

# 3 Full-Length North Carolina EOC NC Math 3 Practice Tests

*Full-Length Test Prep with Detailed Answer Explanations*

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# Welcome to Your Practice Book

3 full-length Algebra 2 tests to diagnose, review, and build confidence

## Welcome!

This book gives you **3 full-length Algebra 2 practice tests** with detailed answer explanations, so every test becomes both practice and review. Use the first test as a baseline, study the explanations for questions you miss, then use the next tests to measure growth.

### Practice routine

- ✓ Take each test in one quiet sitting
- ✓ Use a timer and avoid notes
- ✓ Mark questions you want to revisit

### Improve your score

- ✓ Review every missed question
- ✓ Write down the mistake pattern
- ✓ Practice that kind of problem again

*Practice builds confidence. Careful review turns confidence into results.*

1  
Test

2  
Review

3  
Improve

“ Treat each practice test like the real exam: set a timer, work without notes, and finish before checking answers. ”





# How to Use This Book



A clean 3-test path: diagnose, train, rehearse

## What is inside

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### 3 full-length practice tests

Each test samples Algebra 2 skills across functions, quadratics, polynomials, rational and radical expressions, exponentials, logarithms, sequences, matrices, trigonometry, conics, statistics, probability, and finance.

### Complete answer explanations

Use the explanations as your study guide after each test. The goal is not only to know the answer, but to see the reasoning.

### Reference sheet and tracker

Review the formulas before testing, then record your scores and weak topics so each test improves the next one.

## Question types

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### Multiple Choice

Work first, then match your answer. Eliminate choices that cannot be right.

### Short Answer

Show equations, substitutions, and simplification. Clear work can earn partial credit.

### Graphing & Data

Label axes, plot carefully, and connect the graph or table to the question.

## Your study rhythm

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**Suggested pacing:** Take Test 1 without a timer. Study the topics you miss for 5–7 days. Take Test 2 with a timer. Use Test 3 as a dress rehearsal: quiet room, no notes, full timing.

1 **Score**  
Mark every answer.

2 **Study**  
Review missed topics.

3 **Retry**  
Redo similar problems.

# 💡 Test-Taking Tips 💡

Practical habits for Algebra 2 practice tests

## During the test

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### 1. Read for the target.

Identify exactly what the question asks before calculating.

### 2. Set up before solving.

Write the equation, expression, graph feature, or formula you plan to use.

### 3. Show the algebra.

Keep signs, restrictions, substitutions, and simplification visible.

### 4. Check reasonableness.

Substitute, estimate, inspect the graph, or compare units.

### 5. Answer the question asked.

Re-read the final sentence before marking your answer.

## After the test

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### Score

Mark each question and write down the test score.

### Sort

Group missed questions by topic, not by page number.

### Study

Review the explanation, then retry a similar problem.

## Common traps

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**Inequalities:** flip the sign when multiplying or dividing by a negative.

**Quadratics:** use  $2a$  in the denominator of the quadratic formula and interpret the discriminant before solving.

**Rational expressions:** excluded values come from the original denominator, even after simplifying.

**Radicals and logs:** check domain restrictions and extraneous solutions.

**Graphs:** scale the axes first, then label intercepts, asymptotes, extrema, or end behavior.



# What You'll Need



Gather materials before you begin

## Materials checklist

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- |   |                                 |   |                                     |
|---|---------------------------------|---|-------------------------------------|
| ✓ | Sharpened pencils               | ✓ | Good eraser                         |
| ✓ | Scratch paper                   | ✓ | Ruler or straightedge               |
| ✓ | Graphing calculator, if allowed | ✓ | Quiet place to work                 |
| ✓ | Timer for practice tests        | ✓ | The answer key for review afterward |

## Usually allowed

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Pencils, scratch paper provided on test day, graphing calculator when your state allows it, and a straight-edge for graphing.

## Usually not allowed

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Phones, notes, textbooks, online help, or any calculator/app not permitted by your official test rules.



Same setup



Same tools



Better comparison

A consistent routine makes your scores easier to compare.



# Algebra 2 Reference Sheet



High-yield formulas for quick review before each practice test

## Functions

Domain = allowed inputs; range = outputs.

$$\text{Average rate: } \frac{f(b) - f(a)}{b - a}$$

$f(x) + k$ : up/down;  $f(x - h)$ : right/left

$af(x)$ : vertical stretch/reflection

$f(bx)$ : horizontal change

Inverse:  $f^{-1}(f(x)) = x$

## Linear

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

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

Slope-intercept:  $y = mx + b$

Standard:  $Ax + By = C$

Parallel: same  $m$ ; perpendicular:  $m_1 m_2 = -1$

## Systems

Solutions are intersections.

Substitution: solve one equation, plug in.

Elimination: align terms, add/subtract.

No solution: parallel lines.

Infinitely many: same line.

## Quadratics

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

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

Factored:  $y = a(x - r_1)(x - r_2)$

Axis:  $x = -\frac{b}{2a}$

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

Discriminant:  $b^2 - 4ac$

Roots:  $r_1 + r_2 = -\frac{b}{a}$ ,  $r_1 r_2 = \frac{c}{a}$

## Polynomials

Remainder: divide by  $x - a$ , remainder  $f(a)$ .

Factor:  $x - a$  factor iff  $f(a) = 0$ .

Zeros and factors:  $x = r \leftrightarrow (x - r)$

Even degree: same end behavior.

Odd degree: opposite end behavior.

Even multiplicity touches; odd crosses.

## Complex Numbers

$$i^2 = -1, i^3 = -i, i^4 = 1$$

$(a + bi) + (c + di) = (a + c) + (b + d)i$

$(a + bi)(c + di) = (ac - bd) + (ad + bc)i$

Conjugates:  $a + bi$ ,  $a - bi$

Real polynomials have conjugate complex roots.

## Rational

Excluded values come from original denominator.

Factor first; cancel common factors.

Vertical asymptotes: uncanceled denominator zeros.

Holes: canceled denominator zeros.

Horizontal asymptote compares degrees.

Rational inequality: use sign chart.

## Radicals

$$a^{m/n} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$$

$a^m a^n = a^{m+n}$

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

Power function:  $f(x) = ax^p$

Radical equations: isolate, power, check.

Even roots need nonnegative radicands.

## Exponential

Model:  $y = ab^x$

Growth:  $b > 1$ ; decay:  $0 < b < 1$

Compound:  $A = P(1 + \frac{r}{n})^{nt}$

Continuous:  $A = Pe^{rt}$

Half-life/decay:  $A = A_0(1 - r)^t$

## Logarithms

$\log_b(x) = y \leftrightarrow b^y = x$

$\log_b(MN) = \log_b M + \log_b N$

$\log_b(M/N) = \log_b M - \log_b N$

$\log_b(M^p) = p \log_b M$

Change base:  $\log_b x = \frac{\log x}{\log b}$

Log domain: argument  $> 0$ .

## Sequences

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

Arithmetic recursive:  $a_n = a_{n-1} + d$

$$\text{Arithmetic sum: } S_n = \frac{n(a_1 + a_n)}{2}$$

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

Geometric recursive:  $a_n = r a_{n-1}$

$$\text{Finite sum: } S_n = \frac{a_1(1 - r^n)}{1 - r}$$

$$\text{Infinite sum: } S = \frac{a_1}{1 - r}, |r| < 1$$

## Matrices

Matrix size: rows  $\times$  columns.

Add/subtract only same dimensions.

Multiply  $A_{m \times n} B_{n \times p} = C_{m \times p}$ .

Identity:  $AI = IA = A$

For  $2 \times 2$ , determinant  $ad - bc$ .



# Algebra 2 Reference Sheet



Trig, conics, data, probability, and modeling reminders

## Trigonometry

Unit point:  $(\cos \theta, \sin \theta)$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$\sin = \frac{\text{opp}}{\text{hyp}}, \cos = \frac{\text{adj}}{\text{hyp}}, \tan = \frac{\text{opp}}{\text{adj}}$$

$$\text{Sine/cosine period: } \frac{2\pi}{|b|}$$

$$\text{Tangent period: } \frac{\pi}{|b|}$$

$$\text{Law of Sines: } \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\text{Law of Cosines: } c^2 = a^2 + b^2 - 2ab \cos C$$

## Trig Graphs

$$y = A \sin(B(x - C)) + D$$

$$\text{Amplitude: } |A|$$

$$\text{Period: } \frac{2\pi}{|B|} \text{ for sine/cosine}$$

$$\text{Period: } \frac{\pi}{|B|} \text{ for tangent}$$

$$\text{Phase shift: } C$$

$$\text{Midline: } y = D$$

$$\text{Max/min: } D \pm |A|$$

## Special Angles

$$30^\circ = \frac{\pi}{6}, 45^\circ = \frac{\pi}{4}, 60^\circ = \frac{\pi}{3}$$

$$\sin 30^\circ = \frac{1}{2}, \cos 30^\circ = \frac{\sqrt{3}}{2}$$

$$\sin 45^\circ = \cos 45^\circ = \frac{\sqrt{2}}{2}$$

$$\sin 60^\circ = \frac{\sqrt{3}}{2}, \cos 60^\circ = \frac{1}{2}$$

Quadrant signs: ASTC.

## Conics

$$\text{Circle: } (x - h)^2 + (y - k)^2 = r^2$$

$$\text{Parabola: } (x - h)^2 = 4p(y - k)$$

$$\text{or } (y - k)^2 = 4p(x - h)$$

$$\text{Ellipse: } \frac{(x - h)^2}{a^2} + \frac{(y - k)^2}{b^2} = 1$$

$$\text{Hyperbola: } \frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$$

## Conic Details

Circle center  $(h, k)$ , radius  $r$ .

Parabola vertex  $(h, k)$ , focus is  $|p|$  away.

Ellipse: larger denominator gives major axis.

$$\text{Ellipse: } c^2 = a^2 - b^2$$

$$\text{Hyperbola: } c^2 = a^2 + b^2$$

Asymptotes guide hyperbola branches.

## Statistics

$$\text{Mean: } \bar{x} = \frac{\sum x}{n}$$

$$z = \frac{x - \mu}{\sigma}$$

Residual = actual - predicted

Correlation  $r$  is between  $-1$  and  $1$ .

Normal: about 68%, 95%, 99.7% within 1, 2, 3 SDs.

## Data Displays

$$\text{IQR: } Q_3 - Q_1$$

$$\text{Outlier fence: } Q_1 - 1.5(\text{IQR}), Q_3 + 1.5(\text{IQR})$$

Median resists outliers.

Mean is pulled by outliers.

Standard deviation measures typical distance from mean.

## Regression

Residual: actual - predicted.

Positive  $r$ : as  $x$  rises,  $y$  tends to rise.

Negative  $r$ : as  $x$  rises,  $y$  tends to fall.

Strong linear fit:  $|r|$  close to 1.

$R^2$  is percent of variation explained.

## Probability

$$P(A | B) = \frac{P(A \cap B)}{P(B)}$$

$$\text{Independent: } P(A \cap B) = P(A)P(B)$$

$$\text{Either/or: } P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$\text{Permutations: } {}_n P_r = \frac{n!}{(n - r)!}$$

$$\text{Combinations: } {}_n C_r = \frac{n!}{r!(n - r)!}$$

$$\text{Binomial: } {}_n C_r p^r (1 - p)^{n - r}$$

## Counting

Fundamental counting principle: multiply choices.

Permutation: order matters.

Combination: order does not matter.

With replacement: choices stay the same.

Without replacement: choices decrease.

## Finance

$$\text{Simple interest: } I = Prt$$

$$\text{Future amount: } A = P + I$$

$$\text{Compound: } A = P(1 + \frac{r}{n})^{nt}$$

$$\text{Continuous: } A = Pe^{rt}$$

$$\text{Depreciation: } A = P(1 - r)^t$$

$$\text{Percent change: } \frac{\text{new} - \text{old}}{\text{old}}$$

## Modeling Checks

Linear: constant first differences.

Quadratic: constant second differences.

Exponential: constant ratios.

Domain should match the context.

Round only at the end unless directed.



# My Test Tracker



Record scores, review topics, and save your progress online

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

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

Test	Date	Score / 50	Percent	Main topic to review
1	_____	_____	_____	_____
2	_____	_____	_____	_____
3	_____	_____	_____	_____

## Review pattern

### Test 1

Find your baseline and list the first weak topics.

### Test 2

Check whether your review changed the score.

### Test 3

Practice under full test conditions.

Track your progress and save your scores on [ViewMath.com](https://www.viewmath.com)

Scan the QR code to enter scores, save progress, and review weak topics.

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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. Use the table to identify which values satisfy  $2x - 1 \leq 5$ .

$x$	$2x - 1$	Satisfies?
2	3	yes
3	5	yes
4	7	no

(A)  $x \leq 3$

(B)  $x < 3$

(C)  $x \geq 3$

(D)  $x > 3$

2. What is  $(3m^2)(-4m^5)$ ?

(A)  $-12m^7$

(B)  $-12m^{10}$

(C)  $12m^7$

(D)  $-m^7$

3. What is the slope of the line through  $(2, 5)$  and  $(6, 13)$ ?

(A) 2

(B)  $\frac{1}{2}$

(C) 4

(D) 8

4. Solve  $|2x + 1| < 9$ .

(A)  $-5 < x < 4$

(B)  $x < -5$  or  $x > 4$

(C)  $-4 < x < 5$

(D)  $x < 4$

5. A system's equations reduce to  $0 = 0$ . What is true?

(A) no solution

(B) exactly one solution

(C) infinitely many solutions

(D) solution is  $(0, 0)$  only



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6. Convert  $3x - 2y = 8$  to slope-intercept form.

(A)  $y = \frac{3}{2}x - 4$

(B)  $y = -\frac{3}{2}x + 4$

(C)  $y = 3x - 8$

(D)  $y = \frac{2}{3}x + 8$

7. Which statement describes  $x < -1$  or  $x > 4$ ?

(A) intersection

(B) bounded interval

(C) union of two rays

(D) single point

8. Which line is perpendicular to  $y = -4x + 9$ ?

(A)  $y = -4x - 1$

(B)  $y = 4x + 1$

(C)  $y = \frac{1}{4}x - 2$

(D)  $y = -\frac{1}{4}x + 2$

9. Which restriction is needed for  $\frac{f}{g}$  when  $g(x) = x + 2$ ?

(A)  $x \neq -2$

(B)  $x \neq 2$

(C)  $x \geq -2$

(D) no restriction

10. Which equation has axis of symmetry  $x = -2$ ?

(A)  $y = (x - 2)^2 + 1$

(B)  $y = (x + 2)^2 - 3$

(C)  $y = x^2 + 2$

(D)  $y = (x - 3)^2 - 2$



# *Answer Key & Explanations*



## Answer Key

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

### Practice Test 1 – Answer Key

1 A

2 A

3 A

4 A

5 C

6 A

7 C

8 C

9 A

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 table shows 3 still works but 4 does not, matching the algebraic solution  $x \leq 3$ .

2 Multiply coefficients and add exponents with the same base:  $3(-4)m^{2+5} = -12m^7$ .

3 Slope is change in  $y$  over change in  $x$ :  $\frac{13-5}{6-2} = \frac{8}{4} = 2$ .



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- 4 For a less-than absolute value inequality, write  $-9 < 2x + 1 < 9$ , then solve to get  $-5 < x < 4$ .
- 5 A true identity after elimination means the equations are dependent and represent the same solution set.
- 6 Subtract  $3x$  and divide by  $-2$ :  $-2y = -3x + 8$ , so  $y = \frac{3}{2}x - 4$ .
- 7 The word or joins values in either separate interval, producing two rays rather than an overlap.
- 8 Perpendicular slopes are negative reciprocals, and the negative reciprocal of  $-4$  is  $\frac{1}{4}$ .
- 9 A quotient of functions is undefined where the denominator function is zero, so  $x + 2 \neq 0$  and  $x \neq -2$ .
- 10 In vertex form,  $y = (x - h)^2 + k$  has axis  $x = h$ , so  $(x + 2)^2$  gives  $h = -2$ .

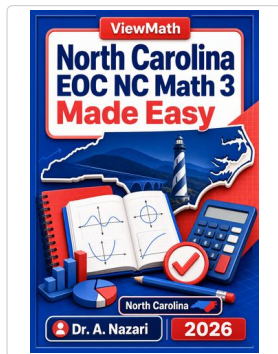


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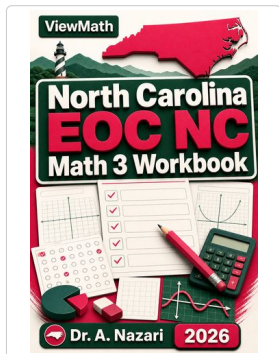
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Study Guide



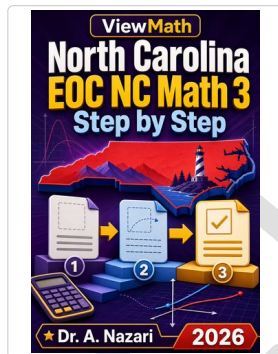
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Workbook



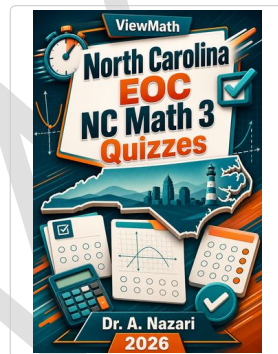
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Step-by-Step



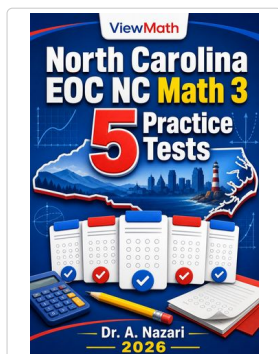
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Quizzes



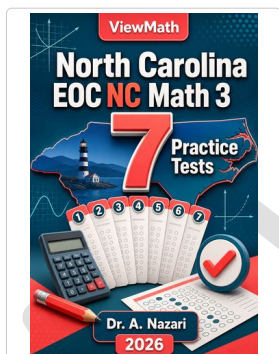
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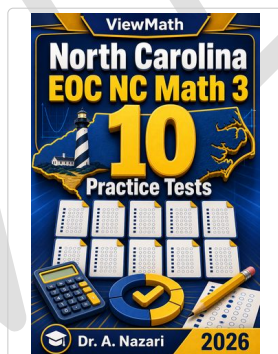
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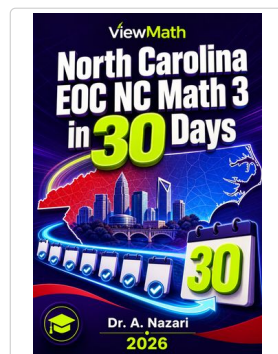
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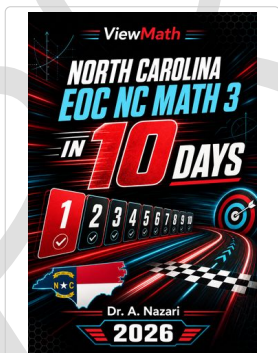
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Math in 30 Days



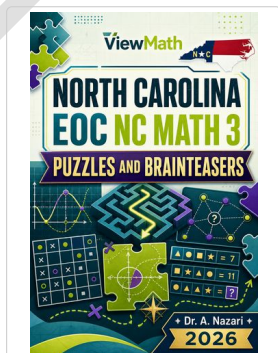
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Math in 10 Days



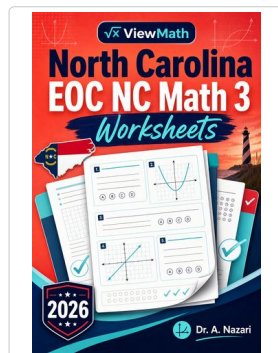
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