Frequently Asked Questions: Implementation of Grade 12 Mathematics:

This document is designed to support the implementation of the revised senior mathematics by providing information about the curriculum and answers to commonly asked questions. This working file includes:

- course codes for the 2000 and 2007 senior mathematics curriculum
- a pathway chart illustrating the relationship between the revised courses to show increased flexibility and choice for students
- questions and answers that will be updated as needed.
- course descriptions released in October 2006
- two memos to directors and principals that address implementation.

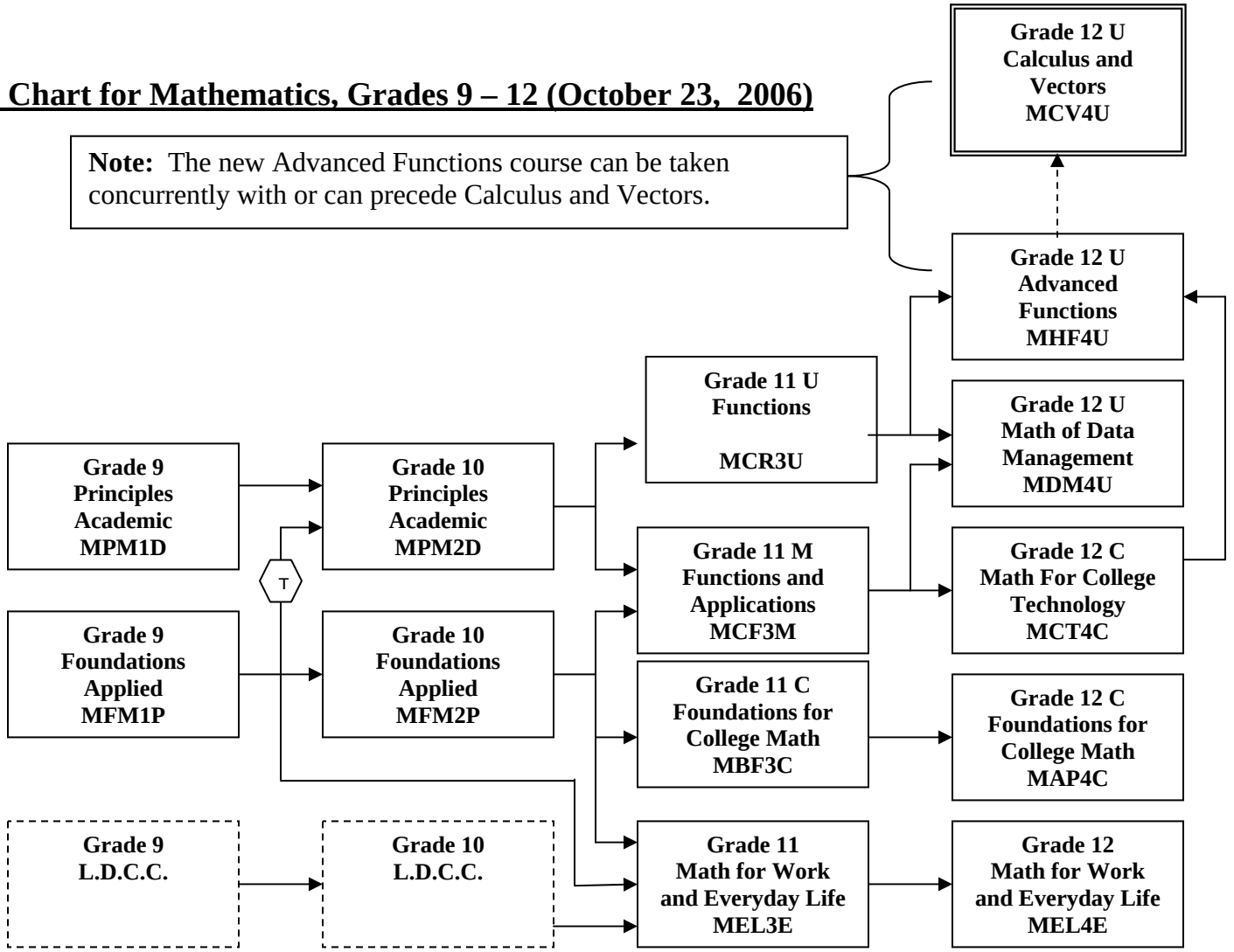
Senior Mathematics Courses:

2000 Curriculum		2007 Curriculum	
Mathematics of Data Management	MDM4U	Mathematics of Data Management	MDM4U
Advanced Functions and Introductory Calculus	MCB4U	Advanced Functions	MHF4U
Geometry and Discrete Mathematics	MGA4U	Calculus and Vectors	MCV4U
Mathematics for College Technology	MCT4C	Mathematics for College Technology	MCT4C
College and Apprenticeship Mathematics	MAP4C	Foundations for College Mathematics	MAP4C
Mathematics for Everyday Life	MEL4E	Mathematics for Work and Everyday Life	MEL4E
Functions and Relations	MCR3U	Functions	MCR3U
Functions	MCF3M	Functions and Applications	MCF3M
Mathematics of Personal Finance	MBF3C	Foundations for College Mathematics	MBF3C
Mathematics for Everyday Life	MEL3E	Mathematics for Work and Everyday Life	MEL3E

DRAFT

Draft Chart for Mathematics, Grades 9 – 12 (October 23, 2006)

Note: The new Advanced Functions course can be taken concurrently with or can precede Calculus and Vectors.



This chart maps out all the courses in the discipline and shows the links between courses and the minimum requirements for them. It does not attempt to depict all possible movements from course to course.

T – Transfer Course
L.D.C.C.. – Locally Developed Compulsory Credit Course

DRAFT

QUESTIONS AND ANSWERS:

This information is intended to support:

- university and college admission requirements
- the implementation of the revised Grade 12 mathematics curriculum
- transitional pathways between courses in the 2000 senior mathematics curriculum and courses in the 2007 senior mathematics curriculum.

Section A: University/College Admission Requirements:

1. How will the university admission requirements change in response to the revisions of the Grade 12 mathematics curriculum?

Universities have worked collaboratively to communicate revised admission requirements for 2008. This information is available on the following web site: http://www.electronicinfo.ca/html/english/2008. It states:

"*University Admission Requirements for 2008 - Mathematics Course Requirements: Students interested in university programs that require Grade 12 mathematics courses should be aware that, under Ministry of Education guidelines, MHF4U is a prerequisite or corequisite of MCV4U. This means that MHF4U must be taken before or, depending on your secondary school course scheduling rules, at the same time as MCV4U. Some university programs require both of these mathematics courses. However, you will also see that, in some cases, the requirement may be stated as MCV4U and one other math course."*

2. Will there be any changes to college admission requirements for 2008, in response to the revisions to the Grade 12 mathematics curriculum?

The colleges are currently gathering and compiling information that will enable them to determine how the revisions to the mathematics curriculum will impact on college admission requirements.

3. Will there be any changes to the admission requirements for applied degree programs offered by the colleges?

At this time, students should contact colleges directly about the 2008 prerequisites for applied degrees. The colleges are planning to release more information in the spring.

4. Will universities recognize, for admission in 2008, the Grade 12 courses in the 2000 senior mathematics curriculum (MCB4U, MGA4U)?

MHF4U and MCV4U are new course codes allowing universities to distinguish these two revised courses from the current MCB4U and MGA4U courses.

The document outlining university admission requirements for 2008 (available on the following web site: http://www.electronicinfo.ca/html/english/2008) includes the following paragraph:

"Old Versus New Mathematics Curriculum: Students who will present mathematics courses from both the old and new mathematics curriculum should consult the universities of interest directly regarding the completion of admission requirements for programs that require mathematics courses."

Some universities have posted on their web sites, information about additional courses that may be needed by students presenting applications with 2000 senior mathematics courses.

5. Should we be concerned that the students in Grade 11 who are taking MCB4U this year may have to take MHF4U in their Grade 12 year if it is listed as a university admission requirement for 2008?

Students who decided to take the MCB4U course in Grade 11 should contact the specific university of interest to determine if any additional requirements will be needed for admission in 2008. Students planning to apply to university programs that involve a first year mathematics course may want to consider taking the MCV4U course in Grade 12

6. I have a concern about some university business departments requiring calculus. Do they need calculus for business? Are the universities using calculus as a filter for high-applicant programs?

Each university sets its own criteria for determining prerequisites, based on factors that include the type of business program offered and the required first year courses. The Minister's Task Force on Senior Mathematics interviewed representatives from university business programs. The consultation revealed that programs vary significantly. For example in some programs students begin their formal business studies in the second year, while others begin in their first year. Some programs require all students to take calculus, others only require calculus for students who will be focusing on specific areas in business, such as finance.

Section B: Implementation:

1. **Our secondary schools are struggling with whether or not to offer the current MCB4U and MGA4U courses in the fall of 2007 for students who have the 2000 Grade 11 U math credit, since these students will not have the revised MCR 3U course content. Can we do this?**

   Mandatory implementation of the revised Grade 12 mathematics curriculum begins in September 2007, replacing the current Grade 12 mathematics courses that will no longer be offered.

2. **Can schools offer the revised Grade 12 mathematics curriculum this summer?**

   The revised Grade 12 mathematics curriculum is scheduled to be released in the spring of 2007. School boards may choose to offer the revised mathematics curriculum in the summer of 2007.

3. **Can continuing education departments offer upgrading courses in the fall of 2007 to support students who failed the courses from the current Grade 12 mathematics curriculum?**

   Yes, schools boards may consider offering upgrading courses for the 2000 Grade 12 mathematics curriculum. This can only be done in the fall term of 2007.

4. **One of the big issues with the new courses is taking MCV4U concurrently with MHF4U. Our math head feels strongly that MHF4U should be taken before MCV4U. If this is the case, it impacts on the availability of courses and graduating times, especially for non-semestered schools, and for students wanting to come back for only one semester in their last year. Why should students take the MHF4U course before MCV4U?**

   Revisions to the senior mathematics curriculum have been made to address the impact that compressing the content of three years of senior mathematics into two has had when the curriculum was last revised in 2000. Feedback and research showed a decrease in the number of students taking the MCR3U as well as a significant decrease in MGA4U enrolment.

   Most jurisdictions (including other provinces, and countries studied in the review) require students to take two senior mathematics courses as preparation for the study of calculus. To maximize student success, schools should try, whenever possible, to provide students with the opportunity to take the MHF4U course before taking MCV4U. Justification for the scheduling challenges this may pose includes providing students with access to a more developmentally appropriate pathway to university programs that include mathematics while at the same time offering viable alternatives for students entering other university programs.

5. What are some ways schools can schedule MCV4U so that students are able to complete the MHF4U course first?

The best way for most students to prepare for MCV4U is to take the MHF4U course first. To do this, students may decide to take MHF4U and MCV4U in their fourth year of high school. Another option is for students to consider taking MCR3U and MHF4U in their third year of high school. The revisions have made these two courses more closely connected, making this a viable alternative.

Non-semestered schools may choose to offer two of the three senior mathematics courses together. For example, in non-semestered schools with a two-day schedule, MCR3U and MHF4U could be taught consecutively or in an integrated manner, by the same teacher in period one of Day One and period one of Day Two. Another alternative is to apply this strategy when combining MHF4U and MCV4U.

In smaller schools, where scheduling can be more challenging, other scenarios may include students taking the Grade 10 Academic Mathematics (MPM2D) or MCR3U in the summer or taking the MCV4U or MHF4U courses online.

6. What effect will the revisions have on students who are currently in their fourth year but are planning to return for a fifth year? We have many of these students, some of whom are planning to do additional math (most often to take or repeat calculus).

The revisions to the Grade 12 mathematics curriculum should not have a significant impact on students who return for a full fifth year. Grade 12 students who were planning to take MCB4U next year (in the fifth year), will be able to take the MCV4U course instead, assuming that the student has successfully completed the MCR3U course from the 2000 senior mathematics curriculum. The MHF4U course may be a better choice for some of these students.

Smaller semestered schools may not be able to offer the MCV4U course in the first semester. Students in these schools may choose to take MCV4U online. The Ministry is currently in the process of developing an online MCV4U course that can be offered through school boards.

7. The International Baccalaureate program (I.B.) in our school is a two year program. The plan we had for this year's Grade 11 students was to take the revised MCR3U and current MDM4U this year and follow that with the MCV4U next year. We now must change our plans. Is it possible for schools to use the draft version of the revised MHF4U to start delivering the course in February 2007 to allow these students to take MCV4U next year?

The revised Grade 12 curriculum is scheduled for release in spring 2007 with mandatory implementation beginning in September 2007. Schools can offer the revised courses only after the final revised curriculum has been released.

Section C: Pathways and Credits

1. **What happens if a student takes both the MHF4U and the MCV4U courses in the same term and is successful in MCV4U but fails MHF4U? Can they be given just the MCV4U credit without its prerequisite?**

   Yes, students can earn the MCV4U credit without the MHF4U credit, however university programs that list MCV4U as a prerequisite generally expect students to have successfully completed MHF4U. Students in this situation should check with their university of interest for more information.

2. **If a Grade 11 student takes the revised MCR3U this year in the first semester, can they take MCB4U in second semester?**

   The revised MCR3U was not designed to prepare students for direct access to MCB4U or MCV4U. Although it will likely be very challenging for most students, principals can choose to waive the prerequisite and allow students to take MCB4U, if it is in the best interests of the students. It is likely that these students will require additional supports.

   For most Grade 11 students it would be in their best interest to wait and take MHF4U in Grade 12 to take advantage of the more coherent and developmentally appropriate curriculum expectations that the revisions offer. This will maximize their opportunity for success and support a deeper development of important mathematical concepts and skills.

3. **If a Grade 11 student fast-tracks this year and decides to also take MCB4U, can the student take MHF4U in Grade 12 and have it count as a second Grade 12U math course? Can the student take MCV4U without MHF4U? Will this student be able to earn two credits for MCB4U and MCV4U or for MCB4U and MHF4U?**

   Students with MCB4U this year have the option of taking MHF4U, MCV4U and/or MDM4U for additional credit next year. Achievement in MCB4U should be used to help students decide whether to take MHF4U or MCV4U. Students who successfully complete MCB4U, do not require MHF4U before taking MCV4U.

4. **Will the Mathematics Transfer, Grade 11, University/College Preparation to University Preparation course (MCR3K) still be available?**

   Revisions, guided by research and consultation, were made to significantly reduce the need for transfer courses. The only transfer course currently available is the The Ontario Curriculum, Grade 9: Mathematics Transfer Course, Applied to Academic, 2006. (http://www.edu.gov.on.ca/eng/curriculum/secondary/math.html). No other transfer course is currently being developed. For some students, taking MCR3U after taking MCF3M will provide good preparation for MHF4U and MCV4U.

DRAFT

5. **In the revised pathway chart, students currently taking MCF3M only have access to one 12U course, the MDM4U course, and cannot access the MCV4U course. Many of these students did not know this when they signed up to take MCF3M. Can this change be grandfathered so that these students can still take either MHF4U or MCV4U?**

   Mandatory implementation of the revised Grade 12 curriculum begins in September 2007. The revisions to MCF3M are significant and this course was not designed to prepare students for the revised MHF4U or MCV4U. However, principals may choose to waive the prerequisite for MHF4U for individual students if it is in their best interests. These students will likely require additional support. A better option for some MCF3M students in a semestered school, may be to consider taking MCT4C in the first semester, followed by MHF4U in the second semester.

   The draft pathway chart reflecting this change for MCF3M was shared with school board representatives during feedback consultations and during training sessions in the spring of 2005 and 2006.

   Revisions to the MCF3M course began in 2003 during the technical analysis to help address the overlap between the MCR3U and MCF3M courses in the 2000 senior mathematics curriculum and also to address the high failure rates caused by grouping students preparing for college mathematics (MCT4C) with students preparing for mathematics-related university programs (MCB4U).

6. **Are students who have completed the MCF3M from the 2000 mathematics curriculums eligible to take the revised MHF4U?**

   Yes, students who completed MCF3M before September 2006 can take MHF4U.

7. **We have some Grade 12 students who are currently enrolled in the revised MBF3C course in first semester and would like to take the 2000 MAP4C course in the second semester. Are they eligible to earn two credits?**

   Although the revised MAP4C includes topics from the 2000 MBF 3C course, the principal may grant two credits for these two courses. Schools should provide supplementary supports to ensure a successful transition between the courses.

8. **What is the suggested route for a student who completed the 2000 MCR3U course last year and who is undecided about which university program to apply for? Which revised courses are the logical follow up to the 2000 MCR3U?**

   Many university programs with mathematics prerequisites list at least the MHF4U course. First year university programs that involve mathematics (e.g., sciences, engineering, some business programs) may also require MCV4U. The MDM4U course is a statistics course that is an excellent choice for many students. University prerequisites and achievement in the MCR3U will likely influence student choices.

Section D: Intermediate Mathematics Courses

Grade 9		Grade 10	
Principles of Mathematics Academic	MPM1D	Principles of Mathematics Academic	MPM2D
Foundations of Mathematics Applied	MFM2P	Foundations of Mathematics Applied	MFM2P

1. Is there a recommended level of achievement that can be used to guide students who want to consider going from MFM2P to MCF3M instead of MBF3C ?

The revision process revealed that although MCT4C is the best preparation for many technology-related programs in college, few students were able to successfully complete this course through the 2000 mathematics curriculum. One of the main reasons was that access to MCT4C was only available through MPM2D, an academic course. Colleges adjusted by making the MAP4C course a prerequisite for programs that require the level of preparation available through MCT4C.

The current revisions aim to improve access to MCT4C, by making it more accessible to students who start with MFM1P. The MCF3M course was revised to prepare students for the MCT4C course, while leaving the option open to take MDM4U. Teachers and guidance counsellors guide students who take MFM2P, to determine the level of achievement that will best prepare them to successfully complete MCF3M. Students and parents should be confident that a level 3 in MFM2P will prepare them for the subsequent work in MCF3M.

2. Is it possible to grant a second credit to students who take MFM1P and then decide to take MPM1D? Two credits are granted when a student goes from Essential to MFM1P. This allows teachers and guidance counsellors to promote the MFM1P and MFM2P in situations where students and parents may want to be sure that doors to university destination courses are not closed and a penalty (i.e., losing the credit for MFM1P) would not be incurred. Parents would appreciate having this option that would allow more students to be introduced to high school mathematics experiencing success.

Revisions to the MFM1P course, released in the spring of 2005, clearly distinguish it from MPM1D. Students who begin high school not having adequately met the Grade 8 mathematics expectations benefit from taking the MFM1P. If these students plan to take university destination courses in mathematics, they have two options for accessing MPM2D. The first is to take the transfer course, Grade 9: Mathematics Transfer Course, Applied to Academic, 2006. For others, it may be wise to take MPM1D. In this case, the principal may choose to grant the student an additional non-compulsory credit. Other options include continuing on to MFM2P and then taking MCF3M or MPM2D.

DRAFT

MEMORANDUM TO:		Directors of Education Superintendents of Programs Principals of Secondary Schools Principals of Provincial Schools Principals of First Nations' Secondary Schools Secretary-Treasurers and Supervisory Officers of School Authorities Principals of Inspected Private Schools
FROM:		Sue Durst Director Curriculum and Assessment Policy Branch
DATE:		October 23, 2006
SUBJECT:		**Revised Course Descriptions**

The purpose of this memorandum is to provide you with electronic copies (attachments) of the revised course descriptions for the 6 courses in Mathematics, Grade 12; 19 courses in English, Grades 9 – 12; and 10 courses in English as a Second Language and English Literacy Development (ESL/ELD), Grades 9-12.

There are two new courses in Grade 12 Mathematics. Calculus and Vectors (MCV4U) replaces Geometry and Discrete Mathematics (MGA4U). Advanced Functions (MHF4U) replaces Advanced Functions and Introductory Calculus (MCB4U). The new Advanced Functions can be taken concurrently with or can precede Calculus and Vectors. Supports and resources are being developed for release along with the revised courses. Included will be an outline of the sequencing of units required for a co-requisite offering.

There is a new English Literacy Development course ELDEO to extend the support for English language learners.

The curriculum policy documents for Grade 12 Mathematics, Grades 9 -12, English, and ESL/ELD, Grades 9 -12 are progressing through the final stages of the curriculum review process and the revised curriculum policy documents are scheduled to be released Spring 2007 for implementation beginning September 2007.

…/2

DRAFT

In anticipation of the implementation of these revised courses beginning in September 2007, Course Calendars for the 2007-2008 school year will reflect these changes. The attached new course descriptions and draft charts should be included in information given to students and parents as they select appropriate pathways and courses of study. The draft charts identify the minimum requirement for each course, but do not attempt to depict all possible movements from course to course. I am asking that you provide the attached electronic copies of the course descriptions to principals of secondary schools to facilitate the sharing of this information at the school level.

Professional development capacity building sessions and supports for these revised curriculum policy documents are scheduled for Spring 2007

Thank you for your participation and continuing support of the Ministry's ongoing curriculum review.

Original signed by:

Sue Durst

Attachments

cc: Regional Office Managers

Mathematics, Grade 12, Course Descriptions, 2007

Calculus and Vectors, Grade 12, University Preparation (MCV4U)
This course builds on students' previous experience with functions and their developing understanding of rates of change. Students will solve problems involving geometric and algebraic representations of vectors, and representations of lines and planes in three-dimensional space; broaden their understanding of rates of change to include the derivatives of polynomial, rational, exponential, and sinusoidal functions; and apply these concepts and skills to the modelling of real-world relationships. Students will also refine their use of the mathematical processes necessary for success in senior mathematics. This course is intended for students who plan to study mathematics in university and who may choose to pursue careers in fields such as physics and engineering.
Note: The new Advanced Functions can be taken concurrently with or can precede Calculus and Vectors.

Advanced Functions, Grade 12, University Preparation (MHF4U)
This course extends students' experience with functions. Students will investigate the properties of polynomial, rational, logarithmic, and trigonometric functions; broaden their understanding of rates of change; and develop facility in applying these concepts and skills. Students will also refine their use of the mathematical processes necessary for success in senior mathematics. This course is intended both for students who plan to study mathematics in university and for those wishing to consolidate their understanding of mathematics before proceeding to any one of a variety of university programs.
Prerequisite: Functions, Grade 11, University Preparation, or Mathematics for College Technology, Grade 12, College Preparation

Mathematics of Data Management, Grade 12, University Preparation (MDM4U)
This course broadens students' understanding of mathematics as it relates to managing data. Students will apply methods for organizing large amounts of information; solve problems involving probability and statistics; and carry out a culminating project that integrates statistical concepts and skills. Students will also refine their use of the mathematical processes necessary for success in senior mathematics. Students planning to enter university programs in business, the social sciences, and the humanities will find this course of particular interest.
Prerequisite: Functions and Applications, Grade 11, University/College Preparation, or Functions, Grade 11, University Preparation

DRAFT

Mathematics for College Technology, Grade 12, College Preparation (MCT4C)
This course enables students to extend their knowledge of functions. Students will investigate and apply properties of polynomial, exponential, and trigonometric functions; continue to represent functions numerically, graphically, and algebraically; develop facility in simplifying expressions and solving equations; and solve problems that address applications of algebra, trigonometry, vectors, and geometry. Students will reason mathematically and communicate their thinking as they solve multi-step problems. This course prepares students for a variety of college technology programs.
Prerequisite: Functions and Applications, Grade 11, University/College Preparation

Foundations for College Mathematics, Grade 12, College Preparation (MAP 4C)
This course enables students to broaden their understanding of real-world applications of mathematics. Students will analyse data using statistical methods; solve problems involving applications of geometry and trigonometry; simplify expressions; and solve equations. Students will reason mathematically and communicate their thinking as they solve multi-step problems. This course prepares students for college programs in areas such as business, health sciences, and human services, and for certain skilled trades.
Prerequisite: Foundations for College Mathematics, Grade 11, College Preparation

Mathematics for Work and Everyday Life, Grade 12, Workplace Preparation (MEL4E)
This course enables students to broaden their understanding of mathematics as it is applied in the workplace and daily life. Students will investigate questions involving the use of statistics; apply the concept of probability to solve problems involving familiar situations; investigate accommodation costs and create household budgets; use proportional reasoning; estimate and measure; and apply geometric concepts to create designs. Students will consolidate their mathematical skills as they solve problems and communicate their thinking.
Prerequisite: Mathematics for Work and Everyday Life, Grade 11, Workplace Preparation

DRAFT