

# 7 Alaska AK STAR Grade 9 Math Practice Tests

*Comprehensive Test Prep with Detailed Answers*

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# 7 Practice Tests

★ Algebra 1 ★

## Welcome!

This book contains **7 full-length practice tests** designed to give you thorough preparation for your Algebra 1 assessment. Each test covers all nine major chapters:

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

Seven tests give you the repetition you need to master every topic. With each test, you'll get faster, more accurate, and more confident.

*Repetition builds mastery. Mastery builds confidence.*

“Seven tests means seven chances to improve. Focus on one chapter at a time and you'll see real results!”



# How to Use This Book

Make the most of 7 practice tests

## What's Inside

- **7 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 can understand the reasoning.
- **Formula Reference Sheet** — essential Algebra 1 formulas and key concepts for quick review before each test.
- **Test Tracker** — log your scores across all 7 tests and monitor your improvement over time.

## Your 7-Test Battle Plan

### ★ PHASE 1: DISCOVER (Tests 1–2)

Untimed. Find your strengths and weaknesses. Review every answer explanation.

### ★★ PHASE 2: BUILD (Tests 3–4)

Soft timer (120 min). Start practicing pacing and time management.

### ★★★ PHASE 3: SHARPEN (Tests 5–6)


Timed, strict. Speed + accuracy together. Show complete solutions.


### 🏆 PHASE 4: PROVE IT (Test 7)


Full test conditions: timed, quiet, no notes. Compare with Test 1.

*Tip: Space tests 4–5 days apart. Use the days between to study the topics you missed.*

 **Types of Questions**

 **Multiple Choice:** Four answer options — only one is correct. Eliminate clearly wrong options to improve your odds.

 **Short Answer & Constructed Response:** Show all your work: equations, substitutions, and simplifications. Even a partial solution can earn credit.

 **Graphing & Data:** Plot points, draw lines, interpret scatter plots and data displays. Use a ruler and label everything clearly.



**Tip:** With 7 tests, you have the depth to truly master every chapter. Don't rush through them — quality review between tests is what drives real improvement.



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# 💡 Test-Taking Tips 💡

A problem-solving checklist for every question

## Your Problem-Solving Checklist

- I read the entire problem and identified what is given and what is asked.
- I wrote the equation or formula before substituting any numbers.
- I solved step by step and showed every operation.
- I checked my answer by plugging it back in or estimating.
- I re-read the question to make sure I answered exactly what was asked.
- I labeled my answer with correct units or notation.

## Common Mistakes in Algebra 1

-  **Combining like terms:**  $3x + 2y \neq 5xy$ . Only combine terms with the same variable and exponent.
-  **Exponent rules:**  $x^2 \cdot x^3 = x^5$  (add exponents), but  $(x^2)^3 = x^6$  (multiply exponents).
-  **Inequality direction:** When multiplying or dividing by a negative, flip the inequality sign.
-  **Function notation:**  $f(3)$  means the output when input is 3, not  $f \times 3$ .
-  **Quadratic formula:** The denominator is  $2a$ , not just  $a$ . Don't forget the  $\pm$ .

## Smart Strategies

- Answer the questions you're most confident about first
- Underline keywords: "solve," "simplify," "factor," "graph," "explain"
- For word problems, define your variable and translate step by step
- When graphing, always plot at least two points and connect with a ruler
- When stuck, skip and come back — fresh eyes often see the solution

 **After Each Test**

- Read the full explanation for every wrong answer
- Note the chapter (not just the question number) so you know what to study
- Before the next test, review those chapters until you understand them
- Log your results in the Test Tracker



“ Every wrong answer is a learning opportunity. After each test, go back and understand not just **what** the right answer is, but **why** your approach didn't work. ”



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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

Seven tests allow for deep, thorough preparation. Plan one test every 4–5 days with study sessions in between.

#### How to help:

- Tests 1–2 should be untimed — let your student explore and learn.
- After each test, review the answer explanations together. Focus on the chapter, not just individual questions.
- Use the Test Tracker to visualize progress across all 7 tests.
- For extra topic support, pair this book with our **Algebra 1 Study Guide** or **Algebra 1 Workbook**.

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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 your scores and track your growth

Name: \_\_\_\_\_

Start Date: \_\_\_\_\_

## Test 1 – Untimed

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / \_\_\_\_\_

%: \_\_\_\_\_

Notes: \_\_\_\_\_

## Test 2 – Untimed

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / \_\_\_\_\_

%: \_\_\_\_\_

Notes: \_\_\_\_\_

## Test 3 – Soft Timer – 120 min

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / \_\_\_\_\_

%: \_\_\_\_\_

Notes: \_\_\_\_\_

## Test 4 – Timed

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / \_\_\_\_\_

%: \_\_\_\_\_

Notes: \_\_\_\_\_

## Test 5 – Timed

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / \_\_\_\_\_

%: \_\_\_\_\_

Notes: \_\_\_\_\_

## Test 6 – Timed – Strict

Date: \_\_\_\_\_

Score: \_\_\_\_\_ / \_\_\_\_\_

%: \_\_\_\_\_

Notes: \_\_\_\_\_

## Test 7 – Full Test Conditions

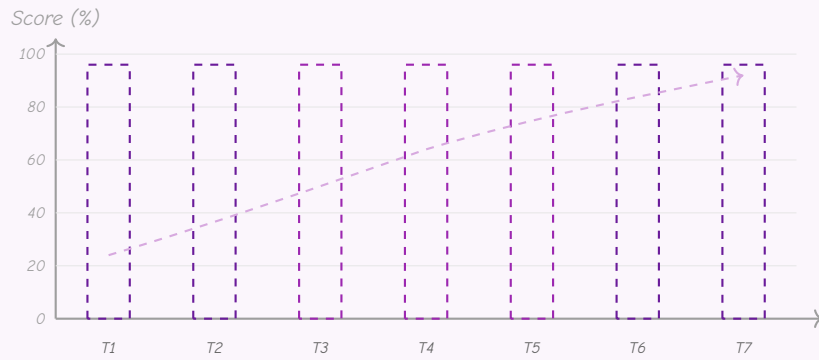
Date: \_\_\_\_\_

Score: \_\_\_\_\_ / \_\_\_\_\_

%: \_\_\_\_\_

Notes: \_\_\_\_\_

### Score Progress



Shade each bar after every test. Watch your progress!

### Final Reflection

The most important thing I learned: \_\_\_\_\_

The topic where I improved the most: \_\_\_\_\_

What I want to keep working on: \_\_\_\_\_



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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. The sum of two numbers is 14 and one number is 4 more than the other. What are the two numbers?

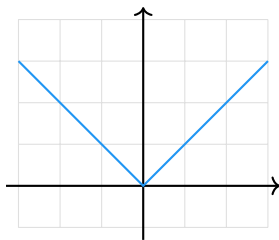
Your Answer:

2. The table below shows an equation with a missing exponent  $n$ . Use the rules of exponents to find the value of  $n$ .

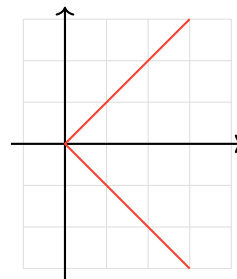
Numerator	Denominator	Result
$x^8 \cdot x^n$	$x^3$	$x^9$

Your Answer:

3. Which graph below represents a function?



Graph I



Graph II

- Ⓐ Graph I only
- Ⓑ Graph II only
- Ⓒ Both Graph I and Graph II
- Ⓓ Neither Graph I nor Graph II

4. How many solutions does  $4(2x + 3) = 2(4x - 1)$  have?

Your Answer:



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5. What type of boundary line does  $y \geq \frac{3}{4}x - 1$  have?

Your Answer:

6. A car is bought for \$18,000 and loses 10% of its value each year. What is the car's value after 5 years? Round to the nearest dollar.

Your Answer:

7. Use the quadratic formula to solve the equation represented by the parabola below. The equation is  $x^2 - 4x + 3 = 0$ .



Your Answer:

8. Expand  $(x + 6)^2$ . Write the result in standard form.

Your Answer:



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9. Given  $f(x) = 4x - 3$  and  $g(x) = x + 7$ , what is  $f(2) + g(2)$ ?

(A) 14

(B) 12

(C) 16

(D) 18

10. A car's value decreases by approximately 15% each year. Which model type best describes this depreciation?

(A) Linear, because the value decreases at a constant rate.

(B) Quadratic, because the value decreases and then increases.

(C) Exponential decay, because the value decreases by a constant percentage each year.

(D) No model is appropriate for depreciation.

PREVIEW



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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 9 and 5

2 4

3 A

4 no solution

5 Solid

6 \$10,629

7  $x = 1$  and  $x = 3$

8  $x^2 + 12x + 36$

9 A

10 C

### 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 Let  $x + y = 14$  and  $x = y + 4$ . Substitute:  $(y + 4) + y = 14$ , so  $2y = 10$  and  $y = 5$ . Then  $x = 9$ . The two numbers are 9 and 5.

2 Using the product rule in the numerator:  $x^8 \cdot x^n = x^{8+n}$ . Then the quotient rule:  $\frac{x^{8+n}}{x^3} = x^{8+n-3} = x^{n+5}$ . Setting  $x^{n+5} = x^9$  gives  $n + 5 = 9$ , so  $n = 4$ .



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3 Graph I shows a V-shape; every vertical line crosses it at most once, so it is a function. Graph II shows a sideways V; a vertical line at  $x = 2$  crosses it at two points (one above and one below the  $x$ -axis), so it is not a function.

4 Distribute:  $8x + 12 = 8x - 2$ . Subtract  $8x$ :  $12 = -2$ . This is a false statement, so the equation has no solution.

5 The symbol  $\geq$  includes equality, so points on the boundary line are solutions. A solid line is used for  $\leq$  or  $\geq$ .

6 The decay factor is  $b = 1 - 0.10 = 0.90$ . After 5 years:  $f(5) = 18,000(0.90)^5 = 18,000 \times 0.59049 \approx \$10,629$ .

7 With  $a = 1$ ,  $b = -4$ ,  $c = 3$ , the discriminant is  $D = 16 - 12 = 4$ . Then  $x = \frac{4 \pm 2}{2}$ , giving  $x = 3$  or  $x = 1$ . These match the  $x$ -intercepts on the graph.

8 Use the square of a sum pattern:  $(x + 6)^2 = x^2 + 2(x)(6) + 6^2 = x^2 + 12x + 36$ .

9 Evaluate each function at  $x = 2$ :  $f(2) = 4(2) - 3 = 5$  and  $g(2) = 2 + 7 = 9$ . Then  $f(2) + g(2) = 5 + 9 = 14$ .

10 A constant percentage decrease each year means the car retains 85% of its value annually, giving the model  $V = V_0(0.85)^t$ . This is exponential decay because each year the amount lost is a fixed fraction of the current value, not a fixed dollar amount.



**Well done checking your answers!**

Keep practicing to strengthen your skills.

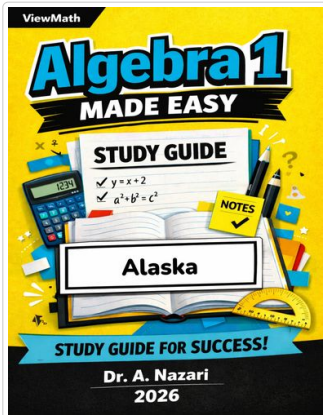


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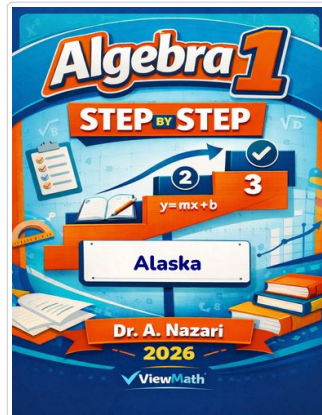
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Study Guide



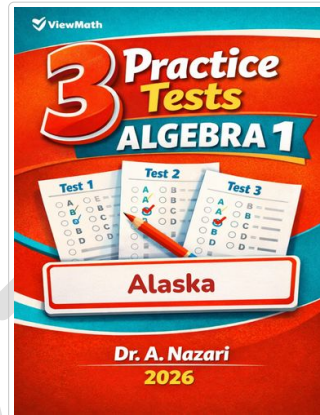
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Step-by-Step



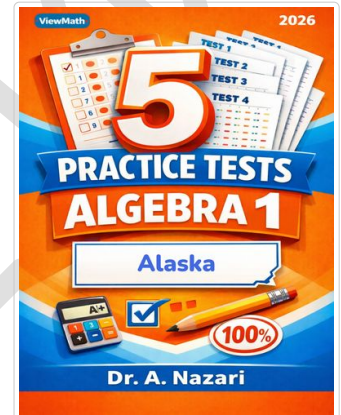
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3 Practice Tests



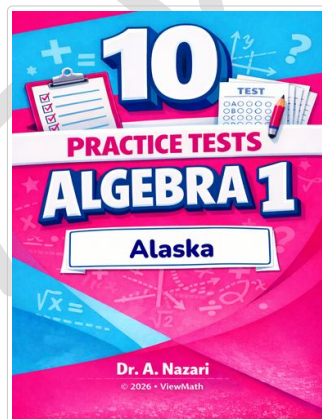
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5 Practice Tests



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10 Practice Tests



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