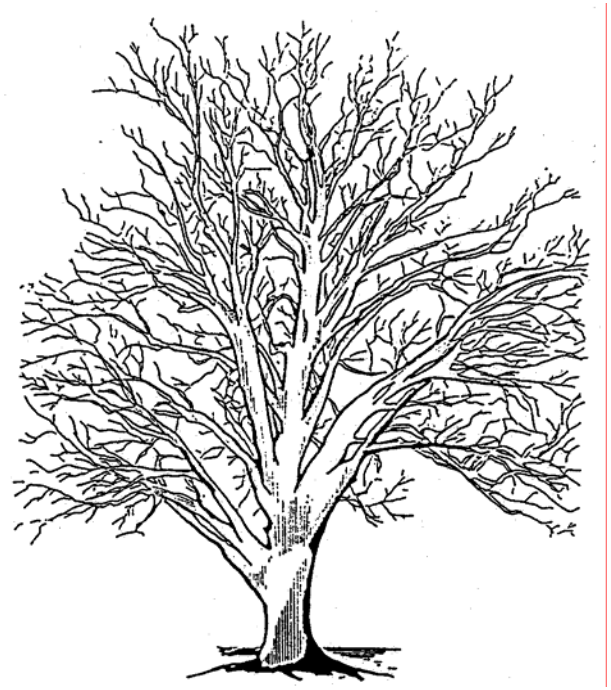
Monroe Township Schools



Curriculum Management System

Fundamentals of Mathematics – Summer Enrichment

Grade 10

January 2006

*** For adoption by all regular education programs as specified and for adoption or adaptation by all Special Education Programs in accordance with Board of Education Policy # 2220.**

Board Approved: June 28, 2006

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Acknowledgments

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Monroe Township Schools

Mission and Goals

Mission

The mission of the Monroe Township School District, a unique multi-generational community, is to collaboratively develop and facilitate programs that pursue educational excellence and foster character, responsibility, and life-long learning in a safe, stimulating, and challenging environment to empower all individuals to become productive citizens of a dynamic, global society.

Goals

To have an environment that is conducive to learning for all individuals.

To have learning opportunities that are challenging and comprehensive in order to stimulate the intellectual, physical, social and emotional development of the learner.

To procure and manage a variety of resources to meet the needs of all learners.

To have inviting up-to-date, multifunctional facilities that both accommodate the community and are utilized to maximum potential.

To have a system of communication that will effectively connect all facets of the community with the Monroe Township School District.

To have a staff that is highly qualified, motivated, and stable and that is held accountable to deliver a safe, outstanding, and superior education to all individuals.

INTRODUCTION, PHILOSOPHY OF EDUCATION, AND EDUCATIONAL GOALS

Philosophy

Monroe Township Schools are committed to providing all students with a quality education resulting in life-long learners who can succeed in a global society. The mathematics program, grades K-12, is predicted on that belief and is guided by the following six principals as stated by the National Council of Teachers of Mathematics (NCTM) in the *Principles and Standards for School Mathematics, 2000.* First, a mathematics education requires equity. All students will be given worthwhile opportunities and strong support to meet high mathematical expectations. Second, a coherent mathematics curriculum will effectively organize, integrate, and articulate important mathematical ideas across the grades. Third, effective mathematics teaching requires the following: a) knowing and understanding mathematics, students as learners, and pedagogical strategies, b) having a challenging and supportive classroom environment and c) continually reflecting on and refining instructional practice. Fourth, students must learn mathematics with understanding. A student's prior experiences and knowledge will actively build new knowledge. Fifth, assessment should support the learning of important mathematics and provide useful information to both teachers and students. Lastly, technology enhances mathematics learning, supports effective mathematics teaching, and influences what mathematics is taught.

As students begin their mathematics education in Monroe Township, classroom instruction will reflect the best thinking of the day. Children will engage in a wide variety of learning activities designed to develop their ability to reason and solve complex problems. Calculators, computers, manipulatives, technology, and the Internet will be used as tools to enhance learning and assist in problem solving. Group work, projects, literature, and interdisciplinary activities will make mathematics more meaningful and aid understanding. Classroom instruction will be designed to meet the learning needs of all children and will reflect a variety of learning styles.

In this changing world those who have a good understanding of mathematics will have many opportunities and doors open to them throughout their lives. Mathematics is not for the select few but rather is for everyone. Monroe township Schools are committed to providing all students with the opportunity and the support necessary to learn significant mathematics with depth and understanding. This curriculum guide is designed to be a resource for staff members and to provide guidance in the planning, delivery, and assessment of mathematics instruction.

Educational Goals

Fundamentals of Mathematics is a summer enrichment course geared for students entering the 10^{th} grade. It is designed to strengthen Algebra I skills as well as to prepare students for success in Geometry. Students will continue an in-depth analysis of the real number system, refine the process of algebra, and expand upon the geometrical knowledge attained in the middle school. Topics included are: roots and powers, simplifying mathematical expressions, solving and graphing linear equations and inequalities, rates, ratios, percents, the Pythagorean Theorem, midpoint and distance formulas, patterns, points, lines, angles, planes, parallel lines, and an introduction to relationships of triangles and of quadrilaterals.

New Jersey State Department of Education
Core Curriculum Content Standards

A note about Mathematics Standards and Cumulative Progress Indicators.

The New Jersey Core Curriculum Content Standards for Mathematics were revised in 2002. The Cumulative Progress Indicators (CPI's) referenced in this curriculum guide refer to these new standards and may be found in the Curriculum folder on the district servers. A complete copy of the new Core Curriculum Content Standards for Mathematics may also be found at: http://www.nj.gov/njded/cccs/s4_math.htm

Fundamentals of Mathematics – Summer Enrichment

Scope and Sequence

Week 1

Pre-Test

Review of Pre-Algebra Skills:

1. Operations with Integers (add, subtract, multiply, divide)
2. Operations with Exponents (positive, zero, negative)
3. Simplify Expressions using Order of Operations.
4. Solving Equations.
5. Solving Inequalities.

Algebra Problem Solving Skills:

6. Graphing Equations,
7. Slope, Slopes of Parallel and Perpendicular Lines
8. Slope-Intercept Form.
9. Solving Word Problems
10. Rates, Ratios, and Percents

Connections to Geometry:

11. Simplifying Square Roots
12. The Pythagorean Theorem
13. Distance and Midpoint Formulas

Week 2

Introduction to Geometry:

1. Patterns
   a) find the next three terms (arithmetic, geometric, and pictures)
   b) find an equation to represent the n^{th} term
   c) find the n^{th} term

Geometry Relationships:

2. Identify points, lines, and planes.
3. Measure segments using a ruler.
4. Graphing points
5. Finding the distance between two points (of a segment) using the distance formula.
6. Find the midpoint of a segment.
7. Measure angles using a protractor and classify as acute, right, obtuse, or straight.
8. Complementary and Supplementary Angles
9. Vertical Angles.

Week 3

Parallel Lines:

1. Relationships between lines and a transversal
2. Relationships when parallel lines are cut by a transversal
3. Slopes of Lines, determine whether parallel, perpendicular, or neither.

Triangle Relationships:

4. Triangle Classifications
5. Angle Measures of Triangles
6. Exterior Angle Theorem
7. Special properties of Isosceles and Equilateral Triangles
8. The Pythagorean Theorem and Distance Formula, classifying triangles using the Pythagorean Theorem.
9. In a triangle, a side opposite a larger angle is longer than a side opposite a smaller angle.
10. Triangle Inequality, Exterior Angle Inequality.

Week 4

Quadrilaterals:

1. Polygons
2. Properties of Parallelograms
3. Rhombuses, Rectangles, and Squares
4. Trapezoids

Review

Post-Test

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 10** Fundamentals of Mathematics - Summer Enrichment	Topic: Pre-Algebra Skills Goal 1: The student will be able to refine basic skills from Algebra I such as simplifying expressions and solving equations.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
1	1.1. Operations with Real Numbers(2.2-2.7)	• *A submarine is currently 100 feet under water (sea level). To avoid collisions with the ocean floor and other marine vessels, the submarine made the following movements: first it moved 20 feet up, then 50 feet deeper, then 40 feet deeper, then 20 feet up, then surfaced. How far did the submarine have to travel from its last depth to get to the surface?* • Add, Subtract, Multiply, and Divide positive and negative real numbers. • Students should memorize rules; some may need to use a number line. • Explanation: Multiplication of Signed Numbers: The story of the good guys (positive) and the bad guys (negative) being in town (positive) and out of town (negative). If the good guys are in town, it's good, + times + = + If the good guys are out of town, it's bad, + times - = - If the bad guys are in town, it's bad, - times + = - If the bad guys are out of town, it's good, - times - = +	McDougal-Littell: Algebra 1 2004 -2.2 Addition (pg. 72-77) -2.3 Subtraction (pg. 79-85) -2.5 Multiplication (pg. 93-98) -2.7 Division (pg. 109-114)
	1.2. Evaluate Expressions containing Variables (1.2)	• *What is a variable?* • Evaluate 8x + 4 if x = -3	McDougal-Littell: Algebra 1 2004 -1.1 Variables (pg. 3-8) -1.2 Exponents and Powers (pg. 9-14)
	1.3. Simplify Expressions Using the Order of Operations (1.3)	• *Does it matter if I deposit money in my checking account before I write the checks out?* • *Why do we need an order of operations?* • Use either PEMDAS, or GEMDAS, be sure students understand that M and D are equal as well as A and S just move left to right. • Do some more difficult problems such as: $\frac{2 \bullet 3-1}{4(6-8 \bullet 3)} - 7^2 + (-3)^3 + (-2)^4$	McDougal-Littell: Algebra 1 2004 -1.2 Exponents and Powers (pg. 9-14) -1.3 Order of Operations (pg. 16-22)

Suggested days of Instruction	**Curriculum Management System** **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Pre-Algebra Skills** **Goal 1: The student will be able to refine basic skills from Algebra I such as simplifying expressions and solving equations.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	1.4. Use properties of exponents to multiply and divide exponential expressions. (8.1,8.3) 1.5. Evaluate powers that have zero and negative exponents. (8.2)	• *What is an exponent? What does it mean to have the same base?* • Simplify $(a^2)^3$ • Simplify $a^2 * a^3$ • Simplify $2x^5 + 3x^5 + 5x^3$ • Simplify $(2x^3y)^2$ • *What does it mean to have a negative exponent? Why divide instead of multiply?* • Show students relation of exponents, positive means multiply, negative means divide, show steps in increasing in power one by one, then decreasing: $2^2 = 4$ $2^1 = 2$ Look for pattern: $2^0 = 1$ $2^{-1} = \frac{1}{2}$ $2^{-2} = \frac{1}{4}$ • Simplify 3^{-2} • Simplify 8^0 • Simplify $\frac{1}{(4x)^{-5}}$ • Simplify $-\frac{2xy}{-x^{-1}} \bullet \left(\frac{2x^3y^4}{8xy}\right)^3$	McDougal-Littell: Algebra 1 2004 -1.2 Exponents and Powers (pg. 9-14) -8.1 Multiplication Properties of Exponents (pg. 450-455) -8.2 Zero and Negative Exponents (pg. 456-462) -8.3 Division Properties of Exponents (pg. 463-469)

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Pre-Algebra Skills** **Goal 1: The student will be able to refine basic skills from Algebra I such as simplifying expressions and solving equations.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	1.6. Solve one-step equations (3.1-3.2) 1.7. Solve multi-step equations (3.3) 1.8. Solve equations with variables on both sides of the equation(3.4)	• *If you have $28 in your wallet, and you want to purchase a jacket for $43, how much more money do you need? 28 + x = 43* • I can solve these problems in my head. How do I use algebra to solve equations? What does it mean to use the opposite operation? • Solve x – 3 = 5 • Solve: x + 5 = 11 • Solve -4x = 28 • Solve $\frac{x}{3} = -39$ • Focus on writing equations from word problems • *Lisa's mother is three more than twice Lisa's age. Lisa's mother is 47, how old is Lisa?* • Always undo the addition or subtraction first, then the multiplication or division. • Solve 3x + 4 = 25 • Solve 7x – 3x + 8 = -24 • Solve 5x + 3(x + 4) = 28 • Solve $-\frac{3}{2}x = -12$ • *How do I get all of the variables together when they are on both sides of the equation?* • Solve 18y + 13 = 12y – 25 • Solve 6y – (3y – 6) = -14 – 3y • Focus on writing equations from word problems and using tables to solve problems.	McDougal-Littell: Algebra 1 2004 -3.1 Solving Equations Using Addition (pg. 132-137) -3.2 Solving Equations Using Multiplication and Division (pg. 138-144) -3.3 Solving Multi-Step Equations (pg. 145-152) -3.4 Solving Equations with Variables on Both Sides (pg. 154-159) -3.5 Linear Equations and Problem Solving. (pg. 160-165) **HSPA:** Amsco: MATHEMATICS: Preparing for the New Jersey HSPA, Grade 11 -Cluster 4.C.2 – pg. 221-226 -Note the representations with a balanced scale squares, and circles.

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 10** Fundamentals of Mathematics - Summer Enrichment	Topic: Algebra I Skills Goal 2: The student will be able to refine problem solving and graphing skills from Algebra I such as solving word problems, using slope-intercept form of an equation, and solve ratio and percent problems.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
2	2.1. Graph the equation of a line using a table of values (4.2)	• *How does a line represent an equation?* • Given the equation y = 2x – 5, students make a table of at least 3 values and graph in a coordinate plane. • Review x-axis, y-axis, origin, quadrants.	McDougal-Littell: Algebra 1 2004 -4.2 Graphing Linear Equations (pg 210-217) Prentice Hall: Algebra - Tools for a Changing World -Ch 2.3 – Linking Graphs to Tables (pg. 69-72)
	2.2. Find the slope of a line. (4.4)	• *What is a rate of change, how is it represented in an equation? What is slope?* • Given a graph, students identify rise and run, to form slope fraction. Emphasize simplest form of a fraction. • Identify that a horizontal line has zero slope, and a vertical line has an undefined slope or no slope. • Explanation: Ski Slopes: A positive or negative slope is an acceptable slope for a downhill skier. A cross-country skier skis on a flat surface (horizontal line) which has zero slope. A vertical drop is not acceptable for a skier…would you like to ski off of a cliff? Heck no! • Given two points on a line, students use the equation $\frac{y_2 - y_1}{x_2 - x_1}$, to find the slope of the line. Emphasize the meaning of the sub numbers to identify the point; it is not for an operation.	McDougal-Littell: Algebra 1 2004 -4.4 The Slope of a Line (pg 226-234) Prentice Hall: Algebra - Tools for a Changing World (textbook - purple binding) -Ch 5.1 Slope (pg. 215-218) -Ch 5.2 Rates of Change (pg. 220-224)

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Algebra I Skills** **Goal 2: The student will be able to refine problem solving and graphing skills from Algebra I such as solving word problems, using slope-intercept form of an equation, and solve ratio and percent problems.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	2.3. Transform an equation into slope-intercept form.(4.6) 2.4. Graph the equation of a line using slope-intercept form. (4.6)	• *Now that I know the slope of a line, how can I find the slope by looking at an equation? What does the rest of the information in the equation mean?* • Identify y = mx + b, have students graph and discover the slope and y-intercept. • Given the equation y = 2x – 5, graph without making a table of values. • Given the equation $y = \frac{1}{2}x + 3$, graph using slope-intercept form. • Emphasize that slope moving up and right is the same as down and left (+/+ and -/-) • And slope moving up and left is the same as down and right (+/- and -/+) • Put the equation 4x – 2y = 10 into slope-intercept form.	McDougal-Littell: Algebra 1 2004 -4.6 Quick Graphs Using Slope-Intercept Form (pg. 241-247)
	2.5. Use slope-intercept form to find the equation of a word problem.	• *Since a line represents an equation, can I use a line to find an equation?* • We already know slope and y-intercept from, how can we identify these things in a graph. • If the slope of a line is ½ and the y-intercept is -3, what is the equation of the line? • Given the graph of a line, find the slope and y-intercept of a line, and write the equation. • Write the equation of the line going through the points: (3, 5) and (-4, -9), Students must know to find the slope first, then pick one of the points to find the equation as in 5.3 • Review horizontal lines (y = number) and vertical lines (x = number)	McDougal-Littell: Algebra 1 2004 -5.1 Writing Linear Equations in Slope-Intercept Form (pg. 274-278) -5.2 Writing Linear Equations Given the Slope and a Point (pg. 279-284) -5.5 Point-Slope form (pg. 300-306) -5.3 Writing Linear Equations Given Two Points.

Suggested days of Instruction	**Curriculum Management System** **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Algebra I Skills** **Goal 2: The student will be able to refine problem solving and graphing skills from Algebra I such as solving word problems, using slope-intercept form of an equation, and solve ratio and percent problems.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	2.6. Use rates, ratios, and percents to solve real-world problems (3.8)	• *How do I put a rate or a percent into an equation?* • The sides of a triangle are related by the ratio 3: 4: 5. The perimeter is 41 cm, what are the lengths of each side? • *How can I figure the discount, sales tax, or shipping quickly?* • Many students use the method: $\frac{part}{whole}=\frac{\%}{100}$ or $\frac{is}{of}=\frac{\%}{100}$. • 30 is 15% of what? • 30 is what % of 15? • What is 30% of 15? • Discounts: A \$60 pair of shoes is on sale for 20% off, what is the sale price? • Find the original: A jacket is on sale for 20% off; the sale price is \$160, what was the original price? • Double Discounts: A \$750 Couch is on sale for 30% off with an additional 10% off? Discuss why this is not the same as 40% off. • Sales Tax and Discount: A \$200 set of pots and pans is on sale for 25% off, what is the price after 6% sales tax? • *What is the difference between a sketch and a scale drawing?* • Most students remember how to solve a proportion: Cross multiply and divide. • Solve: $\frac{3}{y}=\frac{5}{8}$ • Solve: $\frac{x}{8}=\frac{2x-1}{20}$ • Emphasize ability to solve word problems and real life applications.	McDougal-Littell: Algebra 1 2004 -3.8 Rates Ratios and Percents (pg. 180-185) -11.1 Ratio and Proportion (pg. 643-648) -11.2 Percents (pg. 649-655) **HSPA:** Prentice Hall: New Jersey HSPA Mathematics Comprehensive Review (textbook - purple binding – paperback) -1.1 Real Numbers and Algebraic Expressions pg. 1-6 -3.2 Problems Involving Linear Equations in One Variable pg. 46-50 Amsco: MATHEMATICS: Preparing for the New Jersey HSPA, Grade 11 -Cluster 1.B.1 – pg. 13-14 -Cluster 1.B.2 – pg. 15-16

Suggested days of Instruction	**Curriculum Management System** **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Connecting Algebra to Geometry** **Goal 3: The student will be able to use formulas to solve problems in Geometry and simplify their answers in order to give exact answers and rounded answers.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
1	3.1. Simplify Radicals. (CPI 4.1.12 B1, B2)	• *A can of paint reads that a quart of paint covers 75 to 100 square feet. What does this mean? How big of a wall will it cover?* • Students must be able to identify solutions to: $\sqrt{9}, \sqrt{-9}, -\sqrt{9}$, and $\pm\sqrt{9}$ • Review types of numbers: counting (natural), whole, integers, and rational, and irrational. Emphasize the differences between rational and irrational. (terminating or repeating). Look in HSPA books for questions about types of numbers. • Solve $x^2 = 121$ • Solve: $x^2 = 24$; this does not have a whole number answer, we must simplify. • Emphasize the need for exact answers, the need for simplifying radicals. • Simplify these: $\sqrt{64}$, $\sqrt{18}$, $\sqrt{\frac{25}{16}}$	McDougal-Littell: Algebra 1 2004 -9.2 Simplifying Radicals (pg. 511-516) -12.2 Operations with Radical Expressions (pg. 716-721) – only multiplying and dividing as in Example 2 and 3, or Problem #'s 7, 10, 12, 31, 32, 40, 41, 43 Prentice Hall: Algebra - Tools for a Changing World (textbook - purple binding) -9.4 Simplifying Radicals (pg. 430-434)
	3.2. Use the Pythagorean Theorem to solve problems. (CPI 4.2.12 A1, 4.2.12 E1)	• *What whole number side lengths always form right triangles, Pythagorean Triples? How can I use these to solve problems?* • Pythagorean theorem: $a^2 + b^2 = c^2$, $leg^2 + leg^2 = hyp^2$ • In a right triangle one leg is 5, the other leg is 12, find the hypotenuse. • In a right triangle one leg is 20, the hypotenuse is 25, find the other leg. • If two sides of a right triangle are 3 and 4, what are the possible side lengths for the third side?	Geometry, Glencoe, © 2005 - Geometry Activity pg. 349 - 8.2 pg. 350-356 **HSPA:** Amsco: MATHEMATICS: Preparing for the New Jersey HSPA, Grade 11 - Cluster 2.C.6 Pythagorean Theorem – pg. 87-88

Suggested days of Instruction	**Curriculum Management System** **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Connecting Algebra to Geometry** **Goal 3: The student will be able to use formulas to solve problems in Geometry and simplify their answers in order to give exact answers and rounded answers.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	3.3. Find the distance between two points. (CPI 4.2.12 C1) 3.4. Identify and find the midpoint of a segment. (CPI 4.2.12 C1)	• Find the distance on a number line (whether horizontal or vertical) • Distance formula – $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ • Midpoint formulas: Number Line: $\frac{x_1 + x_2}{2}$ Coordinate Plane: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ Emphasize - coordinates. EX 1: Find AB if A(3, 2) and B(3, -5) EX 2: Find AB if A(-5, 3) and B(7, -2) EX 3: A(2, -2), B(2,8), find the coordinates of M.	Geometry, Glencoe, © 2005 -1.3 pg. 21-28

Suggested days of Instruction	**Curriculum Management System** **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic:** **Basics of Geometry – Segments and Angles** **Goal 4:** **The student will be able to use inductive and deductive reasoning to solve problems.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
2	4.1. Identify the next three terms in a pattern. (CPI 4.3.12 A1) 4.2. Find the n^{th} term of an arithmetic pattern. (CPI 4.2.13 A1)	• *If you start a savings account with $500, and add $20 each week, how much money will you have after 1 year?* • Visual patterns – repeating shapes. • Number patterns, arithmetic, geometric, Fibonacci • Repeating patterns: what is the 38^{th} term in GEOMETRYGEO…? What is the 47^{th} digit in $\frac{1}{7}$? Or what is the units digit in 3^{25}? • In the pattern 4, 6, 8, 10, … what are the next three terms? What is the 40^{th} term? What is the n^{th} term (write an equation)?	**HSPA:** Amsco: MATHEMATICS: Preparing for the New Jersey HSPA, Grade 11 - Cluster 2.A.4 Inductive and Deductive Reasoning – pg. 36-38 - Cluster 4.A.1 Patterns – pg. 177-181 - Cluster 4.A.2 Sequences and Series – pg. 181-187 - Cluster 4.A.3 Representation of Relationships and Patterns – pg. 188-189 Prentice Hall: New Jersey HSPA Mathematics Comprehensive Review - 13.1 Patterns and Sequences pg. 298-301

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Geometry Relationships** **Goal 5: The student will be able to identify and use parts and types of lines, angles, and planes in problems solving.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
3	5.1. Identify and use points, lines, and planes in space. (CPI 4.2.12 A1)	• *Why do chairs sometimes wobble?* • Identify collinear and coplanar points. • Name points, lines, line segments, and planes both in words and by symbols • Coordinate Geometry: identify the x-axis, y-axis, origin, quadrants, and plot points. • Introduce z-axis (mention) • Two lines intersect to form a point • Two planes intersect to form a line. • Skew lines are in two different planes, never intersect, but are not parallel.	Geometry, Glencoe, © 2005 -Review of plotting points pg. 728 -1.1 pg. 6-12 **HSPA:** Amsco: MATHEMATICS: Preparing for the New Jersey HSPA, Grade 11 - Cluster 2.A.1Geometric Terms – pg. 23-26 Prentice Hall: New Jersey HSPA Mathematics Comprehensive Review - 10.1 Points, Lines, Planes, and Segments pg. 206-210
	5.2. Find the length and midpoint of a segment. (CPI 4.2.12 C1) 5.3. Identify and use segments, midpoints, and segment bisectors. (CPI 4.2.12 C1)	• *I want to make a garden that is 12 feet by 4 feet. If the border pieces are 4 feet long, how many pieces will I need?* • Name distance in words and by symbols. • Find the distance on a number line (whether horizontal or vertical) • Use a ruler to measure the distance of a segment, in inches and in centimeters.	Geometry, Glencoe, © 2005 -1.3 pg. 21-28 -Activity – The Pythagorean Theorem pg. 28

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Geometry Relationships** **Goal 5: The student will be able to identify and use parts and types of lines, angles, and planes in problems solving.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	5.4. Measure and Classify Angles. (CPI 4.2.12 C1) 5.5. Identify and use congruent angles in problem solving. (CPI 4.2.12 C1)	• *Why when it is the brightest outside does no one use their visors in their cars, yet in the early morning or evening they do?* • Identify the sides, vertex, interior, and exterior of an angle. • Name a ray in words and by symbols. • Name an angle by symbols, using one letter (the vertex), three letters, and a number. • Know the difference between the symbols: $\angle ABC$ and $m\angle ABC$ • Measure an angle using a protractor (optional) • Angles are measured in degrees: Emphasize - students must have degree signs next to angle measures. • Classify Angles as acute, right, obtuse, or straight. • Identify and label congruent angles • Use Algebra to find angle measurements. • Identify and use properties of angle bisectors: Bisector is exactly in middle. Bisector cuts the whole angle in half. The measure of each angle on either side of the bisector is equal. EX. $\overrightarrow{BD}$ is the angle bisector of $\angle ABC$, If $\angle ABD = (8X - 10)^O$ and $\angle DBC = (10x - 20)^o$, find x, $m\angle ABC$ • Angle addition postulate	Geometry, Glencoe, © 2005 - 1.4 pg. 29-36 **HSPA:** Prentice Hall: New Jersey HSPA Mathematics Comprehensive Review - 10.2 Rays and Angles pg. 211-214 **TECHNOLOGY:** Prentice Hall Mathematics: - TI – 83/84 PLUS Activities for Algebra, Geometry, and Algebra II (resource workbook) - Angle Bisectors – pg. 55

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Geometry Relationships** **Goal 5: The student will be able to identify and use parts and types of lines, angles, and planes in problems solving.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	5.6. Identify and use special types of angles and pairs of angles. (CPI 4.2.12 C1)	• *Streets intersect to form many different types of angles, discuss the angels of roads around Monroe and Jamesburg.* • Identify and name adjacent angles • Identify vertical angles - congruent • Complementary angles - two angles whose sum is 90^o • Supplementary angles – two angles whose sum is 180^o • Linear Pair of angles form a line; they are supplementary and their sum is 180^o • Perpendicular lines form 4 right angles. Use Algebra to find angle measurements using each angle type listed above.	Geometry, Glencoe, © 2005 - 1.5 pg. 37-43 **HSPA:** Amsco: MATHEMATICS: Preparing for the New Jersey HSPA, Grade 11 - Cluster 2.A.3 – pg. 33-36 **TECHNOLOGY:** Prentice Hall Mathematics: - TI – 83/84 PLUS Activities for Algebra, Geometry, and Algebra II (resource workbook) - Linear Pairs – pg. 57 - Vertical Angles – pg. 59

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Parallel and Perpendicular Lines** **Goal 6: The student will be able to use angle relationships with parallel and perpendicular lines to solve problems.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
2	6.1. Identify angles formed by two lines and a transversal. (CPI 4.2.12 A3, 4.2.12 A4, 4.2.12 C1)	• *When a house is built, Construction workers must up walls straight. They use beams in the walls called studs to stabilize the wall. How can the workers determine if the studs are parallel?* • Discuss parallel lines and parallel planes. • Introduce types of angles: Alternate exterior, Alternate interior, Corresponding, Consecutive (Same-Side Interior) • Identify angles when three lines cross (not parallel), and when four lines cross (two sets of parallel lines).	Geometry, Glencoe, © 2005 - 3.1 pg. 126-131 - Geometer sketchpad activity p. 132 **HSPA:** Prentice Hall: New Jersey HSPA Mathematics Comprehensive Review - Intersecting, Perpendicular, and Parallel Lines pg. 215-219 **RESOURCES:**
	6.2. Identify and use angle relationships formed by two parallel lines and a transversal. (CPI 4.2.12 A3, 4.2.12 C1, 4.5.12 C1, 4.5.12 D3)	• *A railroad train travels along two rails. The two rails must be the same distance apart along the entire track. How can we make sure the train will not derail?* • Identify the alternate interior, alternate exterior, and corresponding angles, and identify the congruent angles • Identify the consecutive angles and the supplementary angles, show relationship is supplementary. • Congruent angles can be identified by making a "Z", zigzagging across the transversal. • Perpendicular transversal theorem. • Use algebra to solve problems involving parallel lines and a transversal.	Geometry, Glencoe, © 2005 - Geometer sketchpad activity pg. 132 - 3.2 pg. 133-138 - 3.5 pg. 151-158 **TECHNOLOGY:** Prentice Hall Mathematics: - TI – 83/84 PLUS Activities for Algebra, Geometry, and Algebra II (resource workbook) - Parallel Lines, Related Angles – pg. 61

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Parallel and Perpendicular Lines** **Goal 6: The student will be able to use angle relationships with parallel and perpendicular lines to solve problems.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	6.3. Use the slope of a line to determine whether two lines are intersecting, parallel, or perpendicular. (CPI 4.2.12 C1, 4.3.12 B2)	• *When driving in the mountains, or a very hilly area, there are signs posted with pictures of a truck and percentages on them. What are these used for, what does the percentage mean?* • Review slope formula: $\frac{y_2 - y_1}{x_2 - x_1}$ • Review relationships of slopes of parallel and perpendicular lines. • Review slope-intercept form of an equation. • Use slope to graph a line: given the slope and a point, given slope-intercept form.	Geometry, Glencoe, © 2005 - 3.3 pg. 139-144 - pg. 741 – Review graphing using intercepts and slopes. **HSPA:** Amsco: MATHEMATICS: Preparing for the New Jersey HSPA, Grade 11 (navy blue binding – paperback) - Cluster 2.B.5 Coordinate Geometry – pg. 58-61

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 10** Fundamentals of Mathematics - Summer Enrichment	Topic: Triangle Relationships Goal 7: The student will be able to use the relationships of sides and angles in triangles to solve problems.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
3	7.1. Classify triangles by sides and angles (CPI 4.2.12 A3, 4.2.12 A4)	• *Construction workers use triangles when building houses, office buildings, and bridges, name some locations where you've seen triangles used in construction. Why do you think this is?* • Identify the vertices, angles, and sides of a triangle. • Side Classifications – scalene, isosceles, and equilateral • Angle Classifications – acute, obtuse, right, and equiangular • Emphasize: In a right triangle, there is at most 1 right angle. And, in an obtuse triangle, there is at most 1 obtuse angle. • In a right triangle, identify the right angle, the legs and the hypotenuse. • In an isosceles triangle, identify the base, the vertex, and the base angles.	**RESOURCES:** Geometry, Glencoe, © 2005 - 4.1 pg. 178-183 **HSPA:** Prentice Hall: New Jersey HSPA Mathematics Comprehensive Review (textbook - purple binding – paperback) -10.4 Triangles
	7.2. Use the exterior and interior angles of a triangle to solve problems. (CPI 4.2.12 A3, 4.2.12 A4)	• Angle Sum Theorem, the sum of the angles inside an triangle is 180^{o} • Exterior Angles Theorem, the exterior angle is equal to the sum of the two remote interior angles. • Solve problems involving interior and exterior angles.	Geometry, Glencoe, © 2005 - 4.2 pg. 216-221
	7.3. Use properties of isosceles triangles to solve problems. (CPI 4.2.12 A3, 4.2.12 A4)	• Review the vertex, the base, and the base angels. • If the triangle is isosceles, then the base angles are congruent, (If sides then angles). • If the base angles are congruent then the triangle is isosceles. (If angles then sides). • Given one angle in an isosceles triangle, find the other two angels. • Use algebra to solve isosceles triangle problems. EX. In isosceles triangle ABC, where A is the vertex, AB = 4x – 5, AC = 11 + 2x, BC = 3X. Find x, BC.	Geometry, Glencoe, © 2005 - 4.6 pg. 216-221

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 10** Fundamentals of Mathematics - Summer Enrichment	Topic: Triangle Relationships Goal 7: The student will be able to use the relationships of sides and angles in triangles to solve problems.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	7.4. Name congruent triangles and identify corresponding parts. (CPI 4.2.12 A3, 4.2.12 A4)	• *I need to get to the other side of the river, but I need to know how long of a bridge to make, how can I use markings on this side of the river to see if I have enough?* • Review reflexive, symmetric, and transitive properties. • Identify all congruent angles and all congruent sides of congruent triangles. • Make congruence statements • Emphasize: order of letters matters. • CPCTC	Geometry, Glencoe, © 2005 - 4.3 pg. 192-198 **TECHNOLOGY:** Prentice Hall Mathematics: - TI – 83/84 PLUS Activities for Algebra, Geometry, and Algebra II (resource workbook) - Exterior Angle of a Triangle – pg. 63
	7.5. Recognize and Apply triangle inequalities. (CPI 4.2.12 A3, 4.3.12 C1, 4.5.12 A3)	• *Without using a protractor, How can you tell which angle is the biggest angle?* • Angle-Side Relationships: The angle opposite a longer side is larger than an angle opposite a shorter side and vice-versa. • Determine side-angle relationships when there are two adjacent triangles. • Triangle Inequality Theorem: The sum of the lengths of any two sides of a triangle is greater than the length of the third side. EX. Is it possible for a triangle to have side lengths of 3, 5, and 8? 2, 4, and 5? 3, 3, 10? • Given two side lengths, find the range of lengths for the 3rd side. EX. If two sides of a triangle are 10 and 13, what is the range of sizes for the third side? • Also, apply algebra to solving inequalities.	Geometry, Glencoe, © 2005 - 5.2 pg. 247-254 - 5.4 pg. 261-266 - 5.5 pg. 267-273 **TECHNOLOGY:** Prentice Hall Mathematics: - TI – 83/84 PLUS Activities for Algebra, Geometry, and Algebra II (resource workbook) - Inequalities in Triangles – pg. 75

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 10** Fundamentals of Mathematics - Summer Enrichment	Topic: Triangle Relationships Goal 7: The student will be able to use the relationships of sides and angles in triangles to solve problems.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	7.6. Use side lengths to determine if a triangle is acute, right, or obtuse (CPI 4.2.12 A1, 4.2.12 E1)	• *If I am not given any angle measurements, how can I tell if a triangle is acute, right, or obtuse?* • Use Pythagorean Theorem. If hypotenuse is smaller than what c should be according to the theorem, then the triangles is acute, if hypotenuse is larger than what c should be, then the triangle is obtuse. EX. Is a triangle with side lengths 3, 4, 6 is acute, right, or obtuse?	Geometry, Glencoe, © 2005 - 7.2 pg. 350-356

Suggested days of Instruction	Curriculum Management System Grade Level/Subject: **Grade 10** Fundamentals of Mathematics - Summer Enrichment	Topic: Quadrilaterals Goal 8: The student will be able to use properties of quadrilaterals to solve problems.	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
2	8.1. Recognize and apply the properties of parallelograms. (4.2.12 A3) 8.2. Recognize and apply the properties that ensure a quadrilateral is a parallelogram. (CPI 4.2.12 A3)	• *There are many quadrilaterals in nature, where do we see quadrilaterals, and where to we see parallel lines? Why are these so special in architecture?* • Define the five properties of a parallelogram: two pairs of parallel sides, opposite sides are congruent, opposite angles are congruent, consecutive angles are supplementary, and diagonals bisect each other. • Name the parallelogram in words and by symbols. • Label parallelogram with arrows to indicate parallel lines and with slashes to indicate congruence. • Use algebra to solve parallelogram problems • Apply properties that ensure a quadrilateral is a parallelogram – the five properties of a parallelogram, and if one side of a quadrilateral is both parallel and congruent, then the quadrilateral is a parallelogram. • Use algebra to create conditions that ensure a quadrilateral is a parallelogram. EX. In □ $ABCD$, AB = 15, CD = 2x + 3 Find x. • Do many board examples giving 3 angles in a parallelogram, students must find the rest of the angles.	**RESOURCES:** Geometry, Glencoe, © 2005 - 8.2 pg. 411-416 - 8.3 pg. 417-419 **HSPA:** Amsco: MATHEMATICS: Preparing for the New Jersey HSPA, Grade 11 (navy blue binding – paperback) - Cluster 2.A.2 Properties of Geometric Figures pg. 27-33 Prentice Hall: New Jersey HSPA Mathematics Comprehensive Review (textbook - purple binding – paperback) -10.5 Quadrilaterals pg. 226-231 **TECHNOLOGY:** Exploring Geometry with The Geometer's Sketchpad (resource workbook) - Prop. of Parallelograms - 91

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic: Quadrilaterals** **Goal 8: The student will be able to use properties of quadrilaterals to solve problems.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	8.3. Recognize and apply the properties of special parallelograms – rectangles, rhombi, and squares. (CPI 4.2.12 A3)	• *The floor and the walls of a house must be rectangular in order for everything else in the house to be plum. How do construction workers ensure that the floor and the walls are rectangular?* • Understand that Rectangles, Rhombi, and Squares are still parallelograms, therefore all the properties of parallelograms still hold for these shapes. • Special Properties: • Rectangles: All angles are equal (90^o) Diagonals are equal • Rhombi All sides are equal Diagonals are perpendicular Diagonals bisect opposite angles. • Square: Is a parallelogram, a rhombus, and a rectangle, and has all the properties of each. • Solve problems involving special parallelograms, using algebra. EX. In rhombus ABCD, AB=15, BC=3x -6, find x. • Use the Pythagorean Theorem when solving a Rhombus. EX. In rhombus ABCD, BD=15, AC=20, find AB. • Do many board examples given 1 angle in a special parallelogram, and students must find other angles.	**RESOURCES:** Geometry, Glencoe, © 2005 - 8.4 pg. 424-430 - 8.5 pg. 431-437 **TECHNOLOGY:** Exploring Geometry with The Geometer's Sketchpad (resource workbook) - Properties of Rectangles - 93 - Properties of a Rhombus – 95

Suggested days of Instruction	Curriculum Management System **Grade Level/Subject:** **Grade 10** **Fundamentals of Mathematics - Summer Enrichment**	**Topic:** **Quadrilaterals** **Goal 8:** **The student will be able to use properties of quadrilaterals to solve problems.**	
	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) **The student will be able to:**	**Essential Questions** **Sample Conceptual Understandings**	**Instructional Tools / Materials / Technology / Resources / Learning Activities / Interdisciplinary Activities / Assessment Model**
	8.4. Recognize and apply the properties of trapezoids. (CPI 4.2.12 A3)	• Define properties of trapezoids: one pair of parallel sides, define sides, bases and legs, angles connecting the bases are consecutive, therefore are supplementary. • Define isosceles trapezoids: congruent legs, base angles are congruent and diagonals are congruent. • Median of a trapezoid, use the formula: $2 \bullet \text{median} = \text{base}_1 + \text{base}_2$ as students relate to this better than using a fraction. • Solve various problems using algebra with trapezoids – angles, sides in isosceles triangles and medians.	**RESOURCES:** Geometry, Glencoe, © 2005 - 8.6 pg. 439-446 - Hierarchy of Polygons (Quadrilaterals) **TECHNOLOGY:** Exploring Geometry with The Geometer's Sketchpad (resource workbook) - Properties of Isosceles Trapezoids - 97 - Midsegments of a Trapezoid and a Triangle - pg. 100 - Summarizing Properties of Quadrilaterals.
	8.5. Recognize and apply the properties of other quadrilaterals. (CPI 4.2.12 A3)	• Introduce other types of quadrilaterals such as kites. • Review the sum of the interior angles must be 360^{o}. •	**RESOURCES:** Geometry, Glencoe, © 2005 - pg. 438 Activity - Kites

Fundamentals of Mathematics – Summer Enrichment

Grade 10

COURSE BENCHMARKS

1. The student will be able to apply basic skills from Algebra I such as simplifying expressions and solving equations.
2. The student will be able to apply problem solving and graphing skills from Algebra I such as solving word problems, using slope-intercept form of an equation, and solve ratio and percent problems.
3. The student will be able to use formulas in solving Geometry problems and simplify answers to give exact and rounded answers.
4. The student will be able to use inductive and deductive reasoning to solve problems.
5. The student will be able to identify and use parts and types of lines, angles, and planes in problems solving.
6. The student will be able to use angle relationships with parallel and perpendicular lines to solve problems.
7. The student will be able to use the relationships of sides and angles in triangles to solve problems.
8. The student will be able to use properties of quadrilaterals to solve problems.