoir the subject, not Angelou.

WORKED EXAMPLES

- “Built in 1889, the Eiffel Tower was once the world’s tallest structure.” ✓
- “Built in 1889, Gustave Eiffel designed the tower.” ✗ Eiffel wasn’t built.
- “Hoping to win, the team’s practice ran late.” ✗ the practice isn’t hoping.
- “Hoping to win, the team practiced late.” ✓

TRAPS

- ✗ A possessive after the comma (“Kahlo’s paintings”) ✓ The person (“Kahlo painted...”)
- ✗ The most natural-sounding option ✓ The one whose first noun is described
- ✗ A passive version when a person is described ✓ Check who the phrase describes

DRILL HABIT

Write five sentences starting “Born in...,” “Known for...,” “After finishing...,” and make sure the next word is the right person or thing.

TRY IT

- 1 “Discovered in 1922, ___” (A) Howard Carter found Tutankhamun’s tomb (B) Tutankhamun’s tomb was found by Howard Carter (C) Carter’s discovery of the tomb was famous (D) archaeologists celebrated the tomb
- 2 “A pioneer of jazz, ___” (A) Louis Armstrong’s trumpet changed music (B) Louis Armstrong changed music with his trumpet (C) the trumpet of Louis Armstrong changed music (D) music was changed by Armstrong

ANSWERS 1 B · 2 B

Modifiers: Dangling and Misplaced: Drill

10 original questions. Answer all of them before checking.

GM-7

DRILL

- 1 “Built in 1173, ___”
(A) workers noticed the tower leaning (B) the tower’s lean surprised workers (C) the tower began to lean soon after (D) leaning began immediately
- 2 “A gifted chemist, ___”
(A) Marie Curie’s research won two Nobel Prizes (B) the prizes honored Curie (C) Marie Curie won two Nobel Prizes (D) two Nobel Prizes went to Curie
- 3 “After reviewing the data, ___”
(A) the data’s meaning was clear (B) the conclusion was obvious (C) the scientists reached a conclusion (D) a conclusion emerged
- 4 “Raised in Lagos, ___”
(A) her first novel takes place in Lagos (B) the author’s first novel was set in Nigeria (C) the author set her first novel in Nigeria (D) Nigeria is the novel’s setting
- 5 “Exhausted after the race, ___”
(A) the grass was where the runners collapsed (B) the runners collapsed on the grass (C) the runners’ legs gave out (D) collapse came quickly
- 6 “Known for his murals, ___”
(A) Diego Rivera painted on public walls (B) public walls displayed Rivera’s work (C) Diego Rivera’s paintings filled public walls (D) murals made Rivera famous
- 7 “Hoping to save money, ___”
(A) the family traveled by bus (B) the bus was the family’s choice (C) the family’s trip was by bus (D) buses save money
- 8 “Discovered in 1922, ___”
(A) Howard Carter found the tomb (B) the tomb was found by Howard Carter (C) archaeologists celebrated (D) Carter’s discovery was famous
- 9 What must come right after an opening descriptive phrase?
- 10 “Using a telescope, ___”
(A) Jupiter’s moons were seen by Galileo (B) Galileo observed Jupiter’s moons (C) the moons were discovered (D) Jupiter’s moons became visible

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ANSWERS

- 1 C · The tower was built.
- 2 C · Curie is the chemist.
- 3 C · Scientists reviewed.
- 4 C · The author was raised.
- 5 B · Runners were exhausted.
- 6 A · Rivera is known.
- 7 A · The family hoped.
- 8 B · The tomb was discovered.
- 9 The noun it describes · Not a possessive of it.
- 10 B · Galileo used the telescope.

Subject–Verb Agreement

Strip the sentence to subject + verb.

THE RULE

The verb agrees with its true subject, which the SAT hides behind long phrases, inverted order and tricky words. **Cross out the phrases in between** until subject and verb sit side by side.

THE DISGUISE	STRIPPED	VERB
Prepositional phrase	The collection [of rare maps]...	is
Relative clause	The scientist [who studies whales]...	is
Inverted order	Among the ruins were two statues .	were
Compound subject	The novel and its sequel ...	are
Each, every, one of	Each [of the bridges]...	is
Collective noun	The committee ...	has
Neither... nor	Neither the coach nor the players ...	were (closer subject)

REMEMBER On the SAT, the subject can be 15 words from its verb. Cross out every phrase beginning with *of*, *in*, *with*, *that*, *which*, *who*.

WORKED EXAMPLES

- “The population of honeybees in these valleys **has** declined.” (population)
- “Each of the paintings **was** restored.” (each)
- “There **are** many reasons.” (reasons)
- “Neither the mayor nor the council members **were** available.” (members)

TRAPS

~~X Matching the noun right before the verb~~ ✓ **Matching the true subject**

~~X “Each of them are”~~ ✓ **“Each of them is”**

~~X “There’s many reasons”~~ ✓ **“There are many reasons”**

DRILL HABIT

Bracket the subject and box the verb in 15 sentences from SAT texts. Read just the bracket and the box aloud.

TRY IT

- 1 “The results of the experiment, which took six years, ___ published in May.” (A) was (B) were (C) has been (D) is
- 2 “Hidden beneath the floorboards ___ a set of letters.” (A) was (B) were (C) are (D) have been
- 3 “The team of engineers ___ a new design.” (A) propose (B) proposes (C) are proposing (D) have proposed

ANSWERS 1 B · 2 A · 3 B

Subject-Verb Agreement: Drill

10 original questions. Answer all of them before checking.

GM-8

DRILL

- 1 "The collection of rare coins ___ valuable."
(A) have been (B) were (C) is (D) are
- 2 "Each of the players ___ a jersey."
(A) are having (B) has (C) were having (D) have
- 3 "There ___ several reasons for the delay."
(A) has been (B) was (C) is (D) are
- 4 "The scientist and her assistant ___ the results."
(A) is checking (B) check (C) checks (D) has checked
- 5 "Neither the mayor nor the council members ___ present."
(A) has been (B) is (C) was (D) were
- 6 "Among the ruins ___ a statue of a lion."
(A) were (B) was (C) are (D) have been
- 7 "The team ___ its first game."
(A) win (B) wins (C) are winning (D) have won
- 8 "One of my cousins ___ in Hanoi."
(A) are living (B) have lived (C) live (D) lives
- 9 "The results of the survey, which included 3,000 people, ___ published in May."
(A) has been (B) is (C) was (D) were
- 10 "The information in these files ___ confidential."
(A) have been (B) is (C) are (D) were

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ANSWERS

- 1 C · Collection (singular).
- 2 B · Each = singular.
- 3 D · Reasons (plural).
- 4 B · Compound subject: plural.
- 5 D · Closer subject: members.
- 6 B · Inverted: a statue.
- 7 B · Collective noun: singular.
- 8 D · One.
- 9 D · Results (plural).
- 10 B · Information (uncountable, singular).

Pronouns: Agreement and Case

It or they? Its or their?

GM-9

LESSON

THE RULE

A pronoun must agree in number with the noun it replaces: singular **it / its**, plural **they / their**. Companies, teams, studies and countries are singular: *it*, not *they*.

ANTECEDENT	PRONOUN	EXAMPLE
One company, team, country, study	it / its	The company released its report.
Plural noun	they / their / them	The birds left their nests.
Each, every, either	singular	Each nation sent its delegates.
Subject position	I, he, she, we, they, who	She and I arrived.
Object position	me, him, her, us, them, whom	between you and me
Possessive vs. contraction	its / it's, their / they're, whose / who's	its wings (not it's)

REMEMBER Find the antecedent: ask what the pronoun refers to. It may be several words back. If a pronoun could refer to two nouns, the SAT may prefer repeating the noun.

WORKED EXAMPLES

- “Apple changed its logo.”
- “The team celebrated its win.” (singular in US English)
- “The scientists and their students...”
- “The council and the mayor disagreed, so the council revised its plan.”

TRAPS

- X “~~The study and their results~~” ✓ “The study and its results”
- X “~~it's wings~~” ✓ “its wings”
- X “~~between you and I~~” ✓ “between you and me”

DRILL HABIT

In ten SAT texts, draw an arrow from every pronoun back to its noun. Singular noun, singular pronoun.

TRY IT

- 1 “The museum updated ___ hours.” (A) their (B) its (C) it's (D) they're
- 2 “The researchers published ___ findings.” (A) its (B) their (C) there (D) they're
- 3 “The award went to my brother and ___.” (A) I (B) me (C) myself (D) mine

ANSWERS 1 B · 2 B · 3 B

Pronouns: Agreement and Case: Drill

10 original questions. Answer all of them before checking.

GM-9

DRILL

- 1 "The company released ___ annual report."
(A) its (B) they're (C) their (D) it's
- 2 "The birds returned to ___ nests."
(A) they're (B) there (C) their (D) its
- 3 "Each country sent ___ best athletes."
(A) its (B) theirs (C) their (D) it's
- 4 "The prize went to Ana and ___."
(A) mine (B) I (C) myself (D) me
- 5 "___ going to the museum tomorrow?"
(A) Whose (B) Whom's (C) Who (D) Who's
- 6 "The study and ___ conclusions were debated."
(A) their (B) it's (C) theirs (D) its
- 7 "She and ___ arrived first."
(A) myself (B) mine (C) me (D) I
- 8 "The museum changed ___ hours."
(A) its (B) their (C) it's (D) its'
- 9 "The engineers explained ___ design."
(A) they're (B) its (C) their (D) there
- 10 "The jury reached ___ verdict."
(A) its (B) they're (C) their (D) it's

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ANSWERS

- 1 A • Company: singular.
- 2 C • Plural.
- 3 A • Each: singular.
- 4 D • Object of "to."
- 5 D • Who is.
- 6 D • The study (singular).
- 7 D • Subject position.
- 8 A • Possessive, no apostrophe.
- 9 C • Plural engineers.
- 10 A • Collective: singular in US usage.

Verb Tense and Form

Follow the time clues.

THE RULE

Choose the tense that matches the time frame around it, and the correct form after helpers. Look for clues: dates, “currently,” “by 1900,” and the tense of the other verbs in the text.

CLUE	TENSE	EXAMPLE
Past date, finished event	Past simple	In 1903, the Wrights flew.
Before another past event	Past perfect	By 1910, the company had sold 100 planes.
From the past up to now	Present perfect	Since 2010, scientists have found 30 species.
Facts; describing a text	Present simple	The novel explores loss.
After a modal or “to”	Base form	can fly · to fly
After have / has / had	Past participle	had gone · has written
Main verb missing	Not -ing or “to” alone	X The birds migrating south. ✓ The birds migrate south.

REMEMBER Stay consistent with the text’s tense. And every sentence needs a real main verb: a choice with only “-ing” or “to + verb” can leave the sentence a fragment.

WORKED EXAMPLES

- “Since 1990, the lake **has shrunk** by half.”
- “When the war ended, she **had** already **written** three novels.”
- “In her essay, Didion **describes** California.”
- “The fossil, which **was found** in 2004, is now in a museum.”

TRAPS

- X “~~has went~~” ✓ “has gone”
- X A sentence whose only verb is “-ing” ✓ A finite main verb
- X Switching to present in a past narrative ✓ Keeping the text’s tense

DRILL HABIT

For 15 tense questions, underline the time clue that decided the answer before choosing.

TRY IT

- 1 “In 1928, Alexander Fleming ___ penicillin.” (A) discovers (B) discovered (C) has discovered (D) will discover
- 2 “By the time the rescuers arrived, the climbers ___ for two days.” (A) waited (B) have waited (C) had waited (D) wait
- 3 “The poet’s new collection ___ themes of migration.” (A) explore (B) exploring (C) explores (D) to explore

ANSWERS 1 B · 2 C · 3 C

Verb Tense and Form: Drill

10 original questions. Answer all of them before checking.

GM-10

DRILL

- 1 "In 1903, the Wright brothers ___ the first powered flight."
(A) make (B) will make (C) made (D) have made
- 2 "By 1920, the company ___ a million cars."
(A) sold (B) has sold (C) sells (D) had sold
- 3 "Since 2015, scientists ___ ten new species."
(A) have found (B) found (C) had found (D) find
- 4 "In her novel, Morrison ___ memory and trauma."
(A) explored (B) explores (C) exploring (D) to explore
- 5 "The engineers can ___ the bridge in a year."
(A) rebuild (B) to rebuild (C) rebuilt (D) rebuilding
- 6 "She has ___ three books."
(A) writing (B) wrote (C) write (D) written
- 7 "The geese ___ south every October."
(A) migrate (B) to migrate (C) having migrated (D) migrating
- 8 "When the rescuers arrived, the hikers ___ for two days."
(A) waited (B) wait (C) have waited (D) had been waiting
- 9 "The fossil, which ___ in 2004, is now in a museum."
(A) is found (B) was found (C) finds (D) has been found
- 10 "Last year, the town ___ a new library."
(A) built (B) has built (C) builds (D) will build

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ANSWERS

- 1 C · Past date.
- 2 D · Before another past time.
- 3 A · Past up to now.
- 4 B · Describing a text: present.
- 5 A · After a modal: base form.
- 6 D · Past participle after has.
- 7 A · Needs a main verb.
- 8 D · Ongoing before a past event.
- 9 B · Past event.
- 10 A · "Last year."

Possessives and Plurals

How many? Who owns?

GM-11

LESSON

THE RULE

Plural nouns add -s with no apostrophe. Possession adds 's (singular owner) or ' (plural owner ending in s). Possessive pronouns never use apostrophes.

MEANING	FORM	EXAMPLE
More than one	-s	the scientists
Belongs to one	's	the scientist's notes
Belongs to many	s'	the scientists' notes
Irregular plural owner	's	the children's books
Pronoun possessive	no apostrophe	its, their, whose
Contraction	apostrophe	it's = it is · they're = they are

REMEMBER SAT choices often change plural and possessive at once ("researcher's / researchers / researchers'"). Ask two questions: **how many**, and **does it own the next noun**?

WORKED EXAMPLES

- "The orchestra's conductor" (one orchestra)
- "The orchestras' conductors" (many orchestras)
- "The musicians played" (plural, no ownership)
- "The company announced its profits" (no apostrophe)

TRAPS

- X "The artist's painted murals." ✓ "The artists painted murals."
 X "the city's parks" ✓ "the city's parks" or "the cities' parks"
 X "who's book" ✓ "whose book"

DRILL HABIT

Write ten phrases from your life (my friend's phone, my friends' phones, my friends laughed) and say how many and who owns.

TRY IT

- 1 "The two ___ findings were published together." (A) researcher's (B) researchers (C) researchers' (D) researcher
- 2 "The ___ ruins attract thousands of visitors." (one city) (A) cities (B) city's (C) cities' (D) citys
- 3 "The bird returned to ___ nest." (A) it's (B) its (C) its' (D) their

ANSWERS 1 C · 2 B · 3 B

Possessives and Plurals: Drill

10 original questions. Answer all of them before checking.

GM-11

DRILL

- 1 “The two ___ findings were published together.”
(A) researcher (B) researchers’ (C) researcher’s (D) researchers
- 2 “The ___ ruins attract visitors.” (one city)
(A) citys (B) cities’ (C) city’s (D) cities
- 3 “The bird fed ___ chicks.”
(A) its’ (B) their (C) it’s (D) its
- 4 “The ___ toys were scattered.” (many children)
(A) children (B) child’s (C) childrens’ (D) children’s
- 5 “The ___ played until midnight.”
(A) musician’s (B) musicians (C) musicians’ (D) musician
- 6 “___ jacket is this?”
(A) Whos (B) Who’s (C) Whose’ (D) Whose
- 7 “The ___ decision surprised fans.” (one team)
(A) team’s (B) team (C) teams’ (D) teams
- 8 “The ___ conference drew 500 people.” (many scientists)
(A) scientist’s (B) scientists’ (C) scientist (D) scientists
- 9 “The ___ are ripe.”
(A) apple (B) apples (C) apple’s (D) apples’
- 10 Two questions to ask on possessive items?

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ANSWERS

- 1 B · Plural owners.
- 2 C · One owner.
- 3 D · Possessive pronoun.
- 4 D · Irregular plural owner: ‘s.
- 5 B · Plural, no ownership.
- 6 D · Possession.
- 7 A · One owner.
- 8 B · Plural owners.
- 9 B · Plural, no apostrophe.
- 10 How many? Does it own the next noun? · GM-11.

Parallel Structure

Match the forms. Compare like with like.

THE RULE

Items in a list, pair or comparison must share the same grammatical form. Paired words (*both... and, either... or, not only... but also, neither... nor*) take matching forms after each half.

PATTERN	X NOT PARALLEL	✓ PARALLEL
List	teaches coding, design, and how to market	teaches coding, design, and marketing
not only... but also	not only fast but also has power	not only fast but also powerful
either... or	either by train or driving	either by train or by car
Comparison	Swimming is harder than to run.	Swimming is harder than running.
Comparing things	Tokyo's population is larger than Paris.	...larger than that of Paris (or Paris's).

REMEMBER Compare like with like: a population with a population, not with a city. “Than that of” and “than those of” are classic SAT answers.

WORKED EXAMPLES

- “to reduce, to reuse, and to recycle” ✓
- “both in Asia and in Africa” ✓
- “The new design is lighter than the old one.” ✓
- “Her salary is higher than her manager’s.” ✓ salary vs. salary

TRAPS

- X “than Paris” when comparing populations ✓ “than that of Paris”
- X Mixing *ing* and *to + verb* in a list ✓ One form throughout
- X “not only... and also” ✓ “not only... but also”

DRILL HABIT

For every list in your reading this week, check the first word of each item: same part of speech?

TRY IT

- 1 “The goal is to reduce waste, ___ energy, and lower costs.” (A) saving (B) save (C) saves (D) saved
- 2 “Peru’s climate is more varied than ___.” (A) Chile (B) that of Chile (C) Chile is (D) Chile has
- 3 “She was praised not only for her skill ___ for her kindness.” (A) and also (B) but also (C) as well (D) and

ANSWERS 1 B · 2 B · 3 B

Parallel Structure: Drill

10 original questions. Answer all of them before checking.

- 1 “The program teaches coding, design, and ____.”
(A) how to market (B) marketing (C) markets (D) to market
- 2 “She is not only talented but also ____.”
(A) she works hard (B) hardworking (C) works hard (D) hard work
- 3 “Walking is better than ____.”
(A) drive (B) to drive (C) driving (D) you drive
- 4 “Japan’s population is larger than ____.”
(A) Italy has (B) Italy (C) Italy is (D) that of Italy
- 5 “The goal is to reduce costs, ____ quality, and grow sales.”
(A) improves (B) improve (C) improved (D) improving
- 6 “You can pay either in cash or ____.”
(A) by credit card (B) with using credit (C) credit card (D) credit
- 7 “The new phone is lighter than ____.”
(A) the old (B) the old one is heavy (C) the old one (D) older
- 8 “He likes hiking, swimming, and ____.”
(A) climbs (B) climb (C) to climb (D) climbing
- 9 “The museum’s collection is larger than ____.”
(A) that of the library (B) libraries (C) the library has (D) the library
- 10 “Neither the heat nor ____ stopped the runners.”
(A) raining (B) it was rainy (C) it rained (D) the rain

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ANSWERS

- 1 B · -ing nouns.
- 2 B · Adjective matches adjective.
- 3 C · Matching -ing.
- 4 D · Population vs. population.
- 5 B · to reduce / improve / grow.
- 6 A · in cash / by card.
- 7 C · Phone vs. phone.
- 8 D · -ing list.
- 9 A · Collection vs. collection.
- 10 D · Noun / noun.

Concision and Redundancy

Say it once.

THE RULE

When choices say the same thing at different lengths, the **shortest choice that is grammatical and keeps the meaning** is usually right. Cut words that repeat what the sentence already says.

REDUNDANT	CONCISE
return back	return
past history	history
completely finished	finished
each and every	each
collaborate together	collaborate
Thus, as a result,	Thus,
annually every year	annually

REMEMBER Pure concision questions are less common on the digital SAT, but redundancy still hides in transition and boundary choices: “Therefore, as a result,” is wrong because it says the same thing twice.

WORKED EXAMPLES

- “She returned to Lagos.” not “returned back”
- “Thus, the plan failed.” not “Thus, consequently,”
- “The outcome” not “the final outcome”
- “They collaborated” not “collaborated together”

TRAPS

- ~~X “Thus, therefore,”~~ ✓ **One transition**
- ~~X The longest, most formal choice~~ ✓ **The shortest correct choice**
- ~~X Cutting words that carry meaning~~ ✓ **Cutting only repeats**

DRILL HABIT

Rewrite five sentences from your own essays at 80% of their length without losing meaning.

TRY IT

- 1 “The scientists ___ the experiment.” (A) repeated again (B) repeated (C) did repeat again (D) repeated a second time again
- 2 “___, sales rose.” (A) As a result, therefore (B) Consequently (C) Thus, so (D) So, as a result
- 3 “The festival is held ___.” (A) annually each year (B) annually (C) every year annually (D) yearly every year

ANSWERS 1 B · 2 B · 3 B

Concision and Redundancy: Drill

10 original questions. Answer all of them before checking.

GM-13

DRILL

- 1 "The scientists ___ the test."
(A) repeated a second time again (B) did repeat again (C) repeated again (D) repeated
- 2 "___, the plan failed."
(A) As a result, thus (B) Thus, therefore (C) So, as a result (D) Thus
- 3 "The festival is held ___."
(A) every year annually (B) annually each year (C) yearly each year (D) annually
- 4 "They ___ on the project."
(A) jointly collaborated together (B) collaborated (C) collaborated together (D) worked together jointly
- 5 "The ___ is that the bus was late."
(A) reason (B) cause reason (C) reason is because why (D) reason why is because
- 6 "In my view, ___ the plan is wise."
(A) I personally think (B) I think (C) in my opinion (D) (no words)
- 7 "The outcome ___."
(A) was final and conclusive (B) ended in the end (C) was final (D) was finally final
- 8 Which is usually right when all choices are grammatical and mean the same?
- 9 "She ___ to Hanoi."
(A) returned (B) returned back (C) returned again back (D) went back again
- 10 "The ___ of the town dates to 1600."
(A) historical past (B) old history (C) history (D) past history

WHERE TO PRACTICE · FREE

Khan Academy · SAT Reading and Writing · Expression of ideas + standard English conventions

College Board Question Bank · Standard English Conventions · Form, Structure, and Sense

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 D · Again is redundant.
- 2 D · One transition.
- 3 D · Say it once.
- 4 B · Together is implied.
- 5 A · Concise.
- 6 D · Already says "in my view."
- 7 C · Redundant pairs.
- 8 The shortest · Cut repeats, keep meaning.
- 9 A · Return = go back.
- 10 C · History is past.

Conventions Review: The Seven Rules

The whole grammar section on one page.

GM-14

LESSON

THE RULE

Standard English Conventions questions reduce to seven rules. Learn the five-second test for each, and you can answer most of them in **under 30 seconds**.

RULE	THE FIVE-SECOND TEST	LESSON
Boundaries	Two full sentences? Period, semicolon, or comma + FANBOYS	GM-2
Semicolons and colons	Semicolon = period test; colon needs a full sentence before it	GM-3, GM-4
Extra information	Delete it: still works? Then a pair of commas or dashes	GM-5
Unneeded commas	Subject-verb, verb-object, title-name: no comma	GM-6
Modifiers	The first noun after the comma is the one described	GM-7
Agreement	Strip to subject + verb; pronoun to its noun	GM-8, GM-9
Tense, form, possessives	Time clue; how many and who owns	GM-10, GM-11

REMEMBER Conventions questions are the fastest points on the test. Aim for 30 seconds each and bank the time for evidence and inference questions.

WORKED EXAMPLES

- “Explorer Ernest Shackleton led...” → no comma (GM-6).
- “The data, which were collected in 2019, show...” → pair of commas (GM-5).
- “The study was small; however, its results were striking.” (GM-2)
- “The company’s profits doubled.” (GM-11)

TRAPS

- ~~X Guessing by ear under time pressure~~ ✓ **Running the five-second test**
- ~~X Spending a minute on a comma question~~ ✓ **Name the rule, apply it, move**
- ~~X Ignoring what the choices differ on~~ ✓ **Scan the choices first**

DRILL HABIT

Timed: 20 conventions questions in 10 minutes. Then name the rule for every one you missed.

TRY IT

- 1 “The violinist Kim ___ a former child prodigy, performed in Seoul.” (A) Kim, (B) Kim (C) Kim; (D) Kim—
- 2 “Each of the islands ___ its own dialect.” (A) have (B) has (C) are having (D) have had
- 3 “The canal opened in 1914 ___ it shortened the voyage by 8,000 miles.” (A) 1914, (B) 1914 (C) 1914; (D) 1914, it
- 4 “Exhausted after the climb, ___” (A) the summit was reached by the hikers (B) the hikers rested at the summit (C) the hikers’ rest was short (D) rest came quickly

ANSWERS 1 A · 2 B · 3 C · 4 B

Conventions Review: The Seven Rules: Drill GM-14

10 original questions. Answer all of them before checking.

DRILL

- 1 “The violinist ___ Hilary Hahn performed in Tokyo.”
(A) violinist (B) violinist, (C) violinist: (D) violinist;
- 2 “Each of the islands ___ its own language.”
(A) were (B) has (C) are having (D) have
- 3 “The canal opened in 1914 ___ it cut weeks from the voyage.”
(A) 1914, it (B) 1914, (C) 1914 (D) 1914;
- 4 “Tired after the climb, ___”
(A) the summit was reached by the hikers (B) the hikers rested at the summit (C) the hikers’ rest was short (D) rest came quickly
- 5 “The company updated ___ website.”
(A) it’s (B) its (C) their (D) they’re
- 6 “The data, which ___ collected in 2019, show a decline.”
(A) is (B) were (C) has been (D) was
- 7 “The two ___ votes were counted.”
(A) senator’s (B) senators (C) senators’ (D) senator
- 8 “The study had one flaw ___ its sample was small.”
(A) flaw, (B) flaw, and: (C) flaw (D) flaw:
- 9 “The author—a former nurse ___ wrote the memoir in a year.”
(A) nurse; (B) nurse (C) nurse— (D) nurse,
- 10 “The plan aims to cut costs, ___ waste, and boost morale.”
(A) reduced (B) to reducing (C) reducing (D) reduce

WHERE TO PRACTICE • FREE

Khan Academy • SAT Reading and Writing • SAT grammar practice

College Board Question Bank • Standard English Conventions • Boundaries; Form, Structure, and Sense

Rungs 1–2: Foundations units • Question Bank: Easy
Rung 3: Medium units • Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) • Question Bank: Hard

ANSWERS

- 1 A • GM-6: title + name.
- 2 B • GM-8.
- 3 D • GM-2.
- 4 B • GM-7.
- 5 B • GM-9.
- 6 B • GM-8/10: data were (plural, past).
- 7 C • GM-11.
- 8 D • GM-4.
- 9 C • GM-4: matching dashes.
- 10 D • GM-12: cut / reduce / boost.

PART V

Math

Strategy first, then every skill in Algebra, Advanced Math, Data Analysis, and Geometry and Trigonometry.

Why Smart Students Underperform



JOSEF AIDEN DURAND
FROM THE AUTHOR

Smart students often score below their ability for three reasons. They rush, because school rewarded speed. They trust their gut, because their gut is usually right in class. And they skip steps, because writing things down feels beneath them. On the SAT, all three are expensive.

Here's the difference between scorers. A 1200 student knows most of the content and loses points to gaps and traps. A 1400 student knows the content and loses points to hard traps and careless errors. A 1500+ student knows the content, knows the traps, and has a process that removes careless errors: circle what they ask for, write the steps, check the answer against the estimate, plug it back in.

Notice what separates the levels: not raw ability, but process. The top scorers aren't faster thinkers; they're more disciplined ones. They have more ways into a hard question, and they never give away an easy one.

If you're smart and stuck, the fix isn't harder material. It's humbler habits.

Inside the Math Section

44 questions, two modules, Desmos the whole way.

MS-1

LESSON

THE RULE

Two modules of 22 questions, 35 minutes each (70 minutes total). About 75% are multiple choice and 25% are student-produced responses (you type the answer). **The Desmos graphing calculator is built in for every question**, and a formula reference sheet is available. Module 2 adapts to Module 1.

DOMAIN	SHARE	WHAT'S IN IT
Algebra	about 35%	Linear equations, functions, systems, inequalities
Advanced Math	about 35%	Quadratics, exponentials, polynomials, rational and radical equations, functions
Problem-Solving and Data Analysis	about 15%	Ratios, percentages, statistics, probability, studies
Geometry and Trigonometry	about 15%	Area, volume, angles, triangles, trigonometry, circles

REMEMBER Pace: 35 minutes for 22 questions is about **95 seconds each**. Easy questions should take 30–60 seconds, banking time for the hardest questions near the end of Module 2.

WORKED EXAMPLES

- Desmos on every question: graph, solve and check (MS-6).
- The reference sheet covers area, volume and special right triangles; you must know slope, the quadratic formula and more (REF-1).
- Student-produced responses have no choices: check by plugging back in (MS-7).
- No penalty for guessing: answer every question.

TRAPS

- ✗ ~~Doing everything by hand~~ ✓ **Desmos when the algebra is messy**
- ✗ ~~Solving for x when they asked for $2x$~~ ✓ **Circle what they ask for (MS-2)**
- ✗ ~~Rushing Module 1~~ ✓ **Module 1 decides Module 2's difficulty**

DRILL HABIT

Take one timed module. Mark every question where you used Desmos, and every one where you could have. Next module, use it on all of those.

TRY IT

- 1 How many minutes per Math module?
- 2 About how many seconds per question?
- 3 Which two domains make up about 70% of the section?
- 4 Can you use a calculator on every math question?

ANSWERS 1 35 · 2 About 95 · 3 Algebra and Advanced Math · 4 Yes (built-in Desmos, or an approved handheld calculator)

Inside the Math Section: Drill

10 original questions. Answer all of them before checking.

- 1 How many Math questions in each module?
- 2 Minutes per Math module?
- 3 Average seconds per Math question?
- 4 Roughly what share of Math questions are student-produced responses?
- 5 Which two domains make up about 70% of the section?
- 6 Is the Desmos calculator available on every Math question?
- 7 Name two formulas NOT on the reference sheet.
- 8 Where do the hardest questions usually appear?
- 9 Should you skip a question you can't start?
- 10 Does Module 1 performance matter for Module 2?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · About the SAT

College Board Question Bank · all four domains
· a full module of 22, timed

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 22 · 44 total.

2 35 · 70 total.

3 About 95 · $35 \times 60 \div 22 \approx 95$.

4 About 25% · The rest are multiple choice.

5 Algebra and Advanced Math · About 35% each.

6 Yes · Built into Bluebook.

7 Slope; the quadratic formula (also: distance, vertex, percent change) · Memorize them (REF-1).

8 Late in Module 2 · Bank time early.

9 Flag it, guess, return · No blanks.

10 Yes · It sets Module 2's difficulty.

One Legal Move

Don't look for the whole solution. Look for one move.

MS-2

LESSON

THE RULE

Hard questions freeze students because they look for the whole solution at once. Instead: what exactly do they want, what do I know, and **what is one legal move** with what I know?

ASK	EXAMPLE
1 • What exactly do they want?	"the value of $2x$," not x
2 • What do I know? Write it down.	line through $(2, 5)$; slope 3
3 • What is one legal move?	plug the point in; set equations equal; write a formula
4 • Did the move help?	if not, try a different move
5 • Answer the question asked	compute $2x$, not x

REMEMBER Circle the target in the stem; it's often not x . Many misses at the top level are right math with the wrong last step (finding x when they asked for $3x - 1$).

WORKED EXAMPLES

- "If $3x + 6 = 21$, what is $x + 2$?" One move: $3x + 6 = 3(x + 2) = 21$, so $x + 2 = 7$. No need to find x .
- "A line through $(2, 5)$ has slope 3. y-intercept?" One move: $5 = 3(2) + b \rightarrow b = -1$.
- " $f(x) = x^2 - 4$, $f(a) = 12$, $a > 0$." One move: $a^2 - 4 = 12 \rightarrow a = 4$.
- Stuck? Write any formula that involves what they ask for.

TRAPS

- ~~✗ Solving for x when they asked for $2x$~~ ✓ Circling the target first
- ~~✗ Staring at the problem~~ ✓ Writing down what you know
- ~~✗ Starting with heavy algebra~~ ✓ Looking for a shortcut: factor, substitute

DRILL HABIT

For 10 hard questions, write only the first move of each in 60 seconds. Then solve the ones where your first move was right.

TRY IT

- 1 If $4x - 8 = 20$, what is $x - 2$?
- 2 If $2a + 3b = 12$, what is $4a + 6b$?
- 3 A line through $(1, 4)$ has slope 2. What is its y-intercept?

ANSWERS 1 5 · 2 24 · 3 2

One Legal Move: Drill

10 original questions. Answer all of them before checking.

MS-2

DRILL

- 1 If $5x + 10 = 45$, what is $x + 2$?
- 2 If $3a - 6b = 21$, what is $a - 2b$?
- 3 A line through $(3, 7)$ has slope 2. y -intercept?
- 4 If $2x - 3 = 11$, what is $6x - 9$?
- 5 If $x/4 = 6$, what is $x/2$?
- 6 $f(x) = 3x^2$; $f(a) = 48$, $a > 0$. a ?
- 7 If $x + y = 10$ and $x - y = 2$, what is $x^2 - y^2$?
- 8 If $4n = 7$, what is $12n + 1$?
- 9 What should you circle first in every stem?
- 10 If $(x + 3)^2 = 49$ and $x > 0$, what is x ?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · any Math unit

College Board Question Bank · any Math domain · any skill; apply the tool

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $9 \cdot 5(x + 2) = 45$.

2 $7 \cdot$ Divide by 3.

3 $1 \cdot 7 = 2(3) + b$.

4 $33 \cdot 3(2x - 3)$.

5 $12 \cdot$ Double it.

6 $4 \cdot a^2 = 16$.

7 $20 \cdot (x + y)(x - y)$.

8 $22 \cdot 3(4n) + 1$.

9 What they ask for · Often not x .

10 $4 \cdot x + 3 = 7$.

Swap in Numbers

Turn variables into numbers you can see.

MS-3

LESSON

THE RULE

When the question and choices are full of variables, replace them with simple numbers of your own. Solve with your numbers to get a **target**, then test each choice with the same numbers. The choice that hits the target wins.

STEP	EXAMPLE: A price p rises 20%, then falls 20%. New price?
1 • Pick easy numbers	$p = 100$
2 • Solve for a target	$100 \rightarrow 120 \rightarrow 96$. Target: 96
3 • Test every choice	(A) $p \rightarrow 100$ (B) $0.96p \rightarrow 96$ (C) $1.04p \rightarrow 104$ (D) $0.8p \rightarrow 80$
4 • Keep the match	B

REMEMBER Pick numbers that are easy but not special: avoid 0 and 1 (they make many expressions equal), and use different numbers for different variables. If two choices hit the target, try a second set.

WORKED EXAMPLES

- Percent questions: start with 100.
- Expressions in x : try $x = 2$ or 3.
- “Must be true” questions: test several numbers, including negatives and fractions.
- Variables in the choices + “equivalent” = make up numbers, or graph both in Desmos.

TRAPS

- ✗ Picking $x = 0$ or 1 ✓ Picking 2, 3 or 5
- ✗ Different numbers for the target and the choices ✓ The same numbers throughout
- ✗ Stopping at the first match ✓ Checking all four

DRILL HABIT

Solve 10 “which expression is equivalent” questions twice: once with algebra, once with your own numbers. Time both.

TRY IT

- 1 n is an integer. Which must be even? (A) $n + 1$ (B) $2n + 1$ (C) n^2 (D) $n^2 + n$
- 2 A car travels m miles in h hours. Its speed in miles per minute? (A) $60m/h$ (B) $m/(60h)$ (C) $60h/m$ (D) $mh/60$
- 3 Which is equivalent to $(x + 3)^2 - 9$? (A) x^2 (B) $x^2 + 6x$ (C) $x^2 + 9$ (D) $x^2 - 6x$

ANSWERS 1 D ($n^2 + n = n(n + 1)$) • 2 B • 3 B

Swap in Numbers: Drill

10 original questions. Answer all of them before checking.

MS-3

DRILL

- 1 A price rises 10%, then 10% again. Single equivalent change?
(A) 20% (B) 21% (C) 11% (D) 19%
- 2 n is odd. Which must be even?
(A) $n + 2$ (B) $3n$ (C) $n + 1$ (D) n^2
- 3 Which equals $(x + 2)^2 - 4$?
(A) x^2 (B) $x^2 + 4$ (C) $x^2 - 4x$ (D) $x^2 + 4x$
- 4 A worker earns d dollars per hour. Pay for m minutes?
(A) $60dm$ (B) $60d/m$ (C) dm (D) $dm/60$
- 5 Price p falls 50%, then rises 50%. Result?
(A) $0.75p$ (B) p (C) $0.5p$ (D) $1.25p$
- 6 Which is equivalent to $(a + b)^2 - (a - b)^2$?
(A) $2ab$ (B) $4ab$ (C) 0 (D) $2a^2$
- 7 Why avoid picking $x = 0$ or 1 ?
- 8 If k is a positive integer, which is always divisible by 3?
(A) $3k + 1$ (B) $k + 3$ (C) $k(k + 1)(k + 2)$ (D) k^2
- 9 A tank fills in h hours. Fraction filled per minute?
(A) $60/h$ (B) $h/60$ (C) $60h$ (D) $1/(60h)$
- 10 Which equals $x(x + 5) - 5x$?
(A) x^2 (B) $x^2 - 5$ (C) $x^2 + 10x$ (D) $5x$

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · any Math unit

College Board Question Bank · any Math domain · any skill; apply the tool

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 B · $100 \rightarrow 110 \rightarrow 121$.

2 C · Try $n = 3$.

3 D · Try $x = 1$: 5.

4 D · $d = 60$, $m = 30 \rightarrow 30$.

5 A · $100 \rightarrow 50 \rightarrow 75$.

6 B · $a = 2$, $b = 1$: $9 - 1 = 8$.

7 They make many expressions equal · Use 2, 3 or 5.

8 C · Three consecutive integers.

9 D · $h = 1 \rightarrow 1/60$.

10 A · Expand.

Work Backward

Start from the choices.

MS-4

LESSON

THE RULE

When the question asks for a number and the choices are numbers, test the choices in the problem. Start with a middle value; if it's too big or too small, you'll know which way to go.

USE IT WHEN...

EXAMPLE

The question asks for one value

"What is the value of x ?"

The choices are numbers

(A) 2 (B) 4 (C) 6 (D) 8

Setting up the equation is hard

ages, mixtures, ticket sales

Checking a typed answer

plug your answer back into the original

REMEMBER Choices are usually in order, so test B or C first; the result often tells you whether to go higher or lower. Plugging in also catches extraneous solutions automatically (AM-6, AM-7).

WORKED EXAMPLES

- "The sum of three consecutive integers is 84. Smallest?" (A) 26 (B) 27 (C) 28 (D) 29 $\rightarrow 27 + 28 + 29 = 84 \checkmark \rightarrow B$.
- " $\sqrt{x+7} = x - 5$. x ?" (A) 2 (B) 9 (C) 11 (D) 16 $\rightarrow x = 9: \sqrt{16} = 4 = 9 - 5 \checkmark \rightarrow B$.
- If B gives a result that's too small, jump to C or D.
- Desmos alternative: graph both sides and read the intersection.

TRAPS

- ~~X Always testing A first~~ $\checkmark$ **Starting in the middle**
- ~~X Plugging into your rearranged equation~~ $\checkmark$ **Plugging into the original**
- ~~X Using it when choices are expressions~~ $\checkmark$ **Making up numbers instead (MS-3)**

DRILL HABIT

Do 10 word problems by plugging in the answers only. Note which were faster than algebra.

TRY IT

- 1 A number tripled, then decreased by 7, equals 32. Number? (A) 11 (B) 13 (C) 15 (D) 17
- 2 $x^2 - 5x = 24$ and $x > 0$. x ? (A) 3 (B) 6 (C) 8 (D) 12
- 3 Adult tickets cost \$12 and child tickets \$8. Ten tickets cost \$104. How many adult tickets? (A) 4 (B) 5 (C) 6 (D) 7

ANSWERS 1 B · 2 C · 3 C

Work Backward: Drill

10 original questions. Answer all of them before checking.

MS-4

DRILL

- 1 Three consecutive even integers sum to 78. Smallest?
(A) 22 (B) 28 (C) 24 (D) 26
- 2 $\sqrt{x + 11} = x - 1$. x ?
(A) 5 (B) 10 (C) 7 (D) 1
- 3 $2^x + 2^x = 64$. x ?
(A) 5 (B) 6 (C) 32 (D) 4
- 4 A number doubled, plus 9, equals 41. Number?
(A) 20 (B) 16 (C) 14 (D) 18
- 5 $x^2 - 3x = 40$, $x > 0$. x ?
(A) 10 (B) 8 (C) 5 (D) 13
- 6 Pens cost \$3, notebooks \$5; 12 items cost \$44. Notebooks?
(A) 8 (B) 6 (C) 2 (D) 4
- 7 $(x + 4)/(x - 2) = 3$. x ?
(A) 7 (B) 5 (C) 9 (D) 3
- 8 Why start with B or C?
- 9 $3^{x+1} = 81$. x ?
(A) 4 (B) 27 (C) 2 (D) 3
- 10 Ana is 3 times as old as Ben; in 6 years she'll be twice his age. Ben's age now?
(A) 6 (B) 12 (C) 4 (D) 8

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · any Math unit

College Board Question Bank · any Math domain · any skill; apply the tool

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 C · $24 + 26 + 28$.

2 A · $\sqrt{16} = 4$.

3 A · $2 \cdot 32 = 64$.

4 B · $2(16) + 9$.

5 B · $64 - 24 = 40$.

6 D · 8 pens \$24 + 4 notebooks \$20.

7 B · $9/3$.

8 Choices are in order; the result tells you to go up or down · Halves the work.

9 D · 3^4 .

10 A · $18 + 6 = 2(6 + 6)$.

Sketch It

If there's no picture, make one.

MS-5

LESSON

THE RULE

If a question describes a shape, a graph, a path or a situation without a picture, draw one. If there is a picture, **add everything you know to it**. Most geometry misses come from working in your head.

SITUATION	DRAW
Geometry with no figure	Sketch it; label every given length and angle
"Not drawn to scale"	Redraw it; don't trust appearances
Points and lines	Quick axes; plot the points
Motion or distance	A line with start, end and distances
Circles	Center, radius, and the triangle two radii make
Ratios and percents	A bar split into parts

REMEMBER You get scratch paper on test day: use it. Labeling a figure with every given and every value you work out turns many "hard" geometry questions into one-step questions.

WORKED EXAMPLES

- "A rectangle's diagonal is 13 and one side is 5. Area?" Draw: 5-12-13 → area 60.
- "Distance from A(1, 2) to B(7, 10)?" Draw the right triangle: legs 6 and 8 → 10.
- "Isosceles triangle, vertex angle 40° ." Draw: base angles $(180 - 40)/2 = 70^\circ$ each.
- "A 10-ft ladder's base is 6 ft from a wall. Height?" Draw: 6-8-10 → 8 ft.

TRAPS

- ~~X Solving geometry in your head~~ ✓ **Drawing and labeling**
- ~~X Trusting a figure marked "not to scale"~~ ✓ **Using only the given facts**
- ~~X Skipping the sketch to save time~~ ✓ **A 10-second sketch saves a minute**

DRILL HABIT

For every geometry question this week, draw before you calculate, even when there's a figure. Label everything.

TRY IT

- 1 A square has diagonal $6\sqrt{2}$. Area?
- 2 Distance between $(-2, 1)$ and $(4, 9)$?
- 3 A triangle's angles are in the ratio 1 : 2 : 3. Largest angle?

ANSWERS 1 36 · 2 10 · 3 90°

Sketch It: Drill

10 original questions. Answer all of them before checking.

MS-5

DRILL

- 1 Rectangle with diagonal 10 and one side 6. Area?
- 2 Distance from (2, 3) to (8, 11)?
- 3 Isosceles triangle, base angles 65° . Vertex angle?
- 4 A 13-ft ladder reaches 12 ft up a wall. Base distance?
- 5 Square with diagonal $8\sqrt{2}$. Area?
- 6 Walk 3 km north, then 4 km east. Straight-line distance from start?
- 7 A triangle's angles are in ratio 2 : 3 : 4. Largest angle?
- 8 Equilateral triangle, side 10. Height?
- 9 A figure says "not drawn to scale." What do you trust?
- 10 Circle with radius 5 centered at the origin. Does (3, 4) lie on it?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · any Math unit

College Board Question Bank · any Math domain · any skill; apply the tool

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 48 · 6-8-10.

2 10 · Legs 6 and 8.

3 50° · $180 - 130$.

4 5 ft · 5-12-13.

5 64 · Side 8.

6 5 km · 3-4-5.

7 80° · $180 \times 4/9$.

8 $5\sqrt{3}$ · 30-60-90.

9 Only the given measurements · Redraw it.

10 Yes · $3^2 + 4^2 = 25$.

Desmos Power Moves

Turn algebra into reading a graph.

MS-6

LESSON

THE RULE

The built-in Desmos graphing calculator turns many questions into reading a graph. Use it to **solve equations, find intersections, check equivalence, find vertices and zeros, and fit data.**

TASK	TYPE INTO DESMOS	READ
Solve an equation	each side as its own graph	x of the intersection
Solve a system	both equations	the intersection point
Zeros of a function	$y = f(x)$	x-intercepts (click them)
Vertex, max, min	$y = f(x)$	click the turning point
Check equivalence	both expressions	same curve = equivalent
Unknown constant	a slider: $y = ax^2 + 3$	move a until the condition holds
Line of best fit	a table, then $y_1 \sim mx_1 + b$	m and b

REMEMBER Desmos is powerful but not always fastest: simple linear equations are quicker by hand. Use it when the algebra is messy, when you need to check, or when you're stuck. Practice in Bluebook's Desmos so it's automatic on test day.

WORKED EXAMPLES

- " $x^2 - 6x + 5 = 0$. Sum of solutions?" Graph $\rightarrow$ zeros 1 and 5 $\rightarrow$ 6.
- "How many solutions: $y = x^2$ and $y = 2x + 3$?" Graph both $\rightarrow$ 2 intersections.
- "For what c does $x^2 + 4x + c = 0$ have exactly one solution?" Slider c $\rightarrow$ the graph touches the x-axis at $c = 4$.
- "Which is equivalent to $(2x - 3)^2$?" Graph it and each choice; find the overlap.

TRAPS

- ✗ Typing the word problem into Desmos ✓ Setting up the equation first
- ✗ Reading a rounded point by eye ✓ Clicking it for exact coordinates
- ✗ Using Desmos for $2x + 3 = 11$ ✓ Doing easy ones by hand

DRILL HABIT

Do 15 Advanced Math questions using only Desmos, then 15 with your choice of method. Keep a list of question types Desmos crushed.

TRY IT

- 1 Solve $2x^2 - 3x - 2 = 0$ with Desmos. Solutions?
- 2 Where do $y = 3x - 4$ and $y = -x + 8$ intersect?
- 3 Two expressions draw exactly the same graph. What does that mean?

ANSWERS 1 $x = -0.5$ and $x = 2$ 2 (3, 5) 3 They are equivalent

Desmos Power Moves: Drill

10 original questions. Answer all of them before checking.

MS-6

DRILL

- 1 Solve $x^2 - 7x + 10 = 0$ in Desmos. Solutions?
- 2 Intersection of $y = 2x - 1$ and $y = -x + 8$?
- 3 How many solutions: $y = x^2$ and $y = x + 6$?
- 4 Vertex of $y = x^2 - 6x + 4$?
- 5 For what c does $x^2 + 6x + c = 0$ have exactly one solution?
- 6 Two expressions draw the same graph. Conclusion?
- 7 Solve $3x^2 + x - 2 = 0$. Solutions?
- 8 Does $y = x^2 + 1$ ever cross the x -axis?
- 9 When is Desmos slower than hand work?
- 10 Solve $|x - 3| = 5$ by graphing. Solutions?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Advanced math
College Board Question Bank · Advanced Math
 · Nonlinear Equations and Systems (try every one in Desmos)

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 2 and 5 · Read the zeros.
- 2 (3, 5) · Graph both.
- 3 2 · Two intersections.
- 4 (3, -5) · Click the minimum.
- 5 9 · Slider: touches the axis.
- 6 They're equivalent · Same curve.
- 7 $x = 2/3$ and $x = -1$ · Zeros.
- 8 No · Minimum is 1.
- 9 On simple linear equations · $2x + 3 = 11$: by hand.
- 10 8 and -2 · Two intersections.

Student-Produced Responses

Enter it right so it's scored right.

MS-7

LESSON

THE RULE

About a quarter of math questions have no choices: you type the answer. Know the entry rules so a right answer isn't marked wrong, and check the answer yourself, since no choice confirms it.

RULE	EXAMPLE
Positive answers: up to 5 characters	12.75 ✓
Negative answers: up to 6, including the minus sign	-3.25 ✓
Fractions are fine	7/2 ✓ or 3.5 ✓
Decimals too long: fill the space (round or cut off)	2/3 → .6666 or .6667 ✓ (0.67 ✗)
No mixed numbers	3 1/2 ✗ → 7/2 or 3.5
No commas, units, % or \$	1500 ✓ · 1,500 ✗
More than one correct answer	enter just one

REMEMBER Bluebook shows a preview of how your entry will be read: always glance at it. Then plug your answer back into the original equation before moving on.

WORKED EXAMPLES

- Answer $1/8$: enter $1/8$ or $.125$.
- Answer $-5/6$: enter $-5/6$ or $-.8333$.
- Percent asked for as a number: enter 50, not 50%.
- Check: substitute the answer into the original.

TRAPS

- ✗ $1\frac{1}{2}$ ✓ $3/2$ or 1.5
 ✗ 0.67 for $2/3$ ✓ $2/3$ or $.6667$
 ✗ $\$1,200$ ✓ 1200

DRILL HABIT

On every typed answer this week, check the preview and plug your answer back in before moving on.

TRY IT

- 1 Enter $5/12$ two acceptable ways.
- 2 Is " $2\frac{3}{4}$ " acceptable?
- 3 $x^2 = 49$ and the question asks for one value of x . What do you enter?

ANSWERS 1 $5/12$, or $.4166$ / $.4167$ · 2 No: $11/4$ or 2.75 · 3 7 or -7 (enter just one)

Student-Produced Responses: Drill

10 original questions. Answer all of them before checking.

MS-7

DRILL

- 1 Answer is $3/8$. Two acceptable entries?
- 2 Answer is $2/3$. Acceptable decimals?
- 3 Answer is $-1/6$. Acceptable entry?
- 4 Is "4 1/2" acceptable?
- 5 Answer is 2,500. Enter?
- 6 $x^2 = 64$, question asks for one value. Enter?
- 7 Is 0.67 acceptable for $2/3$?
- 8 Answer is 40%; the question asks for the percent as a number. Enter?
- 9 After typing an answer, what two checks?
- 10 $3x + 5 = 9$. Enter x .

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · any Math unit
College Board Question Bank · any Math domain · student-produced response questions

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 $3/8$ or .375 · Both fit.
- 2 .6666 or .6667 · Fill the space.
- 3 $-1/6$ or $-.1666$ / $-.1667$ · Negative allows 6 characters.
- 4 No: enter $9/2$ or 4.5 · No mixed numbers.
- 5 2500 · No commas.
- 6 8 or -8 · Either one.
- 7 No · Too short a decimal.
- 8 40 · No % sign.
- 9 Glance at the preview; plug it back in · No choice confirms it.
- 10 $4/3$ or 1.333 · $x = 4/3$.

The Three Rounds

Easy points first. Hard ones last.

THE RULE

If you run out of time, stop working strictly in order. **Round 1:** answer everything you can do quickly; flag the rest. **Round 2:** work the flagged questions you know how to start. **Round 3:** spend what's left on the hardest. Before time ends, no blanks.

ROUND	WHAT	MATH MODULE (35 MIN)
1	Every question you can do in about a minute; flag the rest	about 15–18 min
2	Flagged questions you know how to start	about 10–12 min
3	The hardest ones: Desmos, plugging in, drawing	what's left
Final minute	Guess on every blank	always

REMEMBER A hard question you skip costs one question; three easy ones you never reach cost three. Even if you finish comfortably, flag and move on from any question taking more than about two minutes.

WORKED EXAMPLES

- Q14 looks long and messy: flag it, keep moving.
- Round 2: back to Q14 with fresh eyes; the first move is often obvious now.
- Round 3: the last two hard questions, with Desmos.
- Before time expires: an answer in every question.

TRAPS

- ✗ ~~Fighting one question for four minutes~~ ✓ **Flag it at about two**
- ✗ ~~Leaving blanks~~ ✓ **Guessing on every blank**
- ✗ ~~Skipping easy-looking questions at the end~~ ✓ **Round 1 includes the whole module**

DRILL HABIT

Take one module with the Three Rounds and one without, both timed. Compare correct answers and time left.

TRY IT

- 1 You've spent two minutes on a question with no path. What now?
- 2 Is there a penalty for wrong answers?
- 3 In which pass do you work the hardest questions?

ANSWERS 1 Flag it, guess, move on, return later · 2 No · 3 Round 3

The Three Rounds: Drill

10 original questions. Answer all of them before checking.

MS-8

DRILL

- 1 Round 1 covers which questions?
- 2 You've spent two minutes without a path. What now?
- 3 Round 2 covers?
- 4 Round 3 covers?
- 5 What happens in the final minute?
- 6 About how long does Round 1 take in a 35-minute module?
- 7 Is it worth four minutes on one hard question while easy ones wait?
- 8 Should Round 1 include questions near the end of the module?
- 9 A question looks long but simple. Round 1 or flag?
- 10 Main benefit of the Three Rounds?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · any Math unit

College Board Question Bank · any Math domain · any skill; apply the tool

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 Everything you can do in about a minute · Flag the rest.
- 2 Flag, guess, move on · Return in Round 2 or 3.
- 3 Flagged questions you know how to start · Fresh eyes help.
- 4 The hardest questions · With Desmos, plugging in, drawing.
- 5 Guess on every blank · No penalty.
- 6 About 15–18 minutes · Then Round 2 and 3.
- 7 No · Answer what you can first; return to the hard one.
- 8 Yes · Easy questions can appear late.
- 9 Round 1 if you can do it in about a minute · Length ≠ difficulty.
- 10 No easy points lost to the clock · Easy first, hard last.

The Myth of Natural Talent, and How to Actually Study



JOSEF AIDEN DURAND
FROM THE AUTHOR

"I'm just not a math person." I've heard it a thousand times, and it has never once been true. Some people started earlier, practiced more, or had better teachers. That's an explanation, not a destiny.

Most students study wrong. They do page after page of questions, check the answers, feel good about the right ones, and move on. The misses, the only questions that could teach them anything, get a glance and a shrug. Then they miss the same kind of question on test day.

Study right instead. Learn one skill at a time. Practice it with questions at the right difficulty. Then spend real time on every miss: prove why the right answer is right, name why yours was wrong, and redo the question three days later, a week later, and three weeks later, from scratch. That last part feels slow. It's the fastest thing you can do.

Talent is what we call the results of practice we didn't see. Go build some.

Linear Equations in One Variable

Isolate x , and know when there's no solution.

THE RULE

Solve by doing the same thing to both sides until x is alone: distribute, combine like terms, move variables to one side, divide. Some equations have **no solution** or **infinitely many**.

CASE	WHAT HAPPENS	EXAMPLE
One solution	$x = \text{a number}$	$3x + 4 = 19 \rightarrow x = 5$
No solution	the variables cancel; a false statement	$2x + 3 = 2x + 7 \rightarrow 3 = 7$
Infinitely many	the variables cancel; a true statement	$2(x + 3) = 2x + 6 \rightarrow 6 = 6$
Fractions	multiply by the common denominator first	$x/3 + x/2 = 10 \rightarrow 2x + 3x = 60 \rightarrow x = 12$
"No solution" questions	same x -coefficient, different constant	$ax + 5 = 3x + 2$ has none when $a = 3$

REMEMBER For "how many solutions" questions, compare coefficients: same x -coefficient and same constant = infinitely many; same x -coefficient, different constant = none; different x -coefficients = exactly one.

WORKED EXAMPLES

- $4(x - 1) = 2x + 10 \rightarrow 4x - 4 = 2x + 10 \rightarrow 2x = 14 \rightarrow x = 7$
- $3x/4 = 9 \rightarrow x = 12$
- $6x + 2 = 2(3x + 1) \rightarrow \text{infinitely many}$
- $ax + 7 = 5x - 1$ has no solution $\rightarrow a = 5$

TRAPS

- $\times$ ~~$4(x - 1) = 4x - 1$~~ $\checkmark$ $4x - 4$ (distribute to every term)
- $\times$ ~~$-(x - 3) = -x - 3$~~ $\checkmark$ $-x + 3$
- $\times$ ~~Dividing only one term by 2~~ $\checkmark$ Dividing every term

DRILL HABIT

Twenty linear equations by hand, timed: target under 40 seconds each. Check each by substituting.

TRY IT

- 1 $5(x - 2) = 3x + 6$. x ?
- 2 For what k does $4x + k = 4x - 9$ have infinitely many solutions?
- 3 $7x - 3 = 7x + c$ has no solution. Give one possible c .
- 4 $(2x + 1)/3 = x - 1$. x ?

ANSWERS 1 8 · 2 -9 · 3 Any $c \neq -3$ · 4 4

Linear Equations in One Variable: Drill

10 original questions. Answer all of them before checking.

- 1 $3(x - 4) = x + 6$. x ?
- 2 $x/5 + 2 = 6$. x ?
- 3 $2(x + 3) = 2x + k$ has infinitely many solutions. k ?
- 4 $5x + 1 = 5x + c$ has no solution. Which c works: 1 or 4?
- 5 $(x + 4)/2 = x - 1$. x ?
- 6 $7 - 2x = 3x - 8$. x ?
- 7 $ax + 3 = 4x - 5$ has no solution. a ?
- 8 $0.4x = 12$. x ?
- 9 $x/3 - x/6 = 2$. x ?
- 10 $4(2x - 1) - 3(x + 2) = 5$. x ?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Algebra

College Board Question Bank · Algebra · Linear Equations in One Variable

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $9 \cdot 3x - 12 = x + 6$.

2 $20 \cdot x/5 = 4$.

3 $6 \cdot$ Same constant.

4 $4 \cdot$ Different constant.

5 $6 \cdot x + 4 = 2x - 2$.

6 $3 \cdot 15 = 5x$.

7 $4 \cdot$ Same coefficient.

8 $30 \cdot 12/0.4$.

9 $12 \cdot x/6 = 2$.

10 $3 \cdot 5x - 10 = 5$.

Linear Functions and Slope

Rate of change and starting value.

THE RULE

A linear function changes by the same amount for every step in x . In $y = mx + b$, m is the slope (rate of change) and b is the y -intercept (starting value).

Slope = rise/run = $(y_2 - y_1)/(x_2 - x_1)$.

IDEA	FORMULA OR MEANING
Slope from two points	$m = (y_2 - y_1)/(x_2 - x_1)$
Slope-intercept form	$y = mx + b$
Point-slope form	$y - y_1 = m(x - x_1)$
Parallel lines	same slope
Perpendicular lines	negative reciprocal slopes (2 and $-1/2$)
In a word problem	m = rate per unit; b = starting amount or fixed fee
Horizontal / vertical	$y = c$ has slope 0; $x = c$ has undefined slope

REMEMBER Word problems test interpretation: in $C = 45h + 60$, 45 is the cost per hour and 60 is the fixed cost (the cost when $h = 0$).

WORKED EXAMPLES

- (1, 5) and (4, 14): $m = 9/3 = 3$
- Parallel to $y = -2x + 7$ through (1, 1): $y = -2x + 3$
- A 500-liter tank drains 20 liters per minute: $V = 500 - 20t$
- Table $x = 0, 1, 2 \rightarrow y = 7, 10, 13$: $y = 3x + 7$

TRAPS

- ~~X~~ Slope = run/rise ☒ rise/run
- ~~X~~ Perpendicular to slope 2 is ~~-2~~ ☒ $-1/2$
- ~~X~~ Reading the intercept as the rate ☒ The rate is the coefficient of x

DRILL HABIT

Write the equation of a line from 10 tables and 10 word problems. Say what m and b mean in words each time.

TRY IT

- 1 Slope through (2, 3) and (6, 11)?
- 2 Slope of a line perpendicular to $y = 4x - 1$?
- 3 $C = 15m + 40$ dollars for m months. What does 40 represent?
- 4 Line through (0, -2) with slope 3?

ANSWERS 1 $2 \cdot 2 - 1/4 \cdot 3$ A one-time starting fee of \$40 · 4 $y = 3x - 2$

Linear Functions and Slope: Drill

10 original questions. Answer all of them before checking.

- 1 Slope through (1, 2) and (5, 14)?
- 2 Slope perpendicular to $y = -3x + 1$?
- 3 Line parallel to $y = 4x - 2$ through (0, 5)?
- 4 $C = 12h + 30$ (cost for h hours). Meaning of 12?
- 5 Same model: meaning of 30?
- 6 Table: $x = 0, 2, 4 \rightarrow y = 5, 11, 17$. Equation?
- 7 A 400-gallon tank drains 25 gallons per minute. When is it empty?
- 8 Line through (2, 9) with slope -2 . y -intercept?
- 9 Slope of a horizontal line?
- 10 $f(x) = 7 - 2x$. f increases or decreases as x increases?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Algebra

College Board Question Bank · Algebra · Linear Functions

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $3 \cdot 12/4$.

2 $1/3 \cdot$ Negative reciprocal.

3 $y = 4x + 5 \cdot$ Same slope.

4 Cost per hour · The rate.

5 Fixed fee (cost at 0 hours) · The intercept.

6 $y = 3x + 5 \cdot$ Slope $6/2$.

7 16 minutes · $400/25$.

8 $13 \cdot 9 = -4 + b$.

9 0 · No rise.

10 Decreases · Negative slope.

Linear Equations in Two Variables

Every solution is a point on the line.

THE RULE

An equation like $3x + 2y = 12$ describes a line: every (x, y) that makes it true is a point on the line. Know how to switch forms, find intercepts, and **model two-item word problems**.

FORM OR TASK	HOW
Standard form $Ax + By = C$	slope = $-A/B$
x-intercept	set $y = 0$
y-intercept	set $x = 0$
Is a point on the line?	plug it in: true means yes
Two-item word problem	$(\text{price}_1)(\text{count}_1) + (\text{price}_2)(\text{count}_2) = \text{total}$
Which combination works?	test the choices in the equation

REMEMBER Model: pencils at \$2 and pens at \$5 cost \$40 in total $\rightarrow 2x + 5y = 40$. If 10 pencils were bought: $20 + 5y = 40 \rightarrow y = 4$ pens.

WORKED EXAMPLES

- $2x + 3y = 12 \rightarrow$ y-intercept 4, x-intercept 6
- The slope of $6x + 3y = 9$ is -2
- Small boxes hold 4 books, large boxes 10; 58 books fill 7 boxes $\rightarrow 4s + 10l = 58$ and $s + l = 7$
- $y = (2/3)x - 4$ in standard form: $2x - 3y = 12$

TRAPS

- ✗ Slope of $Ax + By = C$ as A/B ✓ $-A/B$
- ✗ Mixing up which variable is which item ✓ Define x and y in words first
- ✗ Setting $x = 0$ for the x-intercept ✓ Set $y = 0$

DRILL HABIT

Translate 10 two-item word problems into equations before solving any of them.

TRY IT

- 1 Slope of $4x - 2y = 10$?
- 2 x-intercept of $3x + 5y = 30$?
- 3 Adult tickets cost \$9, child \$6, total \$72. With 4 adult tickets, how many child tickets?
- 4 Is $(2, -1)$ on $5x + 3y = 7$?

ANSWERS 1 2 · 2 10 · 3 6 · 4 Yes ($10 - 3 = 7$)

Linear Equations in Two Variables: Drill

10 original questions. Answer all of them before checking.

AL-3

DRILL

- 1 Slope of $6x + 2y = 10$?
- 2 x-intercept of $4x - 5y = 20$?
- 3 y-intercept of $4x - 5y = 20$?
- 4 Is $(3, 1)$ on $2x + 3y = 9$?
- 5 Apples \$2, pears \$3, total \$24, 6 apples. Pears?
- 6 Write $y = -(1/2)x + 3$ in standard form with integers.
- 7 Small vans hold 8, large hold 12; 10 vans carry 100. Large vans?
- 8 Slope of $3x - y = 7$?
- 9 Which point is on $y = 2x - 3$: $(2, 1)$ or $(1, 2)$?
- 10 Tickets: adult \$10, child \$4. Total \$70 with 5 adults. Children?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Algebra

College Board Question Bank · Algebra · Linear Equations in Two Variables

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $-3 \cdot -A/B$.

2 $5 \cdot y = 0$.

3 $-4 \cdot x = 0$.

4 Yes · $6 + 3 = 9$.

5 $4 \cdot 12 + 3p = 24$.

6 $x + 2y = 6$ · Multiply by 2.

7 $5 \cdot 8s + 12l = 100$, $s + l = 10$.

8 $3 \cdot y = 3x - 7$.

9 $(2, 1) \cdot 4 - 3 = 1$.

10 $5 \cdot 50 + 4c = 70$.

Systems of Linear Equations

Two equations, one point (or none, or infinitely many).

THE RULE

A system is two equations that must both be true. Solve by **substitution**, **elimination**, or **graphing**. Know how many solutions a system has without solving it.

METHOD OR CASE	HOW OR WHEN
Substitution	one variable is already alone ($y = 2x + 1$)
Elimination	add or subtract equations to cancel a variable
Desmos	graph both; read the intersection
Exactly one solution	different slopes
No solution	same slope, different intercepts (parallel lines)
Infinitely many	the same line (one equation is a multiple of the other)

REMEMBER Shortcut: if they ask for $x + y$ or $6x + 4y$, adding or subtracting the equations may give it directly, without solving for each variable.

WORKED EXAMPLES

- $y = 2x$ and $3x + y = 15 \rightarrow 5x = 15 \rightarrow x = 3, y = 6$
- $x + 2y = 8$ and $x - 2y = 0 \rightarrow$ add: $2x = 8 \rightarrow x = 4$
- $y = 3x + 1$ and $y = 3x - 5 \rightarrow$ parallel $\rightarrow$ no solution
- $2x + y = 5$ and $4x + 2y = 10 \rightarrow$ same line $\rightarrow$ infinitely many

TRAPS

- ~~✗ Stopping at x when they ask for y~~ ✓ **Answering what they ask**
- ~~✗ Subtracting only part of an equation~~ ✓ **Subtracting every term**
- ~~✗ Assuming different intercepts means one solution~~ ✓ **Comparing slopes first**

DRILL HABIT

Solve 10 systems three ways: substitution, elimination, Desmos. Note which is fastest for each type.

TRY IT

- 1 $x + y = 10$ and $x - y = 4$. x ?
- 2 $2x + 3y = 13$ and $x = y + 4$. y ?
- 3 For what k do $3x + ky = 6$ and $6x + 4y = 12$ have infinitely many solutions?
- 4 $4x + y = 9$ and $2x + 3y = 7$. What is $6x + 4y$?

ANSWERS 1 7 · 2 1 · 3 2 · 4 16

Systems of Linear Equations: Drill

10 original questions. Answer all of them before checking.

- 1 $x + y = 12$ and $x - y = 4$. x ?
- 2 $y = 3x$ and $2x + y = 20$. y ?
- 3 $2x + 3y = 12$ and $2x - y = 4$. y ?
- 4 $y = 2x + 5$ and $y = 2x - 1$. Solutions?
- 5 $3x + 2y = 6$ and $6x + 4y = 12$. Solutions?
- 6 For what k do $x + ky = 4$ and $2x + 6y = 8$ have infinitely many solutions?
- 7 $5x + y = 13$ and $3x + 3y = 15$. What is $8x + 4y$?
- 8 $x = 2y$ and $x + y = 15$. x ?
- 9 $4x - y = 7$ and $x + y = 8$. x ?
- 10 When does a system have exactly one solution?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Algebra

College Board Question Bank · Algebra ·
Systems of Two Linear Equations in Two
Variables

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing
Challenge) · Question Bank: Hard

ANSWERS

1 8 · Add: $2x = 16$.

2 12 · $5x = 20$.

3 2 · Subtract: $4y = 8$.

4 None · Parallel.

5 Infinitely many · Same line.

6 3 · Double the first.

7 28 · Add the equations.

8 10 · $3y = 15$.

9 3 · Add: $5x = 15$.

10 Different slopes · Lines cross once.

Linear Inequalities

Like equations, with one twist.

THE RULE

Solve inequalities like equations, with one extra rule: **multiplying or dividing by a negative flips the sign**. On a graph, $<$ and $>$ use a dashed line; $\leq$ and $\geq$ use a solid line, with the solutions shaded.

IDEA	EXAMPLE
Solve	$3x - 5 < 10 \rightarrow x < 5$
Flip when dividing by a negative	$-2x \geq 8 \rightarrow x \leq -4$
Word cues	at least $\geq$ · at most $\leq$ · more than $>$ · fewer than $<$
Model	a van holds at most 12 people: $p \leq 12$
Graph $y > 2x + 1$	dashed line, shade above
System of inequalities	the overlap of the shaded regions
Is a point a solution?	plug it into every inequality

REMEMBER Budget problems are the classic: tickets cost \$15 and parking \$10; she can spend at most \$70 $\rightarrow 15t + 10 \leq 70 \rightarrow t \leq 4$.

WORKED EXAMPLES

- $2x + 7 \leq 15 \rightarrow x \leq 4$
- $-x/3 < 2 \rightarrow x > -6$
- $y \leq -x + 4$: solid line, shade below
- Does (2, 3) satisfy $y > x$ and $y < 5$? $3 > 2$ ✓, $3 < 5$ ✓ $\rightarrow$ yes

TRAPS

- ✗ Not flipping after dividing by -2 ✓ Flipping the sign
- ✗ “at least” as $\leq$ ✓ $\geq$
- ✗ A dashed line for $\leq$ ✓ A solid line

DRILL HABIT

Write inequalities for 10 real limits from your life (budget, time, phone storage), then solve them.

TRY IT

- 1 Solve $-3x + 4 > 19$.
- 2 “At least 40 points” as an inequality in p ?
- 3 Is (1, 5) a solution of $y > 3x + 1$?
- 4 Shirts cost \$12 each plus a \$5 fee; the budget is at most \$65. Maximum shirts?

ANSWERS 1 $x < -5$ · 2 $p \geq 40$ · 3 Yes ($5 > 4$) · 4 5

Linear Inequalities: Drill

10 original questions. Answer all of them before checking.

- 1 Solve $4x - 3 < 13$.
- 2 Solve $-2x + 5 \geq 11$.
- 3 “At most 30 students” in s ?
- 4 Is $(2, 7)$ a solution of $y > 3x$?
- 5 Is $(1, 1)$ a solution of $y \geq 2x + 1$?
- 6 Tickets \$12 each plus \$8 parking; budget \$80. Max tickets?
- 7 Graph of $y < x + 2$: line type?
- 8 Solve $x/3 + 1 \leq 5$.
- 9 “More than 50 points” in p ?
- 10 Solve $3 - x > 1$.

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Algebra

College Board Question Bank · Algebra · Linear Inequalities in One or Two Variables

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $x < 4$ · $4x < 16$.

2 $x \leq -3$ · Flip when dividing by -2 .

3 $s \leq 30$ · At most = $\leq$.

4 Yes · $7 > 6$.

5 No · $1 < 3$.

6 $6 \cdot 12t + 8 \leq 80$.

7 Dashed · Strict inequality.

8 $x \leq 12$ · $x/3 \leq 4$.

9 $p > 50$ · Strict.

10 $x < 2$ · $-x > -2$.

Exponents and Radicals

Rewrite until it matches.

AM-1

LESSON

THE RULE

Exponent rules let you rewrite expressions to match the choices. Radicals are fractional exponents: $\sqrt{x} = x^{1/2}$, $\sqrt[3]{x} = x^{1/3}$.

RULE	EXAMPLE
$x^a \cdot x^b = x^{a+b}$	$x^3 \cdot x^4 = x^7$
$x^a \div x^b = x^{a-b}$	$x^6 \div x^2 = x^4$
$(x^a)^b = x^{ab}$	$(x^2)^5 = x^{10}$
$x^0 = 1$	$7^0 = 1$
$x^{-a} = 1/x^a$	$2^{-3} = 1/8$
$x^{a/b} = (\text{b-th root of } x)^a$	$8^{2/3} = (\sqrt[3]{8})^2 = 4$
$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$	$\sqrt{50} = 5\sqrt{2}$

REMEMBER To solve with different bases, rewrite with a common base: $4^x = 2^{2x}$, $27 = 3^3$. Then set the exponents equal.

WORKED EXAMPLES

- $x^5 \cdot x^{-2} = x^3$
- $16^{3/4} = (\text{fourth root of } 16)^3 = 2^3 = 8$
- $2^x = 32 \rightarrow x = 5$
- $(3a^2b)^3 = 27a^6b^3$

TRAPS

- $\times x^3 \cdot x^4 = x^{12}$ ✓ x^7 : add exponents
 $\times (2x)^3 = 2x^3$ ✓ $8x^3$
 $\times x^{-2} = x^2$ ✓ $1/x^2$

DRILL HABIT

Twenty exponent rewrites in 10 minutes. Check the hard ones in Desmos by graphing both forms.

TRY IT

- 1 Simplify $(2x^3)^2 \cdot x$.
- 2 If $9^x = 3^{x+4}$, what is x ?
- 3 Write $\sqrt[3]{x^2}$ as a power of x .
- 4 Simplify $\sqrt{72}$.

ANSWERS 1 $4x^7$ · 2 4 · 3 $x^{2/3}$ · 4 $6\sqrt{2}$

Exponents and Radicals: Drill

10 original questions. Answer all of them before checking.

AM-1

DRILL

- 1 Simplify $x^4 \cdot x^3$.
- 2 Simplify $(3x^2)^3$.
- 3 $8^{2/3} = ?$
- 4 $5^{-2} = ?$
- 5 $4^x = 2^{x+3}$. $x = ?$
- 6 Simplify $\sqrt{48}$.
- 7 Write $\sqrt{(x^3)}$ as a power of x .
- 8 $x^9 \div x^3 = ?$
- 9 $27^x = 9$. $x = ?$
- 10 $(2a^3b)^2 = ?$

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· Equivalent Expressions

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 x^7 · Add exponents.

2 $27x^6$ · Cube both.

3 $4 \cdot (\sqrt[3]{8})^2$.

4 $1/25$ · Reciprocal.

5 $3 \cdot 2^{2x} = 2^{x+3}$.

6 $4\sqrt{3} \cdot 16 \cdot 3$.

7 $x^{3/2}$ · Root = $\frac{1}{2}$ power.

8 x^6 · Subtract.

9 $2/3 \cdot 3^{3x} = 3^2$.

10 $4a^6b^2$ · Square each factor.

Polynomials: Factoring and Equivalent Forms

AM-2

Expand, factor, combine.

LESSON

THE RULE

Equivalent-expression questions ask you to expand, factor or combine. Know the common patterns on sight; when in doubt, make up a number (MS-3) or graph both (MS-6).

PATTERN	EXAMPLE
Distribute (FOIL)	$(x + 3)(x - 5) = x^2 - 2x - 15$
Greatest common factor	$6x^2 + 9x = 3x(2x + 3)$
Difference of squares	$a^2 - b^2 = (a + b)(a - b)$
Perfect square	$(a + b)^2 = a^2 + 2ab + b^2$
Trinomial	$x^2 + 7x + 12 = (x + 3)(x + 4)$
Leading coefficient $\neq 1$	$2x^2 + 7x + 3 = (2x + 1)(x + 3)$
Combine like terms	$(3x^2 - 2x) - (x^2 - 5x) = 2x^2 + 3x$

REMEMBER When subtracting a polynomial, distribute the minus to **every** term. That single sign error is the most common miss on this skill.

WORKED EXAMPLES

- $x^2 - 9 = (x + 3)(x - 3)$
- $x^2 + 10x + 25 = (x + 5)^2$
- $x^2 - x - 20 = (x - 5)(x + 4)$
- $(x + a)(x + 4) = x^2 + 9x + 20 \rightarrow a = 5$

TRAPS

- $\times (x + 3)^2 = x^2 + 9$ ✓ $x^2 + 6x + 9$
 $\times -(x^2 - 5x) = -x^2 - 5x$ ✓ $-x^2 + 5x$
 $\times x^2 + 9 = (x + 3)(x - 3)$ ✓ $x^2 + 9$ doesn't factor this way

DRILL HABIT

Factor 30 quadratics, timed. Check five of them in Desmos.

TRY IT

- 1 Factor $x^2 - 49$.
- 2 Expand $(2x - 3)^2$.
- 3 Factor $3x^2 - 12x$.
- 4 Simplify $(4x^2 + x) - (2x^2 - 3x)$.

ANSWERS 1 $(x + 7)(x - 7)$ · 2 $4x^2 - 12x + 9$ · 3 $3x(x - 4)$ · 4 $2x^2 + 4x$

Polynomials: Factoring and Equivalent Forms: Drill-2

10 original questions. Answer all of them before checking.

DRILL

- 1 Factor $x^2 - 81$.
- 2 Expand $(x - 4)^2$.
- 3 Factor $x^2 + 9x + 20$.
- 4 Factor $5x^2 - 15x$.
- 5 Factor $2x^2 + 5x - 3$.
- 6 $(3x^2 - x) - (x^2 - 4x) = ?$
- 7 $(x + a)(x + 3) = x^2 + 10x + 21$. a?
- 8 Expand $(2x + 5)(x - 1)$.
- 9 Does $x^2 + 16$ factor over the real numbers?
- 10 Factor $x^2 - 10x + 25$.

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Challenge) · Question Bank: Hard

ANSWERS

1 $(x + 9)(x - 9)$ · Difference of squares.

2 $x^2 - 8x + 16$ · Perfect square.

3 $(x + 4)(x + 5)$ · $4 \cdot 5 = 20$, $4 + 5 = 9$.

4 $5x(x - 3)$ · GCF.

5 $(2x - 1)(x + 3)$ · Check by FOIL.

6 $2x^2 + 3x$ · Distribute the minus.

7 $7 \cdot a + 3 = 10$.

8 $2x^2 + 3x - 5$ · FOIL.

9 No · Sum of squares.

10 $(x - 5)^2$ · Perfect square.

Quadratic Equations

Factor, formula, or graph, and the discriminant.

THE RULE

Set the equation equal to 0, then factor, use the quadratic formula, complete the square, or graph. The **discriminant** $b^2 - 4ac$ tells you how many real solutions there are.

TOOL	DETAIL
Factor	$x^2 - 5x + 6 = 0 \rightarrow (x - 2)(x - 3) = 0 \rightarrow x = 2 \text{ or } 3$
Quadratic formula	$x = (-b \pm \sqrt{b^2 - 4ac}) / 2a$
Discriminant > 0	two real solutions
Discriminant $= 0$	exactly one real solution
Discriminant < 0	no real solutions
Sum of the solutions	$-b/a$
Product of the solutions	c/a

REMEMBER Sum and product shortcuts save time: for $2x^2 - 8x + 3 = 0$, the sum of the solutions is $8/2 = 4$, with no solving.

WORKED EXAMPLES

- $x^2 = 4x \rightarrow x^2 - 4x = 0 \rightarrow x(x - 4) = 0 \rightarrow x = 0 \text{ or } 4$
- $2x^2 + 3x - 2 = 0 \rightarrow (2x - 1)(x + 2) = 0 \rightarrow x = 1/2 \text{ or } -2$
- $x^2 - 2x - 1 = 0 \rightarrow x = 1 \pm \sqrt{2}$
- $kx^2 + 4x + 1 = 0$ has one solution $\rightarrow 16 - 4k = 0 \rightarrow k = 4$

TRAPS

- ✗ Dividing $x^2 - 4x$ by x (losing $x = 0$) ✓ Moving everything to one side and factoring
- ✗ A sign error in $-b$ ✓ Writing $-b$ carefully
- ✗ Forgetting the $\pm$ ✓ Two roots unless the discriminant is 0

DRILL HABIT

For 15 quadratics, compute the discriminant first and predict the number of solutions before solving.

TRY IT

- 1 Solve $x^2 + 2x - 15 = 0$.
- 2 How many real solutions does $x^2 + 4x + 7 = 0$ have?
- 3 Sum of the solutions of $3x^2 - 12x + 1 = 0$?
- 4 For what c does $x^2 - 6x + c = 0$ have exactly one solution?

ANSWERS 1 $x = 3 \text{ or } -5$ 2 None ($16 - 28 < 0$) 3 4 4 4

Quadratic Equations: Drill

10 original questions. Answer all of them before checking.

- 1 Solve $x^2 - x - 12 = 0$.
- 2 How many real solutions: $x^2 + 2x + 5 = 0$?
- 3 Sum of the solutions of $2x^2 - 10x + 3 = 0$?
- 4 Product of the solutions of $3x^2 + 4x - 12 = 0$?
- 5 For what k does $x^2 + kx + 16 = 0$ have exactly one solution ($k > 0$)?
- 6 Solve $x^2 = 5x$.
- 7 Solve $x^2 - 4x - 2 = 0$.
- 8 Solve $4x^2 - 9 = 0$.
- 9 Discriminant of $x^2 - 6x + 9$?
- 10 Solve $2x^2 + 7x + 3 = 0$.

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ANSWERS

1 4 and $-3 \cdot (x - 4)(x + 3)$.

2 None · $4 - 20 < 0$.

3 $5 \cdot -b/a$.

4 $-4 \cdot c/a$.

5 $8 \cdot k^2 = 64$.

6 0 and $5 \cdot x(x - 5) = 0$.

7 $2 \pm \sqrt{6}$ · Quadratic formula.

8 $\pm 3/2 \cdot x^2 = 9/4$.

9 0 · One solution.

10 $-1/2$ and $-3 \cdot (2x + 1)(x + 3)$.

Parabolas: Graphs and Forms

Each form shows something different.

THE RULE

The graph of a quadratic is a parabola. **Standard form** shows the y-intercept, **factored form** shows the x-intercepts, and **vertex form** shows the vertex.

FORM	SHOWS	EXAMPLE
Standard: $y = ax^2 + bx + c$	y-intercept c; opens up if $a > 0$	$y = x^2 - 6x + 8 \rightarrow$ y-intercept 8
Factored: $y = a(x - p)(x - q)$	x-intercepts p and q	$y = (x - 2)(x - 4) \rightarrow$ 2 and 4
Vertex: $y = a(x - h)^2 + k$	vertex (h, k)	$y = (x - 3)^2 - 1 \rightarrow$ (3, -1)
Axis of symmetry	$x = -b/2a$, halfway between the zeros	$x = 3$
Maximum or minimum	the vertex's y-value	minimum -1

REMEMBER All three examples are the same parabola. A common question: "Which form displays the minimum value as a constant or coefficient?" Answer: vertex form.

WORKED EXAMPLES

- $y = x^2 + 4x + 1 \rightarrow$ vertex $x = -4/2 = -2$, $y = -3$
- Zeros 1 and 5 $\rightarrow$ axis $x = 3$
- $y = -(x - 2)^2 + 9 \rightarrow$ maximum 9 at $x = 2$
- $h = -16t^2 + 32t + 5 \rightarrow$ maximum at $t = 1$: $h = 21$

TRAPS

- ~~X~~ Vertex of $(x + 1)^2$ at $x = 1$ ✓ $x = -1$
- ~~X~~ Zeros of $(x - 7)(x + 3)$ are -7 and 3 ✓ 7 and -3
- ~~X~~ $a < 0$ opens up ✓ $a < 0$ opens down

DRILL HABIT

Write one parabola in all three forms and check in Desmos that they overlap.

TRY IT

- 1 Vertex of $y = 2(x + 1)^2 + 5$?
- 2 Zeros of $y = (x - 7)(x + 3)$?
- 3 Axis of symmetry of $y = x^2 - 10x + 4$?
- 4 Does $y = -3x^2 + 2$ open up or down?

ANSWERS 1 (-1, 5) • 2 7 and -3 • 3 $x = 5$ • 4 Down

Parabolas: Graphs and Forms: Drill

10 original questions. Answer all of them before checking.

AM-4

DRILL

- 1 Vertex of $y = (x - 4)^2 + 1$?
- 2 Zeros of $y = (x + 2)(x - 6)$?
- 3 Axis of symmetry of $y = x^2 + 8x - 1$?
- 4 Minimum value of $y = x^2 - 2x + 7$?
- 5 $y = -2(x - 3)^2 + 10$: opens? maximum?
- 6 y-intercept of $y = 3x^2 - 5x + 2$?
- 7 A ball: $h = -16t^2 + 64t$. Maximum height?
- 8 Which form shows the vertex as constants?
- 9 Zeros at 1 and 7. Axis of symmetry?
- 10 Rewrite $y = x^2 + 6x + 5$ in vertex form.

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Challenge) · Question Bank: Hard

ANSWERS

1 (4, 1) · Vertex form.

2 -2 and 6 · Factored form.

3 $x = -4 \cdot -b/2a$.

4 6 · At $x = 1$.

5 Down; 10 · $a < 0$.

6 $2 \cdot x = 0$.

7 $64 \cdot t = 2$.

8 Vertex form · $a(x - h)^2 + k$.

9 $x = 4$ · Midpoint.

10 $y = (x + 3)^2 - 4$ · Complete the square.

Exponential Functions

Same percent every step.

AM-5

LESSON

THE RULE

Exponential functions grow or shrink by the same **percent** each step: $f(t) = a(b)^t$, where a is the starting value and b is the growth factor. $b > 1$ is growth; $0 < b < 1$ is decay.

SITUATION	MODEL
Grows 5% per year	$a(1.05)^t$
Decays 20% per year	$a(0.80)^t$
Doubles every 3 years	$a(2)^{t/3}$
Halves every 10 hours	$a(1/2)^{t/10}$
Linear vs. exponential	adds the same amount vs. multiplies by the same factor
Reading b	$1.08 \rightarrow 8\%$ increase · $0.92 \rightarrow 8\%$ decrease

REMEMBER Watch the time units: monthly growth with t in years becomes $(1 + r)^{12t}$. “What does 0.92 represent?” wants the factor or percent decrease, not the starting value.

WORKED EXAMPLES

- \$1,000 at 6% per year: $1000(1.06)^t$
- 80 mg of medicine halving every 6 hours: $80(0.5)^{t/6}$; after 12 hours, 20 mg
- Table 3, 6, 12, 24 $\rightarrow$ exponential ($\times 2$)
- Table 3, 6, 9, 12 $\rightarrow$ linear ($+ 3$)

TRAPS

- ~~X~~ Decay of 20% as $(0.20)^t$ ✓ $(0.80)^t$
- ~~X~~ Doubling every 3 years as 2^{3t} ✓ $2^{t/3}$
- ~~X~~ Calling 1.05 a 105% increase ✓ A 5% increase

DRILL HABIT

Write models for 10 real situations (savings, battery drain, population) and say what a and b mean in each.

TRY IT

- 1 A town of 20,000 grows 3% per year. Model?
- 2 $f(t) = 500(0.85)^t$. Percent decrease per step?
- 3 A culture of 100 doubles every 4 hours. Size after 12 hours?
- 4 Is $y = 3x + 2$ linear or exponential?

ANSWERS 1 $P = 20,000(1.03)^t$ · 2 15% · 3 800 · 4 Linear

Exponential Functions: Drill

10 original questions. Answer all of them before checking.

AM-5

DRILL

- 1 A town of 10,000 grows 4% a year. Model?
- 2 $f(t) = 200(0.9)^t$. Percent decrease per step?
- 3 50 bacteria double every 3 hours. Count after 9 hours?
- 4 120 mg halves every 4 hours. Amount after 8 hours?
- 5 Table 2, 6, 18, 54: linear or exponential?
- 6 \$500 at 5% a year for 2 years (compounded yearly)?
- 7 $y = 3(1.2)^x$: initial value and growth rate?
- 8 A car worth \$20,000 loses 15% a year. Value factor per year?
- 9 Doubles every 5 years. Exponent form with t in years?
- 10 Table 4, 7, 10, 13: linear or exponential?

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Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $P = 10,000(1.04)^t$ · Growth factor 1.04.

2 $10\% \cdot 1 - 0.9$.

3 $400 \cdot 50 \cdot 2^3$.

4 $30 \text{ mg} \cdot 120 \cdot \frac{1}{4}$.

5 Exponential · $\times 3$.

6 $\$551.25 \cdot 500 \cdot 1.05^2$.

7 3; $20\% \cdot a$ and $b - 1$.

8 $0.85 \cdot 1 - 0.15$.

9 $2^{t/5}$ · Divide by the doubling time.

10 Linear · $+ 3$ each step.

Rational Expressions and Equations

Fractions with variables.

AM-6

LESSON

THE RULE

To solve a rational equation, multiply every term by the common denominator, solve, then **check**: values that make a denominator zero are not allowed.

TASK	HOW	EXAMPLE
Simplify	factor, then cancel common factors	$(x^2 - 9)/(x - 3) = x + 3, x \neq 3$
Add or subtract	common denominator	$1/x + 1/2 = (2 + x)/(2x)$
Solve	multiply through by the LCD	$3/x = 6/(x + 2) \rightarrow 3x + 6 = 6x \rightarrow x = 2$
Excluded values	denominator = 0	$x/(x - 4): x \neq 4$
Divide polynomials	long division or rewriting	$(x^2 + 5x + 7)/(x + 2) = x + 3 + 1/(x + 2)$

REMEMBER Multiplying by an expression with x can create an extraneous solution, one that makes a denominator zero. Check every solution in the original equation.

WORKED EXAMPLES

- $(2x + 6)/(x + 3) = 2$
- $1/x = 3/(x + 4) \rightarrow x + 4 = 3x \rightarrow x = 2$
- $(x^2 - 1)/(x + 1) = x - 1$
- Work problems: rate = $1/\text{time}$; combined rate = sum of rates

TRAPS

- ✗ Cancelling terms, not factors: $(x + 6)/6 = x$ ✓ **Only factors cancel**
- ✗ Keeping a solution that zeroes a denominator ✓ **Checking every solution**
- ✗ Adding fractions by adding denominators ✓ **A common denominator**

DRILL HABIT

Solve 10 rational equations. For each, write the excluded values first.

TRY IT

- 1 Simplify $(x^2 + 5x + 6)/(x + 2)$.
- 2 Solve $4/(x - 1) = 2$.
- 3 Which value is excluded from $5/(2x - 6)$?
- 4 Solve $x/(x - 2) = 2/(x - 2) + 3$.

ANSWERS $1\ x + 3 \cdot 2\ 3 \cdot 3\ 3 \cdot 4$ No solution ($x = 2$ is excluded)

Rational Expressions and Equations: Drill

10 original questions. Answer all of them before checking.

AM-6

DRILL

- 1 Simplify $(x^2 - 16)/(x - 4)$.
- 2 Solve $6/x = 2$.
- 3 Excluded value of $7/(3x - 9)$?
- 4 Solve $2/(x + 1) = 1/(x - 1)$.
- 5 Solve $x/(x - 3) = 3/(x - 3) + 2$.
- 6 Simplify $(x^2 + 7x + 12)/(x + 3)$.
- 7 $1/x + 1/(2x) = 3$. x ?
- 8 Pipe A fills a tank in 3 h, pipe B in 6 h. Together?
- 9 Can you cancel the x 's in $(x + 5)/x$?
- 10 Solve $(x + 2)/(x - 1) = 4$.

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Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $x + 4$ ($x \neq 4$) · Factor and cancel.

2 $3 \cdot 6 = 2x$.

3 $3 \cdot 3x - 9 = 0$.

4 $3 \cdot 2x - 2 = x + 1$.

5 No solution · $x = 3$ is excluded.

6 $x + 4$ · Factor.

7 $1/2 \cdot 3/(2x) = 3$.

8 2 hours · $1/3 + 1/6 = 1/2$.

9 No · Only factors cancel.

10 $2 \cdot x + 2 = 4x - 4$.

Radical and Absolute Value Equations

Square, solve, check.

AM-7

LESSON

THE RULE

Isolate the radical, square both sides, solve, then check: **squaring can create extraneous solutions**. For absolute value, split into two equations.

TYPE	STEPS	EXAMPLE
$\sqrt{\text{expression}} = \text{number}$	square both sides	$\sqrt{x + 3} = 5 \rightarrow x = 22$
$\sqrt{\text{expression}} = \text{expression}$	square, solve, check both	$\sqrt{x + 6} = x \rightarrow x = 3$ ($x = -2$ fails)
$ \text{expression} = n$	expression = n or $-n$	$ x - 4 = 7 \rightarrow x = 11$ or -3
$ \text{expression} < n$	$-n < \text{expression} < n$	$ x < 3 \rightarrow -3 < x < 3$
$ \text{expression} > n$	expression $> n$ or $< -n$	$ x > 3 \rightarrow x > 3$ or $x < -3$

REMEMBER The $\sqrt{}$ symbol means the non-negative root, so $\sqrt{x + 6} = x$ requires $x \geq 0$. That's why $x = -2$ fails: $\sqrt{4} = 2$, not -2 .

WORKED EXAMPLES

- $\sqrt{x + 4} = 9 \rightarrow \sqrt{x} = 5 \rightarrow x = 25$
- $\sqrt{(3x + 1)} = x - 1 \rightarrow 3x + 1 = x^2 - 2x + 1 \rightarrow x(x - 5) = 0 \rightarrow x = 5$ ($x = 0$ fails)
- $|x + 2| = 0 \rightarrow x = -2$ (one solution)
- $|x| = -4 \rightarrow$ no solution

TRAPS

- ~~✗ Squaring before isolating the radical~~ ✓ Isolating first
- ~~✗ Keeping both roots without checking~~ ✓ Checking both
- ~~✗ $|x| = 6 \rightarrow x = 6$ only~~ ✓ $x = 6$ or -6

DRILL HABIT

Solve 10 radical equations; circle the extraneous roots.

TRY IT

- 1 $\sqrt{(2x - 1)} = 3$. x ?
- 2 $|2x + 1| = 9$. Both solutions?
- 3 $\sqrt{(x + 2)} = x$. Solution(s)?
- 4 $|x - 5| \leq 2$. Range of x ?

ANSWERS 1 5 · 2 4 and -5 · 3 2 ($x = -1$ is extraneous) · 4 $3 \leq x \leq 7$

Radical and Absolute Value Equations: Drill

AM-7

DRILL

10 original questions. Answer all of them before checking.

- 1 Solve $\sqrt{x - 2} = 4$.
- 2 Solve $|x + 1| = 6$.
- 3 Solve $\sqrt{x + 12} = x$.
- 4 Solve $|2x - 3| < 5$.
- 5 Solve $\sqrt{x} + 3 = 10$.
- 6 Solve $|x| = -2$.
- 7 Solve $\sqrt{5x - 1} = 3$.
- 8 Solve $\sqrt{2x + 3} = x$.
- 9 Solve $|x - 4| \geq 3$.
- 10 Why check radical solutions?

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Rungs 4–5: Advanced units (and Reading and Writing
Challenge) · Question Bank: Hard

ANSWERS

1 $18 \cdot x - 2 = 16$.

2 5 and -7 · Two cases.

3 $4 \cdot x = -3$ is extraneous.

4 $-1 < x < 4$ · $-5 < 2x - 3 < 5$.

5 $49 \cdot \sqrt{x} = 7$.

6 No solution · Absolute value ≥ 0 .

7 $2 \cdot 5x - 1 = 9$.

8 $3 \cdot x = -1$ fails.

9 $x \leq 1$ or $x \geq 7$ · Two rays.

10 Squaring can create extraneous solutions · Plug back in.

Functions and Transformations

Read function notation as instructions.

THE RULE

$f(x)$ is the output of f for input x . Read every function question as an instruction: **replace x with whatever is in the parentheses**.

IDEA	EXAMPLE
Evaluate	$f(x) = 3x - 2 \rightarrow f(4) = 10$
Solve for the input	$f(x) = 13 \rightarrow 3x - 2 = 13 \rightarrow x = 5$
Composition	$f(g(x))$: put $g(x)$ into f
From a graph	$f(2)$ = the y -value at $x = 2$
Shift up or down	$f(x) + k$ moves up k
Shift left or right	$f(x - h)$ moves right h
Reflect	$-f(x)$ flips over the x -axis

REMEMBER Horizontal shifts feel backward: $f(x - 3)$ moves the graph 3 units **right**. Check with one point: if $f(0) = 1$ and $g(x) = f(x - 3)$, then $g(3) = 1$.

WORKED EXAMPLES

- $f(x) = 2x^2 \rightarrow f(a + 1) = 2(a + 1)^2$
- $h(t) = -5t^2 + 20t \rightarrow h(2) = 20$
- $f(x) = 3x$, $g(x) = x - 4$: $g(2) = -2$, so $f(g(2)) = -6$
- f passes through $(1, 4) \rightarrow f(x) - 3$ passes through $(1, 1)$

TRAPS

- ~~$f(x - 3)$ moves left~~ ✓ **It moves right**
- ~~$f(g(x)) = f(x) - g(x)$~~ ✓ **Put g into f**
- ~~$f(2)$ means f times 2~~ ✓ **The output at $x = 2$**

DRILL HABIT

Make a table of $f(x)$ for $x = -2$ to 2 for five functions, apply three transformations to each, and check in Desmos.

TRY IT

- 1 $f(x) = x^2 + 1$. $f(-3)$?
- 2 $g(x) = 2x + 5$. For what x is $g(x) = 17$?
- 3 $f(x) = x + 1$ and $g(x) = x^2$. $f(g(3))$?
- 4 How does $y = f(x + 4) - 2$ move $y = f(x)$?

ANSWERS 1 10 · 2 6 · 3 10 · 4 4 units left, 2 units down

Functions and Transformations: Drill

10 original questions. Answer all of them before checking.

- 1 $f(x) = 2x^2 - 1$. $f(-2)$?
- 2 $g(x) = 4x - 3$. For what x is $g(x) = 13$?
- 3 $f(x) = x + 2$, $g(x) = 3x$. $f(g(4))$?
- 4 $g(f(4))$ for the same functions?
- 5 How does $y = f(x - 5)$ move $y = f(x)$?
- 6 How does $y = f(x) + 3$ move?
- 7 f passes through $(2, 5)$. $y = -f(x)$ passes through?
- 8 $h(t) = -5t^2 + 30t$. $h(3)$?
- 9 $f(x) = x^2$. $f(a + 1) - f(a)$?
- 10 $f(x) = 10 - x$. Solve $f(x) = 2x + 1$.

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Advanced math

College Board Question Bank · Advanced Math
· Nonlinear Functions

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $7 \cdot 8 - 1$.

2 $4 \cdot 4x = 16$.

3 $14 \cdot g(4) = 12$.

4 $18 \cdot f(4) = 6$.

5 5 units right · Opposite of the sign.

6 Up 3 · Vertical shift.

7 $(2, -5)$ · Reflect over the x -axis.

8 $45 \cdot -45 + 90$.

9 $2a + 1$ · Expand.

10 $3 \cdot 10 - x = 2x + 1$.

Nonlinear Systems

A line meets a curve: 0, 1 or 2 times.

THE RULE

A system with a line and a parabola (or circle) can have 0, 1 or 2 solutions. Solve by substitution, or graph in Desmos and read the intersections.

SYSTEM	METHOD	SOLUTIONS
$y = x^2$ and $y = 4$	$x^2 = 4$	2: (2, 4) and (-2, 4)
$y = x^2 + 1$ and $y = 2x$	$(x - 1)^2 = 0$	1: (1, 2)
$y = x^2 + 5$ and $y = x$	$x^2 - x + 5 = 0$, discriminant < 0	0
Line tangent to a parabola	set equal; discriminant = 0	exactly 1

REMEMBER To count solutions without graphing, set the equations equal, move everything to one side, and check the discriminant (AM-3).

WORKED EXAMPLES

- $y = x^2 - 4x$ and $y = 0 \rightarrow x = 0$ or 4
- $x^2 + y^2 = 25$ and $y = 3 \rightarrow x = \pm 4$
- $y = x^2 - 1$ and $y = x + 1 \rightarrow (2, 3)$ and $(-1, 0)$
- $x^2 + 4 = 4x \rightarrow (x - 2)^2 = 0 \rightarrow$ one point

TRAPS

- ~~X~~ Giving only x-values when asked for points ✓ Finding y too
- ~~X~~ Losing the negative root ✓ $\pm$ after a square root
- ~~X~~ Assuming two solutions ✓ Checking the discriminant

DRILL HABIT

Solve 8 nonlinear systems algebraically, then confirm each in Desmos.

TRY IT

- 1 Solve $y = x^2 - 3$ and $y = 2x$.
- 2 How many solutions do $y = x^2$ and $y = -1$ have?
- 3 For what k does $y = x^2 + k$ touch $y = 0$ exactly once?
- 4 $y = x + 2$ and $y = x^2$. Sum of the solutions' x-values?

ANSWERS 1 (3, 6) and (-1, -2) · 2 None · 3 0 · 4 1

Nonlinear Systems: Drill

10 original questions. Answer all of them before checking.

AM-9

DRILL

- 1 Solve $y = x^2 - 1$ and $y = 3$.
- 2 Solve $y = x^2$ and $y = 2x + 3$.
- 3 How many solutions: $y = x^2 + 2$ and $y = 1$?
- 4 $y = x^2 + k$ touches $y = 4$ exactly once. k ?
- 5 $x^2 + y^2 = 25$ and $y = 4$. x -values?
- 6 $y = x^2 - 4x$ and $y = 0$. x -values?
- 7 Is $y = 2x - 1$ tangent to $y = x^2$?
- 8 Sum of x -values where $y = x^2$ meets $y = 5x - 6$?
- 9 Line meets parabola: maximum number of intersections?
- 10 $y = x^2 + 1$ and $y = x$. Solutions?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Advanced math

College Board Question Bank · Advanced Math
· Nonlinear Equations in One Variable and Systems

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 (2, 3) and (-2, 3) · $x^2 = 4$.

2 (3, 9) and (-1, 1) · $x^2 - 2x - 3 = 0$.

3 None · $x^2 = -1$.

4 4 · Vertex on the line.

5 ± 3 · $x^2 = 9$.

6 0 and 4 · $x(x - 4)$.

7 Yes · $x^2 - 2x + 1 = (x - 1)^2$.

8 5 · $x^2 - 5x + 6 = 0$.

9 2 · A quadratic has at most 2 roots.

10 None · Discriminant $1 - 4 < 0$.

Polynomial Zeros and Factors

A zero is a factor is an x-intercept.

THE RULE

If $p(a) = 0$, then $(x - a)$ is a factor of $p(x)$, and a is a zero (an x-intercept). The remainder when $p(x)$ is divided by $(x - a)$ equals $p(a)$.

FACT	EXAMPLE
Zero $\leftrightarrow$ factor	$p(3) = 0 \leftrightarrow (x - 3)$ is a factor
Factored form shows zeros	$(x + 1)(x - 2)(x - 5)$: zeros $-1, 2, 5$
Remainder theorem	$p(x) \div (x - 2)$ leaves remainder $p(2)$
Repeated factor	$(x - 1)^2$: the graph touches at 1 without crossing
Degree n	at most n real zeros
End behavior	x^3 rises to the right; $-x^3$ falls

REMEMBER If a table shows $p(4) = 0$, it is telling you $(x - 4)$ is a factor. If $p(4) = 7$, the remainder on dividing by $(x - 4)$ is 7.

WORKED EXAMPLES

- $p(x) = x(x - 3)(x + 3)$: zeros 0, 3, -3
- $p(-1) = 0 \rightarrow (x + 1)$ is a factor
- $x^3 - x = x(x - 1)(x + 1)$
- Crosses at 2, bounces at $-1 \rightarrow (x - 2)(x + 1)^2$

TRAPS

- ~~X~~ A zero at 3 means a factor of $(x + 3)$ ✓ $(x - 3)$
- ~~X~~ Ignoring the factor x ✓ $x = 0$ is a zero too
- ~~X~~ Remainder from $x - a$ is $p(-a)$ ✓ It's $p(a)$

DRILL HABIT

Match 10 graphs to factored forms; check each in Desmos.

TRY IT

- 1 $p(x) = (x - 2)(x + 4)^2$. Zeros?
- 2 $p(5) = 0$. Which must be a factor: $(x + 5)$ or $(x - 5)$?
- 3 $p(x) = x^3 - 2x + 1$. Remainder when divided by $x - 2$?
- 4 Maximum number of real zeros of a degree-4 polynomial?

ANSWERS 1 2 and $-4 \cdot 2(x - 5) \cdot 3 \cdot 5 \cdot 4 \cdot 4$

Polynomial Zeros and Factors: Drill

10 original questions. Answer all of them before checking.

AM-10

DRILL

- 1 Zeros of $p(x) = x(x - 3)(x + 5)$?
- 2 $p(-4) = 0$. Which is a factor: $x + 4$ or $x - 4$?
- 3 Remainder when $x^3 + 2x - 5$ is divided by $x - 1$?
- 4 Factor $x^3 - 9x$.
- 5 $(x - 2)^2(x + 1)$: at $x = 2$ the graph...?
- 6 Most real zeros of a degree-3 polynomial?
- 7 $p(x) = x^2 - 5x + k$ has a zero at 2. k ?
- 8 Remainder when $x^2 + 4$ is divided by $x + 2$?
- 9 Factored form from zeros $-1, 2, 4$ (leading coefficient 1)?
- 10 Table: $p(3) = 0$. What must be true?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Advanced math

College Board Question Bank · Advanced Math
· Nonlinear Functions; Equivalent Expressions

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing
Challenge) · Question Bank: Hard

ANSWERS

1 0, 3, -5 · Each factor.

2 $x + 4$ · Zero at -4 .

3 -2 · $p(1)$.

4 $x(x - 3)(x + 3)$ · GCF, then difference of squares.

5 Touches without crossing · Repeated factor.

6 3 · Degree $n \rightarrow$ at most n .

7 $6 \cdot 4 - 10 + k = 0$.

8 8 · $p(-2)$.

9 $(x + 1)(x - 2)(x - 4)$ · Each zero $\rightarrow$ a factor.

10 $(x - 3)$ is a factor · Zero $\Leftrightarrow$ factor.

Ratios, Rates and Units

Keep the units attached.

DA-1

LESSON

THE RULE

Set ratios up as fractions and keep the units attached. Proportions are two equal ratios: cross-multiply. Unit conversion is **multiplying by 1** in a useful form.

TASK	EXAMPLE
Ratio	boys : girls = 3 : 5 → girls are $\frac{5}{8}$ of the class
Proportion	$\frac{3}{4} = \frac{x}{20} \rightarrow x = 15$
Rate	120 miles in 2 hours = 60 mph
Unit conversion	$90 \text{ km/h} \times (1,000 \text{ m} / 1 \text{ km}) \times (1 \text{ h} / 3,600 \text{ s}) = 25 \text{ m/s}$
Scale	1 cm : 50 km → 3.2 cm = 160 km
Density	mass ÷ volume

REMEMBER Write the units on every number. If they don't cancel to the units the question asks for, the setup is wrong.

WORKED EXAMPLES

- 5 pens cost \$4 → 20 pens cost \$16
- 60 words per minute for 15 minutes = 900 words
- 1 inch = 2.54 cm → 10 in = 25.4 cm
- 50,000 people on 20 km² → 2,500 per km²

TRAPS

- ✗ Ratio 3 : 5 means $\frac{3}{5}$ of the total ✓ $\frac{3}{8}$ of the total
- ✗ Dividing when you should multiply ✓ Tracking units
- ✗ A proportion set up upside-down on one side ✓ Same units in the same positions

DRILL HABIT

Convert 10 everyday quantities (height, commute, phone storage) between units with written unit fractions.

TRY IT

- 1 A recipe uses 3 cups of flour per 2 cups of sugar. Flour for 7 cups of sugar?
- 2 A car uses 8 gallons for 240 miles. Miles per gallon?
- 3 Convert 2.5 hours to minutes.
- 4 Red : blue marbles = 2 : 7; there are 54 marbles. How many are red?

ANSWERS 1 10.5 cups · 2 30 · 3 150 · 4 12

Ratios, Rates and Units: Drill

10 original questions. Answer all of them before checking.

- 1 4 notebooks cost \$10. Cost of 14?
- 2 Ratio of cats to dogs is 3 : 4; 28 animals. Cats?
- 3 Convert 72 km/h to m/s.
- 4 A map: 1 cm = 25 km. 4.4 cm = ?
- 5 A car goes 270 miles on 9 gallons. Miles per gallon?
- 6 $x/8 = 15/24$. x ?
- 7 Density of 60 g in 15 mL?
- 8 Typing 45 words per minute for 20 minutes?
- 9 Convert 3.5 hours to minutes.
- 10 Recipe: 2 cups rice per 3 cups water. Water for 5 cups rice?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Problem solving and data analysis

College Board Question Bank · Problem-Solving and Data Analysis · Ratios, Rates, Proportional Relationships, and Units

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 \$35 · \$2.50 each.
- 2 $12 \cdot 3/7$ of 28.
- 3 $20 \cdot 72 \cdot 1,000/3,600$.
- 4 110 km · 4.4 · 25.
- 5 $30 \cdot 270/9$.
- 6 5 · Cross-multiply.
- 7 4 g/mL · 60/15.
- 8 900 words · 45 · 20.
- 9 $210 \cdot 3.5 \cdot 60$.
- 10 7.5 cups · 5 · 3/2.

Percentages

Think in multipliers.

DA-2

LESSON

THE RULE

Percent means per hundred. Use multipliers: an increase of $r\%$ multiplies by $(1 + r/100)$; a decrease, by $(1 - r/100)$. **Percent change** = $(\text{new} - \text{old}) \div \text{old}$.

TASK	METHOD	EXAMPLE
$x\%$ of y	$(x/100) \times y$	15% of 80 = 12
Increase by 20%	$\times 1.20$	50 $\rightarrow$ 60
Decrease by 20%	$\times 0.80$	50 $\rightarrow$ 40
Percent change	$(\text{new} - \text{old}) \div \text{old}$	40 $\rightarrow$ 50: +25%
Original before a change	$\text{new} \div \text{multiplier}$	\$63 after 10% off $\rightarrow 63 \div 0.9 = \70
Successive changes	multiply the multipliers	+10% then +10% = $\times 1.21$ (+21%)
a is what percent of b ?	$a \div b \times 100$	18 of 72 = 25%

REMEMBER Successive changes don't add: up 50% then down 50% leaves you at 75% of the start. And always ask "percent of what?": the base is the original amount.

WORKED EXAMPLES

- 35% of 60 = 21
- 120 is 150% of 80
- p increased by 40% = $1.4p$
- 2,000 $\rightarrow$ 2,600 is a 30% increase

TRAPS

- ~~X Up 20% then down 20% = no change~~ ✓ $\times 1.2 \times 0.8 = 0.96 \rightarrow$ down 4%
- ~~X Percent change using the new value as the base~~ ✓ Use the old value
- ~~X Original = sale price $\times 1.10$ after 10% off~~ ✓ Sale price $\div 0.90$

DRILL HABIT

Solve 10 percent questions using only multipliers.

TRY IT

- 1 A \$250 jacket is 30% off. Sale price?
- 2 A price rose from \$80 to \$92. Percent increase?
- 3 After a 25% raise, a salary is \$50,000. Original salary?
- 4 Up 20%, then down 20%: net percent change?

ANSWERS 1 \$175 · 2 15% · 3 \$40,000 · 4 -4%

Percentages: Drill

10 original questions. Answer all of them before checking.

DA-2

DRILL

- 1 25% of 160?
- 2 \$80 jacket, 35% off. Sale price?
- 3 $45 \rightarrow 54$: percent increase?
- 4 After a 20% raise, salary is \$48,000. Original?
- 5 Up 25%, then down 20%: net change?
- 6 12 is what percent of 48?
- 7 Price after a 10% increase on \$250?
- 8 $200 \rightarrow 150$: percent decrease?
- 9 p increased by 30% as an expression?
- 10 Sale price \$63 after 30% off. Original?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Problem solving and data analysis

College Board Question Bank · Problem-Solving and Data Analysis · Percentages

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $40 \cdot \frac{1}{4}$.

2 $\$52 \cdot \times 0.65$.

3 $20\% \cdot 9/45$.

4 $\$40,000 \cdot \div 1.2$.

5 $0\% \cdot 1.25 \times 0.8 = 1$.

6 $25\% \cdot 12/48$.

7 $\$275 \cdot \times 1.1$.

8 $25\% \cdot 50/200$.

9 $1.3p$ · Multiplier.

10 $\$90 \cdot \div 0.7$.

One-Variable Data

Center and spread.

DA-3

LESSON

THE RULE

Mean, median and mode measure center. Range and standard deviation measure spread. Know **how each one changes** when the data change.

MEASURE	MEANING OR EFFECT
Mean	sum $\div$ count; pulled by outliers
Median	middle value in order; resistant to outliers
Range	max – min
Standard deviation	typical distance from the mean: more spread, larger SD
Add a high outlier	the mean rises a lot; the median barely moves
Add the same number to every value	mean and median shift; range and SD don't change
Multiply every value by k	mean, median, range and SD all multiply by k

REMEMBER You won't calculate standard deviation; you'll compare it: the set clustered closer to its mean has the smaller SD. For a median from a frequency table with n values, find position $(n + 1)/2$.

WORKED EXAMPLES

- Scores 70, 80, 90: mean 80
- The mean of 4 tests is 85; a fifth test of 95 $\rightarrow$ new mean 87
- Values 1 ($\times 3$), 2 ($\times 5$), 3 ($\times 2$): $n = 10$, median = average of the 5th and 6th = 2
- Add 5 to every value: SD unchanged

TRAPS

- ~~✗ Finding the median without sorting~~ ✓ **Sorting first**
- ~~✗ Adding 5 to every value changes the SD~~ ✓ **It doesn't**
- ~~✗ Averaging two group means of different sizes~~ ✓ **Weighting by group size**

DRILL HABIT

For 10 data questions, predict the effect of a change (bigger, smaller, same) before calculating.

TRY IT

- 1 Data: 3, 5, 7, 7, 18. Mean and median?
- 2 Remove the 18. Which changes more, the mean or the median?
- 3 Set A: 10, 10, 10, 10. Set B: 1, 5, 15, 19. Which has the larger SD?
- 4 The mean of five numbers is 12. What is their sum?

ANSWERS 1 Mean 8, median 7 · 2 The mean ($8 \rightarrow 5.5$; the median $7 \rightarrow 6$) · 3 B · 4 60

One-Variable Data: Drill

10 original questions. Answer all of them before checking.

DA-3

DRILL

- 1 Mean of 4, 8, 9, 11?
- 2 Median of 3, 9, 1, 7, 5?
- 3 Median of 2, 4, 6, 10?
- 4 Mean of 5 tests is 80. Sum?
- 5 Mean of 4 tests is 85; fifth test 95. New mean?
- 6 Range of 12, 7, 20, 15?
- 7 Add 10 to every value. Effect on standard deviation?
- 8 Data: 2, 3, 3, 4, 50. Mean or median better represents center?
- 9 Which set has a larger SD: {5, 5, 5} or {1, 5, 9}?
- 10 Multiply every value by 3. Mean of 7 becomes?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Problem solving and data analysis

College Board Question Bank · Problem-Solving and Data Analysis · One-Variable Data: Distributions and Measures of Center and Spread

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 $8 \cdot 32/4$.
- 2 5 · Sort: 1, 3, 5, 7, 9.
- 3 5 · Average of 4 and 6.
- 4 $400 \cdot 5 \cdot 80$.
- 5 $87 \cdot (340 + 95)/5$.
- 6 $13 \cdot 20 - 7$.
- 7 None · Shift only.
- 8 Median · 50 is an outlier.
- 9 {1, 5, 9} · More spread.
- 10 21 · Scales.

Two-Variable Data: Scatterplots and Models

DA-4

LESSON

Read the trend, interpret the line.

THE RULE

Scatterplots show how two variables relate. A line of best fit models a linear trend; an exponential curve models percent growth. **Interpret slope and intercept in context** and use the model to predict.

IDEA	WHAT TO SAY OR DO
Positive association	as x increases, y tends to increase
Negative association	as x increases, y tends to decrease
Slope of the best-fit line	predicted change in y for each 1-unit increase in x
y-intercept	predicted y when x = 0 (may not make sense in context)
Prediction	plug x into the model
Residual	actual – predicted
Linear vs. exponential fit	constant change vs. constant percent change

REMEMBER Say “predicted” or “estimated”: a best-fit line describes a trend, not every point. Desmos fits a line from a table in seconds (MS-6).

WORKED EXAMPLES

- $y = -3x + 90$: each extra unit of x predicts 3 fewer units of y
- Points far above the line have positive residuals
- Temperature vs. ice cream sales: positive association
- $y = 100(1.08)^x$: about 8% growth per unit of x

TRAPS

- ✗ ~~The slope as the starting value~~ ✓ **The slope as the rate**
- ✗ ~~“The line proves x causes y.”~~ ✓ **Association only (DA-7)**
- ✗ ~~Residual = predicted – actual~~ ✓ **actual – predicted**

DRILL HABIT

Describe 10 scatterplots in one sentence each: direction, form (linear or not), and strength.

TRY IT

- 1 Best fit $y = 2.5x + 10$ (x = hours studied, y = points gained). Meaning of 2.5?
- 2 Predicted y when x = 4?
- 3 An actual point is (4, 23). Residual?
- 4 The data double each year. Linear or exponential model?

ANSWERS 1 Each extra hour predicts 2.5 more points · 2 20 · 3 3 · 4 Exponential

Two-Variable Data: Scatterplots and Models: Drill A-4

10 original questions. Answer all of them before checking.

DRILL

- 1 Best fit $y = 4x + 20$ (x = hours, y = score). Meaning of 4?
- 2 Same model: predicted y at $x = 5$?
- 3 Actual point (5, 46). Residual?
- 4 As temperature rises, heating bills fall. Association?
- 5 Data grow by about 10% per year. Model type?
- 6 Data grow by about 10 units per year. Model type?
- 7 $y = 500(0.9)^x$ models a population. Change per year?
- 8 Does a strong best-fit line prove x causes y ?
- 9 $y = -2x + 60$: predicted y at $x = 12$?
- 10 A point lies below the best-fit line. Residual sign?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Problem solving and data analysis

College Board Question Bank · Problem-Solving and Data Analysis · Two-Variable Data: Models and Scatterplots

Rungs 1–2: Foundations units · Question Bank: Easy
 Rung 3: Medium units · Question Bank: Medium
 Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 Each extra hour predicts 4 more points · Slope = rate.
- 2 $40 \cdot 20 + 20$.
- 3 $6 \cdot 46 - 40$.
- 4 Negative · One up, one down.
- 5 Exponential · Constant percent.
- 6 Linear · Constant amount.
- 7 10% decrease · Factor 0.9.
- 8 No · Association only (DA-7).
- 9 $36 \cdot 60 - 24$.
- 10 Negative · Actual < predicted.

Probability and Two-Way Tables

The word after “given” picks the denominator.

THE RULE

Probability = favorable outcomes ÷ total outcomes. Conditional probability restricts the total to one group: “given that the student is a senior” means **the denominator is seniors only**.

	SPORT	NO SPORT	TOTAL
Junior	30	20	50
Senior	45	55	100
Total	75	75	150

REMEMBER From the table: $P(\text{sport}) = 75/150 = 1/2$. $P(\text{sport, given senior}) = 45/100$. $P(\text{senior, given sport}) = 45/75 = 3/5$. Same cell, different denominators.

WORKED EXAMPLES

- A fair die: $P(\text{even}) = 3/6 = 1/2$
- “Of the students who play a sport, what fraction are seniors?” → $45/75$
- Expected count: probability $\times$ total = $0.2 \times 500 = 100$
- “Or” in a table: add the cells without counting any twice

TRAPS

- ✗ Using the grand total for a “given” question ✓ The given group’s total
- ✗ Swapping $P(A \text{ given } B)$ and $P(B \text{ given } A)$ ✓ Reading “given” carefully
- ✗ Double-counting overlapping groups ✓ Counting each cell once

DRILL HABIT

For 10 two-way table questions, circle the denominator’s row or column before calculating.

TRY IT

- 1 From the table: $P(\text{junior})$?
- 2 $P(\text{no sport, given junior})$?
- 3 $P(\text{junior, given no sport})$?
- 4 A bag holds 4 red and 6 blue marbles. $P(\text{red})$?

ANSWERS 1 $1/3$ · 2 $2/5$ · 3 $4/15$ · 4 $2/5$

Probability and Two-Way Tables: Drill

10 original questions. Answer all of them before checking.

DA-5

DRILL

- 1 Table — Band: 9th 12, 10th 18 (total 30); Choir: 9th 20, 10th 10 (total 30). $P(\text{band})$?
- 2 Same table: $P(10\text{th grade, given band})$?
- 3 Same table: $P(\text{band, given 10th grade})$?
- 4 Same table: $P(9\text{th grade})$?
- 5 A die: $P(\text{number} > 4)$?
- 6 3 red, 5 blue, 2 green marbles. $P(\text{not blue})$?
- 7 $P(\text{defect}) = 0.04$; 2,500 items. Expected defects?
- 8 What does “given” change?
- 9 Two fair coins: $P(\text{both heads})$?
- 10 Survey: 40 of 160 prefer tea. $P(\text{random respondent prefers tea})$?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Problem solving and data analysis

College Board Question Bank · Problem-Solving and Data Analysis · Probability and Conditional Probability

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $\frac{1}{2}$ · $\frac{30}{60}$.

2 $\frac{3}{5}$ · $\frac{18}{30}$.

3 $\frac{9}{14}$ · $\frac{18}{28}$.

4 $\frac{8}{15}$ · $\frac{32}{60}$.

5 $\frac{1}{3}$ · $\frac{2}{6}$.

6 $\frac{1}{2}$ · $\frac{5}{10}$.

7 $100 \cdot 0.04$ · 2,500.

8 The denominator: the given group only · DA-5.

9 $\frac{1}{4}$ · $\frac{1}{2} \cdot \frac{1}{2}$.

10 $\frac{1}{4}$ · $\frac{40}{160}$.

Samples, Margin of Error, Inference

What a survey can and can't tell you.

DA-6

LESSON

THE RULE

A random sample lets you generalize to the population it was drawn from. A margin of error gives a range of plausible values. **Larger random samples give smaller margins of error.**

IDEA	WHAT IT MEANS
Random sample	every member of the population had a chance of being chosen
Generalize	only to the population that was sampled
Estimate $\pm$ margin of error	54% $\pm$ 3% $\rightarrow$ plausible range 51% to 57%
Larger sample	smaller margin of error
Biased sample	volunteers, one location, online only: can't generalize
Estimate a total	sample proportion $\times$ population size

REMEMBER A margin of error doesn't guarantee the true value is in the range, and it can't fix a biased sample: surveying gym members about exercise says nothing reliable about the whole city.

WORKED EXAMPLES

- A random sample of 500 voters in a state $\rightarrow$ generalize to that state's voters
- Mean 4.2 hours $\pm$ 0.3 $\rightarrow$ 3.9 to 4.5 hours is plausible
- An online poll of volunteers $\rightarrow$ biased
- The same study with a larger sample $\rightarrow$ a smaller margin of error

TRAPS

- ~~✗ Generalizing beyond the sampled population~~ ✓ Same population only
- ~~✗ Treating the estimate as exact~~ ✓ Using the range
- ~~✗ A bigger biased sample fixes the bias~~ ✓ Randomness fixes bias; size doesn't

DRILL HABIT

For 10 survey descriptions, write the population sampled, whether it was random, and what can be concluded.

TRY IT

- 1 A survey reports 62% $\pm$ 4%. Plausible range?
- 2 How can researchers shrink the margin of error?
- 3 A random sample of 200 of a school's 1,000 students finds 30 who bike to school. Estimate the total who bike.
- 4 A survey of a city's library visitors: can it be generalized to all residents?

ANSWERS 1 58% to 66% · 2 Use a larger random sample · 3 150 · 4 No: only library visitors were sampled

Samples, Margin of Error, Inference: Drill

10 original questions. Answer all of them before checking.

- 1 Estimate $48\% \pm 3\%$. Plausible range?
- 2 How do you shrink the margin of error?
- 3 Random sample of 300 of 6,000 students; 45 walk to school. Estimate total walkers.
- 4 Survey of gym members about exercise. Generalize to the whole city?
- 5 Random sample of a state's voters. Generalize to?
- 6 Does a larger sample fix a biased sampling method?
- 7 Mean 6.2 hours ± 0.4 . Is 6.9 hours plausible?
- 8 Two surveys: margins 2% and 5%. Which likely had the larger sample?
- 9 Online volunteer poll. Can it estimate the national average?
- 10 Random sample of 200 trees: 30 diseased. Estimate the percent in the forest.

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Problem solving and data analysis

College Board Question Bank · Problem-Solving and Data Analysis · Inference from Sample Statistics and Margin of Error

Rungs 1–2: Foundations units · Question Bank: Easy
Rung 3: Medium units · Question Bank: Medium
Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 45% to 51% · $\pm$ the margin.
- 2 Use a larger random sample · Size reduces it.
- 3 900 · 15% of 6,000.
- 4 No · Biased sample.
- 5 That state's voters · Same population only.
- 6 No · Randomness fixes bias.
- 7 No · Range is 5.8 to 6.6.
- 8 The 2% survey · Smaller margin.
- 9 No · Self-selected.
- 10 15% · 30/200.

Study Design: Correlation vs. Causation

Only random assignment shows cause.

DA-7

LESSON

THE RULE

Only a **randomized experiment** (subjects randomly assigned to treatments) supports a cause-and-effect conclusion. Observational studies show association, not causation.

DESIGN	YOU CAN CONCLUDE	EXAMPLE
Random sample + random assignment	cause and effect, for the whole population	random voters randomly shown one of two ads
Random assignment only	cause and effect, for these subjects	volunteers randomly given a drug or a placebo
Random sample only	association, for the population	a random survey on sleep and grades
Neither	association, for this sample only	students choosing whether to join a club

REMEMBER This mirrors RW-11: when a science text says students who sleep more score higher, the correct answer says “associated with,” not “causes,” unless sleep was randomly assigned.

WORKED EXAMPLES

- “Students who eat breakfast earn higher grades” (observational) → association only
- Plants randomly assigned fertilizer or none → the fertilizer caused the difference
- A random sample of farms surveyed → the association generalizes to all such farms
- Self-selected groups → other differences (confounding variables) may explain the result

TRAPS

- ~~X “Causes” from an observational study~~ ✓ **“Is associated with”**
- ~~X Generalizing a volunteer experiment to everyone~~ ✓ **Only to similar subjects**
- ~~X Confusing random sampling with random assignment~~ ✓ **Sampling → generalize; assignment → cause**

DRILL HABIT

Classify 10 study descriptions into the four rows of the table.

TRY IT

- 1 Volunteers were randomly assigned to two diets; diet A's group lost more weight. Conclusion?
- 2 A random survey finds coffee drinkers report more anxiety. Does coffee cause anxiety?
- 3 What two features allow a cause-and-effect conclusion about a whole population?

ANSWERS 1 Diet A caused more weight loss for these volunteers (not necessarily everyone) · 2 Not from this study: association only · 3 Random sampling and random assignment

Study Design: Correlation vs. Causation: Drill

DA-7

10 original questions. Answer all of them before checking.

DRILL

- 1 Volunteers randomly assigned to a drug or placebo; drug group improved more. Conclusion?
- 2 Random survey: coffee drinkers sleep less. Does coffee cause less sleep?
- 3 Which two features allow a causal conclusion about a whole population?
- 4 Students chose whether to join a study club; members had higher grades. Causal?
- 5 Random sample of farms; fertilizer randomly assigned. Conclusion?
- 6 What is a confounding variable?
- 7 Random sampling lets you...?
- 8 Random assignment lets you...?
- 9 Correct wording for an observational finding?
- 10 Plants randomly given more light grew taller. Cause or association?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Problem solving and data analysis

College Board Question Bank · Problem-Solving and Data Analysis · Evaluating Statistical Claims: Observational Studies and Experiments

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

- 1 The drug caused improvement for these volunteers · Random assignment; not random sampling.
- 2 Not shown · Observational.
- 3 Random sampling and random assignment · Both.
- 4 No · Self-selected.
- 5 Fertilizer's effect generalizes to all such farms · Both features.
- 6 A third factor that may explain the result · E.g., motivation.
- 7 Generalize to the population · Not prove cause.
- 8 Conclude cause and effect · For the subjects studied.
- 9 "is associated with" · Not "causes."
- 10 Cause · Random assignment.

Area, Volume and Scale

Know the sheet; know the scale rule.

THE RULE

The reference sheet gives the area and volume formulas you need. Your job: pick the right one, plug in carefully, and handle scale. **Doubling every length multiplies area by 4 and volume by 8.**

SHAPE	FORMULA
Rectangle · triangle	$A = lw$ · $A = \frac{1}{2}bh$
Circle	$A = \pi r^2$ · $C = 2\pi r$
Rectangular prism	$V = lwh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone · pyramid	$V = \frac{1}{3}\pi r^2 h$ · $V = \frac{1}{3}lwh$
Scale factor k	lengths $\times k$, areas $\times k^2$, volumes $\times k^3$

REMEMBER Check whether they give the radius or the diameter, and which units they want. Surface area is the sum of the areas of all the faces.

WORKED EXAMPLES

- Triangle with base 10 and height 6: area 30
- Circumference $10\pi \rightarrow r = 5 \rightarrow$ area 25π
- Cone with $r = 3$, $h = 4$: $V = \frac{1}{3}\pi(9)(4) = 12\pi$
- Similar solids with length ratio 1 : 2 $\rightarrow$ volume ratio 1 : 8

TRAPS

- ~~X~~ Using the diameter as the radius ✓ $r = d/2$
- ~~X~~ Doubling lengths doubles area ✓ **Area $\times 4$**
- ~~X~~ Forgetting the $1/3$ for cones ✓ **$\frac{1}{3}\pi r^2 h$**

DRILL HABIT

Write every formula on the reference sheet from memory, then check. Repeat until perfect.

TRY IT

- 1 Cylinder with $r = 3$, $h = 10$. Volume?
- 2 A cube's volume is 64. Surface area?
- 3 A rectangle's sides are tripled. Its area is multiplied by?
- 4 A sphere's diameter is 6. Volume?

ANSWERS 1 90π · 2 96 · 3 9 · 4 36π

Area, Volume and Scale: Drill

10 original questions. Answer all of them before checking.

- 1 Triangle: base 12, height 5. Area?
- 2 Circle with diameter 10. Area?
- 3 Cylinder $r = 2$, $h = 9$. Volume?
- 4 Cube with volume 125. Surface area?
- 5 Sphere with radius 3. Volume?
- 6 Cone $r = 6$, $h = 5$. Volume?
- 7 Every length doubles. Volume multiplies by?
- 8 Circumference 14π . Radius?
- 9 Rectangular prism $3 \times 4 \times 10$. Volume?
- 10 Similar triangles, side ratio 2 : 3. Area ratio?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Geometry and trigonometry

College Board Question Bank · Geometry and Trigonometry · Area and Volume

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $30 \cdot \frac{1}{2} \cdot 12 \cdot 5$.

2 $25\pi \cdot r = 5$.

3 $36\pi \cdot \pi \cdot 4 \cdot 9$.

4 $150 \cdot \text{Side } 5; 6 \cdot 25$.

5 $36\pi \cdot (4/3)\pi \cdot 27$.

6 $60\pi \cdot (1/3)\pi \cdot 36 \cdot 5$.

7 $8 \cdot 2^3$.

8 $7 \cdot 2\pi r$.

9 $120 \cdot lwh$.

10 $4 : 9 \cdot \text{Square it}$.

Lines, Angles and Triangles

180, 360, and similar triangles.

GT-2

LESSON

THE RULE

Angles on a line sum to 180° ; around a point, 360° ; in a triangle, 180° .
Parallel lines cut by a transversal make equal alternate and corresponding angles. **Similar triangles have equal angles and proportional sides.**

FACT	USE
Vertical angles are equal	crossing lines
A linear pair sums to 180°	angles on a straight line
Parallel lines: alternate interior angles are equal	the Z shape
Triangle angles sum to 180°	find the missing angle
Exterior angle = sum of the two remote interior angles	a quick shortcut
Isosceles: equal sides $\leftrightarrow$ equal base angles	two equal angles mean two equal sides
Similar triangles (AA)	sides in the same ratio
Polygon interior angles	$(n - 2) \times 180^\circ$

REMEMBER When two triangles share an angle and have parallel sides, look for similarity, then set up a proportion of matching sides (small/large = small/large).

WORKED EXAMPLES

- Parallel lines: one angle is $110^\circ \rightarrow$ its alternate interior angle is 110° , its neighbor 70°
- Isosceles with base angles of $50^\circ \rightarrow$ vertex angle 80°
- A 6-ft person casts a 4-ft shadow; a tree casts a 30-ft shadow $\rightarrow$ the tree is 45 ft
- Pentagon: $(5 - 2) \times 180 = 540^\circ$

TRAPS

- ~~X~~ Mismatching sides in a proportion ✓ Matching sides by angle
- ~~X~~ Assuming a figure is to scale ✓ Using given facts only
- ~~X~~ Polygon sum $n \times 180$ ✓ $(n - 2) \times 180$

DRILL HABIT

Draw and label 10 figures from words only, then solve them.

TRY IT

- 1 Two angles of a triangle are 47° and 68° . The third?
- 2 Sum of the interior angles of a hexagon?
- 3 Similar triangles with ratio 2 : 5; a small side of 6 matches a large side of?
- 4 An exterior angle is 120° ; one remote interior angle is 50° . The other?

ANSWERS 1 65° · 2 720° · 3 15 · 4 70°

Lines, Angles and Triangles: Drill

10 original questions. Answer all of them before checking.

GT-2

DRILL

- 1 Two angles of a triangle are 52° and 73° . Third?
- 2 Interior angle sum of an octagon?
- 3 Exterior angle 130° , one remote interior 45° . The other?
- 4 Parallel lines, alternate interior angle 68° . Its partner?
- 5 Linear pair: one angle 115° . Other?
- 6 Isosceles, vertex angle 40° . Each base angle?
- 7 Similar triangles, ratio 3 : 7; small side 9. Matching large side?
- 8 A 5-ft pole casts a 3-ft shadow; a tree casts 18 ft. Tree height?
- 9 Each interior angle of a regular hexagon?
- 10 Vertical angles: one is 38° . The other?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Geometry and trigonometry

College Board Question Bank · Geometry and Trigonometry · Lines, Angles, and Triangles

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 55° · $180 - 125$.

2 1080° · $6 \cdot 180$.

3 85° · $130 - 45$.

4 68° · Equal.

5 65° · $180 - 115$.

6 70° · $140/2$.

7 $21 \cdot 9 \cdot 7/3$.

8 30 ft · Similar triangles.

9 120° · $720/6$.

10 38° · Equal.

Right Triangles

Pythagoras, triples and the special two.

GT-3

LESSON

THE RULE

The Pythagorean theorem $a^2 + b^2 = c^2$ links the sides of any right triangle. Know the common triples and the two special right triangles (both on the reference sheet).

TOOL	DETAIL
Pythagorean theorem	$a^2 + b^2 = c^2$; c is the hypotenuse
Common triples	3-4-5, 5-12-13, 8-15-17, 7-24-25, and multiples (6-8-10)
45-45-90	sides $x, x, x\sqrt{2}$
30-60-90	sides $x, x\sqrt{3}, 2x$
Distance between points	$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Converse	if $a^2 + b^2 = c^2$, the triangle is right

REMEMBER An equilateral triangle's height splits it into two 30-60-90 triangles; a square's diagonal splits it into two 45-45-90 triangles. Spot them and skip the algebra.

WORKED EXAMPLES

- Hypotenuse 13, one leg 5 → the other leg is 12
- Square with side 4 → diagonal $4\sqrt{2}$
- Equilateral triangle with side 6 → height $3\sqrt{3}$
- Distance from (1, 1) to (4, 5) = 5

TRAPS

- ✗ Adding the legs instead of their squares ✓ $a^2 + b^2$, then the square root
- ✗ Using a leg as c ✓ c is opposite the right angle
- ✗ $\sqrt{3}$ on the short leg of a 30-60-90 ✓ short x , long $x\sqrt{3}$, hypotenuse $2x$

DRILL HABIT

Memorize the triples and special triangles; solve 15 problems without a calculator.

TRY IT

- 1 Legs 9 and 12. Hypotenuse?
- 2 A 45-45-90 triangle has a leg of 7. Hypotenuse?
- 3 A 30-60-90 triangle has a hypotenuse of 10. Shorter leg? Longer leg?
- 4 Is a triangle with sides 7, 24, 25 a right triangle?

ANSWERS 1 15 · 2 $7\sqrt{2}$ · 3 5 and $5\sqrt{3}$ · 4 Yes ($49 + 576 = 625$)

Right Triangles: Drill

10 original questions. Answer all of them before checking.

GT-3

DRILL

- 1 Legs 8 and 15. Hypotenuse?
- 2 Hypotenuse 25, leg 7. Other leg?
- 3 45-45-90 with leg 6. Hypotenuse?
- 4 30-60-90 with hypotenuse 14. Short leg? Long leg?
- 5 Is 9, 12, 15 a right triangle?
- 6 Square with side 7. Diagonal?
- 7 Distance from $(-3, 2)$ to $(3, 10)$?
- 8 Equilateral triangle side 8. Height?
- 9 Legs 5 and 5. Hypotenuse?
- 10 Is 6, 7, 9 a right triangle?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Geometry and trigonometry

College Board Question Bank · Geometry and Trigonometry · Right Triangles and Trigonometry

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 17 · 8-15-17.

2 24 · 7-24-25.

3 $6\sqrt{2}$ · $x\sqrt{2}$.

4 7 and $7\sqrt{3}$ · x , $x\sqrt{3}$, $2x$.

5 Yes · $81 + 144 = 225$.

6 $7\sqrt{2}$ · 45-45-90.

7 10 · Legs 6 and 8.

8 $4\sqrt{3}$ · 30-60-90.

9 $5\sqrt{2}$ · 45-45-90.

10 No · $36 + 49 \neq 81$.

Trigonometry

SOH-CAH-TOA, complements and radians.

GT-4

LESSON

THE RULE

In a right triangle: **sin = opposite/hypotenuse**, **cos = adjacent/hypotenuse**, **tan = opposite/adjacent**. Complementary angles: $\sin x^\circ = \cos(90^\circ - x^\circ)$.

Radians: $180^\circ = \pi$.

IDEA	EXAMPLE
SOH-CAH-TOA	3-4-5 triangle, angle A opposite 3: $\sin A = 3/5$, $\cos A = 4/5$, $\tan A = 3/4$
Complementary angles	$\sin 30^\circ = \cos 60^\circ$
Similar triangles share trig ratios	the ratios depend only on the angle
Degrees $\leftrightarrow$ radians	multiply degrees by $\pi/180$
Key values	$\sin 30^\circ = 1/2$, $\cos 60^\circ = 1/2$, $\sin 90^\circ = 1$
Find a side	$\tan 40^\circ = h/50 \rightarrow h = 50 \tan 40^\circ$

REMEMBER If $\sin x^\circ = \cos y^\circ$ for acute angles, then $x + y = 90$. It's one of the most common trigonometry questions on the test.

WORKED EXAMPLES

- 5-12-13 triangle, angle opposite 5: $\tan = 5/12$
- $\cos A = 0.6 \rightarrow \sin(90^\circ - A) = 0.6$
- $60^\circ = \pi/3$ radians
- A 10-ft ladder at 60° to the ground reaches $10 \sin 60^\circ = 5\sqrt{3}$ ft

TRAPS

- ~~X~~ $\tan = \text{adjacent/opposite}$ ✓ **opposite/adjacent**
- ~~X~~ $\sin x = \cos y \rightarrow x + y = 180$ ✓ **$x + y = 90$**
- ~~X~~ $\text{Radians} = \text{degrees} \times 180/\pi$ ✓ **$\text{degrees} \times \pi/180$**

DRILL HABIT

Make flashcards for SOH-CAH-TOA, complements and radian conversions. Review daily for a week.

TRY IT

- 1 Right triangle with opposite side 8 and hypotenuse 17. $\sin?$ $\cos?$
- 2 $\sin(x^\circ) = \cos(25^\circ)$. $x?$
- 3 Convert 135° to radians.
- 4 Convert $3\pi/2$ radians to degrees.

ANSWERS 1 $\sin = 8/17$, $\cos = 15/17$ · 2 65° · 3 $3\pi/4$ · 4 270°

Trigonometry: Drill

10 original questions. Answer all of them before checking.

- 1 Right triangle: opposite 5, hypotenuse 13. $\sin$? $\cos$?
- 2 $\tan$ of that angle?
- 3 $\sin x^\circ = \cos 35^\circ$. x ?
- 4 Convert 150° to radians.
- 5 Convert $\pi/4$ radians to degrees.
- 6 $\cos A = 0.8$ (acute). $\sin(90^\circ - A)$?
- 7 A ramp rises 3 m over a 5 m length (hypotenuse). $\sin$ of the angle?
- 8 $\sin 30^\circ = ?$
- 9 Similar right triangles share which ratios?
- 10 Tree height h , 40 ft away, angle of elevation θ . Expression for h ?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Geometry and trigonometry

College Board Question Bank · Geometry and Trigonometry · Right Triangles and Trigonometry

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 $5/13$ and $12/13$ · Adjacent 12.

2 $5/12$ · Opposite/adjacent.

3 55 · Complements.

4 $5\pi/6 \cdot \times \pi/180$.

5 $45^\circ \cdot \times 180/\pi$.

6 0.8 · Complement identity.

7 $3/5$ · Opposite/hypotenuse.

8 $1/2$ · Key value.

9 All trig ratios · Depend only on the angle.

10 $h = 40 \tan \theta$ · $\tan = \text{opposite/adjacent}$.

Circles

Equations, arcs and sectors.

GT-5

LESSON

THE RULE

The equation $(x - h)^2 + (y - k)^2 = r^2$ has center (h, k) and radius r . Arcs and sectors are fractions of the whole circle.

IDEA	FORMULA OR EXAMPLE
Circle equation	$(x - 2)^2 + (y + 3)^2 = 16$: center $(2, -3)$, $r = 4$
Completing the square	$x^2 + 6x + y^2 = 7 \rightarrow (x + 3)^2 + y^2 = 16$
Arc length	$(\text{central angle} \div 360) \times 2\pi r$
Sector area	$(\text{central angle} \div 360) \times \pi r^2$
Radians	arc length = $r\theta$
Tangent line	perpendicular to the radius at the point of tangency
Inscribed angle	half the central angle on the same arc

REMEMBER Completing the square: take half the x-coefficient, square it, and add it to both sides; do the same for y. The radius is the square root of the right side.

WORKED EXAMPLES

- Center $(0, 0)$ through $(3, 4)$: $x^2 + y^2 = 25$
- Central angle 120° , $r = 3$: arc = $(1/3)(6\pi) = 2\pi$
- An inscribed angle on a 100° arc = 50°
- Arc length 4π , radius $8 \rightarrow \theta = \pi/2$ radians

TRAPS

~~$x^2 = 49 \rightarrow r = 49$~~ ✓ $r = 7$

~~Center of $(x + 1)^2$ at $x = 1$~~ ✓ $x = -1$

~~Arc length with πr^2~~ ✓ Arcs use $2\pi r$; sectors use πr^2

DRILL HABIT

Complete the square on 10 circle equations; check each in Desmos.

TRY IT

- Center and radius of $(x + 1)^2 + (y - 5)^2 = 49$?
- Radius 6, central angle 60° . Arc length?
- Radius 10, central angle 90° . Sector area?
- $x^2 - 4x + y^2 + 2y = 4$. Radius?

ANSWERS 1 $(-1, 5)$, $r = 7$ · 2 2π · 3 25π · 4 3

Circles: Drill

10 original questions. Answer all of them before checking.

- 1 Center and radius of $(x - 3)^2 + (y + 2)^2 = 36$?
- 2 Radius 9, central angle 40° . Arc length?
- 3 Radius 6, central angle 120° . Sector area?
- 4 $x^2 + y^2 + 8x - 6y = 0$. Radius?
- 5 Inscribed angle on a 110° arc?
- 6 Arc length 6π , radius 12. Central angle in radians?
- 7 Circle centered at (0, 0) through (5, 12). Equation?
- 8 Tangent line and radius meet at what angle?
- 9 Center of $(x + 7)^2 + y^2 = 4$?
- 10 Circumference of a circle with area 49π ?

WHERE TO PRACTICE · FREE

Khan Academy · SAT Math · Geometry and trigonometry

College Board Question Bank · Geometry and Trigonometry · Circles

Rungs 1–2: Foundations units · Question Bank: Easy

Rung 3: Medium units · Question Bank: Medium

Rungs 4–5: Advanced units (and Reading and Writing Challenge) · Question Bank: Hard

ANSWERS

1 (3, -2), $r = 6$ · Read h, k, r.

2 $2\pi \cdot (40/360)(18\pi)$.

3 $12\pi \cdot (1/3)(36\pi)$.

4 $5 \cdot (x + 4)^2 + (y - 3)^2 = 25$.

5 55° · Half the arc.

6 $\pi/2 \cdot s = r\theta$.

7 $x^2 + y^2 = 169$ · $r = 13$.

8 90° · Perpendicular.

9 (-7, 0) · Opposite sign.

10 14π · $r = 7$.

PART VI

The Season

Thirty-one plays for planning, practicing, evaluating, and winning test day.

Emotional Discipline and the Art of Recovery



JOSEF AIDEN DURAND
FROM THE AUTHOR

Every student hits a question that rattles them. The difference is what happens next. The undisciplined student spends three minutes fighting it, panics, and rushes the next five. That one question cost six.

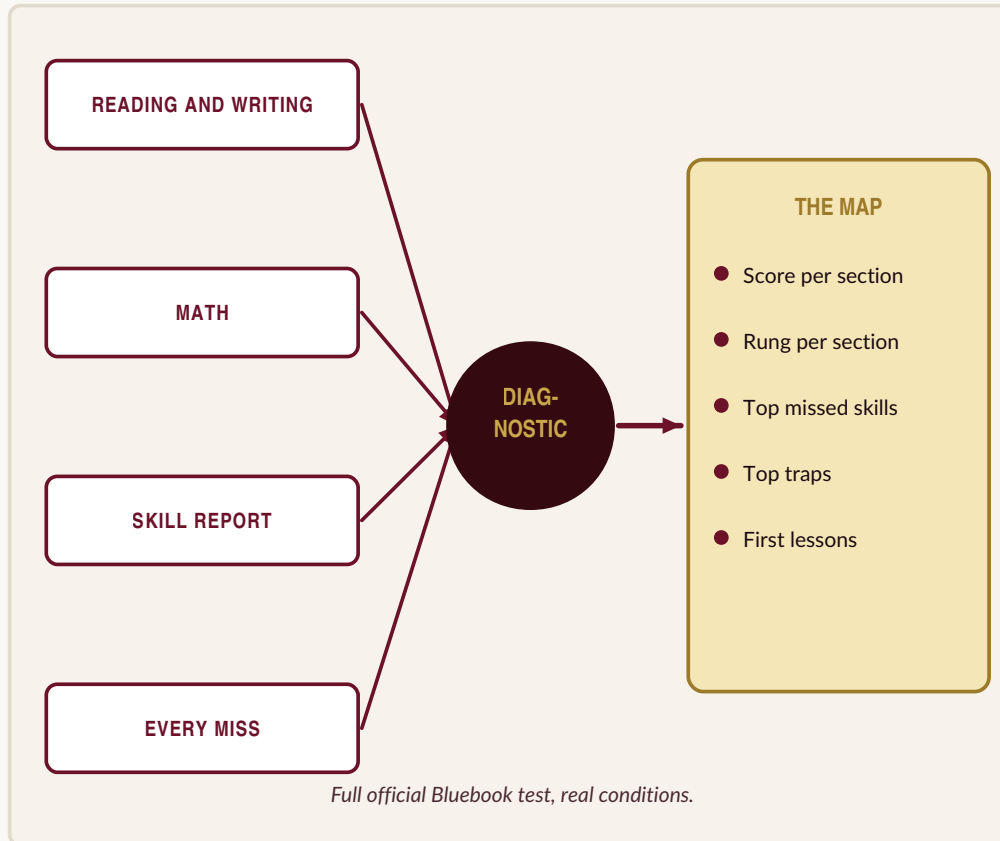
Recovery is a skill. Flag the question, guess, take one slow breath, and play the next question as if it were the first question of a new game. Because it is. The SAT doesn't hold a grudge, and neither should you.

The same goes for bad practice tests. A rough Saturday isn't a verdict; it's film. Football teams don't burn the tape of a loss. They watch it twice, on Monday, with the coaches. Do the same: evaluate every miss within 48 hours and write down what you'll do differently.

Emotional discipline doesn't mean feeling nothing. It means feeling it, and running the play anyway.

The Diagnostic

Start from an official score, not a guess.



FORMATION One full official test, one skill map.

SCOREBOARD

Every student starts with an official practice score and a skill map.

SITUATION

Week 0, before any lessons.

THE PLAY

- 1 Take a full official practice test in Bluebook under real conditions: timed, one sitting, the 10-minute break, the built-in Desmos.
- 2 Record both section scores and the skill breakdown from My Practice.
- 3 Place each section on its own rung of the Score Ladder.
- 4 Evaluate every miss and every guess within 48 hours (SAT-7).

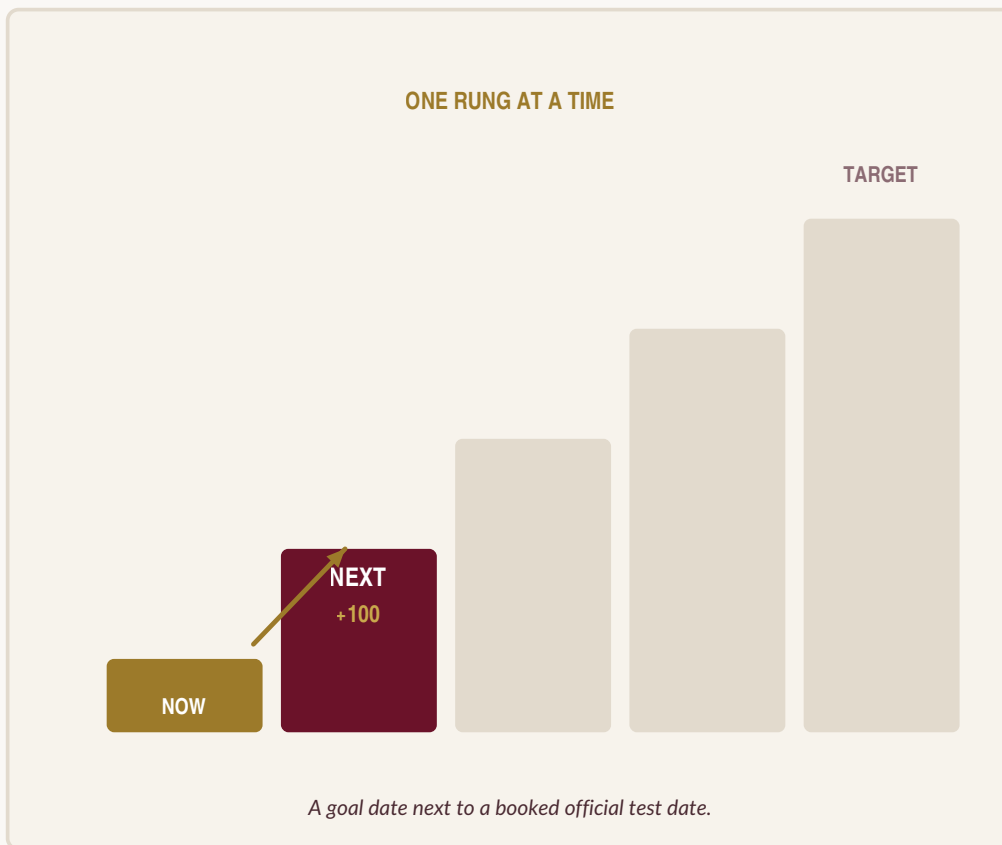
COACHING POINTS

A diagnostic is a map, not a verdict. The most useful number isn't the score; it's the list of skills and traps behind the misses.

FILM College Board Bluebook and My Practice · The SAT Playbook

The Next Rung

The next rung, not the summit.



FORMATION One rung per section, with a date.

SCOREBOARD

Every student has a written next goal for each section, with a date.

SITUATION

After the diagnostic and after every rung exit.

THE PLAY

- 1 Set the goal as the next rung for each section separately: about 100 points, not 1600.
- 2 Set the long-term target from the score ranges of the colleges on your list.
- 3 Put the goal date next to a booked official test date.
- 4 Review progress against the goal at every monthly practice test.

COACHING POINTS

A 300-point goal feels impossible; a 100-point goal feels like next month. Students who see the next rung climb faster than students staring at the top.

FILM The SAT Playbook • your college list

The Game Week

Film, install, scrimmage, film.

THE GAME WEEK

MON	TUE	WED	THU	FRI	SAT	SUN
FILM	INSTALL		INSTALL		SCRIM	FILM

Film Monday · install Tuesday and Thursday (SAT-5) · scrimmage Saturday · film Sunday

The same week, all season.

SITUATION

Every week of the season.

THE PLAY

- 1 Monday, 30 minutes: film. Redo the misses due today (SAT-10) and reread last week’s Film Sheet.
- 2 Tuesday and Thursday, 45 minutes each: install days (SAT-5).
- 3 Saturday: the scrimmage, one timed module in Bluebook.
- 4 Sunday, 30 minutes: film review of every scrimmage miss (SAT-7), with the tutor if you have one.

COACHING POINTS

Teams win on the same week, run all season. A fixed game week survives busy weeks; “I’ll study when I have time” doesn’t.

FORMATION A football week: Monday film, two install days, a Saturday scrimmage, Sunday film.

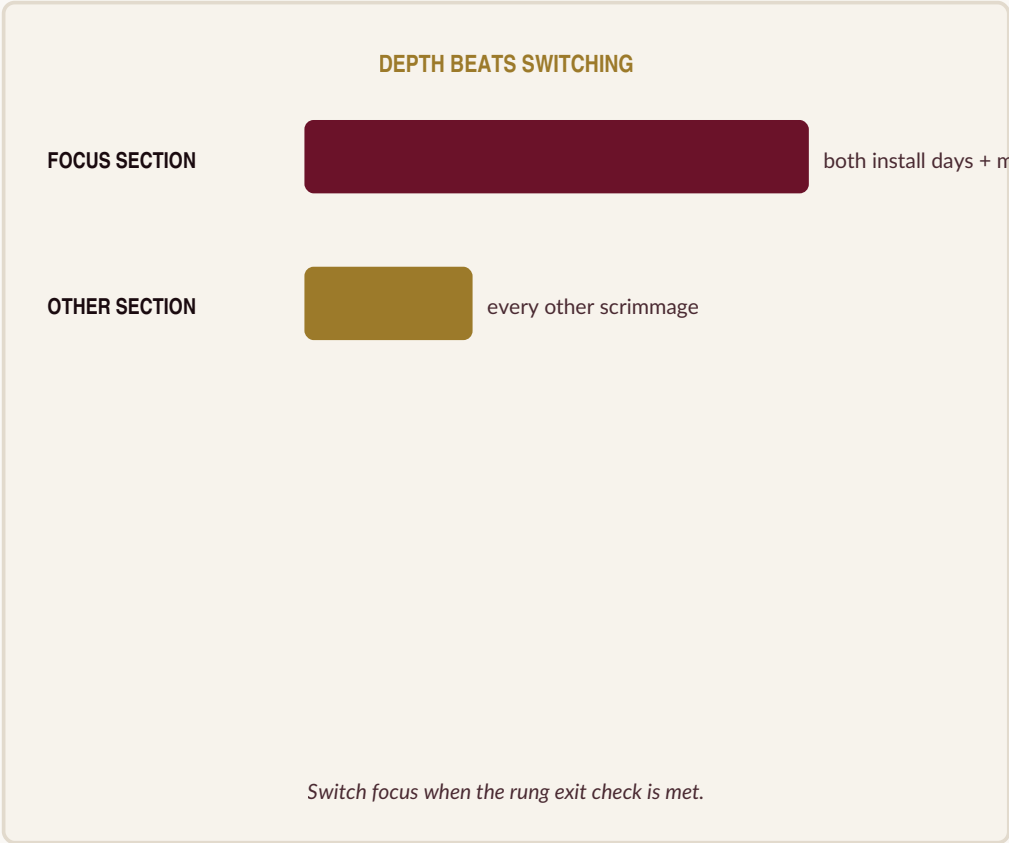
SCOREBOARD

Every day of the game week done, every week.

FILM The SAT Playbook

One Front at a Time

Depth beats switching.



SITUATION

Every block of the season.

THE PLAY

- 1 Choose the section with the bigger gap to the goal, or the one closer to its next rung.
- 2 Both install days go to it until the rung is cleared.
- 3 Hold the other section with every other Saturday scrimmage.
- 4 Switch focus when the rung exit check is met.

COACHING POINTS

Splitting every week between two sections makes slow progress on both. Focus produces visible jumps, and visible jumps build belief.

FORMATION Attack one front; hold the other.

SCOREBOARD

One focus section at a time, with the other maintained weekly.

FILM The SAT Playbook

Install Day

One page in, then the reps.

INSTALL DAY · 45 MINUTES

LEARN

15

one lesson page

REPS

25

10–15 timed questions

LOG

5

for Sunday

The lesson before the reps. Film days do the reviewing.

FORMATION 15 minutes to learn, 25 to rep, 5 to log.

SCOREBOARD

Every install day ends with every miss logged.

FILM The SAT Playbook

SITUATION

Tuesday and Thursday of every game week.

THE PLAY

- 1 15 minutes: one Lesson Book page, chosen from the last scrimmage's film.
- 2 25 minutes: a timed targeted set of 10–15 Question Bank questions on that skill (SAT-9).
- 3 5 minutes: log every miss and guess on the Film Sheet for Sunday (REF-3).
- 4 Stop on time. The film days do the reviewing.

COACHING POINTS

Most students do questions and never learn from them. Install days put the lesson before the reps, and the film days make sure nothing missed goes unreviewed.

Test Dates and Registration

Plan two or three sittings from the start.



Check current dates and deadlines on College Board's SAT site; many colleges superscore.

FORMATION Book early; plan the retake.

SCOREBOARD

Official dates booked before the season starts.

FILM College Board SAT registration

SITUATION

Week 0, and again after every official test.

THE PLAY

- 1 Check current test dates and registration deadlines on College Board's SAT website; book the first official test for the end of the season.
- 2 Plan a second (and if needed a third) sitting a few months later.
- 3 Check each college's policy on superscoring and score reporting.
- 4 Put registration deadlines on the family calendar.

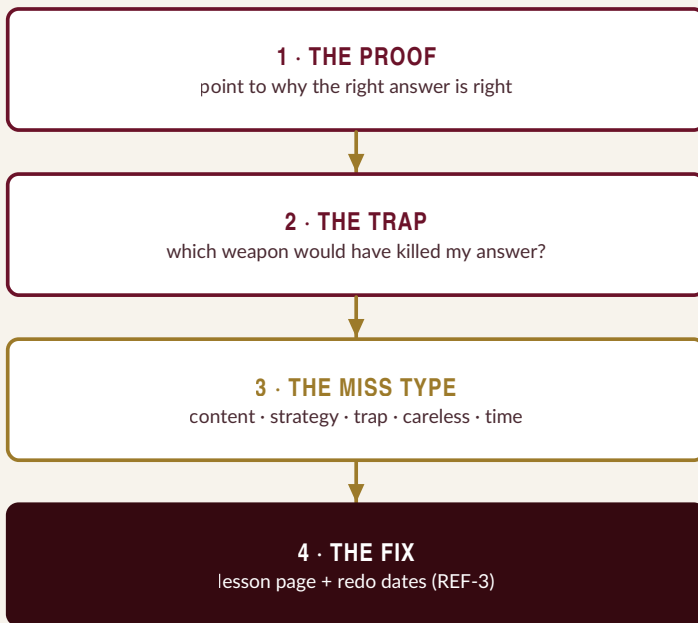
COACHING POINTS

Most students score higher on a second sitting, and many colleges superscore. Planning two sittings from the start takes the pressure off the first.

Film Review

Every miss gets a film session.

EVERY MISS, WITHIN 48 HOURS



Every miss gets a film session.

FORMATION Proof, trap, miss type, fix.

SCOREBOARD

Zero unevaluated misses.

SITUATION

Every missed or guessed question, within 48 hours.

THE PLAY

- 1 Prove the right answer: point to the words or the math that make it right.
- 2 Name why your answer was wrong: which weapon (GL-4 to GL-9) or which step.
- 3 Classify the miss: content, strategy, trap, careless or time.
- 4 Write the fix: a Lesson Book page and a redo date, on the worksheet (REF-3).

COACHING POINTS

Teams that skip film repeat their mistakes on Saturday. Name the trap once, in writing, and it rarely beats the student again.

FILM The Gladiator System · REF-3 The Film Sheet · The SAT Playbook

The Error Log

Patterns, not problems.

THIS WEEK'S PATTERN COUNT



The top three skills set next week's lessons.

FORMATION Every evaluation in one place.

SCOREBOARD

A weekly pattern count, every week.

FILM The SAT Playbook

SITUATION

Every week.

THE PLAY

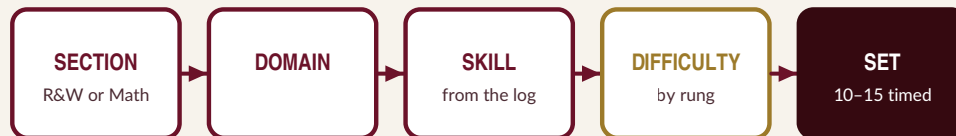
- 1 Keep every evaluation in one log (a notebook, a document or a spreadsheet).
- 2 Each week, count misses by skill and by trap code.
- 3 The top three skills set next week's lessons; the top trap sets next week's drill.
- 4 Use the counts to plan next week's sessions.

COACHING POINTS

Students remember the questions they missed; the patterns are what matter. Ten misses on inference with Out-of-Scope traps is a plan, not a bad week.

Targeted Reps

The exact skill, at the right difficulty.



College Board Question Bank: free, filterable, official.

FORMATION Filter by skill and difficulty.

SCOREBOARD

Every set chosen from the error log's top skills.

FILM College Board SAT Suite Question Bank • The SAT Playbook

SITUATION

Every install day.

THE PLAY

- 1 Use College Board's free Question Bank: filter by section, domain, skill and difficulty.
- 2 Choose the difficulty for your rung: Easy at Rung 1, Medium at Rungs 2-3, Hard at Rungs 4-5.
- 3 Exclude questions that appear in Bluebook practice tests so those stay fresh for scrimmages.
- 4 Work sets of 10-15 timed, then evaluate.

COACHING POINTS

Random practice spreads effort thin. Targeted reps put the time exactly where the points are.

Redo Until Automatic

Solve it again: in 3 days, a week, 3 weeks.

REDO FROM SCRATCH, NO PEEKING



Mastered = two correct redos with full reasoning.

A redo miss resets the schedule.

SITUATION

Every evaluated miss.

THE PLAY

- 1 Redo every missed question 3 days later, from scratch, without looking at the solution.
- 2 Redo it again a week later, and again three weeks later.
- 3 A question is mastered after two correct redos with the full reasoning written out.
- 4 Any redo miss resets the schedule.

COACHING POINTS

Spacing out practice improves long-term memory more than repeating it all at once. Redoing a missed question is the most efficient practice on the SAT.

FORMATION *Three redos on a schedule.*

SCOREBOARD

Every missed question redone on schedule.

FILM Cepeda et al. (2006), distributed practice · The SAT Playbook

The Four-Step Attack

The same four steps, every question.



Ignore the right answer. Hunt the wrong ones.

FORMATION Stem, Shield, weapons, select.

SCOREBOARD

A prediction made before the choices on every question.

SITUATION

Every Reading and Writing question.

THE PLAY

- 1 Read the question stem first, then the text.
- 2 Predict the answer in your own words: the Shield (GL-3).
- 3 Attack every choice with the six weapons (GL-4 to GL-9).
- 4 Select what survives; if two survive, the one that answers the stem better (GL-12).

COACHING POINTS

*Students who run the same process every time stop being surprised.
Ignoring the right answer and hunting the wrong ones short-circuits the justification mode that makes traps work.*

FILM The Gladiator System • Lesson Book GL-1 to GL-3

Weapons Check

Name the weapon for every kill.

SITUATION

Every practice question until it's automatic, then every evaluation.

THE PLAY

- 1 Write a weapon code next to every eliminated choice.
- 2 No code, no elimination: if you can't name why it's wrong, leave it standing.
- 3 In film review, name the weapon that would have killed the trap you chose.
- 4 Track which weapon's traps you fall for most; drill it the next week.

COACHING POINTS

Naming the weapon turns a feeling into a reason. Within a few weeks, students start to see the traps before they finish reading the choice.

GLADIUS	OPP	PUGIO	HALF
Opposite		Half-Right	
TRIDENT	EXT	FIST	RAWQ
Extreme Language		Right Answer, Wrong Question	
MACE	OOS	AXE	REC
Out of Scope		Recycled Language	

"How can I attack this answer?"

The Shield first (GL-3). Then the six weapons (GL-4 to GL-9).

FORMATION Six codes: OPP, HALF, EXT, RAWQ, OOS, REC.

SCOREBOARD

Every elimination has a code during training.

FILM The Gladiator System • REF-2 The Arsenal

Grammar by Rule

Not by ear.



Grammar by rule, never by ear.

FORMATION Choices first, rule second, sentence third.

SCOREBOARD

30 seconds per conventions question, with the rule named.

SITUATION

Every Standard English Conventions question.

THE PLAY

- 1 Scan the choices: what's different between them?
- 2 Name the rule: boundaries, agreement, tense, pronoun, possessive, modifier.
- 3 Apply the rule's five-second test (GM-14).
- 4 Choose; target 30 seconds per question.

COACHING POINTS

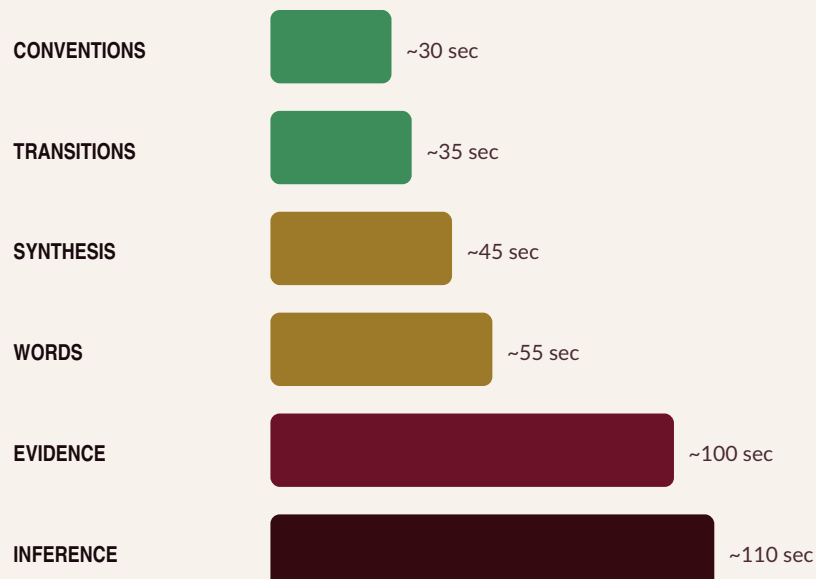
These are the fastest points on the test once students stop guessing by sound. Every second saved here buys time for inference and evidence questions.

FILM The Gladiator System • Lesson Book GM-1 to GM-14

Reading and Writing Timing

About 70 seconds each, spent wisely.

BANK TIME ON FAST TYPES



27 questions in 32 minutes: about 70 seconds on average.

FORMATION Fast types bank time for slow ones.

SCOREBOARD

Every module finished, with flagged questions revisited.

SITUATION

Every timed Reading and Writing module.

THE PLAY

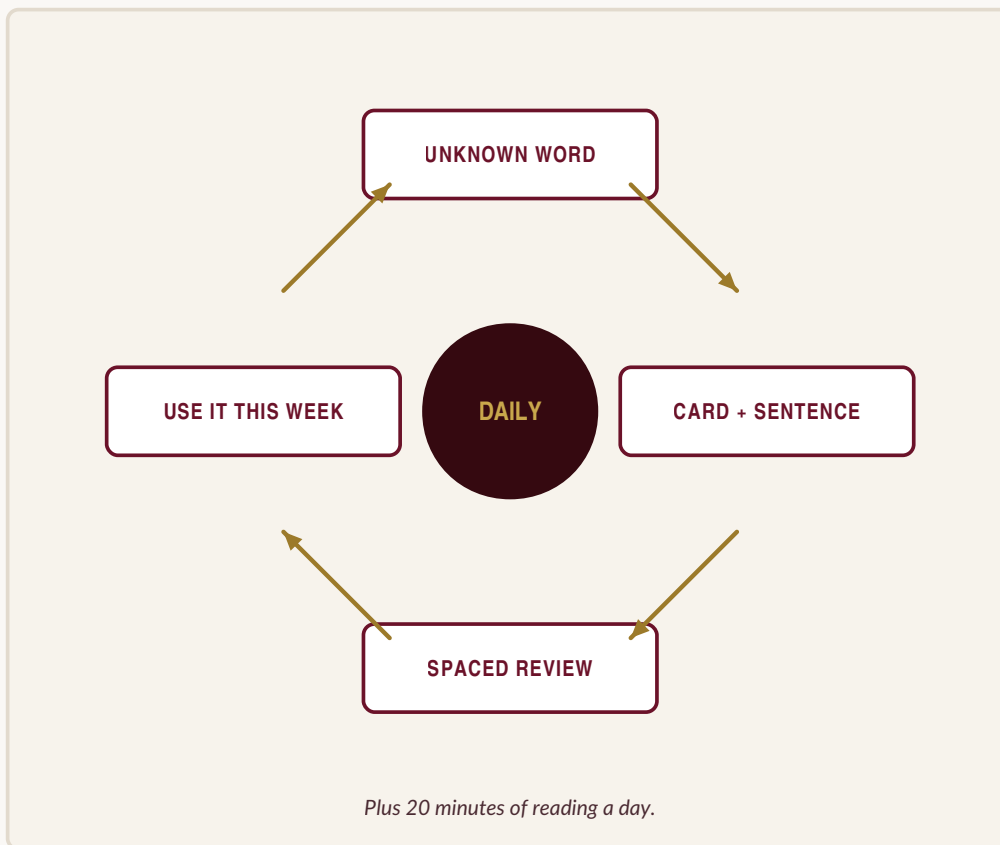
- 1 Average about 70 seconds per question: 27 questions in 32 minutes.
- 2 Move fast on conventions, transitions and synthesis (30–45 seconds).
- 3 Spend the saved time on evidence, inference and cross-text questions.
- 4 Flag at about 90 seconds, guess, move on, and return in the last minutes.

COACHING POINTS

Running out of time is usually a decision problem, not a speed problem: students spend three minutes on one hard question and rush five easy ones.

The Vocabulary Engine

Words from your own misses.



FORMATION Miss, card, review, use.

SCOREBOARD

Every unknown word carded within a day.

FILM Lesson Book RW-2

SITUATION

Daily, ten minutes.

THE PLAY

- 1 Every unknown word from a practice question goes on a card with its sentence.
- 2 Review the cards daily with spaced repetition.
- 3 Use five new words a week in writing or speech.
- 4 Read 20 minutes a day of quality nonfiction or classic fiction.

COACHING POINTS

Words in context questions reward breadth, and the best word list is the one your own misses build. Reading widely is the long-term engine.

Content Before Speed

You can't outrun a gap.

WHERE THE MATH POINTS ARE

ALGEBRA



ADVANCED MATH



DATA ANALYSIS



GEOMETRY + TRIG



Content first; speed follows understanding.

SITUATION

The first weeks of every Math focus block.

THE PLAY

- 1 Map the diagnostic misses to Lesson Book pages (AL, AM, DA, GT).
- 2 Learn the page; do 10 targeted reps at the rung's difficulty.
- 3 Prioritize Algebra and Advanced Math: about 70% of the section.
- 4 Only then work on speed.

COACHING POINTS

Timing drills don't fix a missing formula. Content first; speed follows understanding.

FORMATION Algebra and Advanced Math first: about 70% of the section.

SCOREBOARD

Every missed content skill has a lesson and 10 reps.

FILM College Board digital SAT specifications • Lesson Book AL, AM, DA, GT

The Strategy Toolbox

Four tools for any stuck question.

STUCK? PICK A TOOL

ONE MOVE

MS-2

SWAP IN NUMBERS

MS-3

WORK BACKWARD

MS-4

SKETCH IT

MS-5

Top scorers have more ways in.

FORMATION One move, swap in numbers, work backward, sketch.

SCOREBOARD

Every stuck question tried with at least one tool before guessing.

FILM Lesson Book MS-2 to MS-5

SITUATION

Any question without an obvious path.

THE PLAY

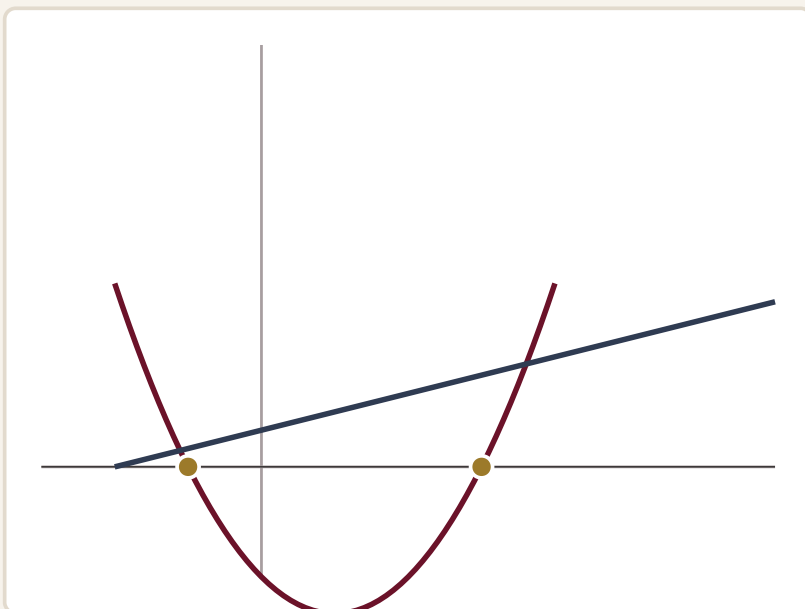
- 1 Find one legal move: what do they want, what do I know, what can I do with it (MS-2).
- 2 Variables everywhere? Swap in numbers (MS-3).
- 3 Number choices and a hard setup? Work backward from the choices (MS-4).
- 4 Shapes or situations? Sketch it (MS-5).

COACHING POINTS

Top scorers aren't faster at algebra; they have more ways in. A student with four tools is rarely stuck for long.

Desmos Daily

Make the calculator automatic.



Zeros, vertices, intersections: click them for exact values.

Practice in Bluebook's Desmos until it's automatic.

FORMATION Graph, intersect, check.

SCOREBOARD

Desmos used on every messy question in practice.

FILM Lesson Book MS-6 • College Board Bluebook

SITUATION

Every math session.

THE PLAY

- 1 Practice in the same Desmos used in Bluebook.
- 2 Solve every messy equation and system by graphing at least once (MS-6).
- 3 Use Desmos to check equivalence and hunt extraneous solutions.
- 4 Keep a list of question types Desmos solves fastest.

COACHING POINTS

Desmos turns many Advanced Math questions into reading a graph. Students who practice with it daily use it without thinking on test day.

The Careless-Error Protocol

Right math, wrong answer, no more.



Careless errors come from skipped steps.

FORMATION Circle, write, check, plug back.

SCOREBOARD

One or fewer careless misses per practice test.

FILM Lesson Book MS-2, MS-7 • The Gladiator System

SITUATION

Every math question at Rungs 4–5, and any student losing points to careless errors.

THE PLAY

- 1 Circle what they ask for (x , $2x$, the sum, the negative root).
- 2 Write every step on scratch paper; no mental algebra with signs.
- 3 Check units and the sign of the answer against your estimate.
- 4 Plug typed answers back into the original equation (MS-7).

COACHING POINTS

At 700+, careless errors are often the biggest category of misses. They aren't random: they come from skipped steps, and a protocol removes them.

Math Timing and the Three Rounds

About 95 seconds each, easy points first.

35 MINUTES, THREE ROUNDS

ROUND 1



quick questions · ~17 min

ROUND 2



flagged, startable · ~11 min

ROUND 3



the hardest · what's left

FINAL MINUTE



no blanks

About 95 seconds per question on average.

SITUATION

Every timed Math module.

THE PLAY

- 1 Average about 95 seconds per question: 22 questions in 35 minutes.
- 2 Round 1: everything you can do in about a minute; flag the rest.
- 3 Round 2: flagged questions you can start; Round 3: the hardest.
- 4 No blanks when time ends.

COACHING POINTS

The hardest questions sit near the end of the second module. Students who bank time on easy questions arrive there with minutes to think.

FORMATION Three rounds, no blanks.

SCOREBOARD

Every module finished with flagged questions revisited.

FILM Lesson Book MS-8 · College Board digital SAT specifications

Focus, Fatigue, and the War Against Distraction



JOSEF AIDEN DURAND
FROM THE AUTHOR

The SAT takes two hours and fourteen minutes. Most teenagers haven't focused on one thing for two hours since they got a phone. That's not a character flaw. It's a training gap, and it can be closed.

Start with your study sessions. Phone in another room, notifications off, door closed. It will feel strange for a week. Then it will feel like a superpower. Every minute of real focus in practice buys you calm on test day.

Fatigue is real, too. Late-test misses are often tiredness, not ignorance. Build stamina the way athletes do: full-length practice tests in the final month, the same time of day as the real thing. And protect your sleep. A rested brain is worth more points than one more night of cramming.

Win the war against distraction in practice, and on test day there won't be a war at all.

The Gladiator Mindset

Switched on, not panicked.

SAT-21

PLAY CALL



FORMATION Every choice is an opponent.

SCOREBOARD

Practice tests taken with full intensity, start to finish.

FILM The SAT Playbook

SITUATION

Every timed practice and test day.

THE PLAY

- 1 Treat the test as a contest: every wrong answer is an opponent trying to take points from you.
- 2 Ask of every choice: "How can I attack this answer?"
- 3 Use the energy: alert and focused, breathing steadily, not panicked.
- 4 Between modules, reset: stand, breathe, drink water.

COACHING POINTS

The right amount of intensity sharpens attention. The gladiator frame turns nerves into focus and keeps students from drifting into passive reading.

Not a Test of Intelligence

It's a game with rules. Learn the rules.

SAT-22

PLAY CALL

SITUATION

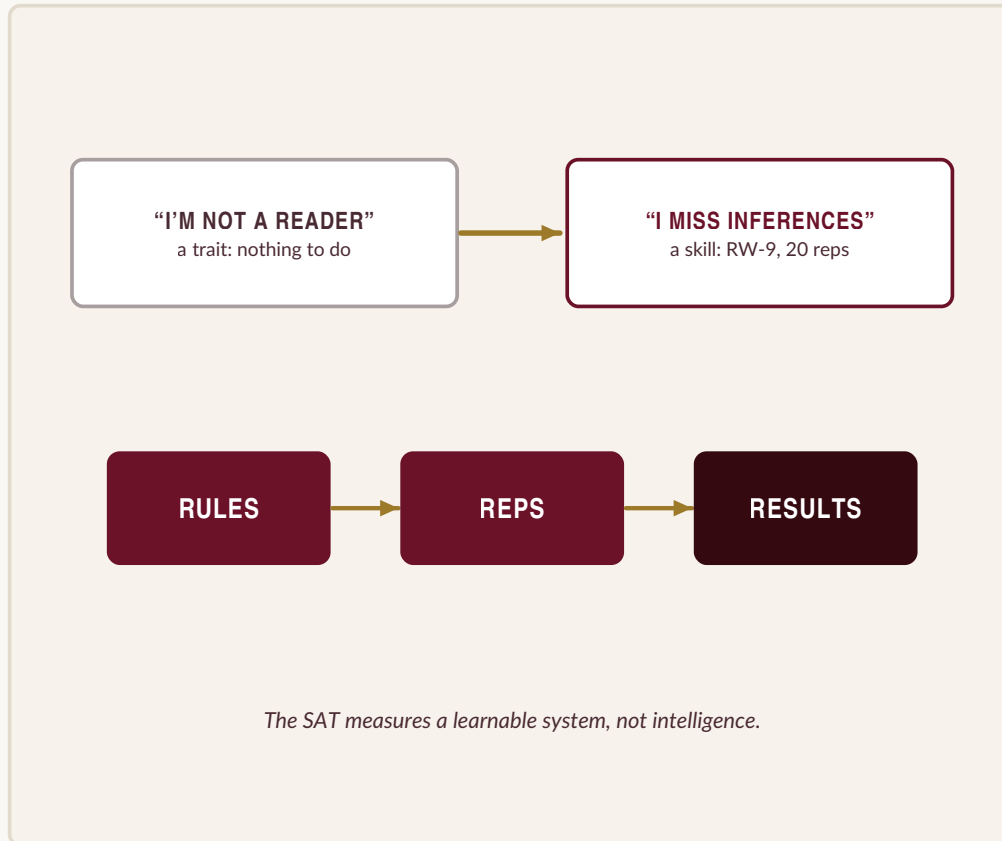
Week 0, and any time a student calls a whole subject a weakness.

THE PLAY

- 1 Explain the opponent: the test-maker and its predictable traps.
- 2 Name the skill, not the trait: inference questions, not "reading."
- 3 Show progress with numbers: rung by rung, skill by skill.
- 4 Celebrate process (sessions done, misses evaluated), not just scores.

COACHING POINTS

Students who believe the SAT measures intelligence stop at their first plateau. Students who believe it measures a learnable system keep climbing.



FORMATION Rules, reps, results.

SCOREBOARD

Every student can name the skill behind a low score, not a trait.

FILM The SAT Playbook

Recovery

The next question is a new game.



One hard question costs one point. Panic costs five.

FORMATION *Flag, breathe, next.*

SCOREBOARD

No more than one question over three minutes per module.

FILM The SAT Playbook

SITUATION

Any hard question, and any moment of panic.

THE PLAY

- 1 Hard question? Flag it, guess, move on. It costs one question; panic costs five.
- 2 Take one slow breath before the next question.
- 3 Never try to guess how Module 1 went; play the module in front of you.
- 4 After the test, review it like film, not like a verdict.

COACHING POINTS

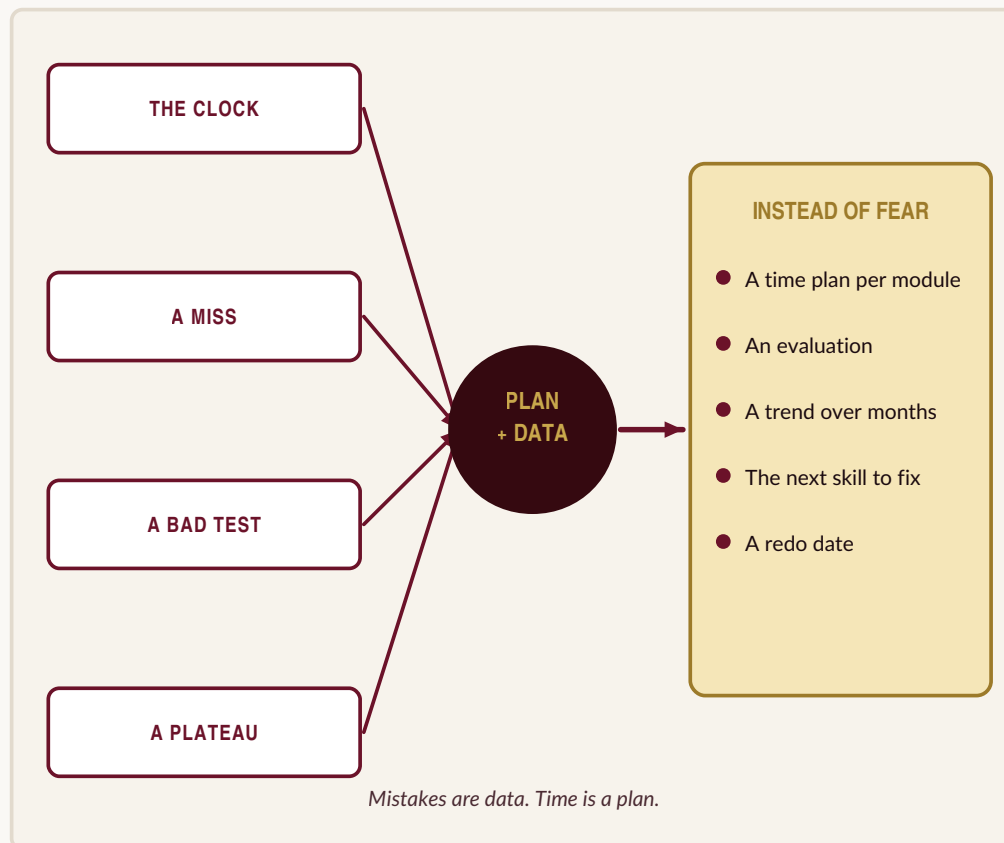
A hard question is not a sign the test is going badly. Students who recover in one breath keep the points the next five questions offer.

Timing Anxiety and Mistakes

Mistakes are data. Time is a plan.

SAT-24

PLAY CALL



SITUATION

Any student who freezes, rushes or dreads practice tests.

THE PLAY

- 1 Use the time plans (SAT-14, SAT-20) so the clock is a schedule, not a threat.
- 2 Practice under time from early in the season, so time pressure feels normal.
- 3 Treat every miss as information: evaluate it, don't judge yourself for it.
- 4 Track trends over months, not single tests.

COACHING POINTS

Smart students often underperform because they fear the clock and their mistakes. A plan for the clock and a habit of evaluating mistakes take the fear out of both.

FORMATION Plan the clock; read the misses.

SCOREBOARD

Every practice test reviewed as data within 48 hours.

FILM The SAT Playbook

Focus and Stamina

Two hours and fourteen minutes of full attention.

FOCUS IS TRAINED LIKE A MUSCLE

1

PHONE IN ANOTHER ROOM

notifications off

2

FULL-LENGTH TESTS

stamina for 2 hours 14 minutes

3

SAME SLEEP SCHEDULE

all week, especially test week

4

USE THE BREAK

water, snack, short walk, no phone

SITUATION

Every study session; especially the final month.

THE PLAY

- 1 Study with the phone in another room and notifications off.
- 2 Build stamina with full-length practice tests in the final weeks.
- 3 Protect sleep: the same bedtime and wake time all week, especially test week.
- 4 Use the 10-minute break: water, a snack, a short walk, no phone.

COACHING POINTS

Late-test misses are often fatigue, not knowledge. Focus is trained like a muscle, and sleep is part of training.

FORMATION Phone out, full tests, sleep.

SCOREBOARD

Every study session distraction-free.

FILM The SAT Playbook

Full Scrimmages

Practice the whole game.



Several scrimmages, and test day feels like home.

FORMATION *Full test, test conditions, evaluated.*

SCOREBOARD

A full scrimmage every week in the final month, evaluated.

SITUATION

Every week in the final 4–5 weeks; every other week at Rung 4.

THE PLAY

- 1 Take a full Bluebook practice test at the same time of day as the real test.
- 2 Real conditions: timed, the break, the built-in Desmos, no phone.
- 3 Evaluate every miss and guess within 48 hours.
- 4 Track both section scores on the ladder chart.

COACHING POINTS

Scrimmages test the whole system at once: knowledge, strategy, pacing, stamina and nerves. Students who have done several feel at home on test day.

FILM College Board Bluebook • The SAT Playbook

The Final Month

Sharpen, don't cram.

SAT-27

PLAY CALL

SHARPEN, DON'T CRAM

WEEK 4



scrimmage + targeted reps

WEEK 3



scrimmage + targeted reps

WEEK 2



scrimmage + error log

FINAL WEEK



redo the log · rest · sleep

No new content in the final week.

SITUATION

The four weeks before an official test.

THE PLAY

- 1 Weeks 4–2: a scrimmage every week; targeted reps on the error log's top skills.
- 2 Final week: no new content; redo the error log; one light module.
- 3 Fix the sleep schedule to the test-day wake time.
- 4 Re-read REF-2 (The Arsenal) and REF-1 (Must-Know Math).

COACHING POINTS

The last month is for sharpening what's there and arriving rested. New content in the final week adds anxiety, not points.

FORMATION *Scrimmage, review, rest.*

SCOREBOARD

No new content in the final week.

FILM The SAT Playbook

The Night Before and the Morning Of

Nothing left to chance.

SAT-28

PLAY CALL

THE NIGHT BEFORE AND THE MORNING OF

- ☒ Bluebook installed, exam setup done
- ☒ Admission ticket
- ☒ Photo ID
- ☒ Device charged + charger
- ☒ Pencils + approved calculator (optional)
- ☒ Water and a snack
- ☒ Sleep on schedule
- ☒ Leave early

FORMATION *The checklist.*

SCOREBOARD

Every item on the checklist done the night before.

FILM College Board test-day checklist • The SAT Playbook

SITUATION

The day before and the morning of every official test.

THE PLAY

- 1 Night before: Bluebook installed and exam setup complete, admission ticket ready, device charged, charger packed.
- 2 Pack photo ID, pencils, an approved calculator if you want one, water and a snack.
- 3 Light review only: the Arsenal and Must-Know Math. Sleep on schedule.
- 4 Morning: a real breakfast, leave early, arrive before check-in opens.

COACHING POINTS

Test-day mistakes are usually logistics: a dead laptop, a missing ID. A checklist turns the morning into a routine.

In the Colosseum

Test day: run the system.



R&W, then Math. Run the system you practiced. No blanks.

FORMATION Module 1 care, flags, no blanks.

SCOREBOARD

The system run, start to finish.

FILM The SAT Playbook

SITUATION

Every official test.

THE PLAY

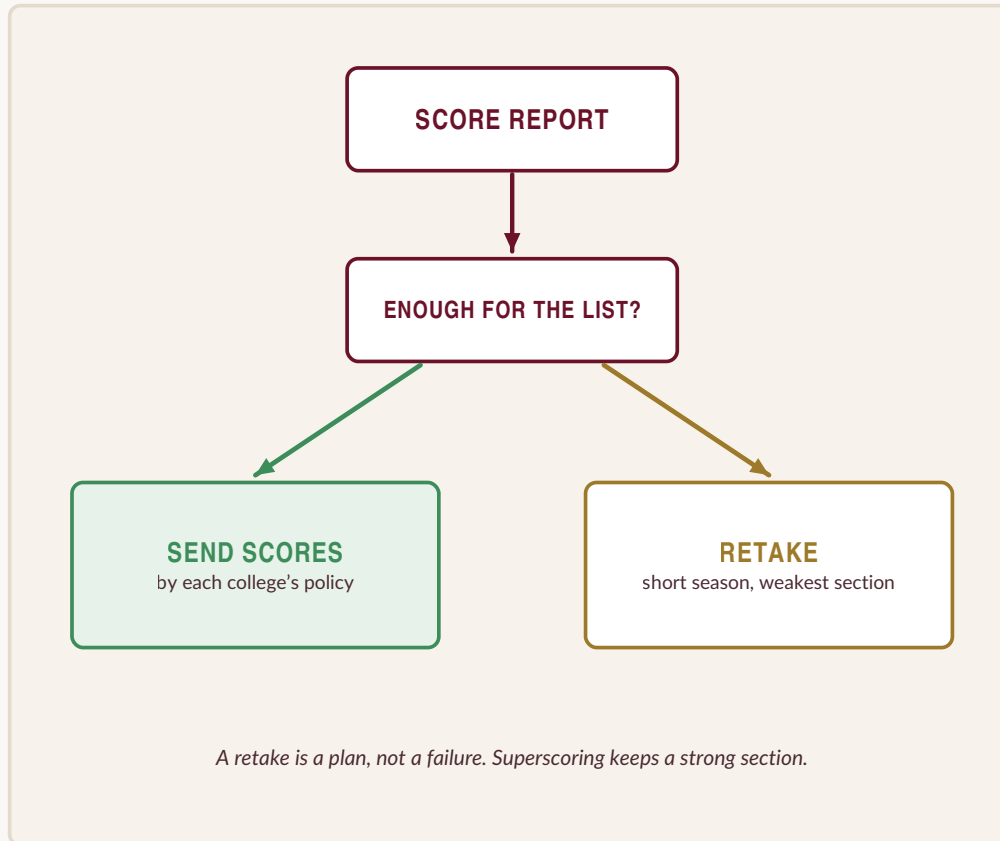
- 1 Module 1 in each section gets full care: it decides how hard Module 2 is.
- 2 Run the Four-Step Attack and the Three Rounds exactly as practiced.
- 3 Flag, guess and return; never leave a blank.
- 4 Use the break to reset; play the next module, not the last one.

COACHING POINTS

Test day is not the day to try something new. The student who runs the same system that worked in scrimmages gets the score the scrimmages predicted, or better.

After the Test

Score, decide, plan.



FORMATION Score report, retake decision, next sitting.

SCOREBOARD

A decision and a plan within a week of every score report.

FILM College Board, score sending

SITUATION

When official scores arrive.

THE PLAY

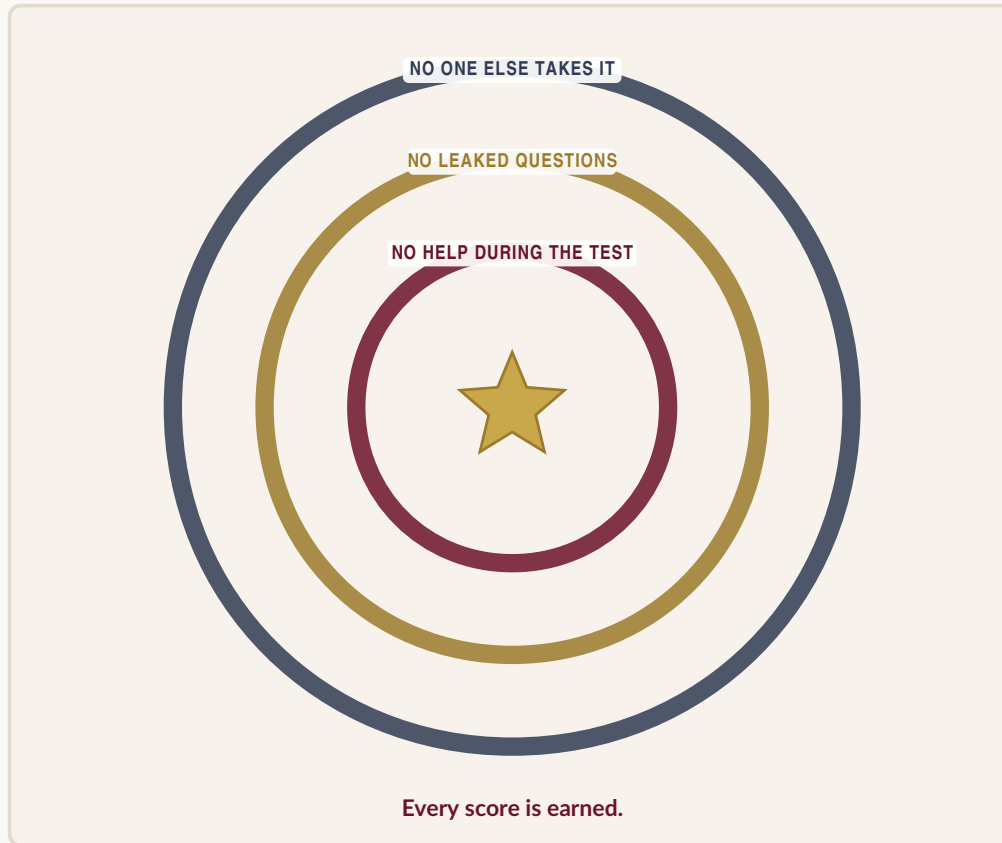
- 1 Compare the score with the goal and the scrimmages.
- 2 Decide (with a counselor if you have one): is the score enough for your list, or retake?
- 3 If retaking: a new diagnostic from the score report, and a short season aimed at the weakest section.
- 4 Send scores according to each college's policy.

COACHING POINTS

A retake is a plan, not a failure. Many students score higher the second time, and superscoring means a strong section is never wasted.

Every Score Is Earned

The integrity rule.



FORMATION *Your own work, every time.*

SCOREBOARD

Zero tolerance, zero exceptions.

SITUATION

Always.

THE PLAY

- 1 Every score comes from the student's own work on test day.
- 2 No leaked or "real" questions from current tests, ever.
- 3 No help from anyone during the test, and no one else takes it.
- 4 Report anyone offering shortcuts to College Board.

COACHING POINTS

Cheating risks score cancellation and a student's future, and it teaches nothing. An earned 1500 builds the student who will do the work in college.

FILM College Board SAT Terms and Conditions · Rules of the Game

PART VII

The Practice Test

A full-length original practice test with answers, explanations and a scoring guide.

Test-Day Nerves and Timing Anxiety



JOSEF AIDEN DURAND
FROM THE AUTHOR

Timing anxiety destroys smart students because it turns the clock into a threat. The fix is to turn the clock into a schedule. In Reading and Writing, you have about 70 seconds a question; spend less on grammar and transitions and more on evidence and inference. In Math, you have about 95; move fast early, think hard late. Know your checkpoints, check them, and keep moving.

On test day, your nerves will show up. Let them. A little adrenaline sharpens attention. What matters is that your process shows up too: the Shield before every set of choices, the six weapons, the three rounds, the flags. You've practiced all of it. Test day isn't the day to invent anything new.

Before you take the practice test that follows, set it up like the real thing. A quiet room. A timer. A ten-minute break between sections. No phone. Then run the system, start to finish, and evaluate every miss within two days. That's how this test becomes practice for the one that counts.

Directions

Two hours and fourteen minutes. Treat it like the real thing.

BEFORE YOU START

Set it up like test day: a quiet room, a timer, scratch paper, a pencil, and a graphing calculator (or Desmos on a computer). Phone in another room.

TIMING

Reading and Writing: Module 1, 27 questions, 32 minutes. Module 2, 27 questions, 32 minutes.

Break: 10 minutes.

Math: Module 1, 22 questions, 35 minutes. Module 2, 22 questions, 35 minutes.

ANSWERING

Multiple-choice questions have one best answer. For student-produced responses, follow the entry rules in MS-7 (fractions or decimals; no mixed numbers). There is no penalty for guessing: answer every question.

ABOUT THIS TEST

Every question is original and follows the structure and question types of the digital SAT. Because a printed test can't adapt, Module 2 here is set at a steady medium-to-hard difficulty rather than adjusting to your Module 1 performance.

RUN THE SYSTEM

Stem first. Shield before sword. Attack every choice. Flag and move at about 90 seconds. No blanks.

AFTERWARD

Score it with the answer key and the scoring guide. Then evaluate every miss and every guess on the worksheet (REF-3) within 48 hours. That's where the points are.

1 Botanist Ynés Mexía began collecting plants at age 55, yet her late start did not _____ her productivity: over thirteen years she gathered roughly 145,000 specimens, including hundreds of species new to science.

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

- A limit
- B measure
- C inspire
- D reveal

2 Rather than replace the town's crumbling stone bridge, engineers chose to _____ it, reinforcing its arches with steel while preserving the original masonry.

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

- A relocate
- B imitate
- C demolish
- D restore

3 Critics initially described the composer's first symphony as _____, complaining that its melodies wandered without direction; decades later, the same work is praised for its careful structure.

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

- A aimless
- B meticulous
- C triumphant
- D derivative

4 For centuries, historians assumed that the Silk Road was a single route linking China and Rome. Recent archaeological surveys, however, have uncovered dozens of smaller trading paths branching across Central Asia, suggesting that the "road" was really a shifting network of local exchanges.

Which choice best describes the main purpose of the text?

- A To describe the goods traded along the Silk Road
- B To argue that Rome dominated trade with China
- C To present findings that challenge a long-held view of the Silk Road
- D To explain why historians stopped studying Central Asia

5 Many people assume that octopuses, as solitary hunters, have little use for learning from others. In one experiment, octopuses that watched a trained octopus choose a red ball over a white one quickly made the same choice themselves. Such results suggest that observational learning may not be limited to social animals.

Which choice best describes the function of the underlined sentence in the text as a whole?

- A It summarizes the conclusion of the text.
- B It explains why octopuses prefer the color red.
- C It presents evidence that challenges an assumption about octopuses.
- D It introduces the assumption that the text later rejects.

6 The poet Gwendolyn Brooks often drew on scenes from her Chicago neighborhood—kitchenettes, street corners, beauty shops—to explore larger themes of dignity and ambition. By grounding these themes in specific, ordinary places, she made them feel immediate to her readers.

Which choice best states the main idea of the text?

- A Brooks used everyday local settings to make broad themes feel vivid.
- B Brooks's poems were mainly descriptions of beauty shops.
- C Brooks preferred to write about Chicago rather than other cities.
- D Readers in Chicago understood Brooks better than others did.

7 Text 1

Urban planners have long argued that wider roads reduce traffic congestion by giving cars more space. Expanding a crowded highway, they reason, should allow vehicles to move faster.

Text 2

Economists studying “induced demand” have found that when a road is widened, more people choose to drive on it. Within a few years, traffic often returns to its earlier levels, leaving the new lanes just as crowded as the old ones.

Based on the texts, how would the economists in Text 2 most likely respond to the reasoning in Text 1?

- A They would claim that highways should never be expanded under any circumstances.
- B They would argue that widening roads may not reduce congestion over time because it encourages more driving.
- C They would agree that widening roads permanently reduces congestion.
- D They would suggest that urban planners ignore the speed of vehicles.

8 The following text is from a short story written for this test. The narrator describes her neighbor.

Mrs. Hale had a way of making every visitor feel expected. Whether one arrived at noon or at nine in the evening, the kettle was already warming, an extra cup set out, as though she had known all along that someone would come.

Which choice best describes Mrs. Hale as she is presented in the text?

- A She prefers visitors to arrive at noon.
- B She rarely receives visitors.
- C She is welcoming and seems prepared for visitors at any time.
- D She is anxious about unexpected guests.

9 In a study of 60 community gardens, ecologist Pilar Ortega found that gardens with a mix of flowering plants attracted nearly three times as many bee species as gardens planted mostly with vegetables. Ortega concluded that even small additions of flowers could make urban gardens valuable habitats for pollinators.

According to the text, what did Ortega conclude?

- A Bees prefer vegetables to flowers.
- B Urban gardens attract more bees than rural farms.
- C Adding flowers to urban gardens could help support pollinators.
- D Vegetable gardens harm bee populations.

10 Researchers hypothesized that zebra finches learn their songs more accurately when they can see, and not only hear, an adult tutor bird. To test this, they raised juvenile finches in three conditions: with a live tutor in view, with a live tutor behind an opaque screen, and with recordings of a tutor's song.

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

- A Finches in all three conditions learned their songs equally well.
- B Finches that heard recordings sang more often than other finches.
- C Adult tutor birds sang more when juvenile finches were present.
- D Finches that could see a live tutor copied the tutor's song more accurately than finches in the other two conditions.

11 Some historians argue that the printing press spread quickly in fifteenth-century Europe mainly because paper had become cheap. Others contend that the growth of universities, which created demand for affordable copies of texts, mattered more.

Which finding would most strongly support the second group of historians' claim?

- A Some printers went out of business.
- B Printing presses appeared first and most densely in cities with large universities, regardless of local paper prices.
- C Many early printed books were religious texts.
- D Paper prices fell sharply across Europe in the 1400s.

12 A researcher compared average weekly reading time among students who used a school library app and those who did not.

Group	Weekly reading (min)
App users, grade 9	145
Non-users, grade 9	98
App users, grade 11	132
Non-users, grade 11	101

The researcher claims that, in both grades, app users read more each week than non-users did.

Which choice most effectively uses data from the table to support the researcher's claim?

- A Grade 11 non-users read 101 minutes per week.
- B App users in grade 9 read more than app users in grade 11.
- C Grade 9 app users read 145 minutes compared with 98 for non-users, and grade 11 app users read 132 compared with 101.

13 Archaeologists excavating a site in Peru found textiles woven from alpaca wool. Alpacas were domesticated in the high Andes and do not thrive in the hot coastal lowlands where the site is located. The textiles, therefore, suggest that _____

Which choice most logically completes the text?

- A alpacas once lived comfortably in the coastal lowlands.
- B the site's inhabitants likely obtained alpaca wool through contact with highland communities.
- C the textiles were made after the site was abandoned.
- D coastal weavers preferred cotton to wool.

14 When chemist Rosalind Franklin's X-ray images of DNA were analyzed, they showed a distinctive X-shaped pattern. Such patterns are produced only by molecules with a helical structure. Franklin's images, therefore, indicated that _____

Which choice most logically completes the text?

- A DNA likely has a helical structure.
- B DNA is shaped like the letter X.
- C X-ray images cannot reveal molecular structure.
- D all molecules produce X-shaped patterns.

15 The Great Barrier Reef is visible from low Earth _____ it stretches for more than 2,000 kilometers along Australia's coast.

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

- A orbit,
- B orbit
- C orbit;
- D orbit, and,

16 After years of drought, the reservoir finally _____ the town lifted its water restrictions.

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

- A refilled
- B refilled, and
- C refilled and,
- D refilled,

17 The sculptor _____ founded an art school in Harlem in 1932.

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

- A —Augusta Savage—
- B , Augusta Savage,
- C Augusta Savage,
- D Augusta Savage

18 The festival features music from three _____ Mali, Brazil, and Portugal.

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

- A countries
- B countries;
- C countries,
- D countries:

19 The collection of letters written by the explorer's crew _____ now housed in a museum in Oslo.

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

- A were
- B is
- C are
- D have been

20 When the archaeologists opened the tomb in 1922, they discovered that thieves _____ it centuries earlier.

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

- A have robbed
- B had robbed
- C robbed
- D rob

21 Known for her experiments with radioactivity, _____

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

- A Marie Curie's laboratory became famous.
- B two Nobel Prizes were awarded to Marie Curie.
- C the Nobel committee honored Curie twice.
- D Marie Curie won Nobel Prizes in two sciences.

22 The company announced that _____ new headquarters would open in spring.

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

- A its
- B it's
- C they're
- D their

23 Honeybees communicate the location of food through a “waggle dance.” _____ the angle of the dance indicates direction, and its duration indicates distance.

Which choice completes the text with the most logical transition?

- A However,
- B Instead,
- C Nevertheless,
- D Specifically,

24 The new subway line was expected to reduce car traffic downtown. _____ traffic increased in its first year, as new businesses drew more visitors to the area.

Which choice completes the text with the most logical transition?

- A Therefore,
- B For example,
- C Instead,
- D Similarly,

25 Early telescopes produced blurry images because different colors of light bent by different amounts. _____ Isaac Newton designed a telescope that used mirrors instead of lenses.

Which choice completes the text with the most logical transition?

- A In response,
- B Likewise,
- C For instance,
- D Even so,

26 While researching a topic, a student has taken the following notes:

- The Sahara is about 9.2 million km².
- The Gobi is about 1.3 million km².
- Both are deserts.

The student wants to emphasize the difference in size between the two deserts. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A The Sahara and the Gobi are both deserts.
- B At about 9.2 million km², the Sahara is roughly seven times the size of the 1.3-million-km² Gobi.
- C The Gobi is about 1.3 million km².
- D Deserts cover large areas of Earth.

27 While researching a topic, a student has taken the following notes:

- Katherine Johnson was a NASA mathematician.
- She calculated trajectories for the 1962 orbital flight of John Glenn.
- Glenn asked that Johnson personally verify the computer's figures.

The student wants to emphasize the trust others placed in Johnson's work. Which choice most effectively uses relevant information from the notes to accomplish this goal?

- A John Glenn's orbital flight took place in 1962.
- B Johnson calculated trajectories.
- C Before his 1962 flight, astronaut John Glenn asked that Katherine Johnson personally check the computer's calculations.
- D Katherine Johnson worked as a mathematician at NASA.

1 Unlike earlier biographies, which portrayed the inventor as a lone genius, a new biography presents a more _____ picture, showing how dozens of assistants and investors shaped his work.

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

- A solitary
- B flattering
- C simplistic
- D collaborative

2 The novel's ending is deliberately _____: readers are left to decide for themselves whether the narrator ever returns home.

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

- A predictable
- B ambiguous
- C conclusive
- D sentimental

3 Though small, the island's research station has made a(n) _____ contribution to climate science, supplying one of the longest continuous records of ocean temperature in the world.

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

- A outsized
- B accidental
- C temporary
- D negligible

4 The new board was designed to serve as a check on the director's power, reviewing all major spending decisions.

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

- A pattern
- B payment
- C inspection mark
- D limit

5 Studies of ancient climate often rely on ice cores, which preserve tiny bubbles of air from thousands of years ago. Yet ice cores exist only where ice has accumulated for long periods. To fill gaps, some researchers have turned to cave formations called stalagmites, whose layers also record past rainfall and temperature.

Which choice best describes the overall structure of the text?

- A It criticizes researchers who rely on ice cores.
- B It describes a method, notes a limitation, and introduces an alternative.
- C It explains how stalagmites form.
- D It compares two caves and concludes that one is older.

6 Some economists predicted that four-day workweeks would lower productivity. A trial at dozens of companies, however, found that output stayed the same or rose at most of them. The results have prompted other firms to consider similar schedules.

Which choice best describes the function of the underlined sentence?

- A It presents evidence that contradicts a prediction.
- B It explains why companies adopted the schedule.
- C It states the prediction the text supports.
- D It introduces the economists.

7 Text 1

Some linguists argue that children learn grammar mainly by imitating adults, copying sentence patterns they hear.

Text 2

Children often produce forms they have never heard, such as “goed” or “mouses.” These errors suggest that children are applying rules they have inferred, not simply copying adult speech.

Based on the texts, how would the author of Text 2 most likely respond to the linguists in Text 1?

- A By agreeing that imitation fully explains how children learn grammar
- B By claiming that children never imitate adults
- C By noting that adults also say “goed”
- D By arguing that children’s errors show they do more than imitate

8 The following text is from a short story written for this test. The narrator has just moved to a new city.

The streets were wider than any I had known, and louder, and everyone in them seemed to be late for something. I walked slowly, half afraid that if I hurried I would be swept along to wherever they were going.

Which choice best describes the narrator’s feelings in the text?

- A Excited to join the crowds
- B Angry at the people who are late
- C Overwhelmed and cautious in an unfamiliar place
- D Bored by the city’s streets

9 Engineers at a solar farm noticed that panels covered in desert dust produced up to 30 percent less electricity. Rather than washing the panels with scarce water, the team tested a coating that causes dust to slide off when the panels tilt. In trials, coated panels lost only 5 percent of their output.

Which choice best states the main idea of the text?

- A Solar farms should be built away from deserts.
- B Washing panels is the best way to keep them clean.
- C A coating offered a way to reduce dust-related losses without using water.
- D Dust has no effect on solar panels.

10 A biologist claims that a species of desert lizard regulates its body temperature by changing color: darker in the cool morning to absorb heat, and lighter at midday to reflect it.

Which finding, if true, would most directly support the biologist's claim?

- A The lizards' skin was measurably darker at 7 a.m. than at noon, and their body temperatures stayed within a narrow range all day.
- B The lizards are most active at midday.
- C Other desert animals also change color.
- D The lizards eat insects.

11 A political scientist argues that voter turnout among voters aged 18 to 24 rises when polling places are located on college campuses.

Which finding would most directly weaken this argument?

- A Turnout among voters aged 18 to 24 rose in towns that added campus polling places.
- B Many colleges have libraries.
- C Voters aged 18 to 24 vote less than older voters.
- D In towns that added campus polling places, turnout among voters aged 18 to 24 did not change compared with similar towns that did not.

12 A team measured how quickly seeds of three plant species germinated at different soil temperatures.

Species	15°C (days)	25°C (days)
Clover	9	4
Rye	6	5
Flax	12	6

The team concluded that warmer soil sped germination most dramatically for flax.

Which choice most effectively uses data from the table to support this conclusion?

- A All species germinated faster at 25°C.
- B Flax germination fell from 12 days to 6, a larger drop than for clover (5 days) or rye (1 day).
- C Rye germinated in 5 days at 25°C.
- D Clover germinated in 4 days at 25°C.

13 Medieval manuscripts were usually written on parchment made from animal skin. A recently studied manuscript, long thought to be from the 1200s, contains a page made of paper produced by a technique that did not reach Europe until the 1300s. This suggests that _____

Which choice most logically completes the text?

- A at least part of the manuscript was likely produced or repaired later than the 1200s.
- B the manuscript was written entirely on parchment.
- C paper was invented in the 1200s.
- D all medieval manuscripts used paper.

14 Some trees in a forest share nutrients through underground networks of fungi. When researchers cut these fungal links around saplings, the saplings grew more slowly than those whose links were left intact. This suggests that _____

Which choice most logically completes the text?

- A fungal networks may help saplings grow.
- B saplings do not need nutrients.
- C fungi harm all trees.
- D older trees grow slowly.

15 The Andes are the longest continental mountain range in the _____ they run about 7,000 kilometers along South America's western edge.

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

- A world,
- B world, and,
- C world—
- D world;

16 The chemist Percy Julian, who synthesized medicines from soybeans _____ held more than 130 patents.

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

- A soybeans
- B soybeans;
- C soybeans—
- D soybeans,

17 The findings of the long-term study _____ that regular reading improves attention.

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

- A has suggested
- B suggests
- C is suggesting
- D suggest

18 The museum's newest exhibit features artifacts from ancient _____ including coins, pottery, and a bronze helmet.

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

- A Greece;
- B Greece:
- C Greece
- D Greece,

19 By the time the rescue team _____, the climbers had already descended.

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

- A had arrived
- B arriving
- C arrived
- D arrives

20 Each of the volunteers _____ trained to identify bird calls.

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

- A was
- B are
- C have been
- D were

21 Hoping to reduce waste, _____

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

- A the school's cafeteria switched to reusable trays.
- B reusable trays were adopted by the school.
- C waste was reduced by the school.
- D the school switched its cafeteria to reusable trays.

22 The orchestra's conductor praised the _____ performance in the final concert.

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

- A musician's
- B musicians
- C musicians'
- D musicians's

23 Coral reefs cover less than 1 percent of the ocean floor. _____ they support about a quarter of all marine species.

Which choice completes the text with the most logical transition?

- A Therefore,
- B Similarly,
- C For example,
- D Nevertheless,

24 The city added protected bike lanes on its main avenue. _____ the number of cyclists using the avenue doubled within a year.

Which choice completes the text with the most logical transition?

- A In contrast,
- B Subsequently,
- C However,
- D For instance,

25 Many spiders spin new webs every day. The orb-weaver, _____ eats its old web each morning to recycle the silk proteins.

Which choice completes the text with the most logical transition?

- A however,
- B instead,
- C therefore,
- D for example,

26 While researching a topic, a student has taken the following notes:

- The Burj Khalifa (Dubai) is 828 m tall.
- Merdeka 118 (Kuala Lumpur) is 679 m tall.
- Both are skyscrapers completed after 2009.

The student wants to present a similarity between the two buildings. Which choice most effectively uses relevant information from the notes?

- A The Burj Khalifa is taller than Merdeka 118.
- B Merdeka 118 is in Kuala Lumpur.
- C Both the Burj Khalifa and Merdeka 118 are skyscrapers completed after 2009.
- D The Burj Khalifa is 828 m tall.

27 While researching a topic, a student has taken the following notes:

- Researchers studied whether background music affects reading speed.
- Participants read with music, with noise, and in silence.
- Silence produced the fastest reading.

The student wants to present the study's aim to an audience unfamiliar with it.

Which choice most effectively accomplishes this goal?

- A Researchers wanted to find out whether background music affects how fast people read.
- B Music is popular among students.
- C Silence produced the fastest reading.
- D Participants read in three conditions.

1 If $3x - 7 = 14$, what is the value of x ?

- A 21
- B 5
- C 7
- D 9

2 A gym charges a \$40 joining fee plus \$25 per month. Which expression gives the total cost, in dollars, for m months?

- A $25 + 40m$
- B $65m$
- C $40 + 25m$
- D $40m - 25$

3 What is 30% of 240?

- A 72
- B 210
- C 80
- D 24

4 The line $y = 4x + b$ passes through the point $(2, 5)$. What is the value of b ?

STUDENT-PRODUCED
RESPONSE

5 Which expression is equivalent to $(x + 6)(x - 2)$?

- A $x^2 + 8x - 12$
- B $x^2 + 4x - 12$
- C $x^2 - 12$
- D $x^2 - 4x - 12$

6 A recipe uses 3 cups of oats for every 2 cups of milk. How many cups of oats are needed for 7 cups of milk?

- A 14
- B 10.5
- C 12
- D 9

7 $x + y = 11$ and $x - y = 3$. What is the value of y ?

- A 8
- B 3
- C 7
- D 4

8 The scores of five students were 72, 85, 90, 85 and 98. What is the median score?

- A 98
- B 90
- C 86
- D 85

9 A right triangle has legs of length 9 and 12. What is the length of the hypotenuse?

STUDENT-PRODUCED
RESPONSE

10 Which inequality represents “a number n increased by 5 is at most 20”?

- A $n + 5 \geq 20$
- B $5n \leq 20$
- C $n + 5 \leq 20$
- D $n + 5 < 20$

11 $f(x) = x^2 - 3x$. What is $f(-2)$?

- A 10
- B -2
- C -10
- D 2

12 A circle has an area of 36π square inches. What is its circumference, in inches?

- A 6π
- B 12π
- C 36π
- D 18π

13 A bag contains 4 red, 6 blue and 10 green marbles. If one marble is chosen at random, what is the probability it is blue?

STUDENT-PRODUCED
RESPONSE

14 What are the solutions of $x^2 - 2x - 15 = 0$?

- A $x = -3$ and $x = 5$
- B $x = 15$ and $x = -1$
- C $x = 2$ and $x = -15$
- D $x = 3$ and $x = -5$

15 A town's population of 8,000 increases by 5% each year. Which expression gives the population after t years?

- A $8,000 + 0.05t$
- B $8,000(0.05)^t$
- C $8,000(1.05)^t$
- D $8,000(1.5)^t$

16 In a right triangle, $\sin A = 7/25$. What is $\cos A$?

- A $7/24$
- B $25/24$
- C $24/25$
- D $18/25$

17 $2x + 5y = 20$ and $4x + ky = 40$ have infinitely many solutions. What is the value of k ?

STUDENT-PRODUCED
RESPONSE

18 The table shows the number of hours, h , a candle has burned and its height, H , in cm: $h = 0, 2, 4 \rightarrow H = 30, 26, 22$. Which equation models the data?

- A $H = 26 - 2h$
- B $H = 30 + 2h$
- C $H = 30 - 2h$
- D $H = 30 - 4h$

19 What is the value of $(2^3 \cdot 2^5) / 2^6$?

- A 8
- B 2
- C 16
- D 4

20 A survey of a random sample of 400 voters in a city found that 220 support a new library. Based on the survey, about how many of the city's 50,000 voters support the library?

- A 27,500
- B 22,000
- C 2,200
- D 45,000

21 The equation of a circle is $(x - 1)^2 + (y + 4)^2 = 49$. What is the radius of the circle?

STUDENT-PRODUCED
RESPONSE

22 $\sqrt{x + 7} = x - 5$. What is the value of x ?

- A 11
- B 6
- C 9
- D 2

- 1** If $5(x - 2) = 3x + 8$, what is the value of x ?

STUDENT-PRODUCED
RESPONSE

- 2** A shirt originally priced at \$50 is on sale for \$38. What is the percent decrease?

A 76%
B 24%
C 31.6%
D 12%

- 3** Which line is perpendicular to $y = (2/3)x - 4$?

A $y = -(2/3)x$
B $y = (2/3)x + 1$
C $y = -(3/2)x + 5$
D $y = (3/2)x - 4$

- 4** $f(x) = 2(x - 3)^2 + 5$. What is the minimum value of f ?

A 5
B 2
C 3
D -3

- 5** For how many real values of x is $x^2 + 6x + 10 = 0$ true?

A 2
B 0
C 1
D Infinitely many

- 6** A data set has a mean of 20. Every value is increased by 4. What is the new mean?

STUDENT-PRODUCED
RESPONSE

- 7** The system $y = x^2 - 4$ and $y = 3x$ has two solutions. What is the sum of the x-coordinates of the solutions?

STUDENT-PRODUCED
RESPONSE

- 8** A cone has radius 3 and height 8. What is its volume?

A 8π
B 96π
C 72π
D 24π

- 9** In a study, 200 volunteers were randomly assigned to either a new diet or their usual diet. The new-diet group lost more weight on average. Which conclusion is best supported?

A The new diet likely caused greater weight loss among the volunteers.
B No conclusion can be drawn about cause.
C The new diet caused weight loss for all adults.
D The usual diet causes weight gain.

- 10** Which expression is equivalent to $(x^2 - 25)/(x + 5)$ for $x \neq -5$?

A $x + 5$
B $x - 25$
C $x^2 - 5$
D $x - 5$

- 11** A scatterplot's line of best fit is $y = 1.5x + 12$, where x is hours of practice and y is a score. What is the predicted score for 8 hours?

STUDENT-PRODUCED
RESPONSE

- 12** Two angles of a triangle measure 48° and 67° . What is the measure of the third angle, in degrees?

STUDENT-PRODUCED
RESPONSE

13 $p(x) = x^3 - 4x^2 + x + 6$. Which of the following is a factor of $p(x)$?

- A $x - 1$
- B $x - 2$
- C $x + 2$
- D $x + 3$

14 $\sin(x^\circ) = \cos(28^\circ)$. What is the value of x ?

STUDENT-PRODUCED
RESPONSE

15 A car's value is \$24,000 and decreases by 12% each year. Which expression gives its value after t years?

- A $24,000(1.12)^t$
- B $24,000(0.12)^t$
- C $24,000 - 0.12t$
- D $24,000(0.88)^t$

16 The table shows students by grade and club: Robotics — 10th: 14, 11th: 16; Debate — 10th: 10, 11th: 20. A student in 11th grade is chosen at random. What is the probability the student is in Robotics?

- A $16/30$
- B $16/60$
- C $14/24$
- D $16/36$

17 $|2x - 5| = 9$. What is the sum of the solutions?

STUDENT-PRODUCED
RESPONSE

18 In the xy -plane, the graph of $x^2 + y^2 - 6x + 8y = 0$ is a circle. What is its radius?

- A 4
- B 25
- C 3
- D 5

19 If $9^x = 27^2$, what is the value of x ?

STUDENT-PRODUCED
RESPONSE

20 For what value of c does the equation $4x^2 - 12x + c = 0$ have exactly one real solution?

- A 36
- B 3
- C 9
- D 6

21 A sector of a circle with radius 10 has a central angle of 72° . What is the area of the sector?

- A 10π
- B 72π
- C 20π
- D 4π

22 The function g is defined by $g(x) = (x - a)(x + 4)$, where a is a constant. The graph of g has its vertex at $x = 1$. What is the value of a ?

STUDENT-PRODUCED
RESPONSE

Reading and Writing, Module 1

#	ANSWER	LESSON	WHY
1	A	RW-2	"Late start... did not ___ her productivity" + huge output → limit.
2	D	RW-2	Reinforcing while preserving → restore.
3	A	RW-2	"Wandered without direction" → aimless.
4	C	RW-3	Assumption → "however" → new evidence. B, A, D: Out of Scope.
5	C	RW-4	Evidence between the assumption and the conclusion. B: Axe (recycles "red").
6	A	RW-6	Covers the whole text. B: detail (Fist); D: Out of Scope.
7	B	RW-5	Accepts the logic, adds a long-term limit. C: Opposite; A: Extreme; D: Out of Scope.
8	C	RW-10	Always ready, makes visitors feel expected.
9	C	RW-6	Stated conclusion. D: Extreme; B: Out of Scope; A: Opposite.
10	D	RW-7	Must compare seeing vs. not seeing on accuracy.
11	B	RW-7	Links presses to universities independent of paper.
12	C	RW-8	Both grades, both comparisons.
13	B	RW-9	Wool from the highlands → trade/contact. A: contradicts the text.
14	A	RW-9	X pattern ⇒ helix. B: Axe; D: Extreme.
15	C	GM-2	Two independent clauses (GM-2).
16	B	GM-2	Comma + FANBOYS.
17	D	GM-6	Title + name: no commas (GM-5, GM-6).
18	D	GM-4	Full sentence + list (GM-4).
19	B	GM-8	Collection (singular) (GM-8).
20	B	GM-10	Before another past event (GM-10).
21	D	GM-7	Modifier: Curie must follow (GM-7).
22	A	GM-9	Company: singular possessive (GM-9).
23	D	RW-12	Elaborates the dance.
24	C	RW-12	Expectation reversed.
25	A	RW-12	Problem → response.
26	B	RW-13	Compares both sizes.
27	C	RW-13	Shows trust directly.

Reading and Writing, Module 2

#	ANSWER	LESSON	WHY
1	D	RW-2	Contrast with “lone genius” + many assistants.
2	B	RW-2	Readers decide → open to interpretation.
3	A	RW-2	“Though small” + major record → outsized.
4	D	RW-2	A check on power = a limit.
5	B	RW-3	Method → limitation → alternative.
6	A	RW-4	“However” + trial results.
7	D	RW-5	Errors ⇒ rule-making, not just imitation. B: Extreme.
8	C	RW-10	Walks slowly, half afraid.
9	C	RW-6	Problem + water-free solution.
10	A	RW-7	Color change matched to temperature control.
11	D	RW-7	No difference → weakens.
12	B	RW-8	Compares the drops: flax 6, clover 5, rye 1.
13	A	RW-9	Modest inference about the date.
14	A	RW-9	Cutting links slowed growth.
15	D	GM-2	Two independent clauses.
16	D	GM-5	Close the comma pair (GM-5).
17	D	GM-8	Findings (plural).
18	D	GM-6	“including...” adds examples: use a comma, not a colon (GM-4, GM-6).
19	C	GM-10	Simple past for the later event.
20	A	GM-8	Each = singular.
21	D	GM-7	The school hoped (GM-7).
22	C	GM-11	Many musicians own the performance.
23	D	RW-12	Small area, huge role: contrast.
24	B	RW-12	Sequence/result.
25	D	RW-12	Example of a spider.
26	C	RW-13	States the similarity.
27	A	RW-13	States the aim.

Math, Module 1

#	ANSWER	LESSON	WHY
1	C	AL-1	$3x = 21$.
2	C	AL-2	Fixed fee + rate $\times$ months.
3	A	DA-2	0.3×240 .
4	-3	AL-2	$5 = 8 + b$.
5	B	AM-2	FOIL.
6	B	DA-1	$7 \times 3/2$.
7	D	AL-4	$x = 7, y = 4$.
8	D	DA-3	Sorted: 72, 85, 85, 90, 98.
9	15	GT-3	$3-4-5 \times 3$.
10	C	AL-5	At most = $\leq$.
11	A	AM-8	$4 + 6$.
12	B	GT-1	$r = 6$.
13	3/10	DA-5	6/20. (Enter 3/10 or .3)
14	A	AM-3	$(x - 5)(x + 3)$.
15	C	AM-5	Growth factor 1.05.
16	C	GT-4	7-24-25.
17	10	AL-4	Second = $2 \times$ first.
18	C	AL-2	Drops 2 cm per hour.
19	D	AM-1	2^2 .
20	A	DA-6	55% of 50,000.
21	7	GT-5	$\sqrt{49}$.
22	C	AM-7	$\sqrt{16} = 4 = 9 - 5$; $x = 2$ is extraneous.

Math, Module 2

#	ANSWER	LESSON	WHY
1	9	AL-1	$2x = 18$.
2	B	DA-2	$12/50$.
3	C	AL-2	Negative reciprocal.
4	A	AM-4	Vertex (3, 5).
5	B	AM-3	$36 - 40 < 0$.
6	24	DA-3	Shift by 4.
7	3	AM-9	$x^2 - 3x - 4 = 0$; sum = 3.
8	D	GT-1	$(1/3)\pi \cdot 9 \cdot 8$.
9	A	DA-7	Random assignment → cause for these subjects.
10	D	AM-6	Difference of squares.
11	24	DA-4	$12 + 12$.
12	65	GT-2	$180 - 115$.
13	B	AM-10	$p(2) = 8 - 16 + 2 + 6 = 0$.
14	62	GT-4	Complements.
15	D	AM-5	Factor 1 – 0.12.
16	D	DA-5	11th grade total = 36.
17	5	AM-7	$x = 7$ or $x = -2$.
18	D	GT-5	$(x - 3)^2 + (y + 4)^2 = 25$.
19	3	AM-1	$3^{2x} = 3^6$.
20	C	AM-3	$144 - 16c = 0$.
21	C	GT-5	$(72/360) \cdot 100\pi$.
22	6	AM-4	Zeros a and –4 average to 1.

Estimate Your Score

An estimate only: the real SAT is adaptive and scored by College Board’s own methods.

R&W (OF 54) CORRECT (AT LEAST)	ESTIMATED SECTION SCORE
54	800
52	770
50	740
47	700
44	660
40	610
35	560
30	520
25	480
20	440
15	390
10	330
5	260
0	200

MATH (OF 44) CORRECT (AT LEAST)	ESTIMATED SECTION SCORE
44	800
42	770
40	740
38	710
35	660
32	620
28	580
24	540
20	500
16	460
12	410
8	350
4	280
0	200

HOW TO USE IT

Count your correct answers in each section, find the highest row you reached, and read the estimate. Add the two sections for your total.

WHY IT’S AN ESTIMATE

This printed test can’t adapt the way the digital test does, and its questions haven’t been calibrated on real test-takers. Use it to practice the system and to find skills to study.

FOR AN OFFICIAL SCORE

Take a full practice test in Bluebook. That’s the number to trust.

THEN

Evaluate every miss with REF-3, and study the lesson listed next to each one in the answer key.

PART VIII

After the Game

The final month, the systems behind the score, and the reference pages.

The Final Month



JOSEF AIDEN DURAND
FROM THE AUTHOR

The last month isn't for learning new things. It's for sharpening what you have and arriving rested.

Weeks four, three and two: one full practice test a week, at the same time of day as your real test, in Bluebook, with every miss evaluated within 48 hours. Between tests, targeted practice on the three skills your error log says matter most.

Final week: no new content. Redo your error log. One light, timed module to stay sharp. Move your bedtime and wake time to match test day. Re-read the Arsenal and Must-Know Math. Then rest.

The night before, pack your bag, check that Bluebook is ready, and go to sleep. You've already done the work. Test day is just where it shows.

The SAT Is Testing Your Life Systems



JOSEF AIDEN DURAND
FROM THE AUTHOR

Here's a secret: the SAT is less a test of what you know than of how you live. Do you keep a schedule? Do you sleep? Do you finish what you start? Do you learn from mistakes, or repeat them? Your score reflects all of it.

Elite scorers don't have more willpower than anyone else. They have systems: four study blocks on the calendar, a worksheet for every miss, a redo schedule, a bedtime. Systems don't depend on motivation. That's the point.

And here's the payoff: the systems you build for the SAT don't expire after test day. The student who learns to plan a season, evaluate honestly and recover from setbacks has learned how to succeed in college, in a career, and in a life. The score is the receipt. The systems are the real prize.

Must-Know Math

On the reference sheet, and not on it.

ON THE REFERENCE SHEET

Circle: $A = \pi r^2$, $C = 2\pi r$ · Rectangle: $A = lw$ · Triangle: $A = \frac{1}{2}bh$ · Pythagorean theorem: $c^2 = a^2 + b^2$ · Special right triangles: x , $x\sqrt{3}$, $2x$ and s , s , $s\sqrt{2}$ · Rectangular prism $V = lwh$ · Cylinder $V = \pi r^2 h$ · Sphere $V = \frac{4}{3}\pi r^3$ · Cone $V = \frac{1}{3}\pi r^2 h$ · Pyramid $V = \frac{1}{3}lwh$ · A circle has 360° or 2π radians · Triangle angles sum to 180° .

LINES

Slope $m = (y_2 - y_1)/(x_2 - x_1)$ · $y = mx + b$ · $y - y_1 = m(x - x_1)$ · $Ax + By = C$ has slope $-A/B$ · Parallel: equal slopes · Perpendicular: slopes multiply to -1 · Midpoint $((x_1 + x_2)/2, (y_1 + y_2)/2)$ · Distance $\sqrt{(\Delta x)^2 + (\Delta y)^2}$

QUADRATICS

$x = (-b \pm \sqrt{b^2 - 4ac})/2a$ · Discriminant $b^2 - 4ac$: > 0 two, $= 0$ one, < 0 none · Vertex $x = -b/2a$ · Sum of roots $-b/a$ · Product c/a · Vertex form $a(x - h)^2 + k$ · $(a \pm b)^2 = a^2 \pm 2ab + b^2$ · $a^2 - b^2 = (a + b)(a - b)$

EXPONENTS

$x^a x^b = x^{a+b}$ · $x^a / x^b = x^{a-b}$ · $(x^a)^b = x^{ab}$ · $x^{-a} = 1/x^a$ · $x^{1/n} = n\text{-th root}$ · Growth $a(1 + r)^t$ · Decay $a(1 - r)^t$ · Doubling $a(2)^{t/d}$

PERCENTS AND STATISTICS

Percent change = $(\text{new} - \text{old})/\text{old}$ · Multipliers: $+r\% \rightarrow \times (1 + r/100)$ · Mean = $\text{sum} \div \text{count}$ · Median = middle value · Range = $\text{max} - \text{min}$ · SD

= spread around the mean · Probability = favorable $\div$ total · Conditional: divide by the “given” group

CIRCLES AND TRIG

$(x - h)^2 + (y - k)^2 = r^2$ · Arc = $(\theta/360)2\pi r$ · Sector = $(\theta/360)\pi r^2$ · Arc = $r\theta$ (radians) · Inscribed angle = $\frac{1}{2}$ central angle · SOH-CAH-TOA · $\sin x^\circ = \cos(90^\circ - x^\circ)$ · degrees $\times \pi/180$ = radians

GEOMETRY

Polygon interior sum $(n - 2)180^\circ$ · Exterior angle = sum of the two remote interior angles · Similar figures: lengths $\times k$, areas $\times k^2$, volumes $\times k^3$ · Triples 3-4-5, 5-12-13, 8-15-17, 7-24-25

The Arsenal

Six weapons. Every wrong answer dies to at least one.

WEAPON	CODE	THE TRAP	HOW TO SPOT IT	THE KILL QUESTION
Gladius	OPP	Opposite	Reverses the text: increase/decrease, supports/undermines, a hidden “not”	Does this say the reverse of the text?
Pugio	HALF	Half-Right	First half matches; the part after and, but, because or which doesn’t	Is every part of this supported?
Trident	EXT	Extreme Language	always, never, all, none, only, proves, completely	Is this stronger than the evidence?
Fist	RAWQ	Right Answer, Wrong Question	True to the text, but answers a different question (a detail for a purpose, a what for a why)	Does this answer THIS stem?
Mace	OOS	Out of Scope / Beyond the Text	Outside knowledge, too broad, new topics, predictions, unstated causes	Can I point to it in the text?
Axe	REC	Recycled Language	Copies passage words but changes who did what, the order, or the meaning	Same words, but same meaning?

THE FOUR-STEP ATTACK

1 Read the stem, then the text. 2 Predict the answer: your Shield. 3 Attack every choice with the weapons. 4 Select what’s left; if two survive, the one that answers the stem better.

THE ONE QUESTION

Ask it of every single answer choice on the test: “How can I attack this answer?” The right answer is the one you can’t kill.

The Film Sheet

Fill one row for every question you missed or guessed. Every miss gets a film session.

DATE · Q	SKILL	MINE / RIGHT	WHY THE RIGHT ANSWER IS RIGHT (THE PROOF)	TRAP (CODE)	MISS TYPE	FIX (LESSON)	REDO DATES
10/4 · M1 Q12	Inference	D / B	The text says shells live only in flowing water, so the river flowed later than thought	OOS	Strategy	RW-9, GL-8	10/7 · 10/11 · 10/25
10/4 · M2 Q19	Quadratics	3 / -5	Both roots satisfy the equation; question asked for the negative one	—	Careless	MS-2	10/7 · 10/11 · 10/25

CONTENT: I didn't know the rule or formula. Fix: the lesson page, then 10 targeted reps.

STRATEGY: I knew the content but skipped a step (no Shield, no POE, read the choices first). Fix: GL-2.

TRAP: I fell for a weapon's target. Fix: write the trap code and three more examples of it.

CARELESS OR TIME: I misread, miscalculated or rushed. Fix: SAT-19 or the Three Rounds (MS-8).

What the SAT Is Actually Teaching You



JOSEF AIDEN DURAND
FROM THE AUTHOR

Strip away the scaled scores and the percentiles, and the SAT is teaching you a handful of lessons that will serve you long after you forget the quadratic formula.

Read what's actually there, not what you expect to see. Make a prediction before you look at the options. Be suspicious of anything that sounds too absolute. Check whether an answer addresses the question you were actually asked. Separate evidence from opinion. Plan your time. Recover from setbacks quickly. Learn more from your mistakes than from your successes.

Those are the habits of good scientists, good lawyers, good founders and good friends. The SAT just happens to be where many students practice them for the first time.

So earn the score. Then keep the habits. We don't just get students in. We build who they become.

ABOUT THE AUTHOR

Josef Aiden Durand



founder and CEO of Veritas Hall and a graduate of Harvard College (A.B. in Psychology). He has more than a decade of experience as a coach and SAT tutor in math and reading, working with students from Beijing to California and with firms including Quad Learning Institute, IvyMax, FLEX College Prep, Bridge Education Foundation and Zenith Prep Academy.

He was admitted to Harvard, Yale, Princeton, Stanford, MIT, Columbia, Penn, Brown, Dartmouth and Cornell, and to competitive BS/MD programs. He has been featured in Forbes and The Hill discussing standardized testing and admissions.

Josef played football, including at Don Bosco Prep, where he competed for a national championship. The coaches who built those teams taught him that winning comes from a system, a playbook and the discipline to run it. He is also the author of *Art of Admissions: The Official College Application Strategy Guide*.

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We build who they become.*

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