

# 10 Virginia SOL 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. A vertical line drawn at  $x = 3$  on a graph passes through two points,  $(3, 1)$  and  $(3, 5)$ . What does this tell you about the relation?

- (A) The relation is a function because 1 and 5 are both positive.
- (B) The relation is not a function because input 3 has two different outputs.
- (C) The relation is a function because the points are different.
- (D) The relation is not a function because  $x = 3$  is positive.

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

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

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

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



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. 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)  $\frac{a^2}{b^3}$

6. 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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7. 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  $4x + 2y = 12$

8. A survey of 80 students asked whether they prefer basketball or soccer and whether they are in 9th or 10th grade. The joint frequency of 10th-graders who prefer soccer is 18. What does the number 18 represent?

(A) The total number of 10th-graders surveyed

(B) The number of students in both the 10th-grade row and the soccer column

(C) The marginal frequency of soccer

(D) The conditional frequency of soccer given 10th grade

9. A student says  $|x| < -2$  has the solution  $-2 < x < 2$ . Which statement is correct?

(A) The student should have flipped the inequality sign.

(B) The correct solution is  $x < -2$  or  $x > 2$ .

(C) The inequality has no solution because absolute value is always non-negative.

(D) The student forgot to split into two cases.

10. 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.



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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 C

3 B

4 B

5 B

6 B

7 B

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 The vertical line test says that if any vertical line hits more than one point, the relation is not a function. Here  $x = 3$  corresponds to two outputs (1 and 5), so the relation fails the test.

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



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3 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  $2x - 1$ .

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 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.

6 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  $x = -4$ .

7 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).

8 A joint frequency is a count that appears inside the body of a two-way table, at the intersection of a specific row and column. The value 18 is the count of students who are both 10th-graders and prefer soccer.

9 Since  $|x| \geq 0$  for all real numbers,  $|x|$  can never be less than  $-2$ . The inequality  $|x| < -2$  has no solution.

10 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  $f(x) = 500(0.85)^x$ .



**Well done checking your answers!**

Keep practicing to strengthen your skills.



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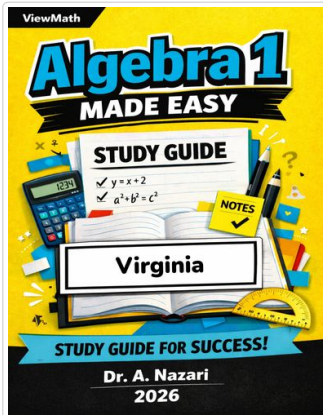


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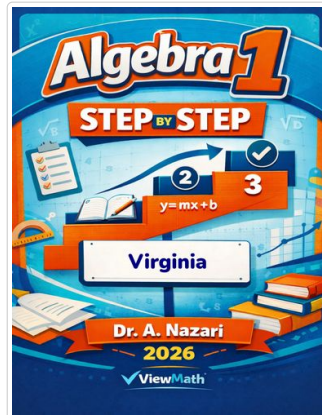
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Study Guide



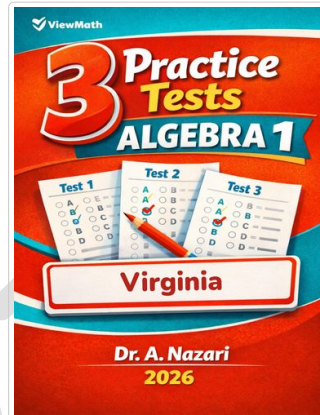
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Step-by-Step



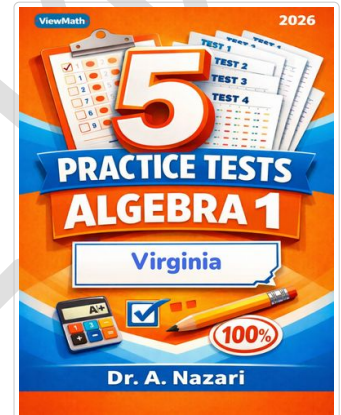
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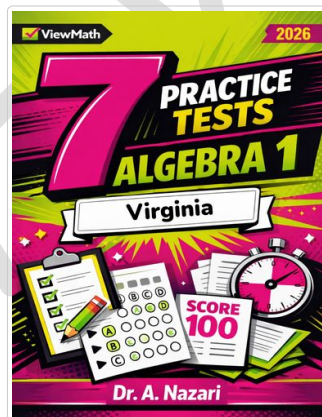
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5 Practice Tests



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7 Practice Tests



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