Pequea Valley School District
Math

Course: Algebra 1 **Grade**: 8, 9, 10

Unit 1: Equations

Unit Essential Question: **How do we use equations to represent and solve real world problems?**

CONCEPT	CONCEPT	CONCEPT
Equations with variables on 1-side	**Equations with variables on both sides**	**Proportions and Percents**
VOCABULARY	**VOCABULARY**	**VOCABULARY**
Expression, Coefficient, Constant, Variable, terms, like terms, Distributive Property, Equation, Commutative Property, Associative Property, Identity Property, Multiplicative Property of Zero, Properties of Equality, Isolate the Variable, Inverse Operations	Solve for a Variable, Isolate, Equivalent Equations, Solution, Formula, No Solution, Identity, All Real Numbers, Perimeter	Ratio, Rate, Reciprocal, Proportion, Cross Product, Percent Increase, Percent Decrease, Percent Proportion, Scale, Scale Drawing, Scale Model
KNOW	**KNOW**	**KNOW**
• Apply algebraic properties • Simplify expressions • Solve equations with variables on 1 side of an equation	• Solve equations with variables on both sides of an equation • Identify and solve equations that have 1 solution, no solution, or infinite solutions (all real numbers) • Solve literal equations/formulas for a given variable	• Identify ratios and rates • Set up and solve a proportion • Find values of related quantities • Find difference between quantities in terms of percents

UNDERSTAND	UNDERSTAND	UNDERSTAND
• Expressions are simplified when there are no like terms or () remaining • Equations must be balanced using the properties of equality.	• Equations may have no, one, or infinite solutions • Formulas can be rewritten	• How to model a real-world situation with a proportion • How to compare different quantities using percent and percent of change • How to find missing side length in scaled drawings and maps
LEARNING OUTCOME	**LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to solve real-life situations involving equations.	• Learners will be able to solve real-life situations involving equations. • Learners will be able to rewrite formulas and equations.	• Learners will be able to represent real-life situations with proportions. • Learners will be able to calculate percents of change, tips, and discounts.

Pa Core Standards:

CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.

CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.

CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.

CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.

CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.

CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.

Assessments: Unit Assessment

Pacing: 26 days (including assessment)

Resources: Schoology, ALEKS, McDougal Littell Algebra 1

***Extended Levels on Algebra 1 Course Mapping**

Pequea Valley School District
Math

Course: Algebra 1 **Grade**: 8, 9, 10

Unit 2: Inequalities

Unit Essential Question: **Why do we want to compare rather than get an exact answer?**

CONCEPT
One Variable Inequalities
VOCABULARY
Inequality, Open Circle, Closed Circle, Solution Set
KNOW
• Translate phrases into inequalities • Solve multi-step inequalities • Graph the solution set to an inequality on a number line • Reverse the direction of an inequality symbol when multiplying or dividing by a negative value
UNDERSTAND
• Inequalities have multiple solutions that can be represented on a number line

CONCEPT
Compound Inequalities
VOCABULARY
Compound Inequality, And, Or
KNOW
• Solve compound inequalities • Graph the solution set on a number line
UNDERSTAND
• How to solve inequalities and interpret the solutions • Compound inequalities and the differences between “and” and “or”.

CONCEPT
Absolute Value Inequalities
VOCABULARY
Absolute Value Inequality, Extraneous Solution, Tolerance, Absolute Deviation
KNOW
• Solving absolute value inequalities
UNDERSTAND
• Tolerance (abs. deviation) as an absolute value inequality • An absolute value inequality can be rewritten as a compound inequality

LEARNING OUTCOME	LEARNING OUTCOME	LEARNING OUTCOME
• Learners will be able to translate real world scenarios into inequalities, solve them, and represent their solutions on a number line.	• Learners will be able to represent real-life situations with linear inequalities and interpret the solutions. • Learners will be able to graphically represent solutions to real-life linear inequalities	• Learners will be able to represent real-life situations with absolute value equations/inequalities and interpret the solutions.

Pa Core Standards:

CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.

CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.

Assessments: Unit Assessment

Pacing: 21 days (including assessment)

Resources: Schoology, Get More Math, McDougal Littell Algebra 1

*Extended Levels on Algebra 1 Course Mapping

Pequea Valley School District
Math

Course: Algebra 1 **Grade**: 8, 9, 10

Unit 3: Graphing & Writing Linear Equations, Inequalities, and Functions

Unit Essential Question: What types of relationships can be modeled by linear rules?

CONCEPT	CONCEPT	CONCEPT	CONCEPT
Coordinate Plane & Slope	**Graphing Linear Equations & Inequalities**	**Direct Variation**	**Function Notation**
VOCABULARY	**VOCABULARY**	**VOCABULARY**	**VOCABULARY**
Coordinates, Points, Line, Quadrant, Origin, *x*-axis, *y*-axis, *x*-intercept, *y*-intercept, Slope, Rate of Change	Linear Equation, Slope-Intercept form, Standard form, Linear function, x-intercept, y-intercept, Graph of a Linear Inequality, Feasible Region	Direct Variation, Constant of Variation	Linear Function, Function Notation, Relation, Function, Domain, Range, Vertical Line Test
KNOW	**KNOW**	**KNOW**	**KNOW**
• Plot points in the Coordinate plane • Calculate the slope of a line • Determine the rate of change from points, a table, and graph	• Graph lines in standard form using x and y-intercepts • Graph lines in slope-intercept form • Graph inequality in 2 variables • Find solutions from feasible region	• Identify a linear relationship as direct variation • Evaluate equations to determine y-intercept value	• Represent a linear relationship using function notation • Identify domain and range of a relation • Determine if a relation is a function • Classify a function as linear or not

UNDERSTAND	UNDERSTAND	UNDERSTAND	UNDERSTAND
• Slope is a constant rate of change.	• Linear equations represent functions that change at a constant rate. • Graphs of linear inequalities have multiple solutions	• Direct variations have no *y*-intercept • Constant of variation is slope of linear graph	• Relationship between domain and range that results in a function. • Functions are input-output relationships.
LEARNING OUTCOME	**LEARNING OUTCOME**	**LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to use the coordinate plane to represent relationships from points, tables, and graphs	• Learners will be able to graphically represent a linear relationship. • Learners will be able to represent real-world situations with graphs of linear inequalities and interpret the solutions.	• Learners will be able to identify the *y*-intercept of a linear equation to determine if the equation is a direct variation. • Learners will be able to calculate the constant of variation.	• Learners will be able to evaluate functions for given input values. • Learners to be able to model real-world situations with reasonable domains and ranges.

CONCEPT	CONCEPT	CONCEPT	CONCEPT
Writing Linear Equations using Point-Slope Form	**Writing Linear Equations using slope-intercept form**	**Parallel & Perpendicular Lines**	**Scatter Plots & Lines of Best Fit**
VOCABULARY	**VOCABULARY**	**VOCABULARY**	**VOCABULARY**
Point-Slope Form, Standard Form	Slope-Intercept Form	Parallel Lines, Perpendicular Lines	Scatter plot, Correlation, Line of Best Fit, Linear Regression, Interpolation, Extrapolation,
KNOW	**KNOW**	**KNOW**	**KNOW**
• Write equations in Point slope form • Convert point-slope form to standard form.	• Write equations in slope-intercept form • Convert between slope-intercept and standard form	• Find slopes of parallel lines • Find slopes of perpendicular lines • Write equations that have parallel and perpendicular relationships	• Positive, negative and no correlation • Draw a line of best fit • Find an equation from two points on the line of best fit • Predict an estimated value • Identify a prediction as interpolation or extrapolation

UNDERSTAND	UNDERSTAND	UNDERSTAND	UNDERSTAND
• An equation will algebraically model the relationship between two variables	• An equation will algebraically model the relationship between two variables	• The slope will determine if two lines have a parallel or perpendicular relationship	• Scatter plots show relationships between two quantitative variables • Line of Best is a model used for summarizing data and making predictions
LEARNING OUTCOME	**LEARNING OUTCOME**	**LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to calculate *x*- and *y*-intercepts and explain what they mean in the context of a real-world problem • Learners will be able to calculate the slope and identify a point from a real-world situation, then use this facts to model a problem with an equation.	• Learners will be able to solve real-life situations involving linear equations • Learners will be able to rewrite formulas and equations	• Learners will be able to model parallel and perpendicular lines both algebraically and graphically	• Learners will be able to model relationships between two sets of data with a scatter plot and a line of best fit • Learners will be able to make predictions and analyze the appropriateness of their predictions for real-world situations.

Pa Core Standards:

CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.

CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.

CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.

CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.

CC.2.2.HS.C.4 Interpret the effects transformations have on functions and find the inverses of functions.

CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.

CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.

CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.

CC.2.4.HS.B.3 Analyze linear models to make interpretations based on the data.

CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.

CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.

CC.2.2.HS.C.6 Interpret functions in terms of the situation they model.

CC.2.2.HS.D.10 Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically

Assessments: Unit Assessment

Pacing: 45 days (including assessment)

Resources: Schoology, Get More Math, McDougal Littell Algebra 1

*Extended Levels on Algebra 1 Course Mapping

Pequea Valley School District
Math

Course: Algebra 1 **Grade**: 8, 9, 10

Unit 4: Systems of Equations and Inequalities

Unit Essential Question: **What can we do with a system of equations/inequalities that we cannot do with a single equation/inequality?**

CONCEPT	CONCEPT	CONCEPT	CONCEPT
Solving Systems of Equations by Graphing	**Solving Systems of Equations by Substitution**	**Solving Systems of Equations by Elimination**	**Systems of Inequalities**
VOCABULARY	**VOCABULARY**	**VOCABULARY**	**VOCABULARY**
System, No solution, Infinite Solutions, Coinciding Lines	Substitution	Elimination, Least Common Multiple	System of Linear Inequalities, Solution of a System of Linear Inequalities, Graph of a System of Linear Inequalities
KNOW	**KNOW**	**KNOW**	**KNOW**
• Graph lines in the coordinate plane • Determine the point of intersection • Recognize the solution to parallel and Coinciding lines • Determine if a given ordered pair is a solution	• Isolate a variable in terms of another variable • Substitute an algebraic expression in place of a variable in another equation	• Multiply/divide linear equations to find common multiples • Combine linear equations in order to isolate a variable	• Graph multiple linear inequalities on the same coordinate plane • Solutions are found in the intersection of the feasible regions of the linear inequalities

UNDERSTAND	UNDERSTAND	UNDERSTAND	UNDERSTAND
• How to graph a system of equations • Graphing is one method to solve a system of equations. • The graphing method is not always the most efficient method for solving a system of equations.	• How to use substitution to solve a system. • Substitution is one method for solving a system and is most efficient when a variable is isolated.	• How to use linear combinations in order to eliminate a variable • Elimination is efficient when both equations are in standard form.	• How to graph linear inequalities • How to find and interpret solutions
LEARNING OUTCOME	**LEARNING OUTCOME**	**LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to create, read, and interpret graphs of linear equations to find solutions to real-world problems.	• Learners will be able to solve systems of linear equations by substituting algebraic expressions for a variable.	• Learners will be able to solve systems of linear equations by eliminating a variable.	• Learners will be able to model real-world situations using systems of linear inequalities to find solutions to real-world problems. • Learners will interpret solutions to systems of linear inequalities in the context of real-world scenarios.

Pa Core Standards:

CC.2.2.HS.C.5 Construct and compare linear, quadratic and exponential models to solve problems.

CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.

CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.

CC.2.2.HS.C.6 Interpret functions in terms of the situation they model.

CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.

CC.2.1.HS.F.7 Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems.

CC.2.2.HS.D.5 Use polynomial identities to solve problems.

CC.2.2.HS.D.4 Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.

CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.

Assessments: Unit Assessment

Pacing: 17 days (including assessment)

Resources: Schoology, GMM, McDougal Littell Algebra 1

*Extended Levels on Algebra 1 Course Mapping

Pequea Valley School District
Math Department

Course: Algebra 1 **Grade**: 8, 9, 10

Unit 5: Exponents

Unit Essential Question: **Why do we need to use exponential notation to model situations?**

CONCEPT	CONCEPT	CONCEPT	CONCEPT
Product, Quotient, and Power Rules of Exponents	**Zero and Negative Exponents**	**Scientific Notation**	**GCF & LCM**
VOCABULARY	**VOCABULARY**	**VOCABULARY**	**VOCABULARY**
Base, exponent, power	Zero Exponent, Negative Exponent	Scientific Notation, Standard Notation	Greatest Common Factor, Least Common Denominator
KNOW	**KNOW**	**KNOW**	**KNOW**
• Apply product, quotient, and power rules to like bases • Simplify exponential expressions using the order of operations	• Numbers, variables, and expressions raised to a 0 exponent equal 1 • Negative exponents create reciprocal expressions from their corresponding positive exponent expressions	• Format for numbers written in scientific notation • Switching from standard form to scientific notation or from scientific notation to standard form • Multiplying and dividing numbers in scientific notation	• How to find GCF • How to find LCM
UNDERSTAND	**UNDERSTAND**	**UNDERSTAND**	**UNDERSTAND**
• How to simplify and evaluate expressions with like bases using the product, quotient, and power rules.	• How to simplify and evaluate expressions that include negative and/or zero exponents.	• How to apply exponent rules to write numbers in scientific notation • How to perform arithmetic with numbers in scientific	• How to apply GCF • How to apply LCM

LEARNING OUTCOME	**LEARNING OUTCOME**	notation **LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to simplify expressions with like bases	• Learners will be able to simplify and evaluate expressions utilizing the properties of zero and negative exponents.	• Learners will be able to represent very large and very small numbers in scientific notation. • Learners will be able to calculate products and quotients of numbers written in scientific notation.	• Learners will be able to calculate the GCF of two or more terms • Learners will be able to calculate the LCM of two or more terms

Pa Core Standards:

CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents

CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.

Assessments: Unit Assessment

Pacing: 11 days (including assessment)

Resources: Schoology, GMM, McDougal Littell Algebra 1

*Extended Levels on Algebra 1 Course Mapping

Pequea Valley School District
Math

Course: Algebra 1 **Grade**: 8, 9, 10

Unit 6: Polynomials

Unit Essential Question: **How can polynomials be simplified and applied to solve problems?**

CONCEPT	CONCEPT	CONCEPT	CONCEPT
Adding and Subtracting Polynomials	**Multiplying Polynomials**	**Factoring**	**Simplifying Rational Expressions**
VOCABULARY	**VOCABULARY**	**VOCABULARY**	**VOCABULARY**
Monomial, Binomial,Trinomial, Polynomial, Degree, Leading Coefficient	FOIL	Zero Product Property, Roots, Zero of a Function, GCF, Difference of two squares	Numerator, Denominator, Undefined
KNOW	**KNOW**	**KNOW**	**KNOW**
• Classify polynomials • Rewrite polynomials in standard form • Add and subtract polynomials • Express the perimeter of polygons as simplified polynomials	• Multiply monomials times a polynomial • Multiply a binomial times a binomial • Multiply a binomial times a trinomial • Express the area of rectangles as simplified polynomials	• Rewrite a trinomial as a product of two binomials • Factor out the GCF monomial factor, Difference of two squares, and trinomials in the form of ax^2+bx+c (a=1)	• Simplify rational expressions by eliminating common polynomials • When a rational expression will be undefined
UNDERSTAND	**UNDERSTAND**	**UNDERSTAND**	**UNDERSTAND**
• How to add and subtract polynomials • Polynomials can be used to express the perimeter of a rectangle	• How to apply the distributive property in conjunction with exponent rules to multiply a monomial by a polynomial • How to multiply binomials	• How to factor a trinomial by using the GCF • How to factor a trinomial by finding the difference of two squares	• How to utilize factoring to simplify rational expressions • How to identify when a rational expression will be undefined

	• How to multiply a binomial and a trinomial	• How to factor trinomials with a leading coefficient of 1	
LEARNING OUTCOME	**LEARNING OUTCOME**	**LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to simplify polynomials using addition and subtraction	• Learners will be able to re-express polynomial expressions involving multiplication as a single polynomial	• Learners will be able to factor a trinomial	• Learners will be able to simplifying rational expressions

Pa Core Standards:

CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.

CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.

CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.

CC.2.2.HS.D.5 Use polynomial identities to solve problems.

Assessments: Unit Assessment

Pacing: 17 days (including assessment)

Resources: Schoology, Get More Math, McDougal Littell Algebra 1
*Extended Levels on Algebra 1 Course Mapping

Pequea Valley School District
Math

Course: Algebra 1 **Grade**: 8, 9, 10

Unit 7: Radicals

Unit Essential Question: **How do power and radical functions model real-world problems and their solutions?**

CONCEPT
Evaluating Rational Radicals Simplifying Irrational Square Roots
VOCABULARY
Rational, Irrational, Radical, Radical Sign, Radicand, Principle Square Root, Perfect Square
KNOW
• Classify radicals as Rational or Irrational • Evaluate Rational Square roots • Simplify Irrational square roots • Simplify square roots with monomial radicands
UNDERSTAND
• That rational radicals can be evaluated, but irrational radicals should be simplified • How to simplify radicals with monomial radicands

CONCEPT
Multiplying and Dividing Square Roots
VOCABULARY
Rationalize the denominator
KNOW
• Multiplication/division across radicands • Multiplication/division across coefficients • Simplifying resulting radical • Rationalize the denominator
UNDERSTAND
• How to multiply/divide radical expressions by combining coefficients and radicands, then simplifying the result • How to rationalize the denominator of a radical expression involving fractions

CONCEPT
Adding & Subtracting Square Roots
VOCABULARY
KNOW
• Simplify a radical to find common bases • Combine radical expressions with equivalent radicands
UNDERSTAND
• How to find common radicands • How to combine like radicals expressions

LEARNING OUTCOME	LEARNING OUTCOME	LEARNING OUTCOME
• Learners will be able to simplify radical expressions to express exact answers in real world problems (not approximations).	• Learners will be able to multiply and divide radical expressions to find appropriate measurements in geometric settings	• Learners will be able to combine radical expressions to simplify algebraic statements

Pa Core Standards:

CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions.

CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.

CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real-world or mathematical problems.

Assessments: Unit Assessment

Pacing: 11 days (including assessment)

Resources: Schoology, GMM, McDougal Littell Algebra 1

*Extended Levels on Algebra 1 Course Mapping