



Academic Systems[®] Algebra

Scope and Sequence

Academic Systems[®] Intermediate Algebra

Standard Course Topics

- Topic EII Essentials of Algebra
- Topic 9 Rational Exponents & Radicals
- Topic 10 Quadratic Equations
- Topic 11 Functions & Graphing
- Topic 12 Exponential & Logarithmic Functions
- Topic 13 Nonlinear Equations & Inequalities

Additional Topics Available

- 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
- Topic F3 Proportional Reasoning II
- Topic F5 Geometry
- Topic F6 Interpreting Data

Academic Systems Intermediate Algebra

Lesson	Concept	Objectives	Hours
Topic EII: Essentials of Algebra			
EII.A Real Numbers and Exponents <i>(reviews 1.1, 1.3, 6.1)</i>	Real Numbers and Notation	a) Number line and notation: sets, ordering symbols, grouping symbols, exponents, and absolute value b) Operations on signed numbers c) Properties of real numbers: commutative law, associative law, distributive law, additive and multiplicative identities, inverses	1 hour
	Integer Exponents	a) Nonnegative integer exponents b) Properties of exponents	1 hour
	Lesson Total		2 hours
EII.B Polynomials <i>(reviews 2.1, 6.2, 7.1, 7.2)</i>	Polynomial Operations	a) Algebra building blocks: constants, variables, terms and coefficients b) Evaluating polynomials c) Adding and subtracting polynomials d) Multiplying and dividing polynomials	1 hour
	Factoring Polynomials	a) Factoring out the greatest common factor b) Factoring by grouping c) Factoring trinomials d) Factoring a difference of 2 squares e) Factoring sums and differences of 2 cubes f) Factoring using a combination of methods	1 hour
	Lesson Total		2 hours
EII.C Equations and Inequalities <i>(reviews 2.2, 2.4)</i>	Linear	a) Solving linear equations b) Solving linear inequalities	2 hours
		Lesson Total	
EII.D Rational Expressions <i>(reviews 8.1, 8.2)</i>	Rational Expressions	a) Negative integer exponents b) Writing rational expressions in lowest terms c) Multiplying and dividing rational expressions d) Adding and subtracting rational expressions	1 hour
	Rational Equations	a) Solving equations that contain rational expressions	1 hour
	Lesson Total		2 hours
EII.E Graphing Lines <i>(reviews 3.1, 4.1, 4.2)</i>	Graphing Lines	a) The coordinate system b) Graphing lines	1 hour
	Finding Equations	a) Slope and intercepts b) Finding the equation of a line	1 hour
	Lesson Total		2 hours
EII.F Absolute Value <i>(new material)</i>	Solving Equations	a) Solving $ x = a$ b) Solving $ Ax + B = a$ c) Solving $ Ax + B = Cx + D $	2 hours
	Solving Inequalities	a) Solving absolute value inequalities	1 hour
	Lesson Total		3 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 $a^{1/n}$ and $a^{m/n}$ b) Definition of $a^{1/m}$ 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

Academic Systems Intermediate Algebra

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
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 12: The Exponential and Logarithmic Functions				
12.1	Exponential Functions	The Exponential Function	a) Recognizing and graphing an exponential function b) Applications of the exponential function c) The algebra of exponential functions	2 hours
				Lesson Total
12.2	Logs and Their Properties	The Logarithmic Function	a) Converting from exponents to logarithms & logarithms to exponents b) Recognizing and graphing a logarithmic function	1 hour
		Logarithmic Properties	a) The algebra of logarithmic functions	0.5 hours
		Explore	a) Graphing Logarithms	0.5 hours
			Lesson Total	2 hours
12.3	Applications of Logs	Natural and Common Logs	a) Base e and natural logarithms b) Finding logs in base 10 and finding powers of 10, using a calculator c) Finding logs in base e and powers of e , using a calculator d) Change of base formula	1 hour
		Solving Equations	a) Solving exponential equations b) Solving logarithmic equations	1 hour
			Lesson Total	2 hours

Academic Systems Intermediate Algebra

Lesson	Concept	Objectives	Hours	
Topic 13: More Nonlinear Equations and Inequalities				
13.1	Nonlinear Equations	Solving Equations	a) Solving polynomial equations by factoring b) Solving quadratic-type equations by factoring or by substitution	1 hour
		Radical Equations	a) Solving $\sqrt{ax + b} = cx + d$ b) Solving $\sqrt{ax + b} + \sqrt{cx + d} = ex + f$ c) Solving $\sqrt[n]{ax + b} = \sqrt[n]{cx + d}$ d) Solving equations that contain rational exponents	1 hour
		Explore	a) Graphing	1 hour
			Lesson Total	3 hours
13.2	Nonlinear Systems	Solving Systems	a) The solution of a nonlinear system b) Solving nonlinear systems by graphing c) Solving nonlinear systems by the addition method d) Solving nonlinear systems by the substitution method	1 hour
		Explore	a) Graphing Systems	1 hour
			Lesson Total	2 hours
13.3	Inequalities	Quadratic Inequalities	a) Solving quadratic inequalities	2 hours
		Rational Inequalities	a) Solving rational inequalities	1 hour
		Explore	a) Graphing Inequalities	1 hour
			Lesson Total	4 hours
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	3 hours
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	5 hours
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	3 hours
4.3	Graphing Inequalities	Linear Inequalities	a) Ordered pairs as solutions of linear inequalities b) Graphing inequalities	2 hours

Academic Systems Intermediate Algebra

Lesson	Concept	Objectives	Hours
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	
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	
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	
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	
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	
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	
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	

Academic Systems Intermediate Algebra

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 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
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

Academic Systems Intermediate Algebra

Lesson	Concept	Objectives	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
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		2-3 hours

Academic Systems Intermediate Algebra

Lesson		Concept	Objectives	Hours
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				2-3 hours