POCONO MOUNTAIN SCHOOL DISTRICT CURRICULUM

Honors Algebra II: Grade 10	Unit 1:	Quadratic, Polynomial Functions, and Complex Numbers	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

The Complex Number System

- **N.CN.1** Know there is a complex number i such that $i^2 = -1$, and every complex number has the form a + bi with a and b real.
- **N.CN.2** Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.
- **N.CN.7** Solve quadratic equations with real coefficients that have complex solutions.
- **N.CN.8** Extend polynomial identities to the complex numbers. For example, rewrite $x^2 + 4$ as $(x + 2i)(x – 2i)$.
- **N.CN.9** Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Arithmetic with Polynomials and Rational Expressions

- **A.APR.1** Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
- **A.APR.2** Know and apply the Remainder Theorem: For a polynomial p(x) and a number a, the remainder on division by x – a is p(a), so p(a) = 0 if and only if (x – a) is a factor of p(x).
- **A.APR.3** Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
- **A.APR.4** Prove polynomial identities and use them to describe numerical relationships.

Reasoning with Equations and Inequalities

- **A.REI.11** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Interpreting Functions

- **F.IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Seeing Structure in Expressions

- **A.SSE.1** Interpret expressions that represent a quantity in terms of its context.
- **A.SSE.2** Use the structure of an expression to identify ways to rewrite it.

MATHEMATICAL PRACTICES:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

POCONO MOUNTAIN SCHOOL DISTRICT CURRICULUM

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
• **How are polynomial functions used to understand/represent the Universe we live in?** • **How are all the different representations of a polynomial function related?** • **How are quadratic functions used to understand/represent the Universe we live in?** • **How can writing a mathematical statement in different but equivalent ways highlight its various features?** • **Often, solving problems involves making choices. How can we make smart choices for any problem?**	Absolute maximum Absolute minimum Absolute Value Arithmetic Sequence Asymptote Axis of Symmetry Binomial Complex Number Conjugate Discriminant Domain End Behavior Exponent Properties Extraneous Solution Index Intercept Form (Factored Form) Inverse Function Irrational Multiplicity Nth Root Parabola Polynomial Polynomial Long Division Quadratic Function Range Regression Models Relative maximum Relative minimum Roots Roots Functions Sample Survey Synthetic Division Translations Trinomial Vertex Form Zeros	**Formative:** • Journals/logs • KWL chart • At the bell activities • Question and answer • Individual white boards/Promethean Board ActiVotes • Homework • Quizzes • Constructed response/open-ended problem solving • Performance tasks • Exit slips **Summative:** • CDT's • Performance based assessments o Quizzes o Tests o Constructed response/open-ended problem solving o Performance tasks o Project

POCONO MOUNTAIN SCHOOL DISTRICT CURRICULUM

UNIT OF INSTRUCTION: GEOMETRY: SIMILARITY, RIGHT TRIANGLES, AND TRIGONOMETRY

PA CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems. **CC.2.1.HS.F6** Extend the knowledge of arithmetic operations and apply to complex numbers. **CC.2.1.HS.F7** Apply concepts of complex numbers in polynomial identities and quadratic equations to solve problems. **CC.2.1.HS.C.5** Construct and compare linear, quadratic and exponential models to solve problems. **CC.2.1.HS.C.2** Graph and analyze functions and use their properties to make connections between the different representations. **CC.2.1.HS.D.1** Interpret the structure of expressions to represent a quantity in terms of its context.1 **CC.2.1.HS.D.2** Write expressions in equivalent forms to solve problems. **CC.2.1.HS.D.3** Extend the knowledge of arithmetic operations and apply to polynomials. **CC.2.1.HS.D.4** Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs. **CC.2.1.HS.D.9** Use reasoning to solve equations and justify the solution method. **CC.2.1.HS.C.1** Use the concept and notation of functions to interpret and apply them in terms of their context. **CC.2.1.HS.C.3** Write functions or sequences that model relationships between two quantities. **CC.2.1.HS.C.4** Interpret the effects transformations have on functions and find the inverses of functions. **CC.2.1.HS.C.6** Interpret functions in terms of the situation they model. **CC.2.1.HS.D.7** Create and graph equations or inequalities to describe numbers or relationships. **CC.2.1.HS.C.8** Apply inverse operations to solve equations or formulas for a given variable. **Essential Skills and Understanding** • Ability to create, interpret, and/or use the equation, graph, or table of a quadratic functions. • Ability to factor algebraic expressions including difference of squares and trinomials. • Ability to write and/or solve quadratic equations by factoring. • Ability to simplify roots with negative radicands. • Ability to simplify & evaluate expressions involving powers of i. • Ability to perform operations with complex numbers.	**A2.1.1 Operations with Complex Numbers** **A2.1.1.1 Represent and/or use imaginary numbers in equivalent forms (e.g., square roots and exponents).** • **A2.1.1.1.1** Simplify/write square roots in terms of i (e.g., $\sqrt{-24} = 2i\sqrt{6}$). • **A2.1.1.1.2** Simplify/evaluate expressions involving powers of i (e.g., $i^6 + i^3 = -1 - i$). **A2.1.1.2 Apply the order of operations in computation and in problem-solving situations** • **A2.1.1.2.1** Add and subtract complex numbers (e.g., $(7 - 3i) - (2 + i) = 5 - 4i$). • **A2.1.1.2.2** Multiply and divide complex numbers (e.g., $(7 - 3i)(2 + i) = 17 + i$). **A2.1.2 Non-Linear Expressions** **A2.1.2.2 Simplify Expressions involving polynomials** • **A2.1.2.2.1** Factor algebraic expressions, including difference of squares and trinomials. Note: Trinomials limited to the form ax^2+bx+c where a is not equal to 0. **A2.1.3 Non-Linear Equations** **A2.1.3.1 Write and/or solve non-linear equations using various methods** • **A2.1.3.1.1** Write and/or solve quadratic equations (including factoring and using the Quadratic Formula). **A2.1.3.2 Describe and/or determine change** • **A2.1.3.2.1** Determine how a change in one variable relates to a change in a second variable (e.g., y = 4/x; if x doubles, what happens to y?). • **A2.1.3.2.2** Use algebraic processes to solve a formula for a given variable (e.g., solve d = rt for r).

	• Ability to use the quadratic formula to find the exact value of the solutions to a quadratic equation. • Ability to use the discriminant to find the number and nature of roots. • Ability to use vertex formula & write quadratic equations in vertex form. • Ability to solve quadratic equations by completing the square. • Ability to create, interpret, and/or use the equation, graph, or table of a polynomial functions. • Note: Honors level students are expected to work on additional rigorous, challenging problems, proofs, and applications of concepts/skills as part of the course. Increased pace of instruction will occur.	**A2.2.1 Patterns, Relations, and Functions** **A2.2.1.1 Analyze and or use patterns or relations** • **A2.2.1.1.3** Determine the domain, range, or inverse of a relation. • **A2.2.1.1.4** Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increase/decrease, intercepts, zeros, and asymptotes). **A2.2.2 Applications of Functions** **A2.2.2.1 Create, interpret, and/or use polynomial, exponential, and /or logarithmic functions and their equations, graphs or tables.** • **A2.2.2.1.1** Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics). • **A2.2.2.1.4** Translate a polynomial, exponential, or logarithmic function from one representation of a function to another (graph, table, and equation). **A2.2.2.2 Describe and/or determine families of functions** • **A2.2.2.2.1** Identify or describe the effect of changing parameters within a family of functions (e.g., $y = x^2$ and $y = x^2 + 3$, or $y = x^2$ and $y = 3x^2$).

DIFFERENTIATION ACTIVITIES:
Teacher directed differentiated instructional projects and activities are ongoing and based on student need.

ENRICHMENT:

- Pearson SuccessNet On-Line Teacher's Edition
- Pearson on-line resources and materials
- StudyIsland
- Web-based Math Resources
- Small group instruction
- Teacher generated/differentiated instruction enrichment and activities
- Supporting the range of learners as per teacher manual
- Encourage and support learners in explaining how they applied their skills during mathematical tasks
- http://www.artofproblemsolving.com/liz/Alcumus/index.php
- Enrichment based on student GIEP or need of student

REMEDIATION:

- Pearson Successnet On-Line Teacher's Edition
- Pearson on-line resources and materials
- Web-based Math Resources
- Supporting the range of learners as per teacher manual
- Teacher generated/differentiated instruction activities
- Small group instruction
- Adapted assignments
- Additional time
- Alternative Assessments
- Chunking of content, assignment and/or assessments
- One-on-one re-teaching
- Volunteer/peer tutoring
- Accommodations based on IEP and/or need
- ELL student(or based on student need) additional support
    - Provide specific examples
    - Use of Manipulatives
    - Simplified language in word problems
    - Visuals
    - Flashcards
    - Multiple-meaning words
    - Bilingual dictionary/picture dictionary
- Math Support, Learning Support, or ELL Teachers as appropriate and based on need

RESOURCES:

- Pearson Algebra II: Units 1, 2, 3, 5
- Prentice Hall Algebra II: 1,2, 5, 6, 7
- PDE SAS portal: http://www.pdesas.org
- Thinking Maps
- Graphing calculator
- Exit Tickets
- Adaptions checklist
- ELL Instructional Strategies for Math
- ESL Resources
  - Click on "Academic" from PMSD website
  - Click on English Language Arts on left side toolbar
  - Click on the link for ESL
  - Click on Teacher
- Teacher generated/differentiated instruction resources and activities
- Algebra II released state sample questions
- Algebra II generated sample questions
- Promethean Flipcharts/ActiveVotes
- Math flipcharts
- Math Internet Resources from PMSD Resource Page
- StudyIsland
- http://www.khanacademy.org/
- Thinkfinity website: http://www.thinkfinity.org/home
- IXL Website: http://www.IXL.com/math/
- United Streaming: http://streaming.discoveryeducation.com/index.cfm
- http://edhelper.com/place_value.html
- http://illuminations.nctm.org
- http://insidemathematics.org
- www.teachingchannel.org
- www.Learnzillion.com
- http://illustrativemathematics.org/standards/k8
- http://wiki.warren.kyschools.us/groups/wcpscommoncorestandards/
- www.teachingchannel.org
- http://www.learnzillion.com
- http://www.teacherspayteachers.com
- flexmath.ck12.org/

POCONO MOUNTAIN SCHOOL DISTRICT CURRICULUM

Honors Algebra II: Grade 10	Unit 2:	Rational and Radical Relationships	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Arithmetic with Polynomials and Rational Expressions

- **A.APR.6** Rewrite simple rational expressions in different forms.
- **A.APR.7** Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

Reasoning with Equations and Inequalities

- **A.REI.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
- **A.REI.11** Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

Interpreting Functions

- **F.IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Seeing Structure in Expressions

- **A.SSE.**1 Interpret expressions that represent a quantity in terms of its context.
- **A.SSE.2** Use the structure of an expression to identify ways to rewrite it.

MATHEMATICAL PRACTICES:

9. Make sense of problems and persevere in solving them.
10. Reason abstractly and quantitatively.
11. Construct viable arguments and critique the reasoning of others.
12. Model with mathematics.
13. Use appropriate tools strategically.
14. Attend to precision.
15. Look for and make use of structure.
16. Look for and express regularity in repeated reasoning.

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
• **How are radical functions used to understand/represent the Universe we live in?** • **How can something that "doesn't exist" affect our world?** • **How can we make sense of exponents that are not integers?** • **How are rational functions and different types of variation used to understand/represent the Universe we live in?** • **How is it possible to keep getting closer and closer to something, but never actually touch it?**	Absolute maximum Absolute minimum Asymptote Binomial Domain Exponent Properties Extraneous Solution Index Irrational Polynomial Radical Function Radicand Range Rational Rational Exponent Roots	**Formative:** • Journals/logs • KWL chart • At the bell activities • Question and answer • Individual white boards/Promethean Board ActiVotes • Homework • Quizzes • Constructed response/open-ended problem solving • Performance tasks • Exit slips **Summative:** • CDT's

	Roots Functions Scatterplot Trinomial Zeros	• Performance based assessments o Quizzes o Tests o Constructed response/open-ended problem solving o Performance tasks o Project

UNIT OF INSTRUCTION: GEOMETRY: SIMILARITY, RIGHT TRIANGLES, AND TRIGONOMETRY

PA CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational expressions. **CC.2.1.HS.F.2** Apply properties of rational and irrational numbers to solve real world or mathematical problems. **CC.2.1.HS.C.2** Graph and analyze functions and use their properties to make connections between the different representations. **CC.2.1.HS.D.1** Interpret the structure of expressions to represent a quantity in terms of its context.1 **CC.2.1.HS.D.2** Write expressions in equivalent forms to solve problems. **CC.2.1.HS.D.3** Extend the knowledge of arithmetic operations and apply to polynomials. **CC.2.1.HS.D.4** Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs. **CC.2.1.HS.D.9** Use reasoning to solve equations and justify the solution method. **CC.2.1.HS.C.1** Use the concept and notation of functions to interpret and apply them in terms of their context. **CC.2.1.HS.C.3** Write functions or sequences that model relationships between two quantities. **CC.2.1.HS.C.4** Interpret the effects transformations have on functions and find the inverses of functions. **CC.2.1.HS.C.6** Interpret functions in terms of the situation they model. **CC.2.1.HS.D.7** Create and graph equations or inequalities to describe numbers or relationships. **CC.2.1.HS.C.8** Apply inverse operations to solve equations or formulas for a given variable. **Essential Skills and Understanding** • Ability to use exponential expressions to represent rational numbers, including all laws of exponents. • Ability to evaluate expressions with rational exponents, including negative and zero exponents. • Ability to solve radical equations.	**A2.1.2 Non-Linear Expressions** **A2.1.2.1 Use exponents, roots, and/or absolute values to represent equivalent forms or to solve problems** • **A2.1.2.1.1** Use exponential expressions to represent rational numbers. • **A2.1.2.1.2** Simplify/evaluate expressions involving positive and negative exponents and/or roots (may contain all types of real numbers—exponents should not exceed power of 10). • **A2.1.2.1.3** Simplify/evaluate expressions involving multiplying with exponents (e.g., $x^6 \bullet x^7 = x^{13}$), powers of powers (e.g., $(x^6)^7 = x^{42}$), and powers of products (e.g., $(2x^2)^3 = 8x^6$). Note: Limit to rational exponents. **A2.1.2.2 Simplify expressions involving polynomials** • **A2.1.2.2.2** Simplify rational algebraic expressions. **A2.2.1 Patterns, Relations, and Functions** **A2.2.1.1 Analyze and/or use patterns or relations** • **A2.2.1.1.3** Determine the domain, range, or inverse of a relation. • **A2.2.1.1.4** Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increase/decrease, intercepts, zeros, and asymptotes). **A2.2.2 Applications of Functions** **A2.2.2.2 Describe and/or determine families of functions** • **A2.2.2.2.1** Identify or describe the effect of changing parameters within a family of functions (e.g., $y = x^2$ and $y = x^2 + 3$, or $y = x^2$ and $y = 3x^2$).

	• Ability to evaluate the composition of two functions given a value of x. • Ability to determine how a change in one variable relates to a change in a second variable. • Ability to simplify rational expressions. • Ability to solve rational equations. • Ability to find the inverse of a function. • Ability to add and subtract rational expressions with like or unlike denominators. • Note: Honors level students are expected to work on additional rigorous, challenging problems, proofs, and applications of concepts/skills as part of the course. Increased pace of instruction will occur.	

DIFFERENTIATION ACTIVITIES:
Teacher directed differentiated instructional projects and activities are ongoing and based on student need.

ENRICHMENT:

- Pearson SuccessNet On-Line Teacher's Edition
- Pearson on-line resources and materials
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- Web-based Math Resources
- Small group instruction
- Teacher generated/differentiated instruction enrichment and activities
- Supporting the range of learners as per teacher manual
- Encourage and support learners in explaining how they applied their skills during mathematical tasks
- http://www.artofproblemsolving.com/liz/Alcumus/index.php
- Enrichment based on student GIEP or need of student

REMEDIATION:

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- Small group instruction
- Adapted assignments
- Additional time
- Alternative Assessments
- Chunking of content, assignment and/or assessments
- One-on-one re-teaching
- Volunteer/peer tutoring
- Accommodations based on IEP and/or need
- ELL student(or based on student need) additional support
    - Provide specific examples
    - Use of Manipulatives
    - Simplified language in word problems
    - Visuals
    - Flashcards
    - Multiple-meaning words
    - Bilingual dictionary/picture dictionary
- Math Support, Learning Support, or ELL Teachers as appropriate and based on need

RESOURCES:

- Pearson Algebra II: Unit 4
- Prentice Hall Algebra II: Units 7, 9
- PDE SAS portal: http://www.pdesas.org
- Thinking Maps
- Graphing calculator
- Exit Tickets
- Adaptions checklist
- ELL Instructional Strategies for Math
- ESL Resources
  - Click on "Academic" from PMSD website
  - Click on "English Language Arts" on left side of tool bar.
  - Click on the link for ESL
  - Click on Teacher
- Teacher generated/differentiated instruction resources and activities
- Algebra II released state sample questions
- Algebra II generated sample questions
- Promethean Flipcharts/ActiveVotes
- Math flipcharts
- Math Internet Resources from PMSD Resource Page
- StudyIsland
- http://www.khanacademy.org/
- Thinkfinity website: http://www.thinkfinity.org/home
- IXL Website: http://www.IXL.com/math/
- United Streaming: http://streaming.discoveryeducation.com/index.cfm
- http://edhelper.com/place_value.html
- http://illuminations.nctm.org
- http://insidemathematics.org
- www.teachingchannel.org
- www.Learnzillion.com
- http://illustrativemathematics.org/standards/k8
- http://wiki.warren.kyschools.us/groups/wcpscommoncorestandards/
- www.teachingchannel.org
- http://www.learnzillion.com
- http://www.teacherspayteachers.com
- flexmath.ck12.org/

POCONO MOUNTAIN SCHOOL DISTRICT CURRICULUM

Honors Algebra II: Grade 10	Unit 3:	Logarithmic, Exponential, and Modeling Functions	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Creating Equations

- **A.CED.1** Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
- **A.CED.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
- **A.CED.3** Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
- **A.CED.4** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.

Interpreting Functions

- **F.IF.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.
- **F.IF.5** Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.
- **F.IF.6** Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
- **F.IF.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
- **F.IF.9** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
- **F.IF.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Building Functions

- **F.BF.1** Write a function that describes a relationship between two quantities.*
- **F.BF.3** Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. F.BF.4 Find inverse functions.

MATHEMATICAL PRACTICES:

17. Make sense of problems and persevere in solving them.
18. Reason abstractly and quantitatively.
19. Construct viable arguments and critique the reasoning of others.
20. Model with mathematics.
21. Use appropriate tools strategically.
22. Attend to precision.
23. Look for and make use of structure.
24. Look for and express regularity in repeated reasoning.

Linear, Quadratic, and Exponential Models • **F.LE.4** For exponential models, express as a logarithm the solution to a $b^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
• **How are functions used to represent/simulate the world we live in, and why are they so important?** • **How do functions help us to make the best decision?** • **What are some different kinds of functions, and what sorts of real-world situations can they model?** • **Why is the idea of "inverse" so important in mathematics?** • **How are exponential and logarithmic functions used to understand/represent the Universe we live in?** • **Why does the graph of an exponential function have its shape? How is it possible to get closer and closer to something and never touch it?**	Asymptote Common Logarithm Domain Exponential Exponential Decay Exponential Function Exponential Growth Increasing/Decreasing Intervals Intercept Inverse of a Function Logarithm Natural Logarithm Negative Exponents Range Regression Models Translation	**Formative:** • Journals/logs • KWL chart • At the bell activities • Question and answer • Individual white boards/Promethean Board ActiVotes • Homework • Quizzes • Constructed response/open-ended problem solving • Performance tasks • Exit slips **Summative:** • CDT's • Performance based assessments o Quizzes o Tests o Constructed response/open-ended problem solving o Performance tasks o Project

UNIT OF INSTRUCTION:
GEOMETRY: SIMILARITY, RIGHT TRIANGLES, AND TRIGONOMETRY

PA CORE STANDARDS		KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
CC.2.1.HS.F.1	Apply and extend the properties of exponents to solve problems with rational exponents	**A2.1.2 Non-Linear Expressions**
CC.2.1.HS.F.3	Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays.	**A2.1.2.1 Use exponents, roots, and/or absolute values to represent equivalent forms or to solve problems**
CC.2.1.HS.C.5	Construct and compare linear, quadratic and exponential models to solve problems.	• **A2.1.2.1.4** Simplify or evaluate expressions involving logarithms and exponents (e.g., $\log_2 8 = 3$ or $\log_4 2 = ½$).
CC.2.1.HS.C.2	Graph and analyze functions and use their properties to make connections between the different representations.	
CC.2.1.HS.D.1	Interpret the structure of expressions to represent a quantity in terms of its context.	**A2.1.3 Non-Linear Equations**
CC.2.1.HS.D.2	Write expressions in equivalent forms to solve problems.	
CC.2.1.HS.D.6	Extend the knowledge of rational functions to rewrite in equivalent forms.	**A2.1.3.1 Write and/or solve non-linear equations using various methods**
CC.2.1.HS.D.9	Use reasoning to solve equations and justify the solution method.	• **A2.1.3.1.3** Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms). A2.1.3.1.4 Write, solve, and/or apply linear or exponential growth or decay (including problem situations).
CC.2.1.HS.D.4	Understand the relationship between zeros and factors of polynomials to make generalizations about functions and their graphs.	
CC.2.1.HS.D.9	Use reasoning to solve equations and justify the solution method.	
CC.2.1.HS.B3	Analyze linear models to make interpretations based on the data.	
CC.2.1.HS.C.4	Interpret the effects transformations have on functions and find the inverses of functions.	
CC.2.1.HS.C.6	Interpret functions in terms of the situation they model.	
CC.2.1.HS.D.7	Create and graph equations or inequalities to describe numbers or relationships.	
CC.2.1.HS.C.8	Apply inverse operations to solve equations or formulas for a given variable.	**A2.1.3.2 Describe and/or determine change**
		• **A2.1.3.2.1** Determine how a change in one variable relates to a change in a second variable (e.g., y = 4/x; if x doubles, what happens to y?).
Essential Skills and Understanding		• **A2.1.3.2.2** Use algebraic processes to solve a formula for a given variable (e.g., solve d = rt for r).
• Ability to write, solve, and apply linear or exponential growth or decay (including problem situations)		
• Ability to simplify or evaluate expressions involving logarithms and exponents.		
• Ability to create, interpret, and/or use the equation, graph, or table of a exponential functions.		
• Ability to create, interpret, and/or use the equation, graph, or table of a logarithmic function.		
• Ability to write and solve exponential equations.		
• Ability to write and solve logarithmic equations.		
• Ability to make predictions using equations or graphs of regression models.		
• Ability to draw, identify, find, interpret and/or write an equation for a regression model for a scatter plot.		
• Note: Honors level students are expected to work on additional rigorous, challenging problems, proofs, and applications of concepts/skills as part of the course. Increased pace of instruction will occur.		

		A2.2.1 Patterns, Relations and Functions **A2.2.1.1 Analyze and/or use patterns or relations** • **A2.2.1.1.1** Analyze a set of data for the existence of a pattern, and represent the pattern with a rule algebraically and/or graphically • **A2.2.1.1.3** Determine the domain, range, or inverse of a relation. • **A2.2.1.1.4** Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increase/decrease, intercepts, zeros, and asymptotes). **A2.2.2 Applications of Functions** **A2.2.2.1 Create, interpret, and/or use polynomial, exponential and/or logarithmic functions, and their equations, graphs, or tables** • **A2.2.2.1.2** Create, interpret, and/or use the equation, graph, or table of an exponential or logarithmic function (including common and natural logarithms). • **A2.2.2.1.3** Determine, use, and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential, or logarithmic function. • **A2.2.2.1.4** Translate a polynomial, exponential, or

		logarithmic function from one representation of a function to another (graph, table, and equation). **A2.2.2.2 Describe and/or determine families of functions** • **A2.2.2.2.1** Identify or describe the effect of changing parameters within a family of functions (e.g., $y = x^2$ and $y = x^2 + 3$, or $y = x^2$ and $y = 3x^2$). **A2.2.3 Data Analysis** **A2.2.3.1 Analyze and/or interpret data on a scatter plot and/or use a scatter plot to make predictions** • **A2.2.3.1.1** Draw, identify, find, interpret, and/or write an equation for a regression model (lines and curves of best fi t) for a scatter plot. • **A2.2.3.1.2** Make predictions using the equations or graphs of regression models (lines and curves of best fit) of scatter plots.

DIFFERENTIATION ACTIVITIES:
Teacher directed differentiated instructional projects and activities are ongoing and based on student need.

ENRICHMENT:

- Pearson SuccessNet On-Line Teacher's Edition
- Pearson on-line resources and materials
- StudyIsland
- Web-based Math Resources
- Small group instruction
- Teacher generated/differentiated instruction enrichment and activities
- Supporting the range of learners as per teacher manual
- Encourage and support learners in explaining how they applied their skills during mathematical tasks
- http://www.artofproblemsolving.com/liz/Alcumus/index.php
- Enrichment based on student GIEP or need of student

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- Volunteer/peer tutoring
- Accommodations based on IEP and/or need
- ELL student(or based on student need) additional support
  - Provide specific examples
  - Use of Manipulatives
  - Simplified language in word problems
  - Visuals
  - Flashcards
  - Multiple-meaning words
  - Bilingual dictionary/picture dictionary
- Math Support, Learning Support, or ELL Teachers as appropriate and based on need

RESOURCES:

- Pearson Algebra II: Unit 5
- Prentice Hall Algebra II: Unit 8
- PDE SAS portal: http://www.pdesas.org
- Thinking Maps
- Graphing calculator
- Exit Tickets
- Adaptions checklist
- ELL Instructional Strategies for Math
- ESL Resources
  - Click on "Academic" from PMSD website
  - Click on "English Language Arts" on left side of tool bar.
  - Click on the link for ESL
  - Click on Teacher
- Teacher generated/differentiated instruction resources and activities
- Algebra II released state sample questions
- Algebra II generated sample questions
- Promethean Flipcharts/ActiVotes
- Math flipcharts
- Math Internet Resources from PMSD Resource Page
- StudyIsland
- http://www.khanacademy.org/
- Thinkfinity website: http://www.thinkfinity.org/home
- IXL Website: http://www.IXL.com/math/
- United Streaming: http://streaming.discoveryeducation.com/index.cfm
- http://edhelper.com/place_value.html
- http://illuminations.nctm.org
- http://insidemathematics.org
- www.teachingchannel.org
- www.Learnzillion.com
- http://illustrativemathematics.org/standards/k8
- http://wiki.warren.kyschools.us/groups/wcpscommoncorestandards/
- www.teachingchannel.org
- http://www.learnzillion.com
- http://www.teacherspayteachers.com
- flexmath.ck12.org/

Honors Algebra II: Grade 10	Unit 4:	Inferences and Conclusions from Data	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Interpreting Categorical and Quantitative Data

- **S.ID.4** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.

Making Inferences and Justifying Conclusions

- **S.IC.1** Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
- **S.IC.2** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?
- **S.IC.3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
- **S.IC.4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
- **S.IC.5** Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
- **S.IC.6** Evaluate reports based on data.

Using Probability to Make Decisions

- **S.MD.6** Use probabilities to make fair decisions (e.g., drawing by lots, using a random number generator).
- **S.MD.7** Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).

MATHEMATICAL PRACTICES:

25. Make sense of problems and persevere in solving them.
26. Reason abstractly and quantitatively.
27. Construct viable arguments and critique the reasoning of others.
28. Model with mathematics.
29. Use appropriate tools strategically.
30. Attend to precision.
31. Look for and make use of structure.
32. Look for and express regularity in repeated reasoning.

POCONO MOUNTAIN SCHOOL DISTRICT CURRICULUM

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
• **How can I use probability and statistics to make predictions and decisions that will benefit me in life?** • **How should I interpret statistical information about myself and that I see in the news?** • **What is the bell curve, why does it appear in many aspects of society, why is understanding it so important to our society?** • **What are some more sophisticated ways of counting, and when are they useful?** • **What kinds of patterns commonly arise in our world?** • **Why is it sometimes desirable to describe a pattern mathematically?** • **When we notice a real-world or mathematical pattern, what are some different ways in which we can describe it?** • **How is it possible to keep getting closer and closer to something, but never actually touch it?** • **How do you decide if a mathematical model is "good"?** • **How can we use existing measurements to make predictions?** • **What are some possible pitfalls of using mathematical models to make predictions?**	Arithmetic Binomial Theorem Conic Sections Combination Compound Distribution Frequency Fundamental Counting Principle Geometric Normal Distribution Odds Pattern Permutation Probability Sequence Series Standard Deviation Variance	**Formative:** • Journals/logs • KWL chart • At the bell activities • Question and answer • Individual white boards/Promethean Board ActiVotes • Homework • Quizzes • Constructed response/open-ended problem solving • Performance tasks • Exit slips **Summative:** • CDT's • Performance based assessments o Quizzes o Tests o Constructed response/open-ended problem solving o Performance tasks o Project

UNIT OF INSTRUCTION: GEOMETRY: SIMILARITY, RIGHT TRIANGLES, AND TRIGONOMETRY

PA CORE STANDARDS		KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
CC.2.1.HS.B.1	Summarize, represent, and interpret data on a single count or measurement variable.	**A2.2.1 Patterns, Relations, and Functions**
CC.2.1.HS.F.3	Apply quantitative reasoning to choose and Interpret units and scales in formulas, graphs and data displays.	**A2.2.1.1 Analyze and/or use patterns or relations** • **A2.2.1.1.1** Analyze a set of data for the existence of a pattern, and represent the pattern with a rule algebraically and/or graphically • **A2.2.1.1.2** Identify and/or extend a pattern as either an arithmetic or geometric sequence (e.g., given a geometric sequence, find the 20th term).
CC.2.1.HS.B.2	Summarize, represent, and interpret data on two categorical and quantitative variables.	
CC.2.1.HS.B.4	Recognize and evaluate random processes underlying statistical experiments.	
CC.2.1.HS.B.5	Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.	
CC.2.1.HS.B.6	Use the concepts of independence and conditional probability to interpret data.	**A2.2.3 Data Analysis**
CC.2.1.HS.B.7	Apply the rules of probability to compute probabilities of compound events in a uniform probability model.	**A2.2.3.2 Apply probability to practical situations** • **A2.2.3.2.1** Use combinations, permutations, and the fundamental counting principle to solve problems involving probability • **A2.2.3.2.2** Use odds to find probability and/or use probability to find odds. • **A2.2.3.2.3** Use probability for independent, dependent, or compound events to predict outcomes.
CC.2.1.HS.F.5	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	
CC.2.1.HS.B3	Analyze linear models to make interpretations based on the data.	

Essential Skills and Understanding

- Ability to analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically.
- Ability to use combinations, permutations, and the fundamental counting principle to solve probability problems
- Ability to use probability for independent, dependent, or compound events to predict outcomes.
- Ability to identify and/or extend a pattern as either an arithmetic or geometric sequence (find the nth term of a sequence)
- Ability to use odds to find probability and/or use probability to find odds
- Ability to use standard deviation, variance, and normal distribution.
- Ability to evaluate the sum of a sequence.
- Ability to use binomial theorem when given the general expansion for $(x+y)^n$
- Ability to identify equations of conic sections.
- Note: Honors level students are expected to work on additional rigorous, challenging problems, proofs, and applications of concepts/skills as part of the course. Increased pace of instruction will occur.

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- IXL Website: http://www.IXL.com/math/
- United Streaming: http://streaming.discoveryeducation.com/index.cfm
- http://edhelper.com/place_value.html
- http://illuminations.nctm.org
- http://insidemathematics.org
- www.teachingchannel.org
- www.Learnzillion.com
- http://illustrativemathematics.org/standards/k8
- http://wiki.warren.kyschools.us/groups/wcpscommoncorestandards/
- www.teachingchannel.org
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- http://www.teacherspayteachers.com
- flexmath.ck12.org/