

SAT MATH — LAST-MINUTE CHEAT SHEET

2 modules × 22 questions × 35 min | ~95 sec per question | Desmos + reference sheet always available

LINES & SYSTEMS

- Slope $m = (y_2 - y_1) / (x_2 - x_1)$ · $y = mx + b$ · $ax + by = c$ has slope $-a/b$
- Parallel = same slope. Perpendicular = negative reciprocal ($m_2 = -1/m_1$).
- **No solution:** same slope, different intercept. **Infinite solutions:** identical equations (all coefficients proportional).
- "Rate of change," "per," "each" → that's the slope. Starting value / flat fee → that's b .

QUADRATICS

- Standard $ax^2 + bx + c$ · Vertex $a(x-h)^2 + k$ → vertex (h, k) · Factored $a(x-r_1)(x-r_2)$ → roots
- Vertex/axis of symmetry: $x = -b/2a$
- $x = [-b \pm \sqrt{b^2 - 4ac}] / 2a$
- **Discriminant $b^2 - 4ac$:** > 0 → 2 real solutions, $= 0$ → 1, < 0 → none
- Sum of roots = $-b/a$ | Product of roots = c/a
- Zeros = roots = solutions = x-intercepts = factors. Same thing, five names.

EXPONENTS & RADICALS

- $x^a \cdot x^b = x^{a+b}$ · $x^a / x^b = x^{a-b}$ · $(x^a)^b = x^{ab}$
- $x^{-a} = 1/x^a$ · $x^0 = 1$ · $x^{1/n}$ = the n -th root of x · $x^{m/n}$ = (n -th root of x) ^{m}
- Same base on both sides → set the exponents equal.

PERCENT, RATIO, GROWTH

- % change = $(\text{new} - \text{old}) / \text{old} \times 100$ (always divide by the **original**)
- Up $p\%$ → multiply by $(1 + p/100)$. Down $p\%$ → multiply by $(1 - p/100)$.
- Exponential: $y = a(1 \pm r)^t$. Doubling/halving every k periods: $y = a \cdot b^{t/k}$.
- **Linear** adds the same amount each time; **exponential** multiplies by the same factor.
- Ratios: set up a proportion and cross-multiply. Keep units in the same spot on both sides.

FUNCTIONS & GRAPHS

- $f(x) + k$ → up k | $f(x) - k$ → down k
- $f(x + k)$ → **LEFT** k | $f(x - k)$ → **RIGHT** k (inside the parentheses is backwards)
- $-f(x)$ flips over the x -axis; $f(-x)$ flips over the y -axis.
- $f(a) = b$ just means the point (a, b) is on the graph.

GEOMETRY & TRIG

- **45-45-90:** $x, x, x\sqrt{2}$ | **30-60-90:** $x, x\sqrt{3}, 2x$
- Pythagorean triples: 3-4-5, 5-12-13, 8-15-17, 7-24-25 (and multiples)
- Circle: $(x-h)^2 + (y-k)^2 = r^2$. If it's not in this form, complete the square.
- Arc length = $(\theta/360) \cdot 2\pi r$ | Sector area = $(\theta/360) \cdot \pi r^2$ | radians = degrees $\times \pi/180$
- Similar figures: sides scale by k , areas by k^2 , volumes by k^3 .
- SOH CAH TOA. Also: $\sin(x^\circ) = \cos(90^\circ - x^\circ)$.
- Triangle angles = 180° ; polygon interior sum = $(n-2) \cdot 180^\circ$.
- Volume/area formulas are on the reference sheet — don't memorize, just look.

STATISTICS & DATA

- Sum = mean $\times$ count. Most "find the missing value" problems are this.
- Outliers drag the **mean**; the **median** barely moves.
- Standard deviation = spread. Tighter cluster → smaller SD.
- Larger sample → smaller margin of error → narrower confidence interval.
- **Random selection** lets you generalize to the population. **Random assignment** lets you claim cause and effect. Correlation alone never does.
- Line of best fit questions: read the *line*, not the individual dots.

DESMOS QUICK WINS

- Systems: type both equations, click the intersection point.
- Quadratics: graph it and click the vertex or the x-intercepts. No algebra needed.
- "How many solutions?": graph and count intersections.
- Inequalities/regions: graph and test a point.
- Stats: type the list, then use `mean(L)`, `median(L)`, `stdev(L)`.

WHEN YOU'RE STUCK

- **Backsolve:** plug the answer choices into the problem. Start with B or C.
- **Pick numbers** when the answers have variables in them. Use 100 for percent problems, 2 and 3 for general numbers (avoid 0 and 1).
- Translate word problems one phrase at a time: "is" = $=$, "of" = $\times$, "per" = $\div$.
- Guess something and move on — there is no penalty and every question is worth the same.

TRAPS THAT COST REAL POINTS

- Solving for x when the question wants $2x$, $x+3$, or y . **Re-read the last line.**
- Unit switches: minutes vs. hours, cm vs. m, per week vs. per year.
- Grid-ins: no commas, no % or \$ signs; fractions are fine; don't round early.
- Negative signs lost while distributing.
- Module 2 gets harder if you did well in Module 1 — that's normal, not a disaster.

SAT READING & WRITING — LAST-MINUTE CHEAT SHEET

2 modules × 27 questions × 32 min | ~71 sec per question | one short passage per question, roughly easy → hard

PUNCTUATION & BOUNDARIES

- Two complete sentences must be joined by: a **period**, a **semicolon**, a **comma + FANBOYS** (for, and, nor, but, or, yet, so), or a **colon/dash**.
- **Semicolon = period**. If a period works there, so does the semicolon — and vice versa.
- **Colon** needs a full sentence *before* it. What follows can be a list, an example, or an explanation.
- **Dashes** can act like a colon (one dash) or like a pair of commas (two dashes). Openers and closers must match: comma...comma, dash...dash.
- However, therefore, moreover, furthermore, nevertheless are **not** conjunctions. They need a semicolon or period before them, not a comma.
- Never put a single comma between a subject and its verb, or between a verb and its object.
- Nonessential info gets commas on **both** sides; essential info gets none.
- Its = belongs to it. It's = it is. Also: their / they're / there, whose / who's, your / you're.
- dogs (plural) · dog's (one dog owns it) · dogs' (many dogs own it)

GRAMMAR RULES ACTUALLY TESTED

- **Subject-verb agreement**: cross out prepositional phrases in between. "The box of old letters **is**..."
- **Verb tense**: match the timeline the passage already established. Don't switch without a reason.
- **Pronouns**: singular antecedent → singular pronoun; the reference must be unambiguous.
- **Modifiers**: whatever comes right after an opening phrase must be the thing that phrase describes. "Running late, Maria grabbed her keys."
- **Parallel structure** in lists and comparisons: hiking, swimming, and biking.
- **Comparisons** must compare like things: "Unlike Smith's novels, Jones's novels..." not "unlike Smith."

TRANSITIONS

- **Contrast**: however, but, nevertheless, conversely, on the other hand, still
- **Cause / result**: therefore, thus, consequently, as a result, so
- **Addition**: moreover, furthermore, in addition, also, similarly
- **Example**: for example, for instance, namely, specifically
- **Emphasis / restatement**: indeed, in fact, in other words
- **Method**: cover the answer choices. Read the sentence before and after, decide the relationship in your own words, *then* pick.

WORDS IN CONTEXT

- Cover the blank. Predict your own word from the clues in the sentence. Then find the closest match.
- Signal words tell you the direction: *but, although, however, despite* flip it; *because, since, and, similarly* keep it.
- The fanciest word is usually not the answer. Pick by meaning, not difficulty.
- Plug your choice back in and read the whole sentence before committing.

INFERENCE / "COMPLETE THE TEXT"

- The answer must be **forced** by the passage, not merely plausible or true in real life.
- Watch the last line's logical direction: after *therefore* you need a conclusion; after *however* you need a reversal.
- Eliminate anything with new information the text never mentioned.

COMMAND OF EVIDENCE

- **Text**: pick the quotation that directly proves the *exact* claim as worded. Close-but-not-quite is the most common trap.
- **Graph/table**: read the axis labels, units, and categories *before* the answers. The right answer must be (1) accurate per the data and (2) actually support the claim. Wrong answers pass one test but not both.

RHETORICAL SYNTHESIS (BULLET NOTES)

- Read the **goal** in the question first and underline it: "emphasize a difference," "introduce the study to an unfamiliar audience."
- Skim the bullets only for what serves that goal. You don't need to absorb all of them.
- A choice can be perfectly accurate and still wrong because it doesn't do the stated job.

TEST-DAY STRATEGY

- Grammar questions: the **shortest** grammatically correct choice usually wins. Don't add commas without a rule behind them.
- If two choices mean the same thing, both are wrong — eliminate the pair.
- Conventions questions (punctuation/grammar) are the fastest points; bank time there for the harder reading ones.
- Answer every question. Flag, guess, move on, come back.
- Watch for extreme words in answer choices: *always, never, only, proves*. They're often too strong.