



Academic Systems[®] Algebra

Scope and Sequence

Academic Systems[®] Elementary Algebra

Standard Course Topics

- Topic EI Essentials-Preparing for Algebra
- Topic 1 Real Numbers
- Topic 2 Solving Linear Equations & Inequalities
- Topic 3 Introduction to Graphing
- Topic 4 Graphing Linear Equations & Inequalities
- Topic 5 Solving Linear Systems
- Topic 6 Exponents & Polynomials
- Topic 7 Factoring
- Topic 8 Rational Expressions

Additional Topics Available

- Topic 9 Rational Exponents & Radicals
 - Topic 10 Quadratic Equations
 - Topic 11 Functions & Graphing
 - Topic F3 Proportional Reasoning II
 - Topic F5 Geometry
 - Topic F6 Interpreting Data
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Academic Systems Elementary Algebra

Lesson	Concept	Objectives	Hours
Topic E1: Essentials — Preparing for Algebra			
E1.A	Fractions <i>(reviews F2.1, F2.2)</i>	Multiplying and Dividing a) Equivalent fractions b) Prime factorization c) Reducing to lowest terms d) The greatest common factor (GCF) e) Multiplying fractions f) Finding reciprocals g) Dividing fractions	2 hours
		Adding and Subtracting a) Fractions with the same denominators b) The least common multiple (LCM) c) The least common denominator (LCD) d) Fractions with different denominators	2 hours
Lesson Total			4 hours
E1.B	Signed Numbers <i>(reviews F4.1, F4.2)</i>	Adding and Subtracting a) Adding signed numbers b) Subtracting signed numbers	2 hours
		Multiplying and Dividing a) Multiplying and dividing signed numbers b) Exponential notation c) Distributive property and other properties of real numbers d) Order of operations	2 hours
Lesson Total			4 hours
Topic 1: Real Numbers			
1.1	The Real Numbers	Number Line and Notation a) Sets b) Subsets of real numbers: natural numbers, integers, rationals, irrationals c) Graphing real numbers on a number line d) Ordering symbols: =, <, >, ≤, ≥ e) The absolute value of a real number f) Grouping symbols g) Exponents	2 hours
		Lesson Total	
1.2	Factoring and Fractions	The GCF and LCM a) Prime factors b) Greatest common factor c) Least common multiple	1 hour
		Fractions a) Reducing to lowest terms b) Multiplication and division c) Addition and subtraction	1 hour
		Explore a) Exploring Greatest Common Factor	1 hour
Lesson Total			3 hours
1.3	Arithmetic of Numbers	Operations on Numbers a) Addition b) Subtraction c) Multiplication d) Division e) Order of operations f) Commutative law g) Associative law h) Distributive law i) Additive and multiplicative identities j) Inverses	1 hour
		Explore a) Exploring Operations on Numbers	1 hour
Lesson Total			2 hours
Topic 2: Solving Linear Equations and Inequalities			
2.1	Algebraic Expressions	Simplifying Expressions a) Constants and variables b) Terms and coefficients c) Combining like or similar terms d) Parentheses e) Evaluating expressions f) Formulas: Substitution	2 hours
		Lesson Total	
2.2	Solving Linear Equations	Solving Equations I a) Recognizing a linear equation b) The addition and subtraction principles for solving a linear equation c) The multiplication and division principles for solving a linear equation d) Combining the principles	2 hours
		Solving Equations II a) Equations with fractions as coefficients b) Equations with no solutions or infinitely many solutions c) Formulas: Solving for a particular unknown	1 hour
Lesson Total			3 hours

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Lesson	Concept	Objectives	Hours	
2.3	Problem Solving	Number and Age	a) Translating words into algebraic expressions b) Number problems c) Age problems	2 hours
		Geometry	a) Geometry problems	2 hours
			Lesson Total	4 hours
2.4	Linear Inequalities	Solving Inequalities	a) Recognizing solutions of linear inequalities b) Graphing solutions of inequalities in one variable c) The addition and subtraction principles for solving a linear inequality d) The multiplication and division principles for solving a linear inequality e) Combining the addition, subtraction, multiplication, and division principles f) Solving problems using inequalities	2 hours
				Lesson Total
Topic 3: Introduction to Graphing				
3.1	Introduction to Graphing	Plotting Points	a) The xy-plane b) The x-axis and y-axis c) The origin d) Ordered pairs e) The x-coordinate (abscissa), the y-coordinate (ordinate) f) Plotting ordered pairs of numbers g) Labeling the four quadrants h) Determining the quadrant in which a point lies i) The signs of the coordinates in each quadrant	1 hour
		Rise and Run	a) Subscript notation b) Geometric interpretation of rise and run c) Algebraic definition of rise and run	1 hour
		The Distance Formula	a) Pythagorean Theorem b) The distance formula c) The equation of a circle	0.5 hours
		Explore	a) Plotting Points	0.5 hours
				Lesson Total
Topic 4: Graphing Linear Equations and Inequalities				
4.1	Graphing Equations	Graphing Lines I	a) Definition of a linear equation in two variables b) Recognizing linear equations in two variables c) Solutions of linear equations d) Graphing a linear equation by plotting ordered pairs	2 hours
		Graphing Lines II	a) Equations and graphs of horizontal and vertical lines b) The intercepts of a line c) Graphing a linear equation by finding the intercepts	1 hour
		Slope of a Line	a) Definition of the slope of a line b) Positive slope, negative slope, zero slope, undefined slope c) Graphing a line given a point and the slope d) Parallel and perpendicular lines	2 hours
				Lesson Total
4.2	The Equation of a Line	Finding the Equation I	a) Finding the equation of a line given a point on the line and the slope of the line b) The point-slope form of the equation of a line c) Finding the equation of a line given two points on the line	1 hour
		Finding the Equation II	a) The slope-intercept form of the equation of a line b) Finding the equation of a horizontal line c) Finding the equation of a vertical line d) Finding the equation of a line parallel or perpendicular to a given line	2 hours
				Lesson Total
4.3	Graphing Inequalities	Linear Inequalities	a) Ordered pairs as solutions of linear inequalities b) Graphing inequalities	2 hours
				Lesson Total

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Topic 5: Solving Linear Systems				
5.1	Solving Linear Systems	Solution by Graphing a) The solution of a linear system b) Graphing linear systems c) Systems with a unique solution d) Systems with no solutions e) Systems with an infinite number of solutions	1 hour	
		Solution by Algebra a) Solving linear systems by the substitution method: one solution, no solution, and an infinite number of solutions b) Solving linear systems by the elimination method: one solution, no solution, and an infinite number of solutions	1.5 hours	
		Explore a) Exploring Graphing Linear Systems	0.5 hours	
			Lesson Total	3 hours
5.2	Problem Solving	Using Linear Systems a) Number problems b) Interest problems c) Coin problems d) Mixture problems	2 hours	
		Lesson Total		2 hours
5.3	Systems of Inequalities	Solving Linear Systems	a) Solving systems of linear inequalities by graphing	1 hour
		Explore	a) Exploring Solving Linear Systems	1 hour
		Lesson Total		2 hours
Topic 6: Exponents and Polynomials				
6.1	Exponents	Properties of Exponents a) Definition of exponent, power, and base b) Multiplication property c) Division property d) Powers raised to powers e) Products raised to powers f) Quotients raised to powers g) The zero exponent	2 hours	
		Lesson Total		2 hours
6.2	Polynomial Operations I	Adding and Subtracting a) Definition of polynomial, term, and coefficient b) Evaluating a polynomial c) The degree of a term and a polynomial d) Writing the terms of a polynomial in descending order e) Definition of a monomial, binomial, and trinomial f) Recognizing like or similar terms g) Combining like or similar terms h) Polynomial addition i) Polynomial subtraction	2 hours	
		Multiplying and Dividing a) Multiplying a monomial by a monomial b) Multiplying a polynomial by a monomial c) Dividing a monomial by a monomial d) Dividing a polynomial by a monomial	2 hours	
		Lesson Total		4 hours
6.3	Polynomial Operations II	Multiplying Binomials a) Multiplying binomials by the "FOIL" method b) Perfect squares, product of the sum and difference of two terms	1.5 hours	
		Multiplying and Dividing a) Multiplying a polynomial by a polynomial b) Dividing a polynomial by a polynomial	1.5 hours	
		Explore a) Multiplying Binomials	1 hour	
		Lesson Total		4 hours
Topic 7: Factoring				
7.1	Factoring Polynomials I	Greatest Common Factor a) Finding the greatest common factor (GCF) of a set of monomials b) Factoring a polynomial by finding the GCF when the GCF is a monomial	2 hours	
		Grouping a) Factoring a polynomial by finding the GCF when the GCF is a binomial b) Factoring a polynomial with four terms by grouping	2 hours	
		Lesson Total		4 hours
7.2	Factoring Polynomials II	Trinomials I a) Factoring trinomials of the form $x^2 + bx + c$; $x^2 + bxy + cy^2$	1 hour	
		Trinomials II a) Factoring trinomials of the form $ax^2 + bx + c$, $a \neq 1$, by trial-and-error b) Factoring trinomials of the form $ax^2 + bx + c$, $a \neq 1$, by grouping c) Solving quadratic equations by factoring	2 hours	
		Explore a) Exploring Factoring	1 hour	
		Lesson Total		4 hours

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Lesson	Concept	Objectives	Hours	
7.3	Factoring by Patterns	Recognizing Patterns a) Factoring a perfect square trinomial b) Factoring a difference of two squares c) Factoring a sum and difference of two cubes d) Factoring using a combination of methods	2 hours	
			Lesson Total	2 hours
Topic 8: Rational Expressions				
8.1	Rational Expressions I	Multiplying and Dividing a) Determining when a rational expression is undefined b) Writing a rational expression in lowest terms c) Multiplying rational expressions d) Dividing rational expressions e) Simplifying a complex fraction	1 hour	
			Adding and Subtracting a) Adding rational expressions with the same denominator b) Subtracting rational expressions with the same denominator	1 hour
			Lesson Total	2 hours
8.2	Rational Expressions II	Negative Exponents a) Notation b) Scientific notation	1 hour	
		Multiplying and Dividing a) Reducing a rational expression of the form $(a-b)/(b-a)$ b) Multiplying rational expressions c) Dividing rational expressions d) Simplifying a complex fraction	1 hour	
		Adding and Subtracting a) Finding the least common denominator of two or more rational expressions b) Adding rational expressions with different denominators c) Subtracting rational expressions with different denominators d) Simplifying a complex fraction	1 hour	
			Lesson Total	3 hours
8.3	Equations with Fractions	Solving Equations a) Solving equations with rational expressions b) Solving for an unknown in a formula involving a rational expression	2 hours	
			Lesson Total	2 hours
8.4	Problem Solving	Rational Expressions a) Ratio and proportion b) Distance problems c) Work problems d) Variation	2 hours	
			Lesson Total	2 hours
Topic 9: Rational Exponents and Radicals				
9.1	Roots and Radicals	Square Roots and Cube Roots a) Definition of square root and cube root b) Radicand, radical c) Principal square root d) Multiplication and division properties e) Simplifying a square root or a cube root of a whole number f) Simplifying a square root or a cube root of simple monomial expression	1 hour	
		Radical Expressions a) Simplifying radical expressions b) Like radical terms c) Simplifying a sum or difference of radical expressions d) Multiplying radical expressions e) Conjugates f) Rationalizing the denominator g) Solving radical equations	2 hours	
			Lesson Total	3 hours
9.2	Rational Exponents	Roots and Exponents a) The n th root of a number $\sqrt[n]{a}$ b) Definition of $a^{1/n}$ and $a^{m/n}$ c) Properties of rational exponents	1 hour	
		Simplifying Radicals a) Simplifying radicals	1 hour	
		Operations on Radicals a) Multiplying radical expressions b) Dividing radical expressions c) Adding and subtracting radical expressions	2 hours	
			Lesson Total	4 hours

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Lesson	Concept	Objectives	Hours		
Topic 10: Quadratic Equations					
10.1	Quadratic Equations I	Solving by Factoring	a) The standard form of a quadratic equation b) Putting a quadratic equation into standard form $ax^2 + bx + c = 0$; $a \neq 0$ c) Solving quadratic equations of the form $ax^2 + bx = 0$ by factoring d) Solving quadratic equations of the form $ax^2 + bx + c = 0$ by factoring	1 hour	
		Solving by Square Roots	a) Finding square roots b) Solving quadratic equations of the form $ax^2 = b$ c) Solving quadratic equations of the form $(ax + b)^2 = c$	1 hour	
			Lesson Total	2 hours	
10.2	Quadratic Equations II	Completing the Square	a) Solving quadratic equations of the form $x^2 + bx + c = 0$ by completing the square b) Solving quadratic equations of the form $ax^2 + bx + c = 0$, $a \neq 1$, by completing the square	1 hour	
		The Quadratic Formula	a) Introducing the quadratic formula b) Using the quadratic formula to solve quadratic equations of the form $ax^2 + bx + c = 0$ c) Using the discriminant of a quadratic equation to determine the nature of the solutions of the equation	1 hour	
		Explore	a) Solving Equations	1 hour	
			Lesson Total	3 hours	
10.3	Complex Numbers	Complex Number System	a) Definition of complex numbers b) Powers of i c) Operations on complex numbers	2 hours	
				Lesson Total	2 hours
Topic 11: Functions and Graphing					
11.1	Functions	Functions and Graphs	a) Definition of a function b) Function as an ordered pair of numbers c) Finding function values given a formula d) Function notation: $y = f(x)$ e) Graphing simple functions f) Domain and range of a function g) The vertical line test	1 hour	
			Linear Functions	a) Graphs of linear functions b) Graphs of absolute value functions	1 hour
			Quadratic Functions	a) Graphs of quadratic functions b) Intercepts of quadratic functions	1 hour
			Explore	a) Functions and Graphs	1 hour
				Lesson Total	4 hours
11.2	The Algebra of Functions	The Algebra of Functions	a) The sum and difference of functions b) The product and quotient of functions c) The composition of functions	2 hours	
			Inverse Functions	a) Finding the inverse and the equation of the inverse b) Defining one-to-one and checking whether a function has an inverse that is a function c) Graphing inverse functions	2 hours
				Lesson Total	4 hours
Topic F3: Proportional Reasoning II					
F3.1	Ratio and Proportion	Ratios	a) Notation b) Equivalent ratios c) Rates d) Applications	2 hours	
			Proportions	a) Setting up a proportion b) Solving a proportion c) Similar triangles d) Applications	3 hours
			Explore	a) Inverting Ratios b) Similar Figures	1 hour
			Lesson Total	4-6 hours	

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Lesson	Concept	Objectives	Hours	
F3.2	Percent	Definition	a) Percent as a fraction b) Percent as a decimal c) "Benchmark" percents d) Applications	2 hours
		Converting	a) Converting among fractions, decimals and percents b) Percent increase and decrease c) Applications	3 hours
		Solving Percent Problems	a) Setting up and solving proportions b) Setting up and solving other equations c) Applications	3 hours
		Explore	a) A Survey b) Computing Tips c) A Percent Question	1 hour
Lesson Total			6-8 hours	
Topic F5: Geometry				
F5.1	Geometry I	Geometric Figures	a) Point, line, line segment, ray b) Polygons c) Measuring angles d) Angles: acute, right, obtuse, straight e) Relationships between angles: complementary, supplementary, adjacent, vertical f) Applications	3 hours
		Explore	a) Tiling with Polygons b) What's the Sum?	1 hour
Lesson Total			4 hours	
F5.2	Geometry II	Perimeter and Area	a) Perimeter of a polygon b) Area of a polygon c) Area of a rectangle, square, parallelogram, triangle, trapezoid d) Circumference of a circle e) Area of a circle f) Perimeter and area of composite figures g) Applications	2 hours
		Surface Area and Volume	a) Surface area of a solid b) Volume of a solid c) Surface area and volume of a rectangular prism d) Surface area and volume of a cylinder e) Volume of a cone f) Volume of a sphere g) Composite figures h) Applications	3 hours
		Explore	a) Don't Fence Me In b) Why π ? c) Packaging Products	1 hour
Lesson Total			4-6 hours	
F5.3	Geometry III	Triangles and Parallelograms	a) Angle sum of a triangle b) Congruent triangles c) Isosceles and equilateral triangles d) Right triangles e) The Pythagorean Theorem f) Parallel lines and transversals g) Properties of parallelograms h) Applications	2 hours
		Similar Polygons	a) Similar polygons b) Similar triangles c) Applications	3 hours
		Explore	a) Congruent Triangles b) Door to Door	1 hour
Lesson Total			4-6 hours	

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Topic F6: Interpreting Data			
F6.1 Units of Measurement	US/English Units	a) Measures: length, weight, time, volume b) Converting from one unit to another c) Adding and subtracting measurements d) Applications	2 hours
	The Metric System	a) The metric system: length, mass, volume b) Fahrenheit and Celsius scales c) Converting between US and metric units d) Applications	3 hours
	Explore	a) Sizing it Up b) Choosing Units	1 hour
Lesson Total			4-6 hours
F6.2 Interpreting Graphs	Data and Graphs	a) Reading data from graphs b) Graphing data c) Pictographs d) Bar graphs e) Circle graphs f) Line graphs g) Applications	2 hours
	Explore	a) Collecting and Picturing Data b) Graphs in the News	1 hour
	Lesson Total		
F6.3 Introduction to Statistics	Statistical Measures	a) Mean b) Median c) Mode d) Box-and-whisker plots e) Applications	2 hours
	Explore	a) Collecting Data b) Where's the Middle?	1 hour
	Lesson Total		