

10 Pennsylvania Keystone Grade 9 Math Practice Tests

The Ultimate Test Prep Collection with Answer Explanations

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10 Practice Tests

🏆 Algebra 1 🏆

10 tests × full coverage

Welcome!

This book contains **10 full-length practice tests** — the most comprehensive preparation you can get for your Algebra 1 assessment. Each test covers all nine chapters:

- 📖 Foundations & Exponents 📖 Linear Equations & Inequalities
- 📖 Functions 📖 Linear Functions & Graphing
- 📖 Systems of Equations 📖 Polynomials & Factoring
- 📖 Quadratic Functions 📖 Exponential Functions
- 📖 Data & Statistics

Ten tests give you the practice needed to walk into the real test feeling fully prepared.

Thorough preparation leads to outstanding results.

4



“ Ten full tests! By the time you finish, there won't be any surprises on test day. ”

1

How to Use This Book

A complete 10-test preparation program

What's Inside

- **10 Full-Length Practice Tests** — each covers all 9 chapters of Algebra 1: foundations & exponents, linear equations & inequalities, functions, linear functions & graphing, systems of equations, polynomials & factoring, quadratics, exponential functions, and data & statistics.
- **Detailed Answer Explanations** — every question includes a step-by-step solution so you learn from every mistake.
- **Formula Reference Sheet** — all the key Algebra 1 formulas you need, organized and ready for quick review.
- **Test Tracker** — log your scores across all 10 tests and monitor your progress from start to finish.

Your 10-Test Training Plan

★ PHASE 1: Foundation (Tests 1–3)

Untimed or soft-timed. Focus on understanding the format, identifying strengths and weaknesses, and building good study habits.

★★ PHASE 2: Building Skills (Tests 4–7)

Timed (120 minutes each). Work on pacing, accuracy, and showing complete solutions. Review weak chapters between tests.

★★★ PHASE 3: Test-Day Ready (Tests 8–10)

Full test conditions: strict timing, quiet space, no notes. Compare scores with your early tests to see your growth.

Schedule: Take one test every 3–4 days, or one per week. Use study days between tests to review.

 **Types of Questions**

 **Multiple Choice:** Four options — work the problem first, then match. Eliminate obviously wrong answers to narrow your choices.

 **Short Answer & Constructed Response:** Show every step: equations, substitutions, simplifications. Partial credit rewards correct reasoning even if the final answer is off.

 **Graphing & Data Analysis:** Plot points, draw lines, interpret graphs and data displays. Label axes clearly.



Tip: Ten tests is a full preparation program. Don't rush. The key is what you do between tests — study, review, and understand your mistakes before moving forward.



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💡 *Test-Taking Tips* 💡

Your complete test-day toolkit

🕒 *Before the Test*

- *Review your notes from the previous test — focus on your weak chapters*
- *Set up a quiet, clean workspace with all your materials ready*
- *Start with a positive mindset: you've prepared for this*

✎ *During the Test*

- *Read each problem fully before calculating anything*
- *Write the equation or set up the expression first, then substitute values*
- *Show all your work — every step, every operation*
- *If stuck for more than 2 minutes, mark it and move on*
- *Use estimation to check if your answers are reasonable*

📖 *After the Test*

- *Read the full explanation for every question you got wrong*
- *Write down which chapters gave you trouble (not just question numbers)*
- *Study those chapters before taking the next test*
- *Record your score in the Test Tracker*

⚠ Common Mistakes in Algebra 1

⚠ Exponents: $x^2 \cdot x^3 = x^5$, but $x^2 + x^3 \neq x^5$. Only add exponents when multiplying.

⚠ Slope formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$ — keep the order consistent.

⚠ Systems of equations: The solution must satisfy both equations.

⚠ Factoring: Always check by multiplying back out: $(x + 3)(x - 2) = x^2 + x - 6$.

⚠ Quadratic formula: Use $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ — the denominator is $2a$, not just 2.



“ The students who improve the most aren't the ones who take the most tests — they're the ones who carefully review every mistake. Make that your priority. ”



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What You'll Need

Gather these materials before you begin

Materials Checklist

- ✓ **Sharpened Pencils** — #2 pencils, at least two
- ✓ **Good Eraser** — for clean corrections
- ✓ **Scratch Paper** — for working out problems
- ✓ **Graphing Calculator** — if allowed by your state test
- ✓ **Ruler / Straightedge** — for graphing lines
- ✓ **Quiet Space** — no distractions
- ✓ **Focused Mind** — ready to do your best

Allowed Materials

- ✓ Pencils and eraser
- ✓ Scratch paper (provided on official test day)
- ✓ Graphing calculator (most Algebra 1 state tests allow calculators — check your state's policy)
- ✓ Ruler or straightedge

Not Allowed

- ✗ Cell phone or any electronic device
- ✗ Notes, textbooks, or reference sheets (unless provided by the test)
- ✗ Help from others during the test
- ✗ Calculator apps or internet access

 **A Note for Parents & Guardians**

Ten tests is a comprehensive program. Plan **one test every 3–4 days** (or one per week) with study sessions between each test.

How to help:

- Tests 1–3 should be untimed — build understanding before adding pressure.
- After each test, review the answer explanations together. Ask: “Which chapters were hardest? Let’s study those before the next one.”
- Use the Test Tracker to celebrate progress over time.
- For chapter-specific help, pair this book with our **Algebra 1 Study Guide** or **Algebra 1 Workbook**.

PREVIEW



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Algebra 1 Reference Sheet

Key formulas and facts you may use during each practice test

★ Properties & Exponents

Commutative: $a + b = b + a$; $ab = ba$

Associative: $(a + b) + c = a + (b + c)$

Distributive: $a(b + c) = ab + ac$

$a^m \cdot a^n = a^{m+n}$ $(a^m)^n = a^{mn}$

$\frac{a^m}{a^n} = a^{m-n}$ $a^0 = 1$

$a^{-n} = \frac{1}{a^n}$ $(ab)^n = a^n b^n$

★ Linear Equations & Inequalities

Slope-intercept: $y = mx + b$

Point-slope: $y - y_1 = m(x - x_1)$

Standard form: $Ax + By = C$

Slope: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Parallel lines: same slope

Perpendicular: $m_1 \cdot m_2 = -1$

★ Functions

A function maps each input to exactly one output.

Vertical line test: passes through at most one point.

Domain: set of all inputs (x -values)

Range: set of all outputs (y -values)

$f(x)$ notation: $f(3)$ means substitute $x = 3$

★ Systems of Equations

Solve by graphing, substitution, or elimination

One solution: lines intersect (consistent)

No solution: lines are parallel

Infinitely many: same line (dependent)

★ Polynomials & Factoring

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

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

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

To factor $ax^2 + bx + c$: find two numbers that multiply to ac and add to b

★ Quadratic Functions

Standard form: $y = ax^2 + bx + c$

Vertex form: $y = a(x - h)^2 + k$

Vertex: (h, k) ; axis of symmetry: $x = h$

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

Discriminant: $b^2 - 4ac$

> 0 : two real solutions $= 0$: one < 0 : none

★ Exponential Functions & Sequences

Growth: $y = a \cdot b^x$ where $b > 1$

Decay: $y = a \cdot b^x$ where $0 < b < 1$

Arithmetic sequence: $a_n = a_1 + (n - 1)d$

Geometric sequence: $a_n = a_1 \cdot r^{n-1}$

★ Data & Statistics

Line of best fit: approximates scatter plot trend

Correlation: positive, negative, or none

Correlation \neq causation

Residual = actual - predicted

Good fit: residuals small, randomly scattered

★ Square Roots & Radicals

Perfect squares: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144

$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

Simplify: $\sqrt{50} = \sqrt{25 \cdot 2} = 5\sqrt{2}$

My Test Tracker

Record every test and watch your scores improve

Name: _____

Start Date: _____

GETTING STARTED (Tests 1-3)

Test 1 — Untimed

Date: _____ Score: _____ / _____ %: _____ Chapters to review: _____

Test 2 — Untimed

Date: _____ Score: _____ / _____ %: _____ Chapters to review: _____

Test 3 — Soft Timer

Date: _____ Score: _____ / _____ %: _____ Chapters to review: _____

BUILDING SKILLS (Tests 4-7)

Test 4 — Timed (120 min)

Date: _____ Score: _____ / _____ %: _____ Focus area: _____

Test 5 — Timed (120 min)

Date: _____ Score: _____ / _____ %: _____ Focus area: _____

Test 6 — Timed (120 min)

Date: _____ Score: _____ / _____ %: _____ Focus area: _____

Test 7 — Timed (120 min)

Date: _____ Score: _____ / _____ %: _____ Focus area: _____

TEST-DAY READY (Tests 8-10)

Test 8 — Full Test Conditions

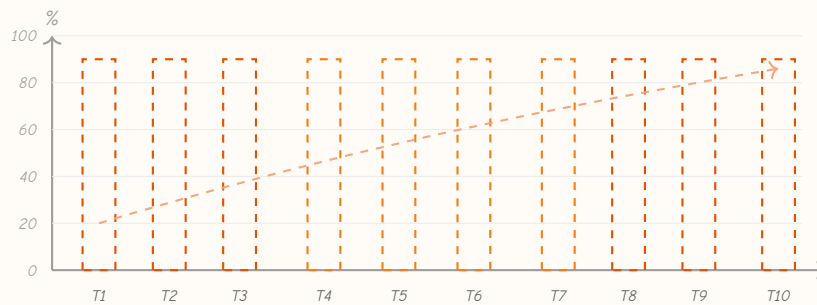
Date: _____ Score: _____ / _____ %: _____ Growth since Test 1: _____

Test 9 — Full Test Conditions

Date: _____ Score: _____ / _____ %: _____ Growth since Test 1: _____

Test 10 — Full Test Conditions

Date: _____ Score: _____ / _____ %: _____ Growth since Test 1: _____

Score Progress


Shade each bar after every test. Watch your improvement!

Final Reflection

The most important thing I learned: _____

The topic where I improved the most: _____

My advice for other students: _____



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PRACTICE TEST

1

Practice Test 1

 10 Questions

Before You Start

- ✓ *Read each question carefully before choosing your answer.*
- ✓ *Show your work on scratch paper when you need to.*
- ✓ *Skip hard questions and come back to them later.*
- ✓ *Check your answers when you're done.*
- ✓ *Take your time — there's no rush!*

★ *You've Got This!* ★

Do your best and show what you know!



1. Which expression is equivalent to $(a^2b^3)^{-1}$?

- (A) $-a^2b^3$ (B) $\frac{1}{a^2b^3}$
(C) $a^{-2} + b^{-3}$ (D) $\frac{a^2}{b^3}$

2. What is the quotient of $(2x^2 + 5x - 3) \div (x + 3)$?

- (A) $2x + 1$ (B) $2x - 1$
(C) $2x + 3$ (D) $2x - 3$

3. A graph consists of a single point at $(3, 7)$. Does the graph represent a function?

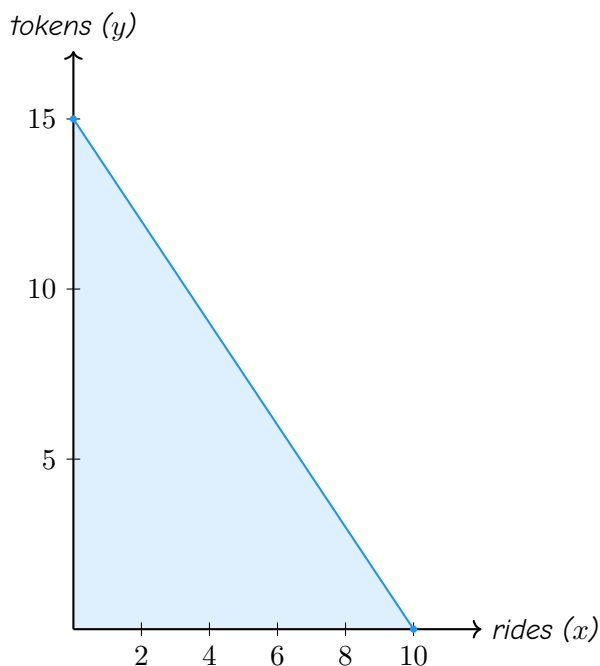
- (A) No, because a function must have at least two points. (B) Yes, because every input on the graph maps to exactly one output.
(C) No, because the point is not on either axis. (D) Yes, but only if the point is at the origin.



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4. A student has \$30 to spend at a fair. Ride tickets (x) cost \$3 each and game tokens (y) cost \$2 each. The graph below shows the boundary line $3x + 2y = 30$.



Which combination can the student afford?

- (A) 8 rides and 4 tokens (B) 6 rides and 5 tokens
(C) 7 rides and 5 tokens (D) 10 rides and 1 token

5. Solve $3(2x - 4) = 18$.

- (A) $x = 11$ (B) $x = 3$
(C) $x = 5$ (D) $x = -5$

6. Which system of equations has no solution?

- (A) $y = x + 5$ and $y = -x + 5$ (B) $y = 3x + 4$ and $y = 3x - 2$
(C) $y = 2x$ and $y = -2x$ (D) $2x + y = 6$ and $4x + 2y = 12$



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7. A student's work for simplifying $\sqrt{75}$ is shown below. Which step has an error?

Step	Work
Step 1	$\sqrt{75} = \sqrt{9 \times 8}$
Step 2	$= \sqrt{9} \cdot \sqrt{8}$
Step 3	$= 3\sqrt{8}$

- (A) Step 1
- (B) Step 2
- (C) Step 3
- (D) No error — the work is correct.

8. A student writes $f(x) = 500(0.15)^x$ to model a laptop that loses 15% of its value each year. What is the student's error?

- (A) The initial value should be 0.15.
- (B) The base should be 0.85, not 0.15.
- (C) The function should use addition, not exponents.
- (D) The exponent should be negative.

9. A trend line predicts $y = 45$ at $x = 3$. The actual value at $x = 3$ is 42. What is the residual?

- (A) 87
- (B) 3
- (C) -3
- (D) 45

10. What are the solutions of $x^2 + 2x - 8 = 0$?

- (A) $x = 4$ and $x = -2$
- (B) $x = -4$ and $x = 2$
- (C) $x = 4$ and $x = 2$
- (D) $x = -4$ and $x = -2$



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Answer Key & Explanations



Answer Key

First try each test on your own, then check your work here.

Practice Test 1 – Answer Key

- 1 B 2 B 3 B 4 B 5 C 6 B 7 A 8 B 9 C
10 B

Time to Learn!

Review the explanations below, *especially for the questions you missed*.

Understanding why each answer is correct builds stronger problem-solving skills.

Tip: Circle any questions you got wrong, then read their explanation carefully.

Practice Test 1 – Detailed Explanations

1 A negative exponent means reciprocal: $(a^2b^3)^{-1} = \frac{1}{a^2b^3}$. Choice A confuses a negative exponent with a negative sign in front, and choice C incorrectly splits the expression into a sum.

2 Use polynomial long division: $2x^2 \div x = 2x$, and $2x(x+3) = 2x^2 + 6x$. Subtract to get $-x - 3$. Then $-x \div x = -1$, and $-1(x+3) = -x - 3$. Remainder is 0, so the quotient is $2x - 1$.



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3 A single-point graph passes the vertical line test because only one vertical line touches the graph, and it touches it at exactly one point. There is one input (3) with one output (7), which satisfies the definition of a function.

4 The constraint is $3x + 2y \leq 30$. Test (6, 5): $3(6) + 2(5) = 18 + 10 = 28 \leq 30 \checkmark$. The other choices give 32, 31, and 32, all exceeding the budget.

5 Use the distributive property: $6x - 12 = 18$. Add 12 to both sides: $6x = 30$. Divide by 6: $x = 5$.

6 No solution means parallel lines: same slope, different y -intercepts. In choice B, both lines have slope 3 but different intercepts (4 and -2). The other systems have different slopes (A, C) or are the same line (D).

7 In Step 1, the factorization is wrong: $9 \times 8 = 72 \neq 75$. The correct factoring is $75 = 25 \times 3$, giving $\sqrt{75} = \sqrt{25} \cdot \sqrt{3} = 5\sqrt{3}$.

8 To model 15% annual decay, the decay factor should be $b = 1 - 0.15 = 0.85$. The student mistakenly used 0.15 (the rate) instead of 0.85 (the factor). The correct function is $f(x) = 500(0.85)^x$.

9 The residual is calculated as actual minus predicted: $42 - 45 = -3$. A negative residual means the actual value is below the predicted value.

10 With $a = 1$, $b = 2$, $c = -8$, the discriminant is $D = 4 + 32 = 36$. Then $x = \frac{-2 \pm 6}{2}$, giving $x = 2$ or $x = -4$.



Well done checking your answers!

Keep practicing to strengthen your skills.



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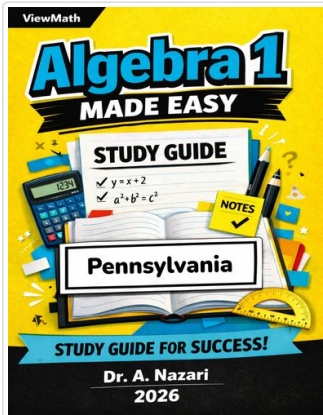


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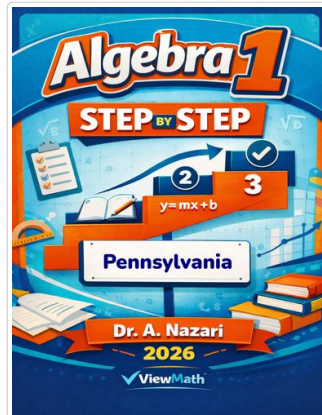
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Study Guide



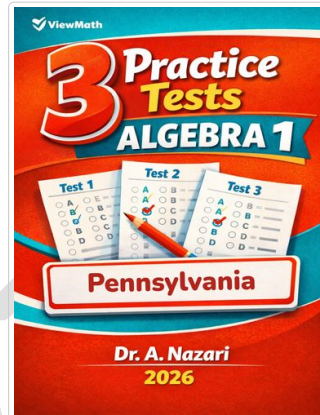
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Step-by-Step



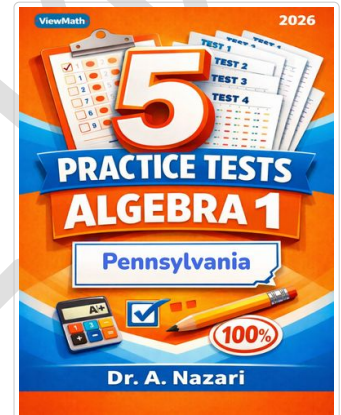
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3 Practice Tests



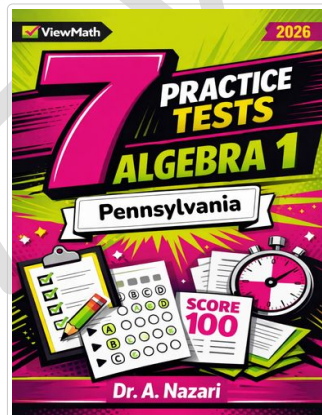
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5 Practice Tests



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7 Practice Tests



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