



ALBERTA COUNCIL ON ADMISSIONS AND TRANSFER

Senior High Mathematics
Final Report of the
Math Articulation Committee
August 2009

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Introduction

The Alberta Council on Admissions and Transfer (ACAT) has served students of Alberta since 1974. While ACAT is well known for its work on the *Alberta Transfer Guide* and its transfer system, it has a complementary focus on admission policies and practices across the system. This focus provides the key linkage between the secondary and post-secondary systems. ACAT serves as the body through which stakeholders work cooperatively to ensure effective secondary to post-secondary transition for students.

ACAT draws on its experience with program articulation committees at the post-secondary level to enhance smooth transition from secondary to post-secondary education. Students should be provided with opportunities to move smoothly from secondary to post-secondary studies. ACAT serves as a facilitator of this process. A Math Articulation Subcommittee of the Council was formed to ensure articulation of the revised math high school courses with prerequisite requirements at post-secondary institutions in order to facilitate successful student transition from high school to post-secondary programs.

The members of the committee include: Ms. Janice Park, Director, ACAT Secretariat; Dr. Craig Loewen, University of Lethbridge; Dr. David Kaminski, University of Lethbridge; Dr. David McNeilly, University of Alberta; Dr. James Lewis, University of Alberta; Ms. Julie Peschke, Athabasca University; Dr. W.E. Couch, University of Calgary; Ms. Bev Kosior, Bow Valley College; Ms. Jean Nordin, Grande Prairie Regional College; Dr. Andreas Guelzow, Concordia University College; Mr. Jack Buck, SAIT. Representatives from Alberta Education include Ms. Deanna Shostak, Applied Math 30 Exam Manager; Ms. Debbie Duvall, Resource Manager, Mathematics; Ms. Jennifer Dolecki, Program Manager, Mathematics K-12; Ms. Kathy McCabe, Program Manager, Mathematics; and Mr. Lorne Lindenberg, Curriculum Manager, Mathematics 10-12. All the post-secondary representatives are professors or instructors of math disciplines and several have administrative responsibilities (see the member list included as Appendix 1).

Purpose

Committee representatives compared the revised mathematics courses with the existing mathematics courses. They conducted a review of the revised program of studies, taking a look at the specific outcomes with achievement indicators in order to initiate discussions of how the revised program might affect how students make the transition into post-secondary studies.

The committee discussed recommendations for resource development and assessment practices pertaining to the revised program. As these materials have not yet been developed, the Math Articulation committee plans to continue discussions on these topics as implementation draws closer.

The Current vs. Revised Mathematics Programs

There are a number of notable differences between the current and the revised mathematics programs. The philosophy of the revised program of studies emphasizes a need for students to have a conceptual understanding of the topics they are studying. This is achieved through a reduction in the amount content which allows more time for students and teachers to explore concepts in depth and to make connections among outcomes. In addition, the content of the three course sequences in the revised programs differs so that students gain the necessary knowledge, skills and attitudes to be successful both in the workplace and in a variety of post-secondary programs. The course sequences are designed for students to make their course selection based on their anticipated post-secondary path. It is also significant that in the revised program students have the option of transferring between the -1 and -2 course sequences at the grade 11 and 12 levels.

The guiding principles of the revised mathematics program include:

- *reduction in content*: The revised program promotes depth of understanding as opposed to breadth of exposure. The amount of content to be covered in each course has been reduced so that teachers and students have more time to explore individual topics in order to achieve greater understanding.
- *post-secondary acceptance of the middle stream*: The revised program for Mathematics 20-2 and 30-2 emphasizes the development of algebra skills and inclusion of topics required for some post-secondary programs. The intent is to provide greater access to post-secondary education for students presenting Mathematics 30-2 as their mathematics admission requirement.
- *transferability between course sequences*: The revised program makes it possible for students to transfer between Mathematics 30-2 and Mathematics 30-1 to provide increase opportunities if their post-secondary plans change.
- *combined grade 10 course for the -1 and -2 course sequences*: The combined grade 10 course enables students to delay having to make a decision about which mathematics course sequence best meets their needs for post-secondary education.

The following timeline shows dates for provincial implementation of the revised courses.

Course	Provincial Implementation
Mathematics 10C/10-3	September 2010
Mathematics 20-1/20-2/20-3	September 2011
Mathematics 30-1/30-2/30-3	September 2012

A detailed comparison of the current and revised program for high school mathematics is found in Appendices 3 through 5.

Key Math Skills Required for Successful Transition to Post-secondary Education

Mathematics provides learning opportunities for students to:

- develop number sense through the study of rational and irrational numbers
- develop algebraic skills through the study of polynomials and rational expressions
- develop spatial sense through the study of geometry and trigonometry
- develop graphical skills through the study of relations and functions
- develop statistical reasoning skills by collecting, organizing, and analyzing data
- develop problem solving skills by applying mathematics to meaningful contexts
- develop communication skills by providing oral and written solutions to problems
- develop logical reasoning skills through the study of proof including deductive and inductive arguments
- develop critical thinking skills by analyzing and critiquing given arguments
- develop an appreciation of the role of mathematics in society by researching an historical event or current area of interest that involves mathematics

The specific outcomes for skills and processes provide opportunities for students to apply their learning to relevant situations and to develop, practice and maintain essential skills as their learning evolves within a grade/course and from grade to grade/course to course.

Benchmark Skills and Processes

The following interrelated mathematical processes are incorporated into the curriculum and are critical aspects of learning, doing and understanding mathematics. The acquisition of these processes will assist graduates as they transition into post-secondary education:

- **Communication:** Students are expected to use *communication* to learn to represent their learning in a variety of ways, write about their thinking and engage in mathematical discourse.
- **Connections:** Students are expected to make *connections* among mathematical ideas, everyday experiences and other disciplines.
- **Mental Mathematics and Estimation:** Students are expected to demonstrate fluency with *mental mathematics and estimation*.
- **Problem Solving:** Students are expected to develop and apply new mathematical knowledge through *problem solving*.

- **Reasoning:** Students are expected to develop *mathematical reasoning*.
- **Technology:** Students are expected to select and use *technology* as a tool for learning and for solving problems.
- **Visualization:** Students are expected to develop *visualization* skills to assist in processing information, making connections and solving problems.

Post-Secondary Representatives' Comments and Recommendations

Post-secondary representatives on the Math Articulation Committee were asked to provide comments on the revised program as well as advice on how the revised mathematics course sequences may be used for admissions purposes at post-secondary institutions. Several post-secondary institution representatives stated that there may be an opportunity for the Mathematics 10C/20-2/30-2 course sequence to be considered for acceptance to certain programs that are currently only open to students who have successfully completed the current Pure Mathematics course sequence.

Recommendation

Post-secondary institutions are encouraged to review admissions criteria for programs that currently require the Pure Mathematics course sequence for admission, and to review the major changes to the program of studies in order to determine if there are certain programs where it may be appropriate to use Mathematics 30-2 as a prerequisite for admission.

APPENDIX 1 – Secondary to Post-secondary Mathematics Articulation Committee

Advanced Education & Technology		
Ms. Janice Park	Director, ACAT	Adult Learning
Mr. Eric Dohei	Manager, ACAT	Adult Learning
Ms. Wendy Pruden	Assistant, ACAT	Adult Learning
Alberta Education		
Ms. Deanna Shostak	Applied Math 30 Exam Manager	Learner Assessment Br.
Ms. Debbie Duvall	Resource Manager, Mathematics	Learning & Teaching Resources Br.
M. Jennifer Dolecki	Program Manager, Mathematics K-12	Curriculum Br.
Ms. Kathy McCabe	Program Manager, Mathematics	Curriculum Br.
Mr. Lorne Lindenberg	Curriculum Manager, Mathematics 10-12	Curriculum Br.
University Representatives		
Dr. Craig Loewen	Assistant Dean, Faculty of Education	U of L
Dr. David Kaminski	Associate Professor, Dept. of Mathematics & Computer Science	U of L
Dr. David McNeilly	Dept. of Mathematical & Statistical Sciences	U of A
Dr. James Lewis	Associate Chair, Undergraduate Studies	U of A
Ms. Julie Peschke	Academic Coordinator in Mathematics	Athabasca U
Dr. W.E. (Gene) Couch	Undergraduate Director, Mathematics Dept.	U of C
Public Colleges Representatives		
Ms. Bev Kosior	Instructor, Academic Foundations	Bow Valley College
Ms. Jean Nordin	Chair, Academic Upgrading Dept.	Grande Prairie Regional College
Private Colleges Representative		
Dr. Andreas Guelzow	Professor of Mathematics/Mathematics Coordinator, Dept. of Math and Computing Sciences	Concordia
Technical Institutes Representative		
Mr. Jack Buck	Mathematics Coordinator	SAIT

APPENDIX 2 – Consultations on the Mathematics Program of Studies

Consultations on the Program of Studies for 10–12 Mathematics		
Date	Event	Consultations
Fall 2004 Winter 2005	Province-wide consultation with representatives of post-secondary institutions. Online survey	Representatives from Alberta Education visited each post-secondary institution in the province to discuss concerns and issues with the current 10–12 mathematics program of studies. An online survey was used to gather feedback about the essential competencies required for students entering various post-secondary programs. Results of these consultations were published in a report, <i>Western and Northern Canadian Protocol (WNCP) Consultation with Post-Secondary Institutions, Business and Industry Regarding Their Requirements for High School Mathematics</i> . The report can be accessed on the WNCP Web site (www.wncp.ca).
Spring 2005 to present	K-12 Mathematics Advisory Committee	This committee meets 3-4 times per year to discuss and provide advice on issues related to K–12 Mathematics education. Current post-secondary members are Robert Woodrow from the Alberta Universities Association, and Wendy Huseman and Corey Mushynsky from the Alberta Association of Colleges and Technical Institutes.
Fall 2005	Province-wide consultation with high school teachers	Focus group meetings were held to gather feedback from high school teachers about their concerns and issues with the current 10–12 mathematics program of studies.
Spring 2006 to Fall 2007	Mathematics Roundtable	This committee included representation from post-secondary institutions, high schools, business and industry. The group met 6 times and provided advice on the structure and content of the course sequences in high school mathematics.
August 25, 2006	PAUC Focus Group	A focus group meeting was held with the members of the Provincial Academic Upgrading Committee (PAUC) to discuss proposed changes to the high school mathematics program of studies.
October 2006	Province-wide consultations with high school teachers	Six focus group meetings were held with teachers to gather feedback on a working draft of the WNCP Common Curriculum Framework (CCF) for 10–12 Mathematics. An additional focus group meeting was held at the annual Mathematics Council (Alberta Teachers' Association) Conference.
October 2006	Province-wide consultation with representatives of post-secondary institutions	Meetings were held at a number of key post-secondary institutions (U of A, U of C, U of L, Mount Royal College, SAIT, Grant MacEwan, NAIT, Keyano, , Lethbridge Community College, Grande Prairie Community College, Red Deer College, Athabasca, Concordia, Devry, Medicine Hat College) across the province to gather feedback on a working draft of the WNCP CCF for 10–12 Mathematics.

March 2007	Province-wide Consultations with high school teachers	Two focus group meetings were held with teachers to gather feedback on a consultation draft of the WNCP CCF for 10–12 Mathematics.
March 2007	Online Survey	An online survey was available to all stakeholders across WNCP jurisdictions to provide feedback on the consultation draft of the WNCP CCF for 10–12 Mathematics. Thirty-eight percent of the responses came from Alberta stakeholders.
Spring 2007 – Spring 2008	Consultations with representatives of post-secondary institutions	Meetings were held with representatives from post-secondary institutions (U of A, U of C, U of L, NAIT, SAIT) to discuss changes to the program of studies and whether the middle course sequence might be acceptable for some post-secondary programs.
April 2007	Alberta Teachers' Association Curriculum Circle	The ATA brought together a group of teachers from across the province to discuss proposed revisions to the 10–12 mathematics program of studies.
May 2007	North-South Math Conference	A presentation on the revisions to the high school Mathematics program was made to delegates at the North-South Math Conference.
July 2007	Writing Committee	After making a decision to not follow the WNCP CCF for grades 11 and 12 of the middle course sequence, Alberta Education brought together a group of teachers and post-secondary representatives to write outcomes and achievement indicators for the middle course sequence, Mathematics 20–2 and Mathematics 30–2.
September 2007	U of A General Faculties Council	Alberta Education presentation to the U of A General Faculties Council regarding the revised program of studies and acceptance of the revised program.
October 3, 2007	ACAT Meeting	The second meeting of the Mathematics Articulation Committee.
October 2007	Consultations with high school teachers	Two focus group meetings were held with teachers in Calgary and Edmonton to review the WNCP CCF for 10–12 Mathematics and the Alberta Mathematics 20–2 and Mathematics 30–2.
November – December 2007	FNMI Consultations	Six focus group meetings were held across the province with representatives of the First Nations, Métis and Inuit (FNMI) communities to gather feedback about infusing an FNMI perspective into the 10–12 mathematics program of studies.
December 2007	Meeting with U of A Faculty of Nursing	A meeting was held with representatives from the U of A Faculty of Nursing to examine whether the Mathematics 20–2 and Mathematics 30–2 course sequence might meet the needs of students entering the Faculty of Nursing.

APPENDIX 3 - A Comparison of Topics in the Current and the Revised Grade 10 Mathematics Courses

How does the revised program of studies for Math compare with the current program?

Pure Mathematics 10 (Current)	Combined Mathematics 10
<p>Topic 1: Sequences and Data Tables</p> <ul style="list-style-type: none"> • Arithmetic and geometric growth <p>Topic 2: Algebraic Expressions</p> <ul style="list-style-type: none"> • Polynomials • Rational expressions <p>Topic 3: Line Segments and Graphs</p> <ul style="list-style-type: none"> • Coordinate Geometry • Equation of a line <p>Topic 4: Relations and Functions</p> <ul style="list-style-type: none"> • Describing functions • Linear functions • Function notation • Variation <p>Topic 5: Exponents and Radicals</p> <ul style="list-style-type: none"> • Irrational numbers, real numbers • Solving problems • Rational exponents • Radicals <p>Topic 6: Trigonometry</p> <ul style="list-style-type: none"> • Solve problems involving two right triangles • Sine and cosine laws 	<p>Topic 1: Measurement</p> <ul style="list-style-type: none"> • Linear measurement (SI and imperial units, conversions) • Surface area and volume • Proportional reasoning • Primary trigonometric ratios <p>Topic 2: Algebra and Number</p> <ul style="list-style-type: none"> • Prime factors and applications • Irrational numbers, real numbers • Rational exponents • Polynomials, factoring <p>Topic 3: Relations and Functions</p> <ul style="list-style-type: none"> • Relations and functions • Linear relations • Function notation • Systems of linear equations • Coordinate geometry • Equation of a line • Slope
<p>Summary of changes from the current Pure Mathematics 10 to Combined Mathematics 10:</p> <p>The following topics were removed:</p> <ul style="list-style-type: none"> • Arithmetic and geometric growth (to Mathematics 20–1) • Rational expressions (to Mathematics 20–1) • Radicals (to Mathematics 20–1) • Sine and cosine laws (to Mathematics 20–1) <p>The following topics were added:</p> <ul style="list-style-type: none"> • Trigonometric ratios (from Grade 9 Mathematics) • Surface area and volume (from Grade 9 Mathematics) 	

Applied Mathematics 10 (Current)	Combined Mathematics 10
<p>Topic 1: Measurement</p> <ul style="list-style-type: none"> • Problems involving length, area, volume, time, mass and rates • Scale factors <p>Topic 2: Number Patterns in Tables</p> <ul style="list-style-type: none"> • Recursive, non-recursive patterns • Irrational numbers, real numbers • Operations on real numbers, problems • Spreadsheets, combining tables <p>Topic 3: Relations and Functions</p> <ul style="list-style-type: none"> • Describing functions • Linear functions • Function notation <p>Topic 4: Line Segments</p> <ul style="list-style-type: none"> • Coordinate geometry problems <p>Topic 5: Linear Functions</p> <ul style="list-style-type: none"> • Graphs of linear functions • Equation of a line, Line of best fit • Variation, arithmetic sequences <p>Topic 6: Trigonometry</p> <ul style="list-style-type: none"> • Solve problems involving two right triangles • Sine and cosine laws 	<p>Topic 1: Measurement</p> <ul style="list-style-type: none"> • Linear measurement (SI and imperial units, conversions) • Surface area and volume • Proportional reasoning • Primary trigonometric ratios <p>Topic 2: Algebra and Number</p> <ul style="list-style-type: none"> • Prime factors and applications • Irrational numbers, real numbers • Rational exponents • Polynomials, factoring <p>Topic 3: Relations and Functions</p> <ul style="list-style-type: none"> • Relations and functions • Linear relations • Function notation • Systems of linear equations • Coordinate geometry • Equation of a line • Slope
<p>Summary of changes from the current Applied Mathematics 10 to Combined Mathematics 10:</p> <p>The following topics were removed:</p> <ul style="list-style-type: none"> • Recursive and non-recursive patterns in tables • Scale factors (to Mathematics 20–2) • Sine and cosine laws (to Mathematics 20–2) <p>The following topics were added:</p> <ul style="list-style-type: none"> • Trigonometric ratios (from Grade 9 Mathematics) • Rational exponents (from Pure Mathematics 10) • Polynomials (from Pure Mathematics 10) <p>It should be noted that whereas algebra was not the focus of the Applied Mathematics course sequence, there will be greater emphasis on the development of algebra skills in the –2 course sequence.</p>	

Mathematics 14 (Current)	Mathematics 10–3
<p>Topic 1: Number</p> <ul style="list-style-type: none"> • Integers, rational number (fractions and decimals) • Arithmetic operations on integers, fractions and decimals • Rates, ratios and proportion <p>Topic 2: Patterns</p> <ul style="list-style-type: none"> • Generalize patterns • Determining values from graphs • Algebraic expressions • Solve linear equations <p>Topic 3: Measurement</p> <ul style="list-style-type: none"> • Linear measurement (SI and imperial) • Problems involving perimeter, area, surface area and volume • Pythagorean theorem <p>Topic 4: Geometry</p> <ul style="list-style-type: none"> • Measure and draw angles • Properties of circles <p>Topic 5: Statistics</p> <ul style="list-style-type: none"> • Measures of central tendency • Collect, display and analyze data 	<p>Topic 1: Measurement</p> <ul style="list-style-type: none"> • Linear measurement (SI and imperial units, conversions) • Area and volume • Mass, capacity and temperature • Regular, composite and irregular 2-D shapes and 3-D objects <p>Topic 2: Geometry</p> <ul style="list-style-type: none"> • Spatial reasoning • Pythagorean theorem • Similarity of polygons • Primary trigonometric ratios • Parallel lines and a transversal • Properties of angles <p>Topic 3: Number</p> <ul style="list-style-type: none"> • Unit pricing, currency exchange, proportional reasoning • Earning an income <p>Topic 4: Algebra</p> <ul style="list-style-type: none"> • Manipulating and applying formulas <p>Note: Arithmetic operations on integers, fractions and decimals are embedded within the topics in this course.</p>
<p>Summary of changes from the current Mathematics 14 to Mathematics 10–3:</p> <p>The following topics were removed:</p> <ul style="list-style-type: none"> • Determining values from graphs (to Mathematics 20–3) • Collect, display and analyze data (to Mathematics 20–3) • Measures of central tendency (to Mathematics 30–3) • Properties of circles (to Grade 9 Mathematics) <p>The following topics were added:</p> <ul style="list-style-type: none"> • Trigonometric ratios (from Grade 9 Mathematics) • Currency exchange and earning an income (from Mathematics 24) • Problems that involve regular, composite and irregular 2-D shapes and 3-D objects (from Mathematics 24) • Similarity of polygons, parallel lines and a transversal (new) 	

APPENDIX 4 - A Comparison of Topics in the Current and the Revised Grade 11 Mathematics Courses

How does the revised program of studies for Math compare with the current program?

Pure Mathematics 20 (Current)	Mathematics 20–1
<p>Topic 1: Linear and Nonlinear Systems</p> <ul style="list-style-type: none"> • Linear inequalities • Systems of linear equations <p>Topic 2: Quadratic Functions and Equations</p> <ul style="list-style-type: none"> • Graph quadratic functions • Solve quadratic equations <p>Topic 3: Polynomial and Rational Functions</p> <ul style="list-style-type: none"> • Solve polynomial equations • Graph polynomial and rational functions • Composition of functions • Inverse of a function <p>Topic 4: Formal Reasoning</p> <ul style="list-style-type: none"> • Inductive and deductive reasoning • Examples and counterexamples <p>Topic 5: Circles and Coordinate Geometry</p> <ul style="list-style-type: none"> • Geometric properties of circles and polygons • Problems involving lines and line segments <p>Topic 6: Finance</p> <ul style="list-style-type: none"> • Solve consumer problems involving wages, taxation, banking and investments 	<p>Topic 1: Algebra and Number</p> <ul style="list-style-type: none"> • Absolute value • Radicals, radical equations • Rational expressions and equations <p>Topic 2: Trigonometry</p> <ul style="list-style-type: none"> • Angles in standard position • Sine and cosine laws, including the ambiguous case <p>Topic 3: Relations and Functions</p> <ul style="list-style-type: none"> • Graphs of absolute value functions • Quadratic functions and equations • Systems of equations • Reciprocal functions • Factoring polynomials • Inequalities • Arithmetic and geometric sequences and series <p>Note: Formal reasoning will be embedded in various topics as appropriate.</p>
<p>Summary of changes from the current Pure Mathematics 20 to Mathematics 20–1:</p> <p>The following topics were removed:</p> <ul style="list-style-type: none"> • Polynomial and rational functions (to Mathematics 30–1) • Circle properties (to Grade 9 Mathematics) • Finance (will be embedded in various topics in Mathematics 20–1 and 30–1) <p>The following topics were added:</p> <ul style="list-style-type: none"> • Radicals and rational expressions (from Pure Mathematics 10) • Sequences and series (from Pure Mathematics 10) • Sine and cosine laws (from Pure Mathematics 10) 	

Applied Mathematics 20 (Current)	Mathematics 20–2
<p>Topic 1: Graphing and Design</p> <ul style="list-style-type: none"> Analyze graphs and charts <p>Topic 2: Regression and Nonlinear Equations</p> <ul style="list-style-type: none"> Solve nonlinear equations Analyze quadratic, polynomial and rational functions Best-fit exponential or quadratic functions <p>Topic 3: Linear Systems and Programming</p> <ul style="list-style-type: none"> Graph linear inequalities Solve systems of linear equations Solve systems of linear inequalities Linear programming <p>Topic 4: Finance</p> <ul style="list-style-type: none"> Solve consumer problems involving wages, taxation, banking and investments <p>Topic 5: Circle Geometry and Design</p> <ul style="list-style-type: none"> Geometric properties of circles and polygons Design and layout problems involving circles and polygons <p>Topic 6: Measurement and Design</p> <ul style="list-style-type: none"> Scale factors, enlarge or reduce Tolerances, percentage error 	<p>Topic 1: Measurement</p> <ul style="list-style-type: none"> Rates, proportional reasoning Scale factors and scale diagrams <p>Topic 2: Geometry</p> <ul style="list-style-type: none"> Deductive proofs Properties of angles and triangles Sine and cosine laws, excluding ambiguous case <p>Topic 3: Number and Logic</p> <ul style="list-style-type: none"> Inductive and deductive reasoning Spatial reasoning Radical equations <p>Topic 4: Statistics</p> <ul style="list-style-type: none"> Normal distribution Confidence intervals <p>Topic 5: Relations and Functions</p> <ul style="list-style-type: none"> Quadratic functions Quadratic equations <p>Topic 6: Research Project</p>
<p>Summary of changes from the current Applied Mathematics 20 to Mathematics 20–2:</p> <p>The following topics were removed:</p> <ul style="list-style-type: none"> Systems of linear equations (to Combined Mathematics 10) Regression (to Mathematics 30–1) Circle properties (to Grade 9 Mathematics) Design problems, linear programming, tolerances, percentage error (deleted) <p>The following topics were added:</p> <ul style="list-style-type: none"> Sine and cosine laws (from Applied Mathematics 10) Statistics (from Applied Mathematics 30) Deductive proofs, logical reasoning (from Pure Mathematics 20) radicals (from Pure mathematics 10 and 20) 	

Mathematics 24 (Current)	Mathematics 20–3
<p>Topic 1: Number</p> <ul style="list-style-type: none"> • Arithmetic operations in table • Consumer problems (unit prices, wages, taxation, financial statements, credit, budgeting) • Simple and compound interest • Leasing vs. buying • Insurance <p>Topic 2: Measurement</p> <ul style="list-style-type: none"> • Problems involving length, area, volume, time mass and rates • Interpret drawings to solve problems • Build, describe and analyze geometric shapes • Scale factors and scale diagrams <p>Topic 3: Geometry</p> <ul style="list-style-type: none"> • Properties of circles • Design and layout problems <p>Topic 4: Statistics</p> <ul style="list-style-type: none"> • Analyze graphs and charts • Critique statistical information and conclusions in media • Draw and validate inferences • Collect, display and analyze data <p>Topic 5: Probability</p> <ul style="list-style-type: none"> • Theoretical vs. experimental probability 	<p>Topic 1: Measurement</p> <ul style="list-style-type: none"> • Surface area and volume (SI and imperial units) <p>Topic 2: Geometry</p> <ul style="list-style-type: none"> • Problems involving two or three right triangles • Scale • Views of 3-D objects • Scale diagrams of 3-D objects <p>Topic 3: Number</p> <ul style="list-style-type: none"> • Numerical reasoning • Consumer problems (budgets, financial services, credit) • Simple and compound interest <p>Topic 4: Algebra</p> <ul style="list-style-type: none"> • Manipulating and applying formulas • Slope • Proportional reasoning <p>Topic 5: Statistics</p> <ul style="list-style-type: none"> • Create and interpret graphs
<p>Summary of changes from the current Mathematics 24 to Mathematics 20–3:</p> <p>The following topics were removed from Mathematics 24:</p> <ul style="list-style-type: none"> • Leasing vs. buying, insurance (to Mathematics 30–3) • Arithmetic operations in tables, design and layout, critique statistical information and conclusions in media, draw and validate inferences (deleted) • Probability (to Mathematics 30–3) <p>The following topics were added to Mathematics 20–3:</p> <ul style="list-style-type: none"> • Numerical reasoning, views and exploded views, slope, formula manipulation (new) 	

APPENDIX 5 - A Comparison of Topics in the Current and the Revised Grade 12 Mathematics Courses

How does the revised program of studies for Math compare with the current program?

Pure Mathematics 30 (Current)	Mathematics 30–1
<p>Topic 1: Transformations of Functions</p> <ul style="list-style-type: none"> • Translations, stretches, reflections, reciprocals <p>Topic 2: Exponents, Logarithms, Geometric Series</p> <ul style="list-style-type: none"> • Exponential growth patterns • Solve exponential and logarithmic equations • Graph exponential and logarithmic functions <p>Topic 3: Trigonometry</p> <ul style="list-style-type: none"> • Radian measure, unit circle, exact values • Solve trigonometric equations • Trigonometric identities • Graph circular functions <p>Topic 4: Conic Sections</p> <ul style="list-style-type: none"> • Classify conic sections by shape and equation <p>Topic 5: Permutations and Combinations</p> <ul style="list-style-type: none"> • Fundamental counting principle • Permutations and combinations • Binomial Theorem • Applications to probability <p>Topic 6: Statistics</p> <ul style="list-style-type: none"> • Normal distributions • Binomial distributions 	<p>Topic 1: Trigonometry</p> <ul style="list-style-type: none"> • Angles in standard position • Radian measure, unit circle • Trigonometric equations • Trigonometric identities • Trigonometric functions <p>Topic 2: Relations and Functions</p> <ul style="list-style-type: none"> • Operations on and compositions of functions • Translations, stretches, reflections of graphs • Inverse of a relation • Polynomial, rational and radical functions • Exponential and logarithmic equations • Exponential and logarithmic functions <p>Topic 3: Permutations, Combinations and Binomial Theorem</p> <ul style="list-style-type: none"> • Fundamental counting principle • Permutations and combinations • Binomial Theorem <p>Note: Formal reasoning will be embedded in various topics as appropriate.</p>
<p>Summary of changes from the Pure Mathematics 30 to Mathematics 30–1:</p> <p>The following topics were removed:</p> <ul style="list-style-type: none"> • Conic sections (deleted) • Statistics (to Mathematics 20–2) <p>The following topics were added:</p> <ul style="list-style-type: none"> • Composition of functions, inverse of a function (from Pure Mathematics 20) • Polynomial, rational and radical functions (from Pure Mathematics 20) 	

Applied Mathematics 30 (Current)	Mathematics 30–2
<p>Topic 1: Matrices and Pathways</p> <ul style="list-style-type: none"> • Fundamental counting principle • Permutations and combinations • Pathway problems • Operations on matrices <p>Topic 2: Statistics and Probability</p> <ul style="list-style-type: none"> • Normal probability distributions • Binomial probability distributions • Probability of a compound event <p>Topic 3: Finance</p> <ul style="list-style-type: none"> • Financial spreadsheets • Renting vs. buying • Leasing vs. buying • Investments <p>Topic 4: Cyclic, Recursive and Fractal Patterns</p> <ul style="list-style-type: none"> • Periodic events, best-fit sinusoidal equations • Fractal patterns, self-similarity <p>Topic 5: Vectors</p> <ul style="list-style-type: none"> • Vector and scalar quantities • Resultant vectors • Problems involving 2-D and 3-D applications <p>Topic 6: Design</p> <ul style="list-style-type: none"> • Cost and design problems 	<p>Topic 1: Logical Reasoning</p> <ul style="list-style-type: none"> • Numerical and logical reasoning • Set theory <p>Topic 2: Probability</p> <ul style="list-style-type: none"> • Odds and probability • Probability of two events • Probability of mutually exclusive and non-mutually exclusive events • Fundamental counting principle • Permutations and combinations <p>Topic 3: Relations and Functions</p> <ul style="list-style-type: none"> • Rational expressions and equations • Polynomial functions • Sinusoidal functions • Logarithms, laws of logarithms • Exponential equations <p>Topic 4: Mathematics Research Project</p> <p>Note: Finance will be embedded in various topics as appropriate.</p>
<p>Summary of changes from the current Applied Mathematics 30 to Mathematics 30–2:</p> <p>The following topics were removed:</p> <ul style="list-style-type: none"> • Matrices, pathway problems, binomial probability distributions, fractals, vectors, design (deleted) • Normal probability distributions (to Mathematics 20–2) <p>The following topics were added:</p> <ul style="list-style-type: none"> • Regression (from Applied Mathematics 20) • Numerical and logical reasoning, rational expressions and equations, polynomial functions, exponential and logarithmic functions (new) 	

(No Current Course)	Mathematics 30–3
	<p>Topic 1: Measurement</p> <ul style="list-style-type: none"> • Precision, accuracy and tolerance of measuring instruments <p>Topic 2: Geometry</p> <ul style="list-style-type: none"> • Sine and cosine laws, excluding ambiguous case • Properties of triangles, quadrilaterals and regular polygons • Transformations on 2-D shapes and 3-D objects <p>Topic 3: Number</p> <ul style="list-style-type: none"> • Logical reasoning • Consumer problems (buying vs. leasing) • Applications to business (expenses, sales, profit or loss) <p>Topic 4: Algebra</p> <ul style="list-style-type: none"> • Linear relations: patterns, graphs, equations, tables <p>Topic 5: Statistics</p> <ul style="list-style-type: none"> • Measures of central tendency • Percentiles <p>Topic 6: Probability</p> <p>Analyze problems that involve probability (warranties, insurance, lotteries, weather predictions)</p>
<p>Summary of changes: Mathematics 30–3 Does not correspond to any current courses.</p>	

