Pequea Valley School District
Math

Course: Algebra 2 **Grade**: 8, 9, 10

Unit 1: Review/Skill Topics

Unit Essential Question: **What basic skills will ensure my success of Algebra 2 content?**

CONCEPT	CONCEPT	CONCEPT	CONCEPT
Real Numbers and Imaginary Numbers	**Functions**	**Exponent Rules**	**Equations and Inequalities**
VOCABULARY	**VOCABULARY**	**VOCABULARY**	**VOCABULARY**
Opposite, Reciprocal, Rational Number, Real Number, Irrational Number, Integer, Whole Number, Unit Rate, Conversion Factor, Absolute Value, Imaginary Unit, Imaginary Numbers, Complex Numbers	Domain, Range, Interval Notation, Function, Vertical Line Test, Direct/Inverse Variation	Exponent, Base, Rational Exponent, Radical, Conjugate, Rationalizing, Power	Absolute Value Equation, Absolute Value Inequality, Extraneous Solution, Tolerance, Absolute Deviation, Linear Inequality, Compound Inequality, Equivalent Inequalities, Literal Equations
KNOW	**KNOW**	**KNOW**	**KNOW**
• Subsets of real numbers • Unit analysis • Properties of real numbers	• Reasonableness of answers • Functions • Domain/Range • Direct Variation • Inverse Variation • Problem solving strategies	• Exponent rules • Rational exponent rules • Simplifying radicals • Rationalizing denominators	• Solving absolute value equations • Solving absolute value inequalities • Rewriting formulas and equations

UNDERSTAND	UNDERSTAND	UNDERSTAND	UNDERSTAND
• Real numbers and their properties • Converting from one unit of measure to another	• Methods of solving word problems • Domain and range in content of problem • The difference between direct and inverse variation	• How to apply exponent and radical rules	• Tolerance (abs. deviation) as an absolute value inequality • Solutions to absolute value equations • How to rewrite formulas and equations (i.e. Solve for y) • How to solve inequalities and interpret the solutions • Compound inequalities and the differences between “and” and “or”.
LEARNING OUTCOME	**LEARNING OUTCOME**	**LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to perform unit conversions and make sense of solutions • Learners will be able to utilize the properties of real numbers to justify work/solutions.	• Learners will be able to solve real-life situations involving direct and inverse variation • Learners are able to apply domain and range in real life situations	• Learners will be able to solve real life equations involving exponents and radicals	• Learners will be able to represent real-life situations with absolute value equations/inequalities and interpret the solutions. • Learners will be able to graphically represent solutions to real-life linear inequalities • Learners will be able to rewrite formulas and equations

Pa Core Standards:

CC.2.1.HS.F.2
Apply properties of rational and irrational numbers to solve real world or mathematical problems.
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.2.2.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.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.

Assessments: Unit Assessment, Level Assessments

Pacing: 14 days (including assessment)

Pequea Valley School District
Math

Course: Algebra 2 **Grade**: 8, 9, 10

Unit 2: All Things Linear

Unit Essential Question: **How do linear equations model real life scenarios?**

CONCEPT	CONCEPT	CONCEPT	CONCEPT
Visual Representations and Definition	**Linear Equations**	**Scatter Plots**	**Systems of Equations**
VOCABULARY	**VOCABULARY**	**VOCABULARY**	**VOCABULARY**
horizontal, vertical, undefined, positive slope, negative slope, zero slope, slope, y-intercept	Slope, y-intercept, rate of change, x-intercept, parallel, perpendicular, slope intercept form, standard form, point-slope form	Scatter plot, regression line, line of best fit, line of fit, data points, outlier, positive correlation, negative correlation, no correlation, cluster, gap	Point of Intersection, Graphing, Substitution, Elimination, Solution, No Solution, Infinite Solutions, Ordered Triple, Linear System
KNOW	**KNOW**	**KNOW**	**KNOW**
• Forms of linear equations • Slope • Representations The (Graphs, Tables, Equations) • Reasonableness of answers • Problem solving strategies	• Forms of linear equations • Slope • Solving linear equations • Properties of Equality • Reasonableness of answers • Rewriting formulas and equations • Problem solving strategies	• Scatter Plots • Calculating Slope • Line of Best Fit	• System Solution • Solve by Graphing • Solve by Substitution • Solve by Elimination • System of 3 Equations • Z coordinate
UNDERSTAND	**UNDERSTAND**	**UNDERSTAND**	**UNDERSTAND**
• What linear relationships look like in graph, table and equation form. • How slope affects the graph	• The process of solving linear equations • How to rewrite formulas and equations(i.e. Solve for	• Positive and negative correlation between • How to use scatter plots to develop linear models for	• Where the solution is visibly • What is means to be a solution to a system of equations

of a linear equation	y) • Methods of solving word problems	real - life data	• Uses of systems of equations
LEARNING OUTCOME	**LEARNING OUTCOME**	**LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to identify linear patterns in real life scenarios	• 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 calculate the line of best fit for any scatter plot • Learners will be able to identify key features of a scatter plot	• Learners will be able to determine whether or not a given point is a solution to a system of equations • Learners will be able to write, identify and interpret a solution(s) to a system of equations for a real-life situation (2 and 3)

Pa Core Standards:

CC.2.2.HS.D.7
Create and graph equations or inequalities to describe numbers or relationships
CC.2.2.HS.C.1
Use the concept and notation of functions to interpret and apply them in terms if their context
CC.2.2.HS.C.2
Graph and analyze functions and use their properties to make connections between 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.2.2.HS.B.2
Interpret functions in terms of the situations they model
CC.2.2.HS.B.3
Summarize, represent, and interpret data on two categorical and quantitative variables
CC.2.2.HS.D.10
Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

Assessments: Unit Assessment, Level Assessments

Pacing: 30 days (including assessment)

Pequea Valley School District
Math

Course: Algebra 2 Grade: 8, 9, 10

Unit 3: Quadratics

Unit Essential Question: How do quadratic equations model real life scenarios?

CONCEPT	CONCEPT	CONCEPT
Visual Representation and Definition	**Complex Numbers**	**Solving Quadratics**
VOCABULARY	**VOCABULARY**	**VOCABULARY**
Vertex, Intercepts, Axis of Symmetry, Roots, Zeros, Solutions, Standard Form, Intercept Form, Vertex Form	Square Root, Imaginary Number, i, Negative Numbers, Imaginary Unit, Complex Number, Real Part of a Complex Number, Conjugate, Complex Conjugate	Point of Intersection, Graphing, Substitution, Elimination, Solution, No Solution, Infinite Solutions, Ordered Triple, Linear System, Discriminant, Quadratic Formula
KNOW	**KNOW**	**KNOW**
• Forms of quadratics • Vertex of a graph • Parabolas are symmetrical	• Simplifying complex numbers • When and why complex numbers are needed	• Factoring methods when a=1 and when a≠1 • Zero Product Property • Special Factoring patterns • Uses for the discriminant • Quadratic Formula • Simplifying by square root

UNDERSTAND	UNDERSTAND	UNDERSTAND
• Graphical representations of quadratic functions • Differences between the x-intercepts and vertex • All 3 forms of equivalent quadratic equations represent the same function/situation and will produce the same graph	• When and how to use complex numbers	• Factoring and purposes of factoring • Solutions to quadratic equations • How and when to apply the Zero Product Property • Zeros, Roots, Solutions and x-intercepts versus linear factors
LEARNING OUTCOME	**LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to identify which form a quadratic is given in • Learners will be able to locate and interpret key features of a quadratic	• Learners will be able to identify complex and imaginary numbers	• Learners will be able to solve quadratic equations using multiple methods • Learners will be able to solve real life equations involving quadratic equations

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.D.2
Write expressions in equivalent forms to solve problems.
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.

Assessments: Unit Assessment, Level Assessments

Pacing: 35 (including assessment)

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Math

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Unit 4: Polynomials

Unit Essential Question: **How do quadratic equations model real life scenarios?**

CONCEPT	CONCEPT	CONCEPT
Visual Representation and Definition	**Polynomial Operations**	**Solving Polynomials**
VOCABULARY	**VOCABULARY**	**VOCABULARY**
Polynomial, Polynomial Function, Leading Coefficient, Degree, Constant Term, Cubic Function, Quartic Function, Monomial, Binomial, Trinomial, Linear, Quadratic, Standard Form	Direct Substitution, Synthetic Substitution, Like Terms,	Zeros, Solutions, Roots, Remainder Theorem, Factor Theorem, Rational Zero Theorem, Fundamental Theorem of Algebra, Zero Product Property, SOAP, Sum/Differences of Perfect Cubes, Difference of Perfect Squares
KNOW	**KNOW**	**KNOW**
• Terms of a Polynomial • Degree of a Polynomial • Name by Number of Terms • Name by Degree • Identify Leading Coefficient	• Combining Like Terms • Polynomial Long Division • Synthetic Division	• Process of factoring by all methods • Perfect Cubes and Perfect Squares • List possible rational zeros • Factor through synthetic division • Find all zeros of polynomial functions

UNDERSTAND	UNDERSTAND	UNDERSTAND
• How to write in standard form • How to identify polynomials by number of terms • How to identify polynomials by degree	• Operations with polynomials	• The process of solving polynomials for all solutions • The process of dividing polynomial functions • The process of solving polynomials through factoring
LEARNING OUTCOME	**LEARNING OUTCOME**	**LEARNING OUTCOME**
• Learners will be able to write a polynomial in standard form • Learners will be able to identify key features of a polynomial	• Learners will be able to apply all operations to any polynomial	• Learners will be able to find all solutions to polynomial equations

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.D.2
Write expressions in equivalent forms to solve problems.
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.

Assessments: Unit Assessment, Level Assessments

Pacing: 35 (including assessment)