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EASTERN LEBANON COUNTY SCHOOL DISTRICT
STUDENT LEARNING MAP

Course/Subject: Algebra 1 — Days: 10 – 13 days
Unit 1: Expressions & Linear Equations — Grade Level: 9

Key Learning

Equations can be used to describe, explain, and predict various aspects of patterns in real world situations. "Solving" an equation is the process of finding the value that makes a sentence true.

Unit Essential Question

How can mathematical ideas be represented and why is it helpful to represent these ideas in different ways?

Concept	**Concept**	**Concept**
Variables & Expressions	Order of Operations	Properties of Numbers
Standards: A1.1.1.5.1	**Standards:** A1.1.1.5.1	**Standards:** A1.1.2.1.2
Lesson Essential Question	**Lesson Essential Question**	**Lesson Essential Question**
How and why are algebraic expressions written?	How are numerical expressions that involve exponents simplified using the Order of Operations?	How can the properties of real numbers be used to simplify expressions?
Vocabulary	**Vocabulary**	**Vocabulary**
Algebraic expression Variable Term Factor Product Power Exponent Base	Evaluate	Equivalent expressions Additive identity Additive inverse Multiplicative identity Multiplicative inverse Reciprocal Like terms Simplest form Coefficient Commutative property Associative property Distributive property

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Concept	**Concept**	**Concept**
Writing Equations	Solving Equations	Solving Absolute Value Equations
Standards: A1.1.2.1.1	**Standards:** A1.1.2.1.1	**Standards:** A1.1.2.1.1
⇩	⇩	⇩
Lesson Essential Question	**Lesson Essential Question**	**Lesson Essential Question**
How is translating sentences to algebraic equations a valuable tool in solving real-world problems?	How can the properties of equality, inverse operations, and properties of real numbers be used to solve equations?	How do you solve absolute value equations algebraically and graphically?
⇩	⇩	⇩
Vocabulary	**Vocabulary**	**Vocabulary**
Formula	Open sentence Equation Solving Solution Set Replacement set Element Solution set Identity Equivalent equations Consecutive integers Number theory	

Additional Information/Resources:
Glencoe Algebra 1 textbook sections: 1-1, 1-2, 1-3, 1-4, 1-5, 2-1, 2-2, 2-3, 2-4, 2-5

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STUDENT LEARNING MAP

Course/Subject: Algebra 1 | Days: 14
Unit 2: Linear Functions | Grade Level: 9

Key Learning
Solving and Graphing Linear Equations

Unit Essential Question
How do you represent and interpret real-world situations using linear functions?

Concept Relations	**Concept** Functions	**Concept** Interpreting Graphs
Standards: A1.2.1.1.3 A1.2.1.2.2	**Standards:** A1.2.1.1.1 A1.2.1.1.2	**Standards:** A1.2.1.2.1 A1.2.2.1.4
Lesson Essential Question How do you represent and interpret graphs, charts, or mappings of relations?	**Lesson Essential Question** When is a relation a function? How do you find values of a function?	**Lesson Essential Question** How do you interpret intercepts and behavior of the graphs of functions?
Vocabulary Coordinate system Coordinate plane x- and y- axes origin domain range ordered pair x- and y- coordinates mapping relation independent variable dependent variable	**Vocabulary** Function Discrete function Continuous function Vertical line test Function notation Nonlinear function	**Vocabulary** Intercept Line symmetry Positive Negative Increasing Decreasing Extrema Relative maximum Relative minimum End behavior

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Concept Graphing Linear Equations	**Concept** Solving Linear Equations by Graphing	**Concept** Rate of Change and Slope
Standards: A1.1.2.1 A1.2.1.2.2 A1.2.2.1.4	**Standards:** A1.1.2.2.1	**Standards:** A1.1.2.1 A1.2.2.1.1
⇩	⇩	⇩
Lesson Essential Question Which equations are linear and which ones are not? What are zeros and intercepts of equations? How do you graph a linear equation?	**Lesson Essential Question** How do you solve and/or estimate solutions to linear equations by graphing?	**Lesson Essential Question** How do you use rate of change to solve problems? What is the slope of a line?
⇩	⇩	⇩
Vocabulary Intercepts linear equation Standard form constant	**Vocabulary** Linear function Parent function Family of graphs Root zeros	**Vocabulary** Slope Rate of change Constant

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Concept Direct Variation	**Concept** Arithmetic Sequences	**Concept** Proportional and Non-proportional Relationships
Standards: A1.2.1.2.1 A1.2.2.1.2	**Standards:** A1.1.2.1	**Standards:** A1.1.2.1
⇩	⇩	⇩
Lesson Essential Question What does it mean for an equation to have "direct variation?"	**Lesson Essential Question** What are common features of arithmetic sequences?	**Lesson Essential Question** What does it mean for an equation to have a proportional relationship?
⇩	⇩	⇩
Vocabulary direct variation inverse variation slope rate of change constant of variation	**Vocabulary** arithmetic sequence common difference	**Vocabulary**

Additional Information/Resources:
Glencoe Algebra 1 textbook sections: 1-6, 1-7, 1-8, 3-1, 3-2, 3-3, 3-4, 3-5, 3-6

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EASTERN LEBANON COUNTY SCHOOL DISTRICT
STUDENT LEARNING MAP

Course/Subject: Algebra 1 Days: 7 days
Unit 3: Equations of Linear Functions Grade Level: 9

Key Learning
Writing linear equations given information about the line in various forms

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Unit Essential Question
How do you write linear equations and use them to interpret data and to make predictions?

Concept	**Concept**	**Concept**
Graphing Equations in Slope-Intercept Form	Writing Equations in Slope-Intercept Form	Writing Equations in Point-Slope Form
Standards:	**Standards:**	**Standards:**
A1.2.2.1.3; A1.2.2.1.4	A1.2.2.1.3; A1.2.2.1.4	A1.2.2.1.3; A1.2.2.1.4
⇩	⇩	⇩
Lesson Essential Question	**Lesson Essential Question**	**Lesson Essential Question**
How are slope and y-intercept useful in writing and graphing a linear equation?	How can you write a linear equation given the slope and one point or just two points on the line?	What is the point-slope form for writing linear equations? How do you transform between the different forms of linear equations?
⇩	⇩	⇩
Vocabulary	**Vocabulary**	**Vocabulary**
Slope-intercept form Constant function	Constraint Linear extrapolation	Point-slope form

Concept	**Concept**	**Concept**
Scatter Plots and Lines of Fit	Regression and Median-Fit Lines	
Standards:	**Standards:**	**Standards:**
A1.2.1.2.1; A1.2.2.2.1	A1.2.1.2.1; A1.2.2.2.1; A1.2.3.2.3	
⇩	⇩	⇩
Lesson Essential Question	**Lesson Essential Question**	**Lesson Essential Question**
How do you use points on a plot and lines of fit to	How do you write equations of median-fit	

investigate relationships between quantities and make predictions?	lines and best-fit lines using regression?	
⇩	⇩	⇩
Vocabulary Bivariate data Scatter plot Line of fit Linear interpolation	**Vocabulary** Best-fit line Linear regression Correlation coefficient Residual Median-fit line	**Vocabulary**

Additional Information/Resources:
Glencoe Algebra 1 textbook sections: 4-1, 4-2, 4-3, 4-4, 4-5, 4-6

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STUDENT LEARNING MAP

Course/Subject: Algebra 1 Days: 9
Topic: Unit 4 Linear Inequalities Grade Level: 9

Key Learning
Solving and Graphing Linear Inequalities

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Unit Essential Question
How do you write, solve and interpret linear inequalities?

Concept Solving Single-Step and Multi-Step Inequalities	**Concept** Solving Compound Inqualities	**Concept** Solving Inequalities Involving Absolute Value.
Standards: A1.1.3.1.2; A1.1.3.1.3	**Standards:** A1.1.3.1.1: A1.1.3.1.3	**Standards:** A1.1.3.1.1
⇩	⇩	⇩
Lesson Essential Question How do you solve and graph the solution of an inequality on a number line?	**Lesson Essential Question** What effect does intersection "and" and union "or" have on the solution and graph of a combined inequality?	**Lesson Essential Question** How do you set up, solve, and graph on a number line the combined inequalities created by absolute values?
⇩	⇩	⇩
Vocabulary Inequality Set-builder notation Properties of Inequalities	**Vocabulary** Compound inequality Intersection Union	**Vocabulary** Absolute value Compound inequality Intersection Union

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Concept Graphing Inequalities In Two Variables	**Concept** Solving Systems of Linear Ineqaulities
Standards: A1.1.3.1.2	**Standards:** A1.1.3.2.1
⇩	⇩
Lesson Essential Question How do you interpret the solution and graph the solution in a coordinate plane for an linear inequality involving two variables?	**Lesson Essential Question** How do you graph a system of linear inequalities in a coordinate plane and interpret the solution to the system?
⇩	⇩
Vocabulary Boundary Half-plane Closed half-plane Open half-plane	**Vocabulary** Systems of Inequalities Boundary Half-plane Closed half-plane Open half-plane

Additional Information/Resources:
Glencoe Algebra 1 textbook sections: 5-1, 5-2, 5-3, 5-4, 5-5, 5-6, 6-6

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STUDENT LEARNING MAP

Course/Subject: Algebra 1
Unit 5: Systems of Linear Equations and Inequalities

Days: 12 to 15 Days
Grade Level: 9

Key Learning
Solving and Graphing Linear Equations and Inequalities

Unit Essential Question
How do you visualize and solve situations that involve two variables?
How do you explain why you need to know different methods of solving linear systems?
How do you know what is the BEST method to use to solve certain problem?

Concept Graphing Systems of Equations.	**Concept** Solving Systems of Equations by Substitution.	**Concept** Solving Systems of Equations by Elimination.	**Concept** Applying Systems of Linear Equations.
Standards: A1.1.2.2.1;A1.1.2.2.2	**Standards:** A1.1.2.2.1;A1.1.2.2.2	**Standards:** A1.1.2.2.1;A1.1.2.2.2	**Standards:** A1.1.2.2.1;A1.1.2.2.2
			
Lesson Essential Question What are the different types of solutions for linear systems?	**Lesson Essential Question** Why might solving a system of equations using substitution be better than graphing the equations to determine the solution?	**Lesson Essential Question** What does the word “eliminate” mean to you in a real life situation?	**Lesson Essential Question** How can you check answers in real life application problems within the context of the situation?
			
Vocabulary System of Equation Consistent Independent Dependent Inconsistent Intersection Parallel Coincide	**Vocabulary** Substitution	**Vocabulary** Elimination	**Vocabulary**

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Additional Information/Resources:
Glencoe Algebra 1 textbook sections: 6-1, 6-2, 6-3, 6-4, 6-5

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Course/Subject: Algebra 1 | Days: 4 days
Unit 6: Exponents & Radicals | Grade Level: 9

Key Learning
Using properties of integer and rational exponents to simplify expressions.

Unit Essential Question
How do you simplify expressions using properties of integer and rational exponents?

Concept Multiplication Properties of Exponents	**Concept** Division Properties of Exponents	**Concept** Rational Exponents
Standards: A1.1.1.3.1	**Standards:** A1.1.1.3.1	**Standards:** A1.1.1.1.2, A1.1.1.3.1
Lesson Essential Question How do you multiply monomials using properties of exponents and simplify expressions using the multiplication properties of exponents?	**Lesson Essential Question** How do you use properties of integer exponents (including negative and zero exponents) to divide monomials and simplify expressions?	**Lesson Essential Question** How do you evaluate and rewrite expressions involving rational exponents?
Vocabulary Monomial Constant Base Exponent Power Factor Product of powers Coefficient Power of a power Power of a product	**Vocabulary** Negative integer exponent Zero exponent Order of magnitude Quotient of powers Power of a quotient reciprocal	**Vocabulary** Rational exponent Nonnegative real number Radical form Exponential form Square root Cube root nth root

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STUDENT LEARNING MAP

Concept
Simplifying Radical Expressions

Standards:
A1.1.1.1.2

Lesson Essential Question
How do you use the properties of radicals to simplify radical expressions.

Vocabulary
Radical expression
Radicand
Index
Product property of square roots
Quotient property of square roots
Rationalizing the denominator

Additional Information/Resources:
Glencoe Algebra 1 textbook sections:
7-1, 7-2, 7-3 (no exponential equations), 10-2 (no conjugates)

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STUDENT LEARNING MAP

Course/Subject: Algebra 1 | Days: 12
Unit 7: Analyzing Data | Grade Level: 9 & 10

Key Learning **To make deductions based on probability and data.**

Unit Essential Question
How do you use probability and data to make accurate deductions?

Concept Simple Probability & Odds	**Concept** Measures of Center and Spread	**Concept** Visual Displays of Data
Standards: A1.2.3.3	**Standards:** A1.2.3.1	**Standards:** A1.2.3.2
		
Lesson Essential Question How do you find the probability and odds of a simple event?	**Lesson Essential Question** How do you calculate the measures of center and of spread for a set of data?	**Lesson Essential Question** How do you represent sets of data using different visual displays?
		
Vocabulary Probability Sample Space Equally Likely Complements Tree Diagram Odds	**Vocabulary** Variable - Data Measurement or Quantitative Data Categorical or Qualitative Data Univariate Data Measures of Center or Central Tendency Mean – Median - Mode Measures of Spread or Variation Range Quartile Measures of Position Lower Quartile Upper Quartile Five Number Summary Interquartile Range IQR Outlier	**Vocabulary** Frequency Table Bar Graph Cumulative Frequency Histogram Line Graph Stem-and-Leaf Plot Circle (Pi) Graph Box-and-Whisker Plot

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Concept Statistics and Parameters	**Concept** Distributions of Data	**Concept** Comparing Sets of Data
Standards: A1.2.3.2	**Standards:** A1.2.3.2	**Standards:** A1.2.3.2
⇩	⇩	⇩
Lesson Essential Question How do you use statistics to analyze data?	**Lesson Essential Question** How do you describe the shapes of a distribution?	**Lesson Essential Question** How do you determine the effect that a transformation of data will have on the measures of tendency and variation?
⇩	⇩	⇩
Vocabulary Statistical Inference Statistic Parameter Mean Absolute Deviation Standard Deviation Variance	**Vocabulary** Distribution Negatively Skewed Distribution Symmetric Distribution Positively Skewed Distribution	**Vocabulary** Linear Transformation

Concept Probability and Compound Events
Standards: A1.2.3.3
⇩
Lesson Essential Question How do you find the probabilities of independent and dependent events and mutually exclusive events?
⇩
Vocabulary Compound Event Joint Probability Independent Events Dependent Events

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Mutually Exclusive Events

Additional Information/Resources:
Glencoe Algebra 1 textbook sections: 0-11, 0-12, 0-13, 13-2, 12-3, 12-4, 12-7

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Course/Subject: Algebra 1 Days: 9 days
Unit 8: Quadratic Expressions and Equations Grade Level: 9

Key Learning
Operations on Polynomials, Factoring Polynomials, and Simplifying Rational Expressions

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Unit Essential Question
How do you use addition, subtraction, multiplication, and factoring of polynomials in order to simplify rational expressions?

Concept	**Concept**	**Concept**
Adding and Subtracting Polynomials	Multiplying a Polynomial by a Monomial	Multiplying Polynomials
Standards:	**Standards:**	**Standards:**
A1.1.1.5.1	A1.1.1.3.1, A1.1.1.5.1	A1.1.1.5.1
⇩	⇩	⇩
Lesson Essential Question	**Lesson Essential Question**	**Lesson Essential Question**
How do you identify, add, and subtract polynomials?	How do you multiply a polynomial by a monomial and solve equations using the products of monomials and polynomials?	How do you multiply polynomials by using the distributive property (and multiply binomials by using the F.O.I.L. method)?
⇩	⇩	⇩
Vocabulary	**Vocabulary**	**Vocabulary**
Monomial Binomial Trinomial Polynomial Standard form of a polynomial Leading coefficient Like terms (similar monomials) Degree of a monomial Degree of a polynomial Constant term Linear term Quadratic term Additive inverse	Distributive property	F.O.I.L. method Quadratic expression

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Concept Special Products	**Concept** Using the Distributive Property (GCF Factoring)	**Concept** Solving $x^2 + bx + c = 0$
Standards: A1.1.1.5.1	**Standards:** A1.1.1.2.1, A1.1.1.5.2	**Standards:** A1.1.1.5.2
⇩	⇩	⇩
Lesson Essential Question How do you find products of sums and differences, or squares of sums or differences?	**Lesson Essential Question** How do you use the distributive property (GCF) to factor polynomials and solve equations of the form $ax^2 + bx = 0$?	**Lesson Essential Question** How do you factor quadratic trinomials and use factored form to solve equations of the form $x^2 + bx + c = 0$?
⇩	⇩	⇩
Vocabulary Squares of Sums and Differences Perfect Square Trinomial Product of a Sum and a Difference Perfect Square Difference of Two Squares Zero pair Pattern recognition	**Vocabulary** Greatest Common Factor (GCF) Least Common Multiple (LCM) Prime factorization Factor tree Factored form Factoring Factoring by grouping Zero product property	**Vocabulary** Quadratic trinomial Quadratic equation Zeros of a function Guess and check Factor pairs Prime polynomial

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Concept Difference of Squares	**Concept** Perfect Squares (Trinomials)	**Concept** Simplifying Rational Expressions
Standards: A1.1.1.5.2	**Standards:** A1.1.1.5.2	**Standards:** A1.1.1.5.3
⇩	⇩	⇩
Lesson Essential Question How do I factor binomials that are the difference of squares and use factored form to solve equations?	**Lesson Essential Question** How do I factor perfect square trinomials and use factored form to solve equations?	**Lesson Essential Question** How do I identify values excluded from the domain of a rational expression and simplify rational expressions?
⇩	⇩	⇩
Vocabulary Pattern recognition Difference of two squares Multiple factoring methods Sum of squares (prime) Factor completely	**Vocabulary** Pattern recognition Perfect squares Perfect square trinomial Repeated factor Square root property	**Vocabulary** Rational expression Excluded values/ Restrictions on domain Zeros of a function

Additional Information/Resources:
Glencoe Algebra 1 textbook sections: 8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-8, 8-9, 11-3