$y = ax^2 + bx + c$

$(x+2)^2 = 16$

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



7 FULL-LENGTH

WEST VIRGINIA

Algebra II

— PRACTICE TESTS —

Algebra 2 prep made simple with realistic practice, clear answer keys, and student-friendly step-by-step solutions

7 FULL-LENGTH PRACTICE TESTS

CLEAR ANSWER KEYS

STEP-BY-STEP SOLUTIONS

PRACTICE SMART. TEST CONFIDENTLY. SUCCEED.

7

West Virginia

Algebra II

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Reza Nazari

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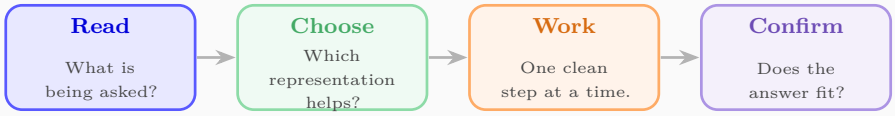
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Advanced Algebra, Calm Thinking

What to do when a problem has more than one step

Difficult questions become manageable when your process stays steady.



By the time you reach a seven-test book, you are not just practicing content. You are practicing how to think when a question asks you to connect several ideas at once.

When the problem includes a graph

Read the axes, scale, labels, intercepts, and direction before touching the choices. A graph often gives the answer's shape before it gives the answer's value.

When the problem includes an equation

Identify the form first. Factored form points to zeros. Vertex form points to maximum or minimum. Standard form may need rewriting. Rational and radical equations may need restrictions checked.

When the problem includes a context

Translate the story into variables, units, and a relationship. Then solve the mathematical question and return to the context so the final answer makes sense.

When time feels tight

Protect the points you can earn. Finish accessible questions first, mark the heavy ones, and come back. A calm second look often solves what a rushed first look could not.

Mindset that actually helps: confidence is not pretending a hard problem is easy. Confidence is knowing you have a process even when the first step is not obvious.

1. FUNCTIONS, TRANSFORMATIONS, AND INVERSES

Composition: $(f \circ g)(x) = f(g(x))$

Inverse relationship: $f(g(x)) = x$ and $g(f(x)) = x$

Vertical shift: $f(x) + k$ moves up/down

Horizontal shift: $f(x - h)$ moves right by h

Average rate of change: $\dfrac{f(b) - f(a)}{b - a}$

Domain: allowed inputs

Range: possible outputs

2. QUADRATICS, POLYNOMIALS, AND COMPLEX NUMBERS

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

Vertex: $x = -\dfrac{b}{2a}$

Discriminant: $b^2 - 4ac$

Remainder theorem: remainder is $f(a)$ after division by $x - a$

Complex numbers: $i^2 = -1$

Conjugates: $(a + bi)(a - bi) = a^2 + b^2$

3. EXPONENTIALS, LOGARITHMS, AND SEQUENCES

Exponential model: $y = ab^x$

Log definition: $\log_b a = c \Leftrightarrow b^c = a$

Change of base: $\log_b a = \dfrac{\log a}{\log b}$

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

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

Finite geometric sum: $S_n = a_1 \dfrac{1 - r^n}{1 - r}$

4. TRIGONOMETRY, CONICS, AND STATISTICS

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

Law of sines: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B}$

Law of cosines: $c^2 = a^2 + b^2 - 2ab\cos C$

Circle: $(x - h)^2 + (y - k)^2 = r^2$

Mean: $\bar{x} = \dfrac{\sum x_i}{n}$

Standard deviation: spread around the mean

Normal curve: about $68\%, 95\%, 99.7\%$

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Algebra II Reference Materials

QUADRATICS AND POLYNOMIALS

Quadratic formula	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Discriminant	$\Delta = b^2 - 4ac$
Vertex of $ax^2 + bx + c$	$x = -\dfrac{b}{2a}$
Remainder theorem	$f(a)$ is the remainder after division by $x - a$
Difference of squares	$a^2 - b^2 = (a - b)(a + b)$

EXPONENTIALS AND LOGARITHMS

Product rule	$\log_b(MN) = \log_b M + \log_b N$
Quotient rule	$\log_b(M/N) = \log_b M - \log_b N$
Power rule	$\log_b(M^p) = p \log_b M$
Change of base	$\log_b a = \dfrac{\log a}{\log b}$
Compound interest	$A = P(1 + r)^t$

SEQUENCES, SERIES, AND COMPLEX NUMBERS

Arithmetic sequence	$a_n = a_1 + (n - 1)d$
Arithmetic series	$S_n = \dfrac{n}{2}(a_1 + a_n)$
Geometric sequence	$a_n = a_1 r^{n-1}$
Geometric series	$S_n = a_1 \dfrac{1 - r^n}{1 - r}$
Imaginary unit	$i^2 = -1$

TRIGONOMETRY AND CONICS

Pythagorean identity	$\sin^2\theta + \cos^2\theta = 1$
Law of sines	$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$
Law of cosines	$c^2 = a^2 + b^2 - 2ab\cos C$
Circle	$(x - h)^2 + (y - k)^2 = r^2$
Parabola	$(x - h)^2 = 4p(y - k)$ or $(y - k)^2 = 4p(x - h)$

STATISTICS

Mean	$\bar{x} = \dfrac{\sum x_i}{n}$
Standard deviation idea	typical distance from the mean
Margin of error	critical value $\times$ standard error
Empirical rule	about $68\%, 95\%, 99.7\%$ within $1, 2, 3$ SDs

1) A rectangle has length $3x + 2$ units and width $x - 5$ units, where $x > 5$. Which expression represents the perimeter of the rectangle?

☐ A. $4x - 3$
☐ B. $3x^2 - 13x - 10$
☐ C. $8x - 6$
☐ D. $8x + 14$

2) A savings account earns interest according to $A = P(1+r)^t$, where P is the principal, r is the annual interest rate (decimal), and t is the number of years. Find A to the nearest cent when $P = \$1{,}000$, $r = 0.05$, and $t = 2$.

☐ A. \$1,102.50
☐ B. \$1,050.00
☐ C. \$2,100.00
☐ D. \$1,100.00

3) Simplify: $i^{15} \cdot (2 + i)$.

☐ A. $-1 + 2i$
☐ B. $1 - 2i$
☐ C. $-2 - i$
☐ D. $2 + i$

4) Solve $x^2 - 4x + 1 = 0$.

☐ A. $x = 2 \pm \sqrt{12}$
☐ B. $x = 4 \pm \sqrt{3}$
☐ C. $x = -2 \pm \sqrt{3}$
☐ D. $x = 2 \pm \sqrt{3}$

5) A bakery makes muffins and loaves of bread. Each muffin batch uses 2 cups of flour, and each loaf uses 5 cups of flour. The bakery has at most 60 cups of flour. Let m be muffin batches and ℓ be loaves. Write the flour constraint.

Record your answer in the space provided.

6) What is the degree of $p(x) = (x-1)^3(x+2)^2(x^2+4)$, and how many complex roots (with multiplicity) does it have?

☐ A. degree 5, 5 roots
☐ B. degree 6, 6 roots
☐ C. degree 7, 7 roots
☐ D. degree 7, 5 roots

7) The graph of $f(x) = x^2 - 6x + 8$ crosses the x-axis at two points. Which points are they?

☐ A. $(-2, 0)$ and $(-4, 0)$
☐ B. $(2, 0)$ and $(4, 0)$
☐ C. $(0, 8)$ and $(6, 0)$
☐ D. $(3, -1)$

8) Simplify: $3(2x + 5)$.

☐ A. $2x + 15$
☐ B. $6x + 5$
☐ C. $5x + 8$
☐ D. $6x + 15$

9) Multiply: $(x - 4)(x + 5)$.

☐ A. $x^2 + x - 20$
☐ B. $x^2 - x - 20$
☐ C. $x^2 + 9x - 20$
☐ D. $x^2 + x + 20$

10) A print shop made 80 total items. Posters use 3 sheets each, flyers use 1 sheet each, and the shop used 140 sheets. If p is posters, find p.

Record your answer in the space provided.