Math Enhancement: Grade 8

Course Description:
Math Enhancement for grade 8 will focus on content, strategies, and test taking skills for the grade 8 PSSA. Primary content focus will be based on integration of previous student deficiencies based on data into the relevant grade 8 PSSA Eligible Content Standards. Continued integration and spiral review of non-proficient topics will be incorporated into lessons during the course to help ensure mastery of eligible content standards.

Students will receive 55 minutes of math instruction in addition to their regularly scheduled math class. The additional time for instruction will be scheduled in place of one out of the two related arts rotations for 90 days. Ongoing communication between the Math Enhancement teacher, students and parents will occur through progress reports, report cards, phone contacts, email, conferences, etc.

Student Selection:
Students were recommended for this 55 minute class based on the following criteria:

- PSSA Scores
- Marking period grades and local benchmark assessments

Instructional Strategies:
Core instructional content based on eligible content standards will be reinforced through the use of:

- Direct instruction
- Guided instruction
- Modeling/Discussion
- Independent practice
- Computer assisted technology (Ex. StudyIsland and other resources listed in curriculum)
- Cooperative Learning
- Constructed response through guided and independent problem solving
- Other strategies/activities based on class and individual needs

Data and Assessment:
Previous data will be utilized to identify areas of need at the beginning of the course along with the pre-test.

Ongoing Assessment:
As each topic is taught, teachers will track proficiency using a checklist based on eligible content standards.

- Deficiencies will be addressed through spiraling and integration of content into future lessons to help students meet proficiency.
    - Formative and summative assessments will be utilized as part of classroom assessment practices.
    - Diagnostic assessments including the CDT's and StudyIsland assessments will be used as additional information for differentiation.
        - All assessments will be shared through communication between the Math Enhancement and Essentials of Algebra teachers on an ongoing basis.

A post-test will be given to determine growth of each student at the end of the 90 days.

- Student data from the post-test will be distributed to students' year-long math teacher for review and use in addressing any additional areas of need.
- Post-test information will also be used to continually evaluate the Math Enhancement course focus and strategies.

Differentiating Instruction:
Study Island, PearsonSuccessNet, CK12Math, and other resources listed in the curriculum will be utilized to help differentiate instruction based on student data and needs.

POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

MATH ENHANCEMENT: GRADE 8 90 Day Course	STATE STANDARD AREA/UNIT:	Numbers and Operations: The Number System	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Know that there are numbers that are not rational, and approximate them by rational numbers.

- **8.NS.1** Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which eventually into a rational number.
- **8.NS.2** Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of* $\sqrt{2}$*, show that* $\sqrt{2}$ *is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*

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.

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
• **How do you distinguish between rational and irrational numbers using their properties?** • **How do you identify and provide examples of rational versus irrational numbers of the real number system?** • **How do you estimate irrational numbers by comparing them to rational numbers?**	• rational numbers • irrational numbers • approximate • radical • terminating decimals • repeating decimals	**Formative:** • Journals/logs • KWL chart • At the bell activities • Question and answer • Thumbs up/thumbs down • Individual white boards/Promethean Board ActiVotes • Homework • Quizzes • Constructed response/open-ended problem solving • Performance tasks • Exit slips

POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT
		Summative: • Benchmark assessments • Performance based assessments o Quizzes o Tests o Constructed response/open-ended problem solving o Performance tasks o Project o Spiral Review o Study Island Practice

UNIT OF INSTRUCTION: THE NUMBER SYSTEM	PA COMMON CORE ASSESSMENT ANCHORS	PA ELIGIBLE CONTENT STANDARDS/ESSENTIAL CONTENT LEARNING ACTIVITIES
	CC.2.1.8.E.1: Distinguish between rational and irrational numbers using their properties. **Essential Skills and Understanding** • Knowledge of differences between rational and irrational. • Knowledge of definition and description of rational and irrational. • Ability to identify and provide examples of rational versus irrational numbers, of the real number system. **CC.2.1.8.E.4:** Estimate irrational numbers by comparing them to rational numbers. **Essential Skills and Understanding** • Ability to round to the hundredths place. • Ability to use a number line that specifies in tenths and hundredths the value between two whole numbers. • Ability to use a number line that extends indefinitely, such as π.	**M08.A-N.1: Demonstrate an understanding of rational and irrational numbers.** **M08.A-N.1.1.1** • Determine whether a number is rational or irrational. For rational numbers, show that the decimal expansion terminates or repeats (limit repeating decimals to thousandths). **M08.A-N.1.1.2** • Convert a terminating or repeating decimal to a rational number (limit repeating decimals to thousandth). **M08.A-N.1.1.3** • Estimate the value of irrational numbers without a calculator (limit whole number radicand to less than 144). **M08.A-N.1.1.4** • Use rational approximations of irrational numbers to compare and order irrational numbers. **M08.A-N.1.1.5** • Locate/identify rational and irrational numbers at their approximate locations on a number line.

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
- Ck12Math
- 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
- StudyIsland
- Ck12Math
- 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:	• StudyIsland, Ck12Math, other resources below: The Number System
	• 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
	• Grade 8 released state sample questions
	• Grade 8 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
	• 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

MATH ENHANCEMENT: GRADE 8 90 Day Course	STATE STANDARD AREA/UNIT:	Algebraic Concepts: Expressions and Equations	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Work the radicals and integer exponents.

- **8.EE.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.
- **8.EE.2** Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ *and* $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know the $\sqrt{2}$ is irrational.
- **8.EE.3** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one if than the other. *For example, estimate the population of the United State as* 3×10^8 *and the population of the world as* 7×10^9*, and determine that the world population is more than 20 times larger.*
- **8.EE.4** Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.

Understand the connections between proportional relationships, lines, and linear equations.

- **8.EE.5** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*
- **8.EE.6** Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.

Analyze and solve linear equations and pairs of simultaneous linear equations.

- **8.EE.7** Solve linear equations in one variable.
  a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, unit an equivalent equation of the form $x = a$, $a = a$, or $a=b$ results (where a and b are different numbers).
  b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
- **8.EE.8** Analyze and solve pairs of simultaneous linear equations.
  a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.

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.

b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5* and *3x + 2y =6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*
c. Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of pints, determine whether the line through the first pair of points intersects the line through the second pair.*

ESSENTIAL QUESTIONS	VOCABULARY		ASSESSMENT
• **How do you work with radicals and integer exponents?** • **What are the connections between proportional relationships, lines, and linear equations?** • **How do you analyze and solve linear equations and pairs of simultaneous linear equations?**	• radicals • square roots • cube roots • scientific notation • perfect square • perfect cube • proportional relationships	• slope • slope-intercept form • similar figures • unit rate • linear equation • systems of linear equations • coefficient • like terms	**Formative:** • Journals/logs • KWL chart • At the bell activities • Question and answer • Thumbs up/thumbs down • Individual white boards/Promethean Board ActiVotes • Homework • Quizzes • Constructed response/open-ended problem solving • Performance tasks • Exit slips **Summative:** • Benchmark assessments • Performance based assessments o Quizzes o Tests o Constructed response/open-ended problem solving o Performance tasks o Project o Spiral Review o Study Island Practice o

POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

UNIT OF INSTRUCTION: EXPRESSIONS AND EQUATIONS	PA COMMON CORE ASSESSMENT ANCHORS	PA ELIGIBLE CONTENT STANDARDS/ESSENTIAL CONTENT LEARNING ACTIVITIES

	CC.2.2.8.B.1: Apply concepts of radical and integer exponents to generate equivalent expressions.
	
	Essential Skills and Understanding
	• Ability to recognize and apply the following properties of integer exponents:
	  o Product/Quotient of Powers
	  o Negative Exponents
	  o Zero Exponents
	  o Power of Powers
	• Ability to apply a combination of properties to show equivalency.
	• Ability to recognize and apply the following:
	  o Perfect Squares
	  o Perfect Cubes
	  o Square Roots(Symbol Notation)
	  o Principal (positive) roots/negative roots
	• Ability to recognize and use inverse relationships of squares with square roots and of cubes with cube roots.
	• Ability to compare large and small numbers using properties of integer exponents.
	• Ability to compare units of measure.
	• Ability to read scientific notation on a calculator.
	
	CC.2.2.8.B.2: Understand the connections between proportional relationships, lines, and linear equations.
	
	Essential Skills and Understanding
	• Ability to relate and compare graphic, symbolic, numerical representations of proportional relationships.
	• Ability to calculate constant rate of change/slope of a line graphically.
	• Ability to understand that all proportional relationships start at the origin.
	• Ability to recognize and apply direct variation.
	• Ability to understand that similar right triangles *(provide diagram of graphical notation)* can be used to establish that slope is constant for a non-vertical line.
		M08.B-E.1: Represent and use expressions and equations to solve problems involving radicals and integer exponents.
		
		M08.B-E.1.1.1
		• Apply one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents).
		M08.B-E.1.1.2
		• Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ *and* $x^3 = p$, where p is a positive rational number. Evaluate square roots of perfect squares (up to and including 12^2) and cube roots of perfect cubes (up to and including 5^3) without a calculator.
		M08.B-E.1.1.3
		• Estimate very large or very small quantities by using numbers expressed in the form of a single digit times an integer power of 10 and express how many times larger or smaller one number is than another.
		M08.B-E.1.1.4
		• Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Express answers in scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology (e.g., interpret 4.7EE9 displayed on a calculator as 4.7×10^{9}).
		
		M87.B-E.2: Understand the connections between proportional relationships, lines and linear equations.
		
		M08.B-E.2.1.1
		• Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.
		M08.B-E.2.1.2
		• Use similar right triangles to show and explain why the slope

UNITE OF INSTRUCTION: EXPRESSIONS AND EQUATIONS	PA COMMON CORE ASSESSMENT ANCHORS	PA ELIGIBLE CONTENT STANDARDS/ESSENTIAL CONTENT LEARNING ACTIVITIES
	• Ability to graphically derive equations $y = mx$ and $y = mx + b$. • Ability to differentiate between zero slope and undefined slope. • Ability to understand how the y-intercept translates a line along the y-axis (families of graphs). **CC.2.2.8.B.3:** Analyze and solve linear equations and pairs of simultaneous linear equations. **Essential Skills and Understanding** • Ability to build on prior knowledge of solving linear equations. • Ability to solve linear equations with rational number coefficient, including equations whose solutions require expanding expressions using the distributive property and combining like terms. • Ability to solve systems of equations numerically or by graphing. • Ability to solve systems of two linear equations in two variables algebraically using substitution or elimination. • Ability to discuss efficient solution methods with a system of equations – graphically and algebraically. • Ability to solve simple cases by inspection, one solution, infinitely many solutions, or no solutions. • Ability to write an equation given two points. • Ability to write equations from context. • Ability to interpret the solution to a system of equations in context.	m is the same between any two distinct points on a non-vertical line in the coordinate plane. **M08.B-E.2.1.3** • Derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b. **M08.B-E.3: Analyze and solve linear equations and pairs of simultaneous linear equations.** **M08.B-E.3.1.1** • Write and identify linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). **M08.B-E.3.1.2** • Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **M08.B-E.3.1.3** • Interpret solutions to a system of two linear equations in two variables as points of intersection of their graphs because points of intersection satisfy both equations simultaneously. **M08.B-E.3.1.4** • Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection. **M08.B-E.3.1.5** • Solve real-world and mathematical problems leading to two linear equations in two variables.

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
- Ck12Math
- 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
- StudyIsland
- Ck12Math
- 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:

- StudyIsland, Ck12Math, other resources below: Expressions and Equations
- 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
- Grade 8 released state sample questions
- Grade 8 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
- 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

MATH ENHANCEMENT: GRADE 8 90 Day Course	STATE STANDARD AREA/UNIT:	Algebraic Concepts: Functions	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Define, Evaluate, and compare functions.

- **8.F.1** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
- **8.F.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*
- **8.F.3** Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not a on a straight line.*

Use functions to model relationships between quantities.

- **8.F.4** Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two *(x,y)* values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values.
- **8.F.5** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

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 define, evaluate, and compare functions?** • **How do you use functions to model relationships between quantities?** • **How do you determine the steepness or rate of change of a linear representation?** • **How do you show linear representations numerically in tables, graphically, and algebraically (equations)?**	• function • input • output • ordered pair • rate of change • slope • slope-intercept form	• domain • range • x-intercept • y-intercept • non-linear function • relations	**Formative:** • Journals/logs • KWL chart • At the bell activities • Question and answer • Thumbs up/thumbs down • Individual white boards/Promethean Board ActiVotes • Homework • Quizzes • Constructed response/open-ended problem solving • Performance tasks • Exit slips **Summative:** • Benchmark assessments • Performance based assessments o Quizzes o Tests o Constructed response/open-ended problem solving o Performance tasks o Project o Spiral Review o Study Island Practice

POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

UNIT OF INSTRUCTION: FUNCTIONS	PA COMMON CORE ASSESSMENT ANCHORS	PA ELIGIBLE CONTENT STANDARDS/ESSENTIAL CONTENT LEARNING ACTIVITIES
	CC.2.2.8.C.1: Define, evaluate, and compare functions. **Essential Skills and Understanding** • Ability to recognize functional relationships and apply the following: • Function Tables • Vertical Line Test • Domain/Input/Independent (x-coordinate) • Range/Output/Dependent (y-coordinate) • Ability to compare properties-constant rate of range/slope, increasing, decreasing, y-intercept, parallel lines, slopes of horizontal/vertical lines. • Ability to calculate slope/rate of change of a line graphically from a table or verbal description. • Ability to determine y-intercept from table, equation, graph, or verbal description. • Ability to distinguish between linear and non-linear functions. • Ability to identify and define independent variables and dependent variables in equations that represent authentic scenarios. **CC.2.2.8.C.2:** Use concepts of functions to model relationships between quantities. **Essential Skills and Understanding** • Ability to calculate and interpret constant rate of change/slope from a scenario, table, graph, or two points. • Ability to calculate and interpret initial value (y- intercept) from a scenario, graph, or table. • Ability to represent linear relationships numerically in tables, graphically, and algebraically (equation). • Ability to distinguish rate of change within an interval of a function. • Ability to interpret directionality and steepness of the graph of a function. • Ability to sketch a graph given algebraic context or a scenario (slope and initial value). • Ability to create a plausible story given a graph.	**M08.B-F.1: Analyze and interpret functions.** **M08.B-F.1.1.1** • Determine whether a relation is a function. **M08.B-F.1.1.2** • Compare properties of two functions, each represented in a different way (i.e., algebraically, graphically, numerically in tables, or by verbal descriptions). **M08.B-F.1.1.3** • Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line; give examples of functions that are not linear. **M08.C-G.1: Demonstrate an understanding of geometric transformations.** **M08.C-G.1.1.1** • Identify and apply properties of rotations, reflections, and translations. **M08.C-G.1.1.2** • Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them. **M08.C-G.1.1.3** • Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **M08.C-G.1.1.4** • Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them.

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
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	• Web-based Math Resources
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	• 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
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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:

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- Adaptions checklist
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- Grade 8 released state sample questions
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- 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
- 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

MATH ENHANCEMENT: GRADE 8 90 Day Course	STATE STANDARD AREA/UNIT:	Geometry: Geometry	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Understand congruence and similarity using physical models, transparencies, or geometry software.

- **8.G.1** Verify experimentally the properties of rotations, reflections, and translations:
  a. Lines are taken to lines, and line segments to line segments of the same length.
  b. Angles are taken to angles of the same measure.
  c. Parallel lines are taken to parallel lines.
- **8.G.2** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them.
- **8.G.3** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
- **8.G.4** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.
- **8.G.5** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*

Understand and apply the Pythagorean Theorem.

- **8.G.6** Explain a proof of the Pythagorean Theorem and its converse.
- **8.G.7** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
- **8.G.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.

- **8.G.9** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

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 use congruence and similarity with physical models, transformations, or geometry software?**
• **How do you apply the Pythagorean Theorem?**
• **How do you solve real-world and mathematical problems involving volume of cylinders, cones and spheres?**
	• congruent
	• transformations
	• similar
	• lines
	• line segments
	• angles
	• parallel
	• interior angles
		• angle sums
		• Pythagorean Theorem & Converse
		• transversal
		• 2-dimensional figures
		• 3-dimensional figures
		• volume
		• exterior angles
			<u>Formative:</u>
			• Journals/logs
			• KWL chart
			• At the bell activities
			• Question and answer
			• Thumbs up/thumbs down
			• Individual white boards/Promethean Board ActiVotes
			• Homework
			• Quizzes
			• Constructed response/open-ended problem solving
			• Performance tasks
			• Exit slips
			
			<u>Summative:</u>
			• Benchmark assessments
			• Performance based assessments
			  o Quizzes
			  o Tests
			  o Constructed response/open-ended problem solving
			  o Performance tasks
			  o Project
			  o Spiral Review
			  o Study Island Practice

POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

UNIT OF INSTRUCTION: GEOMETRY	PA COMMON CORE ASSESSMENT ANCHORS	PA ELIGIBLE CONTENT STANDARDS/ESSENTIAL CONTENT LEARNING ACTIVITIES
	CC.2.3.8.A.2: Understand and apply congruence, similarity, and geometric transformations using various tools. **Essential Skills and Understanding** • Ability to solve problems involving scale drawings of geometric figures, including finding length and area. • Ability to identify or describe the properties of all types of triangles based on angle and side measures. • Ability to use and apply the Triangle Inequality Theorem. • Ability to describe the two-dimensional figures that result from slicing three-dimensional figures. **CC.2.3.8.A.3:** Understand and apply the Pythagorean Theorem to solve problems. **Essential Skills and Understanding** • Knowledge of the hypotenuse and legs of a triangle. • Ability to use the Pythagorean Theorem to solve problems and real-world applications. • Ability to derive the distance formula from the Pythagorean Theorem, using the hypotenuse of a triangle. **CC.2.3.8.A.1:** Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems. **Essential Skills and Understanding** • Ability to identify and use properties of supplementary, complementary and adjacent angles to solve simple equations for an unknown angle in a figure. • Ability to identify and use properties of angles formed when two parallel lines are cut by a transversal. • Ability to find the area and circumference of a circle in problem solving situations. • Ability to solve real-world and mathematical problems involving area, volume, and surface area to two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.	**M07.C-G.1: Demonstrate an understanding of geometric figures and their properties.** **M07.C-G.1.1.1** • Solve problems involving scale drawings of geometric figures, including finding length and area. **M07.C-G.1.1.2** • Identify or describe the properties of all types of triangles based on angle and side measures. **M07.C-G.1.1.3** • Use and apply the Triangle Inequality Theorem. **M07.C-G.1.1.4** • Describe the two-dimensional figures that result from slicing three-dimensional figures. **M07.C-G.2: Solve real-world and mathematical problems involving angle measure, circumference, area, surface area, and volume.** **M07.C-G.2.1.1** • Identify and use properties of supplementary, complementary and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. **M07.C-G.2.1.2** • Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding). **M07.C-G.2.2.1** • Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). **M07.C-G.2.2.2** • Solve real-world and mathematical problems involving area, volume, and surface area to two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms.

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
- Ck12Math
- 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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- 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:

- StudyIsland, Ck12Math, other resources below: Geometry
- 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
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- United Streaming: http://streaming.discoveryeducation.com/index.cfm
- http://edhelper.com/place_value.html
- http://illuminations.nctm.org
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POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

MATH ENHANCEMENT: GRADE 8 90 Day Course	STATE STANDARD AREA/UNIT:	Measurement, Data and Probability: Statistics and Probability	TIME FRAME:	Ongoing

NATIONAL COMMON CORE STANDARDS:

Investigate patterns of association in bivariate data.

- **8.SP.1** Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
- **8.SP.2** Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
- **8.SP.3** Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an addition 1/5 cm in mature plant height.*
- **8.SP.4** Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*

MATHEMATICAL PRACTICES:

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5. Use appropriate tools strategically.
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ESSENTIAL QUESTIONS	VOCABULARY	ASSESSMENT	
		Formative:	**Summative:**

• **How do you describe patterns such as clustering, outliers, positive or negative correlation, linear association, and nonlinear association?**
• **How do you use the equation of a linear model to solve problems in the context of data by using the slope and intercept?**
• **How do you construct and interpret a two-way table summarizing data with two categorical variables collected.**
• **How do you investigate patterns with bivariate data?**
	• scatter plot
	• clustering
	• outliers
	• correlation
	• line of best fit
	• linear representation
	• non-linear representation
	• frequency
	• bivariate
		• Journals/logs
		• KWL chart
		• At the bell activities
		• Question and answer
		• Thumbs up/thumbs down
		• Individual white boards/Promethean Board ActiVotes
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		• Quizzes
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		• Exit slips
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POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

UNIT OF INSTRUCTION: STATISTICS AND PROBABILITY	PA COMMON CORE ASSESSMENT ANCHORS	PA ELIGIBLE CONTENT STANDARDS/ESSENTIAL CONTENT LEARNING ACTIVITIES
	CC.2.4.8.B.1: Analyze and/or interpret bivariate data displayed in multiple representations. **Essential Skills and Understanding** • Ability to integrate technology and relate data scenarios to authentic student-centered situations. • Ability to keep paired data organized in relation to one another within two sets of quantities. • Ability to describe patterns such as clustering, outliers, positive or negative correlation, linear association, and nonlinear association. **CC.2.4.8.B.2:** Understand that patterns of association can be seen in bivariate data utilizing frequencies. **Essential Skills and Understanding** • Ability to identify a line of best fit for scatter plots that suggest a linear association. • Ability to use the equation of a linear model to solve problems in the context of data by using the slope and intercept. • Ability to construct and interpret a two-way table summarizing data with two categorical variables collected. • Ability to use relative frequencies calculated for rows or columns to describe possible associations between the two variables.	**M08.D-S.1.: Investigate patterns of association in bivariate data.** **M08.D-S.1.1.1** • Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative correlation, linear association, and nonlinear association. **M08.D-S.1.1.2** • For scatter plots that suggest a linear association, identify a line of best fit by judging the closeness of the data points to the line. **M08.D-S.1.1.3** • Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. **M08.D-S.1.2.1** • Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible associations between the two variables.

POCONO MOUNTIAN SCHOOL DISTRICT CURRICULUM

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- Additional time
- Alternative Assessments
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- 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:

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- Exit Tickets
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