

Senior School Curriculum

Mathematics



MINISTRY OF EDUCATION

Bermuda

2000

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Bermuda

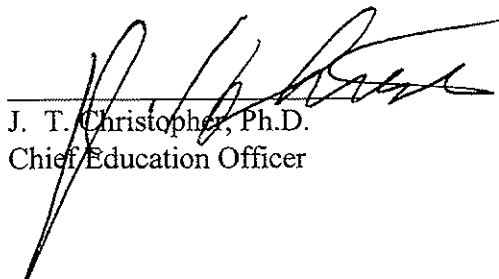
FOREWORD

Quality curriculum is basic to any educational programme. The written curriculum must provide the structure and substance of what is taught to all students. The written curriculum is a guide to teachers to ensure that the knowledge, skills, competencies and resources students need in order to learn are provided during instruction.

In particular, it is acknowledged that knowledge is virtually infinite in that it is continually changing and expanding as “new” knowledge is developed and “old” knowledge is refined. In addition the skills and competencies that students need change as the environment in the total community changes. It is important therefore that a school system has a structure for the instructional programme that provides direction, focus, flexibility and state-of-the-art thinking about each content area.

Because of its strategic geographical position, Bermuda has been influenced continuously by the changes in the relationship between the continents bordering the Atlantic -- North and South America, Africa and Europe. The current interest in the globalization of the world community allows Bermuda to build on its strength in international relations. It is essential that our students become accustomed to viewing the entire world as the area in which they must live and grow. They must integrate knowledge across all subjects in preparation for their adult life. Our curriculum guides must be viewed from this perspective.

A team of teachers, education officers and other persons within the school system and community, drawing from their collective experience in working with young people, has developed this curriculum guide. Input from community representatives on each Curriculum Advisory Committee has assisted us in Bermudianizing the curriculum. All of the contributors share both the pride and the responsibilities of authorship. This guide represents the essential elements of education in Bermuda’s senior schools.



J. T. Christopher, Ph.D.
Chief Education Officer

ACKNOWLEDGEMENTS

The Mathematics senior school curriculum was developed by teachers with the leadership and support of Marva Allen and Marlette Darrell, Education Officers, Mathematics. This writing team was comprised of diligent and devoted teachers. Appreciation is extended to these teachers for their ability to collaborate amicably and collegially in the production of this professional document. The members of the writing team were:

Keisha Douglas
Winston Laylor
Lou Matthews
Dr. C. V. Maxwell
Gina Saltus
Robert Steede
Rodney Stuart

The restructured curriculum development process began in 1994 under the leadership of Dr. Helen Stemler, restructuring curriculum coordinator. During 1994-1995, the frameworks for the entire curriculum development process were developed by the writing teams in the various content areas. From 1995-1997 the curricula for the middle level were created. Thanks also to Dr. Gina Tucker, curriculum coordinator 1998-1999. Special thanks to Mrs. Kalreta Conyers-Steede, education officer business studies, who coordinated the final production of these curriculum documents 1999-2000.

These documents would not have been completed without the support of a very hardworking, dedicated group of people - the secretarial/support staff who typed and assisted with numerous tasks associated with completing these documents. This group includes the following persons:

Johnnel Booth
Makeba Calder
Nina Chapman
Marilyn Dyer
Donna Foggo
Raquel Furbert
Katherine Ingham
Donna Jacobs
Judy Lawrence

Paula Outerbridge
Samuel Robinson
George Simons
Kim Simons
Theresa Simons
Wanda Stuhlpfarrer
Michelle Squire
Deshan Thompson
Rochelle Trott

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OVERVIEW

The aim of the senior school is to provide for the academic achievement and personal development necessary to prepare students for work, further education and productive citizenry in the 21st Century. In keeping with this aim, the senior school curriculum builds on the middle level programme and is organized around four (4) career pathways: arts and communications, applied technologies, health & human services and international business and tourism.

The senior school curriculum, composed of a rigorous programme of study, sets high expectations for students by emphasizing mastery of complex academic and technical concepts. The programme is based on the belief that all students make every effort to succeed when in an environment that fosters and encourages success, regardless of their background or previous level of achievement.

The curriculum guide contains three (3) sections beginning with the Introduction. The stated twelve goals of education direct instructional outcomes in all senior school subjects and programmes. Specifically, a curriculum framework has been approved for each subject and is to be used as the basis for the subject specific philosophy, goals and subgoals, performance indicators and scope and sequence. Effective utilization of this framework will establish continuity and progression of instruction throughout all year levels.

The second section of this guide delineates the senior school programme of instruction and contains the following: subject's rationale, course description, requirements and outline, correlation matrix and modules for each course offered. It is expected that all teachers will focus instruction on the established curriculum objectives outlined in the modules. The final section of this guide contains an appendix of valuable resources for teachers.

GOALS OF EDUCATION

In Bermuda, the Goals of Education provide the direction for senior level education. These twelve (12) goals enable senior level students to:

- develop responsiveness to the dynamic process of learning
- develop resourcefulness, adaptability and creativity in learning and living
- acquire the basic knowledge and skills needed to comprehend and express ideas through words, numbers and other symbols
- develop a wellness approach to life
- gain satisfaction from participating in and appreciating the various forms of artistic expression
- develop a feeling of self-worth
- develop values related to personal and ethical beliefs and to the common welfare of society
- develop an understanding of the role of the individual within a family unit, the role of the family within society and the role of our society in a global context
- develop a sense of personal responsibility in society at the national and international levels
- acquire skills that contribute to self-reliance in solving practical problems in everyday life
- acquire skills and attitudes that will lead to satisfaction and productivity in a career
- develop respect for the environment and a commitment to the wise use of resources.

CAREER PATHWAYS

The curriculum at the senior level will be organized around four (4) career pathways: arts and communications, applied technologies, health and human services and international business and tourism. Career pathways are clusters of occupations/careers that are grouped because many of the people in them share similar interests and strengths. All pathways include a variety of occupations that require different levels of education and training. Career pathways help students focus on and prepare for the future. In addition, teachers, counsellors and other adults can better support students as they direct their energies toward their established goal.

The senior school graduation requirements are subsumed within each pathway and include four years of English language arts and three years of mathematics, science and social studies. Students also are required to take physical education, health education, computer studies, business studies, family studies or design and technology and at least one of the arts.

Additionally, information technology, library information, career education, learning support and other student service programmes will be offered to all senior level students. It is expected that the implemented curriculum will be based on the premise that all students can learn and that instruction should be differentiated to meet the unique needs of the learner. Further, it is expected that the senior school curriculum will be implemented from a Bermudianized and multicultural perspective as much as is feasible.

BERMUDA SCHOOL CERTIFICATE (BSC)

From September 1999 all students who successfully complete the graduation requirements will be awarded the Bermuda School Certificate (BSC). Students must acquire 116 credits; the 70 required credits from the chart below and an additional 46 credits from student selected courses.

SUBJECTS	COURSE LEVELS				Total Requirements
	100	200	300	400	
English Language Arts	4	4	4	4	16
Mathematics	4	4	4	-	12
Science	4	4	4	-	12
Social Studies	4	4	4	-	12
Physical Education	2	2	2	-	6
Health Education	2	-	-	2	4
The Arts*	2	-	-	-	2
Business Studies	2	-	-	-	2
Computer Studies	2	-	-	-	2
EITHER: Family Studies OR Design Technology	2 or 2	-	-	-	2 or 2
TOTALS	28	18	18	6	70

*A further two credits will be required in the Arts when the new facility at The Berkeley Institute is completed.

How will the courses be organized?

All 100 level courses will be mandatory.

200-400 level courses will be organized under broad career pathways:

Applied Technologies
Arts and Communications
Health and Human Services
International Business and Tourism

Within each Career Pathway students will choose courses in line with their intended career choice.

How are course grades obtained?

A variety of assessments, including written tests, portfolios and practical assignments will be used to indicate achievement of course objectives. Each assessment instrument is detailed in the curriculum document. Students need a pass grade (D) in each course to be awarded credit.

What do the grades mean?

GRADE	% SCORES	MEANING OF GRADE	GRADE POINT
A	90 and above	Outstanding	4.0
B	80 -89	Good	3.0
C	70 -79	Satisfactory	2.0
D	60 - 69	Pass	1.0
F	59 and below	Failing Grade	0.0

What is a Grade Point Average (GPA)?

The GPA is the total of grade points achieved in all courses taken by the student divided by the number of courses taken.

$$\text{GPA} = \frac{\text{grade points for all courses}}{\text{number of courses taken}}$$

Can students graduate and go directly to College or University?

Students will be able to enter the Bermuda College or another college or university directly from the senior school programme provided they meet that college's or university's entry requirements. Admission will depend upon the courses the student has taken, the grades obtained and overall grade point average.

Will students who enter the system from abroad or from a local private institution be given credit towards the BSC?

Students coming from a recognized institution will be given credit for course work successfully completed at that institution.

SENIOR SCHOOL COURSES AT A GLANCE

English Language Arts (EL)	Mathematics (MT)
English Language & Literature I (R) English Language & Literature II (R) English Language & Literature III English Language & Literature IV Journalism & Publications Literature of Africa, Bermuda & the Caribbean Reading & Study Skills Speech & Debate Writer's Workshop	Foundations of Mathematics (R) Mathematics Laboratory (no credit) Advanced Mathematics Applied Mathematics I Applied Mathematics II Applied Mathematics IIIA Applied Mathematics IIIB Business Mathematics I Business Mathematics II Integrated Mathematics I Integrated Mathematics II Introductory Calculus
Science (SC)	Social Studies (SS)
Science I (R) Science II (R) Applied Biology & Chemistry Applied Physics Biology I Biology II Chemistry I Chemistry II Earth Science Environmental Science I Environmental Science II Human Biology Introduction to Horticulture Marine Science Physics I Physics II	Bermuda Social Science: An Overview (R) Politics & Law in Action (R) Comparative Religion and Ethics Introduction to African History Introduction to American History Preserving our Heritage Physical and Human Geography I Physical and Human Geography II Physical and Human Geography III World History

Business Studies (BS)	Computer Science (CS)
Business Essentials I (R) Accounts I Accounts II Business & Personal Law Business Essentials II Computer Keyboarding & Business Applications Economics Insurance International Business Marketing Office Technology Office Technology & Business Application Small Business Management Travel & Tourism	Computer Science I (R) Computer Science II Computer Programming I Computer Programming II Information Technology Projects Inside the Computer Multimedia Network Technology Presentation Tools Web-Page Design
Design & Technology (DT)	Family Studies (FM)
Design & Technology Design & Realization I Design & Realization II Design & Realization III Electronics Technology I Electronics Technology II Electronics Technology III Graphic Communication I Graphic Communication II Graphic Communication III Transportation Technology I Transportation Technology II Transportation Technology III	Exploring Family Living Child Care & Development I Child Care as a Profession II Discovering Food & Nutrition Exploring Careers in Design & Textiles Exploring Careers in Nutrition & Hospitality Fashion & Textile Design Interior Decorating Meal Management & Hospitality Personal Care I Personal Care II Textile Design

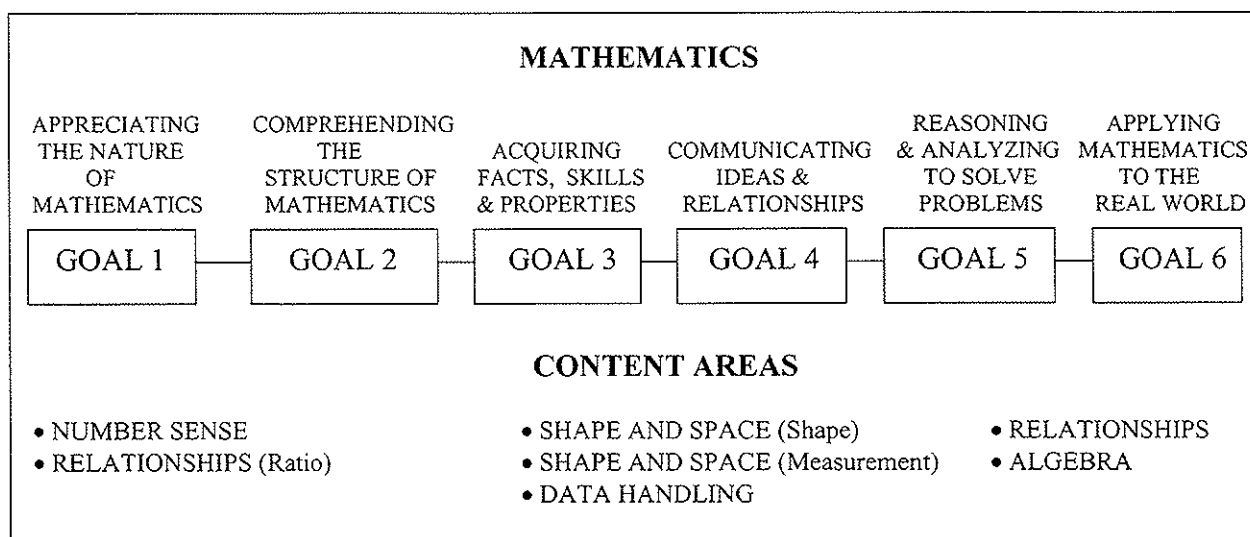
Health (HE)	Physical Education (PE)
Health & Wellness (R) Health Issues(R) Tobacco, Alcohol & Other Drugs (A)* First Aid CPR (A)* Relationships & Human Sexuality (B)** Diseases, Prevention & Control (B)** Health Occupations ***Courses labeled A or B will run consecutively as a pair.	Physical Education I (R) Physical Education II (R) Physical Education III (R) Physical Education IV
Foreign Languages (FL)	Functional Skills (FC)
French/Spanish/Portuguese I French/Spanish/Portuguese II French/Spanish/Portuguese III French/Spanish/Portuguese IV Foreign Languages for International Business	Functional Skills I Functional Skills II Functional Skills III Functional Skills IV

Music (MU)	Visual Art (VR)
Music in Society <u>Instrumental Music</u> Instrumental Ensemble Instrumental Independent Study Jazz Band Keyboard Lab Music Technology Show Band Ensemble <u>Vocal Music</u> Concert Choir Vocal Independent Study Vocal Ensemble	Visual Art in Society Ceramics Drawing & Painting Drawing, Painting & Printed Works Photography Three Dimensional Visual Art
Dance (DN)	Theatre (TH)
Dance in Society Ballet, Modern, Tap & Jazz I Ballet, Modern, Tap & Jazz II Dance & Sports Dance Production Popular & Social Dance Dance Company World Dance Forms	Theatre in Society Acting I Acting II General Communication Play Directing Play Production Scriptwriting Technical Theatre Video Arts

MATHEMATICS PHILOSOPHY

Mathematics is an interrelated body of knowledge consisting of patterns, multiple representations and abstract concepts. It is a sequential discipline that builds on accumulated knowledge. Therefore, the mathematics curriculum is designed to foster meaningful classroom communication, explore important mathematical concepts, develop rich environments for teaching and learning, and promote technology as an educational tool.

Through the use of developmentally appropriate tasks, manipulatives and real world issues, the students will be empowered to transition from concrete experiences to the development of abstract mathematical ideas. They will be encouraged to construct their own meaning of mathematical ideas, to apply effective problem-solving processes and to appreciate the importance of mathematics in their world and the global society in which we live.



GOAL 6 APPLICATION

**STUDENTS WILL APPLY MATHEMATICS IN PERSONAL,
CAREER AND SOCIETAL SETTINGS.**

Subgoal 6.1 Adapt the use of mathematical processes and problem solving strategies

Subgoal 6.2 Design a new application of mathematical tools and techniques

Subgoal 6.3 Use mathematics to solve real world issues

Subgoal 6.4 Justify the application of mathematical ideas as a lifelong process

GOAL 1	Students will appreciate the nature of mathematics.			
MATHEMATICS	PERFORMANCE INDICATORS			
Sub Goals	PS – P3 Learning Phase A	P4 – P6 Learning Phase B	M1 – M3 Learning Phase C	S1 – S4 Learning Phase D
1.1 Apply mathematics as an interrelated body of knowledge	recognize mathematical ideas	use mathematical ideas to understand higher level mathematics	apply mathematical ideas, not isolated facts to solve everyday problems	apply mathematics as an interrelated body of knowledge
1.2 Display confidence through successful experiences in mathematics	demonstrate awareness of the importance of successful experiences in mathematics	appreciate successful experiences in mathematics	appreciate the need for successful experiences in mathematics	display confidence through successful experiences in mathematics
1.3 Appraise the significance of mathematics in history, culture and our changing society	accept the role of mathematics in history, culture and our changing society	explain the role of mathematics in history, culture and our changing society	value the significance of mathematics in history, culture and our changing society	appraise the significance of mathematics in history, culture and our changing society

GOAL 2		Students will comprehend the structure of mathematics.			
MATHEMATICS		PERFORMANCE INDICATORS			
Sub Goals		PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
2.1 Analyze the structure of the real number system		identify the structure of a number system	recognize the structure of a number system	compare and contrast the structure of the real number system	analyze the structure of the real number system
2.2 Appreciate the similarity of number systems		display awareness of number systems	enjoy working with number systems	initiate working with number systems	appreciate the similarity of number systems
2.3 Evaluate concepts, processes and patterns		create a variety of patterns	extend their creation of a variety of patterns	analyze a variety of patterns	evaluate concepts, processes and patterns
2.4 Analyze mathematical theorems		describe mathematical relationships	apply mathematical relationships to new situations	formulate mathematical theorems	analyze mathematical theorems
2.5 Interpret the logic and purpose of algebraic procedures		N/A	identify algebraic procedures	apply algebraic procedures	interpret the logic and purpose of algebraic procedures

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GOAL 3		Students will acquire mathematical facts, skills, concepts and properties.			
MATHEMATICS		PERFORMANCE INDICATORS			
Sub Goals		PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
3.1	Evaluate applications of numbers and number theory concepts in mathematical and real world situations	develop number sense through everyday experiences	recognize relationships among counting, grouping, place value and number systems concepts	apply numbers and number theory concepts in mathematical and real world situations	evaluate applications of numbers and number theory concepts in mathematical and real world situations
3.2	Evaluate a mathematical solution by using estimation	apply guess and check techniques	apply strategies for rounding and sampling	formulate a mathematical solution by using estimation	evaluate a mathematical solution by using estimation
3.3	Evaluate mathematical representation numerically, algebraically and geometrically	identify simple patterns and relationships	create mathematical relationships numerically and geometrically	illustrate mathematical representations numerically, algebraically and geometrically	evaluate mathematical representation numerically, algebraically and geometrically
3.4	Evaluate data appropriately	represent simple data	apply data appropriately	analyze data appropriately	evaluate data appropriately
3.5	Evaluate the application of geometric and measurement properties to real world situations	classify shapes	develop spatial sense and relate geometric ideas to number and measurement	apply geometric and measurement properties to real world situations	evaluate the application of geometric and measurement properties to real world situations

GOAL 3		Students will acquire mathematical facts, skills, concepts and properties.			
MATHEMATICS		PERFORMANCE INDICATORS			
Sub Goals		PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
3.6 Apply algebraic procedures to solve a variety of problems		N/A	identify the concept of a variable	apply the concepts of variables, expressions and equations	apply algebraic procedures to solve a variety of problems
3.7 Evaluate the interrelationships among mathematics, media and technology		identify how to use media and technology to explore mathematics	recognize applications of media and technology in exploring mathematics	analyze the interrelationships among mathematics, media and technology	evaluate the interrelationships among mathematics, media and technology

GOAL 4		Students will communicate mathematical ideas and relationships.			
MATHEMATICS		PERFORMANCE INDICATORS			
Sub Goals		PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
4.1	Justify their mathematical ideas and relationships	describe mathematical ideas and relationships	illustrate mathematical ideas and relationships	justify their mathematical ideas and relationships	justify their mathematical ideas and relationships
4.2	Evaluate the use of mathematical symbols, formulas and terminology	match symbols with concepts	apply mathematical symbols, formulas and terminology	analyze the use of mathematical symbols, formulas and terminology	evaluate the use of mathematical symbols, formulas and terminology
4.3	Reorganize mathematical ideas in oral and written form	describe mathematical ideas in oral and written form	explain mathematical ideas in oral and written form	construct mathematical ideas in oral and written form	reorganize mathematical ideas in oral and written form
4.4	Communicate algebraical generalizations discovered through investigations	N/A	formulate definitions to express generalizations discovered through investigations	express algebraically, generalizations discovered through investigations	communicate algebraical generalizations discovered through investigations
4.5	Value the role of symbolic notation in mathematics	display interest in the role of symbolic notation in mathematics	enhance awareness of the role of symbolic notation in mathematics	appreciate the role of symbolic notation in mathematics	value the role of symbolic notation in mathematics

GOAL 4	Students will communicate mathematical ideas and relationships.			
MATHEMATICS	PERFORMANCE INDICATORS			
Sub Goals	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
4.6 Demonstrate skillful use of manipulatives and technology	use manipulatives and technology as demonstrated	display appropriate use of manipulatives and technology	demonstrate skillful use of manipulatives and technology	demonstrate skillful use of manipulatives and technology
4.7 Evaluate the use of appropriate manipulatives and technology to display mathematical ideas and relationships	use manipulatives to display mathematical ideas and relationships	use appropriate manipulatives and technology to display mathematical ideas and relationships	use appropriate manipulatives and technology to display mathematical ideas and relationships	evaluate the use of appropriate manipulatives and technology to display mathematical ideas and relationships

GOAL 5	Students will reason and analyze mathematically to solve problems and make decisions.			
MATHEMATICS	PERFORMANCE INDICATORS			
Sub Goals	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
5.1 Display confidence in solving problems independently	solve problems with increasing confidence	demonstrate a problem solving attitude	demonstrate self-reliance when solving problems independently	display confidence in solving problems independently
5.2 Evaluate information to reason, solve problems and generalize	demonstrate reasoning skills	organize information and identify problem solving strategies	apply deductive and inductive reasoning skills to evaluate information	evaluate information to reason, solve problems and generalize
5.3 Confidently use manipulatives and technology in problem solving	use manipulatives to assist in problem solving	select appropriate manipulatives and technology to assist in problem solving	confidently use manipulatives and technology to solve problems	confidently use manipulatives and technology in problem solving
5.4 Apply skillful mathematical thinking and modelling to problems that arise in mathematics and other disciplines	use mathematical thinking to solve simple problems	demonstrate basic mathematical thinking and modelling when solving problems that arise in mathematics and other disciplines	apply mathematical thinking and modelling to problems that arise in mathematics and other disciplines	apply skillful mathematical thinking and modelling to problems that arise in mathematics and other disciplines

GOAL 5		Students will analyze mathematically to solve problems and make decisions.			
MATHEMATICS		PERFORMANCE INDICATORS			
Sub Goals		PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
5.5 Evaluate solutions for reasonableness and accuracy		describe how to verify results with respect to the original problems	recognize the reasonableness and accuracy of a solution	analyze solutions for reasonableness and accuracy	evaluate solutions for reasonableness and accuracy
5.6 Evaluate applications of mathematical modelling processes to real world problems		N/A	apply mathematical modelling processes to real world problems	analyze applications of mathematical modelling processes to real world problems	evaluate applications of mathematical modelling processes to real world problems

GOAL 6	Students will apply mathematics in personal, career and societal settings.			
MATHEMATICS	PERFORMANCE INDICATORS			
Sub Goals	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
6.1 Adapt the use of mathematical processes and problem solving strategies	describe mathematical processes and problem solving strategies	apply mathematical processes and problem solving strategies	display the use of mathematical processes and problem solving strategies	adapt the use of mathematical processes and problem solving strategies
6.2 Design new applications of mathematical tools and techniques	use mathematical tools	demonstrate simple applications of mathematical tools and techniques	demonstrate skillful applications of mathematical tools and techniques	design new applications of mathematical tools and techniques
6.3 Use mathematics to solve real world issues	create simple mathematical problems from real life situations	create complex problems from real life situations	use problem solving strategies to examine real world issues	use mathematics to solve real world issues
6.4 Justify the application of mathematical ideas as a lifelong process	N/A	explain the application of mathematical ideas as a lifelong process	illustrate the application of mathematical ideas as a lifelong process	justify the application of mathematical ideas as a lifelong process

NUMBER SENSE	MATHEMATICS SCOPE AND SEQUENCE			
	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
Number Sense	• whole number • magnitude • place value • order • fractions	• whole number • fractions • decimals • place value • order • comparison • classification	• whole number • fractions • decimals • place value • order • comparison • classification	• advanced applications
Symbolic Representation	• addition • subtraction • equality	• addition • subtraction • multiplication • division • comparison	• scientific notation • square roots • exponents	• advanced applications
Estimation	• quantity	• quantity • approximate value • basic operations	• approximate value • basic operations • reasonableness of results	• approximate value • basic operations • reasonableness of results
Computation	• whole number • addition • subtraction	• whole number • fractions • decimals • addition • multiplication • division	• all basic operations • whole numbers • fractions • decimals • percent • order of operations • expanded notation • proportion	• advanced application

SHAPE AND SPACE (SHAPE)	MATHEMATICS SCOPE AND SEQUENCE			
	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
Perimeter	• measurement (non-standard)	• measurement • concept • estimation • computation • applications	• formulas • applications	• formulas • applications
Area	• measurement (non-standard)	• concept • measurement • estimation • applications	• formulas • applications	• formulas • applications
Volume	• measurement (non-standard)	• concept • measurement • estimation • applications	• formulas • applications	• formulas • applications
Shapes	• spatial sense • plane/solid symmetry • congruence • corners	• spatial sense • plane/solid symmetry • congruence • angles • classification • nets	• spatial sense • plane/solid symmetry • similarity • transformations	• spatial sense • plane/solid symmetry • similarity • transformations • vectors • trigonometry • ratios • identities • 2 and 3 dimensions

SHAPE AND SPACE (MEASUREMENT)	MATHEMATICS SCOPE AND SEQUENCE			
	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
Length, Mass and Capacity	• estimation • comparison • measurement (non-standard)	• estimation • comparison • measurement • metric and customary	• estimation & conversion within and between systems	• applications
Time	• gross divisions • time sequence • estimation • calendar	• calendar • standard and digital clocks • elapsed time • conversion of units • timetables	• unit conversion • estimation • elapsed time • time zones	• applications
Money	• identification and comparison of coins	• identification and comparison of coins • computation	• computation	• applications
Temperature	• thermometer • temperature words	• measurement • estimation	• Celsius and Fahrenheit (comparison)	• applications

RELATIONSHIPS (RATIO)	MATHEMATICS SCOPE AND SEQUENCE			
	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
Rate	N/A	• unit	• rate of exchange • speed/distance/time	• application • speed/distance/time
Ratio/Proportion	N/A	• comparison • notation	• unknown quantities • applications (direct and inverse proportions) • equivalent calculation • scales	• algebraic variations

ALGEBRA	MATHEMATICS SCOPE AND SEQUENCE			
	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
Symbolic Representation	N/A	- variables - missing factors - ordered pairs	- algebraic expressions - variables - formulas - substitution	- algebraic expression - variables - substitution - formulas
Polynomials and Factors	N/A	N/A	- addition - subtraction - multiplication - factors	- addition - subtraction - multiplication - factors
Equations	missing numbers	missing terms	- linear and non-linear - algebraic and graphical representation	- linear and non-linear - algebraic and graphical representation
Inequalities	N/A	- concepts - symbols	algebraic and graphical representation	algebraic and graphical representation

RELATIONSHIPS (FUNCTIONS AND GRAPHS)	MATHEMATICS SCOPE AND SEQUENCE			
	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
Patterns	• number • attributes • geometric	• number • attributes • geometric	• sequences • generalizations	• generalizations including algebraic statements
Functions	N/A	N/A	• notation • rules • graphs	• notations • simple • inverse • graphs • gradients • precalculus

DATA HANDLING	MATHEMATICS SCOPE AND SEQUENCE			
	PS – P3 Learning Phase A	P4 - P6 Learning Phase B	M1 - M3 Learning Phase C	S1 - S4 Learning Phase D
Probability	• predictions	• predictions • experiments	• predictions • experiments	• applications • experiments
Statistics	• tally charts	• central tendency	• central tendency • data analysis	• sampling and simulation • inferences
Graphs	• pictographs • bar charts	• bar charts • line • circle • coordinate	• bar charts • line • circle • coordinate • stem and leaf • box and whisker • scattergrams	• all graphs
Tables	N/A	• analysis	• analysis • spreadsheets • matrices • set theory	• analysis • spreadsheets • matrices • set theory

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INTRODUCTION TO SENIOR SCHOOL CURRICULUM

The senior school curriculum (S1 - S4) recognizes the distinct needs of the middle to late adolescent learner (14 to 18 years) and is based on the necessity of working consciously with the many developmental changes of students during this phase. It is a time to build on the foundation laid in the middle school by preparing students for work, further education and productive citizenry in the 21st Century.

As members of the senior school community, students have an opportunity to choose from a number of options and to participate in a variety of activities. The more involved students become in the life of the school, the more meaning school will have. Students will get the most from their educational experiences if their choices reflect their personal needs, interests, and talents. Students should select carefully those courses which offer the greatest opportunity for learning and which serve to better individual education and career goals.

Following are some of the characteristics of senior school students:

- intellectual habits increase
- thought processes become more abstract
- awareness of complexity of issues increases; rejection of simplistic explanations
- thought becomes more comprehensive
- ability to hypothesize and analyze increases
- thought becomes less egocentric
- interest in laws that regulate society increases
- ability to focus attention for long periods, increases (i.e. on topics of interest)

The senior school curriculum is a written guide that identifies the goals and curriculum objectives which teachers establish for students to achieve. It makes visible the articulation necessary for preschool through senior level programmes so that students do not have large gaps in their understanding, skills and competencies. Its scope and sequence also allows teachers to plan linkages across the curriculum so those cross-curricular connections can be made more easily between and among various subjects.

Given the above characteristics, the senior school curriculum is intended to provide students opportunities to:

- discuss, explore, investigate and hypothesize
- find solutions to real problems
- utilize both concrete and abstract reasoning skills
- process information at formal operations level

The following section outlines the curriculum to be taught in Bermuda's senior schools.

SENIOR LEVEL EDUCATION

GOAL:

To ensure students become critical and analytical readers, logical and insightful thinkers, and concise users of visual, written and oral language.

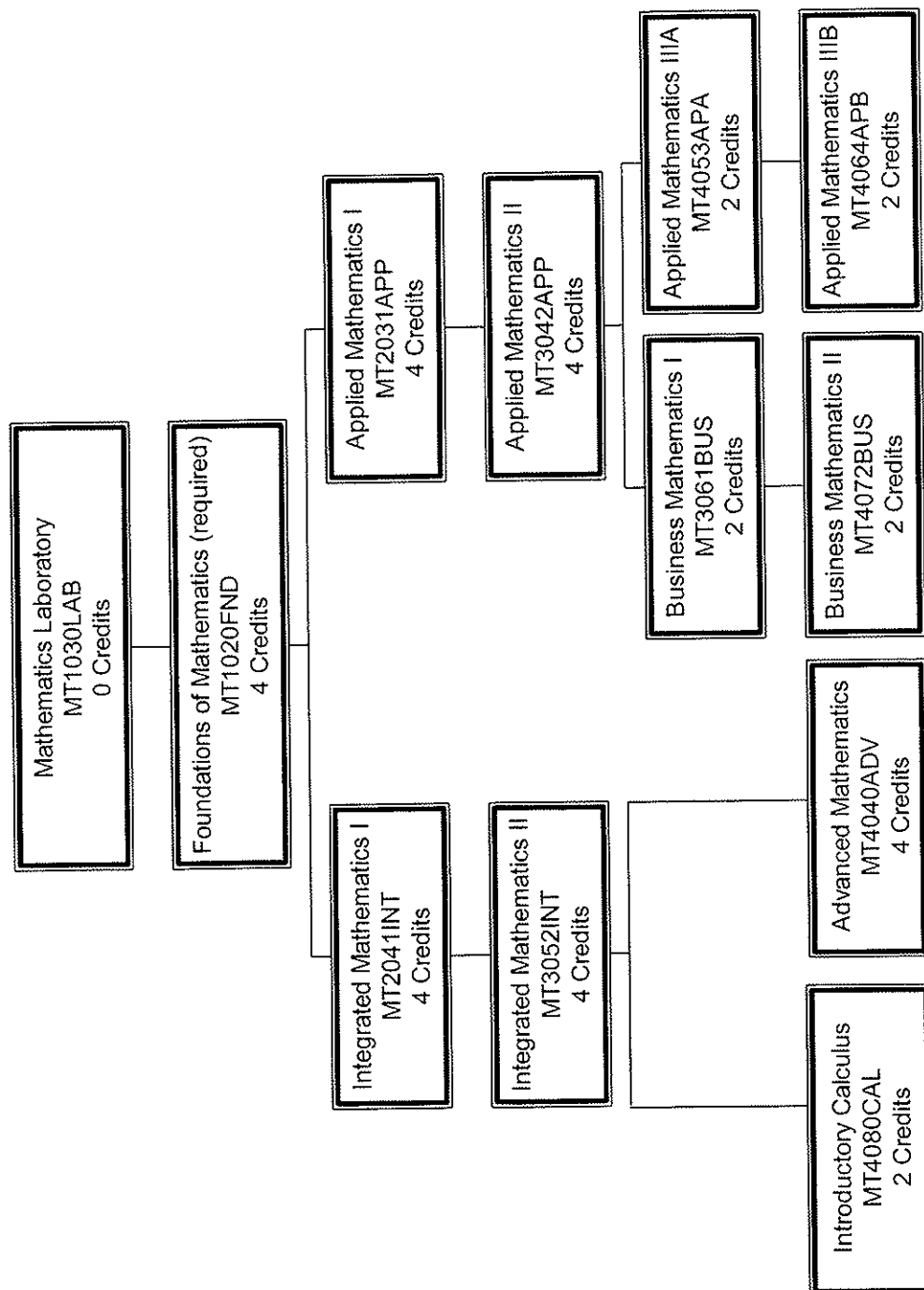
SENIOR SCHOOL MATHEMATICS RATIONALE

The Senior School Mathematics Curriculum will provide an integrated core of interesting and significant topics. Emphasis will be placed on investigations, relationships, applications and modelling. Differentiation will be reflected in the depth and breadth of mathematical content and activities.

An interactive approach to teaching and learning will be employed to assist all students in developing the ability to reason, communicate and solve problems. The integration of theory and relevant applications will reflect the nature of senior school mathematics, the interest and characteristics of young people and the emerging needs of the community.

Today's society expects for all students to have the ability to apply mathematical ideas to common and complex problems. In order to reach this goal, higher level mathematical knowledge and processes will be accessible to all students. This senior school mathematics curriculum will provide the foundation for further studies and will meet the expectation of employers in the job market.

SENIOR SCHOOL MATHEMATICS COURSES



COURSE DESCRIPTIONS

Mathematics (MT)

Foundations of Mathematics (required course)

Prerequisite: None

MT1020 FND

4 credit (s)

S1 level (s)

Foundations of Mathematics is an introductory course offered to all students entering senior school. Students will develop their understanding of mathematical concepts and expand on topics taught at the middle level. This core curriculum will be differentiated in relationship to the breadth and depth of the treatment of topics and their applications. Foundations of Mathematics is intended to improve problem solving, communication and reasoning skills while fostering a positive attitude towards mathematics.

Mathematics Laboratory (no credit)

Prerequisite: None

MT1030 LAB

0 credit (s)

S1 level (s)

Mathematics Laboratory is a course designed for students who had difficulty with middle school level three mathematics. The student will apply basic mathematics to various consumer activities, sports statistics, job-related problems and other real-life situations. Manipulative materials and technology will be used to help students bridge the gap between the concrete experiences and abstract ideas.

Integrated Mathematics I

Prerequisite: Foundations of Mathematics

MT2041 INT

4 credit (s)

S2 level (s)

Integrated Mathematics I incorporates the mathematics topics offered in a standard Algebra I, Geometry and Algebra II sequence. The contents of these courses are offered through a core curriculum over a two-year period. Important concepts are differentiated in relationship to the breadth and depth of their treatment and application within this discipline and across other disciplines. Through challenging explorations, students will collaboratively investigate and solve a variety of problems.

Integrated Mathematics II

Prerequisite: Integrated Mathematics I or

Applied Mathematics I with at least a B standing

MT3052 INT

4 credit (s)

S3 level (s)

This is the third component of a core curriculum that includes topics from standard geometry and algebra level II courses. Ideas from Integrated Mathematics I are expanded upon and students will be expected to reason mathematically while exploring and describing real world issues. The major emphasis will be on students constructing ideas through questioning, exploration and discovery with frequent use of models, applications, connections and technology.

Applied Mathematics I

Prerequisite: Foundations of Mathematics

MT2031 APP

4 credit (s)

S2 level (s)

Students will work with polynomials and solve problems involving systems of equations and quadratic equations. They will be involved with a more in-depth study of triangles, circles, and solid figures and will practice some basic geometric constructions. Throughout the course real world applications will be used to present these concepts in contextual settings.

Applied Mathematics II

Prerequisite: Applied Mathematics I or Integrated Mathematics I

MT3042 APP

4 credit (s)

S3-S4 level (s)

Students will perfect their skills of solving equations and inequalities and will create equations to fit problem situations. Problem-solving strategies will be used in real-world scenarios to enable students to master concepts within the appropriate context. This course is a continuation of Applied Mathematics I.

Advanced Mathematics

Prerequisite: Integrated Mathematics II or

Applied Mathematics IIIA with at least a B standing

MT4040 ADV

4 credit (s)

S4 level (s)

This course involves a theoretical and in-depth approach to the advanced topics in mathematics. The student is expected to be able to solve problems of a more complex and abstract nature. The focus will be on important concepts in mathematics and how they can be applied to solve a wide variety of real world problems encountered in daily life and careers. Topics to be covered include: functions, trigonometry, sequences and series, rates and area, conic sections and matrices.

Applied Mathematics IIIA

Prerequisite: Applied Mathematics II or Integrated Mathematics II

MT4053 APA

2 credit (s)

S4 level (s)

This course offers algebra and geometry concepts in context. Teachers will use authentic situations to encourage students to connect mathematics to the workplace and everyday life. Students will be given the opportunity to read, interpret and apply mathematical principles, reasoning and appropriate supporting explanations. Technology will be used to supplement pen and paper work.

Applied Mathematics IIIB

Prerequisite: Applied Mathematics IIIA

MT4064 APB

2 credit (s)

S4 level (s)

This course continues to explore algebra and geometry concepts offered in Applied Mathematics IIIA. Trigonometry will be introduced and students will be encouraged to apply principles of statistics. This course meets the needs of students who are contextual learners and abstract concepts are offered through concrete experiences. Real-world and workplace situations are used as settings for investigations. Processes such as problem solving, communicating, reasoning and connecting are embedded throughout the course. The mathematical content is practical and relevant.

Business Mathematics I

Prerequisite: Integrated Mathematics I or Applied Mathematics I or II

MT3061 BUS

2 credit (s)

S3-S4 level (s)

This course is designed for students who are interested in business and/or personal (home) financing. This course covers the personal applications of mathematical concepts and skills that will be used to solve consumer and job-related problems. Students will also explore budgeting and investment techniques.

Business Mathematics II

Prerequisite: Business Mathematics I or Applied Mathematics II

MT4072 BUS

2 credit (s)

S3-S4 level (s)

Business mathematics II is a 2 credit course designed for the student who is interested in a business major. Students will be given the opportunity to apply mathematics to actual business practices. Focus will be placed on viewing the use of mathematics in a wide range of business. The students will examine how mathematical concepts and principles are applied to a variety of business procedures.

Introductory Calculus

Prerequisite: Integrated Mathematics II

MT4080 CAL

2 credit (s)

S4 level (s)

This course is designed to introduce students to the mathematics of motion and change. It is expected that they will have studied advanced mathematical concepts and the emphasis will be placed on using limits to test functions for continuity. Students will be assisted in gaining conceptual understanding by reviewing real life situations through graphical, numerical and algebraic representations of limits, derivatives and integrals. This course is appropriate for students who wish to pursue a career in a mathematical or scientific field.

Foundations of Mathematics

Course Code: MT1020FND



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title (s): Foundations of Mathematics

4 credit (s)

120 hour (s)

Prerequisite(s): None

S1 level (s)

Course Code: MT1020FND

☒ required or ☐ elective

Course Description

Foundations of Mathematics is an introductory course offered to all students entering senior school. Students will develop their understanding of mathematical concepts and expand on topics taught at the middle level. This core curriculum will be differentiated in relationship to the breadth and depth of the treatment of topics and their applications. Foundations of Mathematics is intended to improve problem solving, communication and reasoning skills while fostering a positive attitude towards mathematics.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio which should reflect representative samples of their work collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

Additional requirements for this course are as follows:

Performance Assessments: - lab reports - problem solving tasks - debates and presentations - investigations	20%
Product Assessments: Comprehensive assessments including: - written tests using a variety of items - selected response, free-response and open-ended - portfolio (a collection of works from each module)	30%
Written Assessments: - formative assessments and assignments	10%
Final Examination:	40%
Total	100%

Course Resources

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended Text

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Number Sense	18	B. Geometry/Measurement	15
- ratio and proportion - finance: Personal Business - scientific notation - powers and roots - simple and compound interest - problem solving - averages - speed, distance, time		- properties of a circle - properties of polygons - surface area - volume - transformations - congruency and similarity - constructions - Pythagorean Theorem	
C. Trigonometry	4	D. Data Handling	10
- squares and square roots - right-angled triangles - tangent, sine and cosine ratios		- experiments - surveys and inferences - modelling - presentation and analysis of data - measures of central tendencies - design and execution of simple probability experiments - simulations	
E. Algebra	18	F. Functions and Graphs	10
- indices - inequalities - equations (simultaneous) - matrices - trinomials - creation and evaluation of formulas		- patterns and relationships - function notation - systems solved by using graphing utility - identification of slope - exploration of sequences that build to formulas that are linear	

Subtotal	75
Optional double periods	<u>15</u>
Total double periods	90

SENIOR SCHOOL MATHEMATICS

check one: S1 ☒ S2 ☐ S3 ☐ S4 ☐

Foundations of Mathematics

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
1	Appreciation	1.1	Interrelationships	x	x	x	x	x	x
		1.2	Successful Experiences	x	x	x	x	x	
		1.3	Significance	x	x	x	x		x
2	Structure	2.1	Comparison	x	x				x
		2.2	Appreciation	x	x		x		x
		2.3	Evaluation	x	x	x		x	x
		2.4	Generalization	x		x	x		
		2.5	Interpretation	x	x			x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x	x	
		3.2	Estimation	x	x				
		3.3	Multiple Representations	x	x	x		x	x
		3.4	Data Handling	x	x	x	x	x	x
		3.5	Geometric and Measurement Properties	x	x	x			
		3.6	Algebraic Procedures	x	x	x		x	
		3.7	Technology	x	x		x	x	x
4	Communication	4.1	Ideas and Concepts	x	x		x	x	x
		4.2	Formulae and Terminology		x	x	x	x	x
		4.3	Oral/Written	x	x	x	x	x	
		4.4	Generalization	x				x	x
		4.5	Symbolic notation				x	x	
		4.6	Manipulatives and Technology	x	x	x	x	x	x
		4.7	Evaluation	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
MODULES				A	B	C	D	E	F

MODULE KEY

A - Number Sense
B - Geometry and Measurements
C - Trigonometry

D - Data Handling
E - Algebra
F - Relationships (Functions and Graphs)

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check one: S1 ☒ S2 ☐ S3 ☐ S4 ☐

Foundations of Mathematics

5	Cognition	5.1	Confidence in Problem Solving	x	x	x	x	x	x
		5.2	Evaluation			x		x	
		5.3	Technology			x	x	x	x
		5.4	Application	x	x	x		x	
		5.5	Evaluation of Reasonableness	x	x			x	x
		5.6	Modelling	x	x	x	x	x	x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x	x
		6.2	Decision Making	x	x		x	x	
		6.3	Real World Issues	x	x	x	x	x	x
		6.4	Lifelong Skills	x	x	x		x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry and Measurements

C - Trigonometry

D - Data Handling

E - Algebra

F - Relationships (Functions and Graphs)

(page 2 of 2)

MATHEMATICS

Course Title: FOUNDATIONS OF MATHEMATICS

Sequence Reference: MT1020FND-A

Module Title: Number Sense

Senior School Level

Number of Periods: 10 double periods

S1	S2	S3	S4
☒	☐	☐	☐

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.3, 4.4, 4.6, 4.7 Communication
- 5.1, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Real Life Applications

Curriculum Objectives:

At the end of this module, students will:

- use estimation and mental calculation to make decisions about situations that are common in everyday life
- demonstrate a proficiency with calculations
- apply numbers in various forms, including fractions, decimals, percents and exponential notations
- understand the relationships among events, time, distances and velocities
- analyze the real number system including the hierarchy of real numbers, the meaning of infinity and ordering.

Content Detail:

- multiples and factors
- estimation and computation
- simple and compound interest
- ratio and proportion
- finance: personal business
- scientific notation
- powers and roots
- real life problem solving
- patterns
- averages
- speed, distance and time

Module Evaluation:

- **Performance Assessments:**
 - written artifact
 - debate (real number system)
 - oral presentation (final project)
 - oral questioning
 - think along form
- **Product Assessments:**
 - written artifact
 - lab report
 - portfolio (a collection of selected and journal writings)
 - final project (Finance: personal business)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- demonstrate a proficiency with arithmetic operations
- apply a variety of methods to solve problems
- use numbers to describe quantities
- represent numbers in multiple ways
- use a calculator efficiently

Special Resources

(materials, equipment & community involvement):

- government statistician
- investments officer from a bank
- laboratory technician
- *USA Today*
- *Business Week*
- local newspapers and other publications

GLOSSARY:

ratio	A comparison of two numbers by division. A comparison of 9 and 12 can be written as 9 to 12, $9 : 12$, and $9/12$.
scientific notations	A way of expressing a numerical term as the product of a number that is at least 1, but less than 10, multiplied by a power of 10. In scientific notation 4,100 is 4.1×10^3 .
down payment	A small portion of the total price to be paid at the time of purchase.
finance charge	The difference between the credit price and the cash price of an item.
geometric sequence	A sequence of numbers in which succeeding terms are found by multiplying the preceding term by the same number (common ratio).
interest	A percent of the principal that is an amount earned on a deposit or an amount owed on a loan.
principal	The amount of money borrowed or invested on which interest is based.
commission	Earnings based on a percent of sales.
discount	An amount subtracted from the regular price of an item.
discount rate	The percent of decrease in the regular price of an item.
gross pay	Total wage before deductions are made.
net pay	Take home pay found after subtracting total and personal deductions from gross pay.
real number	Any number that is either rational or irrational.
rational number	A real number that can be written as a quotient of two integers a/b , $b \neq 0$.
irrational number	A real number that cannot be written as the quotient of two integers.
proportion	An equation that shows two equal ratios.

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
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- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- * Recommended text

MATHEMATICS

Course Title: FOUNDATIONS OF MATHEMATICS

Sequence Reference: MT1020FND-B

Module Title: Geometry and Measurement

Senior School Level

Number of Periods: 16 double periods

S1	S2	S3	S4
☒	☐	☐	☐

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.6, 4.7 Communication
- 5.1, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Geometry
- Measurement
- Application to careers

Curriculum Objectives:

At the end of this module, students will:

- formulate solutions for problems involving area, perimeter and volume
- analyze the use of various systems of measurement
- investigate geometric methods to solve problems in the physical world
- explore the angles and properties of a circle
- compare similar/congruent triangles
- appraise spatial and geometric relationships
- explore geometric relationships using appropriate software
- use manipulatives to solve problems involving design in two dimensions by comparing area and perimeter

Content Detail:

- arc length and area of a sector of a circle
- areas of polygons (investigations)
- perimeter (polygons, circles)
- surface area (prisms and cylinders)
- volume
- congruency and similarity
- transformations (translations, rotations, reflections)
- properties of a circle
- symmetry
- constructions
- Pythagorean Theorem
- 2-D shapes and 3-D objects

Module Evaluation:

- **Performance Assessments:**
- performance-based tests, interviews, group investigations and reports, debate (congruent figures are similar, but similar figures are not necessarily congruent)
- **Product Assessments:**
- written artifacts, models, investigative tasks, journal writing, projects (geometric shapes in buildings and industry)
- **Written Assessments:**

Prerequisite Skill Areas

(if any):

- computational skills
- use of a calculator
- representing algebraic expressions in multiple ways
- coordinates
- metric conversions

Special Resources

(materials, equipment & community involvement):

- an architectural firm and interior decorator representative
- visit with construction worker, carpenter, tiler, engineer, carpet installer
- advertising agent
- graph paper
- measurement devices (measuring cups, rulers, tapes)
- geometric models and geo-D sticks

GLOSSARY:

axis of symmetry	A line associated with a geometric figure such that every point on one side of the line has a corresponding point on the other side.
circumference	The perimeter of a circle.
congruent	Dimensions and angles of figures are identical in shape and size.
flip	A term used in motion geometry to describe the result of a reflection line.
image	The result of a transformation.
prism	A space figure with two parallel congruent bases. The other sides of the prism are faces.
rotation	A turn or transformation of an object about a fixed point.
similar figures	Two figures with the same shape, but not necessarily the same size.
surface area	The sum of the areas of each surface of a 3-dimensional figure.
symmetry	When a polygon can be folded so that one half is exactly over the other half.
tessellation	A repeated pattern of a geometric figure that will completely cover a surface.
transformation	A change made to an object or its position.
vector	A directed line segment used to describe a quantity that has direction as well as magnitude.
volume	The number of cubic units require to fill a space.

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
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- *Rubenstein. R. et al. Integrated Mathematics I. Illinois: McDougal Littell, 1998.
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- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics I. Illinois: McDougal Littell, 1998.

* Recommended text

MATHEMATICS

Course Title: FOUNDATIONS OF MATHEMATICS

Sequence Reference: MT1020FND-C

Module Title: Trigonometry

Senior School Level

Number of Periods: 4 double periods

S1	S2	S3	S4
☒	☐	☐	☐

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.3, 2.4 Structure
- 3.1, 3.3, 3.4, 3.5, 3.6 Acquisition
- 4.2, 4.3, 4.6, 4.7 Communication
- 5.1, 5.2, 5.3, 5.4, 5.6 Cognition
- 6.1, 6.3, 6.4 Application

Content Focus

- Pythagorean Theorem
- Practical applications of trigonometric ratios

Curriculum Objectives:

At the end of this module, students will:

- identify the sides of a right-angled triangle
- distinguish between the use of Pythagorean Theorem and trigonometric ratios by considering parameters
- select the appropriate ratio (sine, cosine, or tangent) and technology when finding a side of a right-angled triangle
- solve practical problems involving trigonometric ratios

Content Detail:

- squares and square roots
- right-angled triangles
- tangent, sine and cosine ratios

Module Evaluation:

- Performance Assessments:**
 - write or give a well organized speech or essay on either the Pythagorean theorem or the origin of trigonometry
 - investigate actual measurements and/or angles around the school grounds using the trigonometric ratios
 - oral questioning
- Product Assessments:**
 - portfolio (a collection of selected works and journal writings)
 - investigative project
- Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- module 1B "Geometry/Measurement"
- representing algebraic expressions in multiple ways
- basic properties and symbols associated with triangles
- measurement skills
- use a scientific calculator efficiently

Special Resources

(materials, equipment & community involvement):

- tape measures/clinometer
- visit to library
- internet
- scientific calculator
- graphing calculator
- computer software

GLOSSARY:

Pythagorean Theorem	In a right-angled triangle, the sum of the squares of the lengths of the sides containing the right angle is equal to the square of the hypotenuse. For example: $a^2 + b^2 = c^2$ $3^2 + 4^2 = 5^2$ $9 + 16 = 25$
squares	The square of a number is calculated by multiplying the number by itself. For example: $4^2 = 4 \times 4 = 16$
square root	The square root of a number N is the number which, when squared is equal to N. For example $\sqrt{16} = 4$ because $4 \times 4 = 16$
trigonometry	This word is formed from two Greek words meaning triangle and measure. Simply, trigonometry is concerned with sides and angles of right-angled triangles.
hypotenuse	This is the largest side of a right-angled triangle and is always opposite the right angle.
opposite side	This is the side that is directly opposite to the selected angle in a right angled triangle.
adjacent side	This is the side that is adjacent to the selected angle in a right-angled triangle

REFERENCES - TEACHER

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
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- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
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- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

REFERENCES - STUDENT

- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.

*

Recommended text

MATHEMATICS

Course Title: FOUNDATIONS OF MATHEMATICS

Sequence Reference: MT1020FND-D

Module Title: Data Handling

Senior School Level

Number of Periods: 13 double periods

S1	S2	S3	S4
☒	☐	☐	☐

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.2, 2.4, 2.5 Structure
- 3.1, 3.4, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.5, 4.6, 4.7 Communication
- 5.1, 5.3, 5.6 Cognition
- 6.1, 6.2, 6.3 Application

Content Focus

- Statistics
- Probability

Curriculum Objectives:

At the end of this module, students will:

- collect, organize and display real-world data
- determine reasonableness of data interpretations
- justify the applications of mathematical ideas to surveys and interpretation
- design and use experimental and theoretical probability to represent and solve problems involving uncertainty, using technology whenever appropriate
- design and execute simple experiments
- explore statistical software and spreadsheets

Content Detail:

- experiments
- design a survey
- presentations and analysis of data
- statistical representations to model real world issues
- measures of central tendencies
- simple probability experiments
- simulations

Module Evaluation:

- **Performance Assessments:**
 - group activities
 - presentation of project
 - written assignments
 - investigative tasks
 - problem-based assessments
- **Product Assessments:**
 - project (design a survey, analyze and interpret the data, make decisions)
 - portfolio (selected work and journal writings)
- **Written Assessments:**

Prerequisite Skill Areas

(if any):

- module 1 A "Number Sense"
- creating and interpreting charts and graphs

Special Resources

(materials, equipment & community involvement):

- statistician
- appropriate computer software
- census 2000 report
- data table and charts from various government departments

GLOSSARY:

box and whisker plot	A method for displaying the median, quartiles and extremes of a data set.
dependent event	Two events such that the outcome of the first affects the outcome of the second. For example, drawing a first card and then a second card without replacing the first.
histogram	A type of bar graph that displays frequencies.
independent variable	Events such that the outcome of the first does not effect the outcome of the second. For example, tossing a coin and rolling a number cube.
mean	The sum of the data in a data set divided by the number of items.
mean	Arithmetic average
median	In a data set, the middle number or the average of the two middle numbers, when the data are arranged in numerical order.
mode	The most frequently occurring item, or items, in a data set.
outliners	Data values that are much larger or much smaller than the other values in a data set, and therefore not typical of the data set.
probability	The ratio of the number of favourable outcomes to the total number of outcomes.
range	The difference between the extremes in a data set.
scatter plot	A graph that shows the relationship between two sets of data. A line passes close to most of the data points is called a <i>fitted line</i> .
spreadsheets	A computerized version of a matrix. Each position in a spreadsheet is a <i>cell</i> .
stem - and - leaf plot	Display of data where each number is represented by a stem and a leaf.

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- * Recommended text

MATHEMATICS

Course Title: FOUNDATIONS OF MATHEMATICS

Sequence Reference: MT1020FND-E

Module Title: Algebra

Senior School Level

Number of Periods: 18 double periods

S1	S2	S3	S4
☒	☐	☐	☐

Subgoal Emphasis:

- 1.1, 1.2 Appreciation
- 2.3, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Algebra as a means of representation and as a tool

Curriculum Objectives:

At the end of this module, students will:

- multiply and divide with positive indices (including zero)
- interpret negative indices
- represent algebraic expressions in multiple ways (factorizing, expanding and transposing)
- generate and solve linear inequalities, linear and simultaneous equations
- use tables, graphs and matrices as tools to interpret expressions, equations and inequalities
- explore the process of graphing linear equations or inequalities in two variables as they relate to real world problems

Content Detail:

- indices
- inequalities
- trinomials
- simultaneous equations
- linear equations (unknowns on both sides/parentheses)
- matrices (additions and subtractions)
- graphing
- formulas

Module Evaluation:

- **Performance Assessments:**
 - problem solving tasks
 - performance-based tasks: ask students to (i) solve and verify linear equations and inequalities in one variable, (ii) explain the process used, (iii) demonstrate the process used to check their work
 - oral questioning: examining the relationship between an equation, its solution and its graph
- **Product Assessments:**
 - graphing linear and simultaneous equations
 - portfolio: selected works, journals
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- basic algebraic concepts and procedures

Special Resources

(materials, equipment & community involvement):

- algebra tiles
- plumber
- dentist
- pharmacist
- business manager
- appropriate computer software

GLOSSARY:

indices	These are raised numbers used as a power to indicate the number of repeated multiplications of the base. For example, 3^4 : index is 4
inequality	This is a mathematical statement formed by placing an inequality symbol ($<$, $>$) between numerical or variable expressions. For example, $x^2 + 8x < 12$
linear equation	This is an equation whose graph is a straight line.
quadratic equation	This is an equation that can be written in the form $ax^2 + bx + c = 0$, when $a \neq 0$.
matrices	This is a group of numbers arranged in rows and columns and enclosed by parentheses.

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
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- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.

* Recommended text

MATHEMATICS

Course Title: FOUNDATIONS of MATHEMATICS

Sequence Reference: MT1020FND-F

Module Title: Functions and Graphs

Senior School Level

Number of Periods: 13 double periods

S1	S2	S3	S4
☒	☐	☐	☐

Subgoal Emphasis:

- 1.1, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.5 Structure
- 3.3, 3.4, 3.7 Acquisition
- 4.1, 4.2, 4.4, 4.6, 4.7 Communication
- 5.1, 5.5, 5.3, 5.6 Cognition
- 6.1, 6.3, 6.4 Application

Content Focus

- Graphs
- Functions
- Algebra

Curriculum Objectives:

At the end of this module, students will:

- generate the graph of functions using technology
- create functions
- develop graphical techniques for solving problems
- interpret graphs of various functions
- appraise numeric, geometric and situation sequences that build to formulas, including those representing patterns

Content Detail:

- patterns and relationships
- inequalities and the number line
- coordinates
- function graphing software
- graphing linear and simultaneous equations

Module Evaluation:

- **Performance Assessments:**
 - group tasks and presentations
 - investigative tasks
- **Product Assessments:**
 - lab reports
 - problem solving tasks
 - portfolio assessment
 - reflection on use of graphs
 - project(s) (collection presentation and analysis of data to answer a question)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- locating points on the coordinate plane
- use of a calculator
- module E "Algebra"

Special Resources

(materials, equipment & community involvement):

- graphing calculators
- computers
- appropriate software
- data to support an interdisciplinary project

GLOSSARY:

coordinates	The unique ordered pair of real numbers associated with each point in a coordinate plane. The first number of the ordered pair is the x-coordinate, the second number is the y-coordinate.
coordinate geometry	Geometry involving drawing, analyzing and comparing figures on a coordinate plane.
coordinate plane	A grid formed by two perpendicular number lines or axes intersecting at the origin. The axes split the plane into four quadrants.
function	A relationship between two variables in which the value of the dependent variable is dependent on the value of the control variable. There can only be one value of the dependent variable for each value of the control variable .
graph of an equation	The points whose coordinates are the solutions of the equation.
linear equation	An equation of a line.
linear function	A function that can be defined by $y = mx + b$.
linear inequality	An inequality whose graph on a coordinate plane is a region bounded by a line, called the boundary line .
parabola	The graph of $y = ax^2 + bx + c, a \neq 0$. The point where the curve turns is either the maximum or the minimum and is called the vertex .
quadratic function	Any function of the form $y = ax^2 + bx + c, a \neq 0$.
slope-intercept, form of an equation	An equation of the form, $y = mx + b$, where m represents the slope and b represents the y- intercept of a line.
spreadsheet	A computerized version of a matrix - each position in a spreadsheet is a cell .

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
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- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.

* Recommended text

Mathematics Laboratory

Course Code: MT1030LAB



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title: Mathematics Laboratory

no credit (s)

Prerequisite (s): None

S1 level (s)

Course Code: MT1030LAB

☐ required or ☒ elective

Course Description

Mathematics Lab is a course designed for the students who had difficulty with middle school level three mathematics. The student will apply basic mathematical concepts to various consumer activities, sports statistics, job-related problems and other real life situations. Manipulative materials and technology will be used to help students bridge the gap between concrete experiences and abstract ideas. It is recommended that participating students take this course during the summer prior to entering senior school.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work, collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

Additional requirements for this course are as follows:

Performance Assessments: - debates; presentations - investigations - portfolios - lab reports - problem solving tasks	20%
Product Assessments: - comprehensive assessments including written tests using a variety of items – selected response, free-response and open-ended - projects - portfolio (a collection of tasks from each module)	30%
Written Assessments: - written assessments and assignments	10%
Final Assessment: - examination	40%
Total	100%

Course Resources

Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.

Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.

*Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD,

Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project.
Chicago: Everyday Learning Corporation.

Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.

Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Rubenstein, R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.

The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum.
Reston, Va: NCTM, 1992.

The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.

*Recommended Texts

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Whole Numbers and Decimals	6	B. Fractions and Percents	8
- writing numbers as words		- fractional operations	
- rounding		- converting fractions and percents	
- comparing numbers		- finding a percent	
- estimation		- ratio and proportion	
- decimals		- applications	
- averages			
- applications			
C. Graphing and Statistics	6	D. Algebra	8
- reading tables and charts		- integers	
- compiling and organizing data		- collecting like terms	
- constructing graphs		- substitution	
- mean, median and mode		- solving equations	
		- applications	
E. Geometry and Measurement	5	F. Problem Solving	5
- angles and lines		- four-step method (understand, plan, work and answer)	
- identifying common polygons (square, etc.)		- constructing a table	
- perimeter		- guess and check	
- area		- working backwards	
- circles		- writing an equation	
		- drawing a diagram	
		- restating the problem	

Subtotal	38
Optional double periods	7
Total double periods.....	45

SENIOR SCHOOL MATHEMATICS

check one: S1 ☒ S2 ☐ S3 ☐ S4 ☐

Foundations of Mathematics

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
1	Appreciation	1.1	Interrelationships	x	x	x	x	x	x
		1.2	Successful Experiences	x	x	x	x	x	
		1.3	Significance	x	x	x	x		x
2	Structure	2.1	Comparison	x	x				x
		2.2	Appreciation	x	x		x		x
		2.3	Evaluation	x	x	x		x	x
		2.4	Generalization	x		x	x		
		2.5	Interpretation	x	x			x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x	x	
		3.2	Estimation	x	x				
		3.3	Multiple Representations	x	x	x		x	x
		3.4	Data Handling	x	x	x	x	x	x
		3.5	Geometric and Measurement Properties	x	x	x			
		3.6	Algebraic Procedures	x	x	x		x	
		3.7	Technology	x	x		x	x	x
4	Communication	4.1	Ideas and Concepts	x	x		x	x	x
		4.2	Formulae and Terminology		x	x	x	x	x
		4.3	Oral/Written	x	x	x	x	x	
		4.4	Generalization	x				x	x
		4.5	Symbolic notation				x	x	
		4.6	Manipulatives and Technology	x	x	x	x	x	x
		4.7	Evaluation	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry and Measurements

C - Trigonometry

D - Data Handling

E - Algebra

F - Relationships (Functions and Graphs)

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check one: S1 ☒ S2 ☐ S3 ☐ S4 ☐

Foundations of Mathematics

5	Cognition	5.1	Confidence in Problem Solving	x	x	x	x	x	x
		5.2	Evaluation			x		x	
		5.3	Technology			x	x	x	x
		5.4	Application	x	x	x		x	
		5.5	Evaluation of Reasonableness	x	x			x	x
		5.6	Modelling	x	x	x	x	x	x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x	x
		6.2	Decision Making	x	x		x	x	
		6.3	Real World Issues	x	x	x	x	x	x
		6.4	Lifelong Skills	x	x	x		x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry and Measurements

C - Trigonometry

D - Data Handling

E - Algebra

F - Relationships (Functions and Graphs)

(page 2 of 2)

MATHEMATICS

Course Title: MATHEMATICS LABORATORY

Sequence Reference: MT1030LAB-A

Module Title: Whole Numbers and Decimals

Senior School Level

Number of Periods: 6 double periods

S1	S2	S3	S4
☒	☐	☐	☐

Subgoal Emphasis:

- | | |
|-------------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.2, 2.3, 2.5 | Structure |
| • 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 | Acquisition |
| • 4.1, 4.3, 4.4, 4.6, 4.7 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Number Sense
- Real Life Applications

Curriculum Objectives:

At the end of this module, students will:

- write numbers as words
- round numbers to appropriate values
- make appropriate comparisons of numbers
- explore number systems
- calculate the average of a set of numbers
- appropriately use technology

Content Detail:

- place value
- decimal places and significant figures
- ordering numbers
- estimation
- real life problem solving
- averages
- prime and composite numbers
- factors and multiples

Module Evaluation:

- **Performance Assessments:**
- written assignments, performance-based tests, problem solving tasks
- **Product Assessments:**
- selected students' work
- **Written Assessments:**
- formative assessments and assignments

Prerequisite Skill Areas

(if any):

- N/A

Special Resources

(materials, equipment & community involvement):

- appropriate computer software
- newspapers
- bank officer

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended Texts

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: MATHEMATICS LABORATORY

Sequence Reference: MT1030LAB-B

Module Title: Fractions and Percents

Senior School Level

Number of Periods: 8 double periods

S1	S2	S3	S4
☒	☐	☐	☐

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.3, 4.4, 4.6, 4.7 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Number Sense
- Concepts and Applications
- Real Life Applications

Curriculum Objectives:

At the end of this module, students will:

- perform fractional operations
- convert from fractions to decimals to percents and vice-versa
- find a percentage of a given quantity
- use ratios to compare quantities
- use technology appropriately

Content Detail:

- operations involving fractions
- percents
- ratio and proportion
- conversions
- real life problem solving

Module Evaluation:

- **Performance Assessments:**
 - investigative tasks comparing fractions, decimals, ratios and percentages
 - problem solving tasks
- **Product Assessments:**
 - portfolio with selected students' work
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- N/A

Special Resources

(materials, equipment & community involvement):

- appropriate computer software
- newspapers
- loan officer

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
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- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended Texts

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: MATHEMATICS LABORATORY	Sequence Reference: MT1030LAB-C								
Module Title: Graphing and Statistics	Senior School Level <table><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr><tr><td>☒</td><td>☐</td><td>☐</td><td>☐</td></tr></table>	S1	S2	S3	S4	☒	☐	☐	☐
S1	S2	S3	S4						
☒	☐	☐	☐						
Number of Periods: 6 double periods									
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.3, 2.4, 2.5 Structure 3.2, 3.3, 3.4, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application	Content Focus - Real Life Applications - Collecting and Interpreting Data - Presentation of Data								
Curriculum Objectives:	Content Detail:								
At the end of this module, students will: - interpret tables and charts - use appropriate methods to organize and present data - use technology appropriately - determine and appropriately use measures of central tendency	- bar charts, pie charts, line graphs and pictograms - mean, median and mode - real life problem solving								
Module Evaluation:									
Performance Assessments: - investigative tasks(collection, representation and analysis of test data) - oral reports Product Assessments: - portfolio to include investigative tasks and journal writings - project (analysis of census 2000 data) Written Assessments: - formative assessments and assignments									
Prerequisite Skill Areas (if any):	Special Resources (materials, equipment & community involvement):								
N/A	- Government Statistical Department - appropriate computer software - newspapers - graph paper - meteorologist - Census 2000 report								

GLOSSARY:

- **integers** whole numbers and their opposites
- **linear equation** equation whose graph is a straight line

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended Texts

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: MATHEMATICS LABORATORY

Sequence Reference: MT1030LAB-D

Module Title: Algebra

Senior School Level

S1	S2	S3	S4
☒	☐	☐	☐

Number of Periods: 8 double periods

Subgoal Emphasis:

- | | |
|-------------------------------------|---------------|
| • 1.1, 1.2 | Appreciation |
| • 2.3, 2.4, 2.5 | Structure |
| • 3.1, 3.3, 3.4, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Algebra as a means of representation
- Algebra as a tool

Curriculum Objectives:

At the end of this module, students will:

- simplify algebraic expressions
- evaluate algebraic expressions
- solve linear equations
- evaluate formulas and algebraic expressions
- generalize numeric and geometric patterns to find the next term and the n^{th} term
- solve problems using algebraic methods

Content Detail:

- integers
- simplification
- substitution
- solution of linear equations
- real life problem solving

Module Evaluation:

- Performance Assessments:**
 - investigative tasks
 - performance – based tests
- Product Assessments:**
 - problem solving activities
 - portfolio with selected works and journals
- Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- N/A

Special Resources

(materials, equipment & community involvement):

- algebra tiles
- appropriate computer software
- two colour counters

GLOSSARY:

- **integers** whole numbers and their opposites
- **linear equation** equation whose graph is a straight line

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended Texts

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: MATHEMATICS LABORATORY		Sequence Reference: MT1030LAB-E			
Module Title: Geometry and Measurement		Senior School Level			
Number of Periods: 5 double periods		S1	S2	S3	S4
		☒	☐	☐	☐
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.5 Structure 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.5, 4.6, 4.7 Communication 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		Content Focus - Geometry - Measurement - Real Life Applications			
Curriculum Objectives:		Content Detail:			
At the end of this module, students will: - formulate solutions for problems involving area and perimeter - explore the angle and line properties of squares, triangles and circles - explore geometric relationship using appropriate software - classify simple shapes in two dimensions and three dimensions - convert units within the metric system - solve problems involving money, time, length etc. - examine similar shapes		- angles - figures - square, triangle, circle - perimeter - area - real life problem solving			
Module Evaluation:					
Performance Assessments: - investigative tasks - performance-based tests Product Assessments: - portfolio assessment - selected tasks and tests and journal writings Written Assessments: - formative assessments and assignments					
Prerequisite Skill Areas		Special Resources			
(if any):		(materials, equipment & community involvement):			
N/A		- visits with relevant organizations - architectural companies, construction companies - appropriate computer software - graph paper - measurement devices (measuring cups, rulers, tapes) - geometric models and geo-D sticks			

GLOSSARY:

perimeter

the distance around a polygon

area

the number of square units needed to cover a surface of a plane figure

REFERENCES - TEACHER:

Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.

Bumby, Douglas, et al. Integrated Mathematics, Course 1, Ohio: Glencoe, 1995.

*Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.

Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.

Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.

Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach, Ohio: Southwestern, 1999.

*Rubenstein. R. et al. Integrated Mathematics 1, Illinois: McDougal Littell, 1998.

The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.

The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.

The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended Texts

REFERENCES - STUDENT:

Bumby, Douglas, et al. Integrated Mathematics, Course 1, Ohio: Glencoe, 1995.

*Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD

Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach, Ohio: Southwestern, 1999.

*Rubenstein. R. et al. Integrated Mathematics 1, Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: MATHEMATICS LABORATORY

Sequence Reference: MT1030LAB-F

Module Title: Problem Solving

Senior School Level

S1	S2	S3	S4
☒	☐	☐	☐

Number of Periods: 5 double periods

Subgoal Emphasis:

- | | |
|-------------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.2, 2.3, 2.5 | Structure |
| • 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Real Life Applications

Curriculum Objectives:

At the end of this module, students will:

- apply appropriate problem solving strategies
- use technology tools appropriately
- solve problems set in context
- pose, explore and solve a variety of problems, including those that are non-routine
- explore mathematical games and puzzles

Content Detail:

- four-step method (understand, plan, work and answer)
- problem solving strategies:
 - act out or use objects
 - tables
 - guess and check
 - working backwards
 - equations
 - diagrams
 - restating
 - make an organized list
 - use or look for a pattern
 - logical reasoning
- mathematical games and puzzles
- real-life applications

Module Evaluation:

- **Performance Assessments:**
 - written assignments and oral presentations
 - investigative tasks
 - problem solving tasks
- **Product Assessments:**
 - portfolio with selected works and journal writings
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- N/A

Special Resources

(materials, equipment & community involvement):

- appropriate computer software
- Problem Solver 7, Creative Publications

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended Texts

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.

*Recommended text

Advanced Mathematics

Course Code: MT4040ADV



MINISTRY OF EDUCATION

Bermuda
2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title: Advanced Mathematics

4 credit (s)

120 hour (s)

Prerequisite (s): Integrated Mathematics II or
Applied Mathematics III A
with at least a B standing

S4 level (s)

Course Code: MT4040ADV

☐ required or ☒ elective

Course Description

Advanced Mathematics is a four-credit course designed for the accelerated mathematics student and involves a theoretical and in-depth approach to the study of advanced topics. The focus will be on important concepts in mathematics and how they can be applied to solve a wide variety of problems encountered in daily life and careers. Topics to be covered include: functions, trigonometry, sequences and series, rates and area, conic sections and matrices.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work, collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

Additional requirements for this course are as follows:

Performance Assessments: - lab reports; problem solving tasks - oral presentation using technology - debates; presentations - investigations - cooperative group activities	20%
Product Assessments: - comprehensive assessments including written tests using a variety of items – short answer, multiple choice, free-response and open-ended - written tests - projects - portfolios	30%
Written Assessments: - formative assessments and assignments including problem solving tasks	10%
Final Examination	40%
Total	100%

Course Resources

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
 Urso, Rosario, Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Functions and Graphs 22		B. Matrices and Vectors 10	
- composition of functions		- matrix transformations	
- piecewise functions		- vectors and transformations	
- limits		- dependence of vectors	
- factor theorem		- solutions of systems through matrices	
- remainder theorem		- linear programming	
- graphs		- vectors	
- equations and inequalities			
- equations of circles, parabolas, ellipses and hyperbolas			
- conic sections (graphic calculators)			
- transformations of conics			
- tangents and normals to the conic sections			
C. Trigonometry 10		D. Data Handling 11	
- connections of trigonometric and circular functions		- statistical graphs - line, bar, circle, histogram, scatterplots	
- identities and equations		- measures of central tendency	
- inverses		- variability	
- modelling with trigonometric functions		- correlation and regression	
		- theoretical model (binomial and geometric)	
		- empirical probability	
E. Sequences and Series 12		F. Limits and Derivatives 10	
- arithmetic and geometric sequences		- average and instantaneous rates of change	
- arithmetic and geometric series		- secants approaching tangents	
- convergent and divergent series		- derivation of general derivatives from the definition	
- binomial theorem		- areas by grid, Monte Carlo, rectangle and trapezoid methods	
		- visualize volumes of revolution	
		- derivation of integrals from the definition	

Subtotal	75
Optional double periods	15
Total double periods	90

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☐ S3 ☐ S4 ☒

Advanced Mathematics

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
1	Appreciation	1.1	Interrelationships	x	x		x	x	x
		1.2	Successful Experiences	x	x	x	x	x	x
		1.3	Significance	x		x	x		x
2	Structure	2.1	Comparison	x	x				x
		2.2	Appreciation	x		x	x		x
		2.3	Evaluation				x		x
		2.4	Generalization	x				x	x
		2.5	Interpretation	x	x	x	x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x	x	x
		3.2	Estimation	x	x	x	x	x	x
		3.3	Multiple Representations	x	x		x	x	x
		3.4	Data Handling	x	x		x	x	x
		3.5	Geometric and Measurement Properties			x			
		3.6	Algebraic Procedures	x	x	x		x	x
		3.7	Technology	x	x	x	x	x	x
4	Communication	4.1	Ideas and Concepts	x	x	x	x		x
		4.2	Formulae and Terminology	x	x	x		x	
		4.3	Oral/Written	x		x			x
		4.4	Generalization	x					x
		4.5	Symbolic notation	x	x	x		x	x
		4.6	Manipulatives and Technology	x		x	x	x	
		4.7	Evaluation	x	x		x		x
CONTENT STRUCTURE		Functions and Graphs		x					
		Matrices and Vectors			x				
		Trigonometry				x			
		Data Handling					x		
		Limits and Derivatives						x	
		Sequences and Series							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Functions and Graphs
B - Matrices and Vectors
C - Trigonometry

D - Data Handling
E - Sequences and Series
F - Limits and Derivatives

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SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☐ S3 ☐ S4 ☒

Advanced Mathematics

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
5	Cognition	5.1	Confidence in Problem Solving	x		x	x	x	x
		5.2	Evaluation	x		x	x		x
		5.3	Technology	x	x	x	x	x	x
		5.4	Application	x	x	x	x	x	x
		5.5	Evaluation of Reasonableness	x		x	x	x	x
		5.6	Modelling	x	x	x	x	x	x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x	x
		6.2	Decision Making	x			x		x
		6.3	Real World Issues	x	x	x	x	x	x
		6.4	Lifelong Skills	x			x		x
CONTENT STRUCTURE		Functions and Graphs		x					
		Matrices and Vectors			x				
		Trigonometry				x			
		Data Handling					x		
		Limits, Derivatives and Integrals						x	
		Sequences and Series							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Functions and Graphs
B - Matrices and Vectors
C - Trigonometry

D - Data Handling
E - Sequences and Series
F - Limits and Derivatives

(page 2 of 2)

MATHEMATICS

Course Title: ADVANCED MATHEMATICS

Sequence Reference: MT4040ADV-A

Module Title: Functions and Graphs

Senior School Level

Number of Periods: 22 double periods

S1	S2	S3	S4
☐	☐	☐	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Functions (real world applications: investment, projectile motion, consumer awareness, economics, biology and physics)
- Graphs

Curriculum Objectives:

Content Detail:

At the end of this module, students will:

- identify the domain and range of a function and perform complex operations
- write the composition of two or more functions
- find the inverse of a function
- graph a function and its inverse and, using appropriate technology, interpret properties of these representations - intercepts, slopes, rate of change
- identify polynomial functions and use limit theorems to evaluate the limit of a polynomial function
- determine the critical points of the graph of a polynomial function and determine if each function is a minimum, maximum or point of inflection

- composition of functions
- piecewise functions
- limits
- factor theorem
- remainder theorem
- continuity and discontinuity
- inverse of functions
- roots of polynomial functions
- equations of circles, parabolas, ellipses and hyperbolas
- conic sections
- transformations of conics
- tangents and normals to conic sections

(Objectives continued on next page)

Module Evaluation:

- Performance Assessments:**
 - cooperative learning groups and presentations; written assignments
 - performance-based tests
- Product Assessments:**
 - portfolio (selected tasks and journal writings)
 - projects (the bouncing ball experiment)
 - investigation/exploration: e.g. students are asked to find the relationship between the distance a ball is dropped and the height of its rebound
- Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- graphing calculator familiarity (optional)
- working knowledge of spreadsheets (optional)

Special Resources

(materials, equipment & community involvement):

- graphing calculators (TI-83 or equivalent)
- computer accessibility (spreadsheet applications)
- integrated software e.g. **f(g) Scholar™**
- professionals who apply functions and graphs in their daily operations

(Page 1 of 2)

MATHEMATICS

Course Title: ADVANCED MATHEMATICS

Sequence Reference: MT4040ADV-A

Module Title: Functions and Graphs cont'd

Senior School Level

Number of Periods: 22 double periods

S1	S2	S3	S4
☐	☐	☐	☒

Subgoal Emphasis:

Content Focus

Curriculum Objectives:

Content Detail:

At the end of this module, students will:

- solve systems of equations and inequalities, using graphical methods
- find the factors of polynomials using the remainder and factor theorems
- determine continuity and discontinuity of functions
- use the discriminant to describe the roots of quadratic equations
- use conic sections to model motion, such as the graph of velocity versus position of a pendulum
- examine tangents and normals to conic sections
- model and solve a variety of real-world problems, using graphical methods

Module Evaluation:

Note: Assessment of student learning is to be detailed on individual lesson plans.

Prerequisite Skill Areas

(if any):

Special Resources

(materials, equipment & community involvement):

(Page 2 of 2)

GLOSSARY:

composition of functions
continuous

given functions $[f \text{ and } g]=f(g(x))$.

a function is said to be continuous at point (x_1, y_1) if it is defined at that point and passes through that point with a break.

constant function
discontinuous

a function of the form $f(x)=b$.

a function is said to be discontinuous at point (x_1, y_1) if there is a break in the graph of the function at that point.

discriminant

let $ax^2 + bx + c = 0$ be any quadratic equation, where a , b , and c are real numbers and $a \neq 0$. The value of $b^2 - 4ac$ is the discriminant and can be used to determine the number of real solutions of a quadratic equation.

domain

the set of possible values for the first coordinate of a relation.

factor theorem

if f is any polynomial function, $x - a$ is a factor of f if and only if a is a zero of f . Also, a is a zero of f if $x - a$ divides f exactly.

function

a relation in which each element of the domain is paired with exactly one element in the range.

inverse function

the inverse of a function f can be obtained by reversing the order of the coordinates in each ordered pair of f . The function f will have an inverse function, or be invertible, when each second coordinate of f corresponds to exactly one first coordinate.

linear function

a function defined by $f(x) = mx + b$, where A and B are not both 0.

polynomial function

a function where $y = P(x)$ where $P(x)$ is a polynomial in one variable.

range of relation

the set of possible values for the second coordinates in a relation.

relation

any set of ordered pairs.

root

the solution of the equation $P(x) = 0$.

vertical-line test

if a vertical line crosses the graph of a relation in more than one point, the relation is not a function.

REFERENCES - TEACHER:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.

Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

REFERENCES - STUDENT:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.

Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

MATHEMATICS

Course Title: ADVANCED MATHEMATICS		Sequence Reference: MT4040ADV-B	
Module Title: Matrices and Vectors		Senior School Level	
Number of Periods: 10 double periods		S1 ☐	S2 ☐
Subgoal Emphasis:		S3 ☐	S4 ☒
• 1.1, 1.2 Appreciation • 2.1, 2.5 Structure • 3.1, 3.2, 3.3, 3.4, 3.6, 3.7 Acquisition • 4.1, 4.2, 4.5, 4.7 Communication • 5.3, 5.4, 5.6 Cognition • 6.1, 6.3 Application		Content Focus • Algebra • Matrices • Vectors	
Curriculum Objectives:		Content Detail:	
At the end of this module, students will: • use linear programming procedures to solve problems and recognize situations where exactly one solution to a linear programming problem may exist • add and subtract vectors in three dimensional space • find the magnitude of vectors in three dimensional space • use the concept of vectors to model situations defined by magnitude and direction • analyze and solve vector problems generated by real-life situations		• matrix algebra • matrix transformations • vectors in three dimensional space • applications with vectors • dependence of vectors • linear programming • real world applications: data processing, payroll, nutrition, sports, ballooning, business, manufacturing, investment, aerospace medicine • interdisciplinary topics: geography, physics, geometry	
Module Evaluation:			
• Performance Assessments: - cooperative group activities and presentations - investigations/exploration: e.g. matrix transformations and symmetry - performance-based tests • Product Assessments: - portfolio (selected works and journal writings) - projects • Written Assessments: - formative assessments and assignments			
Prerequisite Skill Areas (if any):		Special Resources (materials, equipment & community involvement):	
• matrix addition and subtraction • matrix multiplication		• scientific calculator, graphing calculators (TI-83 or equivalent) • integrated software e.g. <i>f(g) Scholar™</i>	

GLOSSARY:

- **augmented matrix** an array of the coefficients and constants of a system of equations
- **consistent system** a system of equations that has at least one solution
- **components of a vector** two or more vectors whose sum is a given vector
- **dependent system** a system of equations that has infinitely many solutions
- **direction vector** a vector used to describe the slope of a line
- **identity matrix** an $n \times n$ matrix with one along the main diagonal and zeros elsewhere
- **inconsistent system** a system of equations that has no solutions
- **independent system** a system of equation that has a unique solution
- **inner dimensions** when two matrices are to be multiplied, the number of columns of the first matrix and the number of rows of the second matrix are called the inner dimensions. To perform the multiplication, the inner dimensions of the two matrices must be the same
- **inverse of a matrix** if A is an $n \times n$ matrix with an inverse, then A^{-1} is its inverse matrix and $A \times A^{-1} = In = A^{-1} \times A$.
- **linear programming** a method of finding a maximum or minimum value that satisfies all of the given conditions of a particular situation.
- **magnitude of a vector** the length of the directed line segment.
- **outer dimensions** when two matrices are multiplied, the number of rows of the first matrix and the number of columns of the second matrix are called the outer dimensions. The outer dimensions become the dimensions of the resulting product matrix.
- **parallel vectors** two vectors that have the same or opposite directions.
- **parameter** the independent variable t in the vector equations of a line.
- **parametric equation of a line** the vector equation $(x - x_p, y - y_p) = t(a_p, a_y)$ written as the two equations $x = x_p + ta_x$ and $y = y_p + ta_y$
- **resultant of vectors** the sum of two or more vectors
- **unit vector** a vector of length 1 that is parallel to the x -, y -, or z -axis

REFERENCES - TEACHER:

- Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
- Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

REFERENCES - STUDENT:

- Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
- Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

MATHEMATICS

Course Title: ADVANCED MATHEMATICS

Sequence Reference: MT4040ADV-C

Module Title: Trigonometry

Senior School Level

Number of Periods: 10 double periods

S1	S2	S3	S4
☐	☐	☐	☒

Subgoal Emphasis:

- 1.2, 1.3 Appreciation
- 2.2, 2.5 Structure
- 3.1, 3.2, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.5, 4.6 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.3 Application

Content Focus

- Trigonometry (real world applications: transportation, cycling, music, astronomy, business physiology, geometry, physics)

Curriculum Objectives:

At the end of this module, students will:

- find the values of the six trigonometric functions of an angle in standard position, given a point on its terminal side
- determine whether a triangle has zero, one or two solutions and solve triangles using law of sines
- solve triangles using law of cosines
- use the graphs of various trigonometric functions
- find the amplitude, period and phase shift for a trigonometric function
- evaluate inverse trigonometric functions
- identify and use reciprocal identities, quotient identities, symmetry identities and Pythagorean identities
- solve trigonometric equations

Content Detail:

- connections of trigonometric and circular functions
- identities and equations
- inverses
- modelling with trigonometric functions

Module Evaluation:

- **Performance Assessments:**
 - cooperative group activities and presentations
 - written assignments/worksheets
 - performance-based tests
- **Product Assessments:**
 - portfolio (collection of selected works and journal writings)
 - projects
 - investigations/exploration: e.g. students will explore the theory of biorhythms and apply it using the sine function
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- Advanced Mathematics - "Functions and Graphs" Module A

Special Resources

(materials, equipment & community involvement):

- scientific or graphing calculators (TI-83 or equivalent)
- integrated software e.g. *f(g) Scholar™*
- community professionals who specialize in the above application area to visit students

GLOSSARY:

- **identify** is a statement of equality between two expressions that is true for all values of the variable for which the expressions are defined.
- **law of cosines** given two sides, a and b , of a triangle and the measure of angle C included between them, the Law of Cosine states that $c^2 = a^2 + b^2 - 2ab\cos C$, where c is the length of the side opposite angle C .
- **law of sines** the law of sines relates the three angle measures of a triangle to the lengths of the corresponding sides. $\sin A/a = \sin B/b = \sin C/c$
- **Pythagorean identities** three identities derived from the "Pythagorean" Right-Triangle Theorem. They are $\sin^2\theta + \cos^2\theta = 1$, $1 + \tan^2\theta = \sec^2\theta$ and $1 + \cot^2\theta = \csc^2\theta$.
- **trigonometric equation** an equation involving a trigonometric function that is true for some, but not all, values of variable.
- **trigonometric function** for any angle with measure θ , a point $P(x, y)$ on its terminal side and $r = \sqrt{x^2 + y^2}$, the trigonometric functions of θ are as follows:
 $\sin \theta = y/r$ $\cos \theta = x/r$ $\tan \theta = y/x$
 $\csc \theta = r/y$ $\sec \theta = r/x$ $\cot \theta = x/y$
- **trigonometric identity** an equation involving a trigonometric function that is true for all values of the variable.

REFERENCES - TEACHER:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

REFERENCES - STUDENT:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

MATHEMATICS					
Course Title: ADVANCED MATHEMATICS		Sequence Reference: MT4040ADV-D			
Module Title: Data Handling		Senior School Level			
Number of Periods: 11 double periods		S1	S2	S3	S4
		☐	☐	☐	☒
Subgoal Emphasis:		Content Focus			
• 1.1, 1.2, 1.3 Appreciation • 2.2, 2.3, 2.5 Structure • 3.1, 3.2, 3.3, 3.4, 3.7 Acquisition • 4.1, 4.6, 4.7 Communication • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition • 6.1, 6.2, 6.3, 6.4 Application		• Statistics • Probability			
Curriculum Objectives:		Content Detail:			
At the end of this module, students will: • interpret information from various graphs to draw conclusions from the data • analyze numerical data, using measures of central tendency, variability and correlation, in order to make inferences • interpret information, using regression methods • develop and implement a plan for collecting and analyzing data in order to make decisions • describe everyday situations involving chance, using probability models: - theoretical and empirical		• statistical graphs - line, bar, circle, histograms, scatterplots • measures of central tendency • variability • correlation and regression • analysis and predictions • theoretical model (binomial and geometric) • empirical probability			
Module Evaluation:					
• Performance Assessments: - cooperative learning groups and presentations - investigations/exploration - performance-based tests • Product assessments: - projects: e.g. data-analysis project including written report, visual display, oral report or multi-media presentation • Written Assessments: - formative assessments and assignments					
Prerequisite Skill Areas		Special Resources			
(if any):		(materials, equipment & community involvement):			
• knowledge of statistical representations		• scientific or graphing calculators (TI-83 or equivalent) • integrated software e.g. <i>f(g) Scholar™</i> • community/business professionals who specialize in the application of statistics and probability (actuary, insurance representative, financial analyst)			

GLOSSARY:

- refer to student text

REFERENCES - TEACHER:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

REFERENCES - STUDENT:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

MATHEMATICS

Course Title: ADVANCED MATHEMATICS		Sequence Reference: MT4040ADV-E			
Module Title: Sequences and Series		Senior School Level			
Number of Periods: 12 double periods		S1	S2	S3	S4
		☐	☐	☐	☒
Subgoal Emphasis: 1.1, 1.2 Appreciation 2.4, 2.5 Structure 3.1, 3.2, 3.3, 3.4, 3.6, 3.7 Acquisition 4.2, 4.5, 4.6 Communication 5.1, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		Content Focus - Arithmetic series and sequences - Geometric series and sequences			
Curriculum Objectives:		Content Detail:			
At the end of this module, students will: - represent patterns, using arithmetic and geometric sequences and series - use arithmetic, geometric and other sequences and series to solve real-life problems - describe limits of sequences and apply their properties to investigate convergent and divergent series - apply sequences and series to solve problems including sums and binomial expansion		- arithmetic series - geometric series and sequences - binomial expansion - patterning - convergent - divergent			
Module Evaluation:					
Performance Assessments: - cooperative learning groups and presentations - written assignments/worksheets - performance-based tests Product Assessments: - projects - investigations (written reports) - problem solving tasks Written Assessments: - formative assessments and assignments					
Prerequisite Skill Areas		Special Resources			
(if any):		(materials, equipment & community involvement):			
- patterning - variables - algebraic representations		- scientific or graphing calculators (TI-83 or equivalent) - integrated software e.g. <i>f(g) Scholar™</i> - community/business professionals who specialize in the application of patterns			

GLOSSARY:

- refer to student text

REFERENCES - TEACHER:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

REFERENCES - STUDENT:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

MATHEMATICS

Course Title: ADVANCED MATHEMATICS		Sequence Reference: MT4040ADV-F			
Module Title: Limits and Derivatives		Senior School Level			
Number of Periods: 10 double periods		S1 ☐	S2 ☐	S3 ☐	S4 ☒
Subgoal Emphasis: • 1.1, 1.2, 1.3 Appreciation • 2.1, 2.2, 2.3, 2.4, 2.5 Structure • 3.1, 3.2, 3.3, 3.4, 3.6, 3.7 Acquisition • 4.1, 4.3, 4.4, 4.5, 4.7 Communication • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition • 6.1, 6.2, 6.3, 6.4 Application		Content Focus • Limits • Derivatives • Integrals			
Curriculum Objectives:		Content Detail:			
At the end of this module, students will: • determine the derivatives of a function • determine the area between a curve and the x-axis by using the limit of areas of rectangles • use derivatives to solve problems from business and science		• limits • derivatives • area • rates			
Module Evaluation:					
• Performance Assessments: - cooperative learning groups - presentations - performance-based tests • Product Assessments: - portfolio to include projects and investigations • Written Assessments: - formative assessments and assignments					
Prerequisite Skill Areas (if any):			Special Resources (materials, equipment & community involvement):		
• Advanced Mathematics – module A			• scientific or graphing calculators (TI-83 or equivalent) • integrated software e.g. <i>f(g) Scholar</i>™ • community/business professionals who specialize in the application of calculus		

GLOSSARY:

- refer to student text

REFERENCES - TEACHER:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

REFERENCES - STUDENT:

Gordon-Holliday, B. W. et al. Advanced Mathematical Concepts. Ohio: Glencoe/McGraw Hill, 1999.
Urso, Rosario. Calculus with Applications. Ohio: Glencoe/McGraw Hill, 1995.

Applied Mathematics I

Course Code: MT2031APP



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title: Applied Mathematics I

4 credit (s)

120 hour (s)

Prerequisite (s): Foundations of Mathematics

S2 level (s)

Course Code: MT2031APP

☐ required or ☒ elective

Course Description

Applied Mathematics I is a two semester course. Students will work with polynomials and solve problems involving systems of equations and quadratic equations. They will be involved with a more in-depth study of triangles, circles, and solid figures and will practice some basic geometric constructions. Throughout the course, real world applications will be used to present these concepts in contextual settings.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work, collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

Additional requirements for this course are as follows:

Performance Assessments: - lab reports; - problem solving tasks - debates; presentations - investigations	30%
Product Assessments: - comprehensive assessments including: - written tests using a variety of items (selected response, free-response and open-ended) - projects - portfolio (selected works and journal writings)	30%
Written Assessments: - formative assessments and assignments	10%
Final Examination	30%
Total	100%

Course Resources

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics Draft. Reston, Va: NCTM, 1998.

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Number Sense..... 10		B. Geometry/Measurement..... 15	
- calculations		- standard and metric units	
- problem solving		- parallel and perpendicular lines	
- scientific notation		- lines and angles	
- estimation		- common figures	
- roots and powers		- perimeter and area	
- finance, small business		- volume	
		- scale drawings	
		- Pythagorean Theorem	
		- geometry in the workplace	
		- applications of congruency and similarity	
		- simple transformations	
C. Trigonometry..... 7		D. Data Handling..... 12	
- squares and square roots		- collecting and organizing data	
- right-angled triangles		- interpreting data	
- tangent, sine and cosine ratios		- modelling	
- problem solving		- presentation and analysis of data	
		- measures of central tendencies	
		- probability of simple events	
E. Algebra 18		F. Functions and Graphs..... 13	
- signed numbers		- interpret graphs	
- vectors		- coordinate systems	
- equations		- linear and quadratic functions	
linear		- slope and intercept	
simultaneous		- graphing inequalities	
quadratic			
- matrices			
- trinomials			
- creation and evaluation of formulas			
- inequalities			

Subtotal	75
Optional double periods	<u>15</u>
Total double periods	90

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☒ S3 ☐ S4 ☐

Applied Mathematics I

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
1	Appreciation	1.1	Interrelationships	x	x	x	x	x	x
		1.2	Successful Experiences	x	x	x	x	x	
		1.3	Significance	x	x	x	x		x
2	Structure	2.1	Comparison	x	x		x		
		2.2	Appreciation	x	x		x		
		2.3	Evaluation	x	x	x		x	x
		2.4	Generalization	x		x	x		
		2.5	Interpretation	x	x		x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x	x	
		3.2	Estimation	x	x		x		
		3.3	Multiple Representations	x	x	x	x	x	x
		3.4	Data Handling	x	x	x	x	x	x
		3.5	Geometric and Measurement Properties	x	x	x			
		3.6	Algebraic Procedures	x	x			x	
		3.7	Technology	x	x		x	x	x
4	Communication	4.1	Ideas and Concepts	x	x		x	x	x
		4.2	Formulae and Terminology	x	x	x	x	x	x
		4.3	Oral/Written		x	x	x	x	
		4.4	Generalization	x			x	x	x
		4.5	Symbolic notation				x	x	
		4.6	Manipulatives and Technology	x	x	x	x	x	x
		4.7	Evaluation	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense
B - Geometry and Measurements
C - Trigonometry

D - Data Handling
E - Algebra
F - Functions and Graphs

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☒ S3 ☐ S4 ☐

Applied Mathematics I

5	Cognition	5.1	Confidence in Problem Solving	x	x	x		x	x
		5.2	Evaluation			x		x	
		5.3	Technology	x	x	x	x	x	x
		5.4	Application	x	x	x		x	
		5.5	Evaluation of Reasonableness	x	x		x	x	x
		5.6	Modelling	x	x	x	x	x	x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x	x
		6.2	Decision Making	x	x		x		
		6.3	Real World Issues	x	x	x	x	x	x
		6.4	Lifelong Skills	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry / Measurements

C - Trigonometry

D - Data Handling

E - Algebra

F - Functions and Graphs

(page 2 of 2)

MATHEMATICS

Course Title: APPLIED MATHEMATICS I

Sequence Reference: MT2031APP-A

Module Title: Number Sense

Senior School Level

Number of Periods: 10 double periods

S1	S2	S3	S4
☐	☒	☐	☐

Subgoal Emphasis:

- | | |
|-------------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.2, 2.3, 2.4, 2.5 | Structure |
| • 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.4, 4.6, 4.7 | Communication |
| • 5.1, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Numbers and Number Systems
- Real Life Application

Curriculum Objectives:

At the end of this module, students will:

- use estimation and mental calculation to make decisions about every day situations
- demonstrate a proficiency with calculations
- use numbers in their appropriate format
- understand relationships among events, time, distances and velocities
- distinguish between direct and indirect relationships
- solve practical, work related problems
- investigate the components of setting up a small business

Content Detail:

- multiples and factors
- estimation and computation
- ratios and proportion
- decimals, fractions and percentages
- scientific notation

Module Evaluation:

- **Performance Assessments:**
 - investigative tasks
 - lab reports
 - presentations
 - interviews
- **Product Assessments:**
 - final project
 - problem solving tasks
 - portfolio (selected works and journal writings)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- demonstrate a proficiency with arithmetic operations
- apply a variety of methods to solve problems
- use numbers to describe quantities
- represent numbers in various formats
- use a calculator efficiently

Special Resources

(materials, equipment & community involvement):

- accountants
- insurance sales person
- investment officer
- Financial Times
- Business Week
- local publications

GLOSSARY:

- **ratio** A relationship between two numbers by division. A relationship between 3 and 4 can be written as 3 to 4, 3:4 and $\frac{3}{4}$
- **scientific notation** Using power of 10 to express very large or very small numbers. The number becomes a product of a number between 1 and 10 and is multiplied by a power of 10. Example 3,259 becomes 3.259×10^3 in scientific notation.
- **proportion** An equation that shows two equal ratios.

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

* Recommended text

MATHEMATICS

Course Title: APPLIED MATHEMATICS I

Sequence Reference: MT2031APP-B

Module Title: Geometry and Measurements

Senior School Level

Number of Periods: 15 double periods

S1	S2	S3	S4
☐	☒	☐	☐

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.5 Structure
- 3.1, 3.2, 3.4, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.6, 4.7 Communication
- 5.1, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Geometry
- Measurements
- Real Life Application

Curriculum Objectives:

At the end of this module, students will:

- recognize the relationship between angles formed by lines crossing parallel lines
- solve problems involving area, perimeter and volume
- model real life structures with scale drawings
- use Pythagoras Theorem to find height of an object or distance between two objects
- draw auxiliary diagrams to help solve for an unknown dimension or angle
- determine point, line and plane symmetry
- solve workplace problems in solid geometry
- construct congruent geometric figures using reflections, translations and rotations
- construct similar geometric figures using dilations

Content Detail:

- standard and metric units
- parallel and perpendicular lines
- lines and angles
- common figures
- perimeter and area
- volume
- scale drawings
- Pythagorean Theorem
- transformations

Module Evaluation:

- Performance Assessments:**
 - performance-based assessments
 - group investigations
- Product Assessments:**
 - projects (models and scale drawings)
 - portfolio (a collection of selected works and journal writings)
- Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- computation skills
- proficient use of a calculator
- metric conversion

Special Resources

(materials, equipment & community involvement):

- construction worker, carpet layer, carpenter, tiler
- graph paper
- measuring equipment (measuring cups, tape measures)
- geometry set
- solid shapes
- Geo-D stick

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

* Recommended text

MATHEMATICS

Course Title: APPLIED MATHEMATICS I

Sequence Reference: MT2031APP-C

Module Title: Trigonometry

Senior School Level

S1	S2	S3	S4
☐	☒	☐	☐

Number of Periods: 7 double periods

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.3, 2.4 Structure
- 3.1, 3.3, 3.4, 3.5 Acquisition
- 4.2, 4.3, 4.6, 4.7 Communication
- 5.1, 5.2, 5.3, 5.4, 5.6 Cognition
- 6.1, 6.3, 6.4 Application

Content Focus

- Pythagorean Theorem
- Practical application of trigonometric ratios

Curriculum Objectives:

At the end of this module, students will:

- use the characteristics of 'special' right triangles to solve problems
- use the ratios for sine, cosine and tangent of an angle to solve problems
- understand the graphs of sine and cosine waves

Content Detail:

- squares and square roots
- right-angled triangles
- cosine, sine and tangent ratios
- problem solving

Module Evaluation:

- **Performance Assessments:**
 - students will develop and present a well organized speech on either Pythagorean Theorems or the origin of trigonometry
 - investigative tasks (determine the actual measurements, distances, heights or angles around the school using trigonometric ratios)
- **Product Assessments:**
 - project
 - portfolio (selected works and journal writings)
- **Written assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- computation skills
- proficient use of a calculator
- metric conversion

Special Resources

(materials, equipment & community involvement):

- construction worker, carpet layer, carpenter, tiler
- graph paper
- measuring equipment (measuring cups, tape measures)
- clinometer
- Geo-D sticks

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

* Recommended text

MATHEMATICS

Course Title: APPLIED MATHEMATICS I

Sequence Reference: MT2031APP-D

Module Title: Data Handling

Senior School Level

S1	S2	S3	S4
☐	☒	☐	☐

Number of Periods: 12 double periods

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.3, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Collecting and Interpreting Data
- Presentation of Data
- Real Life Applications

Curriculum Objectives:

At the end of this module, students will:

- collect, organize and present real-world data
- rationalize interpretation of data
- design and execute simple probability experiments
- draw diagrams and charts to help find probability
- create histograms to represent frequency distributions of data
- distinguish between measures of central tendency

Content Detail:

- design a survey
- use statistical representations to model real world issues
- measures of central tendencies
- probability of simple events

Module Evaluation:

- **Performance Assessments:**
 - performance-based assessments
 - group investigation
- **Product Assessments:**
 - project (design a survey; analyze and interpret the data; write conclusions and recommendations)
 - portfolio (selected works and journal writings)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- Module 1A- "Number Sense"
- creating and interpreting charts and graphs

Special Resources

(materials, equipment & community involvement):

- statistician
- appropriate computer software
- Census 2000 report
- information tables and charts from various government departments
- Internet (see appendix)

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics, Course 2, Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach, Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2, Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2, Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach, Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2, Illinois: McDougal Littell, 1998.

* Recommended text

MATHEMATICS

Course Title: APPLIED MATHEMATICS I

Sequence Reference: MT2031APP-E

Module Title: Algebra

Senior School Level

S1	S2	S3	S4
☐	☒	☐	☐

Number of Periods: 18 double periods

Subgoal Emphasis:

- | | |
|-------------------------------------|---------------|
| • 1.1, 1.2 | Appreciation |
| • 2.3, 2.5 | Structure |
| • 3.1, 3.3, 3.4, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.3, 6.4 | Application |

Content Focus

- Algebra as a means of representation and as a tool

Curriculum Objectives:

At the end of this module, students will:

- perform the four basic operations with signed numbers
- generate and solve linear inequalities and equations
- generate and solve simultaneous equations
- represent algebraic expressions through factorizing and expanding
- recognize non-linear equations and become familiar with their graphs
- solve problems algebraically
- use matrices to represent information
- solve quadratic equations

Content Detail:

- signed numbers
- vectors
- simultaneous equations
- linear equations
- matrices
- trinomials
- creation and evaluation of formulas
- inequalities
- quadratic equations

Module Evaluation:

- Performance Assessments:**
 - investigative activities - the relationship between an equation, the answer and its graph
 - performance-based tasks (solve and verify linear equations and inequalities in one variable; explain the process used; demonstrate the process used to check the working)
- Product Assessments:**
 - portfolio (selected works and journal writings)
- Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- basic algebraic concepts and skills

Special Resources

(materials, equipment & community involvement):

- algebra tiles
- scales
- computer software
- two colour tiles
- visit with an actuary
- graph paper
- graphic calculator
- Internet (see appendix)

GLOSSARY:

- **inequality** This is a mathematical statement formed by placing an inequality symbol between numerical or variable expressions.
- **linear equation** This is an equation whose graph is a line.
- **matrix** This is a group of numbers arranged in rows and columns and enclosed by parentheses.

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12. A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: APPLIED MATHEMATICS I

Sequence Reference: MT2031APP-F

Module Title: Functions and Graphs

Senior School Level

Number of Periods: 13 double periods

S1	S2	S3	S4
☐	☒	☐	☐

Subgoal Emphasis:

- 1.1, 1.3 Appreciation
- 2.3, 2.5 Structure
- 3.3, 3.4, 3.7 Acquisition
- 4.1, 4.2, 4.4, 4.6, 4.7 Communication
- 5.1, 5.3, 5.5, 5.6 Cognition
- 6.1, 6.3, 6.4 Application

Content Focus

- Plotting Coordinates
- Exploring Functions

Curriculum Objectives:

At the end of this module, students will:

- represent mathematical relationships as tables of data, ordered pairs, graphs, equations and word sentences
- graph linear inequalities

Content Detail:

- interpret graphs
- coordinate systems
- linear and quadratic functions
- slope and intercept
- graphing inequalities

Module Evaluation:

- **Performance Assessments:**
 - performance-based assessments
 - investigative tasks
 - oral presentation of project
- **Product Assessments:**
 - portfolio (selected works and journal writings)
 - project
 - problem solving tasks
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- successful completion of module 1E – Algebra
- locating points on the coordinate plane
- proficient use of a calculator

Special Resources

(materials, equipment & community involvement):

- graphic calculators
- appropriate computer software

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

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- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

*Recommended text

Applied Mathematics II

Course Code: MT3042APP



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title: Applied Mathematics II

4 credit (s)

120 hour (s)

Prerequisite (s): Applied Mathematics I or Integrated Mathematics I

S3-S4 level (s)

Course Code: MT3042APP

☐ required or ☒ elective

Course Description

Applied Mathematics II is a 4-credit course. Students will perfect their skills of solving equations and inequalities and will create equations to fit problem situations. Problem-solving strategies will be used in real-world scenarios to enable students to master concepts within the appropriate context. This course is a continuation of Applied Mathematics I.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work, collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

Additional requirements for this course are as follows:

Performance Assessments: - lab reports; problem solving tasks - debates; presentations - investigations	20%
Product Assessments: - comprehensive module assessments including projects - portfolios	40%
Written Assessments: - formative assessments and assignments	10%
Final Examination	30%
Total	100%

Course Resources

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12. A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Number Sense	10	B. Geometry/Measurement	18
- the set of real numbers and its subsets		- congruent triangles	
- properties of real numbers		- altitude, medians and perpendicular bisectors	
- operations with rational numbers		- similar triangles	
- ordering real numbers		- proportional segments	
- exponents		- special right triangles	
- scientific notation		- arcs, central and inscribed angles	
		- chords, secants and tangents	
		- vectors	
		- angle and line bisectors	
		- surface area of prisms, cylinders, pyramids and cones	
		- volume of prisms, cylinders, pyramids and cones	
C. Trigonometry	8	D. Data Handling	10
- unit circle (quadrants I and II)		- collecting data	
- laws of sines and cosines		- central tendency	
- right triangle trigonometry application (2D and 3D)		- variances and standard deviation	
		- displaying and analyzing data	
		- reviewing percents and probability	
		- compound events	
		- independent and dependent events	
		- fundamental counting principle	
		- factorial notation	
E. Algebra	17	F. Functions and Graphs	12
- solving one-step equations		- relations defined on coordinate plane	
- solving multi-step equations (linear and quadratics)		- mapping	
- using a graphing calculator to solve a single-variable linear equation		- functions	
- solving linear inequalities		- domain and range	
- polynomials (collecting like terms and factorizing)		- systems of equations by graphing	
		- systems of inequalities	
		- solving parabolas by graphing	

Subtotal	75
Optional double periods.....	<u>15</u>
Total double periods	90

SENIOR SCHOOL MATHEMATICS

check: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Applied Mathematics II

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
1	Appreciation	1.1	Interrelationships	x	x	x	x	x	x
		1.2	Successful Experiences	x	x	x	x	x	x
		1.3	Significance	x	x	x	x	x	x
2	Structure	2.1	Comparison	x	x		x	x	x
		2.2	Appreciation	x	x			x	x
		2.3	Evaluation	x	x	x		x	x
		2.4	Generalization	x		x	x		x
		2.5	Interpretation	x	x		x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x	x	x
		3.2	Estimation	x	x		x		
		3.3	Multiple Representations	x	x	x	x	x	x
		3.4	Data Handling	x	x	x	x	x	x
		3.5	Geometric and Measurement Properties	x	x	x			
		3.6	Algebraic Procedures	x	x			x	x
		3.7	Technology	x	x	x	x	x	x
4	Communication	4.1	Ideas and Concepts	x	x	x	x	x	x
		4.2	Formulae and Terminology	x	x	x	x	x	x
		4.3	Oral/Written	x	x	x	x	x	
		4.4	Generalization	x			x	x	x
		4.5	Symbolic notation	x		x	x	x	x
		4.6	Manipulatives and Technology	x	x	x	x	x	x
		4.7	Evaluation	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense
B - Geometry and Measurements
C - Trigonometry

D - Data Handling
E - Algebra
F - Functions and Graphs

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Applied Mathematics II

5	Cognition	5.1	Confidence in Problem Solving	x	x	x		x	x
		5.2	Evaluation			x		x	x
		5.3	Technology	x		x	x	x	x
		5.4	Application	x	x	x	x	x	x
		5.5	Evaluation of Reasonableness	x	x		x	x	x
		5.6	Modelling	x	x	x	x	x	x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x	x
		6.2	Decision Making	x	x		x	x	x
		6.3	Real World Issues	x	x	x	x	x	x
		6.4	Lifelong Skills	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry / Measurements

C - Trigonometry

D - Data Handling

E - Algebra

F - Functions and Graphs

(page 2 of 2)

MATHEMATICS

Course Title: APPLIED MATHEMATICS II

Sequence Reference: MT3042APP-A

Module Title: Number Sense

Senior School Level

Number of Periods: 10 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Real Life Application

Curriculum Objectives:

At the end of this module, students will:

- demonstrate a proficiency with calculations
- use numbers in their appropriate format
- evaluate the real number system including the hierarchy of real numbers and ordering
- explore historical aspects of number systems
- create and solve complex problems
- investigate the mathematics related components of managing a small business

Content Detail:

- the set of real numbers and its subsets
- properties of real numbers
- review operations with rational numbers
- scientific notation
- ordering real numbers
- exponents
- ratio and percent

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - oral presentations
 - investigative tasks
- **Product Assessments:**
 - problem-solving tasks
 - portfolio to include project selected works and journal writings
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- demonstrate a proficiency with arithmetic operations
- apply a variety of methods to solve problems
- use numbers to describe quantities
- represent numbers in various formats
- use a calculator efficiently

Special Resources

(materials, equipment & community involvement):

- accountants
- an insurance sales person
- investments analyst
- Financial Times
- Business Week
- local publications
- Microsoft Excel

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12. A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.

MATHEMATICS

Course Title: APPLIED MATHEMATICS II	Sequence Reference: MT3042APP-B								
Module Title: Geometry and Measurements	Senior School Level								
Number of Periods: 18 double periods	<table><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr><tr><td>☐</td><td>☐</td><td>☒</td><td>☒</td></tr></table>	S1	S2	S3	S4	☐	☐	☒	☒
S1	S2	S3	S4						
☐	☐	☒	☒						
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.5 Structure 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.6, 4.7 Communication 5.1, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application	Content Focus - Geometry - Measurements - Real Life Application								
Curriculum Objectives:	Content Detail:								
At the end of this module, students will: - recognize the relationship between angles formed by lines crossing parallel lines - solve problems involving surface area and volume - compare similar and congruent triangles - explore the angles and properties of a circle - add vectors in a coordinate plane - explore applications of resulting vectors - determine the locus of points meeting given conditions - use appropriate software to explore geometrical properties - apply geometric principles to problems found in the workplace (e.g. building, packaging, storage, etc...)	- congruent triangles - altitude, medians and perpendicular bisectors - similar triangles - proportional segments - special right triangles - arcs, central and inscribed angles - chords, secants and tangents - angle and line bisectors - surface area and volume of prisms, cylinders, pyramids and cones - vectors								
Module Evaluation:									
Performance Assessments: - performance-based tests - oral presentations - investigative tasks (models and scale drawings) - debate (compare triangles or volume of various solids) Product Assessments: - problem-solving tasks - portfolio to include selected works and journal writings - project (geometry in the workplace) Written Assessments: - formative assessments and assignments									
Prerequisite Skill Areas	Special Resources								
(if any):	(materials, equipment & community involvement):								
- computation skills - proficient use of a calculator - metric conversion	- construction worker, carpet layer, carpenter, tiler - graph paper - measuring equipment (measuring cups, tape measures) - draftsman - Geometer sketchpad - CAD software								

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

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- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.

MATHEMATICS

Course Title: APPLIED MATHEMATICS II

Sequence Reference: MT3042APP-C

Module Title: Trigonometry

Senior School Level

S1	S2	S3	S4
☐	☐	☒	☒

Number of Periods: 8 double periods

Subgoal Emphasis:

- | | |
|--------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.3, 2.4 | Structure |
| • 3.1, 3.3, 3.4, 3.5, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.5, 4.6, 4.7 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.6 | Cognition |
| • 6.1, 6.3, 6.4 | Application |

Content Focus

- Practical applications of trigonometric ratios

Curriculum Objectives:

At the end of this module, students will:

- apply the law of sines and cosines when finding an unknown angle or side in a triangle
- formulate and solve problems involving 2 and 3 dimensional figures
- apply trigonometric ratios to solve problems taken from daily experiences
- use technology to investigate trigonometric ratios and identities

Content Detail:

- unit circle
- right-angled trigonometry application (2D & 3D)
- law of sines and cosines
- problem solving

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests (models and scale drawings)
 - oral presentations
 - investigative tasks (height of a building)
- **Product Assessments:**
 - problem-solving tasks
 - portfolio to include selected works and journal writings
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- completion of Modules A and B
- basic properties and symbols associated with triangles
- measurement skills
- proficient use of a scientific calculator

Special Resources

(materials, equipment & community involvement):

- scientific calculator
- graphing paper
- Internet
- surveyor

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12. A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.

MATHEMATICS

Course Title: APPLIED MATHEMATICS II

Sequence Reference: MT3042APP-D

Module Title: Data Handling

Senior School Level

Number of Periods: 10 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- | | |
|-------------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.4, 2.5 | Structure |
| • 3.1, 3.2, 3.3, 3.4, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 | Communication |
| • 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Collecting and Interpreting Data
- Presentation of Data
- Real Life Applications

Curriculum Objectives:

At the end of this module, students will:

- justify the interpretation of data through the application of measures of central tendencies, variances and standard deviation
- describe the effect of sample size and population size on the validity of predictions from a set of data
- explore statistical software
- explore designs of surveys, polls and experiments to assess the validity of their results and to identify potential sources of bias
- design and execute probability experiments
- design a fair game and provide a justification for fairness
- use probability to solve problems involving uncertainty

Content Detail:

- collecting, displaying and analyzing data
- measures of central tendencies
- variances and standard deviation
- percentages and probability
- compound events
- independent and dependent events
- fundamental counting principle
- factorial notation

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - oral presentations
 - investigative tasks (making predictions from a set of data)
- **Product Assessments:**
 - problem-solving tasks (design a fair game)
 - portfolio to include selected works and journal writings
 - project (design a survey, then interpret and analyze data to answer a meaningful question)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- completion of module 1A - Number Sense
- creating and interpreting graphs

Special Resources

(materials, equipment & community involvement):

- statistician
- relevant computer software
- local statistical data
- meteorologist
- Internet (see Appendix)

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.

MATHEMATICS

Course Title: APPLIED MATHEMATICS II

Sequence Reference: MT3042APP-E

Module Title: Algebra

Senior School Level

Number of Periods: 17 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- | | |
|-------------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.2, 2.3, 2.5 | Structure |
| • 3.1, 3.3, 3.4, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Algebra as a means of representation and as a tool

Curriculum Objectives:

At the end of this module, students will:

- generate and solve linear inequalities and quadratic equations
- represent algebraic expressions through factorizing, collecting like terms and expanding
- identify problem situations that lead to linear or quadratic equations and solve by applying appropriate graphical or symbolic methods
- use algebraic or graphical methods to solve systems of linear equations and describe relationships between different solution methods

Content Detail:

- one-step equations
- multi-step equations (linear and quadratic)
- using graphing calculator to solve a single variable linear equation
- linear inequalities
- polynomials

Module Evaluation:

- Performance Assessments:**
 - performance-based tests
 - oral presentations
 - investigative tasks
- Product Assessments:**
 - problem-solving tasks
 - portfolio to include selected works and journal writings
- Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- basic terminology associated with algebra
- symbols and notation
- integers

Special Resources

(materials, equipment & community involvement):

- algebra tiles
- scales
- appropriate computer software
- graphing calculator
- two-colour tiles
- actuary
- Bermuda College lecturers
- Internet (see appendix)

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12. A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.

MATHEMATICS

Course Title: APPLIED MATHEMATICS II

Sequence Reference: MT3042APP-F

Module Title: Functions and Graphs

Senior School Level

S1	S2	S3	S4
☐	☐	☒	☒

Number of Periods: 12 double periods

Subgoal Emphasis:

- | | |
|--------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.2, 2.3, 2.4, 2.5 | Structure |
| • 3.1, 3.3, 3.4, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.4, 4.5, 4.6, 4.7 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Plotting coordinates
- Exploring functions

Curriculum Objectives:

At the end of this module, students will:

- distinguish between functions and non-functions
- interpret graph of various functions
- generate the graph of linear and quadratic functions using technology
- express variations in the form of equations
- graph functions and analyze them to determine domain, range, intercepts and maximum and minimum values

Content Detail:

- relations defined on coordinate plane
- mapping
- function
- domain and ranges
- systems of equations by graphing
- systems of equalities
- solving parabolas by graphing

Module Evaluation:

- Performance Assessments:**
 - performance-based tests
 - oral presentations
 - investigative tasks (generate and analyze a graph to answer meaningful questions)
- Product Assessments:**
 - problem-solving tasks
 - portfolio to include project, selected works and reflection on use of graphs
- Written assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- completion of Module E-Algebra
- locating points on the coordinate plane
- proficient use of a calculator

Special Resources

(materials, equipment & community involvement):

- graphing calculators
- appropriate computers software
- meteorologist
- Internet (see appendix)

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12. A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

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- Bumby, Douglas, et al. Integrated Mathematics, Course 2 and 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2 and 3. Illinois: McDougal Littell, 1998.

Applied Mathematics IIA

Course Code: MT4053APA



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title (s): Applied Mathematics IIIA

2 credit (s)
60 hour (s)

Prerequisite (s): Applied Mathematics II or
Integrated Mathematics II

S3 or S4 level (s)

Course Code: MT4053APA

☐ required or ☒ elective

Course Description

This course offers algebra and geometry concepts in context. Teachers will use authentic situations to encourage students to connect mathematics to the workplace and everyday life. Students will be given the opportunity to read, interpret and apply mathematical principles, reasoning and appropriate supporting explanations. Technology will be used to supplement pen and paper investigations.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

The requirements for this course are as follows:

Performance Assessments: - oral presentations using technology - teacher observations - investigations - debates - mathematics labs - cooperative group activities	20%
Product Assessments: - comprehensive module assessments including written tests using a variety of items - short answer, multiple choice, free-response and open-ended - problem solving tasks - projects - portfolio (collection of tasks from each module)	40%
Written Assessments: - formative assessments and assignments	10%
Final Project To be determined in consultation with both senior schools	30%
Total	100%

Course Resources

*Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.

Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster

Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.

*Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.

Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.

Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.

*Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

Rubenstein. R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.

The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.

The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.

The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended texts

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Number Sense.....	6	B. Geometry/Measurement.....	7
- logic		- geometric relationships	
valid arguments		- angle and line properties	
biconditional and definitions		- similarity	
negation		- congruence	
inference		- transformations	
- sequences and series		- area and volume	
arithmetic			
geometric			
C. Trigonometry.....	5	D. Data Handling.....	6
- tangent, sine and cosine ratios		- data	
- circular measure		collection	
- graphs of sine and cosine waves		representation	
- problem solving		interpretation	
		- central tendency	
		- range	
		- scatterplots	
		- sampling	
		- experimental probability	
E. Algebra.....	9	F. Functions and Graphs.....	5
- algebraic expressions		- linear and quadratic functions	
- equation solving procedures:		- gradient and y-intercept	
- linear equations		- domain and range patterns	
- simultaneous equations			
- quadratic equations			
- inequalities			
- word problems			

Subtotal	38
Optional double periods	<u>7</u>
Total double periods.....	45

SENIOR SCHOOL MATHEMATICS

check: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Applied Mathematics IIIA

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
1	Appreciation	1.1	Interrelationships	x	x	x	x	x	x
		1.2	Successful Experiences	x	x	x	x	x	x
		1.3	Significance	x	x	x	x	x	x
2	Structure	2.1	Comparison	x	x	x	x	x	x
		2.2	Appreciation	x	x	x	x	x	x
		2.3	Evaluation	x	x	x	x	x	x
		2.4	Generalization	x	x	x	x	x	x
		2.5	Interpretation	x	x	x	x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x	x	x
		3.2	Estimation	x	x	x	x		
		3.3	Multiple Representations	x	x	x	x	x	x
		3.4	Data Handling				x	x	x
		3.5	Geometric and Measurement Properties	x	x	x	x		
		3.6	Algebraic Procedures			x	x	x	x
		3.7	Technology	x	x	x	x	x	x
4	Communication	4.1	Ideas and Concepts	x	x	x	x	x	x
		4.2	Formulae and Terminology		x	x	x	x	x
		4.3	Oral/Written	x	x	x	x	x	x
		4.4	Generalization	x	x	x	x	x	x
		4.5	Symbolic notation		x	x		x	x
		4.6	Manipulatives and Technology	x	x	x	x	x	x
		4.7	Evaluation	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense
B - Geometry and Measurements
C - Trigonometry

D - Data Handling
E - Algebra
F - Functions and Graphs

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Applied Mathematics IIIA

5	Cognition	5.1	Confidence in Problem Solving	x	x	x	x	x	x
		5.2	Evaluation				x	x	x
		5.3	Technology	x	x	x	x	x	x
		5.4	Application	x	x	x	x	x	x
		5.5	Evaluation of Reasonableness	x	x	x	x	x	x
		5.6	Modelling		x	x	x		x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x	x
		6.2	Decision Making	x	x	x	x	x	x
		6.3	Real World Issues	x	x	x	x	x	x
		6.4	Lifelong Skills	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry and Measurement

C - Trigonometry

D - Data Handling

E - Algebra

F - Functions and Graphs

(page 2 of 2)

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIA

Sequence Reference: MT4053APA-A

Module Title: Number Sense

Senior School Level

Number of Periods: 6 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- | | |
|---------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.2, 2.3, 2.4, 2.5 | Structure |
| • 3.1, 3.2, 3.3, 3.7 | Acquisition |
| • 4.1, 4.3, 4.4, 4.6, 4.7 | Communication |
| • 5.1, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Logic
- Sequences and Series

Curriculum Objectives:

At the end of this module, students will:

- explore arithmetic and geometric sequences including finding the n^{th} term
- find the position of a given term in arithmetic and geometric sequences
- find arithmetic and geometric means
- find the sum of arithmetic and geometric series
- explore valid arguments, the bi-conditional, negation and inference

Content Detail:

- valid arguments
- the biconditional
- negation
- inference
- arithmetic sequences and series
- geometric sequences and series

Module Evaluation:

- **Performance Assessments:**
 - investigative tasks
 - oral presentations
- **Product Assessments:**
 - problem-solving tasks
 - portfolio (collection of selected works and journal writings)
 - project (applications of sequences, series or arguments to authentic situations)
- **Written assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- N/A

Special Resources

(materials, equipment & community involvement):

- scientific or graphing calculator (TI-83 or equivalent)
- appropriate software
- community/business professionals
- Internet (see appendix)

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics Draft. Reston, VA: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIA

Sequence Reference: MT4053APA-B

Module Title: Geometry/Measurement

Senior School Level

S1	S2	S3	S4
☐	☐	☒	☒

Number of Periods: 5 double periods

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.5, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Congruency of triangles
- Similarity of triangles
- Polygon and circle theorems

Curriculum Objectives:

At the end of this module, students will:

- develop an awareness of the structure of a mathematical system, connecting definitions, postulates, logical reasoning and theorems
- make generalizations about geometric properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles
- make connections between mathematics and real world applications, using properties of transformations and their compositions
- solve problems involving right triangles including triangles whose sides are Pythagorean triples and triangles with angles 45° - 45° - 90° and 30° - 60° - 90°
- analyze geometric figures using appropriate software
- find and compare surface areas and volumes of prisms, pyramids, spheres, cones and cylinders in problem situations

Content Detail:

- geometric relationships
- angle and line properties
- similarity
- congruence
- transformations
- area and volume

Module Evaluation:

- **Performance Assessments:**
 - oral presentation
 - performance-based tests
- **Product Assessments:**
 - problem-solving tasks
 - project (geometry and architecture; geometry and engineering; etc...)
 - portfolio (selected works and journal writings)
- **Written assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- familiarity with circle properties

Special Resources

(materials, equipment & community involvement):

- scientific or graphing calculator (TI-83 or equivalent)
- appropriate software (Geometer sketchpad, CAD)
- community/business professionals
- architect, construction foreman, engineer

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
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- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIA

Sequence Reference: MT4053APA-C

Module Title: Trigonometry

Senior School Level

S1	S2	S3	S4
☐	☐	☒	☒

Number of Periods: 5 double periods

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.2, 5.3, 5.4, 5.6 Cognition
- 6.1, 6.3, 6.4 Application

Content Focus

- Practical applications of trigonometric ratios

Curriculum Objectives:

At the end of this module, students will:

- apply trigonometric ratios in right triangles to solve problems
- apply angle measure including circular measure to practical situations
- understand and use the graphs of sine and cosine waves

Content Detail:

- sine, cosine and tangent ratios
- circular measure
- sine and cosine waves
- problem solving

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - oral presentation
- **Product assessments:**
 - problem-solving tasks
 - portfolio (selected works and journal writings)
 - project (investigate navigation on the earth's surface)
- **Written Assessments:**
 - topic assessments and assignments

Prerequisite Skill Areas

(if any):

- basic properties and symbols associated with triangles
- use a scientific calculator efficiently

Special Resources

(materials, equipment & community involvement):

- scientific calculator
- graphing paper
- tape measure
- magnetic compass
- Internet (see appendix)
- graphing calculator

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIA

Sequence Reference: MT4053APA-D

Module Title: Data Handling

Senior School Level

Number of Periods: 6 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- | | |
|--------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.2, 2.3, 2.4, 2.5 | Structure |
| • 3.1, 3.2, 3.3, 3.4, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.4, 4.6, 4.7 | Communication |
| • 5.3, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Collecting and interpreting data
- Presentation of data

Curriculum Objectives:

At the end of this module, students will:

- design surveys and apply random sampling techniques
- describe a set of frequency distribution data by spread and measures of central tendency
- interpret information from various graphs including scatter plots to make predictions and/or decisions
- determine experimental probabilities using simulations (e.g. random number tables and random functions)

Content Detail:

- data
 - collection
 - representation
 - interpretation
- central tendency
- range
- scatterplots
- sampling
- experimental probability

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - oral presentations of tasks and projects
- **Product Assessments:**
 - problem-solving tasks (statistical analysis of a set of data)
 - portfolio (selected works and journal writings)
 - project (interpret a statistical report or design, undertake and evaluate a statistical investigation)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- use a protractor and ruler
- use a calculator

Special Resources

(materials, equipment & community involvement):

- geometry set
- graph paper
- calculator
- statistical charts
- Census 2000 report
- appropriate software

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998,
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIA

Sequence Reference: MT4053APA-E

Module Title: Algebra

Senior School Level

Number of Periods: 5 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.3, 3.4, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.3, 6.4 Application

Content Focus

- Linear and simultaneous equations
- Set theory

Curriculum Objectives:

Content Detail:

At the end of this module, students will:

- solve linear, simultaneous and quadratic equations
- investigate inequalities
- use algebraic and graphical methods to solve systems of linear equations
- solve word problems using algebraic procedures
- transform polynomial expressions by rearranging and collecting terms, factoring and applying the properties of exponents in order to solve problems

- algebraic expressions
- equation solving procedures:
 - linear equations
 - simultaneous equations
 - quadratic equations
- inequalities
- word problems

Module Evaluation:

- **Performance assessments:**
 - performance-based tests
 - oral presentations
 - investigative tasks
- **Product Assessments:**
 - problem-solving tasks
 - portfolio
 - project (selected works and journal writings)
- **Written Assessments:**
 - topic assessments and assignments

Prerequisite Skill Areas

(if any):

- proficient knowledge of integers

Special Resources

(materials, equipment & community involvement):

- algebra tiles
- scientific and graphing calculators
- graph paper
- appropriate software

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics Draft. Reston, Va: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIA

Sequence Reference: MT4053APA-F

Module Title: Functions and Graphs

Senior School Level

Number of Periods: 5 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.3, 3.4, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.5 Cognition
- 6.1, 6.3, 6.4 Application

Content Focus

- Plotting Coordinates
- Graphing Functions

Curriculum Objectives:

At the end of this module, students will:

- graph data as points on a coordinate system
- recognize and find the slope and intercepts of a graphed line
- graph linear and quadratic functions
- identify the domain and range of mathematical relations and functions
- use patterns and functions to solve problems
- use technology tools to examine graphs
- describe similarities and differences among families of linear and quadratic functions

Content Detail:

- linear and quadratic functions
- gradient
- intercepts
- domain and range
- patterns

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - investigations (describe and justify graphical representations of functions)
- **Product Assessments:**
 - problem-solving tasks
 - project (selected works and journal writings)
 - portfolio
- **Written Assessments:**
 - topic assessments and assignments

Prerequisite Skill Areas

(if any):

- Applied Mathematics – Module E, Algebra

Special Resources

(materials, equipment & community involvement):

- graph paper
- ruler
- drawing kit (Accu-line™)
- tape measure
- scientific and graphing calculators
- appropriate software

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics Draft. Reston, Va: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

Applied Mathematics IIIB

Course Code: MT4064APB



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title: Applied Mathematics IIB

2 credit (s)

60 hour (s)

Prerequisite (s): Completion of applied mathematics IIIA

S3-S4 level (s)

Course Code: MT4064APB

☐ required or ☒ elective

Course Description

This course continues to explore algebra and geometry concepts offered in Applied Mathematics IIIA. Trigonometric identities will be introduced and students will be encouraged to apply principles of statistics. This course meets the needs of students who are contextual learners, since abstract concepts are offered through concrete experiences. Real-world and workplace situations are used as settings for investigations. Processes such as problem solving, communicating, reasoning and connecting are embedded throughout the course. The mathematical content is practical and relevant.

Course Requirements

The requirements for this course are as follows:

Performance Assessments: - oral presentations using technology - teacher observations - investigations - debates - problem solving tasks - cooperative group activities	20%
Product Assessments: - comprehensive Module assessments including written tests using a variety of - items - short answer, multiple choice, free-response and open-ended - problem solving tasks - projects - portfolio (collection of tasks from each module)	40%
Written Assessments: - formative assessments and assignments	10%
Final Project Research topic and laboratory explorations to be determined in consultation with both senior schools	30%
Total	100%

Course Resources

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

*Recommended texts

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Number Sense	5	B. Geometry/Measurements	7
- infinite geometric series		- circle theorems	
- binomials		- 3-dimensional figures	
- Pascal's triangle		- transformations	
- binomial theorem		- congruence	
- career applications		- similarity	
		- measurement properties	
		- applications	
C. Trigonometry	5	D. Data Handling	8
- trigonometry identities		- data interpretation and analysis	
- laws of sines and cosines		- histograms	
- graphs of sine and cosine		- standard deviation	
- waves		- normal curve	
		- simple probability	
		- variance	
		- correlation	
		- theoretical probability	
		- empirical probability	
E. Algebra	8	F. Functions and Graphs	5
- linear equations with fractions		- characteristics of graphs	
- simultaneous equations		- linear and quadratic relations and functions	
- quadratic equations		- graphical solutions	
- inequalities			

Subtotal	38
Optional double periods	7
Total double periods.....	45

SENIOR SCHOOL MATHEMATICS

check: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Applied Mathematics IIIB

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
1	Appreciation	1.1	Interrelationships	x	x	x	x	x	x
		1.2	Successful Experiences	x	x	x	x	x	x
		1.3	Significance	x	x	x	x	x	x
2	Structure	2.1	Comparison	x	x	x	x	x	x
		2.2	Appreciation	x	x	x	x	x	x
		2.3	Evaluation	x	x	x	x	x	x
		2.4	Generalization	x	x	x	x	x	x
		2.5	Interpretation	x	x	x	x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x	x	x
		3.2	Estimation	x	x	x	x		
		3.3	Multiple Representations	x	x	x	x	x	x
		3.4	Data Handling				x	x	x
		3.5	Geometric and Measurement Properties		x	x			
		3.6	Algebraic Procedures			x	x	x	x
		3.7	Technology	x	x	x	x	x	x
4	Communication	4.1	Ideas and Concepts	x	x	x	x	x	x
		4.2	Formulae and Terminology		x	x	x	x	x
		4.3	Oral/Written	x	x	x	x	x	x
		4.4	Generalization	x	x	x	x	x	x
		4.5	Symbolic notation		x	x		x	x
		4.6	Manipulatives and Technology	x	x	x	x	x	x
		4.7	Evaluation	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
MODULES				A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry and Measurements

C - Trigonometry

D - Data Handling

E - Algebra

F - Functions and Graphs

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Applied Mathematics IIIB

5	Cognition	5.1	Confidence in Problem Solving	x	x	x		x	x
		5.2	Evaluation				x	x	
		5.3	Technology	x	x	x	x	x	
		5.4	Application	x	x	x		x	
		5.5	Evaluation of Reasonableness	x	x	x	x	x	x
		5.6	Modelling		x	x	x		x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x	x
		6.2	Decision Making	x	x		x		
		6.3	Real World Issues	x	x	x	x	x	x
		6.4	Lifelong Skills	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
MODULES				A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry and Measurement

C - Trigonometry

D - Data Handling

E - Algebra

F - Functions and Graphs

(page 2 of 2)

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIB	Sequence Reference: MT4064APB-A								
Module Title: Number Sense	Senior School Level								
Number of Periods: 5 double periods	<table><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr><tr><td>☐</td><td>☐</td><td>☒</td><td>☒</td></tr></table>	S1	S2	S3	S4	☐	☐	☒	☒
S1	S2	S3	S4						
☐	☐	☒	☒						
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.2, 3.3, 3.7 Acquisition 4.1, 4.3, 4.4, 4.6, 4.7 Communication 5.1, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application	Content Focus - Infinite geometric series - Binomial theorem - Career applications								
Curriculum Objectives:	Content Detail:								
At the end of this module, students will: - formulate the sum of an infinite geometric series - expand powers of binomials, using Pascal's triangle and the binomial theorem - identify specific terms of the binomial expansion - explore "amortization", using basic spreadsheet software - investigate careers and real world situations that pertain to the content of the module i.e. aviation, physicists, athletes, chefs, finance, etc.	- infinite geometric series - binomials - Pascal's triangle - binomial theorem - career applications - loans and mortgages								
Module Evaluation:									
Performance Assessments: - performance-based tests - investigative tasks - problem solving activities - written and oral presentations Product Assessments: - computer assignment - portfolio – a collection of tasks involving research, organization of data, analysis and problem solving Written Assessments: - formative assessments and assignments									
Prerequisite Skill Areas (if any):	Special Resources (materials, equipment & community involvement):								
- number systems and number operations - problem solving strategies	- relevant software - visit a physicist - banker - scientific or graphing calculator - amortization charts/tables								

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics Draft. Reston, VA: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS				
Course Title: APPLIED MATHEMATICS IIIB		Sequence Reference: MT4064APB-B		
Module Title: Geometry/Measurement		Senior School Level		
Number of Periods: 7 double periods		S1	S2	S3
		☐	☐	☒
Subgoal Emphasis:		Content Focus		
1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.2, 3.3, 3.5, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		- Proof and deductions - Angles - Parallel lines - Career applications		
Curriculum Objectives:		Content Detail:		
At the end of this module, students will: - formulate and test conjectures, about the properties and attributes of circles and the lines that intersect them - use congruence transformation - use appropriate software to explore geometric properties - use vector geometry to solve problems - describe the effect on perimeter, area and volume when length, width or height of a three-dimensional solid is changed and apply this idea in solving problems - choose an appropriate network to organize and visually represent information - develop and evaluate optimal solutions using networks		- circle theorems 3-dimensional figures - transformations - congruence - similarity - measurement properties - applications		
Module Evaluation:				
Performance Assessments: - investigative tasks - performance-based tests Product Assessments: - computer assignment - mini-project where students apply material learned and make connections to career opportunities e.g. advertising, botany, geology, etc. - portfolio (selected works and journal writings) Written Assessments: - topic assessments and assignments				
Prerequisite Skill Areas		Special Resources		
(if any):		(materials, equipment & community involvement):		
- familiarity with basic geometric and measurement properties - proficient use of a ruler		- an architect - geometer sketchpad - CAD software - scientific and/or graphing calculator - building contractor		

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
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- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIB

Sequence Reference: MT4064APB-C

Module Title: Trigonometry

Senior School Level

Number of Periods: 5 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.3, 5.4, 5.6 Cognition
- 6.1, 6.3, 6.4 Application

Content Focus

- Practical applications of trigonometric ratios

Curriculum Objectives:

Content Detail:

At the end of this module, students will:

- examine the amplitude, wavelength, period and frequency of sine waves
- calculate distances and model periodic motion, using trigonometric ratios and functions, available through technology
- use trigonometric functions to calculate distances, angles and area, including the use of sine rule, cosine rule and area of triangle formula

- sines waves
- trigonometric identities
- sine and cosine laws

Module Evaluation:

- **Performance Assessments:**
 - individual and group investigations (e.g. unit circle, law of cosines)
- **Product Assessments:**
 - project (trigonometric investigations with written report and graphical display – e.g. use of triangulation in surveying)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- trigonometric ratios
- proficient use of a scientific calculator

Special Resources

(materials, equipment & community involvement):

- scientific and graphing calculators
- drawing kit (Accu-line TM)
- protractor
- tape measure
- unit circle board
- surveyor
- engineer
- draftsman
- appropriate software

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIB

Sequence Reference: MT4064APB-D

Module Title: Data Handling

Senior School Level

S1	S2	S3	S4
☐	☐	☒	☒

Number of Periods: 8 double periods

Subgoal Emphasis:

- | | |
|--------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.2, 2.3, 2.4, 2.5 | Structure |
| • 3.1, 3.2, 3.3, 3.4, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.4, 4.6, 4.7 | Communication |
| • 5.3, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Handling data
- Probability

Curriculum Objectives:

At the end of this module, students will:

- analyze graphs from journals newspapers and other sources to determine validity of stated arguments
- develop and implement a plan for collecting and analyzing data in order to make decisions
- draw histograms to represent frequency distributions of data
- interpret the characteristics of a normal curve
- analyze numerical data using standard deviation variability and correlation in order to make influences
- use probability models to describe everyday situation involving chance

Content Detail:

- data interpretation and analysis
- histograms
- standard deviation
- normal curve
- simple probability
- variance
- correlation
- theoretical probability
- empirical probability

Module Evaluation:

- **Performance Assessments:**
 - individual and group assignments (i.e. counting calories)
 - investigations and laboratory experiments (use of statistical techniques in marketing research and life insurance)
- **Product Assessments:**
 - project
 - i. evaluate data presented in the Census 2000 report and discuss the statistical significance of trends which may be evident
 - ii. explore discrete random variables and their use in, for example, life insurance, games of chance, events involving risk
- **Written Assessments:**

Prerequisite Skill Areas

(if any):

- proficient use of a ruler
- proficient use of a calculator
- knowledge of the different types of statistical representations

Special Resources

(materials, equipment & community involvement):

- geometry set
- an actuary
- life insurance agent
- relevant computer software
- spinners
- playing cards
- Census 2000 Report
- Internet (see appendix)

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics Draft. Reston, VA: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS					
Course Title: APPLIED MATHEMATICS IIIB		Sequence Reference: MT4064APB-E			
Module Title: Algebra		Senior School Level			
Number of Periods: 8 double periods		S1	S2	S3	S4
		☐	☐	☒	☒
Subgoal Emphasis:		Content Focus			
1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		Algebra as a means of representation and as a tool			
Curriculum Objectives:		Content Detail:			
At the end of this module, students will: - solve problems by forming equations in terms of two unknowns - solve quadratic equations by factoring, formulas, matrices and graphing - solve linear inequalities in one variable and graph their solutions - solve practical problems using quadratic equations - explore the use of set theory to solve problems		- simultaneous equations - quadratic equations - inequalities - matrices - set theory			
Module Evaluation:					
Performance Assessments: - journal writings - investigative tasks - problem-solving tasks Product Assessments: - mini-project (use formulas/equations to model real and simulated situations, and interpret their solutions in a given context) Written Assessments: - oral and written tests					
Prerequisite Skill Areas			Special Resources		
(if any):			(materials, equipment & community involvement):		
knowledge of integers			- graph paper - algebra tiles - graphing calculators - appropriate software		

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va: NCTM, 1998.

*Recommended texts

REFERENCES - STUDENT:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

MATHEMATICS

Course Title: APPLIED MATHEMATICS IIIB	Sequence Reference: MT4064APB-F								
Module Title: Functions and Graphs	Senior School Level								
Number of Periods: 5 double periods	<table><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr><tr><td>☐</td><td>☐</td><td>☒</td><td>☒</td></tr></table>	S1	S2	S3	S4	☐	☐	☒	☒
S1	S2	S3	S4						
☐	☐	☒	☒						
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.3, 3.4, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.5, 5.6 Cognition 6.1, 6.3, 6.4 Application	Content Focus - Graphing linear and quadratic equation - Graphical solutions - Functions								
Curriculum Objectives:	Content Detail:								
At the end of this module, students will: - calculate and plot linear and quadratic equations - use graphs to find the solution to simultaneous, linear and quadratic equations - determine the equation which has its roots at the points of intersection of the graphs of linear and quadratic equations - develop the definition of logarithms by exploring and describing the relationship between exponential functions and their inverses	- simultaneous equations - quadratic equations - inequalities - matrices - logarithms - exponential functions								
Module Evaluation:									
Performance Assessments: - journal writings - investigative tasks requiring graphical representations - explanations of algebraic concepts and procedures Product Assessments: - mini-graphing project (use of graphs to illustrate real and simulated situations and interpret their solutions in a given context) Written Assessments: - formative assessments and assignments									
Prerequisite Skill Areas	Special Resources								
(if any):	(materials, equipment & community involvement):								
- knowledge of integers - Applied Mathematics IIIB – module E - use a calculator and computer efficiently	- graph paper - graphing calculator - appropriate software								

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, VA: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, VA: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, VA: NCTM, 1998.

*Recommended texts

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- *Ashlock, R. et al. Mathematics Connections: Integrated and Applied. Ohio: Glencoe, 1995.
- Bumby, Douglas, et al. Integrated Mathematics. Ohio: Glencoe, 1995.
- *Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- *Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.

*Recommended texts

Business Mathematics I

Course Code: MT3061BUS



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title: Business Mathematics I

2 credit (s)

60 hour (s)

**Prerequisite (s): Integrated Mathematics I or
Applied Mathematics I**

S3 or S4 level (s)

Course Code: MT3061BUS

☐ required or ☒ elective

Course Description

Business Mathematics I is a two-credit course designed for students who are interested in business and/or personal (home) financing. This course covers the personal applications of mathematical concepts and skills that will be used to solve consumer and job-related problems. Students will also explore budgeting and investment techniques.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

The requirements for this course are as follows:

Performance Assessments: - oral presentations using technology - teacher observations - investigations - debates - problem solving tasks - cooperative group activities	20%
Product Assessments: - comprehensive module assessments including written tests using a variety of items - short answer, multiple choice, free-response and open-ended - projects - portfolio (collection of tasks from each module)	40%
Written Assessments: - formative assessments and assignments including problem solving tasks	10%
Final Project: To be determined in consultation with both senior schools	30%
Total	100%

Course Resources

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Budgeting	15	B. Investments	11
- personal budget		- deposits	
- average monthly expenditure		- bank statements	
- gross and net pay		- passbooks and statement accounts	
- commission		- simple interest	
- employee tax		- compound interest	
- various deductions (insurance, pension and union dues)		- certificates of deposits	
- mortgage loans		- effective annual yield	
- home ownership		- stocks, dividends and selling stocks	
- home rental		- bonds	
		- e-commerce	
C. Comparative Buying	3	D. Credit, Debits and Loans	5
- sales tax		- account statements	
- unit pricing		- finance charges	
- finding the better buy		- single-payment loans	
- markdown and sale price		- installment loans	
- imperial and metric units		- determining the APR (Annual Percentage Rate)	
		- credit card accounts	
		- debit card accounts	
E. Insurance	4		
- health insurance premiums			
- health insurance benefits			
- term life insurance			
- other types of life insurance			
- reinsurance			

Subtotal	38
Optional double periods	7
Total double periods	45

SENIOR SCHOOL MATHEMATICS

check: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Business Mathematics I

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX				
1	Appreciation	1.1	Interrelationships	x	x	x	x	x
		1.2	Successful Experiences	x	x	x	x	x
		1.3	Significance	x	x	x	x	x
2	Structure	2.1	Comparison	x	x	x	x	x
		2.2	Appreciation	x	x	x	x	x
		2.3	Evaluation	x	x	x	x	x
		2.4	Generalization	x	x	x	x	x
		2.5	Interpretation	x	x	x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x	x
		3.2	Estimation	x	x	x	x	x
		3.3	Multiple Representations	x				
		3.4	Data Handling	x	x	x	x	x
		3.5	Geometric and Measurement Properties					
		3.6	Algebraic Procedures					
		3.7	Technology	x	x	x	x	x
4	Communication	4.1	Ideas and Concepts	x	x	x	x	x
		4.2	Formulae and Terminology	x	x	x	x	x
		4.3	Oral/Written	x	x	x	x	x
		4.4	Generalization	x	x	x	x	x
		4.5	Symbolic Notation	x	x	x	x	x
		4.6	Manipulatives and Technology	x	x	x	x	x
		4.7	Evaluation		x			
CONTENT STRUCTURE		Budgeting		x				
		Investments			x			
		Comparative Buying				x		
		Credit, Debits and Loans					x	
		Insurance						x
		MODULES		A	B	C	D	E

MODULE KEY

A - Budgeting
B - Investments
C - Comparative Buying

D - Credit, Debits and Loans
E - Insurance

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Business Mathematics I

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX				
5	Cognition	5.1	Confidence in Problem Solving	x	x	x	x	x
		5.2	Evaluation	x	x	x	x	x
		5.3	Technology	x	x	x	x	x
		5.4	Application	x	x	x	x	x
		5.5	Evaluation of Reasonableness	x	x	x	x	x
		5.6	Modelling	x	x	x	x	x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x
		6.2	Decision Making	x	x	x	x	x
		6.3	Real World Issues	x	x	x	x	x
		6.4	Lifelong Skills	x	x	x	x	x
CONTENT STRUCTURE		Budgeting		x				
		Investments			x			
		Comparative Buying				x		
		Credit, Debits and Loans					x	
		Insurance						x
		MODULES		A	B	C	D	E

MODULE KEY

A - Budgeting
B - Investments
C - Comparative Buying

D - Credit, Debits and Loans
E - Insurance

(page 2 of 2)

MATHEMATICS

Course Title: BUSINESS MATHEMATICS I

Sequence Reference: MT3061BUS-A

Module Title: Budgeting

Senior School Level

Number of Periods: 15 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Number Sense
- Ratio
- Algebra
- Data Handling
- Functions and Graphs

Curriculum Objectives:

Content Detail:

At the end of this module, students will:

- use estimation and mental calculations to make decisions on personal gross and net income
- demonstrate a proficiency with calculations
- apply fractions, decimals and percents
- formulate a realistic budget
- analyze mortgage loans
- compare the cost of renting with the cost of buying a home

- personal budget
- average monthly expenditure
- gross and net pay
- commission
- employee tax
- various deductions (insurance, pension and union dues)
- mortgage loans
- home ownership
- home rental

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - investigative tasks (create a personal budget including written and oral presentations)
- **Product Assessments:**
 - projects (calculations using an actual timecard; collecting and analyzing employment ads from newspapers; spreadsheet applications, interviews)
 - portfolio (selected tasks and journal writing)
- **Written assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- computational skills - whole numbers, decimals
- fractions and percents
- use a calculator efficiently
- computer applications - spreadsheets

Special Resources (materials, equipment

& community involvement):

- daily newspaper
- human resources department of a business
- computers for student use
- timecards and realistic pay information
- union executive members re: salary deductions
- loan officer
- lawyer (conveyance)
- homeowner's insurance agent
- reference charts - mortgage, land tax, etc.
- Bermuda Housing Corporation

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

REFERENCES - STUDENT:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

MATHEMATICS				
Course Title: BUSINESS MATHEMATICS I		Sequence Reference: MT3061BUS -B		
Module Title: Investments		Senior School Level		
Number of Periods: 7 double periods		S1	S2	S3
		☐	☐	☒
Subgoal Emphasis:		Content Focus		
1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.2, 3.4, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		- Number Sense - Ratio - Algebra - Data and Handling		
Curriculum Objectives:		Content Detail:		
At the end of this module, students will:				
- demonstrate a proficiency with writing numbers in words - calculate simple and compound interest - analyze statements - analyze different investment schemes and their annual yield - analyze types of saving options and compare relative advantages - investigate and compare stocks, bonds, annuities and retirement plans		- deposits - bank statements - passbooks and statement accounts - simple interest - compound interest - certificates of deposits - effective annual yield - stocks, dividends and selling stocks - bonds - e-commerce		
Module Evaluation:				
Performance Assessments: - performance-based tests - investigative tasks - oral presentations - "what if you had \$1000 to invest?" "what if you had one million dollars to invest?" Product Assessments: - projects (deposit and withdrawal slips, investment profiles, spreadsheets applications, interviews, journal writing) Written Assessments: - formative assessments and assignments				
Prerequisite Skill Areas		Special Resources		
(if any):	(materials, equipment & community involvement):			
- computational skills - whole numbers, decimals, fractions and percents - use a calculator efficiently - computer applications - spreadsheets	- various bank forms - deposit and withdrawal, bank reconciliation statements, copies of cheque registers, copies of savings statement sheets - computers for student use - teacher of Business Studies - stockbroker, financial advisor, banker - teacher resources (see appendix)			

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

REFERENCES - STUDENT:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

MATHEMATICS

Course Title: BUSINESS MATHEMATICS I	Sequence Reference: MT3061BUS-C								
Module Title: Comparative Buying	Senior School Level <table><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr><tr><td>☐</td><td>☐</td><td>☒</td><td>☒</td></tr></table>	S1	S2	S3	S4	☐	☐	☒	☒
S1	S2	S3	S4						
☐	☐	☒	☒						
Number of Periods: 3 double periods									
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.2, 3.4, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6 Communication 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application	Content Focus - Number Sense - Ratio - Algebra								
Curriculum Objectives:	Content Detail:								
At the end of this module, students will: - explore cost and selling price - justify better buys, based on unit prices - analyze methods of payment available in retail purchasing and compare relative advantages and disadvantages of each option	- decimal addition and subtraction, using money - percentages and finding percentage of quantities - calculations with imperial and metric unit - sales tax/custom duties - total purchase price - unit price - dollar amount of the markdown - sale price when markdown rate is known								
Module Evaluation:									
Performance Assessments: - performance-based tests - oral presentations, class discussions and debates - interviews - problem solving tasks Product Assessments: - problem solving tasks - research project - portfolio (selected works and journal writings) Written Assessments: - formative assessments and assignments									
Prerequisite Skill Areas (if any):	Special Resources (materials, equipment & community involvement):								
- computational skills - whole numbers, decimals, fractions and percents - efficiently use a calculator - computer applications - spreadsheets	- custom declaration forms - invoices and sales sheets - Customs Officer - loan officer - computers for student use								

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

REFERENCES - STUDENT:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

MATHEMATICS

Course Title: BUSINESS MATHEMATICS I

Sequence Reference: MT3061BUS-D

Module Title: Credits, Debits and Loans

Senior School Level

Number of Periods: 5 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.4, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Number Sense
- Ratio
- Relationships (Functions and Graphs)
- Algebra

Curriculum Objectives:

At the end of this module, students will:

- analyze and compare installment plans
- evaluate financial charges
- analyze annual percentage rates (APR's)
- distinguish between bank and reconciliation statements
- understand and apply compound interest principles
- analyze types of loan options and compare relative advantages

Content Detail:

- credit card account
- debit card account
- percentages
- installment plans
- amount financed on an installment loan
- interest rates and maturity value
- charge account
- finance charge
- maturity value and interest rate of a single-payment loan
- payment to interest, payment to principal and new balance on loans
- annual percentage rate of a loan (APR)
- finance charge refunded for early repayment of a loan
- e-commerce

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - oral presentations, class discussions and debates
 - interviews
- **Product Assessments:**
 - written assignments
 - research project including the role of mathematics in careers
 - loan portfolio
 - journal writings
- **Written Assessments**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- computational skills, whole numbers, decimals
- fractions and percents
- efficiently use a calculator
- computer applications - spreadsheets

Special Resources

(materials, equipment & community involvement):

- loan applications - forms and charts
- loan officer
- computers for student use
- retail banking representative
- teacher resources (see appendix)

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

REFERENCES - STUDENT:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

MATHEMATICS

Course Title: BUSINESS MATHEMATICS I

Sequence Reference: MT3061BUS-E

Module Title: Insurance

Senior School Level

Number of Periods: 8 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.4, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Number Sense
- Ratio
- Functions and Graphs
- Algebra

Curriculum Objectives:

At the end of this module, students will:

- analyze forms of insurance:
 - health
 - life
 - house
 - reinsurance
- analyze and compare coverage options and rates in insurance

Content Detail:

- health insurance premiums
- health insurance benefits
- term life insurance
- other types of life insurance
- reinsurance

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - oral presentations, class discussions and debates
 - interviews
- **Product Assessments:**
 - portfolio (a collection of tasks and journal writings)
 - research project
- **Written assessments:**
 - projects (research on various career opportunities, investment portfolio, interviews, journal writing, direct trade)

Prerequisite Skill Areas

(if any):

- computational skills
 - whole numbers, decimals, fractions and percents
- use a calculator efficiently
- computer applications
 - spreadsheets

Special Resources

(materials, equipment & community involvement):

- appropriate computer software
- home owner's insurance agent
- charts used by insurance agents, lawyers and loans officers
- reinsurance agent
- information from International Business

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

REFERENCES - STUDENT:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

Business Mathematics II

Course Code: MT4072BUS



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title: Business Mathematics II

2 credit (s)

60 hour (s)

Prerequisite (s): Business Mathematics I or
Applied Mathematics II

S3 or S4 level (s)

Course Code: MT4072BUS

☐ required or ☒ elective

Course Description

Business Mathematics II is a two-credit course designed for the student who is interested in a business major. Students will be given the opportunity to apply mathematics to actual business practices. Focus will be placed on viewing the use of mathematics in a wide range of businesses. The students will examine how mathematical concepts and principles are applied to a variety of business procedures.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

The requirements for this course are as follows:

Performance Assessments: - oral presentations using technology - teacher observations - investigations - debates - problem solving tasks - cooperative group activities	20%
Product Assessments: - comprehensive module assessments including written tests using a variety of items - short answer, multiple choice, free-response and open-ended - projects - portfolio (collection of tasks from each module)	40%
Written Assessments: - formative assessments and assignments including problem solving tasks	10%
Final Assessment: To be determined in consultation with both senior schools	30%
Total	100%

Course Resources

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Marketing and Personnel	8	B. Purchasing, Sales and Services	12
- cost analysis: - administering wages and salaries - employee benefits (pensions) - disability insurance - travel expenses - employee training - opinion surveys - sales potential - market share - sales projections - advertising costs - pricing - e-commerce		- trade discounts - chain discounts - cash discounts - markup - net profit - selling price - cost - markdown - building rental - maintenance and improvement - equipment rental - utilities costs - professional services	
C. Production, Storage and Distribution	7	D. Financial Management	11
- manufacturing - break-even analysis - quality control - time study - packaging - storage space - taking an inventory - valuing an inventory - carrying out an inventory - transportation		- statistical graphs and charts - corporate income tax - issuing stocks and bonds: - bond market, mutual funds, commodities - borrowing - investments - growth expenses - inflation - statistical data - Gross National Product (GNP) - consumer price index - budgets - business expenses: apportioning, depreciation - probability - random sampling	

Subtotal	38
Optional double periods	7
Total double periods.....	45

SENIOR SCHOOL MATHEMATICS

check: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Business Mathematics II

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX			
1	Appreciation	1.1	Interrelationships	x	x	x	x
		1.2	Successful Experiences	x	x	x	x
		1.3	Significance	x	x	x	x
2	Structure	2.1	Comparison	x	x	x	x
		2.2	Appreciation	x	x	x	x
		2.3	Evaluation	x	x	x	x
		2.4	Generalization	x	x	x	x
		2.5	Interpretation	x	x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x
		3.2	Estimation	x	x	x	x
		3.3	Multiple Representations				
		3.4	Data Handling	x	x	x	x
		3.5	Geometric and Measurement Properties	x	x	x	
		3.6	Algebraic Procedures	x			x
		3.7	Technology	x	x	x	x
4	Communication	4.1	Ideas and Concepts	x	x	x	x
		4.2	Formulae and Terminology	x	x	x	x
		4.3	Oral/Written	x	x	x	x
		4.4	Generalization	x	x	x	x
		4.5	Symbolic Notation	x			
		4.6	Manipulatives and Technology	x	x	x	x
		4.7	Evaluation	x		x	x
CONTENT STRUCTURE		Marketing and Personnel		x			
		Purchasing, Sales and Services			x		
		Production, Storage and Distribution				x	
		Financial Management					x
		MODULES		A	B	C	D

MODULE KEY

A - Marketing and Personnel
B - Purchasing, Sales and Services

C - Production, Storage and Distribution
D - Financial Management

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check: S1 ☐ S2 ☐ S3 ☒ S4 ☒

Business Mathematics II

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX			
5	Cognition	5.1	Confidence in Problem Solving	x	x	x	x
		5.2	Evaluation	x	x	x	x
		5.3	Technology	x	x	x	x
		5.4	Application	x	x	x	x
		5.5	Evaluation of Reasonableness	x	x	x	x
		5.6	Modelling		x	x	
6	Application	6.1	Problem Solving Strategies	x	x	x	x
		6.2	Decision Making	x	x	x	x
		6.3	Real World Issues	x	x	x	x
		6.4	Lifelong Skills	x	x	x	x
CONTENT STRUCTURE		Marketing and Personnel		x			
		Purchasing, Sales and Services			x		
		Production, Storage and Distribution				x	
		Financial Management					x
		MODULES		A	B	C	D

MODULE KEY

A - Marketing and Personnel
B - Purchasing, Sales and Services

C - Production, Storage and Distribution
D - Financial Management

(page 2 of 2)

MATHEMATICS

Course Title: BUSINESS MATHEMATICS II

Sequence Reference: MT4072BUS-A

Module Title: Marketing and Personnel

Senior School Level

Number of Periods: 8 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.4, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Number Sense
- Relationships (Ratio)
- Relationships (Functions and Graphs)
- Algebra
- Space and Shapes (Measurements)
- Data Handling

Curriculum Objectives:

At the end of this module, students will:

- analyze data to make business decisions
- design effective packaging
- analyze expenses associated with running a business:
 - personnel
 - building
 - inventory

Content Detail:

- surface area and volume
- opinion surveys
- sales potential
- market share
- sales projections
- advertising costs
- pricing
- cost analysis:
 - hiring new employees
 - wages and salaries
 - employee benefits (pensions)
 - expenses (travel, training)
- e-commerce

Module Evaluation:

- **Performance Assessments:**
 - chapter test, oral presentations
 - class discussion/debates
 - investigative and problem solving tasks
- **Product Assessments:**
 - written assignments
 - portfolio (a collection of tasks and journal writings)
 - projects - *Making your Business Profitable*, research – to include interviews, analysis of data, conclusion, etc.
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- computational skills: whole numbers, decimals, fractions, percents
- use a calculator efficiently
- computer applications:
 - spreadsheets
- interpreting charts and tables

Special Resources

(materials, equipment & community involvement):

- visit to a department store - marketing department
- computers for student use
- human resource manager
- manufacturer

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

REFERENCES - STUDENT:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

MATHEMATICS

Course Title: BUSINESS MATHEMATICS II		Sequence Reference: MT4027BUS-B											
Module Title: Purchasing, Sales and Services		Senior School Level <table border="1" style="width: 100%; text-align: center;"> <tr> <td>S1</td> <td>S2</td> <td>S3</td> <td>S4</td> </tr> <tr> <td>☐</td> <td>☐</td> <td>☒</td> <td>☒</td> </tr> </table>				S1	S2	S3	S4	☐	☐	☒	☒
S1	S2	S3	S4										
☐	☐	☒	☒										
Number of Periods: 12 double periods													
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.2, 3.4, 3.5, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.6 Communication 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		Content Focus - Number Sense - Relationships (Ratio) - Algebra											
Curriculum Objectives:		Content Detail:											
At the end of this module, students will: - analyze the variables associated with sales - analyze the variables associated with purchasing - shipping, duty, tax, volume discounts, etc. - explore costs associated with the building - analyze consultants' fees - develop a plan for collecting and analyzing data in order to make a decision regarding purchases for a business		- markup - net and gross profit - selling price - based percentage on selling price and percentage on cost price - markdown - fixed and variable costs - trade discounts - duty and tax - chain discounts - cash discounts - shipping and handling - building rental - maintenance and improvement - equipment rental - utilities costs - professional services											
Module Evaluation:													
Performance Assessments: - performance-based test - communicate methods used for a data-analysis project by written report, visual display, oral report or multi-media presentation - investigative and problem solving tasks Product Assessments: - written assignments - portfolio (a collection of tasks and journal writings) - projects – <i>Running a Business</i>, research to include interviews, data analysis, conclusion and recommendations Written Assessments: - formative assessments and assignments													
Prerequisite Skill Areas (if any):			Special Resources (materials, equipment & community involvement):										
- computational skills: whole numbers, decimals, fractions, percents - use a calculator efficiently - computer applications: spreadsheets - interpreting charts and tables			- visit to a department store (purchasing and sales representative) - computers for student use - visit a marketing representative - visit a warehouse manager										

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

REFERENCES - STUDENT:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

MATHEMATICS

Course Title: BUSINESS MATHEMATICS II

Sequence Reference: MT4072BUS-C

Module Title: Production, Storage and Distribution

Senior School Level

Number of Periods: 7 double periods

S1	S2	S3	S4
☐	☐	☒	☒

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.4, 3.5, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.6, 4.7 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Data and Handling

Content Focus

- Number Sense
- Relationships (Ratio)
- Relationships (Functions and Graphs)
- Algebra
- Data and Handling

Curriculum Objectives:

At the end of this module, students will:

- analyze costs associated with purchasing, services, sales, production, warehouse, distribution
- determine volume for efficient storage capacity
- analyze procedures involved with inventory including data collection and analysis

Content Detail:

- manufacturing
- break-even analysis
- quality control
- time study
- packaging
- storage space
- inventory
- transportation costs

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - oral presentations
 - class discussion/debates
 - investigative and problem solving tasks
- **Product Assessments:**
 - written assignments
 - portfolio (a collection of tasks and journal writings)
 - project – *Production* or *Storage and Distribution*, research to include budgets, interviews, analysis and recommendations
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- computational skills
 - whole numbers, decimals, fractions, percents
- use a calculator efficiently
- computer applications - spreadsheets
- interpreting charts and tables

Special Resources

(materials, equipment & community involvement):

- visit a factory (perfume, pottery, Four Star Pizza)
- computers for student use
- appropriate computer software
- Bermuda Small Business Development Corporation
- resource persons (see appendix)

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

REFERENCES - STUDENT:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

MATHEMATICS

Course Title: BUSINESS MATHEMATICS II	Sequence Reference: MT4072BUS-D								
Module Title: Financial Management	Senior School Level <table><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr><tr><td>☐</td><td>☐</td><td>☒</td><td>☒</td></tr></table>	S1	S2	S3	S4	☐	☐	☒	☒
S1	S2	S3	S4						
☐	☐	☒	☒						
Number of Periods: 11 double periods									
Subgoal Emphasis: • 1.1, 1.2, 1.3 Appreciation • 2.1, 2.2, 2.3, 2.4, 2.5 Structure • 3.1, 3.2, 3.4, 3.6, 3.7 Acquisition • 4.1, 4.2, 4.3, 4.4, 4.6, 4.7 Communication • 5.1, 5.2, 5.3, 5.4, 5.5 Cognition • 6.1, 6.2, 6.3 6.4 Application	Content Focus • Number Sense • Relationships (Ratio) • Relationships (Functions and Graphs) • Algebra • Data Handling								
Curriculum Objectives: At the end of this module, students will: • explore corporate taxation • explore investments and borrowing • apply mathematical processes to support accounting practices: staff payroll, receivables and payables • analyze inflation and the Gross National Product (GNP) • create and analyze a corporate budget • develop and implement a plan for collecting and analyzing financial information in order to make decisions • design surveys and apply random sampling techniques • describe a set of frequency distribution data by spread and measures of central tendency • interpret information from various graphs including scatter plots to make predictions and/or decisions • determine experimental probabilities using simulations (e.g. random number tables and random functions)	Content Detail: • statistical graphs and charts • corporate income tax • issuing stocks and bonds: - bond market, mutual funds, commodities • borrowing • investments • growth expenses • inflation • statistical data • Gross National Product (GNP) • consumer price index • budgets • business expenses: apportioning, depreciation • probability • random sampling								
Module Evaluation: • Performance Assessments: - chapter test, oral presentations, class discussion/debates - investigative and problem solving tasks • Product Assessments: - portfolio (a collection of tasks and journal writings) - projects – <i>Corporate Budget</i>, research – to include interviews, analysis of data, interpretation, conclusions and recommendations • Written Assessments: - formative assessments and assignments									
Prerequisite Skill Areas (if any): • computational skills - whole numbers, decimals, fractions, percents • use a calculator efficiently • computer applications - spreadsheets • interpreting charts and tables	Special Resources (materials, equipment & community involvement): • stock broker and/or investments analyst, accountant • computers for student use • Bermuda Stock Exchange (BSX) • representative from Finance Department, Registrar of companies or Statistics Department • local and foreign business magazines and newspapers • end of year report from a large business • human resources (see appendix)								

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

REFERENCES - STUDENT:

Lange, W. H. et al. Mathematics with Business Applications. Ohio: Glencoe/McGraw Hill, 1998.

Integrated Mathematics I

Course Code: MT2041INT



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title (s): Integrated Mathematics I

4 credit (s)

120 hour (s)

Prerequisite(s): Foundations of Mathematics

S2 level (s)

Course Code: MT2041INT

☐ required or ☒ elective

Course Description

Integrated Mathematics I incorporates the mathematics topics offered in a standard Algebra I, Geometry and Algebra II sequence. The content of these courses is offered through a core curriculum over a two-year period. Important concepts are differentiated in relationship to the breadth and depth of their treatment and application within this discipline and across other disciplines. Through challenging explorations, students will collaboratively investigate and solve a variety of problems.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work, collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

Additional requirements for this course are as follows:

Performance Assessments: - lab reports - debates; presentations - investigations - problem solving tasks	20%
Product Assessments: - Comprehensive assessments including written tests using a variety of items - short answer, selected response, free-response and open-ended - project - portfolio (a collection of tasks from each module and journal writings)	30%
Written Assessments: - formative assessments and assignments including problem solving tasks	10%
Final Examination	40%
Total	100%

Course Resources

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 1. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 1. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

* Recommended text

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Number Sense	10	B. Geometry/Measurement	15
- extending and generalizing patterns of numbers and geometric figures		- coordinate geometry:	
- problem solving		- distance and midpoint formulas	
- finance; small business		- slopes of parallel and perpendicular lines	
		- vectors as ordered pairs	
		- transformations:	
		- translations and vectors	
		- applications of congruency and similarity	
		- application of polygon and circle theorems	
C. Trigonometry	10	D. Data Handling	10
- unit circle (quadrant 1 and 11)		- translation of data and effects on graphs,	
- laws of sines and cosines		- central tendency and dispersion	
- right triangle trigonometry applications (2-D and 3-D)		- matrices for storage of information	
		- networks and their graphs	
		- Pascal's triangle	
		- binomial theorem	
		- probability (simple applications)	
		- experiments and problem solving	
		- spreadsheets	
E. Algebra	20	F. Functions and Graphs	10
- exponent laws		- input and output	
- inequalities		- constant functions	
- equations (simultaneous, quadratic)		- functions as lines and parabolas	
- creation and evaluation of formulas		- transformations of functions	
- absolute value		- linear, quadratic and exponential functions	
- sums and products of matrices and applications		- exponential modeling	
- variations (direct and inverse)		- translations and scale changes of functions and effects on graphs and equations	
- modelling		- graphic solution of systems	
- set theory			

Subtotal	75
Optional double periods	<u>15</u>
Total double periods	90

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☒ S3 ☐ S4 ☐

Integrated Mathematics I

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
1	Appreciation	1.1	Interrelationships	x	x		x	x	x
		1.2	Successful Experiences	x	x	x	x	x	x
		1.3	Significance	x	x	x	x	x	x
2	Structure	2.1	Comparison	x	x	x	x	x	x
		2.2	Appreciation	x	x		x	x	x
		2.3	Evaluation		x			x	x
		2.4	Generalization				x	x	x
		2.5	Interpretation	x	x	x	x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x		x	
		3.2	Estimation	x	x	x	x		x
		3.3	Multiple Representations	x	x	x	x	x	x
		3.4	Data Handling	x	x		x		x
		3.5	Geometric and Measurement Properties	x	x	x			
		3.6	Algebraic Procedures			x		x	x
		3.7	Technology		x	x	x	x	x
4	Communication	4.1	Ideas and Concepts	x	x	x	x	x	x
		4.2	Formulae and Terminology	x	x	x	x	x	x
		4.3	Oral/Written	x	x	x		x	x
		4.4	Generalization	x	x	x	x	x	x
		4.5	Symbolic notation		x	x		x	x
		4.6	Manipulatives and Technology	x	x	x	x	x	x
		4.7	Evaluation	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense
B - Geometry and Measurement
C - Trigonometry

D - Data Handling
E - Algebra
F - Functions and Graphs

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☒ S3 ☐ S4 ☐

Integrated Mathematics I

5	Cognition	5.1	Confidence in Problem Solving	x	x	x	x	x	x
		5.2	Evaluation				x	x	x
		5.3	Technology	x	x	x	x	x	x
		5.4	Application	x	x	x	x	x	x
		5.5	Evaluation of Reasonableness	x	x	x	x	x	x
		5.6	Modelling		x	x	x		x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x	x
		6.2	Decision Making	x	x	x	x	x	x
		6.3	Real World Issues	x	x	x	x	x	x
		6.4	Lifelong Skills	x	x	x	x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
			MODULES	A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry and Measurement

C - Trigonometry

D - Data Handling

E - Algebra

F - Functions and Graphs

(page 2 of 2)

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS I

Sequence Reference: MT2041INT-A

Module Title: Number Sense

Senior School Level

Number of Periods: 10 double periods

S1	S2	S3	S4
☐	☒	☐	☐

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.5 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.6, 4.7 Communication
- 5.1, 5.3, 5.4, 5.5 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Computations
- Number relations

Curriculum Objectives:

At the end of this module, students will:

- extend and generalize patterns of numbers and geometric figures
- solve number and geometric problems
- create and solve complex problems

Content Detail:

- real number system, rational and irrational numbers
- number sequences and patterns
- Pascal's triangle
- problem solving

Module Evaluation:

- **Performance Assessments:**
 - lab
 - presentation of project
 - investigative tasks
- **Product Assessments:**
 - project
 - portfolio (selected works and journal writings)
 - problem solving activities
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- represent numbers in various formats
- understand number systems
- familiar with graphing calculators
- knowledge of problem solving steps and strategies

Special Resources

(materials, equipment & community involvement):

- accountant
- insurance sales person
- investments analyst
- Financial Times
- Business Week
- local publications

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics. Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation. Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics. Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS												
Course Title: INTEGRATED MATHEMATICS I Module Title: Geometry/Measurement Number of Periods: 15 double periods		Sequence Reference: MT2041INT-B Senior School Level <table border="1"> <tr> <th>S1</th> <th>S2</th> <th>S3</th> <th>S4</th> </tr> <tr> <td>☐</td> <td>☒</td> <td>☐</td> <td>☐</td> </tr> </table>			S1	S2	S3	S4	☐	☒	☐	☐
S1	S2	S3	S4									
☐	☒	☐	☐									
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.5 Structure 3.1, 3.2, 3.3, 3.4, 3.5 Acquisition 4.1, 4.2, 4.3, 4.4, 4.6, 4.7 Communication 5.1, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		Content Focus - Geometry - Measurement - Vectors										
Curriculum Objectives: At the end of this module, students will: - explore coordinate geometry involving: - distance and mid-point formulas - slopes of parallel and perpendicular lines - vectors as ordered pairs - perform transformations - perform calculations and simple proofs, using lines and angles - apply measurement concepts for the solution of authentic problems		Content Detail: - plotting points using ordered pairs - finding the distance between two points and the midpoint of the line joining the points - graphical solution of equations - slopes of parallel and perpendicular lines - vector notation - addition and subtraction of vectors - scalar multiplication - vector geometry - translations, reflections, enlargements and rotations using vectors - simple geometric constructions 2-D shapes and 3-D objects										
Module Evaluation: Performance Assessments: - models (used to solve problems set in the context of a realistic situation) - scale drawings - investigative tasks Product Assessments: - project (selected works and journal writings) - group investigations - lab report Written Assessments: - formative assessments and assignments												
Prerequisite Skill Areas (if any):		Special Resources (materials, equipment & community involvement):										
- interpreting and creating linear graphs - familiarity with translations - symmetry and reflection		- construction worker, carpet layer, carpenter, tiler - graph paper - measuring equipment (measuring cups, tape measures) - geometry set - appropriate software - graphing calculator										

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein, R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS I

Sequence Reference: MT2041INT-C

Module Title: Trigonometry

Senior School Level

Number of Periods: 10 double periods

S1	S2	S3	S4
☐	☒	☐	☐

Subgoal Emphasis:

- 1.2, 1.3 Appreciation
- 2.1, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Trigonometry
- Geometry

Curriculum Objectives:

At the end of this module, students will:

- investigate the unit circle (quadrant I and II)
- apply right triangle trigonometry to problem solving tasks
- apply the laws of sines and cosines
- explore graphing utilities
- explore the use of trigonometric properties in careers

Content Detail:

- radian and degree measurement
- unit circle $x^2 + y^2 = 1$
- evaluate trigonometric functions of real numbers for $t = \theta$ ($0^\circ \leq \theta \leq \pi$)
- trigonometric functions of acute angles
- application problems involving the right-angled triangle

Module Evaluation:

- **Performance Assessments:**
 - performance-based assessments and assignments
 - labs and investigative tasks
 - group investigations
 - teacher/student interview
 - oral presentation of project
- **Product Assessments:**
 - project (collection, representation and analysis of information required to find the height of a building, the distance between two islands, etc.)
 - portfolio (selected works and journal writings)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- familiarity with sine, cosine and tangent ratios
- graphing calculator
- transposing formulas

Special Resources

(materials, equipment & community involvement):

- construction worker, carpet layer, carpenter, tiler
- graph paper
- measuring equipment (measuring cups, tape measures)
- geometry set
- appropriate software
- graphing calculator

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12. A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein, R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS I	Sequence Reference: MT2041INT-D								
Module Title: Data Handling	Senior School Level								
Number of Periods: 10 double periods	<table><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr><tr><td>☐</td><td>☒</td><td>☐</td><td>☐</td></tr></table>	S1	S2	S3	S4	☐	☒	☐	☐
S1	S2	S3	S4						
☐	☒	☐	☐						

Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.4, 2.5 Structure 3.2, 3.3, 3.4, 3.7 Acquisition 4.1, 4.2, 4.4, 4.6, 4.7 Communication 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application	Content Focus - Statistics - Probability
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Curriculum Objectives:	Content Detail:
At the end of this module, students will: - translate data and effects on graphs, central tendency and dispersion - organize and use spreadsheets - analyze data - create and analyze probability experiments - analyze authentic statistical data and make projections	- designing questionnaires - sampling - hypothesis - comparing data - cumulative frequency - standard deviation - normal distribution - scatter diagrams - estimation of probability by experiment - introduction to spreadsheets - Pascal's triangle

Module Evaluation:

Performance Assessments: - performance-based assessments and assignments - labs and investigative tasks - group investigations - teacher/student interview - oral presentation of project Product Assessments: - project (collection, representation and analysis of data to answer a meaningful question) - portfolio (selected works and journal writings) Written Assessments: - formative assessments and assignments
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Prerequisite Skill Areas (if any):	Special Resources (materials, equipment & community involvement):
- module 1A - Number Sense - create and interpret statistical graphs - familiarity with basic probability concepts	- accountants - insurance sales person - investments officer - Financial Times - Business Week - local publications - Census 2000 report

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein, R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein, R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS I		Sequence Reference: MT2041INT-E											
Module Title: Algebra		Senior School Level <table border="1"> <tr> <td>S1</td> <td>S2</td> <td>S3</td> <td>S4</td> </tr> <tr> <td>☐</td> <td>☒</td> <td>☐</td> <td>☐</td> </tr> </table>				S1	S2	S3	S4	☐	☒	☐	☐
S1	S2	S3	S4										
☐	☒	☐	☐										
Number of Periods: 20 double periods													
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.3, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.2, 5.3, 5.4, 5.5 Cognition 6.1, 6.2, 6.3, 6.4 Application		Content Focus - Algebra - Graphing											
Curriculum Objectives:		Content Detail:											
At the end of this module, students will: - understand real numbers, set theory and interval notation - apply laws of exponents - apply four rules to polynomials - factor polynomials - solve linear equations in one variable - solve problems using algebraic procedures including equations - create and evaluate formulas - solve inequalities in one variable - apply and solve quadratic equations - solve simultaneous equations algebraically and graphically - solve simultaneous equations using matrices - find and apply the product of matrices - perform variation problems with modelling - solve real world problems - recognize a pattern and, given specific instances, make generalizations		- set operations, number line and interval notation - exponential expression - polynomial expressions - long and synthetic division - factorization - equations - linear, simultaneous, quadratic - system of equations - inequalities in one variable - determinants - variation and mathematical models - fractional expression and equations											
Module Evaluation:													
Performance Assessments: - Algebra lab - oral presentations - performance-based assessments and assignments Product Assessments: - project - portfolio (selected works, lab reports and journal writings) Written Assessments: - formative assessments and assignments													
Prerequisite Skill Areas			Special Resources										
(if any):			(materials, equipment & community involvement):										
<i>Foundations of Mathematics</i>: module E (Algebra)			- accountants - insurance sales person - investments analyst - Financial Times - Business Week - local publications										

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12. A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS I

Sequence Reference: MT2041INT-F

Module Title: Functions and Graphs

Senior School Level

S1	S2	S3	S4
☐	☒	☐	☐

Number of Periods: 10 double periods

Subgoal Emphasis:

- | | |
|-------------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.2, 2.3, 2.4, 2.5 | Structure |
| • 3.2, 3.3, 3.4, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.5 | Cognition |
| • 6.1, 6.2, 6.3, 6.4 | Application |

Content Focus

- Functions
- Graphs
- Algebra

Curriculum Objectives:

At the end of this module, students will:

- understand input and output with regard to functions
- evaluate functions
- analyze the graphs of functions
- perform applications involving step functions
- graph and analyze a function, using appropriate technology
- model and solve problems, using graphical methods

Content Detail:

- definition of function
- evaluate functions
- domain and range of functions
- graphs of linear functions
- graphs of systems
- step functions

Module Evaluation:

- **Performance Assessments:**
 - performance-based assessments and assignments
 - labs and investigative tasks
 - oral presentations
 - interviews
- **Product Assessments:**
 - project
 - portfolio (selected works and journal writings)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- module 1E - Algebra
- locating points on the coordinate plane
- use a calculator efficiently

Special Resources

(materials, equipment & community involvement):

- accountants
- insurance sales person
- investments analyst
- Financial Times
- Business Week
- local publications

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 2. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 2. Illinois: McDougal Littell, 1998.

*Recommended text

Integrated Mathematics II

Course Code: MT3052INT



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title: Integrated Mathematics II

4 credit (s)

Prerequisite (s): Integrated Mathematics I or
Applied Mathematics I with at
least a B standing

S3 level (s)

Course Code: MT3052INT

☐ required or ☒ elective

Course Description

This is the third component of a core curriculum that includes topics from standard geometry and algebra II courses. Ideas from Integrated Mathematics I are expanded upon and students will be expected to reason mathematically while exploring and describing real world issues. The major emphasis will be on students constructing ideas through questioning, exploration and discovery, with frequent use of models, applications, connections and technology.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work, collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

Additional requirements for this course are as follows:

Performance Assessments: - lab reports; problem solving tasks - debates and presentations - investigations - performance-based assessments	20%
Product Assessments: - comprehensive assessments including written tests using a variety of items – short answer, selected response, free-response and open-ended - project - portfolio (a collection of tasks from each module)	30%
Written Assessments: - formative assessments and assignments including problem solving tasks	10%
Final Exam	40%
Total	100%

Course Resources
(Teacher's Manual & Student Text)

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein, R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Virginia: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation Standards for School Mathematics. Reston, Virginia: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Virginia: NCTM, 1998.

* Recommended text

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Number Sense	10	B. Geometry/Measurement	12
- number systems		- proofs and deductions using congruency	
- negation, conjunction and disjunction, use of truth tables		- isosceles triangles, median, altitudes	
- inductive and deductive reasoning		- constructions involving triangles	
- hypothesis and conclusion		- proofs and deductions, involving parallel lines and polygons	
- proofs		- transformations	
- fractional exponents		- ratio, proportion and similarity	
- operations on radical expression		- right triangles and the Pythagorean theorem	
- complex numbers		- chord and tangent properties of circles	
- radical equations		- sectors, arc length and area of circles	
		- measurement properties of 2-D shapes and 3-D objects	
		- locus	
C. Trigonometry	8	D. Data Handling	13
- angles in a co-ordinate system		- representation of data using descriptive statistics	
- degrees and radians		- measure of location , mean, median, mode	
- arc length		- measure of dispersion, variance and standard deviation	
- unit circle		- probability by experiment (conditional and independent)	
- trigonometric functions of an acute angle		- Tree diagrams	
- trigonometric functions of any angle		- probability (and/or and at least)	
- graphs of sine, cosine and tangent functions		- normal distribution	
		- sampling	
		- permutations and combinations	
E. Algebra	17	F. Functions and Graphs	15
- graphical representation, showing boundaries or regions		- functions of polynomial and rational expression	
- quadratic equations		- domain and range of functions	
- square root method		- constant, linear and quadratic, square root, reciprocal and absolute value functions	
- factoring		- quadratic relations centred at the origin	
- completing the square		- graphs of functions	
- quadratic formula		- algebra of functions - operations	
- appropriate technology		- composite and inverse functions	
- systems of linear equations in two variables		- exponential and logarithmic functions	
- graphing		- arithmetic and geometric series	
- substitution		- Fibonacci Series	
- addition and multiplication		- binomial expansion	
- appropriate technology			
- matrix algebra			
- problem solving			

Subtotal	75
Optional double periods	<u>15</u>
Total double periods.....	90

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☐ S3 ☒ S4 ☐

Integrated Mathematics II

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
1	Appreciation	1.1	Interrelationships	x	x	x	x	x	x
		1.2	Successful Experiences	x	x	x	x	x	x
		1.3	Significance	x	x	x	x	x	x
2	Structure	2.1	Comparison	x	x	x	x	x	x
		2.2	Appreciation	x	x	x	x	x	
		2.3	Evaluation	x	x	x	x	x	x
		2.4	Generalization	x	x		x	x	x
		2.5	Interpretation	x		x	x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x		x	x	x
		3.2	Estimation	x	x	x	x		x
		3.3	Multiple Representations	x	x	x	x	x	x
		3.4	Data Handling				x		x
		3.5	Geometric and Measurement Properties		x	x			
		3.6	Algebraic Procedures					x	x
		3.7	Technology	x		x	x	x	x
4	Communication	4.1	Ideas and Concepts	x	x	x	x	x	x
		4.2	Formulae and Terminology		x	x	x	x	x
		4.3	Oral/Written	x	x	x	x	x	x
		4.4	Generalization	x	x		x	x	x
		4.5	Symbolic notation	x		x	x	x	x
		4.6	Manipulatives and Technology	x	x	x	x	x	x
		4.7	Evaluation				x	x	x
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry and Measurement

C - Trigonometry

D - Data Handling

E - Algebra

F - Functions and Graphs

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☐ S3 ☒ S4 ☐

(Page 2 of 2)

Integrated Mathematics II

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX					
5	Cognition	5.1	Confidence in Problem Solving	x	x	x	x	x	x
		5.2	Evaluation	x	x	x	x	x	x
		5.3	Technology	x	x	x	x	x	x
		5.4	Application	x	x	x	x	x	x
		5.5	Evaluation of Reasonableness	x	x	x	x	x	x
		5.6	Modelling	x	x	x	x	x	x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x	x
		6.2	Decision Making	x	x	x	x	x	x
		6.3	Real World Issues	x	x	x	x	x	x
		6.4	Lifelong Skills	x	x		x	x	
CONTENT STRUCTURE		Number Sense		x					
		Geometry and Measurement			x				
		Trigonometry				x			
		Data Handling					x		
		Algebra						x	
		Functions and Graphs							x
		MODULES		A	B	C	D	E	F

MODULE KEY

A - Number Sense

B - Geometry and Measurement

C - Trigonometry

D - Data Handling

E - Algebra

F - Functions and Graphs

(page 2 of 2)

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS II

Sequence Reference: MT3052INT-A

Module Title: Number Sense

Senior School Level

Number of Periods: 10 double periods

S1	S2	S3	S4
☐	☐	☒	☐

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.7 Acquisition
- 4.1, 4.3, 4.4, 4.5, 4.6 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Appreciation

Content Focus

- Logic
- Algebra

Curriculum Objectives:

Content Detail:

At the end of this module, students will:

- apply elementary logic to reason, and communicate using:
 - valid arguments
 - biconditionals and definitions
 - negations
 - inferences
- explore radicals
- evaluate the real number system, including the hierarchy of real numbers and ordering
- create and solve problems related to real-world situations
 - financial management (personal and business)
 - investing
 - borrowing (mortgages and loans)
 - renting and buying a home
- use technology tools appropriately

- number systems
- negation, conjunction and disjunction, use of truth tables
- inductive and deductive reasoning
- hypothesis and conclusion
- proofs
- fractional exponents
- operations on radical expression
- complex numbers
- radical equations

Module Evaluation:

- **Performance Assessments:**
 - performance-based tests
 - investigative tasks and presentations
 - problem solving tasks (oral and written explanations of process)
- **Product Assessments:**
 - project
 - portfolio (selected works and journal writings)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- rules for exponents

Special Resources

(materials, equipment & community involvement):

- financial analyst
- business managers
- accountants
- local and foreign publications
- technology tools
- appropriate computer software
- graphing calculators

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS II		Sequence Reference: MT3052INT-B			
Module Title: Geometry/Measurement		Senior School Level			
Number of Periods: 12 double periods		S1	S2	S3	S4
		☐	☐	☒	☐
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4 Structure 3.1, 3.2, 3.3, 3.5 Acquisition 4.1, 4.2, 4.3, 4.4, 4.6 Communication 5.1, 5.2, 5.3, 5.4, 5.5 Cognition 6.1, 6.2, 6.3, 6.4 Appreciation		Content Focus - Geometry - Measurement - Vectors - Matrices			
Curriculum Objectives:		Content Detail:			
At the end of this module, students will: - determine proofs and deductions related to geometric figures - use technology to test conjectures and solve problems - apply measurement concepts and vectors for the solution of real world problems - represent and transform objects, using matrices - find the inner and cross products of two vectors - determine whether two vectors are perpendicular		- proofs and deductions using congruency - isosceles triangles, median, altitudes - constructions involving triangles - proofs and deductions, involving parallel lines and polygons - transformations - ratio, proportion and similarity - right triangles and the Pythagorean theorem - chord and tangent properties of circles - sectors, arc length and area of circles - measurement properties of 2-D shapes and 3-D objects - locus			
Module Evaluation:					
Performance Assessments: - models - oral and written reports - scale drawings - group investigation - geometry lab Product Assessments: - lab report - project (topics to connect geometric, trigonometric and measurement concepts) Written Assessments: - formative assessments and assignments					
Prerequisite Skill Areas			Special Resources		
(if any):			(materials, equipment & community involvement):		
understanding of deductive reasoning using geometric properties for simple proofs and calculations			- architectural and mechanical draftsman - CAD software - electrical and motor engineers - geometer sketchpad and other software - graphing calculator 3-D models		

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS II

Sequence Reference: MT3052INT-C

Module Title: Trigonometry

Senior School Level

S1	S2	S3	S4
☐	☐	☒	☐

Number of Periods: 8 double periods

Subgoal Emphasis:

- | | |
|--------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.2, 2.3, 2.5 | Structure |
| • 3.2, 3.3, 3.5, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.5, 4.6 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3 | Application |

Content Focus

- Trigonometry
- Coordinate Geometry

Curriculum Objectives:

At the end of this module, students will:

- convert from degree measure to radian measure and vice versa
- perform applications in solving periodic motion
- use technology tools to investigate properties of circular functions and their graphs
- investigate sine and cosine identities
- solve problems related to real-world situations

Content Detail:

- angles in a co-ordinate system
- degrees and radians
- arc length
- unit circle
- trigonometric functions of an acute angle
- trigonometric functions of any angle
- graphs of sine, cosine and tangent functions
-

Module Evaluation:

- **Performance Assessments:**
 - performance-based assessments
 - oral and written presentations
 - group investigations
 - lab (scale drawings)
- **Product Assessments:**
 - project (topic to connect geometric, trigonometric and measurement concepts)
 - models
 - portfolio (a collection of selected works and journal writings)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- familiarity with right-angled triangle trigonometry
- Integrated Mathematics II - Module B

Special Resources

(materials, equipment & community involvement):

- visit to electrical technology shops
 - alternating current wave forms
 - electric circuits
- surveyor
- works and engineering representatives
- navigator

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.
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- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

REFERENCES - STUDENT:

- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS II

Sequence Reference: MT3052INT-D

Module Title: Data Handling

Senior School Level

S1	S2	S3	S4
☐	☐	☒	☐

Number of Periods: 13 Double periods

Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.2, 2.3, 2.4, 2.5 Structure
- 3.1, 3.2, 3.3, 3.4, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication
- 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Algebra
- Statistics
- Probability

Curriculum Objectives:

At the end of this module, students will:

- use descriptive statistics appropriately
- solve probability problems ("or", "and")
- investigate theoretical probability, conditional probability
- explore components of inferential statistics: describe a set of frequency distribution data by spread, skewness, symmetry and number of modes
- use technology to explore simulations for determining experimental probabilities

Content Detail:

- representation of data using descriptive statistics
- measure of location, mean, median, mode
- measure of dispersion, variance and standard deviation
- probability by experiment (conditional and independent)
- Tree diagrams
- probability (and/or and at least)
- normal distribution
- sampling
- permutations and combinations

Module Evaluation:

- **Performance Assessments:**
 - performance-based assessments
 - lab
 - oral and written presentations
- **Product Assessments:**
 - project (collection, organisation, representation and analysis of data to answer a meaningful question)
 - portfolio (selected works and journal writings)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- familiarity with basic descriptive statistics
- creating and interpreting statistical graphs
- familiarity with basic probability concepts

Special Resources

(materials, equipment & community involvement):

- data charts from agriculture, business, science, industrial quality control, psychology, sociology, government, information sciences
- Census 2000 report
- Internet (see appendix)

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.
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- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

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- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS II	Sequence Reference: MT3052INT-E								
Module Title: Algebra	Senior School Level <table border="1"><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr><tr><td>☐</td><td>☐</td><td>☒</td><td>☐</td></tr></table>	S1	S2	S3	S4	☐	☐	☒	☐
S1	S2	S3	S4						
☐	☐	☒	☐						
Number of Periods: 17 double periods									
Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.3, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application	Content Focus - Algebra - Graphing								
Curriculum Objectives: At the end of this module, students will: - factor polynomials up to three terms, using combinations of techniques - add, subtract, multiply and divide rational expressions with polynomial denominators - simplify algebraic complex fractions - solve rational equations and test for extraneous roots - solve quadratic equations by symbolic, graphical and numerical methods and apply each method when appropriate - solve systems of equations using symbolic, numeric and graphical methods and describe the relationships among the methods - use matrix algebra to solve systems of equations - use equations to solve a variety of problems and determine if the solutions are reasonable, within the context of the problem	Content Detail: - polynomials - graphical representation, showing boundaries or regions - quadratic equations (solve using a variety of methods) - appropriate technology - systems of linear equations in two variables - graphing - substitution - addition and multiplication - appropriate technology - matrix algebra - problem solving								
Module Evaluation Performance Assessments: - investigative tasks - algebra labs Product Assessments: - project, portfolio (selected works and journal writings) Written Assessments: - formative assessments and assignments:									
Prerequisite Skill Areas (if any): - Integrated Mathematics 1- module E (Algebra) - sketching graphs of linear functions - matrices	Special Resources (materials, equipment & community involvement): - business and banking representatives - magazines and journals - lecturers from the Bermuda College - graphing calculator - appropriate technology								

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.
- The National Council of Teachers of Mathematics. Addenda Series Grades 9-12, A Core Curriculum. Reston, Va: NCTM, 1992.
- The National Council of Teachers of Mathematics. Curriculum and Evaluation, Standards for School Mathematics. Reston, Va: NCTM, 1989.
- The National Council of Teachers of Mathematics. Principles and Standards for School Mathematics (Draft). Reston, Va. NCTM, 1998.

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- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.

*Recommended text

MATHEMATICS

Course Title: INTEGRATED MATHEMATICS II

Sequence Reference: MT3052INT-F

Module Title: Functions and Graphs

Senior School Level

S1	S2	S3	S4
☐	☐	☒	☐

Number of Periods: 15 double periods

Subgoal Emphasis:

- | | |
|-------------------------------------|---------------|
| • 1.1, 1.2, 1.3 | Appreciation |
| • 2.1, 2.3, 2.4, 2.5 | Structure |
| • 3.1, 3.2, 3.3, 3.4, 3.6, 3.7 | Acquisition |
| • 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 | Communication |
| • 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 | Cognition |
| • 6.1, 6.2, 6.3 | Appreciation |

Content Focus

- Algebra
- Functions
- Graphs

Curriculum Objectives:

At the end of this module, students will:

- determine the equation of a relationship, given its graph
- express variations in the form of equations (direct, inverse, joint, combination)
- solve problems involving variations
- identify maximum and minimum values of functions and use them in applications
- solve problems involving arithmetic and geometric sequences, series and their properties
- examine and apply functions and their graphs
- find the inverses of a function
- model and solve real-world problems using graphical methods

Content Detail:

- functions of polynomial and rational expression
- domain and range of functions
 - constant, linear and quadratic, square root,
 - reciprocal and absolute value functions
- quadratic relations centred at the origin
- graphs of functions
- algebra of functions - operations
- composite and inverse functions
- exponential and logarithmic functions
- arithmetic and geometric series
- Fibonnaci Series
- binomial expansion

Module Evaluation:

- **Performance Assessments:**
 - investigative tasks
 - presentation of project
 - cooperative group work
- **Product Assessments:**
 - project (a collection of selected works and journal writings)
 - problem solving (activities to be based on authentic data)
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- familiarity with linear functions and the rectangular co-ordinate system

Special Resources

(materials, equipment & community involvement):

- accountants, insurance agent and banking representatives
- financial analyst
- meteorologist

GLOSSARY:

- refer to text

REFERENCES - TEACHER:

- Bauer, G., Lotl, J. et al. SIMMS Integrated Mathematics. Texas: Simon and Schuster.
- Bumby, Douglas, et al. Integrated Mathematics, Course 3. Ohio: Glencoe, 1995.
- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Coxford, Fey, J. et al. Contemporary Mathematics in Context: The Core-Plus Mathematics Project. Chicago: Everyday Learning Corporation, 1998.
- Ellis, June et al. Math Connections: A Secondary Mathematics Core Curriculum. New York: It's About Time, 1998.
- Lynch, C. and Olmstead, E.. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.
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- Centre for Occupational Research and Development (CORD). Applied Mathematics. Texas: CORD.
- Lynch, C. and Olmstead, E. Mathmatters: An Integrated Approach. Ohio: Southwestern, 1999.
- *Rubenstein. R. et al. Integrated Mathematics 3. Illinois: McDougal Littell, 1998.

*Recommended text

Introductory Calculus

Course Code: MT4080CAL



MINISTRY OF EDUCATION

Bermuda

2000

SENIOR SCHOOL MATHEMATICS COURSE OVERVIEW

Title: Introductory Calculus

2 credit (s)

60 hour (s)

Prerequisite (s): Integrated Mathematics II

S4 level (s)

Course Code: MT4080CAL

☐ required or ☒ elective

Course Description

This course is designed to introduce students to the mathematics of motion and change. It is expected that they will have studied advanced mathematical concepts and the emphasis will be placed on using limits to test functions for continuity. Students will be assisted in gaining conceptual understanding by reviewing real life situations through graphical, numerical and algebraic representations of limits, derivatives and integrals. This course is appropriate for students who wish to pursue a career in a mathematical or scientific field.

Course Requirements

Students are required to maintain a journal in which they record their thoughts, understandings of mathematical concepts and their questions. They are encouraged to keep a portfolio, which should reflect representative samples of their work, collected over a period of time. Reflections, portfolios and self-tests will assist the students in keeping a record of what they have learned, their difficulties and successes.

The requirements for this course are as follows:

Performance and Assessments: - lab reports; problem solving tasks - debates; presentations - investigations	20%
Product Assessments: - comprehensive assessments including written tests and projects - portfolios	30%
Written Assessments: - formative assessments and assignments	10%
Final Examination	40%
Total	100%

Course Resources

Bleau, B.L. Forgotten Calculus. New York: Barron's Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

Course Outline

Module Title	# Double Periods	Module Title	# Double Periods
A. Algebra Review.....	5	B. Differentiation.....	8
- exponents		- limits and continuity	
- multiplying and factoring		- average rates of change	
- equations		- differentiation using limits	
- inequalities and interval notation		- power and sum-difference rules	
- graphs and functions		- rates of change	
- straight lines and linear functions		- product and quotient rules	
- rational, absolute – value and square-root functions		- the chain rule	
- mathematical modelling		- higher-order derivatives	
C. Applications of Differentiation.....	9	D. Exponential and Logarithmic Functions	6
- absolute and relative maxima and minima		- exponential functions	
- first and second derivative tests		- logarithmic function	
- business, economic and engineering applications		- applications to growth and decay	
- differentials		- derivatives of such functions	
- implicit differentiation			
- related rates			
E. Integration.....	10		
- the anti-derivative			
- area			
- the definite integral: area between curves			
- technique of substitution			
- areas as the limit of sums			
- volumes of solids of revolution			

Subtotal	38
Optional double periods	7
Total double periods	45

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☐ S3 ☐ S4 ☒

Introductory Calculus

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX				
1	Appreciation	1.1	Interrelationships	x	x	x	x	x
		1.2	Successful Experiences	x	x	x	x	x
		1.3	Significance	x	x	x	x	x
2	Structure	2.1	Comparison	x	x	x	x	x
		2.2	Appreciation	x		x		x
		2.3	Evaluation	x				
		2.4	Generalization	x	x	x	x	x
		2.5	Interpretation	x	x	x	x	x
3	Acquisition	3.1	Application of Number Concepts	x	x	x	x	x
		3.2	Estimation					
		3.3	Multiple Representations	x	x	x	x	x
		3.4	Data Handling	x	x	x	x	x
		3.5	Geometric and Measurement Properties					
		3.6	Algebraic Procedures	x	x	x	x	x
		3.7	Technology	x	x	x	x	x
4	Communication	4.1	Ideas and Concepts	x	x	x	x	x
		4.2	Formulae and Terminology	x	x	x	x	x
		4.3	Oral/Written		x	x	x	x
		4.4	Generalization	x	x	x	x	x
		4.5	Symbolic notation	x	x	x	x	x
		4.6	Manipulatives and Technology	x	x	x	x	x
		4.7	Evaluation			x	x	x
CONTENT STRUCTURE		Algebra Review		x				
		Differentiation			x			
		Applications of Differentiation				x		
		Exponential and Logarithmic Functions					x	
		Integration						x
		MODULES		A	B	C	D	E

MODULE KEY

A - Algebra Review

B - Differentiation

C - Applications of Differentiation

D - Exponential and Logarithmic Functions

E - Integration

(page 1 of 2)

SENIOR SCHOOL MATHEMATICS

check one: S1 ☐ S2 ☐ S3 ☐ S4 ☒

Introductory Calculus

GOALS		SUBGOALS		MODULE & CURRICULUM CORRELATION MATRIX				
5	Cognition	5.1	Confidence in Problem Solving	x	x	x	x	x
		5.2	Evaluation			x		x
		5.3	Technology	x	x	x	x	x
		5.4	Application	x	x	x	x	x
		5.5	Evaluation of Reasonableness	x	x	x	x	x
		5.6	Modelling	x	x	x	x	x
6	Application	6.1	Problem Solving Strategies	x	x	x	x	x
		6.2	Decision Making	x	x	x	x	x
		6.3	Real World Issues	x	x	x	x	x
		6.4	Lifelong Skills	x	x	x	x	x
CONTENT STRUCTURE		Algebra Review		x				
		Differentiation			x			
		Applications of Differentiation				x		
		Exponential and Logarithmic Functions					x	
		Integration						x
		MODULES		A	B	C	D	E

MODULE KEY

A - Algebra Review
 B - Differentiation
 C - Applications of Differentiation

D - Exponential and Logarithmic Functions
 E - Integration

(page 2 of 2)

MATHEMATICS				
Course Title: INTRODUCTORY CALCULUS		Sequence Reference: MT4080CAL- A		
Module Title: Algebra Review		Senior School Level		
Number of Periods: 5 double periods		S1 ☐	S2 ☐	S3 ☐
		S4 ☒		
Goal and Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.3, 2.4, 2.5 Structure 3.1, 3.3, 3.4, 3.6, 3.7 Acquisition 4.1, 4.2, 4.4, 4.5, 4.6 Communication 5.1, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		Content Focus - Algebra - Graphs - Functions		
Curriculum Objectives:		Content Detail:		
At the end of this module, students will: - review the laws of indices - expand polynomials - factorise polynomials - solve equations of first and second degrees - solve inequalities - investigate linear functions - analyze rational, absolute-value and square-root functions - analyze mathematical modelling		- forming expressions - evaluating expressions - polynomials (multiplication) - inequalities and interval notation - factors (expansion) - equations of first and second degrees - straight lines and linear functions - evaluating parabolas - rational, absolute-value and square-root functions - mathematical modelling		
Module Evaluation:				
Performance Assessments: - cooperative learning groups and presentations - written assignments/worksheets - performance-based tests - create original formulae (problem-solving) Product Assessments: - projects - investigations (written reports) - problem solving tasks Written Assessments: - formative assessments and assignments				
Prerequisite Skill Areas (if any):		Special Resources (materials, equipment & community involvement):		
- number sense and basic algebra - introduction to modelling		- appropriate computer and software - graphic calculator - communication experts etc. - Internet (see appendix)		

GLOSSARY:

- polynomial of function of degree “n”
- modelling
- common or ‘Shouting’ Factor
- rational, absolute – value
- square root functions
- parabola
- hyperbola
- first degree equation
- second degree equation

REFERENCES - TEACHER:

Bleau, B.L. Forgotten Calculus. New York: Barron’s Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

REFERENCES - STUDENT:

Bleau, B.L. Forgotten Calculus. New York: Barron’s Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

MATHEMATICS

Course Title: INTRODUCTORY CALCULUS

Sequence Reference: MT4080CAL-B

Module Title: Differentiation

Senior School Level

Number of Periods: 8 double periods

S1	S2	S3	S4
☐	☐	☐	☒

Goal and Subgoal Emphasis:

- 1.1, 1.2, 1.3 Appreciation
- 2.1, 2.4, 2.5 Structure
- 3.1, 3.3, 3.4, 3.6, 3.7 Acquisition
- 4.1, 4.2, 4.3, 4.4, 4.5, 4.6 Communication
- 5.1, 5.3, 5.4, 5.5, 5.6 Cognition
- 6.1, 6.2, 6.3, 6.4 Application

Content Focus

- Algebra
- Differentiation

Curriculum Objectives:

At the end of this module, students will:

- define limits
- apply the properties of limits
- analyze average rates of change
- differentiate, using limits
- differentiate, using the product and quotient rules
- apply the chain rule
- differentiate higher-order functions

Content Detail:

- introduction
- properties of limits
- gradient and velocity-instantaneous rate of change
- differentiation, using limits
- continuity – definition and properties
- product and quotient rules
- continuity (one-sided and closed)
- instantaneous rate of change
- related rates
- the chain rule
- higher-order derivatives

Module Evaluation:

- **Performance Assessments:**
 - cooperative learning groups and presentations
 - written assignments/worksheets
 - performance-based tests
 - create original formulae (problem-solving)
 - experiments and analysis
- **Product Assessments:**
 - projects
 - investigations (written reports)
 - problem solving tasks
- **Written Assessments:**
 - formative assessments and assignments

Prerequisite Skill Areas

(if any):

- Completion of Integrated Mathematics II or equivalent, including:
 - coordinate systems
 - symmetry
 - functions and their graphs
 - graphs of equations
 - intersection of graphs

Special Resources

(materials, equipment & community involvement):

- appropriate computer software
- graphic calculator
- Internet (see appendix)

GLOSSARY:

- limits
- existence or non-existence of the limit
- infinite limits: vertical asymptotes
- limits at infinity: horizontal asymptotes
- continuity
- one-sided continuity
- closed interval
- composite functions
- derivative
- instantaneous rate of change
- related rates
- concavity
- tangent

REFERENCES - TEACHER:

Bleau, B.L. Forgotten Calculus. New York: Barron's Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

REFERENCES - STUDENT:

Bleau, B.L. Forgotten Calculus. New York: Barron's Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

MATHEMATICS					
Course Title: INTRODUCTORY CALCULUS		Sequence Reference: MT4080CAL-C			
Module Title: Applications of Differentiation		Senior School Level			
Number of Periods: 9 double periods		S1	S2	S3	S4
		☐	☐	☐	☒
Goal and Subgoal Emphasis:		Content Focus			
1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.4, 2.5 Structure 3.1, 3.3, 3.4, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		- Algebra - Graphing - Differentiation			
Curriculum Objectives:		Content Detail:			
At the end of this module, students will: - define absolute and relative maxima and minima - test absolute and relative maxima and minima - differentiate, using business, economic and engineering applications - approximate, using differentials - apply implicit differentiation (business, economics, engineering) - apply related rates - use appropriate technology tools		- maximum and minimum problem - first and second derivative testing - operations on differentials - application of implicit differentiation (business, economic and engineering applications) - application of related rates			
Module Evaluation:					
Performance Assessments: - cooperative learning groups and presentations - presentation of reports - performance-based tests - create original formulae (problem-solving) - application of derivatives including written reports, visual display, oral report or multi-media presentation Product Assessments: - projects - investigations (written reports) - problem solving tasks Written Assessments: - formative assessments and assignments					
Prerequisite Skill Areas			Special Resources		
(if any):			(materials, equipment & community involvement):		
- Completion of Integrated Mathematics II or equivalent, including: - coordinate systems - symmetry - functions and their graphs - graphs of equations - intersection of graphs			- appropriate computer software - graphing calculator - Internet (see appendix) - financial analyst - insurance underwriter - college lecturer (mathematics)		

GLOSSARY:

- Relative Extreme
- Absolute Extreme
- Maximum Value
- Minimum Value
- Differentials
- Implicit differentiation
- Concavity
- Average speed (velocity)

REFERENCES - TEACHER:

Bleau, B.L. Forgotten Calculus. New York: Barron's Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

REFERENCES - STUDENT:

Bleau, B.L. Forgotten Calculus. New York: Barron's Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

MATHEMATICS

Course Title: INTRODUCTORY CALCULUS	Sequence Reference: MT4080CAL-D								
Module Title: Exponential and Logarithmic Functions	Senior School Level <table><tr><td>S1</td><td>S2</td><td>S3</td><td>S4</td></tr><tr><td>☐</td><td>☐</td><td>☐</td><td>☒</td></tr></table>	S1	S2	S3	S4	☐	☐	☐	☒
S1	S2	S3	S4						
☐	☐	☐	☒						
Number of Periods: 6 double periods									
Goal and Subgoal Emphasis: 1.1, 1.2, 1.3 Appreciation 2.1, 2.4, 2.5 Structure 3.1, 3.3, 3.4, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application	Content Focus - Functions - Graphs								
Curriculum Objectives:	Content Detail:								
At the end of this module, students will: - explore power and exponential functions - differentiate exponential functions - apply exponential functions - differentiate logarithmic functions - apply exponential and logarithmic functions to growth and decay	- power function - exponential function and derivatives - the number e - exponential rule - logarithmic functions and derivatives - natural logarithm - application to growth and decay								
Module Evaluation:									
Performance Assessments: - cooperative learning groups and presentations - written assignments/worksheets - performance-based tests - create original formulae (problem-solving) Product Assessments: - projects - investigations (written reports) - problem solving tasks Written Assessments: - formative assessments and assignments									
Prerequisite Skill Areas (if any):	Special Resources (materials, equipment & community involvement):								
- optimization revisited (determining maximum and minimum values) - logarithms - laws of indices	- appropriate computer software - graphing calculator - Internet (see appendix)								

GLOSSARY:

- Power Function – $f(x) = x^n$, n a real number
- Exponential Function – $F(x) = b^x$, b a real number, $b > 0$
- The number e – like π it is an irrational number
- The graph of $f(x) = e^x$
- Exponential Rule – If $f(x) = e^{u(x)}$, where $u(x)$ is a function of x , then $f'(x) = u'(x)e^{u(x)}$
- Optimization – determining maximum and minimum values
- Logarithmic Function
- The Natural Logarithm
- Logarithmic Rule – If $f(x) = \ln u(x)$, then $f'(x) = \frac{u'(x)}{u(x)}$

REFERENCES - TEACHER:

Bleau, B.L. Forgotten Calculus. New York: Barron's Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

REFERENCES - STUDENT:

Bleau, B.L. Forgotten Calculus. New York: Barron's Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

MATHEMATICS					
Course Title: INTRODUCTORY CALCULUS		Sequence Reference: MT4080CAL-E			
Module Title: Integration		Senior School Level			
Number of Periods: 10 double periods		S1	S2	S3	S4
		☐	☐	☐	☒
Goal and Subgoal Emphasis:		Content Focus			
1.1, 1.2, 1.3 Appreciation 2.1, 2.2, 2.4, 2.5 Structure 3.1, 3.3, 3.4, 3.6, 3.7 Acquisition 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7 Communication 5.1, 5.2, 5.3, 5.4, 5.5, 5.6 Cognition 6.1, 6.2, 6.3, 6.4 Application		- The Antiderivative - Definite Integrals			
Curriculum Objectives:		Content Detail:			
At the end of this module, students will:					
- examine antiderivatives - evaluate functions using antiderivatives - apply antiderivatives to real-life situations, eg. business and science - apply definite integrals to measurement problems - area - volume of solids of revolution - determine area as the limit of sum		- definition and notation of antiderivative - antiderivatives of functions - antiderivative of x^{-1} - definite integral - area under a curve - properties of the definite integral - change of variable in a definite integral - applications of integration (volumes)			
Module Evaluation:					
Performance Assessments: - cooperative learning groups and presentations - written assignments/worksheets - performance-based tests - create original formulae (problem-solving) Product Assessments: - projects - investigations (written reports) - problem solving tasks Written Assessments: - formative assessments and assignments					
Prerequisite Skill Areas			Special Resources		
(if any):			(materials, equipment & community involvement):		
Introductory Calculus - Modules B, C and D			- appropriate computer software - graphing calculator - Internet (see appendix)		

GLOSSARY:

- Power Function – $f(x) = x^n$, n a real number
- Exponential Function – $F(x) = b^x$, b a real number, $b > 0$
- The number e – like π it is an irrational number
- The graph of $f(x) = e^x$
- Exponential Rule – If $f(x) = e^{u(x)}$, where $u(x)$ is a function of x , then $f'(x) = u'(x)e^{u(x)}$
- Optimization – determining maximum and minimum values
- Logarithmic Function
- The Natural Logarithm
- Logarithmic Rule – If $f(x) = \ln u(x)$, then $f'(x) = \frac{u'(x)}{u(x)}$

REFERENCES - TEACHER:

Bleau, B.L. Forgotten Calculus. New York: Barron's Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

REFERENCES - STUDENT:

Bleau, B.L. Forgotten Calculus. New York: Barron's Educational Series, Inc. 1994

*Smith, R. and Mentors, R. Calculus. Ohio: Glencoe/McGraw Hill, 2000.

*Recommended Text

EXEMPLAR SCORING GUIDE (0 - 4 Scale)

		EQUIVALENT	
Level	Definition	Letter	% mark
4	An excellent performance • focuses on the purpose of the task • meets or exceeds all the requirements of the task • organizes content and ideas in a logical way • presents information clearly • includes appropriate detail to support ideas or conclusions • demonstrates creativity, originality and/or initiative	A	90-100
3	A good performance • focuses on purpose of the task • meets all the requirements of the task • organizes content and ideas in a logical way • presents information clearly • includes some detail to support ideas or conclusions	B	80-89
2	A fair performance • has some awareness of the purpose of the task • meets most of the requirements of the task • organizes content and ideas in a logical way • presents information in an understandable way • may not include significant details to support ideas or conclusions	C	70-79
1 (R)	A poor performance • does not fit the purpose of the task • does not meet the requirements of the task • presents information in an unorganized or confused way • does not include details to support ideas or conclusions • Remediation required.	D	60-69
0 (R)	An unscorable performance • does not demonstrate the required knowledge, skills or capabilities • is not understandable, is incomplete or 'defiant' (e.g. "I won't do this"). • Extensive remediation is required.	F	Below 60

'R' – Extensive Remediation required: student may need to repeat or restart work, or teaching method may need to be altered.

An '0' student may be one who refuses to work or needs specialist help.

* Adapted from British Columbia

Senior School Mathematics

Assessment Practices

Assessment is the obtaining of information about skills and potentials of individuals, with dual goals of providing useful feedback to the individual and helpful data to the surrounding community. (H. Gardner, 1992)

Students should be given ample opportunity to demonstrate their mathematical understanding through a variety of procedures, including investigations, projects, portfolios, discussions, interviews, presentations and written tests. Using these strategies, teachers can assess students' mathematical knowledge and ability in order to determine growth and development. The assessment instruments should be designed to measure the extent to which students understand concepts, apply skills, interpret data and communicate outcomes. These assessment opportunities should be balanced and aligned with the mathematics curriculum goals and objectives. A balanced assessment programme should include individuals or small groups working on short and extended tasks that are structured or open-ended.

Assessment is authentic when it matches instruction and involves students in the kinds of activities they will find outside of the classroom. It is suggested that teachers use rubrics to describe the content and quality of students' performances on problem solving tasks or projects. Rubrics are used to guide teachers and students as they examine:

- knowledge of mathematical principles and concepts which result in correct responses
- inclusion of important elements of the task, for example, the use of diagrams, graphs, models and symbols
- written explanation and rationale for the process

The criteria for a general scoring rubric is outlined on the following page.

The Final Examination - Suggested Format

The assessment items should provide the students with an opportunity to apply their knowledge and skills across the content and processes defined in the senior school curriculum. The design of the assessment is outlined below:

1. Question items should be based on text prompts, the context of which should be familiar to students in Bermuda.
2. Content will include aspects of number sense, space and shape, data handling, relationships and algebra.
3. Mathematical processes will include problem solving, reasoning, decision-making and communicating. Students will be required to:
4.
 - model and formulate information
 - transform and manipulate data
 - infer and draw conclusions
 - check and evaluate the results
 - report their outcomes
5. A variety of free-response questions should be offered - routine, non-routine and open-ended.
6. The recommended time for the final examination is 1½ hours.
7. Students should work individually to complete the tasks.
8. A rubric should be used to score the responses. (see *General Scoring Rubric*)

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General Scoring Rubric

Level	General Criteria	Specific Criteria
4 EXPERT	• shows complete understanding of ideas and mathematical processes • solution is correct • uses appropriate strategies • clear accurate explanation including use of diagrams, where appropriate • goes beyond requirement of problem	
3 PRACTITIONER	• shows understanding of ideas and mathematical processes • uses appropriate strategies • computation is mostly correct • explanation lacks clarity • diagram/table/chart is mostly accurate • satisfies requirements of the problem	
2 APPRENTICE	• shows some evidence of conceptual understanding • may not use appropriate strategies • computation is mostly correct • written explanation may be difficult to interpret • satisfies some requirements	
1 NOVICE	• shows minimal understanding • may not use appropriate strategies • computation is incorrect • written explanation is not satisfactory • diagram/table/chart is not accurate	
0	• no attempt to solve the problem	

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Scoring Rubric for Projects

Level	25	Description
Superior	20-25	- Shows thorough understanding of the question and concepts studied - Uses exemplary strategies of investigation - Conclusions presented are correct and substantiated by the study - Written report is exemplary - Diagram/tables/charts/graphs are accurate and appropriate - Goes beyond requirements of an effective study
Acceptable	15-19	- Shows understanding of the questions and concepts studied - Uses appropriate strategies of investigation - Conclusions presented are correct and mostly substantiated by the study - Written report is effective - Diagrams/tables/charts/graphs are accurate but inappropriate - Satisfies all requirements of an effective study
Revision needed	10-14	- Shows understanding of most questions and concepts studied - Most investigation strategies used are appropriate - Conclusions presented are mostly correct but not substantiated by the study - Written report is mostly effective - Diagrams/tables/charts/graphs are mostly accurate but may be inappropriate - Satisfies most requirements of an effective study
Restart	0-9	- Shows little or no understanding of the questions and concepts studied - Often used inappropriate strategies of investigation - Conclusions presented are mostly incorrect - Written report is mostly ineffective - Diagrams/tables/charts/graphs are mostly inaccurate and inappropriate - Does not satisfy requirements of an effective study

Adapted from Alternative Assessment in the Mathematics Classroom, Glencoe, McGraw-Hill Publications.

Investigations or Projects *An Implementation Guide*

Outcome:

The investigation or project provides an opportunity for the students to grow intellectually by learning how to define problems, conduct research and draw conclusions. These activities are generally long term - two to four months. Planning is required by both students and teacher. Regular meetings should be held to monitor progress.

Topics

The teacher may propose a list of topics related to careers, home management, sports or other disciplines. The students may construct, build, draw or write about:

- designing a
 - city, playground or bedroom
 - scoring system for sports day or math-a-thon
 - board game
- conducting a survey and trend analysis of
 - popular running shoes
 - career opportunities in Bermuda
- conducting research on
 - mathematics and music
 - history of mathematics
 - Mobius Strip
 - Magic Squares

Helpful hints:

1. Students should be encouraged to use:
 - information technology to store, present and analyze data
 - design technology to construct models
 - resource persons - engineers, architects, retailers, managers, educators etc..(see *Evaluating the Research Project* and *Scoring Rubrics for Projects*)
2. Students may work in groups to collect and discuss data but each student must design, develop and present his/her own project.
3. Planning suggestions:

Identification of topic	January
Outline of relevant mathematics, data collection process, special resources, interviews	February
Collection of data	March
First draft	April (first week)
Final report	April (last week)

(See the *Organizational Chart* for students)

**Evaluating the Research Project
A Rating Scale**

Criteria	5	4	3	2	1
Methods of collecting data are appropriate					
Variety of resources used					
Calculations are accurate					
Charts, graphs etc. used to display data are appropriate					
Graphs/pictorial representations are accurate					
Description regarding data collection methods, findings and conclusions are clear and logical					
Conclusions are valid, based on data					
Research and findings are logically presented					
Effective methods used to organize and display data and findings					
Adequate justifications are given for methods, findings and conclusions					
Ideas communicated in a clear, logical and understandable fashion					
Presentation to class delivered in a clear and logical manner					

Key:

5 - Excellent

4 - Good

3 - Average

2 - Needs some improvement

1 - Needs Complete Review

Adapted from British Columbia Mathematics: Integrated Resource Package 1996

Planning for Assessment

Teachers are encouraged to record the outcome of any assessment procedures used to determine whether or not students have achieved the objectives of each module.

Course: Foundations of Mathematics

Sample

MODULE	Lab/Activity	Tests or Examination	Interview	Investigation or Project	Presentation
E. Algebra	3/11/99 - simplifying algebraic expressions - hands-on helped understanding	12/12/99 - all topics - students created word problems that can be solved algebraically - class av. 76%	—	—	4/10/99 - group work - history of algebra - Internet use - collaboration - satisfactory progress

MODULE	Percentage of Learning Time	Lab or Activity	Written Tests or Examination	Interview or Oral question	Investigation or Project	Presentation	Goals met
A. Number Sense	14%						
B. Geometry and Measurement	22%						
C. Trigonometry	5%						
D. Data Handling	17%						
E. Algebra	25%						
F. Function and Graphs	17%						

Planning for Assessment

Teachers are encouraged to record the outcome of any assessment procedures used to determine whether or not students have achieved the objectives of each module.

Course: Mathematics Laboratory
Sample

MODULE	Lab/Activity	Tests or Examination	Interview	Investigation or Project	Presentation
E. Algebra	3/11/98 - simplifying algebraic expressions - hands-on helped understanding	12/12/98 - all topics - students created word problems that can be solved algebraically - class av. 82%	—	—	4/10/98 - group work - history of algebra - Internet use - collaboration - excellent progress

MODULE	Percentage of Learning Time	Lab or Activity	Written Tests or Examination	Interview or Oral question	Investigation or Project	Presentation	Goals met
A. Whole Numbers and Decimals	16%						
B. Fractions and Percents	21%						
C. Graphing and Statistics	16%						
D. Algebra	21%						
E. Geometry	13%						
F. Problem Solving	13%						

SENIOR 1 MATHEMATICS CURRICULUM OBJECTIVES AT A GLANCE
FOUNDATIONS OF MATHEMATICS
PACING GUIDE

Objectives	Time/ Minutes	Date Completed	Objectives	Time/ Minutes	Date Completed
A. NUMBER SENSE ☐ use estimation and mental calculation to make decisions about situations that are common in everyday life ☐ demonstrate a proficiency with calculations ☐ apply numbers in various forms, including fractions, decimals, percents and exponential notations ☐ understand the relationships among events, time, distances and velocities ☐ analyze the real number system including the hierarchy of real numbers, the meaning of infinity and ordering B. GEOMETRY AND MEASUREMENT ☐ formulate solutions for problems involving area, perimeter and volume ☐ analyze the use of various systems of measurement ☐ investigate geometric methods to solve problems in the physical world ☐ explore the angles and properties of a circle ☐ compare similar/congruent triangles ☐ appraise spatial and geometric relationships ☐ explore geometric relationships using appropriate software ☐ use manipulatives to solve problems involving design in two dimensions by comparing area and perimeter C. TRIGONOMETRY ☐ identify the sides of a right-angled triangle ☐ distinguish between the use of Pythagorean Theorem and trigonometric ratios by considering parameters ☐ select the appropriate ratio (sine, cosine or tangent) and technology when finding a side of a right-angled triangle ☐ solve practical problems involving trigonometric ratios			D. DATA HANDLING ☐ collect, organize and display real-world data ☐ determine reasonableness of data interpretations ☐ justify the applications of mathematical ideas to surveys and interpretation ☐ design and use experimental and theoretical probability to represent and solve problems involving uncertainty, using technology whenever appropriate ☐ design and execute simple experiments ☐ explore statistical software and spreadsheets E. ALGEBRA ☐ multiply and divide with positive indices (including zero) ☐ interpret negative and fractional indices ☐ represent algebraic expressions in multiple ways (factorizing, expanding and transposing) ☐ generate and solve linear inequalities, linear, and simultaneous equations ☐ use tables, graphs and matrices as tools to interpret expressions, equations and inequalities ☐ explore the process of graphing linear equations or inequalities in two variables as they relate to real world problems F. FUNCTIONS AND GRAPHS ☐ generate the graph of functions using technology ☐ create functions ☐ develop graphical techniques for solving problems ☐ interpret graphs of various functions ☐ appraise numeric, geometric and situation sequences that build to formulas, including those representing patterns		

SENIOR 1 MATHEMATICS CURRICULUM OBJECTIVES AT A GLANCE
MATHEMATICS LABORATORY
PACING GUIDE

Objectives	Time/ Minutes	Date Completed	Objectives	Time/ Minutes	Date Completed
A. WHOLE NUMBERS AND DECIMALS ☐ write numbers as words ☐ round numbers to appropriate values ☐ make appropriate comparisons of numbers ☐ explore number systems ☐ calculate the average of a set of numbers ☐ appropriately use technology B. FRACTIONS AND PERCENTS ☐ perform fractional operations ☐ convert from fractions to decimals and vice-versa ☐ find a percentage of a given quantity ☐ use ratios to compare quantities ☐ use technology appropriately C. GRAPHING AND STATISTICS ☐ interpret tables and charts ☐ use appropriate methods to organize and present data ☐ use technology appropriately ☐ determine and appropriately use measures of central tendency			D. ALGEBRA ☐ simplify algebraic expressions ☐ evaluate algebraic expressions ☐ solve equations ☐ evaluate formulas E. GEOMETRY AND MEASUREMENT ☐ formulate solutions for problems involving area and perimeter ☐ explore the angles and properties of squares, triangles and circles ☐ explore geometric relationship using appropriate software ☐ classify simple shapes in two dimensions and three dimensions ☐ convert units within the metric system ☐ solve problems involving money, time, length etc. F. PROBLEM SOLVING ☐ use appropriate problem solving techniques ☐ use technology tools appropriately ☐ solve problems set in context ☐ solve non-routine problems ☐ explore mathematical games and puzzles		

Mathematics Curriculum Objectives

SENIOR SCHOOL MATHEMATICS OBJECTIVES Foundations of Mathematics – Applied Mathematics IIIB				
SENIOR 1 Foundations of Mathematics	SENIOR 2 Applied Mathematics I	SENIOR 2 Applied Mathematics II	SENIOR 3 OR 4 Applied Mathematics IIIA	SENIOR 3 OR 4 Applied Mathematics IIIB
A: Number Sense (18) • use estimation to make decisions • demonstrate a proficiency with calculations • apply number in various forms • understand the relationship among events, time, distance and velocities • evaluate the real number system	A: Number Sense (10) • use estimation and mental calculations to make decisions about everyday situations • demonstrate a proficiency with calculations • use numbers in their appropriate format • understand relationships among events, time, distances and velocities • distinguish between direct and indirect relationships • solve practical, work related problems • investigate the components of setting up a small business	A: Number Sense (10) • demonstrate a proficiency with calculations • use numbers in their appropriate format • evaluate the real number system including the hierarchy of real numbers and ordering • explore historical aspects of number systems • create and solve complex problems • investigate the mathematics related components of managing a small business	A: Number Sense (6) • explore arithmetic and geometric sequences including finding the n^{th} term • find the position of a given term in an arithmetic and geometric sequence • find arithmetic and geometric means • find the sum of arithmetic and geometric series • explore valid arguments, the bi-conditional, negation and inference	A: Number Sense (5) • formulate the sum of an infinite geometric series • expand powers of binomials, using Pascal's triangle and the binomial theorem • identify specific terms of the binomial expansion • explore "amortization", using basic spreadsheet software • investigate careers that pertain to the content of the module i.e. aviation, physicists, athletes, cook, finance, etc.

() Number of double periods

SENIOR 1 Foundations of Mathematics	SENIOR 2 Applied Mathematics I	SENIOR 2 Applied Mathematics II	SENIOR 3 OR 4 Applied Mathematics IIIA	SENIOR 3 OR 4 Applied Mathematics IIIB
B: Geometry/Measurement (15) • solve problems on perimeter, area and volume • justify the use of various systems of measurement • investigate geometric methods to solve problems • explore the angles and properties of a circle • compare similar/congruent triangles • appraise spatial and geometric relationships	B: Geometry/Measurement (15) • recognize the relationship between angles formed by lines crossing parallel lines • solve problems involving area, perimeter and volume • model real life structure with scale drawings • use Pythagoras Theorem to find the height of an object or distance between two objects • draw auxiliary diagrams to help solve for an unknown dimension or angle • determine point, line and plane symmetry • solve workplace problems in solid geometry • construct congruent geometric figures using reflections, translations and rotations • construct similar geometric figures using dilations	B: Geometry/Measurement (18) • recognize the relationship between angles formed by lines crossing parallel lines • solve problems involving surface area and volume • compare similar and congruent triangles • explore the angles and properties of a circle • add vectors in a coordinate plane • explore applications of resulting vectors • determine the locus of points meeting given conditions • use appropriate software to explore geometrical properties • apply geometric principles to problems found in the workplace (e.g. building, packaging, storage,...)	B: Geometry/Measurement (7) • develop an awareness of the structure of a mathematical system, connecting definitions, postulates, logical reasoning and theorems • make generalizations about geometric properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles • use properties of transformations and their compositions to make connections between mathematics and real world applications • solve problems involving right triangles including triangles whose sides are Pythagorean triples and triangles with angles 45°-45°-90° and 30°-60°-90° • analyze geometric figures using appropriate software • find surface area and volume of prisms, pyramids, spheres, cones and cylinders in problem situations	B: Geometry/Measurement (7) • formulate and test conjectures, about the properties and attributes of circles and the lines that intersect them • use congruence transformation • use appropriate software to explore geometric properties • use vector geometry to solve problems • describe the effect on perimeter area and volume when length, width or height of a three-dimensional solid is changed and apply this idea in solving problems • choose an appropriate network to organize and visually represent information • develop and evaluate optimal solutions, using networks

() Number of double periods

SENIOR 1 Foundations of Mathematics	SENIOR 2 Applied Mathematics I	SENIOR 2 Applied Mathematics II	SENIOR 3 OR 4 Applied Mathematics IIIA	SENIOR 3 OR 4 Applied Mathematics IIIB
C: Trigonometry (4) - identify the sides of a right angle triangle - distinguish between the use of Pythagorean theorem and trigonometric ratios - select the appropriate trigonometric ratio - formulate and solve practical problems	C: Trigonometry (7) - use the characteristics of 'special' right triangles to solve problems - use the ratios for sine, cosine and tangent of an angle to solve problems - understand the graphs of sine and cosine waves	C: Trigonometry (8) - apply the law of sines and cosines when finding an unknown angle or side in a triangle - formulate and solve problems involving 2 and 3 dimensional figures - apply trigonometric ratios to solve problems taken for daily experiences - use technology to investigate trigonometric ratios	C: Trigonometry (5) - apply trigonometric ratios in right triangles to solve problems - understand the graph of sine and cosine waves - apply angle measure including circular measure, and apply it to practical situations	C: Trigonometry (5) - examine the amplitude, wavelength, period and frequency of sine waves - calculate distances and model periodic motion using trigonometric ratios and functions, available through technology - use trigonometric functions to calculate distances, angles and area, including the use of sine rule, cosine rule and area of triangle formula

() Number of double periods

SENIOR 1 Foundations of Mathematics	SENIOR 2 Applied Mathematics I	SENIOR 2 Applied Mathematics II	SENIOR 3 OR 4 Applied Mathematics IIIA	SENIOR 3 OR 4 Applied Mathematics IIIB
D: Data Handling (10) - collect, organize and display real-world data - recognize appropriateness of interpretation of data - justify the application of mathematical ideas to surveys, data and interpretations - design and use experimental and theoretical probability to represent and solve problems - design and execute simple experiments	D: Data Handling (12) - collect, organize and present real-world data - rationalize interpretation of data - design and execute simple probability experiments - draw diagrams and charts to help find probability - create histograms to represent frequency distributions of data - distinguish between measures of central tendency	D: Data Handling (10) - justify the interpretation of data through the application of measures of central tendencies, variances and standard deviation - describe the effect of sample size and population size on the validity of predictions from a set of data - explore statistical software - explore designs of surveys, polls and experiments to assess the validity of their results and to identify potential sources of bias - design and execute simple probability experiments - design a fair game and provide a justification for fairness - use probability to solve problems involving uncertainty	D: Data Handling (6) - design surveys and apply random sampling techniques - describe a set of frequency distribution data by spread and measures of central tendency - interpret information from various graphs including scatter plots to make predictions and/or decisions - determine experimental probabilities using simulations (e.g. random number tables and random functions)	E: Data Handling (8) - analyze information and graphs from journals, newspapers and other sources to determine validity of stated arguments - develop and implement a plan for collecting and analyzing data in order to make decisions - draw histograms to represent frequency distributions of data - interpret the characteristics of a normal curve - analyse numerical data using standard deviation, variability and correlation in order to make inferences - use probability models to describe everyday situations involving chance

SENIOR 1 Foundations of Mathematics	SENIOR 2 Applied Mathematics I	SENIOR 2 Applied Mathematics II	SENIOR 3 OR 4 Applied Mathematics IIIA	SENIOR 3 OR 4 Applied Mathematics IIIB
E: Algebra (18) - multiply and divide with positive indices - interpret negative indices - represent algebraic expressions in multiple ways (factors, expansion and transposing) - generate and solve linear inequalities, equations; matrices; simultaneous and quadratic equations - use tables and graphs as tools to interpret expressions, equations and inequalities - explore the process of graphing linear equations or inequalities in two variables as they relate to real world problems	E: Algebra (18) - perform the four basic operations with signed numbers - generate and solve linear inequalities and equations - generate and solve simultaneous equations - represent algebraic expressions through factorizing and expanding - recognize non-linear equations and become familiar with their graphs - solve problems algebraically - use matrices to represent information - solve quadratic equations	E: Algebra (17) - generate and solve linear inequalities and quadratic equations - represent algebraic expressions through factorizing, collecting like terms and expanding - identify problem situations that lead to linear or quadratic equations and solve by applying appropriate graphical or symbolic methods - use algebraic or graphical methods to solve systems of linear equations and describe relationships between different solution methods	E: Algebra (9) - solve linear, simultaneous and quadratic equations - investigate inequalities - use algebraic and graphical methods to solve systems of linear equations - solve word problems using algebraic procedures - transform polynomial expressions by rearranging and collecting terms, factoring and applying the properties of exponents in order to solve problems	E: Algebra (8) - solve problems by forming equations in terms of two unknowns - solve quadratic equations by factoring, formulas, matrices and graphing - solve linear inequalities in one variable and graph their solutions - solve practical problems using quadratic equations - explore the use of set theory to solve problems

SENIOR 1 Foundations of Mathematics	SENIOR 2 Applied Mathematics I	SENIOR 2 Applied Mathematics II	SENIOR 3 OR 4 Applied Mathematics IIIA	SENIOR 3 OR 4 Applied Mathematics IIIB
F: Functions and Graphs (10) • generate the graph of a function using technology • create functions based on cross-curricular issues • develop graphical techniques for solving problems • interpret graphs of various functions • appraise numeric, geometrical and situational sequences that build to formulas, including those representing patterns	F: Functions and Graphs (13) • represent mathematical relationships as tables of data, ordered pairs, graphs, equations and word sentences • graph linear inequalities	F: Functions and Graphs (12) • distinguish between functions and non-functions • interpret graph of various functions • generate the graph of linear and quadratic function using technology • express variations in the form of equations • graph functions and analyze them to determine domain, range, vertices intercepts and maximum and minimum values	F: Functions and Graphs (5) • graph data as points on a coordinate system • recognize and find the slope and intercepts of a graphed line • graph linear and quadratic functions • identify the domain and range of mathematical relations and functions. • use patterns and functions to solve problems • use technology to examine graphs • describe similarities and differences among families of linear and quadratic functions	F: Functions and Graphs (5) • calculate and plot linear and quadratic equations • use graphs to find the solution to simultaneous linear and quadratic equations • determine the equation which has its roots at the points of intersection of the graphs of linear and quadratic equations • develop the definition of logarithm by exploring and describing the relationship between exponential functions and their inverses

Mathematics Curriculum Objectives

SENIOR SCHOOL MATHEMATICS OBJECTIVES <i>Foundations of Mathematics – Advanced Mathematics</i>			
SENIOR 1 Foundations of Mathematics	SENIOR 2 Integrated Mathematics 1	SENIOR 3 Integrated Mathematics II	SENIOR 4 Advanced Mathematics
A: Number Sense (18) • use estimation and mental calculation to make decisions about situations that are common in everyday life • demonstrate a proficiency with calculations • apply numbers in various forms, including fractions, decimals, percents and exponential notations • understand the relationships among events, time, distances and velocities • analyze the real number system including the hierarchy of real numbers, the meaning of infinity and ordering	A: Number Sense (10) • extend and generalize patterns of numbers and geometric figures • solve number and geometric problems • create and solve complex problems	A: Number Sense (10) • apply elementary logic to reason, and communicate using: - valid arguments - biconditionals and definitions - negations • - inferences • explore radicals • evaluate the real number system, including the hierarchy of real numbers and ordering • create and solve problems related to real-world situations • financial management (personal and business) • investing • borrowing (mortgages and loans) • renting and buying a home • use technology tools appropriately	E: Sequences and Series (12) • represent patterns, using arithmetic and geometric sequences and series • use arithmetic, geometric and other sequences and series to solve real-life problems • describe limits of sequences and apply their properties to investigate convergent and divergent series • apply sequences and series to solve problems including sums and binomial expansion

SENIOR 1 Foundations of Mathematics	SENIOR 2 Integrated Mathematics I	SENIOR 3 Integrated Mathematics II	SENIOR 4 Advanced Mathematics
B: Geometry and Measurement (15) • formulate solutions for problems involving area, perimeter and volume • analyze the use of various systems of measurement • investigate geometric methods to solve problems in the physical world • explore the angles and properties of a circle • compare similar/congruent triangles • appraise spatial and geometric relationships • explore geometric relationships using appropriate software • use manipulatives to solve problems involving design in two dimensions by comparing area and perimeter	B: Geometry and Measurement (15) • explore coordinate geometry involving: - distance and mid-point formulas - slopes of parallel and perpendicular lines - vectors as ordered pairs • perform transformations • perform calculations and simple proofs, using lines and angles • apply measurement concepts for the solution of authentic problems	B: Geometry and Measurement (12) • determine proofs and deductions related to geometric figures • use technology to test conjectures and solve problems • apply measurement concepts and vectors for the solution of real world problems • represent and transform objects, using matrices • find the inner and cross products of two vectors • determine whether two vectors are perpendicular	B: Matrices and Vectors (10) • use linear programming procedures to solve problems and recognize situations where exactly one solution to a linear programming problem may exist • add and subtract vectors in three dimensional space • find the magnitude of vectors in three dimensional space • use the concept of vectors to model situations defined by magnitude and direction • analyze and solve vector problems generated by real-life situations

SENIOR 1 Foundations of Mathematics	SENIOR 2 Integrated Mathematics 1	SENIOR 3 Integrated Mathematics II	SENIOR 4 Advanced Mathematics
C: Trigonometry (4) • identify the sides of a right-angled triangle • distinguish between the use of Pythagorean Theorem and trigonometric ratios by considering parameters • select the appropriate ratio (sine, cosine, or tangent) and technology when finding a side of a right-angled triangle • solve practical problems involving trigonometric ratios	C: Trigonometry (10) • investigate the unit circle (quadrant I and II) • apply right triangle trigonometry to problem solving tasks • apply the laws of sines and cosines • explore graphing utilities • explore the use of trigonometric properties in careers	C: Trigonometry (8) • convert from degree measure to radian measure and vice versa • perform applications in solving periodic motion • use technology tools to investigate properties of circular functions and their graphs • investigate sine and cosine identities • solve problems related to real-world situations	C: Trigonometry (10) • find the values of the six trigonometric functions of an angle in standard position, given a point on its terminal side • determine whether a triangle has zero, one or two solutions and solve triangles using law of sines • solve triangles using law of cosines • use the graphs of various trigonometric functions • find the amplitude, period and phase shift for a trigonometric function • evaluate inverse trigonometric functions • identify and use reciprocal identities, quotient identities, symmetry identities and Pythagorean identities • solve trigonometric equations

SENIOR 1 Foundations of Mathematics	SENIOR 2 Integrated Mathematics 1	SENIOR 3 Integrated Mathematics 1I	SENIOR 4 Advanced Mathematics
D: Data Handling (10) • collect, organize and display real-world data • determine reasonableness of data interpretations • justify the applications of mathematical ideas to surveys and interpretation • design and use experimental and theoretical probability to represent and solve problems involving uncertainty, using technology whenever appropriate • design and execute simple experiments • explore statistical software and spreadsheet	D: Data Handling (10) • translate data and effects on graphs, central tendency and dispersion • organize and use spreadsheets • analyze data • create and analyze probability experiments • analyze authentic statistical data and make projections	D: Data Handling (13) • use appropriately descriptive statistics • solve probability problems (“or”, “and”) • investigate theoretical probability, conditional probability • explore components of inferential statistics: describe a set of frequency distribution data by spread, skewness, symmetry and number of modes • use technology to explore simulations for determining experimental probabilities	D: Data Handling (11) • interpret information from various graphs to draw conclusions from the data • analyze numerical data, using measures of central tendency, variability and correlation, in order to make inferences • interpret information, using regression methods • develop and implement a plan for collecting and analyzing data in order to make decisions • describe everyday situations involving chance, using probability models: - theoretical and empirical

SENIOR 1 Foundations of Mathematics	SENIOR 2 Integrated Mathematics I	SENIOR 3 Integrated Mathematics II	SENIOR 4 Advanced Mathematics
E: Algebra (18) - multiply and divide with positive indices (including zero) - interpret negative indices - represent algebraic expressions in multiple ways (factorizing, expanding and transposing) - generate and solve linear inequalities, linear, and simultaneous equations - use tables, graphs and matrices as tools to interpret expressions, equations and inequalities - explore the process of graphing linear equations or inequalities in two variables as they relate to real world problems	E: Algebra (20) - understand real numbers, set theory and interval notation - apply laws of exponents - apply four rules to polynomials - factor polynomials - solve linear equations in one variable - solve problems using algebraic procedures including equations - create and evaluate formulas - solve inequalities in one variable - apply and solve quadratic equations - solve simultaneous equations algebraically and graphically - solve simultaneous equations using matrices - find and apply the product of matrices - perform variation problems with modelling - solve real world problems - recognize a pattern and, given specific instances, make generalizations	E: Algebra (17) - factor polynomials up to three terms, using combinations of techniques - add, subtract, multiply and divide rational expressions with polynomial denominators - simplify algebraic complex fractions - solve rational equations and test for extraneous roots - solve quadratic equations by symbolic, graphical and numerical methods and apply each method when appropriate - solve systems of equations using symbolic, numeric and graphical methods and describe the relationships among the methods - use matrix algebra to solve systems of equations - use equations to solve a variety of problems and determine if the solutions are reasonable, within the context of the problem	F: Limits and Derivatives (10) - determine the derivatives of a function - determine the area between a curve and the x-axis by using the limit of areas of rectangles - use derivatives to solve problems from business and science

SENIOR 1 Foundations of Mathematics	SENIOR 2 Integrated Mathematics 1	SENIOR 3 Integrated Mathematics II	SENIOR 4 Advanced Mathematics
F: Functions and Graphs (10) • generate the graph of functions using technology • create functions • develop graphical techniques for solving problems • interpret graphs of various functions • appraise numeric, geometric and situation sequences that build to formulas, including those representing patterns	F: Functions and Graphs (12.5) • understand input and output with regard to functions • evaluate functions • analyze the graphs of functions • perform applications involving step functions • graph and analyze a function, using appropriate technology • model and solve problems, using graphical methods	F: Functions and Graphs (15) • determine the equation of a relationship, given its graph • express variations in the form of equations (direct, inverse, joint, combination) • solve problems involving variations • identify maximum and minimum values of functions and use them in applications • solve problems involving arithmetic and geometric sequences, series and their properties • examine and apply functions and their graphs • find the inverses of a function • model and solve real-world problems using graphical methods	A: Functions and Graphs (22) • identify the domain and range of a function and perform complex operations • write the composition of two or more functions • find the inverse of a function • graph a function and its inverse and, using appropriate technology, interpret properties of these representations - intercepts, slopes, rate of change • identify polynomial functions and use limit theorems to evaluate the limit of a polynomial function • determine the critical points of the graph of a polynomial function and determine if each function is a minimum, maximum or point of inflection • solve systems of equations and inequalities, using graphical methods • find the factors of polynomials using the remainder and factor theorems • determine continuity and discontinuity of functions • use the discriminant to describe the roots of quadratic equations • use conic sections to model motion, such as the graph of velocity versus position of a pendulum • examine tangents and normals to conic sections • model and solve a variety of real-world problems, using graphical methods

Mathematics Curriculum Objectives

SENIOR SCHOOL MATHEMATICS OBJECTIVES Business Mathematics I and II	
SENIOR 3 Business Mathematics 1	SENIOR 3/4 Business Mathematics 1I
A: Budgeting (15) • use estimation and mental calculations to make decisions on personal gross and net income • demonstrate a proficiency with calculations • apply fractions, decimals and percents • formulate a realistic budget • analyze mortgage loans • compare the cost of renting with the cost of buying a home	A: Marketing and Personnel (8) • analyze data to make business decisions • design effective packaging • analyze expenses associated with running a business: – personnel – building – inventory
B: Investments (7) • demonstrate a proficiency with writing numbers in words • calculate simple and compound interest • analyze statements • analyze different investment schemes and their annual yield • analyze types of saving options and compare relative advantages • investigate and compare stocks, bonds, annuities and retirement plans	B: Purchasing, Sales and Services (12) • analyze the variables associated with sales • analyze the variables associated with purchasing - shipping, duty, tax, volume discounts, etc. • explore costs associated with the building • analyze consultants' fees • develop a plan for collecting and analyzing data in order to make a decision regarding purchases for a business
C: Comparative Buying (3) • explore cost and selling price • justify better buys, based on unit prices • analyze methods of payment available in retail purchasing and compare relative advantages and disadvantages of each option	C: Production, Storage and Distribution (7) • analyze costs associated with purchasing, services, sales, production, warehouse, distribution • determine volume for efficient storage capacity • analyze procedures involved with inventory including data collection and analysis

SENIOR 3 Business Mathematics 1	SENIOR 3/4 Business Mathematics II
D: Credits, Debits and Loans (5) - analyze and compare installment cost - evaluate financial charges - analyze annual percentage rates (APR's) - distinguish between bank and reconciliation statements - understand and apply compound interest principles - analyze types of loan options and compare relative advantages	D: Financial Management (11) - explore corporate taxation - explore investments and borrowing - apply mathematical processes to support accounting practices: staff payroll, receivables and payables - analyze inflation and the Gross National Product (GNP) - create and analyze a corporate budget - develop and implement a plan for collecting and analyzing financial information in order to make decisions - explore corporate taxation - explore investments and borrowing - apply mathematical processes to support accounting practices: staff payroll, receivables and payables - analyze inflation and the Gross National Product (GNP) - create and analyze a corporate budget - develop and implement a plan for collecting and analyzing financial information in order to make decisions - design surveys and apply random sampling techniques - describe a set of frequency distribution data by spread and measures of central tendency - interpret information from various graphs including scatter plots to make predictions and/or decisions - determine experimental probabilities using simulations (e.g. random number tables and random functions)
E: Insurance (8) - analyze forms of insurance: - health - life - house - reinsurance - analyze and compare coverage options and rates in insurance	

**SUGGESTIONS FOR INFUSING
LIBRARY INFORMATION, INFORMATION TECHNOLOGY AND CAREER EDUCATION ACROSS
FOUNDATIONS OF MATHEMATICS**

LIBRARY INFORMATION	S1 Students will:
Orientation and Organization	study the history of trigonometry
Selection and Utilization	research architectural designs and how they relate to geometrical concepts
Research and Thinking Skills	- relate the design of pyramids to the Pythagorean theorem - research information on creating a budget - research the history of mathematics

INFORMATION TECHNOLOGY	S1 Students will:
Word Processing	- create an electronic portfolio for the module "Data Handling" - create lab and project reports
Spreadsheet	- create a monthly record of revenue, expenses and profit for the project "Finance: Personal/Business" - collect and display survey data (SENIDMTH project)
Databases	- manage the sales records and bonuses of a group of salesman (class business project) - create a database on the senior school Track and Field Championships

CAREER EDUCATION	S1 Students will:
Self Assessment	- use their journals to record their attitudes toward and perceptions about mathematics ideas - reflect on their own mathematical ability as they explore career options
Career Directions	- explore the use of mathematics in a variety of career majors - compile data on career options that require advance mathematical skills and processes
Career Planning	- relate what they are learning to career majors - recognize the importance of the relationship between academic choices and career choices regarding mathematics courses - make informal decisions regarding the selection of mathematics courses

**SUGGESTIONS FOR INFUSING
LIBRARY INFORMATION, INFORMATION TECHNOLOGY AND CAREER EDUCATION ACROSS
FOUNDATIONS OF MATHEMATICS**

LIBRARY INFORMATION	S1 Students will:	INFORMATION TECHNOLOGY	S1 Students will:	CAREER EDUCATION	S1 Students will:
Appreciation of Literature	Research Bermudian architectural designs	Desktop Publishing	- Publish a monthly newsletter on "Mathematics and Your Career" - Design and publish a magazine on mathematical games and puzzles (bi-weekly) - Design an ad for a product or service (measurement, geometry, trigonometry) - Publish results of survey (SENIDMTH project)		
Production, Application and Communication	Design and develop an advertisement for a product or service	Enrichment/ Demonstrative Software	- develop abstract ideas through concrete experiences - analyze and test mathematical models		
		Internet Use	- design the layout of a web page - network with a grade 9 class in North America		
		Calculator	- investigate mathematical ideas and experiences that may be limited by paper and pencil computation - explore linear and simultaneous graphs		

Mathematics in Business

Resource Persons

NAME	BUSINESS	TELEPHONE
Walton & Irmgard Brown	Surveys and Data Management	
April Crichlow	Bank of N.T. Butterfield (Lending)	295-1111
Suzette Crichlow	ACE Limited (Human Resources)	295-5200
Christopher Dill	Bermuda Stock Exchange	292-7212
Deanna Durham	Emerald Financial (Financial Advisor Investments)	292-3235
Stacy Hill	Secrets (Business Owner – marketing and purchasing)	295-0651
Patricia Horner	Osprey Investments	296-8288
Paul King	King & Associates (Conveyance Lawyer)	295-6661
Carole Mitchell	Bank of N.T. Butterfield (Personal Lending)	295-1111
Donna Pearman	People's Pharmacy	292-7527
Corin Smith Carlsen Philip	Conveyance Lawyers	296-1990
Jefferson Sousa	Sousa's Landscape Management Co. Ltd.	238-1797
William Spriggs Neville Grant	Bermuda Small Business Development Corp (Business Accounting)	292-5570
Randy Stafford	Stafford & Co. (Business Owner – warehousing and wooden floor installation)	295-9744
Cavon Steede	BAM Services (Business Accounting and Management Services)	296-6309
Simone Weldon Gibbons	Mokah (Business Owner marketing, purchasing)	292-1925
Cyril Whitter	Independent Management Group	295-1646
Dale Young	The Property Group Ltd.	234-6900

Internet Sites

Algebra	agent5.lycos.cs.cmu.edu/cgi_bin/pursuit?algebra
Applied mathematics	www.nyu.edu/pages/mathmol/
Bermuda Government Land Tax Rates	www.landvaluation.bm
Calculus	www.math.purdue.edu/~ccc/ www.ma.iup.edu/mathdept/projects/calcedemma/summary.html www_cm.math.uiuc.edu/
Chaos Theory	wwwosc.er.doe.gov/ams1.html
Doctor Math	forum.swarthmore.edu/dr_math/dr_math.html
FunBrain.com	www.FunBrain.com
General Mathematics Resources	www.tc.cornell.edu:80/Edu/MathSciGateway/
Geometry	www.geom.umn.edu/apps/gallery.html forum.swarthmore.edu/k12/k12.html
MathsNet	http://anglia.co.uk/education/mathsnets/links_revision.html
National Council of Teachers of Mathematics	www.nctm.org
NSF Show-Me Project	www.showmecentre.missouri.edu
PBS Teacher Source	pbs.org/teachersource
The TIMSS International Curriculum Analysis Database	ustimss.msu.edu
1999 Toshiba/NSTA Laptop Learning Challenge	www.nsta.org/programs/laptop
Zoom Web	pbskids.org/zoom

Other sites:

<http://www.bbc.co.uk/education/revision/maths/index.shtml>
<http://learning.channel4.com>
<http://www.numbercrew>
<http://www.angliacampus.com/>
<http://www.learnfree.co.uk>
<http://www.telegraph.co.uk>
<http://www.educationunlimited.co.uk>
<http://www.gcse.com/Maths/pre.htm>
<http://www.maths-help.co.uk>
<http://www.btinternet.com/~tang/gcserevision/gcse/maths/mgtopics.html>
<http://www.freeseve.net/education/examrevision/maths/mgtopics.html>
<http://www.logo.com/resources/lks/subjects.htm>
<http://www.virtualschool.co.uk>

PLANNING FOR INTEGRATED CURRICULUM IN THE SENIOR SCHOOLS

When you walk through the Botanical Gardens, you don't hear kiskadees for ten minutes, then the wind rustling for five minutes, and then smell the flowers for three minutes. All of this impacts on you at once and you make the experience into a meaningful whole.

"Young people are interested in the entire world around them - it doesn't make sense to them to say, 'Mathematics', 'Science' or 'Social Studies'. When instruction jumps from one discipline to another every 45 minutes, learning is fragmented unnecessarily."

*By Susan Krog,
Professor of Education
Western Washington University*

Where Are We Now?

If we consider a continuum from parallel connections across each discipline to a blending of all subject areas, teachers may be at different stages of integrating curriculum.

Simplest Stage: Parallel teachers realign content so that related topics are taught concurrently.

More Ambitious Stage: Teachers begin to link subjects by scrutinizing what they teach, reinforcing overlapping concepts and avoiding needless repetition.

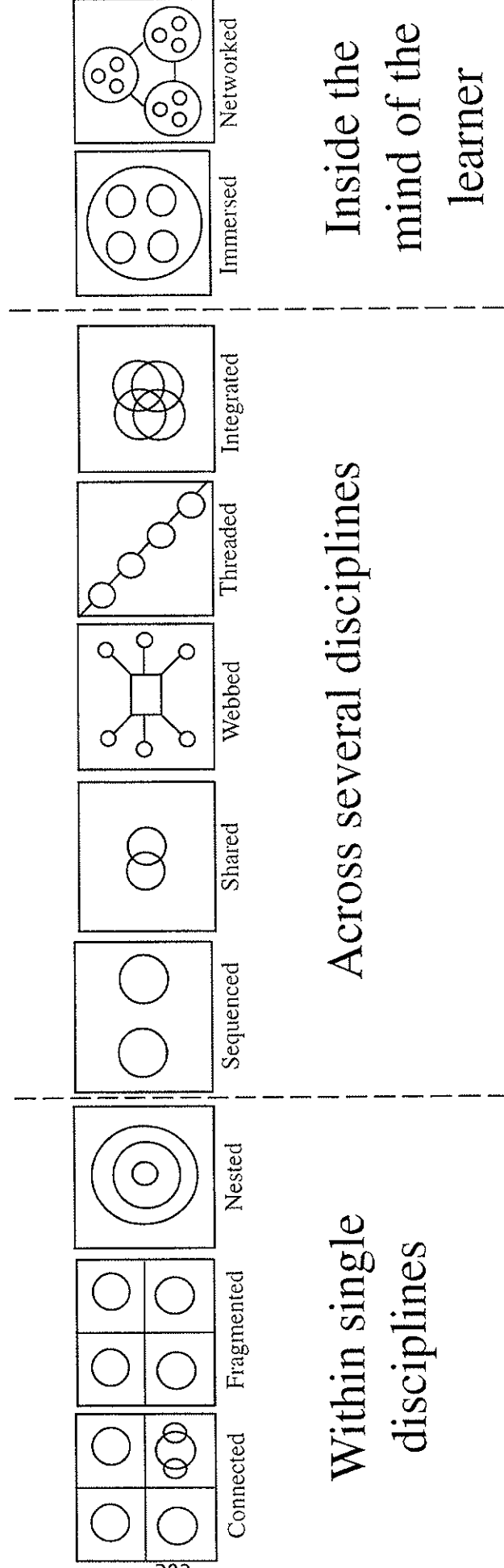
Most Ambitious Stage: Teachers create interdisciplinary modules that focus on a theme or project.

The process of collaboration at the building level will strengthen integrated curriculum and give a vital tool for professional growth of teachers. Appropriate and meaningful staff development, perusal of professional literature, and/or university training on approaches to integrating curriculum is vital to any significant change in education practice. Teachers should find ways to naturally integrate subjects and develop meaningful instruction.

Design Options (see next page)

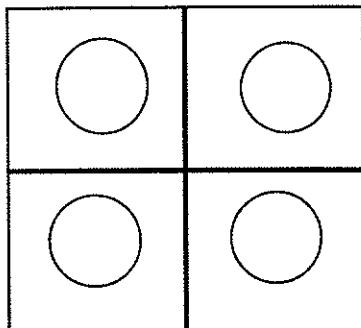
Techniques for designing an integrated curriculum include mapping the curriculum and planning an integrated module. To design an integrated curriculum, teachers need to know what is taught in other subject areas and at other grade levels - information that is traditionally not shared.

How to Integrate the Curriculum



Design options for curriculum might include:

Disciplined-based

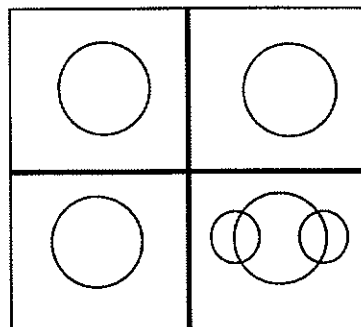


Description

The traditional model of separate and distinct disciplines which fragments the subject areas.

Example

Teacher applies this view in history, science and social studies.



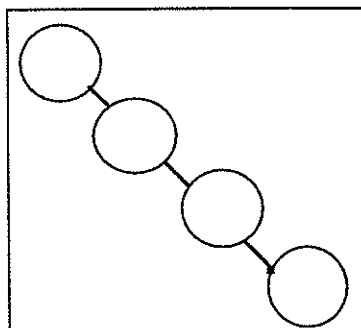
Description

Within each subject area, course content is connected topic to topic, concept to concept, one year's work to next and relates idea(s)

Example

Teacher relates the concept of fractions to decimals, which in turn relates to money, grades.

Parallel Disciplines

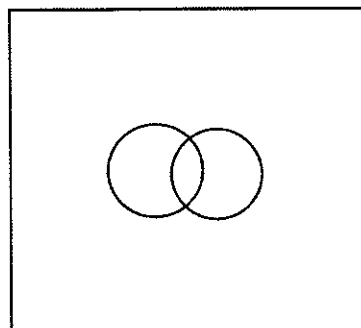


Description

The metacurricular approach threads thinking skills, multiple technology and study skills through various disciplines.

Example

Teaching staff targets prediction in reading, mathematics and science lab experiments while the social studies teacher targets forecasting current events and thus threads the skill (prediction) across all



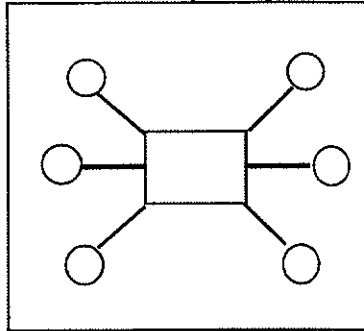
Description

Shared planning and teaching take place in two disciplines in which overlapping concepts or ideas emerge as organizing

Example

Science and mathematics teachers data collection, charting and as shared concepts that can be team-taught.

Multidisciplinary



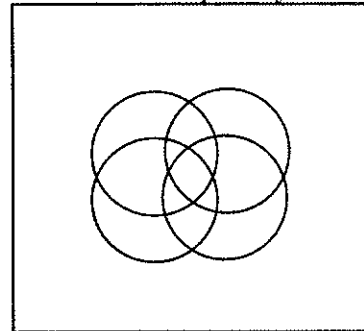
Description

The fertile theme is webbed to link contents and disciplines; use the theme to sift out appropriate concepts, topics and

Example

Teacher presents a simple topical theme, such as the circus, and webs into the subject areas. A conceptual theme, such as conflict, can be for more depth in the theme

Interdisciplinary



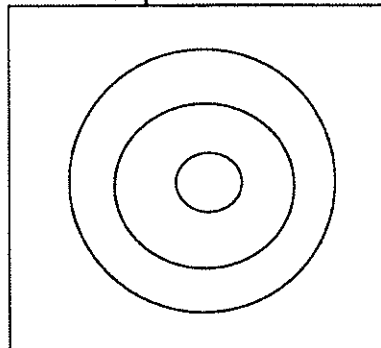
Description

This interdisciplinary approach matches subjects for overlaps in and concepts with some team in an authentic integrated

Example

In science, the arts, health family studies and design and technology, teachers look for patterning models and approach content through these

Disciplined-based



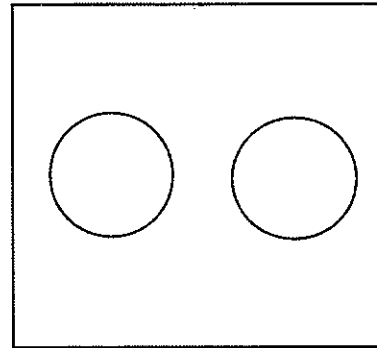
Description

Within each subject area, the teacher targets multiple skills: a social skill, a thinking skill and a concept-specific skill.

Example

Teacher designs the unit on photosynthesis to simultaneously target consensus seeking (social skill), sequencing (thinking skill) and plant life cycle (science skill)

Parallel-based

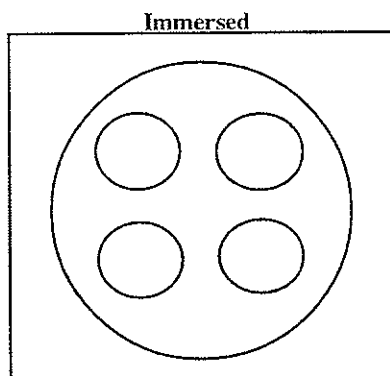


Description

Topics or units of study are rearranged and sequenced to coincide with one another. Similar ideas are taught in concert while remaining separate subjects.

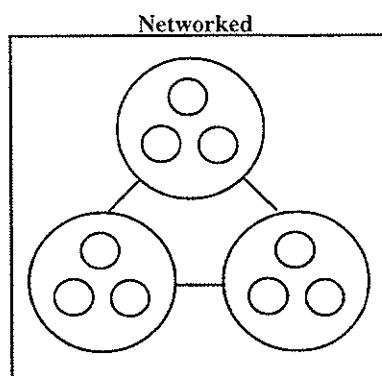
Example

English Language Arts teacher an historical novel depicting a particular period while Social Science teacher teaches covers the same period.



Description

The disciplines become part of the learner's lens of expertise: the learner filters all content through this lens and becomes immersed in his or her own experience.



Description

Learner filters all learning through the expert's eye and makes internal connections that lead to external networks of experts in related fields.

Choosing a Theme

In the initial development of senior schools, four career pathways have been identified:

- Applied Technologies
- Arts and Communications
- Health and Human Services
- International Business and Tourism

Interdisciplinary teachers, along with teachers of other subjects areas should utilize related materials located in their professional library, modifying these as appropriate to their students' needs and interests.

It is important that senior school teachers keep abreast of current research and trends on integrating curriculum and careers associated with the various pathways. Teachers are encouraged to take part in related staff development workshops, read professional literature and/or take university courses.

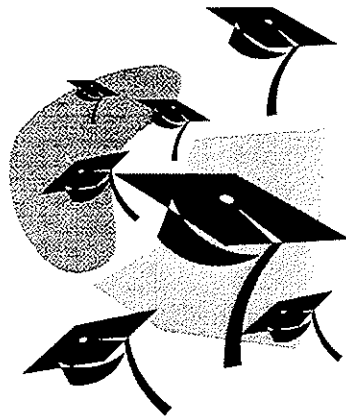
Teachers should:

- take inventory of what is already being done - career awareness initiatives, writing across the curriculum, etc.
- design a curriculum map by listing the content of associated subjects and then identify a theme or umbrella
- design an integrated module and develop related lesson plans
- decide on the length of time for completion and an appropriate title
- discover student interest - ask them what they want to know!
- decide whether the theme has substance and application to the real world
- display student work
- celebrate success!

**Department of
Education**

Career Pathways

SEPTEMBER 2000



**FOR
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