

# 5 Full-Length Pennsylvania Keystone Grade 9 Math Practice Tests

*Extra Practice for Test Day Success*

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# 5 Practice Tests

Algebra 1



## Welcome!

This book contains **5 full-length Algebra 1 practice tests** to prepare you for your end-of-course assessment. Each test covers every major topic you need to know:

Foundations of Algebra    Linear Equations

Functions    Linear Functions & Graphs

Systems of Equations    Polynomials & Factoring

Quadratic Functions    Exponential Functions

Data Analysis & Statistics

With five tests, you'll have plenty of opportunity to identify weak areas, practice them, and build real confidence.

*The more you practice, the more prepared you'll be.*

“Five tests give you a real advantage. Use each one to get stronger before the real thing!”



# How to Use This Book

A 5-week plan for effective test preparation

## What's Inside

- **5 Full-Length Practice Tests** — each covers all 9 chapters of Algebra 1: real numbers & exponents, linear equations & inequalities, functions, linear functions & graphing, systems of equations, polynomials & factoring, quadratics, exponential functions, and data analysis.
- **Detailed Answer Explanations** — every question includes a complete step-by-step solution to help you learn from your mistakes.
- **Formula Reference Sheet** — all the key Algebra 1 formulas and concepts organized in one page for quick access.
- **Test Tracker** — record scores and track improvement across all five tests.

## Your 5-Week Study Path



Space tests one week apart. Use the days between to study the topics you missed.

## Types of Questions

- **Multiple Choice:** Four answer options. Work the problem yourself first, then match your answer. Eliminate clearly wrong options to narrow your choices.
- **Short Answer & Constructed Response:** Write your full solution. Show all equations, substitutions, and simplification steps. Partial credit is given for correct work even if the final answer is missing or wrong.
- **Graphing & Data:** Plot points, draw lines, and interpret graphs and scatter plots. Label axes clearly and use a ruler for straight lines.



*Tip: Five tests is enough to see real progress. Space them out, study between them, and always review the full explanation for every problem you get wrong.*

PREVIEW



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# 💡 Test-Taking Tips 💡

Five key strategies for success

## ✍️ Five Strategies for Every Problem

- 1. Read carefully.** Don't skim. Read every word of the problem and identify exactly what is being asked before you start calculating.
- 2. Estimate first.** Before solving, make a rough estimate. This helps you catch major errors in your final answer.
- 3. Show your work.** Write the equation, substitute values, and simplify step by step. This earns partial credit and reduces mistakes.
- 4. Check your answer.** Plug your result back into the original equation or condition. Does it satisfy the equation?
- 5. Manage your time.** If you're stuck for more than 2 minutes, skip the problem and come back later. Don't let one question eat your time.

## ⚠️ Common Mistakes to Watch For

- ⚠️ **Sign errors:** When solving  $3x - 7 = 14$ , add 7 to both sides. Watch negative signs.
- ⚠️ **Distributing negatives:**  $-(2x - 5) = -2x + 5$ , not  $-2x - 5$ .
- ⚠️ **Slope formula:**  $m = \frac{y_2 - y_1}{x_2 - x_1}$  — keep the order consistent.
- ⚠️ **Factoring:** Always check your factored form by multiplying it back out.
- ⚠️ **Quadratic formula:** Don't forget the  $\pm$  — most quadratics have two solutions.

 **Don't Forget**

- Circle keywords in the problem: “solve,” “simplify,” “which equation,” “graph”
- For word problems, define a variable first, then translate step by step
- When graphing lines, plot at least two points and use a ruler
- For systems of equations, check your solution in both equations
- For inequalities, remember to flip the sign when multiplying or dividing by a negative



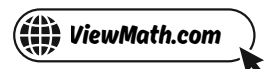
“ After each practice test, go back to every problem you got wrong and figure out *where* your approach broke down. That single habit makes the biggest difference. ”



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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

Five tests provide a steady, manageable study plan. Space them **one week apart** with study days in between.

#### How to help:

- Tests 1–2 should be untimed — focus on learning, not speed.
- After each test, review the full solutions together. Ask: “Which topics were hardest? Let’s study those before the next one.”
- Use the Test Tracker page to visualize progress over time.
- For extra support on specific topics, pair this book with our **Algebra 1 Study Guide**.



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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 progress

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

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

## Test 1 (Untimed)

Date: \_\_\_\_\_ Score: \_\_\_\_\_ / \_\_\_\_\_ Percent: \_\_\_\_\_ Topics to review:  
\_\_\_\_\_

## Test 2 (Untimed or Soft Timer)

Date: \_\_\_\_\_ Score: \_\_\_\_\_ / \_\_\_\_\_ Percent: \_\_\_\_\_ Improved on:  
\_\_\_\_\_

## Test 3 (Timed — 120 Minutes)

Date: \_\_\_\_\_ Score: \_\_\_\_\_ / \_\_\_\_\_ Percent: \_\_\_\_\_ Still challenging:  
\_\_\_\_\_

## Test 4 (Timed)

Date: \_\_\_\_\_ Score: \_\_\_\_\_ / \_\_\_\_\_ Percent: \_\_\_\_\_ Growth from Test 1:  
\_\_\_\_\_

## Test 5 (Full Test Conditions)

Date: \_\_\_\_\_ Score: \_\_\_\_\_ / \_\_\_\_\_ Percent: \_\_\_\_\_ Total improvement:  
\_\_\_\_\_

### Score Progress



Shade each bar to your score after each test.

### Final Reflection

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

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

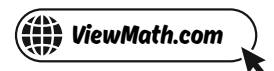
What I want to keep working on: \_\_\_\_\_



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-  **Personalized Dashboard** — A learning plan tailored just for you



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PRACTICE TEST

1

## Practice Test 1

 10 Questions

### Before You Start

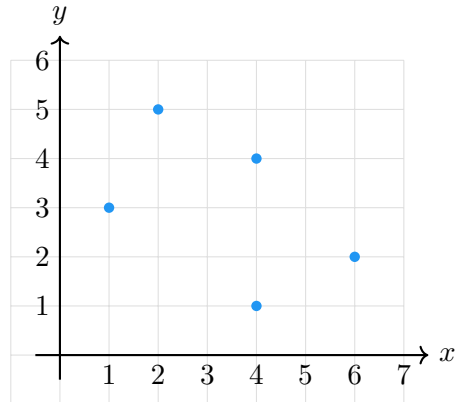
- ✓ *Read each question carefully before choosing your answer.*
- ✓ *Show your work on scratch paper when you need to.*
- ✓ *Skip hard questions and come back to them later.*
- ✓ *Check your answers when you're done.*
- ✓ *Take your time — there's no rush!*

★ *You've Got This!* ★

*Do your best and show what you know!*



1. Look at the graph below. How many points on the graph share the same  $x$ -coordinate as another point?



Your Answer:

2. Simplify  $(a + b)^2 - 2ab$ .

Your Answer:

3. Which expression is equivalent to  $x^{-3}$ ?

- (A)  $-x^3$                       (B)  $-3x$   
 (C)  $\frac{1}{x^3}$                       (D)  $\frac{x}{3}$

4. Solve  $8x - 3 = 5x + 12$ .

Your Answer:



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5. For what value of  $k$  does the system  $3x + y = 9$  and  $6x + 2y = k$  have infinitely many solutions?

(A) 9

(B) 12

(C) 15

(D) 18

6. A data set is modeled by  $y = 2x^2 + 3$ . At  $x = 3$ , the actual value is 20. What is the residual?

(A) -1

(B) 1

(C) 2

(D) -2

7. The graph below shows the value of a collectible card over time, modeled by an exponential growth function.



Based on the labeled points, what is the value of the card after 3 years? Round to the nearest cent.

Your Answer:



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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

- |            |                      |            |            |            |            |                  |            |
|------------|----------------------|------------|------------|------------|------------|------------------|------------|
| <b>1</b> 2 | <b>2</b> $a^2 + b^2$ | <b>3</b> C | <b>4</b> 5 | <b>5</b> D | <b>6</b> A | <b>7</b> \$67.50 | <b>8</b> A |
| <b>9</b> C | <b>10</b> A          |            |            |            |            |                  |            |

### 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 points  $(4, 1)$  and  $(4, 4)$  both have  $x = 4$ . Those 2 points share the same  $x$ -coordinate, which means a vertical line at  $x = 4$  hits the graph twice and the relation is not a function.

**2** Expand  $(a + b)^2 = a^2 + 2ab + b^2$ . Then subtract  $2ab$ :  $a^2 + 2ab + b^2 - 2ab = a^2 + b^2$ .



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3 The negative exponent rule states  $a^{-n} = \frac{1}{a^n}$ . So  $x^{-3} = \frac{1}{x^3}$ . A negative exponent means reciprocal, not a negative number. Choice A confuses the sign of the exponent with the sign of the base.

4 Subtract  $5x$  from both sides:  $3x - 3 = 12$ . Add 3:  $3x = 15$ . Divide by 3:  $x = 5$ .

5 Multiply the first equation by 2:  $6x + 2y = 18$ . For infinitely many solutions, this must be identical to the second equation. So  $k = 18$ .

6 Predicted:  $y = 2(3)^2 + 3 = 2(9) + 3 = 21$ . Residual = actual - predicted =  $20 - 21 = -1$ . The actual value is 1 below the model's prediction.

7 The initial value is  $a = 20$  and the growth factor is  $b = \frac{30}{20} = 1.5$ . After 3 years:  $f(3) = 20(1.5)^3 = 20 \times 3.375 = \$67.50$ .

8 Substitute  $t = 1$ :  $h(1) = -16(1)^2 + 48(1) + 4 = -16 + 48 + 4 = 36$ . The ball is 36 units high after 1 second.

9 Absolute value measures distance from 0. If  $|x| = 7$ , then  $x$  is 7 units from 0, so  $x = 7$  or  $x = -7$ .

10 With  $a = 3$ ,  $b = -2$ ,  $c = -5$ , the discriminant is  $D = 4 + 60 = 64$ . Then  $x = \frac{2 \pm 8}{6}$ , giving  $x = \frac{10}{6} = \frac{5}{3}$  or  $x = \frac{-6}{6} = -1$ .



**Well done checking your answers!**

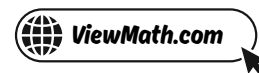
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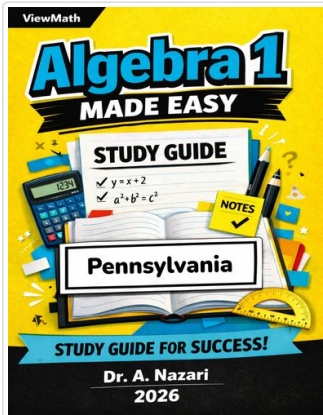


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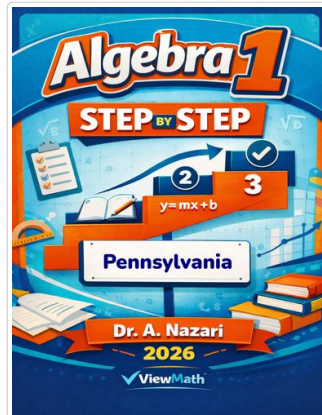
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Study Guide



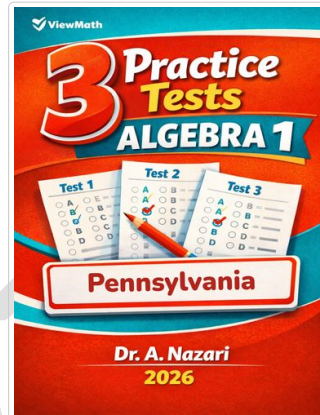
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Step-by-Step



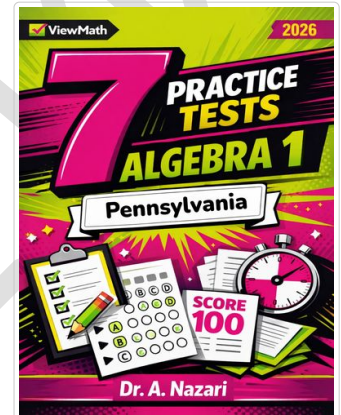
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3 Practice Tests



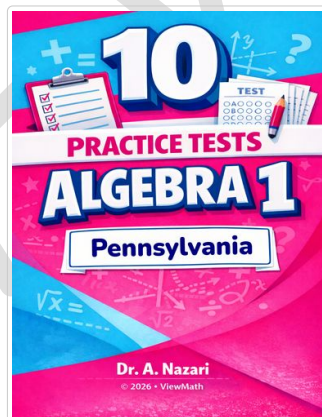
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7 Practice Tests



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10 Practice Tests



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