New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 1: Number Theory

Essential Questions:
1. How is the study of set theory related to other disciplines?
2. What kind of data would you use to represent absolute value?

Time	Perform Ind	Content	Lessons	Vocabulary
Sept. (3 week)	AA29	Use set builder notation and /or interval notation to illustrate the elements of a set, given the elements in roster form.	Set Theory Set Builder notation Interval Notation Roster Notation Complement Intersection, Union	Approximation Complement Element Empty Set Intersection Irrational Multiplicative Inverse/Identity Rational Reciprocal Set Subset Union
	AA30	Find the complement of a subset of a given set, within a given universe.		
	AA31	Find the intersection of sets (no more than three sets) and/or union of sets (no more than three sets).	Closure Commutative Property Associative Property Distributive Property Identity Inverse	
	AN1	Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, inverse) *Note: Students do not need to identify groups and fields, but students should be engaged in the ideas.*	Evaluating Expressions • Absolute value • Exponents	
	AN6	Evaluate expressions involving factorial(s), **absolute value(s),** and exponential expression(s).	(applications are taught throughout the lessons)	

New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 2: Algebraic Expressions and Equations (Translations)

Essential Questions:
1. Why do we need to convert expressions to algebraic expressions?
2. What strategies can be used to solve word problems?

Time	Perform Ind	Content	Lessons	Vocabulary
Sept-Oct. (1 week)	8A1	Translate verbal sentences into algebraic inequalities.	Translating verbal phrases and sentences into algebraic expressions, equations, and inequalities. Writing algebraic expressions, equations, and inequalities that represent verbal phrases and sentences. Solving multi-step equations. • Combine like terms • Distribute • Variables on both side Word Problems • Consecutive Integers • Motion Word Problems • Money • Age Applications	Algebraic Equation Algebraic Expression Binomial Coefficient Consecutive Even Integer Consecutive Odd Integer Inverse Operation Like Terms Monomial Polynomial Simplify Translate Trinomial
	8A2 AA2	Write verbal expressions that match given mathematical expressions.		
	AA1	Translate a quantitative verbal phrase into an algebraic expression.		
	AA3	Distinguish the difference between an algebraic expression and an algebraic equation.		
	AA4	Translate verbal sentences into mathematical equations or inequalities.		
	AA5	Write algebraic equations or inequalities that represent a situation.		

New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 3: Polynomials (Laws of Exponents and Operations)

Essential Questions:
1. How are multiplication and division related to finding the area and volume of different geometric shapes?
2. Why is scientific notation important to science?

Time	Perform Ind	Content	Lessons	Vocabulary
Oct. (1 week)	8N1	Develop and apply the laws of exponents for multiplication and division.	Multiplying and dividing monomials	Binomial Coefficient Like Terms Monomial Polynomial Simplify Trinomial
	8N2	Evaluate expressions with integral exponents.	Evaluate Expressions • Scientific Notation ○ Product ○ Quotient	
	AN4	Understand and use scientific notation to compute products and quotients of numbers.	Combine Like Terms • Add/Subtract Monomials and Polynomials	
	AN6	Evaluate expressions involving factorial(s), absolute value(s), and **exponential expression(s)**.	Multiply Polynomials • Distribution	
	8A6	Multiply and divide monomials.	Divide Polynomials	
	8A7	Add and subtract polynomials (integer coefficients).	All Operations of Polynomials	
	8A8	Multiply a binomial by a monomial or a binomial (integer coefficients).		
	8A9	Divide a polynomial by a monomial (integer coefficients) *Note: The degree of the denominator is less than or equal to the degree of the numerator for all variables.*		
	AA12	Multiply and divide monomial expressions with a common base, using the properties of exponents *Note: Use integral exponents only.*		
	AA13	Add, subtract, and multiply monomials and polynomials.		
	AA14	Divide a polynomial by a monomial or binomial, where the quotient has no remainder.		

New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 4: Linear Equations and Inequalities in One Variable

Essential Questions:
1. How can real life situations be represented as equations?
2. Why can you earn a 200% increase in your average, but not have a grade of 200%?

Time	Perform Ind	Content	Lessons	Vocabulary
Oct. (2 weeks)	A.A.4	Translate verbal sentences into mathematical equations or inequalities.	Solving Equations with Fractions • Multiply by LCD • Proportions Solving Inequalities • Graph on number lines Word Problems • Solve Literal Equations • Percents • Percent Change • Discount • Fractions Word Problems • Mixed Practice	Percent Increase Percent Decrease Discount Sales Tax Rate Direct Variation
	A.A.5	Write algebraic equations or inequalities that represent a situation.		
	A.A.22	Solve all types of linear equations in one variable.		
	A.A .25	Solve equations involving fractional expressions. **Note**: Expressions which result in linear equations in one variable.		
	A.A.6	Analyze and solve verbal problems whose solution requires solving a linear equation in one variable or linear inequality in one variable.		
	A.A.26	Solve algebraic proportions in one variable which results in linear equations.		
	A.A.21	Determine whether a given value is a solution to a given linear equation in one variable or linear inequality in one variable.		
	8N3	Read, write, and identify percents less than 1% and greater than 100%.		
	8N4	Apply percents to: Tax, Percent increase/decrease, Simple interest, Sale price, Commission, Interest rates, Gratuities.		
	A.N.5	Solve algebraic problems arising from situations that involve fractions, decimals, percents (decrease/increase and discount) , and proportionality/direct variation.		
	8.A.14	Solve linear inequalities by combining like terms, using the distributive property, or moving variable to one side of the inequality (including multiplication or division of inequalities by negative numbers).		
	A.A.24	Solve linear inequalities in one variable.		
	8.G.19	Graph the solution set of an inequality on a number line.		
	8.A.13	Solve multi-step inequalities and graph the solution set on a number line.		

New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 5: Factoring and Rational Expressions

Essential Questions:
1. What strategies can be used to multiply and divide algebraic fractions?
2. How is factoring related to quadratic functions?

Time	Perform Ind	Content	Lessons	Vocabulary
Oct.-Nov (3 weeks)	8A10	Factor algebraic expressions using the GCF.	Factoring • Trinomials (a=1) • Trinomial with GCF Factoring • GCF • DOPS Algebraic Fractions • Undefined • Simplify Add/Subtract Algebraic Fractions • Monomials • Like Binomials Multiply/Divide Algebraic Fractions Algebraic Fractions Applications	Greatest Common Factor Perfect Square Standard Form Undefined
	8A11	Factor a trinomial in the form $ax^2 + bx + c$; a=1 and c having no more than three sets of factors.		
	AA20	Factor algebraic expression completely, including trinomials with a lead coefficient of one (after factoring a GCF).		
	AA13	Add, subtract, and multiply monomials and polynomials.		
	AA14	Divide a polynomial by a monomial or binomial, where the quotient has no remainder.		
	AA19	Identify and factor the difference of two perfect squares.		
	A.A.15	Find values of a variable for which an algebraic fraction is undefined.		
	A.A .16	Simplify fractions with polynomials in the numerator and denominator by factoring both and renaming them to lowest terms.		
	A.A.17	Add or subtract fractional expressions with monomial or like binomial denominators.		
	A.A.18	Multiply and divide algebraic fractions and express the product or quotient in simplest form.		

New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 6: Linear Equations and Inequalities in Two Variables

Essential Questions:
1. How can linear relationships be used to make decisions? (Decide, Show, Predict, Describe….)
2. How can we use linear equations to solve real-life situations?
3. How does slope represent a rate of change?

Time	Perform Ind	Content	Lessons	Vocabulary
Nov.-Dec. (4 weeks)	7A7	Draw the graphic representation of a pattern from an equation or from a table of data.	Introduce Function terminology Linear Equations • Intro. y=mx+b • Put EQ. into standard form • Solutions Graphing y=mx+b • Identify the types of Slope • Slope (graphically-rise over run) • Slope: rate of change • Parallel lines to x and y axis • Graph y=mx+b lines Graphing y=mx+b • Effect of Coefficients(discovery) • Parallel and Perpendicular Lines • Graph all types of lines Writing Linear Equations • Slope and given point • Two given points • Slope and y-intercept • Parallel and Perpendicular Lines Graph Linear Inequalities Applications	Linear Equation x and y intercepts Independent /Dependent variables Parallel Perpendicular Slope
	7A8	Create algebraic patterns using charts/table, graphs, equations, and expressions.		
	7A9	Build a pattern to develop a rule for determining the sum of the interior angles of polygons.		
	7A10	Write an equation to represent a function from a table of values.		
	8.G.13	Determine the slope of a line from a graph and explain the meaning of a slope as a constant rate of change.		
	A.A.32	Explain slope as a rate of change between dependent and independent variables.		
	8.G.15	Graph a line using a table of values.		
	A.G.4	Identify and graph linear equations.		
	8.G.14	Determine the y-intercept of a line from a graph and be able to explain the y-intercept.		
	8.G.17	Graph a line from an equation in slope-intercept form (y=mx+b).		
	8.G.16	Determine the equation of a line given the slope and y-intercept.		
	A.G.5	Investigate and generalize how changing the coefficients of a function affects its graph.		
	A.A.36	Write the equation of a line parallel to the x- or y-axis.		

	8A16	Find a set of ordered pairs to satisfy a given linear numerical pattern (expressed algebraically); then plot the ordered pairs and draw the line.		
	A.A.39	Determine whether a given point is on a line, given the equation of the line.		
	A.A.33	Determine the slope of a line, given the coordinates of two points on the line.		
	A.A.37	Determine the slope of a line, given its equation in any form.		
	A.A.38	Determine if two lines are parallel given their equations in any form.		
	A.A.34	Write the equation of a line, given its slope and the coordinates of a point on the line.		
	A.A.35	Write the equation of a line, given the coordinates of two points on the line.		
	A.G.6	Graph linear inequalities.		
	8.A.18	Determine if a relation is a function.		
	A.G.3	Determine when a relationship is a function, by examining ordered pairs and inspecting graphs of relations.		

Unit 7: Quadratic Equations and Functions

Essential Questions:
1. How can we use a graph of a quadratic equation to make a prediction?
2. How do people in the business world use quadratics?
3. What is the connection between the roots of a quadratic equation and its factors?

Time	Perform Ind	Content	Lessons	Vocabulary
Dec. (2 weeks)	8.G.20	Distinguish between linear and nonlinear equations (only graphically).	Identify linear vs. non-linear equations graphically and algebraically Solve Quadratic 　Equation Graphically 　• Effects of coefficients-discovery 　• Find vertex, axis of symmetry, roots Solve Quadratic 　Equation Graphically 　• Calculator 　• Table of Values 　• Write EQ. from graphic function Solve Quadratic 　Equation Algebraically 　• Get into standard form 　• Algebraic Proportions Solve Algebraically 　• Contrast Graphically Word Problems Applications	Axis of Symmetry Calculator Terms Factorable Integral Roots Parabola Roots Vertex (Max/Min) Abscissa
	8.A.3	Describe a situation involving relationships that matches a given graph.		
	8.A.4	Create a graph given a description or expression for a situation involving a linear or non-linear relationship.		
	8.G.21	Recognize the characteristics of quadratics in tables, graphs, equations, and situations.		
	A.G.4	Identify and graph quadratic functions.		
	A.A.27	Understand and apply the multiplication property of zero to solve quadratic equations with integral coefficient and integral roots.		
	A.A.28	Understand the difference and connection between roots of a quadratic equation and factors of a quadratic equation.		
	A.A.26	Solve algebraic proportions in one variable which result in a quadratic equations.		
	A.A.41	Determine the vertex and axis of symmetry of a parabola, given its equation.		
	A.G.8	Find the roots of a parabolic function graphically. (Only quadratic equations with integral solutions).		
	A.G.10	Determine the vertex and axis of symmetry of a parabola, given its graph.		
	A.A.8	Analyze and solve verbal problems that involve quadratic equations.		

Unit 8: Systems of Equations and Inequalities

Essential Questions:
1. How many points of intersection can be found when graphing systems of equations?
2. Why do you need two equations to determine the value of two unknowns?

Time	Perform Ind	Content	Lessons	Vocabulary
Jan. (2 weeks)	8.G.18	Solve systems of equations graphically (only linear, integral solutions, y=mx+b format, no vertical/horizontal lines).	Linear-Linear Systems Graphically • Equations and Inequalities • Word Problems	Point of Intersection Solution Set
	A.A.10	Solve systems of two linear equations in two variables algebraically.	Linear-Linear Systems Algebraically • Substitution • Word Problems	
	A.A.7	Analyze and solve verbal problems whose solution requires solving systems of linear equations in two variables.		
	A.A.11	Solve a system of one linear and one quadratic equation in two variables, where only factoring is required. **Note: *The quadratic equation should represent a parabola and the solution(s) should be integers.***	Linear-Linear Systems Algebraically • Elimination • Word Problems	
	A.G.9	Solve systems of linear and quadratic equations graphically. **Note: *Only use systems of linear and quadratic equations that lead to solutions whose coordinates are integers.***	Practice Linear Equation Problems Quadratic-Linear Systems • Graphically • Algebraically (Factorable Solutions Only)	
	A.G.7	Graph and solve systems of linear equations and inequalities with rational coefficients in two variables.		
	A.A.40	Determine whether a given point is in the solution set of a system of linear inequalities.	Applications **ANTICIPATED MIDTERM**	

12/07

New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 9: More Relations and Functions

Essential Questions:
1. How can we represent increase/decrease of populations with an exponential function?
2. Investigate and explore: What are other situations that will be best represented by an exponential function?
3. How can percents describe growth over time?

Time	Perform Ind	Content	Lessons	Vocabulary
Jan.-Feb. (2 weeks)	8.A.15	Understand that numerical information can be represented in multiple ways: arithmetically, algebraically, and graphically.	Determine if a relation is a function • Graphically • Equation • Table of Values	Decay Domain Exponential Growth Function Range Relation
	8.A.18	Determine if a relation is a function.	Graph Absolute Value Equations	
	8.A.17	Define and use correct terminology when referring to function (domain and range).	Graph Exponential Functions	
	8.A.19	Interpret multiple representations using equation, table of values, and graph.	Verbal Problems • Exponential Growth/Decay	
	A.G.3	Determine when a relation is a function, by examining ordered pairs and inspecting graphs of functions.	Applications	
	A.G.4	Identify and graph absolute value and exponential functions.		
	A.A.9	Analyze and solve verbal problems that involve exponential growth and decay.		

New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 10: Applied Mathematics

Essential Questions:
1. Why do we use units in measurement?
2. How do measurements help compare objects?
3. How are non-standard units used to measure objects?

Time	Perform Ind	Content	Lessons	Vocabulary
Feb. (2 weeks	A.A.23	Solve literal equations for a given variable (incl. formulas).	Solve literal equations Calculate rates Formulas • Perimeter • Area • Shaded Area o (**Sectors of circles**) Formulas • Volume • Surface Area • Calculate relative error Applications **Note: Dimensional Analysis included in applications**	Sector Quarter-Circle Semi-Circle
	A.M.1	Calculate rates using appropriate units.		
	8.M.1	Solve equations/proportions to convert to equivalent measurements within metric and customary measurement systems *Note: Also allow Fahrenheit to Celsius and vice versa.*		
	A.M.2	Solve problems involving conversions within measurement systems, given the relationship between the units.		
	A.G.1	Find the area and/or perimeter of figures composed of polygons, and circles, or sectors of a circle.		
	A.G.2	Use formulas to calculate volume and surface area of rectangular solids and cylinders.		
	A.M.3	Calculate the relative error of measuring square and cubic units, when there is an error in the linear measure.		

Unit 11: Right Triangle Relations (Pythagorean and Trig)

Essential Questions:
1. How can trig be used?
2. Why do we use trig? And when?
3. Why are trigonometric ratios needed to solve some right triangles problems, but the Pythagorean Theorem is needed for others?

Time	Perform Ind	Content	Lessons	Vocabulary
Feb. (1 week)	A.A.45	Determine the measure of a third side of a right triangle using the Pythagorean Theorem, given the lengths of any two sides.	Pythagorean Theorem - Triples - Application to Area and Perimeter Trig Ratios - Identify - Set-up ratios Trig Ratios - Solve ratios Applications	Angle of Depression Angle of Elevation Sine Cosine Tangent Adjacent Opposite Hypotenuse
	A.A.42	Find the sine, cosine, and tangent ratios of an angle of a right triangle, given the lengths of the sides.		
	A.A.43	Determine the measure of an angle of a right triangle, given the lengths of any two sides of the triangle.		
	A.A.44	Find the measure of the side of a right triangle, given an acute angle and the length of another side.	**Preparation for Math 8 State Exam** _Note: Post-march 7 and Pre-March 8 performance indicators not specifically addressed in the Integrated algebra curriculum will be reviewed/reinforced at this time to prepare for the grade 8 exam._	

New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 12: Radicals

Essential Questions:
1   Why is prime factorization helpful when simplifying radicals?
2   Are all radicals irrational?

Time	Perform Ind	Content	Lessons	Vocabulary
March (2 weeks)	A.N.2	Simplify radical terms **(no variable in radicand).**	Simplify Radicals **(no variables)**	Approximation Irrational Radical Rational
	A.N.3	Perform the four arithmetic operations using like and unlike radical terms and express the result in simplest form.	Multiply/Divide Radicals Add/Subtract Radicals Radicals-All Operations	

Unit 13: Data & Statistics

Essential Questions:
1. What are the similarities and differences among the measures of central tendency?
2. What is the difference between a histogram and a bar graph?
3. What does cumulative mean?

Time	Perform Ind	Content	Lessons	Vocabulary
April-May (4 weeks)	A.S.2	Determine whether the data to be analyzed is univariate or bivariate.	Mean, median, mode, range • Word Problems Histograms • Frequency Tables • Cumulative • Median intervals Construct Plots • Stem and Leaf • Box and Whisker Analyze graphs • Quartiles • Percentiles Analyze graphs • Read and Analyze Variety of Graphs • Qualitative/ • Quantitative Data • Identify Source of Bias Scatter Plot • Sketch Line of Best Fit • Write the equation • Make Predictions	Bivariate Box-and-Whisker Plot Causation Correlation Histogram Line of Best Fit Mean Median Mode Ordinate Outliers Percentile Qualitative VS Quantitative Quartile Range Slope Stem-and-Leaf Plot Univariate
	A.S.12	Identify the relationship between the independent and dependent variables from a scatter plot of bivariate data.		
	A.S.7	Create a scatter plot of bivariate data.		
	A.S.17	Use a reasonable line of best fit to make a prediction involving interpolation or extrapolation.		
	A.S.13	Understand the difference between correlation and causation.		
	A.S.14	Identify variables that might have a correlation but not a causal relationship.		
	A.S.8	Construct manually a reasonable line of best fit for a scatter plot and determine the equation of that line.		
	A.S.10	Evaluate published reports and graphs that are based on data by considering: experimental design, appropriateness of the data analysis, and the soundness of the conclusions.		
	A.S.1	Categorize data as qualitative or quantitative.		
	A.S.3	Determine when collected data or display of data may be biased.		
	A.S.15	Identify and describe sources of bias and its effect, drawing conclusion from data.		

	A.S.4	Compare and contrast the appropriateness of different measures of central tendency for a given data set.	Applications Assessment:	
	A.S.16	Recognize how linear transformations of one-variable data affect the data's mean, median, mode, and range.		
	A.S.5	Construct a histogram, cumulative frequency histogram, and a box-and-whisker plot, given a set of data.		
	A.S.9	Analyze and interpret a frequency distribution table or histogram, a cumulative frequency distribution table or histogram, or a box-and-whisker plot.		
	A.S.6	Understand how the five statistical summary (minimum, maximum, and the three quartiles) is used to construct a box-and-whisker plot.		
	A.S.11	Find the percentile rank of an item in a data set and identify the point values for the first, second, and third quartiles.		

New Paltz Central School District
Math 8 Accelerated/Integrated Algebra

Unit 14: Probability

Essential Questions:
1. Why is probability important in sports?
2. How is probability used to make predictions?
3. How can probability be displayed in a Venn Diagram?

Time	Perform Ind	Content	Lessons	Vocabulary
May.-June (3 weeks)	A.N.6	Evaluate expressions involving **factorial(s),** absolute value(s), and exponential expression(s).	Single Event and Compound Events • Vocabulary • AND/OR/NOT	Certainty Complements Empirical Theoretical Factorial Mutually Exclusive Sample Space Permutations Combinations Dependent Event Independent Event
	A.N.7	Determine the number of possible events, using counting techniques or the Fundamental Principle of Counting.	Counting Principle • Sample Space • Tree Diagram	
	A.S.19	Determine the number of elements in a sample space and the number of favorable events.	Probability • With/without replacement	
	A.N.8	Determine the number of possible arrangements (permutations) of a list of items.	• Conditional probability	
	A.S.18	Know the definition of conditional probability and use it to solve for probabilities in finite sample spaces.	Mixed Probability • Applications Permutations	Conditional probability
	A.S.20	Calculate the probability of an event and its complement.	• Factorials Applications Assessment	
	A.S.21	Determine empirical probabilities based on specific sample data.		
	A.S.22	Determine, based on calculated probability of a set of events, if: > some or all are equally likely to occur > one is more likely to occur than another > whether or not an event is certain to happen or not to happen.	**Integrated Algebra Regents Exam**	
	A.S.23	Calculate the probability of: > a series of independent events > a series of dependent events > two mutually exclusive events > two events that are not mutually exclusive.		