Algebra I Tutorials and Video Resources

Unit	Standards	Introduction Videos (Learnzillion)	Sophia Tutorials	Khan Academy Tutorials	CK-12.org
Unit 1: Solving Linear Equations	A.CED.1 - Create equations that describe numbers and relationships.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.1 -Solving equations as a process of reasoning, explain the reasoning.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.3 - Solve equations and inequalities in one variable.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	N.Q.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.CED.4 - Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.	Learnzillion	Sophia.org	Khan Academy	CK12.org
Unit	**Standards**	**Introduction Videos (Learnzillion)**	**Sophia Tutorials**	**Khan Academy Tutorials**	**CK12.org**

Unit 2: Solving Linear Inequalities	A.CED.1 - Create equations that describe numbers and relationships.	Learnzillion	Sophia.org	Khan Academy	CK12.org CK12.org
	A.REI.3 - Solve equations and inequalities in one variable.	Learnzillion	Sophia.org	Khan Academy Khan Academy	CK12.org
Unit	**Standards**	**Introduction Videos (Learnzillion)**	**Sophia Tutorials**	**Khan Academy Tutorials**	**CK12.org**
Unit 3: Graphing Linear Functions	F.IF.1 - Understand the function and function notation.	Learnzillion Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.2 - Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.CED.2 - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Learnzillion Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.10 - Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	Learnzillion	Sophia.org	Khan Academy	CK12.org

	F.IF.4 - For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.5 - Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.7 - Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph piecewise-defined functions, including step functions and absolute value.	Learnzillion Learnzillion	Sophia.org Sophia.org	Khan Academy Khan Academy	CK12.org CK12.org

	F.LE.1 - Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	Learnzillion	Sophia.org	Khan Academy	CK12.org CK12.org
	F.IF.9 - Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.LE.5 - Interpret the parameters in a linear or exponential function in terms of a context.	Learnzillion	Sophia.org	Khan Academy	CK12.org CK12.org
	F.BF.3 - Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs.	Learnzillion	Sophia.org	Khan Academy	CK12.org
Unit	**Standards**	**Introduction Videos**	**Sophia Tutorials**	**Khan Academy**	

		(Learnzillion)		Tutorials	
Unit 4: Writing Linear Functions	A.CED.2 - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.BF.1 - Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.LE.1 - Distinguish between situations that can be modeled with linear functions and with exponential functions. b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.LE.2 - Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including reading these from a table).	Learnzillion	Sophia.org	Khan Academy	CK12.org

	F.IF.3 - Recognize that sequences are functions, whose domain is a subset of the integers.	Learnzillion	Sophia.org	Khan Academy	CK12.org
Unit 5: Solving Systems of Linear Equations	A.CED.3 - Represent constraints by equations or inequalities	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.5 - Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.6 - Solve a system of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.11 - Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x)	Learnzillion	Sophia.org	Khan Academy	CK12.org

	and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.				
	A.REI.12 - Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	Learnzillion	Sophia.org	Khan Academy	CK12.org
Unit 6: Exponential Functions and Sequences	N.RN.1 - Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.	Learnzillion	Sophia.org	Khan Academy	CK12.org CK12.org
	N.RN.2 - Rewrite expressions involving radicals and rational exponents using the properties of exponents.	Learnzillion	Sophia.org	Khan Academy	CK12.org CK12.org
	A.CED.2 - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.4 - For a function that	Learnzillion	Sophia.org	Khan Academy	CK12.org

	models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.				CK12.org
	F.IF.7 - Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.9 - Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.BF.1 - Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.BF.3 - Identify the effect on	Learnzillion	Sophia.org	Khan Academy	CK12.org

	the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs.				
	F.LE.1 - Distinguish between situations that can be modeled with linear functions and with exponential functions. a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. c. Recognize situations in which one quantity grows or decays by a constant rate per unit interval relative to another.	Learnzillion Learnzillion	Sophia.org Sophia.org	Khan Academy Khan Academy	CK12.org CK12.org
	F.LE.2 - Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including reading these from a table).	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.SSE.3 - Choose and produce an equivalent form of	Learnzillion	Sophia.org	Khan Academy	CK12.org

	an expression to reveal and explain properties of the quantity represented by the expression. c. Use the properties of exponents to transform expressions for exponential functions.				
	F.IF.8 - Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. b. Use the properties of exponents to interpret expressions for exponential functions.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.BF.1 - Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.CED.1 - Create equations and inequalities in one variable and use them to solve problems.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.1 - Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the	Learnzillion	Sophia.org	Khan Academy	CK12.org

	original equation has a solution.				
	A.REI.11 - Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.3 - Recognize that sequences are functions, whose domain is a subset of the integers.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.BF.2 - Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between two forms.	Learnzillion	Sophia.org	Khan Academy	CK12.org CK12.org
Unit 7: Polynomial Equations and Factoring	A.APR.1 - Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract,	Learnzillion	Sophia.org	Khan Academy	CK12.org

	and multiply polynomials.				
	A.APR.3 - Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.4 - Solve quadratic equations in one variable. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$for real numbers a and b.	Learnzillion Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.SSE.2 - Use the structure of an expression to identify ways to rewrite it.	Learnzillion	Sophia.org	Khan Academy Khan Academy	CK12.org
	A.SSE.3 - Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. a. Factor a quadratic expression to reveal the zeros of the function it defines.	Learnzillion	Sophia.org	Khan Academy	CK12.org

Unit 8: Graphing Quadratic Functions	A.CED.2 - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.BF.3 - Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.9 - Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	Learnzillion	Sophia.org	Khan Academy	CK12.org

	F.IF.4 - For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.	Learnzillion	Sophia.org Sophia.org	Khan Academy	CK12.org
	F.BF.1 - Write a function that describes a relationship between two quantities. a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.SSE.3 - Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines..	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.APR.3 - Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the	Learnzillion	Sophia.org	Khan Academy	CK12.org

	function defined by the polynomial.				
	F.IF.8 - Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.6 - Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.LE.3 - Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	Learnzillion	Sophia.org	Khan Academy	CK12.org
Unit 9: Solving	N.RN.2 - Rewrite expressions involving radicals and rational exponents using the	Learnzillion	Sophia.org	Khan Academy	CK12.org CK12.org

Quadratic Equations	properties of exponents.				
	N.RN.3 - Explain why the sum of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.11 - Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. a. Graph linear and quadratic functions and show intercepts, maxima, and	Learnzillion	Sophia.org	Khan Academy	CK12.org

	minima.				
	A.CED.1 - Create equations and inequalities in one variable and use them to solve problems.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.CED.4 - Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.4b - Solve quadratic equations in one variable. b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$for real numbers a and b.	Learnzillion Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.SSE.3 - Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines..	Learnzillion	Sophia.org	Khan Academy	CK12.org

	A.REI.4 - Solve quadratic equations in one variable. a. Use the method of completing the square to transform the equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.	Learnzillion Learnzillion	Sophia.org	Khan Academy	CK12.org
	F.IF.8 - Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.	Learnzillion	Sophia.org	Khan Academy	CK12.org
	A.REI.7 - Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.	Learnzillion	Sophia.org	Khan Academy	CK12.org