

Monroe Township Schools



Curriculum Management System

MTHS Summer Study Program **Introduction to Dynamics of Trig/Math Analysis** **Grade 12** **July 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 # 201.

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Table of Contents

Monroe Township Schools Administration and Board of Education Members	Page 3
Acknowledgments	Page 4
District Mission Statement and Goals	Page 5
Introduction/Philosophy/Educational Goals	Page 6
National and State Standards	Page 7
Scope & Sequence	Pages 8-9
Goals/Objectives/Instructional Tools/Activities	Pages 10-14
Benchmarks	Page 15

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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 predicated on that belief and is guided by the following six principles 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

Introduction to Dynamics of Trigonometry/Math Analysis is an MTHS Summer Study option to help students obtain a head-start on required course-work in the fall by gaining experience in skills and concepts necessary for success in Dynamics of Trig/Math Analysis. This summer study class will focus on topics generally covered in the first quarter of the school year. Student growth will be charted through a pre-test in the beginning of the course and a post-test at the end. Credit is not awarded for this course, however, students will receive a Certificate of Participation. More importantly, students will receive exposure to skills needed to be successful during the school year. Topics included are:

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/02/s4_math.htm.

MTHS Summer Study Program

Introduction to Dynamics of Trig/Math Analysis

Scope and Sequence

Week 1	
I. Introduction and Pre-test	II. Linear Functions and graphs a. Slope b. Parallel and perpendicular c. Equation of a line
Week 2	
III. Linear functions and graphs continued a. Domain, range, zeros of a function b. Applications of linear functions	

Week 3	
IV. Quadratic Functions and their graphs <ul style="list-style-type: none"> a. Operations with complex numbers b. Solving quadratic equations by factoring c. Quadratic Formula 	
Week 4	
V. Quadratic Functions and their graphs continued <ul style="list-style-type: none"> d. The discriminant f. Extraneous values g. Graphs of quadratic functions h. Applications using quadratic functions 	V. Post -test

Suggested days of Instruction	Mandated Assessment				Curriculum Management System Grade Level/Subject: Grade 12 Introduction to Dynamics of Trig/Math Analysis	Goal 1: The student will be able to identify relationships between linear functions and their graphs.	
	NJ ASK	GEPA	HSPA	TERRANOVA	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) The student will be able to:	Instructional Tools / Materials / Technology / Resources	Learning Activities / Interdisciplinary Activities / Assessment Model
10			X	X	<p>1.1. Determine the slope of a line. 4.2.12.C.1, 4.3.12.B.2</p> <p>1.2. Identify parallel and perpendicular lines using their slopes. 4.2.12.C.1, 4.3.12.B.2</p> <p>1.3. Write the equation of a line. 4.2.12.C.1, 4.3.12.B.2</p> <p>1.4. Identify domain, range and zero of a linear function. 4.3.12.B.2</p> <p>1.5. Model real-world situations by means of linear functions. 4.2.12.B.1, 4.3.12.C.1, 4.3.12.B.4</p> <p>***Standards 4.5.K12.A-F are applicable throughout this goal.</p>	<ul style="list-style-type: none"> • <u>Advanced Mathematics</u>; Richard G. Brown; McDougal Littell; Houghton Mifflin 2000. Teacher's Resources: <u>Precalculus Plotter Plus</u>, <u>Using Technonogy</u>, <u>Activities Book</u>, <u>Warm-up Exercises Transparencies</u>, <u>Alternative Assesment</u>, <u>Student Resource Guide</u>, <u>Overhead Visuals Transparencies</u> • Overhead TI-83 Graphing Calculator • Class set TI-83plus graphing calculators • <u>Exploring Geometry with the Geometer's Sketchpad</u>, Key Curriculum Press, 1999 • <u>Ti-83 or TI-82 Mini-Labs: Algebraic Investigations</u>, DeMarois, MathWare, 1996. 	<p>Graphing Software Activities</p> <ul style="list-style-type: none"> • The Slope of a Line, and Playing the Slope Game. Students will explore the slopes of lines and challenge a classmate to identify lines by their slope. <u>Exploring Geometry with the Geometer's Sketchpad</u>, p.20-21. • Equations of Lines. Students will identify equations of lines using the slope-intercept form. <u>Exploring Geometry with the Geometer's Sketchpad</u>, p.22-23. • Slopes of Parallel and Perpendicular Lines. Students will learn how to use slope to tell whether lines are parallel or perpendicular. <u>Exploring Geometry with the Geometer's Sketchpad</u>, p. 24. <p>Graphing Calculator Activities</p> <ul style="list-style-type: none"> • Using the Overhead TI-83 the teacher will graph equations of lines having the same slope and different intercepts, then equations with the same intercepts and different slopes and discuss the relationships between slopes and intercepts ing the equation of a line.

Suggested days of Instruction	Mandated Assessment				Curriculum Management System <u>Grade Level/Subject</u> : Grade 12 Introduction to Dynamics of Trig/Math Analysis	Goal 1: The student will be able to identify relationships between linear functions and their graphs.
	NJ ASK	GEPA	HSPA	TERRANOVA	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) The student will be able to:	Instructional Tools / Materials / Technology / Resources
						<ul style="list-style-type: none"> To determine whether a function is linear or not, students will graph the functions from Class Exercise 2, p.22 <u>Advanced Mathematics</u>. Following class discussion, the students will offer further examples of linear and non-linear functions to graph. Students will investigate a situation involving a linear relationship between two variables. <u>Ti-83 or TI-82 Mini-Labs: Algebraic Investigations</u>, Mini-Lab 13, p.47. <p><u>Assessment</u></p> <p>Class Participation:</p> <ul style="list-style-type: none"> Participation in Graphing Calculator Activities Participation in Geometer's Sketchpad Lab Activities <p>Classwork / Homework:</p> <ul style="list-style-type: none"> Completion of written lab activities. Completion of daily assignments. <p>Quizzes / Tests</p>

Suggested days of Instruction	Mandated Assessment				Curriculum Management System Grade Level/Subject: Grade 12 Introduction to Dynamics of Trig/Math Analysis	Goal 1: The student will be able to identify relationships between linear functions and their graphs.
	NJ ASK	GEPA	HSPA	TERRANOVA	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) The student will be able to:	Instructional Tools / Materials / Technology / Resources
						<p>*Graphing- showing negative, positive, whole number, and fractional slopes. The relationship between slope and parallel/perpendicular lines will be explored. Students will show these relationships using sentences and graphs. The equations of each line graphed will be written, clearly identifying the slope and intercept.</p> <p>* Domain and range of a function. Students will solve a word problem involving domain and range. See addendum on page 39 for complete description.</p> <p>* These modifications are designed to meet the needs of all learners.</p>

Suggested days of Instruction	Mandated Assessment				Curriculum Management System Grade Level/Subject: Grade 12 Introduction to Dynamics of Trig/Math Analysis	Goal 2: The student will be able to identify relationships between quadratic functions and their graphs.	
	ESPA	GEPA	HSPA	TERRANOVA	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) The student will be able to:	Instructional Tools / Materials / Technology / Resources	Learning Activities / Interdisciplinary Activities / Assessment Model
10			X		2.1. Add, subtract, multiply and divide complex numbers. 4.1.12.A.1, 4.1.12.B.1 2.2. Solve quadratic equations by factoring. 4.3.12.D.2 2.3. Solve quadratic equations using the quadratic formula. 4.1.12.A.2 2.4. Identify the nature of the roots of a quadratic equation using the discriminant. 4.3.12.D.2 2.5. Choose the appropriate method when solving equations to avoid losing or gaining a root. 4.3.12.D.2, 4.3.12.D.3 2.6. Sketch the graphs of quadratic functions. 4.1.12.A.2, 4.3.12.B.2, 4.3.12.B.3 2.7. Model real-world situations using quadratic functions. 4.3.12.B.1, 4.3.12.B.4, 4.3.12.C.1 ***Standards 4.5.K12.A-F are applicable throughout this goal.	<ul style="list-style-type: none"> Advanced Mathematics: Richard G. Brown; McDougal Littell; Houghton Mifflin 2000. Teacher's Resources: <u>Precalculus Plotter Plus</u>, <u>Using Technology</u>, <u>Activities Book</u>, <u>Warm-up Exercises Transparencies</u>, <u>Alternative Assessment</u>, <u>Student Resource Guide</u>, <u>Overhead Visuals Transparencies</u> Overhead TI-83 Graphing Calculator Class set TI-83plus graphing calculators Advanced Mathematics: <u>Precalculus Plotter Plus</u> software Ti-83 or TI-82 Mini-Labs: <u>Algebraic Investigations</u>, DeMarois, MathWare, 1996. 	Graphing Calculator activities <ul style="list-style-type: none"> Students will investigate the effects of the parameters a, b, and c on the graph of the quadratic function $y = ax^2 + bx + c$. <u>Ti-83 or TI-82 Mini-Labs: Algebraic Investigations</u>, Mini-Lab 14, p.49-50. Using the overhead graphing calculator, the class will discover the effects of a, h, and k on the graph of the quadratic function $y = a(x - h)^2 + k$. Students will challenge each other and the teacher to write the equation of a parabola given only its graph. Students will sketch parabols given in vertex form and check their graphs on the graphing calculator.

Suggested days of Instruction	Mandated Assessment				Curriculum Management System Grade Level/Subject: Grade 12 Introduction to Dynamics of Trig/Math Analysis	Goal 2: The student will be able to identify relationships between quadratic functions and their graphs.
	ESPA	GEPA	HSPA	TERRANOVA	Objectives / Cluster Concepts / Cumulative Progress Indicators (CPI's) The student will be able to:	Instructional Tools / Materials / Technology / Resources Learning Activities / Interdisciplinary Activities / Assessment Model
						<u>Assessment</u> Class Participation: <ul style="list-style-type: none"> • Participation in Graphing Calculator Activities • Participation in class discussion. Classwork / Homework: <ul style="list-style-type: none"> • Completion of written lab activities. • Completion of daily assignments. Quizzes / Tests *Green Globes Given various quadratic equations, students will graph these equations and then use the equation grapher on Green Globes to check their answers. Students will then use the Linear and Quadratic Graphs program to write equations for the parabolas shown. * These modifications are designed to meet the needs of all learners.

MTHS Summer Study Program

Introduction to Dynamics of Trig/Math Analysis

COURSE BENCHMARKS

1. The student shall be able to understand and apply linear, quadratic and polynomial functions.
2. The student shall be able to understand and apply exponential and logarithmic functions.