



Linear mastery · Systems · Models

From case study: 98 Q · 79✓ · 19✗

Algebra ■ ■ ■ ■ ■ 6/7 Hard ← only Math gap

Adv Math / PSDA / Geo 7/7 · SEC 5/7 Medium

Core toolkit (speed + accuracy)

Idea	Formula / 1600 note
Slope	$m = (y_2 - y_1) / (x_2 - x_1)$ · rate of change
Slope-intercept	$y = mx + b$ · b = start / y-intercept
Point-slope	$y - y_1 = m(x - x_1)$
Standard	$Ax + By = C$ · intercepts C/A, C/B
Parallel	same m , different b → no solution if system
Perpendicular	$m_1 \cdot m_2 = -1$
Absolute value	$ x - a = b \rightarrow x = a \pm b$ ($b \geq 0$); split inequalities
Inequality	Flip when $\times / \div$ by negative; check endpoints

Ask check: before finishing, underline whether the answer is x , $2x$, $x+3$, xy or an expression in a

Hard Algebra traps

- Solved for x ; asked for $2x$ or $x+k$
- Used wrong intercept as “start”
- Forgot to flip inequality
- Treated parallel lines as one solution
- $|x|$ equation with $b < 0 \rightarrow$ no solution
- Unit mismatch in rate problems

Desmos checks

- Graph both lines; click intersection
- Table mode to test candidate x
- Inequality shading vs choices
- Equivalent forms: graphs overlap
- Still write the model first

Backsolve / pick numbers

- Clean answer choices → plug mid-size first
- Abstract “in terms of” → pick easy numbers
- Percent / ratio stories → pick 100 or 10
- Confirm with second number if unsure

Systems — decide the method in 5 seconds

- **Elimination:** coefficients match or opposite
- **Substitution:** one variable already isolated
- **Desmos:** messy decimals / verify intersection
- **No solution:** same slope, different intercept
- **Infinite:** same line (equivalent equations)
- Word systems: define variables for what the question asks

Linear word translation

- is / equals → $=$ · of → $\times$ · per → rate
- Mixture: amount $\times$ strength; distance = rate $\times$ time
- Consecutive integers: $n, n+1, n+2 \dots$
- “In terms of” → stop once expression matches; don’t over-solve

Weekly Algebra set (until 7/7)

- Mon: 8 systems (mix no/infinite/one)
- Wed: 8 linear models from tables/stories
- Fri: 8 abs value + inequalities
- Sun: 12 mixed Hard Algebra timed (~ 1.4 min/Q)
- Every miss → autopsy + 3 clones
- Goal: zero “wrong quantity” errors for 2 weeks



Edge cases · Functions lite · Closeout

Edge cases that steal Hard-module points

Situation	Do this
Two expressions “equivalent?”	Expand / Desmos overlay / pick numbers
Parameter in slope/intercept	Match coefficients after rewriting $y=mx+b$
Piecewise / absolute as V-graph	Vertex at kink; slope $\pm m$ on each side
Constraint inequalities	Graph feasible region; test a point
Rate changing mid-trip	Split time or distance; never average speeds
Percent of percent	Multiply factors ($0.2 \times 0.3 \times N$)
SPR answer	Exact fraction/decimal; no mixed number; re-enter

Maintain Advanced / PSDA / Geo (don't get bored-wrong)

- **Quadratic:** discriminant, vertex, factor — 4 mixed Q / week
- **Exponents/radicals:** one properties warm-up / week
- **PSDA:** conditional probability denominator check
- **Geo/Trig:** 30-60-90 / 45-45-90 + circle equation once / week
- If any domain drops below 7/7, pause Algebra polish and repair

Math section pacing

- ~1.6 min/Q average; bank time on easy linear
- Flag multi-step Algebra early; return with Desmos

Pre-bubble Algebra checklist

- ☐ Quantity asked underlined
- ☐ Units consistent
- ☐ Inequality flip checked
- ☐ System case ($0/1/\infty$) sensible
- ☐ Plug answer back once

When to Desmos vs mental

- Mental: clean integers, simple isolate
- Desmos: decimals, verify, systems graph
- Both: high-stakes Hard items — solve then confirm

Math 800 definition

- Algebra 7/7
- Other domains stay 7/7
- ≤ 1 miss total on full Math, never careless
- Then protect with sleep + light review

Pair with full 1600 pack

- Strategy PDF: weekly calendar + miss autopsy
- Conventions PDF: kill Medium SEC leaks
- General Math sheet: /pdfs/sat-math-cheatsheet.pdf
- Practice: CertStud SAT Math · Bluebook full tests
- Track Algebra bars every full exam
- Stop when 7/7 holds across 2 consecutive tests