California Algebra 2 Summer Math Review

8-Week Core Review with Practice, Weekly Quizzes, and Answer Explanations

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☼ Welcome to Summer Math Review! ☼

This 8-week plan reviews the Algebra 2 math students already learned this year.

How each week works

- *Monday through Thursday are short review days.*
- *Each day starts with a Lesson Review.*
- *Each practice day has 6 problems.*
- *Friday is a 10-question quiz.*
- *Answers explain the thinking, not just the final number.*

Try your best first. Then use the answer key like a teacher.

Your 8-Week Summer Review Plan

Use this book four days a week, then take the quiz on Friday.

Weekly Schedule

Week	Monday	Tuesday	Wednesday	Thursday	Friday
1	Foundations	Equations	Linear	Systems	Quiz 1
2	Functions	Transforms	Quadratics	Quad Models	Quiz 2
3	Complex	Polynomials	Zeros	Rational Expr.	Quiz 3
4	Rational Eq.	Radicals	Radical Eq.	Exp/Logs	Quiz 4
5	Exp/Log Eq.	Sequences	Sigma/Binomial	Matrices	Quiz 5
6	Unit Circle	Identities	Applied Trig	Sine/Cosine	Quiz 6
7	Tangent/Inverse	Circles/Parabolas	Conics	Statistics	Quiz 7
8	Probability	Regression/Finance	Mixed Algebra	Final Review	Final Quiz

For students

Read the Lesson Review first. Try all 6 problems before checking answers. If you miss one, read the explanation and fix your work.

For parents and teachers

The daily pages are meant to be short. If a student struggles, use the answer explanation as the teaching step, then have the student correct the problem.

Goal

By the end of 8 weeks, students will have completed 192 daily practice problems and 80 quiz questions, with review across the full Algebra 2 math year.

Algebra 2 Reference Sheet

High-yield formulas to keep nearby during summer review.

Functions

Domain = allowed inputs; range = outputs.

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

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: $m_1m_2=-1$

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

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

Discriminant: b^2-4ac

Roots: $r_1+r_2=-\frac{b}{a}$, $r_1r_2=\frac{c}{a}$

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

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

Geometric: $a_n=a_1r^{n-1}$

Geometric recursive: $a_n=ra_{n-1}$

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

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 2×2, determinant $ad-bc$.

Algebra 2 Reference Sheet

Trig, conics, data, probability, and modeling reminders

Trigonometry

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

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

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

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

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

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

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

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

Trig Graphs

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

Amplitude: $|A|$

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

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

Phase shift: C

Midline: $y = D$

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

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

Parabola: $(x - h)^2 = 4p(y - k)$

or $(y - k)^2 = 4p(x - h)$

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

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.

Ellipse: $c^2 = a^2 - b^2$

Hyperbola: $c^2 = a^2 + b^2$

Asymptotes guide hyperbola branches.

Statistics

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

IQR: $Q_3 - Q_1$

Outlier fence: $Q_1 - 1.5(IQR)$*,* $Q_3 + 1.5(IQR)$

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

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

Independent: $P(A \cap B) = P(A)P(B)$

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

Permutations: ${}_nP_r = \frac{n!}{(n - r)!}$

Combinations: ${}_nC_r = \frac{n!}{r!(n - r)!}$

Binomial: ${}_nC_r p^r (1 - p)^{n-r}$

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

Simple interest: $I = Prt$

Future amount: $A = P + I$

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

Continuous: $A = Pe^{rt}$

Depreciation: $A = P(1 - r)^t$

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

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.

Summer Progress Tracker

Check off each day as you finish it.

Week	Mon	Tue	Wed	Thu	Fri Quiz
1	☐	☐	☐	☐	☐
2	☐	☐	☐	☐	☐
3	☐	☐	☐	☐	☐
4	☐	☐	☐	☐	☐
5	☐	☐	☐	☐	☐
6	☐	☐	☐	☐	☐
7	☐	☐	☐	☐	☐
8	☐	☐	☐	☐	☐

Small practice adds up.

Four short days and one quiz each week is enough to keep Algebra 2 math fresh all summer.

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Your 8-week summer review plan

Day 1 Real Numbers, Properties, and Expressions

Algebra 2 review works best when you name the structure before you calculate.

- Number sets are nested: natural, whole, integer, rational, and real.
- Interval notation uses brackets for included endpoints and parentheses for excluded endpoints.
- Order of operations controls simplifying; properties justify equivalent rewrites.
- Negative exponents move a factor across the fraction bar; they do not make a value negative.
- Evaluate by substituting with parentheses, then simplify carefully.
- Combine only like terms with exactly the same variable part.

Practice

1. Classify $\sqrt{81}$ as precisely as possible.

2. Write $\{x \mid -2 \leq x < 5\}$ in interval notation. _____

3. Evaluate $4 + 3(2^3 - 5)$. _____

4. Simplify $(2x^3y^{-2})(5x^{-1}y^5)$ with positive exponents.

5. Evaluate $2a^2 - 3b$ when $a = -4$ and $b = 5$. _____

6. Simplify $4(3x - 2) - 5x$. _____

Day 2 Equations, Inequalities, and Absolute Value

Algebra 2 review works best when you name the structure before you calculate.

- Use inverse operations to isolate the variable in equations.
- Do the same operation to both sides to preserve equality or the solution set.
- Reverse an inequality sign when multiplying or dividing by a negative number.
- Compound inequalities describe overlap with "and" or separated regions with "or."
- Absolute value measures distance from 0, so $|A| = c$ gives two cases.
- For $|A| < c$, keep the expression between $-c$ and c.

Practice

1. Solve $3x - 7 = 20$. _____

2. Solve $\dfrac{m+4}{5} = -2$. _____

3. Solve $2(3p - 1) \leq 16$. _____

4. Write $-1 < x \leq 6$ in interval notation. _____

5. Solve $|x - 5| = 9$. _____

6. Solve $|2x + 1| < 7$. _____

Week 1 Quiz

Foundations and Linear Models Check

Name: _____ Date: _____ Score: _____/10

1. Which is the most precise classification of $-\sqrt{36}$?

A. natural **B.** whole

C. integer **D.** irrational

2. Write $x > 3$ in interval notation. _____

3. Simplify $2(4x - 1) - 3x$. _____

4. True or False: Solving $-2x < 8$ gives $x < -4$. ☐ True ☐ False

5. Solve $|x + 2| = 6$. _____

6. Find the slope between $(1, -2)$ and $(5, 10)$. _____

7. Which line is parallel to $y = -\frac{1}{2}x + 7$?

A. $y = 2x - 1$ **B.** $y = -\frac{1}{2}x + 3$

C. $y = \frac{1}{2}x + 7$ **D.** $y = -2x$

8. Solve the system $y = x + 1$ and $y = 3x - 5$.

9. Does $(2, 5)$ satisfy $y \leq 2x + 1$?

10. A taxi charges $\$4$ plus $\$2.50$ per mile. Write a model and find the cost for 9 miles.

Week 1, Day 1 Answer Key Real Numbers, Properties, and Expressions

Answers

1 natural number	2 $[-2, 5)$	3 13	4 $10x^2y^3$	5 17	6 $7x - 8$

Explanations

1. Evaluate the radical first: $\sqrt{81} = 9$. The smallest precise set is natural numbers, even though 9 is also whole, integer, rational, and real.
2. The endpoint -2 is included, so it uses a bracket. The endpoint 5 is not included, so it uses a parenthesis.
3. Use order of operations: first $2^3 = 8$, then $8 - 5 = 3$. Multiply $3 \cdot 3 = 9$ and add 4 to get 13.
4. Multiply coefficients and add exponents on like bases: $2 \cdot 5 = 10$, $x^{3+(-1)} = x^2$, and $y^{-2+5} = y^3$. The result has only positive exponents.
5. Substitute with parentheses: $2(-4)^2 - 3(5)$. The square gives 16, so $2 \cdot 16 - 15 = 17$.
6. Distribute first to get $12x - 8 - 5x$. Combine like terms, $12x - 5x = 7x$, so the expression is $7x - 8$.

Week 1, Day 2 Answer Key Equations, Inequalities, and Absolute Value

Answers

1 $x = 9$	2 $m = -14$	3 $p \leq 3$	4 $(-1, 6]$	5 $x = -4$ or $x = 14$	6 $-4 < x < 3$

Explanations

1. Add 7 to both sides to undo subtraction: $3x = 27$. Divide by 3 to isolate the variable, so $x = 9$.
2. Multiply both sides by 5 to get $m + 4 = -10$. Subtract 4 from both sides, giving $m = -14$.
3. Distribute to get $6p - 2 \leq 16$. Add 2 and divide by positive 6, so the inequality direction stays the same and $p \leq 3$.
4. The value -1 is excluded because the inequality is strict, so use a parenthesis. The value 6 is included because of $\leq$, so use a bracket.
5. An absolute value equation asks for two distances: $x - 5 = 9$ or $x - 5 = -9$. Solving those gives $x = 14$ and $x = -4$.
6. For an absolute value less than 7, write $-7 < 2x + 1 < 7$. Subtract 1 and divide by 2 to get $-4 < x < 3$.

Week 1 Quiz Answer Key Foundations and Linear Models Check

Answers

1. C
2. $(3, \infty)$
3. $5x - 2$
4. False
5. $x = 4$ or $x = -8$
6. 3
7. B
8. $(3, 4)$
9. yes
10. $C = 2.5m + 4$; \$26.50

Explanations

1. Since $-\sqrt{36} = -6$, the number is an integer. It is also rational and real, but integer is the most precise choice listed.
2. The value 3 is not included, so use a parenthesis. Infinity always uses a parenthesis.
3. Distribute first: $2(4x - 1) = 8x - 2$. Then combine like terms, $8x - 3x = 5x$, giving $5x - 2$.
4. Dividing by the negative number -2 reverses the inequality sign. The correct solution is $x > -4$, so the stated answer has the sign facing the wrong way.
5. An absolute value equation represents two distances from 0, so split it into $x + 2 = 6$ or $x + 2 = -6$. Solving the two linear equations gives $x = 4$ and $x = -8$.
6. Use $m = \frac{10-(-2)}{5-1} = \frac{12}{4} = 3$. The slope is the change in y divided by the change in x.
7. Parallel lines have the same slope. Choice B has slope $-\frac{1}{2}$, matching the given line.
8. At the intersection, both equations have the same y-value, so set $x + 1 = 3x - 5$. Then $6 = 2x$, so $x = 3$, and substituting gives $y = 4$.
9. Substitute the point: $5 \leq 2(2) + 1 = 5$. Because equality is allowed by $\leq$, the point satisfies the inequality.
10. The fixed charge is 4 and the rate is 2.50 per mile. Substitute $m = 9$ to get $2.5(9) + 4 = 26.5$ dollars.

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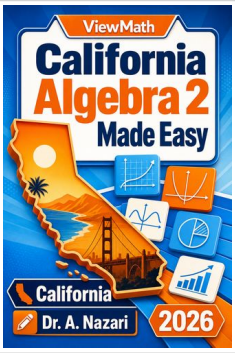

Study Guide

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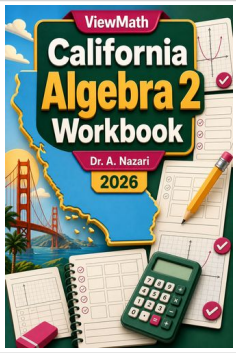

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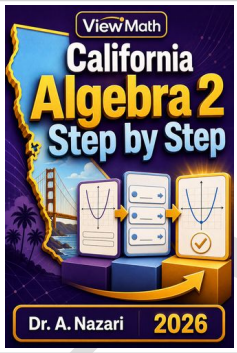

Step-by-Step

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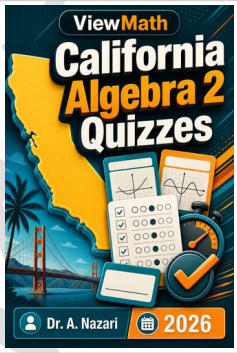

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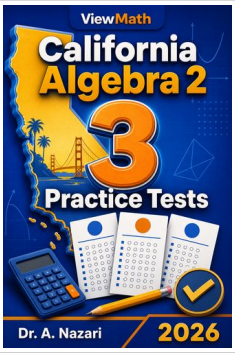

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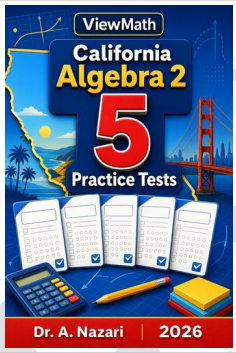

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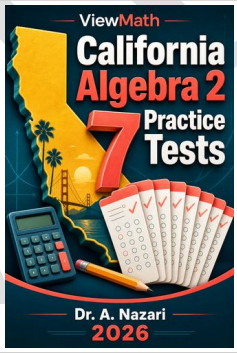

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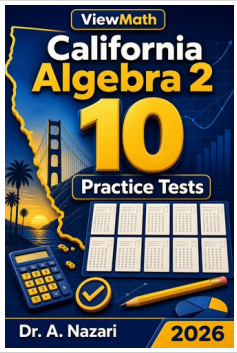

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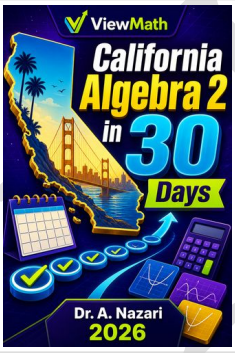

Math in 30 Days

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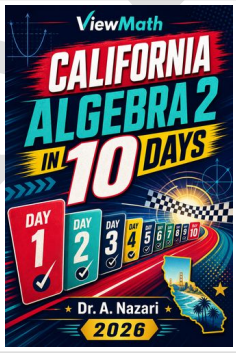

Math in 10 Days

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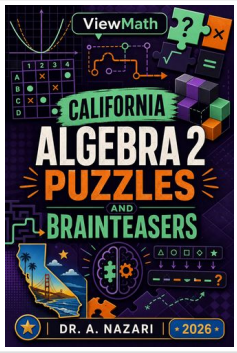

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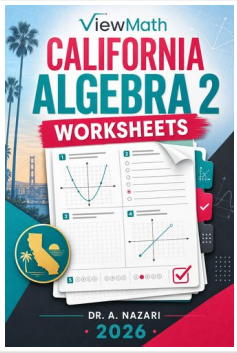

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