Algebra IB

Algebra IB is the second course offered of the multi-year sequence for Algebra I. Students in Algebra IB have taken Algebra IA in grade 9. The Algebra I Keystone Exam will be administered to students while taking Algebra IB in May. Scoring proficient on the Algebra I Keystone Exam is a graduation requirement for all students.

Students will review prior Algebra IA content through the integration of concepts with related Algebra IB content. In addition, content from Algebra IA and concepts from Algebra IB will continually be reviewed throughout the course using ATB's, mini-lessons, and integration of previous concepts with similar standards.

- Keystone released items and sample questions will be integrated into the course as topics are studied in preparation for the Keystone Algebra I Exam.
- Dedicated class periods for Keystone Preparation will be utilized prior to the Keystone Algebra I Exam to review and practice Algebra I content to help prepare students for the exam.

The new topics emphasized for the second half of the Algebra I curriculum include the study of:

- Exponents and Exponential Functions
- Polynomials and Factoring
- Quadratic Equations and Functions
- Radical Expressions and Equations
- Rational Expressions and Functions
- Probability

Making connections between equations, tables, graphs of linear equations, and systems of equations and inequalities will be continued from Algebra IA. Studying the behavior, making connections, and finding solutions to real world problems with quadratic, exponential, radical, and rational expressions will be emphasized. Graphing calculators for making connections and developing concepts will be used as a teaching tool throughout the year.

POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

Academic Algebra IB: Gr. 10	MODULE 1/UNIT 1:	Operations and Linear Equations & Inequalities: Operations with Real Numbers and Expressions	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Extend the properties of exponents to rational exponents.

- **N.RN.1** Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = (5^{(\frac{1}{3})3})$ to hold, so $(5^{1/3})^3$ must equal 5.
- **N.RN.2** Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Use properties of rational and irrational numbers.

- **N.RN.3** Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.

Interpret the structure of expressions.

- **A.SSE.1** Interpret expressions that represent a quantity in terms of its context.
  a. Interpret parts of an expression, such as terms, factors, and coefficients.
  b. Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^N$ as the product of P and a factor not depending on P.*
- **A.SSE.2** Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (Y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*

Write expressions in equivalent forms to solve problems.

- **A.SSE.3** Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.
  a. Factor a quadratic expression to reveal the zeros of the function it defines.
  b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.
  c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12T} \approx 1.012^{12T}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*

Perform arithmetic operations on polynomials.

- **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.

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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

Understand solving equations as a process of reasoning and explain the reasoning.

- **A.REI.1** Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
- **A.REI.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

ESSENTIAL QUESTIONS	VOCABULARY		ASSESSMENT
• **How do you compare and/or order real numbers?** • **How are radical expressions represented?** • **What are the characteristics of square root functions?** • **How are radical equations simplified?** • **How do you find the Greatest Common Factor and Least Common Multiple for sets of monomials?** • **How can you represent very large and very small numbers?** • **How can you simplify expressions involving exponents and/or absolute value?** • **Can two algebraic expressions that appear to be different be equivalent?** • **How are the properties of real numbers related to polynomials?** • **How can polynomials be factored?** • **How do you simplify polynomials?** • **How do you simplify/reduce rational expressions?** • **How do you find the solution to a quadratic equation using factoring, the quadratic formula, completing the square, and graphing?**	real numbers natural numbers whole numbers integers rational numbers irrational numbers simplify evaluate distributive property like terms absolute value inverse operations equation inequality domain function percent of change ratio proportion square root	multiplication property power of a power distributive property over multiplication and division (power of a product / power of a quotient) division property exponent zero exponent negative exponent undefined values monomial binomial trinomial quadratic function polynomial roots or zeros of quadratic functions	**<u>Formative:</u>** • 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 **<u>Summative:</u>** • CDT's • Performance based assessments o Quizzes o Tests o Constructed response/open-ended problem solving o Performance tasks o Project

UNIT OF INSTRUCTION: OPERATIONS WITH REAL NUMBERS AND EXPRESSIONS	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	CC.2.1.6.E.3: Develop and/or apply number theory concepts to find common factors and multiples. **CC.2.2.7.B.3:** Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations. **CC.2.2.8.B.1:** Apply concepts of radicals and integer exponents to generate equivalent expressions. **CC.2.1.8.E.1:** Distinguish between rational and irrational numbers using their properties. **CC.2.1.8.E.4:** Estimate irrational numbers by comparing them to rational numbers. **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. **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. **CC.2.2.HS.D.6** Extend the knowledge of rational functions to rewrite in equivalent forms. **CC.2.2.HS.D.9** Use reasoning to solve equations and justify the solution method. **Essential Skills and Understanding** • Ability to use prior knowledge of properties of integer exponents to build understanding of rational exponents and radicals. • Knowledge of the connection between radical and exponential notation. • Ability to translate between radical and exponential notation. • Ability to perform operations on both rational and irrational numbers. • Ability to make connections between symbolic representations and proper mathematics vocabulary for linear, quadratic and exponential expressions. • Ability to identify parts of an expression such as terms, factors, coefficients, etc. for linear, quadratic and exponential expressions. • Ability to interpret and apply rules for order of operations for linear, quadratic and exponential expressions. • Ability to use properties of mathematics to alter the structure of an expression. • Ability to select and then use an appropriate factoring technique. • Ability to connect the factors, zeros and x-intercepts of a graph.	**A1.1.1 Operations with Real Numbers and Expressions** **A1.1.1.1 Represent and/or use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, square roots, and exponents).** **A1.1.1.1.1** • Compare and/or order any real numbers. Note: Rational and irrational may be mixed. **A1.1.1.1.2** • Simplify square roots (e.g., $\sqrt{24} = 2\sqrt{6}$). **A1.1.1.2 Apply number theory concepts to show relationships between real numbers in problem solving settings.** **A1.1.1.2.1** • Find the Greatest Common Factor (GCF) and/or the Least Common Multiple (LCM) for sets of monomials. **A1.1.1.3 Use exponents, roots, and/or absolute values to solve problems.** **A1.1.1.3.1** • Simplify/evaluate expressions involving properties/laws of exponents, roots, and/or absolute values to solve problems. Note: Exponents should be integers from -10 to 10. **A1.1.1.4 Use estimation strategies in problem-solving situations.** **A1.1.1.4.1** • Use estimation to solve problems.

UNIT OF INSTRUCTION: OPERATIONS WITH REAL NUMBERS AND EXPRESSIONS	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	• Ability to use the Zero-Product Property to solve quadratic equations • Ability to recognize key features of a quadratic model given in vertex form. • Ability to connect experience with properties of exponents to more complex expressions by writing expressions in different forms. • Ability to show that when polynomials are added, subtracted or multiplied that the result is another polynomial. • Ability to identify the mathematic property (addition property of equality, distributive property, etc.) used at each step in the solution process as a means of justifying a step. • Ability to simplify/reduce a rational algebraic expression.	**A1.1.1.5 Simplify expressions involving polynomials.** **A1.1.1.5.1** • Add, subtract, and/or multiply polynomial expressions (express answers in simplest form). Note: Nothing larger than a binomial multiplied by a trinomial. **A1.1.1.5.2** • Factor algebraic expressions, including difference of squares and trinomials. Note: Trinomials are limited to the form ax^2+bx+c where a is equal to 1 after factoring out all monomial factors. **A1.1.1.5.3** • Simplify/reduce a rational algebraic expression.

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 I: Units 1, 2, 3, 4, 8, 9, 10, 11, 12
- PDE SAS portal: http://www.pdesas.org
- Thinking Maps
- Graphing calculator
- Exit Tickets
- Adaptions checklist
- ELL Instructional Strategies for Math
- ESL Handbook
    - Click on "Academic Resources" from PMSD website
    - Click on "ESL" on left side of tool bar.
    - Click on the link to the PMSD ESEL Handbook
    - Scroll through to page 44 in the appendices.
- Teacher generated/differentiated instruction resources and activities
- Algebra I released state sample questions
- Algebra I 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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

Algebra IB: Gr. 10	MODULE 1/UNIT 2:	Operations and Linear Equations & Inequalities: Linear Equations	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Reason quantitatively and use units to solve problems.

- **N.Q.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
- **N.Q.2** Define appropriate quantities for the purpose of descriptive modeling.
- **N.Q.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Understand the concept of a function and use function notation.

- **F.IF.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and x is an element of its domain, then *f(x)* denotes the output of *f* corresponding to the input x. The graph of *f* is the graph of the equation *y = f(x)*.
- **F.IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- **F.IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*

Interpret functions that arise in applications in terms of a context.

- **F.IF.4** For a function that models a relationship between two quantities, interpret key features of the graph and the table in terms of the quantities, and sketch the graph 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.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
    a. Graph **linear** and quadratic functions and show **intercepts**, maxima, and minima.

Build a function that models a relationship between two quantities.

- **F.BF.1** Write a function that describes a relationship between two quantities.
    a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
- **F.BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

Create equations that describe numbers or relationships.

- **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.*

Represent and solve equations and inequalities graphically.

- **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.

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT

• **Can equations that appear to be different be equivalent?**
• **How can you solve equations?**
• **What kinds of relationships can proportions represent?**
• **How can you represent and describe functions?**
• **Can functions describe real-world situations?**
• **How can you solve a system of equations?**
• **How can systems of equations model real-world situations?**
	independent variable
	dependent variable
	function
	solving equations
	literal equations
	inverse operations
	domain
	range
	origin
	y-intercept
	x-intercept
	axis
	rate of change
	systems of equations
	elimination method for solving systems of equations
	substitution method for solving systems of equations
	graphing method for solving systems of equations
		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: LINEAR EQUATIONS	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	CC.2.2.8.B.3: Analyze and solve linear equations and pairs of simultaneous linear equations. **CC.2.2.8.C.1:** Define, evaluate, and compare functions. **CC.2.2.8.C.2:** Use concepts of functions to model relationships between quantities. **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.C.3:** Write functions or sequences that model relationships between two 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. **Essential Skills and Understanding** • Ability to choose appropriate units of measure to represent context of the problem. • Ability to convert units of measure using dimensional analysis. • Ability to select and use units of measure to accurately model a given real world scenario. • Knowledge of and ability to apply rules of significant digits. • Ability to use precision of initial measurements to determine the level of precision with which answers can be reported. • Ability to solve linear equations. • Ability to set up and solve proportions. • Ability to determine if a relation is a function. • Ability to identify the domain and range of a function from multiple representations. • Ability to use functional notation. • Knowledge of and ability to apply the vertical line test. Ability to write arithmetic sequences and the relationship as an example of linear functions.	**A1.1.2 Linear Equations** **A1.1.2.1 Write, solve, and/or graph linear equations using various methods.** **A1.1.2.1.1** • Write, solve, and/or apply linear equation (including problem situations). **A1.1.2.1.2** • Use and/or identify an algebraic property to justify any step in an equation-solving process. Note: Linear equations only. **A1.1.2.1.3** • Interpret solutions to problems in the context of the problem situation. Note: Linear equations only. **A1.1.2.2 Write, solve, and/or graph systems of linear equations using various methods.** **A1.1.2.2.1** • Write and/or solve a system of linear equations (including problem situations) using graphing, substitution, and/or elimination. Note: Limit systems to two linear equations. **A1.1.2.2.2** • Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear equations.

UNIT OF INSTRUCTION: LINEAR EQUATIONS	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	• Ability to relate the concept of domain to each function studied. • Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations. • Ability to describe the restrictions on the domain of all functions based on real world context. • Ability to graph linear functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. • Ability to write a function that describes a relationship between two quantities. • Ability to create equations in one variable and use them to solve problems. • Ability to find solutions of systems of linear equations in real world situations. • Ability to determine unknown parameters needed to create an equation that accurately models a given situation. • Ability to represent constraints by equations and by systems of equations and interpret solutions as viable or non-viable options in a modeling context. • Ability to distinguish between a mathematical solution and a contextual solution. • Ability to recognize/create equivalent forms of literal equations.	

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 I: Units 3, 5, 7
- PDE SAS portal: http://www.pdesas.org
- Thinking Maps
- Graphing calculator
- Exit Tickets
- Adaptions checklist
- ELL Instructional Strategies for Math
- ESL Handbook
  - Click on "Academic Resources" from PMSD website
  - Click on "ESL" on left side of tool bar.
  - Click on the link to the PMSD ESEL Handbook
  - Scroll through to page 44 in the appendices.
- Teacher generated/differentiated instruction resources and activities
- Algebra I released state sample questions
- Algebra I 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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

Algebra IB: Gr. 10	MODULE 1/UNIT 3:	Operations and Linear Equations & Inequalities: Linear Inequalities	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Reason quantitatively and use units to solve problems.

- **N.Q.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
- **N.Q.2** Define appropriate quantities for the purpose of descriptive modeling.
- **N.Q.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Interpret functions that arise in applications in terms of a context.

- **F.IF.4** For a function that models a relationship between two quantities, interpret key features of the graph and the table in terms of the quantities, and sketch the graph 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.7** Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
    a. Graph **linear** and quadratic functions and show **intercepts**, maxima, and minima.

Create equations that describe numbers or relationships.

- **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.*

Represent and solve equations and inequalities graphically.

- **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.

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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
• **How do you represent relationships between quantities that are not equal?** • **Can inequalities that appear to be different be equivalent?** • **How can you solve inequalities?** • **How can you represent and describe functions using inequalities?** • **How can you solve a system of inequalities?** • **How can systems of inequalities model real-world situations?** • **How do you solve absolute value equations?** • **How do you solve absolute value inequalities?**	independent variable dependent variable function domain range origin y-intercept x-intercept axis systems of inequalities solving systems of inequalities absolute value absolute value inequalities	**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: LINEAR INEQUALITIES	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	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. **CC.2.2.HS.D.10:** Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically. **Essential Skills and Understanding** • Ability to choose appropriate units of measure to represent context of the problem. • Ability to convert units of measure using dimensional analysis. • Ability to select and use units of measure to accurately model a given real world scenario. • Knowledge of and ability to apply rules of significant digits.	**A1.1.3 Linear Inequalities** **A1.1.3.1 Write, solve, and/or graph linear inequalities using various methods.** **A1.1.3.1.1** • Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities). **A1.1.3.1.2** • Identify or graph the solution set to a linear inequality on a number line. **A1.1.3.1.3** • Interpret solutions to problems in the context of the problem situation. Note: Linear inequalities only.

	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	• Ability to use precision of initial measurements to determine the level of precision with which answers can be reported. • Ability to identify the domain and range of a function from multiple representations. • Ability to relate the concept of domain to each function studied. • Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations. • Ability to describe the restrictions on the domain of all functions based on real world context. • Ability to graph linear inequalities expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. • Ability to write inequalities that describes a relationship between two quantities. • Ability to create inequalities in one variable and use them to solve problems. • Ability to find solutions of systems of linear inequalities in real world situations. • Ability to determine unknown parameters needed to create an inequality that accurately models a given situation. • Ability to represent constraints by inequalities and by systems of inequalities and interpret solutions as viable or non-viable options in a modeling context. • Ability to distinguish between a mathematical solution and a contextual solution. • Ability to solve absolute value equations and inequalities.	**A1.1.3.2 Write, solve, and/or graph systems of linear inequalities using various methods.** **A1.1.3.2.1** • Write and/or solve a system of linear inequalities using graphing. Note: Limit systems to two linear inequalities. **A1.1.3.2.2** • Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear inequalities.

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 I: Unit 4, 7
	• PDE SAS portal: http://www.pdesas.org
	• Thinking Maps
	• Graphing calculator
	• Exit Tickets
	• Adaptions checklist
	• ELL Instructional Strategies for Math
	• ESL Handbook
	  o Click on "Academic Resources" from PMSD website
	  o Click on "ESL" on left side of tool bar.
	  o Click on the link to the PMSD ESEL Handbook
	  o Scroll through to page 44 in the appendices.
	• Teacher generated/differentiated instruction resources and activities
	• Algebra I released state sample questions
	• Algebra I 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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

Algebra IB: Gr. 10	MODULE 2/UNIT 4:	Linear Functions and Data Organizations: Functions	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Understand the concept of a function and use function notation.

- **F.IF.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
- **F.IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
- **F.IF.3** Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1. Learn as general principle; focus on linear and exponential and on arithmetic and geometric sequences.

Interpret functions that arise in applications in terms of a context.

- **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.

Analyze functions using different representations.

- **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.
  a. Graph linear and quadratic functions and show intercepts, maxima, and minima.
  b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.
  c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.
  e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.
- **F.IF.8** Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
  b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, and classify them as representing exponential growth or decay.

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.

Build a function that models a relationship between two quantities.

- **F.BF.1** Write a function that describes a relationship between two quantities.
  a. Determine an explicit expression, a recursive process, or steps for calculation from a context.
  b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.
- **F.BF.2** Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.

Build new functions from existing functions.

- **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.

Construct and compare linear, quadratic, and exponential models and solve problems.

- **F.LE.2** Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).
- **F.LE.3** Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.

Summarize, represent, and interpret data on two categorical and quantitative variables.

- **S.ID.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
- **S.ID.6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
  a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
  c. Fit a linear function for a scatter plot that suggests a linear association.

POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
• **How can you determine whether a relation is a function?** • **How can you represent and describe functions?** • **How can functions describe real-world situations?** • **How do you describe the domain and range of a relation?** • **Can you represent a linear equation using a graph, table, and equation?** • **Can you compare the graphs of linear functions, quadratic functions, absolute value functions, square root functions, and exponential functions?**	linear equation arithmetic sequence common difference geometric sequence common ratio term continuous data discrete data relation function function notation vertical line test domain range translation linear function graph quadratic function graph absolute value function graph exponential growth exponential function graph square root function graph rational function graph	**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: FUNCTIONS	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	CC.2.2.8.B.2: Understand the connections between proportional relationships, lines, and linear equations. **CC.2.2.8.C.1:** Define, evaluate, and compare functions. **CC.2.2.8.C.2:** Use concepts of functions to model relationships between quantities. **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.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.2.1.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. **Essential Skills and Understanding** • Ability to determine if a relation is a function. • Ability to analyze data for the existence of a pattern and represent the pattern algebraically and/or graphically. • Ability to determine whether a relation is a function, given a set of points or a graph. • Ability to identify the domain and range of a function from multiple representations. • Ability to use of function notation. • Knowledge of and ability to apply the vertical line test. • Ability to make connections between context and algebraic representations which use function notation to write arithmetic and geometric sequences. • Emphasize arithmetic and geometric sequences as examples of linear and exponential functions. • Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations. • Ability to relate the concept of domain to each function studied. • Ability to describe the restrictions on the domain of all functions based on real world context. • Knowledge that the rate of change of a function can be positive, negative or zero. • Ability to identify the rate of change from multiple representations. • Determine an explicit expression, a recursive process, or steps for calculations from a	**A1.2.1 Functions** **A1.2.1.1 Analyze and/or use patterns or relations.** **A1.2.1.1.1** • Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically. **A1.2.1.1.2** • Determine whether a relation is a function, given a set of points or a graph. **A1.2.1.1.3** • Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table). **A1.2.1.2 Interpret and/or use linear functions and their equations, graphs, or tables.** **A1.2.1.2.1** • Create, interpret, and/or use the equation, graph, or table of a linear function. **A1.2.1.2.2** • Translate from one representation of a linear function to another (i.e., graph, table, and equation).

	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	context. • Ability to focus on vertical translations of graphs of linear and exponential functions. Relate the vertical translation of a linear function to its y-intercept. • Ability to compare the graphs of linear functions, quadratic functions, absolute value functions, square root functions, and exponential functions and identify main components and equations for each. • Knowledge of the characteristics of categorical data. • Ability to recognize types of relationships that lend themselves to linear and exponential models. • Ability to create and use regression models to represent a contextual situation.	

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 I: Units 5, 6, 8, 10, 12
- PDE SAS portal: http://www.pdesas.org
- Thinking Maps
- Graphing calculator
- Exit Tickets
- Adaptions checklist
- ELL Instructional Strategies for Math
- ESL Handbook
    - Click on "Academic Resources" from PMSD website
    - Click on "ESL" on left side of tool bar.
    - Click on the link to the PMSD ESEL Handbook
    - Scroll through to page 44 in the appendices.
- Teacher generated/differentiated instruction resources and activities
- Algebra I released state sample questions
- Algebra I 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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

Algebra IB: Gr. 10	MODULE 2/UNIT 5:	Linear Functions and Data Organizations: Coordinate Geometry	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Understand the concept of a function and use function notation.

- **F.IF.1** Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
- **F.IF.2** Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

Interpret functions that arise in applications in terms of a context.

- **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.

Analyze functions using different representations.

- **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.
  a. Graph linear and quadratic functions and show intercepts, maxima, and minima.

Summarize, represent, and interpret data on two categorical and quantitative variables.

- **S.ID.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
- **S.ID.6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
  a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
  b. Fit a linear function for a scatter plot that suggests a linear association.

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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
• **What information does the equation of a line give you?** • **How can you make predictions based on a scatter plot?** • **What does the slope of a line indicate about the line?** • **What does the y-intercept indicate about a line?** • **How do you write or identify a linear equation when given the graph of the line, two points on the line, or the slope and a point on the line?** • **How do you represent an equation of a line using a graph, table, and equation?**	linear equation rate of change slope y-intercept x-intercept domain range origin slope-intercept form standard form point-slope form	**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: COORDINATE GEOMETRY	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	CC.2.4.8.B.1: Analyze and/or interpret bivariate data displayed in multiple representations. **CC.2.2.8.C.2:** Use concepts of functions to model relationships between quantities. **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.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.1:** Summarize, represent, and interpret data on a single count or measurement variable. **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. **Essential Skills and Understanding** • Ability to identify, describe, and/or use constant rates of change. • Knowledge that the rate of change of a function can be positive, negative, zero, or none. • Ability to identify the rate of change from multiple representations. • Ability to identify the domain and range of a function from multiple representations. • Ability to translate from algebraic representations to graphic or numeric representations and identify key features using the various representations. • Ability to identify or write a linear equation when given various parts of a linear equation, table or graph. • Ability to determine the slope and/or y-intercept represented by a linear equation or graph. • Ability to describe the restrictions on the domain of all functions based on real world context. • Ability to focus on vertical translations of graphs of linear functions. Relate the vertical translation of a linear function to its y-intercept. • Knowledge of the characteristics of categorical data. • Ability to translate from linear algebraic representations to graphic or numeric representations and identify key features using the various representations. • Ability to recognize types of relationships that lend themselves to linear models. • Ability to create and use regression models to represent a contextual situation.	**A1.2.2 Coordinate Geometry** **A1.2.2.1 Describe, compute, and/or use the rate of change (slope) of a line.** **A1.2.2.1.1** • Identify, describe, and/or use constant rates of change. **A1.2.2.1.2** • Apply the concept of linear rate of change (slope) to solve problems. **A1.2.2.1.3** • Write or identify a linear equation when given o the graph of the line, o two points on the line, or o the slope and a point on the line. Note: Linear equation may be in point-slope, standard, and/or slope-intercept form. **A1.2.2.1.4 Determine the slope and/or *y*-intercept represented by a linear equation or graph.** **A1.2.2.2** • Analyze and/or interpret data on a scatter plot. **A1.2.2.2.1** • Draw, identify, find, and/or write an equation for a line of best fit for a scatter plot.

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 I: Units 5, 6
- PDE SAS portal: http://www.pdesas.org
- Thinking Maps
- Graphing calculator
- Exit Tickets
- Adaptions checklist
- ELL Instructional Strategies for Math
- ESL Handbook
  - Click on "Academic Resources" from PMSD website
  - Click on "ESL" on left side of tool bar.
  - Click on the link to the PMSD ESEL Handbook
  - Scroll through to page 44 in the appendices.
- Teacher generated/differentiated instruction resources and activities
- Algebra I released state sample questions
- Algebra I 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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

Algebra IB: Gr. 10	MODULE 2/UNIT 6:	Linear Functions and Data Organizations: Data Analysis	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Summarize, represent, and interpret data on a single count or measurement variable.

- **S.ID.1** Represent data with plots on the real number line (dot plots, histograms, and box plots).
- **S.ID.2** Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
- **S.ID.3** Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).

Summarize, represent, and interpret data on two categorical and quantitative variables.

- **S.ID.5** Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.
- **S.ID.6** Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
    a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
    b. Informally assess the fit of a function by plotting and analyzing residuals.
    c. Fit a linear function for a scatter plot that suggests a linear association.

Interpret linear models.

- **S.ID.7** Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
- **S.ID.8** Compute (using technology) and interpret the correlation coefficient of a linear fit.
- **S.ID.9** Distinguish between correlation and causation.

Use the rules of probability to compute probabilities of compound events in a uniform probability model.

- **S.CP.6** Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.
- **S.CP.7** Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.

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 MOUNTIAN SCHOOL DISTRICT CURRICULUM

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
• **How can collecting and analyzing data help you make decisions or predictions?** • **How can you make and interpret different representations of data?** • **How can you make predictions based on a circle, line, or bar graph; measure of central tendency; or other representation?** • **How can you analyze data, make predications, and/or answer questions based on box-and-whisker plots, stem-and-leaf plots, scatter plots, measures of central tendency, or other representations?** • **How can you make predictions using the equations or graphs of best-fit lines for scatter plots?** • **How is probability related to real-world events?**	outliers quartile interquartile range measure of central tendency dependent events independent events box and whisker plots stem and leaf plots favorable outcome scatter plot line of best fit	**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: DATA ANALYSIS	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	CC.2.4.HS.B.1: Summarize, represent, and interpret data on a single count or measurement variable. **CC.2.4.HS.B.3:** Analyze linear models to make interpretations based on the data. **CC.2.4.HS.B.4:** Recognize and evaluate random processes underlying statistical experiments. **CC.2.4.HS.B.5:** Make inferences and justify conclusions based on sample surveys, experiments, and observational studies. **CC.2.4.HS.B.7:** Apply the rules of probability to compute probabilities of compound events in a uniform probability model. **Essential Skills and Understanding** • Knowledge of the characteristics of categorical data. • Ability to read and use a two-way frequency table. • Ability to read a segmented bar graph. • Ability to recognize types of relationships that lend themselves to linear and	**A1.2.3 Data Analysis** **A1.2.3.1 Use measures of dispersion to describe a set of data.** **A1.2.3.1.1** • Calculate and/or interpret the range, quartiles, and interquartile range of data. **A1.2.3.2 Use data displays in problem-solving settings and/or to make predictions.**

	PA COMMON CORE STANDARDS	KEYSTONE ELIGIBLE CONTENT/LEARNING ACTIVITIES
	exponential models. • Ability to create and use regression models to represent a contextual situation. • Ability to create a graphic display of residuals. • Ability to recognize patterns in residual plots. • Ability to calculate error margins (residuals) with a calculator. • Ability to recognize a linear relationship displayed in a scatter plot. • Ability to determine an equation for the line of best fit for a set of data points. • Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. • Knowledge of the range of values and the interpretation of those values for correlation coefficients ($-1 \leq r \leq 1$). • Ability to compute and analyze the correlation coefficient for the purpose of communicating the goodness of fit of a linear model for a given data set. • Ability to provide examples of two variables that have a strong correlation but one does not cause the other. • Ability to find probabilities for compound events and represent as a fraction, decimal, or percent.	**A1.2.3.2.1** • Estimate or calculate to make predictions based on a circle, line, bar graph, measure of central tendency, or other representation. **A1.2.3.2.2** • Analyze data, make predictions, and/or answer questions based on displayed data (box-and-whisker plots, stem-and-leaf plots, scatter plots, measures of central tendency, or other representations). **A1.2.3.2.3** • Make predictions using the equations or graphs of best-fit lines of scatter plots. **A1.2.3.3 Apply probability to practical situations.** **A1.2.3.3.1** • Find probabilities for compound events (e.g., find probability of red and blue, find probability of red or blue) and represent as a fraction, decimal, or percent.

POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

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 I: Units 1, 6, 11, 12
- PDE SAS portal: http://www.pdesas.org
- Thinking Maps
- Graphing calculator
- Exit Tickets
- Adaptions checklist
- ELL Instructional Strategies for Math
- ESL Handbook
  - Click on "Academic Resources" from PMSD website
  - Click on "ESL" on left side of tool bar.
  - Click on the link to the PMSD ESEL Handbook
  - Scroll through to page 44 in the appendices.
- Teacher generated/differentiated instruction resources and activities
- Algebra I released state sample questions
- Algebra I 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/