Algebra Concepts Video Examples

Video problems, answers, and QR codes organized by Algebra Concepts homework topic.

Module 1: Linear Equations, Inequalities, and Functions

Solve and model with linear equations and inequalities, graph lines, and build the function language needed for nonlinear and piecewise functions.

Mod 1 A Solving Linear Equations

Solve linear equations from one-step forms through equations with distribution, fractions, and special solution cases.

VIDEO EXAMPLE

Solve $x + 5 = 26$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=MZmz4T1cyd0&t=104s

Answer: $x = 21$.

VIDEO EXAMPLE

Solve $a - 10 = 35$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=MZmz4T1cyd0&t=195s

Answer: $a = 45$.

VIDEO EXAMPLE

Solve $4c = 36$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=MZmz4T1cyd0&t=269s

Answer: $c = 9$.

VIDEO EXAMPLE

Solve $\frac{y}{6} = 11$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=MZmz4T1cyd0&t=333s

Answer: $y = 66$.

VIDEO EXAMPLE

Solve $3x + 5 = 41$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=MZmz4T1cyd0&t=397s

Answer: $x = 12$.

VIDEO EXAMPLE

Solve $3x + 5 = 6x - 16$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=MZmz4T1cyd0&t=553s

Answer: $x = 7$.

VIDEO EXAMPLE

Solve $4x + 5 = 2x + 15$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=6JmY2QHUHQY&t=7s

Answer: $x = 5$.

VIDEO EXAMPLE

Solve $3x + 5 = 7x - 19$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=E0pNqTeIm6I&t=0s

Answer: $x = 6$.

VIDEO EXAMPLE

Solve $5x - 4 = 3x + 11$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=gxLP4zWPfIQ&t=31s

Answer: $x = \frac{15}{2} = 7.5$.

VIDEO EXAMPLE

Solve $\frac{x}{3} - 6 = 4$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=gxLP4zWPfIQ&t=321s

Answer: $x = 30$.

VIDEO EXAMPLE

Solve $2x + 6 = 5x - 15$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=uB8AbQd3BJc&t=39s

Answer: $x = 7$.

VIDEO EXAMPLE

Solve $-3(x + 5) = 15$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=uB8AbQd3BJc&t=222s

Answer: $x = -10$.

VIDEO EXAMPLE

Solve $4(x - 7) = -2(x - 3)$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=uB8AbQd3BJc&t=438s

Answer: $x = \frac{17}{3}$.

VIDEO EXAMPLE

Solve $\frac{3}{2}x - \frac{4}{3} = \frac{8}{9}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=mM54CTDOW08&t=0s

Answer: $x = \frac{40}{27}$.

VIDEO EXAMPLE

Solve $2x - 5 = 38$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=6KEmAFed0wQ&t=60s

Answer: $x = \frac{43}{2}$.

VIDEO EXAMPLE

Solve $\frac{16m}{7} = 12$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=6KEmAFed0wQ&t=470s

Answer: $m = \frac{21}{4}$.

VIDEO EXAMPLE

Solve $x - \frac{3}{4} = \frac{5}{2}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=SSJ_m8dU_Yg&t=60s

Answer: $x = \frac{13}{4}$.

VIDEO EXAMPLE

Solve $\frac{1}{4}p - \frac{3}{8}p = 4$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=SSJ_m8dU_Yg&t=399s

Answer: $p = -32$.

VIDEO EXAMPLE

Solve $-\frac{3}{4}(8x-12)=\frac{5}{6}(6x+12)$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=SSJ_m8dU_Yg&t=705s

Answer: $x=-\frac{1}{11}$.

VIDEO EXAMPLE

Solve $\frac{1}{3}(r+6)=\frac{1}{6}(r+8)$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=SSJ_m8dU_Yg&t=979s

Answer: $r=-4$.

VIDEO EXAMPLE

Solve $-\frac{2}{3}\left(\frac{5}{4}x-2\right)=4x-\frac{25}{3}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=8tjCSfx0KJU&t=15s

Answer: $x=2$.

VIDEO EXAMPLE

Solve $\frac{5}{4}(3x+2)=\frac{7}{12}(2x-15)$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=d6biE6ReZpQ&t=78s

Answer: $x=-\frac{135}{31}$.

Mod 1 B Translating Equations and Word Problems

Translate verbal statements into equations and use those equations to solve number and applied problems.

VIDEO EXAMPLE

Translate into an equation: Seven more than a number is eighteen.



SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=UVMbleAaIZk&t=105s

Answer: $x + 7 = 18$.

VIDEO EXAMPLE

Translate into an equation: Three times a number increased by four is twenty-two.



SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=Uc44b2PU9Yo&t=74s

Answer: $3x + 4 = 22$.

VIDEO EXAMPLE

Nine less than three times a number is five more than the number. Find the number.



SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=ampGzAJQHgM&t=1402s

Answer: $3x - 9 = x + 5$, so $x = 7$.

VIDEO EXAMPLE

Translate into an equation: Half of a number plus four is six less than that number.



SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=UVMbleAaIZk&t=288s

Answer: $\frac{x}{2} + 4 = x - 6$.

VIDEO EXAMPLE

The length of a rectangular garden is five feet more than twice its width. Its perimeter is 148 feet. Find its dimensions.



SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=ALkSvI844Gk&t=60s

Answer: Using $2(5 + 2w) + 2w = 148$, $w = 23$ feet and $\ell = 51$ feet.

Mod 1 C Equations With More Than One Variable

Rearrange formulas for a requested variable and use common formulas in applications.

VIDEO EXAMPLE

Solve $x - d = 5$ for x.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=6KEmAFed0wQ&t=170s

Answer: $x = d + 5$.

VIDEO EXAMPLE

Solve $wx - z = h$ for x.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=6KEmAFed0wQ&t=273s

Answer: $x = \dfrac{h + z}{w}$.

VIDEO EXAMPLE

Solve $\dfrac{km}{g} = p$ for m.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=6KEmAFed0wQ&t=667s

Answer: $m = \dfrac{gp}{k}$.

VIDEO EXAMPLE

Solve $\dfrac{q}{r} - z = ax$ for z.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=6KEmAFed0wQ&t=795s

Answer: $z = \dfrac{q}{r} - ax$.

Mod 1 D Absolute Value Equations

Solve absolute value equations by separating distance statements into cases.

VIDEO EXAMPLE

Solve $|x| = 7$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=vPCcHVzNjy4&t=115s

Answer: $x = -7$ or $x = 7$.

VIDEO EXAMPLE

Solve $|x - 2| = 6$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=2mv-YvR08jQ&t=65s

Answer: $x = -4$ or $x = 8$.

VIDEO EXAMPLE

Solve $|2x + 6| = 20$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=2mv-YvR08jQ&t=180s

Answer: $x = -13$ or $x = 7$.

VIDEO EXAMPLE

Solve $\left|\frac{2}{3}x + 5\right| = \frac{21}{2}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=ampGzAJQHgM&t=733s

Answer: $x = -\frac{93}{4}$ or $x = \frac{33}{4}$.

VIDEO EXAMPLE

Solve $|x| = -6$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=vPCcHVzNjy4&t=238s

Answer: No solution, $\varnothing$.

Mod 1 E Solving Linear Inequalities

Solve linear inequalities and express solutions with inequality, interval, and number-line notation.

VIDEO EXAMPLE

Solve $2(8+w) > 22$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=mkE8Ef6Dez4&t=1933s

Answer: $w > 3$, or $(3, \infty)$.

VIDEO EXAMPLE

Solve $-3x - 20 \leq 1$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=mkE8Ef6Dez4&t=1431s

Answer: $x \geq -7$, or $[-7, \infty)$.

VIDEO EXAMPLE

Solve $-2x + 5 \geq 19$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=jACoRjpn9Gs&t=486s

Answer: $x \leq -7$, or $(-\infty, -7]$.

VIDEO EXAMPLE

Solve $0.5n - 0.3 < 0.2(2n + 1)$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=mkE8Ef6Dez4&t=1672s

Answer: $n < 5$, or $(-\infty, 5)$.

Mod 1 G Absolute Value Inequalities

Translate absolute value inequalities into compound inequalities and graph their solution sets.

VIDEO EXAMPLE

Solve $|x| > 6$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=UiGXw8YrXnc&t=27s

Answer: $x < -6$ or $x > 6$, or $(-\infty, -6) \cup (6, \infty)$.

VIDEO EXAMPLE

Solve $|a| \leq 4$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=UiGXw8YrXnc&t=430s

Answer: $-4 \leq a \leq 4$, or $[-4, 4]$.

VIDEO EXAMPLE

Solve $|2x + 5| > 10$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=N5E7IVEyM7c&t=100s

Answer: $x < -\frac{15}{2}$ or $x > \frac{5}{2}$, or $(-\infty, -\frac{15}{2}) \cup (\frac{5}{2}, \infty)$.

VIDEO EXAMPLE

Solve $|z| \geq -3$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=UiGXw8YrXnc&t=664s

Answer: All real numbers, $(-\infty, \infty)$.

VIDEO EXAMPLE

Solve $|c| < -7$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=UiGXw8YrXnc&t=769s

Answer: No solution, $\varnothing$.

Mod 1 H Graphing Linear Equations by Plotting Points

Create ordered-pair tables and graph linear equations from calculated points.

VIDEO EXAMPLE

Graph $y = \frac{1}{2}x + 3$ by plotting points.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=S32-hEc2_Kc&t=13s

Answer: One possible set of points is $(-6, 0), (0, 3), (2, 4), (8, 7)$. Draw the line through them.

VIDEO EXAMPLE

Graph $x - 2y = -6$ by plotting points.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=MnylOgFzjZY&t=1113s

Answer: One possible set of points is $(-6, 0), (-2, 2), (0, 3), (2, 4)$. Draw the line through them.

Mod 1 I Graphing Linear Equations by Plotting Intercepts

Find x- and y-intercepts and use them to graph linear equations.

VIDEO EXAMPLE

Graph $-x + 2y = 6$ using its intercepts.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=V2qYAb6adZU&t=14s

Answer: x-intercept: $(-6, 0)$. y-intercept: $(0, 3)$. Draw the line through them.

Mod 1 J Slope

Find slope from ordered pairs and linear equations.

VIDEO EXAMPLE

Find the slope through $(14, -11)$ and $(-19, 18)$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=MnylOgFzjZY&t=789s

Answer: $m = -\frac{29}{33}$.

Mod 1 K Writing Equations of Lines

Write slope-intercept equations from slopes, points, and intercepts.

VIDEO EXAMPLE

Write the equation of the line through $(-5, -8)$ and $(-2, -3)$ in slope-intercept form.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=iWCgsh11oZM&t=1s

Answer: $y = \frac{5}{3}x + \frac{1}{3}$.

Module 2: Exponents, Polynomials, and Quadratic Foundations

Use exponent rules, operate on and divide polynomials, factor completely, and solve foundational quadratic equations and applications.

Mod 2 A Exponent Rules

Simplify expressions using the product, quotient, and power rules.

VIDEO EXAMPLE

Simplify $(4xy^3w^2)^2$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=LGNkC3Zw1GU&t=56s

Answer: $16x^2y^6w^4$.

Mod 2 B Polynomial Introduction

Find polynomial degree and classify polynomials by their number of terms.

VIDEO EXAMPLE

Classify $2x^3 + 8x - 12$ and find its degree.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=LGNkC3Zw1GU&t=635s

Answer: It is a trinomial of degree 3. The term degrees are $3, 1, 0$.

Mod 2 C Polynomial Operations

Add, subtract, and multiply polynomials, including common binomial products.

VIDEO EXAMPLE

Multiply $2x(5x - 3)$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=AzwOPVkaD2o&t=99s

Answer: $10x^2 - 6x$.

Mod 2 D Scientific Notation

Convert between standard and scientific notation for very large and very small numbers.

VIDEO EXAMPLE

Write 3590 in scientific notation.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=W-jYSq34W04&t=629s

Answer: 3.59×10^3.

Mod 2 E Polynomial Division

Divide polynomials by monomials and binomials using termwise division and long division.

VIDEO EXAMPLE

Divide $\dfrac{21x^9 - 15x^7}{3x^2}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=LGNkC3Zw1GU&t=2763s

Answer: $7x^7 - 5x^5$.

Mod 2 H Factoring

Factor polynomials completely using GCF, grouping, trinomial patterns, and special products.

VIDEO EXAMPLE

Factor $5n^2 + 19n + 12$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=k5iDHrAT6FY&t=57s

Answer: $(5n + 4)(n + 3)$.

Mod 2 I Solving Quadratic Equations by Factoring

Use the zero-product property to solve factorable quadratic equations.

VIDEO EXAMPLE

Solve $x^2 - 8x = -12$ by factoring.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=LGNkC3Zw1GU&t=3890s

Answer: $x = 2$ or $x = 6$.

Mod 2 J Applications of Quadratic Equations

Translate applications into quadratic equations and choose solutions that fit the context.

VIDEO EXAMPLE

A window washer drops a bucket from a 144-foot building. Its height after t seconds is $h = -16t^2 + 144$. When does it hit the ground?

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=LGNkC3Zw1GU&t=4053s

Answer: It hits the ground after 3 seconds.

Module 3: Rational Expressions, Radicals, and Complex Numbers

Work with rational expressions and equations, build radical and rational-exponent skills, apply coordinate formulas, and operate with complex numbers.

Mod 3 A Domain of Rational Expressions

Find domain restrictions by identifying values that make a rational denominator zero.

VIDEO EXAMPLE

Find the values that make a rational expression with denominator $x^2 - 6x + 8$ undefined.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=yIcPEQjFr_M&t=13s

Answer: $x = 2$ and $x = 4$.

Mod 3 B Simplifying Rational Expressions

Factor and simplify rational expressions while preserving restrictions from the original expression.

VIDEO EXAMPLE

Simplify $\dfrac{15x^2 - 60x}{12x^2 - 48x}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=yIcPEQjFr_M&t=236s

Answer: $\dfrac{5}{4}$, with $x \neq 0, 4$.

Mod 3 C Multiplying and Dividing Rational Expressions

Multiply and divide rational expressions by factoring, canceling, and using reciprocals.

VIDEO EXAMPLE

Multiply and simplify $\frac{2p-2}{p} \cdot \frac{6p^2}{9p-9}$.



SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=yIcPEQjFr_M&t=524s

Answer: $\frac{4p}{3}$, with $p \neq 0, 1$.

Mod 3 E Adding and Subtracting Rational Expressions With Unlike Denominators

Find least common denominators and combine rational expressions with different denominators.

VIDEO EXAMPLE

Add and simplify $\frac{2}{y^2-3y+2} + \frac{7}{y^2-1}$.



SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=yIcPEQjFr_M&t=1101s

Answer: $\frac{3(3y-4)}{(y-2)(y-1)(y+1)}$, with $y \neq -1, 1, 2$.

Mod 3 F Rational Equations

Solve equations containing rational expressions and check restrictions and extraneous candidates.

VIDEO EXAMPLE

Solve $\frac{4}{x} = \frac{2}{x} + 5$.



SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=yIcPEQjFr_M&t=1728s

Answer: $x = \frac{2}{5}$.

Mod 3 H Rational Equation Word Problems

Model reciprocal, work, motion, and proportion applications with rational equations.

VIDEO EXAMPLE

A stream flows at 4 mph. A boat travels 82 miles downstream in the same time it travels 41 miles upstream. Find the boat's speed in still water.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=yIcPEQjFr_M&t=3660s

Answer: **The boat's speed in still water is 12 mph.**

Mod 3 I Square Roots and Cube Roots

Evaluate and simplify square and cube roots, including roots with variables.

VIDEO EXAMPLE

Simplify $\sqrt{16x^{12}}$, assuming $x > 0$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=DZOmQpl1tSs&t=9s

Answer: $4x^6$.

Mod 3 L Rational Exponents

Write rational exponents in radical notation and simplify products and quotients with rational exponents.

VIDEO EXAMPLE

Simplify $\left(-343x^{12}\right)^{1/3}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=DZOmQpl1tSs&t=377s

Answer: $-7x^4$.

Mod 3 M Product and Quotient Rules for Radicals

Multiply, divide, and simplify radical expressions using product and quotient properties.

VIDEO EXAMPLE

Simplify $\frac{\sqrt{100}}{\sqrt{5}}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=DZOmQpl1tSs&t=1081s

Answer: $2\sqrt{5}$.

Mod 3 N Distance Formula

Find exact and approximate distances between points in the coordinate plane.

VIDEO EXAMPLE

Find the distance between $(6, 1)$ and $(-7, -5)$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=DZOmQpl1tSs&t=1251s

Answer: $\sqrt{205}$ **units.**

Mod 3 P Adding and Subtracting Radical Expressions

Simplify radicals and combine like radical terms.

VIDEO EXAMPLE

Simplify $3\sqrt{6} - 6\sqrt{24}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=DZOmQpl1tSs&t=1432s

Answer: $-9\sqrt{6}$.

Mod 3 Q Multiplying Radical Expressions

Multiply monomial and binomial radical expressions and simplify the results.

VIDEO EXAMPLE

A rectangle has length $4\sqrt{18}$ feet and width $\sqrt{8}$ feet. Find its area.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=DZOmQpl1tSs&t=1830s

Answer: 48 **square feet.**

Mod 3 R Rationalizing Denominators

Rewrite radical fractions so no radical remains in the denominator.

VIDEO EXAMPLE

Rationalize $\dfrac{7}{\sqrt[3]{11}}$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=DZOmQpl1tSs&t=2017s

Answer: $\dfrac{7\sqrt[3]{121}}{11}$.

Mod 3 S Solving Radical Equations

Isolate radicals, remove them with powers, and reject extraneous solutions.

VIDEO EXAMPLE

Solve $\sqrt{x+6} = 8$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=tKanuIj95sA&t=9s

Answer: $x = 58$.

Module 4: Quadratic Methods, Inequalities, Graphs, and Applications

Finish quadratic equation methods, solve polynomial and rational inequalities, graph quadratics in multiple forms, and interpret quadratic models.

Mod 4 A Solving Quadratic Equations Using the Square Root Method

Use the square-root property to solve equations with an isolated squared expression.

VIDEO EXAMPLE

Solve $(x+3)^2 = 25$.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=xsNoF5hXGjA&t=21s

Answer: $x = -8$ or $x = 2$.

Mod 4 C Solving Quadratic Equations Using the Quadratic Formula

Use the quadratic formula to solve quadratic equations.

VIDEO EXAMPLE

Solve $(x-9)(x-1) = 22$ using the quadratic formula.

SCAN FOR VIDEO WALKTHROUGH
www.youtube.com/watch?v=DZOmQpl1tSs&t=2527s

Answer: $x = 5 \pm \sqrt{38}$.