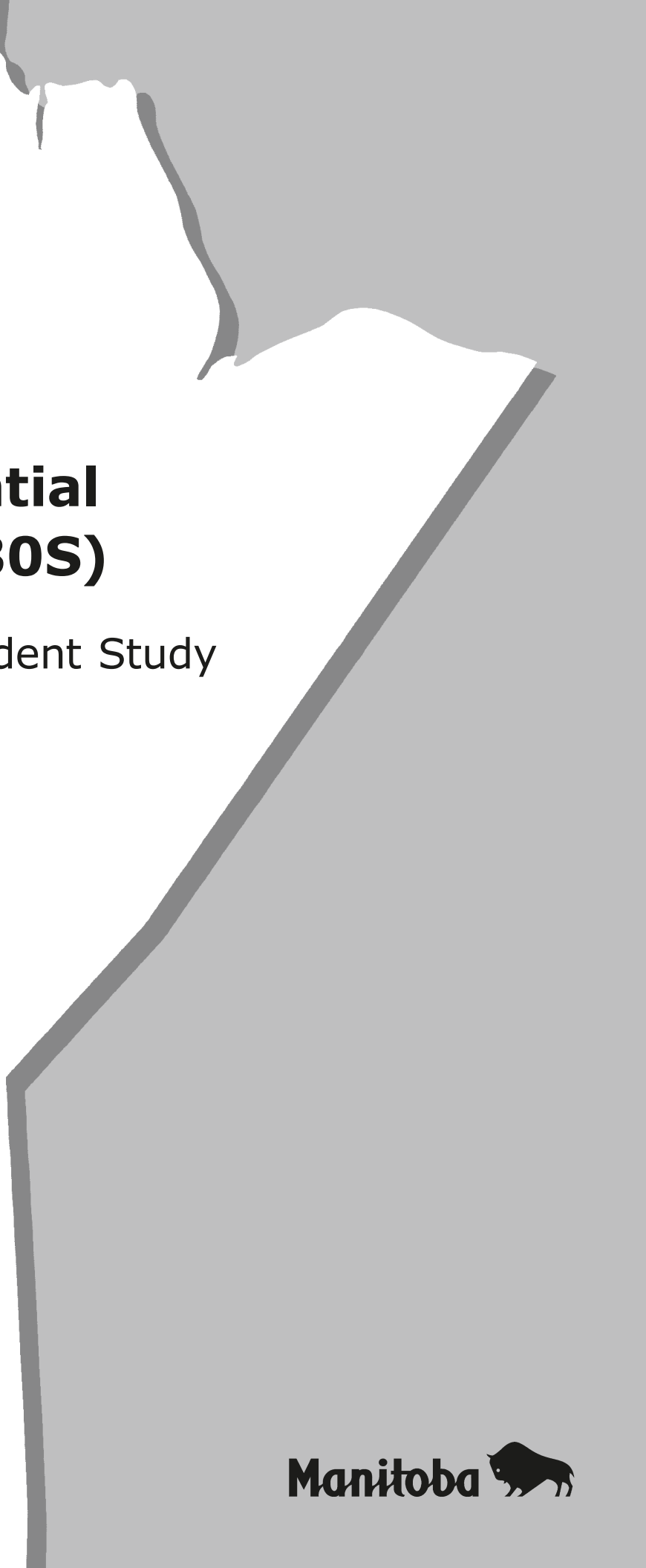
Grade 11 Essential Mathematics (30S)

A Course for Independent Study



Manitoba

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CONTENTS

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Grade 11 Essential Mathematics (30S)

Introduction

Introduction to the Course

Overview

Welcome to Grade 11 Essential Mathematics!

This course is a continuation of the concepts you have been studying in previous years, as well as an introduction to new topics. You will put to use many of the skills that you have already learned to solve problems and do basic arithmetic operations. This course helps you develop the skills, ideas, and confidence that you will need to continue studying math in the future.

As a student enrolled in a distance learning course, you have taken on a dual role—that of a student and a teacher. As a student, you are responsible for mastering the lessons and completing the learning activities and assignments. As a teacher, you are responsible to check your work carefully, noting areas in which you need to improve and motivating yourself to succeed.

What Will You Learn in This Course?

In this course, Grade 11 Essential Mathematics, you build on the knowledge and skills you gained while studying Grade 10 Essential Mathematics. In general, the Essential Mathematics curriculum emphasizes consumer applications, problem solving, decision making, and spatial sense. The specific topics studied in Grade 11 are listed below. After completing this course, you will be well-prepared to complete Grade 12 Essential Mathematics.

How Is This Course Organized?

The Grade 11 Essential Mathematics course consists of the following seven modules:

- Module 1: Interest and Credit
- Module 2: 3-D Geometry
- Module 3: Statistics
- Module 4: Managing Money
- Module 5: Relations and Patterns
- Module 6: Trigonometry
- Module 7: Design Modelling

Each module in this course consists of several lessons, which contain the following components:

Examples:

- **Lesson Focus:** The Lesson Focus at the beginning of each lesson identifies one or more specific learning outcomes (SLOs) that are addressed in the lesson. The SLOs identify the knowledge and skills you should have achieved by the end of the lesson.
- **Introduction:** Each lesson begins with an explanation of what you will be learning in that lesson.
- **Lesson:** The main body of the lesson is made up of the content that you need to learn. It contains text, explanations, images, diagrams, and completed examples.
- **Learning Activities:** Many (most) lessons include one or more learning activities that will help you learn about the lesson topics and prepare you for the assignments, the midterm examination, and the final examination. Once you complete a learning activity, check your responses against those provided in the Learning Activity Answer Key found at the end of each applicable module. You will not submit the completed learning activities to your tutor/marker.
- **Assignments:** Assignments are found at the end of each lesson that has an assignment. You will mail or electronically submit all your completed assignments to your tutor/marker for assessment at the end of each module. In total, all assignments are worth 75% of your final course mark.
- **Summary:** Each lesson ends with a brief review of what you just learned.

This course also includes the following appendices:

- **Appendix A: Unit Conversions:** At the end of the course, you will find an appendix that contains Conversion Formula Tables. These unit conversions are for reference use only and are not required for the exam.
- **Appendix B: Glossary:** The glossary at the end of the course provides definitions for an alphabetical list of the terms identified throughout the course. You can use the glossary to review terms used in the course.

What Resources Will You Need for This Course?

You do not need a textbook for this course. All the content is provided directly within the course. You will, however, need access to a variety of resources.

The required and optional resources for this course are identified below.

Required Resources

For this course, you will need access to the following resources. If you do not have access to one or more of these resources, contact your tutor/marker.

- **A calculator:** Use a graphing or scientific calculator as you work through this course. You will also need the calculator for the examination(s).
- **A metric and imperial ruler:** Use the rulers as you work through this course. You will also need both rulers for the examination(s).
- **A geometry set:** Use a geometry set including a set of compasses, a protractor, and a set square for this course. You will also need the geometry set for the examination.

Electronic Resources

For this course, you will need the following electronic resource. If you do not have access to the Internet, or if you need a copy of the resource, contact the Independent Study Option (ISO) office at 1-800-465-9915.

- Module 7 contains a number of diagrams that represent 2-D views of 3-D objects. Module 7: Design Modelling is available in the Student Downloads section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/downloads/index.html>.

Optional Resources

It would be helpful if you had access to the following resources:

- **Photocopier/scanner:** With access to a photocopier/scanner, you could make a copy of your assignments before submitting them so that if your tutor/marker wants to discuss an assignment with you over the phone, each of you will have a copy. It would also allow you to continue studying or to complete further lessons while your original work is with the tutor/marker. Photocopying or scanning your assignments will also ensure that you keep a copy in case the originals are lost.
- **A computer with spreadsheet software:** Access to spreadsheet software (e.g., Microsoft Excel) would help you to present and analyze data graphically.

- **A computer with Internet access:** Some lessons suggest website links as sources of information or for supplementary reference and reading. If you do not have Internet access, you will still be able to complete the course.

Who Can Help You with This Course?

Taking an independent study course is different from taking a course in a classroom. Instead of relying on the teacher to tell you to complete a learning activity or an assignment, you must tell yourself to be responsible for your learning and for meeting deadlines. There are, however, two people who can help you be successful in this course: your tutor/marker and your learning partner.

Your Tutor/Marker

Tutor/markers are experienced educators who tutor ISO students and mark assignments and examinations. When you are having difficulty with something in this course, contact your tutor/marker, who is there to help you. Your tutor/marker's name and contact information were sent to you with this course. You can also obtain this information in the Who Is My Tutor/Marker? section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/iso/assistance.html>.

Your Learning Partner

Another person who can help you with your course is a learning partner. A learning partner is someone you choose who will help you learn. It may be someone who knows something about Mathematics, but it doesn't have to be. A learning partner could be someone else who is taking this course, a teacher, a parent or guardian, a sibling, a friend, or anybody else who can help you. Most importantly, a learning partner should be someone with whom you feel comfortable and who will support you as you work through this course.

Your learning partner can help you keep on schedule with your coursework, read the course with you, check your work, look at and respond to your learning activities, or help you make sense of assignments. You may even study for your examination(s) with your learning partner. If you and your learning partner are taking the same course, however, your assignment work should not be identical.

How Will You Know How Well You Are Learning?

You will know how well you are learning in this course by how well you complete the learning activities, assignments, and examinations.

Learning Activities

Each learning activity has two parts—Part A has BrainPower questions and Part B has questions related to the content in the lesson

Part A: BrainPower

The BrainPower questions are provided as a warm-up activity for you before trying the other questions. Each question should be completed quickly and without using a calculator, and most should be completed without using pencil and paper to write out multiple steps. Some of the questions will relate directly to content of the course. Some of the questions will review content from previous courses—content that you need to be able to answer efficiently.

Being able to do these questions in a few minutes will be helpful to you as you continue with your studies in mathematics. If you are finding it is taking you longer to do the questions, you can try one of the following:

- work with your learning partner to find more efficient strategies for completing the questions
- ask your tutor/marker for help with the questions
- search online for websites that help you practice the computations so you can become more efficient at completing the questions.

None of the assignment questions or exam questions will require you to do the calculations quickly or without a calculator. However, it is for your benefit to complete the questions as they will help you in the course. Also, being able to successfully complete the BrainPower exercises will help build your confidence in mathematics. BrainPower questions are like a warm-up you would do before competing in a sporting event.

Part B: Course Content Questions

One of the easiest and fastest ways to find out how much you have learned is to complete Part B of the learning activities. These have been designed to let you assess yourself by comparing your answers with the answer keys at the end of each module. There is at least one learning activity in each lesson. You will need a notebook or loose-leaf pages to write your answers.

The learning activities in this course will help you to review and practise what you have learned in the lessons. You will not submit the completed learning activities to your tutor/marker. Instead, you will complete the learning activities and compare your responses to those provided in the Learning Activity Answer Key found at the end of each module.

Make sure you complete the learning activities. Doing so will not only help you to practise what you have learned, but will also prepare you to complete your assignments and the examination(s) successfully. Many of the questions on the examination(s) will be similar to the questions in the learning activities. Remember that you **will not submit learning activities to your tutor/marker**.

Assignments

Each module in this course contains assignments, which you will complete and submit to your tutor/marker for assessment. The assignments are worth a total of 75% of your final course mark.

There are two types of assignments that you must submit to your tutor/marker. Each module has a cover assignment, which you can complete at any time during the module. Lesson assignments are located throughout the modules, and include questions similar to the questions in the learning activities of previous lessons. The cover assignments and lesson assignments have space provided for you to write your answers on the question sheets. **You need to show all your steps as you work out your solutions, and make sure your answers are clear (include units, where appropriate).**

The tutor/marker will mark your assignments and return them to you. Remember to keep all marked assignments until you have finished the course so that you can use them to study for your examinations.

Resource Sheet

When you write your Midterm and Final Examinations, you will be allowed to take an Exam Resource Sheet with you into the exam. This sheet will be one letter-sized page, 8½ " by 11", with both sides in your handwriting or typewritten. It is to be submitted with your exam. The Exam Resource Sheet is not worth any marks.

Creating your own resource sheet is an excellent way to review. It also provides you with a convenient reference and quick summary of the important facts of each module. Each student is asked to complete a resource sheet for each module to help with studying and reviewing.

The lesson summaries are written for you to use as a guide, as are the module summaries at the end of each module. Refer to these when you create your own resource sheet. Then, go to Appendix B: Glossary (at the end of the course) to check the information on your resource sheet.

After you complete each module's resource sheet, you should summarize the sheets from all of the modules to prepare your Exam Resource Sheet. The Midterm Examination is based only on the first three modules of the course, while the Final Examination is based on Modules 4 to 7.

Midterm and Final Exams

This course contains a midterm examination and a final examination.

- The midterm examination is based on Modules 1 to 3, and is worth 12.5% of your final mark in this course. You will write the midterm examination when you have completed Modules 1 to 3.

  Formulas are not provided on the exam. As a student, you can use your Midterm Exam Resource Sheet to bring any formulas you have not memorized into the exam with you. You will be required to bring the following supplies to the Midterm Examination: pens and pencils (2 or 3 of each), blank paper, a scientific or graphing calculator, a geometry set (which includes a ruler, a protractor, and a compass), and your Midterm Exam Resource Sheet.

- The final examination is based on Modules 4 to 7, and is worth 12.5% of your final mark in this course. You will write the final examination when you have completed Module 7.

  You can use your Final Exam Resource Sheet to bring any formulas you have not memorized into the exam with you. Formulas are not provided on the exam. You will be required to bring the following supplies to the final exam: pens and pencils (2 or 3 of each), blank paper, a scientific or graphing calculator, a geometry set (which includes a ruler, a protractor, and a compass), and your Final Exam Resource Sheet. You may also bring coloured pencils for the 2-D and 3-D drawings.

The two examinations are worth a total of 25% of your final course mark. You will write both examinations under supervision.

To do well on each examination, you should review all the work you have completed from the modules, including all learning activities and assignments.

Practice Examinations and Answer Keys

To help you succeed in your examinations, you will have an opportunity to complete a Midterm Practice Examination and a Final Practice Examination. These examinations, along with the answer keys, are found in the Student Downloads section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/downloads/index.html>. If you do not have access to the Internet, contact the Independent Study Option office at 1-800-465-9915 to obtain a copy of the practice examinations.

These practice examinations are similar to the actual examinations you will be writing. The answer keys enable you to check your answers. This will give you the confidence you need to do well on your examinations.

Requesting Your Examination(s)

You are responsible for making arrangements to have the examinations sent to your proctor from the ISO office. Please make arrangements before you finish Module 3 to write the midterm examination. Likewise, you should begin arranging for your final examination before you finish Module 7.

To write your examinations, you need to make the following arrangements:

- **If you are attending school,** ask your school's ISO school facilitator to request your examination. Do this at least **three weeks before** you are ready to write your examination. For more information on examination procedures, please contact your ISO school facilitator or visit the Grading and Evaluation section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/iso/assignments.html>.

- **If you are not attending school,** check the **Examination Request Form** for options available to you. The form was mailed to you with this course. **Three weeks before** you are ready to write the examination, fill in the Examination Request Form and mail, fax, or email it to

  ISO Office
  555 Main Street
  Winkler MB R6W 1C4
  Fax: 204-325-1719
  Toll-Free Telephone: 1-800-465-9915
  Email: distance.learning@gov.mb.ca

How Much Time Will You Need to Complete This Course?

Learning through independent study has several advantages over learning in the classroom. You are in charge of how you learn and you can choose how quickly you will complete the course. You can read as many lessons as you wish in a single session. You do not have to wait for your teacher or classmates.

From the date of your registration, you have a maximum of 12 months to complete this course, but the pace at which you proceed is up to you. Read the following suggestions on how to pace yourself.

Chart A: Semester 1

If you want to start the course in September and complete it in January, you can follow the timeline suggested below.

Module	Completion Date
Module 1	Middle of September
Module 2	Early October
Module 3 and Midterm Exam	End of October
Module 4	Middle of November
Module 5	Early December
Module 6	End of December
Module 7 and Final Exam	Middle of January

Chart B: Semester 2

If you want to start the course in January and complete it in June, you can follow the timeline suggested below.

Module	Completion Date
Module 1	Middle of February
Module 2	Early March
Module 3 and Midterm Exam	End of March
Module 4	Middle of April
Module 5	End of April
Module 6	Middle of May
Module 7 and Final Exam	End of May

Chart C: Full School Year (Not Semestered)

If you want to start the course in September and complete it in June, you can follow the timeline suggested below.

Module	Completion Date
Module 1	Middle of October
Module 2	End of November
Module 3 and Midterm Exam	Early January
Module 4	Middle of February
Module 5	Middle of March
Module 6	Middle of April
Module 7 and Final Exam	End of May

Timelines

Do not wait until the last minute to complete your work, since your tutor/marker may not be available to mark it immediately. It may take a few weeks for your tutor/marker to assess your work and return it to you or your school.

If you need this course to graduate this school year, remember to schedule and complete your final examination by **May 31**.

When and How Will You Submit Completed Assignments?

When to Submit Assignments

While working on this course, you will submit completed assignments to your tutor/marker seven times. Each time you submit assignments, you must include the applicable Cover Sheet, which you will find at the end of this Introduction.

The following chart shows you exactly what assignments you will be submitting at the end of each module.

Submission of Assignments	
Submission	Assignments You Will Submit
1	**Module 1: Interest and Credit** Module 1 Cover Sheet Module 1 Cover Assignment: Loyalty Programs Assignment 1.1: Interest Assignment 1.2: What Is Credit? Assignment 1.3: Credit Payment Calculations Assignment 1.4: Credit Card Calculations
2	**Module 2: 3-D Geometry** Module 2 Cover Sheet Module 2 Cover Assignment: Geometric Patterns Assignment 2.1: Surface Area Assignment 2.2: Volume Assignment 2.3: Applications of Volume and Capacity
3	**Module 3: Statistics** Module 3 Cover Sheet Module 3 Cover Assignment: Statistics in Your Life Assignment 3.1: Circle Graphs, Bar Graphs, and Histograms Assignment 3.2: Line Graphs Assignment 3.3: Interpreting Graphs
4	**Module 4: Managing Money** Module 4 Cover Sheet Module 4 Cover Assignment: How Time Affects the Value of Money Assignment 4.1: Budgets Assignment 4.2: Bank Accounts Assignment 4.3: Cheques, Deposit Slips, and Registers
5	**Module 5: Relations and Patterns** Module 5 Cover Sheet Module 5 Cover Assignment: Applying Patterns Assignment 5.1: Scatterplots Assignment 5.2: Patterns and Linear Relations Assignment 5.3: Slope Assignment 5.4: Scale
6	**Module 6: Trigonometry** Module 6 Cover Sheet Module 6 Cover Assignment: Math Operations Assignment 6.1: Applying Trigonometry
7	**Module 7: Design Modelling** Module 7 Cover Sheet Module 7 Cover Assignment: Four-Colour Problem Assignment 7.1: Three 2-D Views of 3-D Objects Assignment 7.2: One-Point Perspective Drawings Assignment 7.3: Exploded Views and Component Parts

How to Submit Assignments

In this course, you have the choice of submitting your assignments either by mail or electronically.

- **Mail:** Each time you **mail** something, you must include the print version of the applicable Cover Sheet (found at the end of this Introduction).
- **Electronic submission:** Each time you **submit** something **electronically**, you must include the electronic version of the applicable Cover Sheet (found in the Student Downloads section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/downloads/index.html>) or you can scan the Cover Sheet located at the end of this Introduction.

Complete the information at the top of each Cover Sheet before submitting it along with your assignments.

Submitting Your Assignments by Mail

If you choose to mail your completed assignments, please photocopy/scan all the materials first so that you will have a copy of your work in case your package goes missing. You will need to place the applicable module Cover Sheet and assignments in an envelope, and address it to

ISO Tutor/Marker
555 Main Street
Winkler MB R6W 1C4

Your tutor/marker will mark your work and return it to you by mail.

Submitting Your Assignments Electronically

Assignment submission options vary by course. Sometimes assignments can be submitted electronically and sometimes they must be submitted by mail. Specific instructions on how to submit assignments were sent to you with this course. You can also obtain this information in the Grading and Evaluation section of the distance learning website at <www.edu.gov.mb.ca/k12/dl/iso/assignments.html>.

If you are submitting assignments electronically, make sure you have saved copies of them before you send them. That way, you can refer to your assignments when you discuss them with your tutor/marker. Also, if the original assignments are lost, you are able to resubmit them.

Your tutor/marker will mark your work and return it to you electronically.

The Independent Study Option office does not provide technical support for hardware-related issues. If troubleshooting is required, consult a professional computer technician.

What Are the Guide Graphics For?

Guide graphics are used throughout this course to identify and guide you in specific tasks. Each graphic has a specific purpose, as described below.

Lesson Introduction: The introduction sets the stage for the lesson. It may draw upon prior knowledge or briefly describe the organization of the lesson. It also lists the learning outcomes for the lesson. Learning outcomes describe what you will learn.

Learning Partner: Ask your learning partner to help you with this task.

Learning Activity: Complete a learning activity. This will help you to review or practise what you have learned and prepare you for an assignment or an examination. You will not submit learning activities to your tutor/marker. Instead, you will compare your responses to those provided in the Learning Activity Answer Key found at the end of the applicable module.

Assignment: Complete an assignment. You will submit your completed assignments to your tutor/marker for assessment at the end of a given module.

Mail or Electronic Submission: Mail or electronically submit your completed assignments to your tutor/marker for assessment.

Phone or Email: Telephone or email your tutor/marker.

Resource Sheet: Indicates material that may be valuable to include on your resource sheet.

Examination: Write your midterm or final examination at this time.

Note: Take note of and remember this important information or reminder.

Remember: If you have questions or need help at any point during this course, contact your tutor/marker or ask your learning partner for help.

Good luck with the course!

Notes

Grade 11 Essential Mathematics (30S)

Module 1
Interest and Credit

Module 1:
Interest and Credit

Introduction

In Grade 10 Essential Mathematics, you studied payment for work, including gross pay and net pay. This module will focus on two topics that relate to what you do with the money you earn. The first two lessons deal with interest, both on investments and loans. The following lessons talk about credit—where you can get it and how to use it. You may wonder what this has to do with you, but interest and credit will probably be an important part of your financial world. Money deposited in a savings account earns interest. On the other hand, if you borrow money or use a credit card, you will likely pay interest—sometimes a lot. Sometimes you may need credit to purchase an expensive item, such as a car, laptop, or even a house!

Before beginning the first lesson of this course, complete Learning Activity 1.1 at the end of this introduction. It will prepare you for the course you are about to start.

Assignments in Module 1

To obtain credit for Module 1, you will need to send the following five assignments to your tutor/marker. Your evaluation for this module is based on these assignments.

Lesson	Assignment Number	Assignment Title
	Cover Assignment	Loyalty Programs
2	Assignment 1.1	Interest
3	Assignment 1.2	What Is Credit?
5	Assignment 1.3	Credit Payment Calculations
6	Assignment 1.4	Credit Card Calculations

Resource Sheet

When you write your midterm exam, you are encouraged to take a Midterm Exam Resource Sheet with you into the exam. This sheet will be one letter-sized page, 8½ " by 11", with both sides in your handwriting or typewritten. You will submit it with your exam, but you do not receive any marks for it.

Many students have found that preparing a resource sheet is an excellent way to review. It provides you with a summary of the important facts of each module. You should complete a resource sheet for each module to help with your studying and reviewing. Lesson summaries and module summaries are included for you to use as a guide.

You may use the list of instructions provided below to help you with preparing your resource sheet for the material in Module 1. On this sheet, you should record math terms and definitions, formulas, sample questions, or a list of places where you often make mistakes. You should also identify special areas that require extra attention or review by recording the page numbers.

After you have completed each module's resource sheet, you may summarize the sheets from Modules 1, 2, and 3 to prepare your Midterm Exam Resource Sheet. The midterm exam for this course is based on Modules 1 to 3.

Resource Sheet for Module 1

1. List all the important math terms, and define them if necessary. If needed, refer to the glossary in Appendix B.
2. List all the formulas and perhaps a sample problem that shows how the formula is used.
3. If necessary, write the solutions to some problems, showing in detail how you did the calculations.
4. Copy any questions that represent the key points of the lesson, and perhaps include the solutions as well.
5. Identify the problems you found most difficult, and copy the page numbers onto the resource sheet so that you can review them before writing the exam. You may also copy the problems and the solutions onto your resource sheet, and later write them onto your midterm exam resource sheet.
6. Write any comments, ideas, shortcuts, or other reminders that may be helpful during an exam.

Learning Activity 1.1

This learning activity is the only one that does not include a BrainPower section, although it does have two parts. Be sure to complete this learning activity before you begin your first lesson.

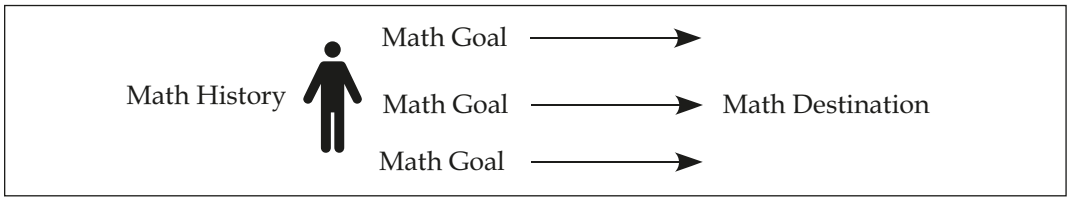
The first learning activity involves you having a conversation with your tutor/marker. Having this conversation with your tutor/marker has two important purposes. First, it introduces you to a very valuable resource – your tutor/marker. He or she is available for you to answer questions, explain concepts, and guide you through this course. You can discuss your math learning and progress. Feel free to contact your tutor by phone or email at any time during this course.

The second important purpose of this assignment is to get you thinking about your math goals. You may have a future career in mind and this course is getting you one step closer to it by completing a prerequisite for a future required course. There may be specific skills or topics you are interested in learning about and they are covered in this course.

If you are unsure of your math goals or why they are important, consider this:

- goals give you a sense of direction and purpose in taking this course
- goals help motivate you to learn and do your best, even when it's tough
- when you accomplish your goals, there is a great sense of achievement and success.

Good goals need to be realistic and specific, and they should reflect what is important to you. They should give you direction and take you further down the path from where you have been to where you want to go.



Goals can be long term or short term, but they are the pathway that takes **you** from where you were/are, closer to where you want to go.

continued

Learning Activity 1.1 (continued)

Part A: Your Tutor/Marker

Fill in the following blanks using information provided with your course:

My tutor/marker's name is _____

I can phone my tutor/marker at 1-8_____

My tutor/marker's email is _____

Be ready to discuss the following topics and the reasons for your answers with your tutor/marker during your phone conversation. If you'd like, make some notes below before you call in order to help you feel prepared. Feel free to add other questions or comments that you may have as well.

1. I am taking this course by distance education because…

_____

_____

_____

_____

2. What I like about math and can do mathematically is… (favourite topic, skill, where you use math, etc.)

_____

_____

_____

_____

continued

Learning Activity 1.1 (continued)

3. What I dislike about math or have difficulty doing is …

4. Previous math experiences that influence the way I feel about math are…

5. The next math course I would like to take is…

6. What I am hoping this course will help me accomplish and learn for the future is…

continued

7. I will organize things to help me succeed in this course by…

_____

_____

_____

_____

During your phone conversation, jot down a sentence or two in the spaces above about what you and your tutor/marker talk about. For example, if you are taking this course because it doesn't fit into your schedule at school or because you travel a lot with your basketball team and this is more convenient, state that in the space below question 1.

Part B: Your Math Pathway

Use the answers to the questions from the conversation with your tutor/marker as a starting point and fill in the following diagram. In the Math History box, jot down point-form notes about your prior experience and knowledge about math (Questions 2, 3, and 4). In the Math Destination box, jot down what completing this course will help you accomplish in the future (Questions 5 and 6).

In the Pathway box, write down what you will need to do to move down the pathway from your History to your Destination.

Math History	Pathway	Math Destination

continued

Learning Activity 1.1 (continued)

For example, if your destination includes needing a 75% in this course so that you can feel confident going into Grade 12 Essential Mathematics, or you need to learn how to make smart consumer decisions, what will help you accomplish this? It may mean figuring out how you best learn and study math. It may mean setting up a schedule so you complete the assignments on time. You may need to find your calculator manual and figure out how to use it, set up regular appointments with your learning partner, research a topic on the Internet, or read a textbook about a certain math concept or skill. Your pathway is unique to you.

As you move through this course and work on achieving your goals, self-assessment becomes important. It is the way for you to determine if you are getting closer to your destination, and if the steps along your pathway are taking you in the right direction. You will need to periodically ask yourself: Am I doing my assignments? Are my note-taking skills improving? How often have I contacted my tutor/marker or worked with my learning partner? Have I found useful homework websites? Is my schedule working? What do I need to change or adjust so I can get to my destination?

Several times during this course, you will go through this cycle of looking at where you have been, where you want to go, and where you currently are. At any time, you may want to revise your goals or set new ones, as you evaluate your own progress and learning.

- Look back/history—reflect on what you know, how far you have come
- Look around/pathway—assess if you are achieving your goals, determine if new learning or understanding has occurred, and check your progress
- Look forward/destination—determine what you want to know, set goals

Each time you go through these steps you will become better at mathematics!

It is important that you keep the chart of your pathway handy, as you will revisit it at other points in this course.

Notes

Lesson Focus

In this lesson, you will

- ❑ use the simple interest formula to calculate interest and the other variables

Lesson Introduction

When you invest money, you are able to earn interest on your investment. Conversely, when you repay a loan, you must pay interest in addition to the amount you originally borrowed. In this lesson, we will explore the most basic form of interest, called **simple interest**.

Simple Interest

Financial institutions borrow and lend money. When you deposit money into a savings account, you are lending the financial institution money for a period of time. The financial institution pays you interest for borrowing your money. In turn, the financial institution lends your money to individuals who need it. These individuals must pay interest for the money they borrow. The interest rate they pay the financial institution is higher than the interest rate you receive from the same institution. In this way, the financial institution earns a profit on these transactions.

Calculating Simple Interest

When you invest some money in a financial institution, the institution pays you interest for using your money. When you borrow money from a financial institution, you pay interest to the institution. The mathematical formula for calculating simple interest is:

$I = Prt$, where
I = interest
P = principal, which is the original amount invested or borrowed
r = annual (yearly) rate of interest expressed as a decimal
t = length of time in years

You should include this formula on your resource sheet.

Note that the time in the formula, $I = Prt$, must be in years.

- When the length of time is in months, divide by 12 to convert it into years.
- When the length of time is in days, divide by 365.

The mathematical formula $I = Prt$ is a calculation for simple interest. **Simple interest** is calculated from the *original amount* invested or borrowed, not on an amount that includes interest already charged.

Most financial institutions calculate interest based on amounts including previously charged interest (known as compound interest). This may sound complicated, but it will be explained in the next lesson.

In this course, when you are asked to calculate interest, you must calculate **simple interest** unless you are asked to calculate **compound interest**.

Example 1

Olive Branch invests \$1500 in a financial institution that offers her an interest rate of 4% per annum (per year). Calculate the interest Olive will earn at the end of

a) three years

b) seven months

c) 100 days

Solution

a) In the formula $I = Prt$, $P = \$1500$, $r = 4\%$ or 0.04, $t = 3$.

$I = Prt$
$= 1500 \times 0.04 \times 3$
$= 180$

At the end of three years, Olive will earn \$180.

b) In the formula $I = Prt$, $P = \$1500$; $r = 4\%$ or 0.04; $t = \frac{7}{12}$.

$$I = Prt$$
$$= 1500 \times 0.04 \times \frac{7}{12}$$
$$= 35$$

At the end of seven months, Olive will earn \$35.

c) In the formula $I = Prt$, $P = \$1500$, $r = 4\%$ or 0.04, and $t = \frac{100}{365}$.

$$I = Prt$$
$$= 1500 \times 0.04 \times \frac{100}{365}$$
$$= 16.44$$

At the end of 100 days, Olive will earn \$16.44.

Using the Simple Interest Formula

Not only can we use the formula $I = Prt$ to calculate interest, but we can also use it to calculate the other variables in the formula (principal, rate, and time).

To calculate the interest, use:

$I = Prt$

To calculate the rate, you must isolate the variable r.

$I = Prt$ Divide both sides by variables you already know, Pt.

$\frac{I}{Pt} = \frac{Prt}{Pt}$ Simplify the right-hand side by cancelling Pt.

$$\frac{I}{Pt} = r$$
$$r = \frac{I}{Pt}$$

To find the principal, **divide** the interest by the product of the rate and the time.

$$P = \frac{I}{rt}$$

To find the time, **divide** the interest by the product of the principal and the time.

$$t = \frac{I}{Pr}$$

You may want to include these formulas on your resource sheet, but you don't need to if you understand how to calculate them from the simple interest formula.

Example 1

Treya Pine invested a certain sum of money in a financial institution and earned $200 interest after four years. If the annual interest rate was 5 percent, what amount did Treya invest?

Solution

In the formula $I = Prt$, $I = \$200$, $r = 5\%$ or 0.05, $t = 4$, $P = ?$

$$P = \frac{I}{rt}$$
$$= \frac{200}{(0.05 \times 4)}$$
$$= \$1000$$

Treya invested $1000.

You can calculate the above using the following keys on your calculator.

200	÷	(	0.05	×	4	)	=

You can also solve this problem by substituting the values into the $I = Prt$ formula and *then* solving the equation.

$$I = Prt$$
$$200 = P(0.05)(4)$$
$$200 = P(0.2)$$
$$\frac{200}{0.2} = \frac{P(0.2)}{0.2}$$
$$\frac{200}{0.2} = P$$
$$1000 = P$$

Treya invested $1000.

Example 2

Brooke Poole has $2400 to invest in a financial institution. Calculate the annual rate of interest if she plans to earn $300 on her investment at the end of two years.

Solution

$I = \$300$, $P = \$2400$, $t = 2$, $r = ?$

$$r = \frac{I}{Pt}$$
$$= \frac{300}{(2400 \times 2)}$$
$$= 0.0625$$
$$= 6.25\%$$

Brooke requires an annual rate of 6.25% if she wants to earn $300 on her investment at the end of two years.

Example 3

Wade Lake borrows $5000 from the bank. He is charged interest at a rate of 4% per year. Calculate the number of days Wade kept the money if he owes $360 in interest.

Solution

$I = \$360$, $P = \$5000$, $r = 4\%$ or 0.04, $t = ?$

$$t = \frac{I}{Pr}$$
$$= \frac{360}{(5000 \times 0.04)}$$
$$= 1.8 \text{ year}$$
$$= 1.8 \times 365 = 657 \text{ days}$$

Wade kept the money for 657 days.

Note that the time is always in years when in the formula. To calculate the number of days, multiply the answer, 1.8 years, by 365.

The following learning activity will help you put into practice what you have just learned. When you have finished, check your answers in the Learning Activities Answer Key at the end of this module.

Learning Activity 1.2

Complete the following, and check your answers in the learning activity keys found at the end of this module.

Part A: BrainPower

You should be able to complete the following five questions in just a few minutes without using a calculator or paper and pencil.

1. Evaluate for $y = 4 : 4y + (-6)$
2. A right triangle has sides with lengths of 12, 20, and 16. What is the length of the hypotenuse?
3. How many times do you have to reflect an image over a line so that you get the original image back?
4. There is a square kite in a picture, drawn to scale. The scale ratio is 1 mm : 20 cm. If the kite has a side length of 3 mm, how large is the life-size kite?.
5. Denise earns 15% of her sales at her family restaurant. If she sells $1400 in food, how much money will she earn?

Part B: Simple Interest Formula

Remember, these questions are similar to the ones that will be on your assignments and midterm exam. If you are able to answer them correctly, you are likely to do well on your exam. If you are not able to answer them correctly, you need to go back to the lesson to review the information you do not understand. Don't forget that you can ask your learning partner or tutor/marker for help if you are having a hard time understanding.

1. Find the simple interest for each of the following. Round to the nearest cent.

Interest	Principal	Rate	Time
	$1000	5%	2 years
	$1000	5%	6 months
	$1000	5%	100 days
	$10,000	7¾%	1 year
	$10,000	7¾%	360 days
	$10,000	7¾%	18 months

continued

Learning Activity 1.2 (continued

2. Rayna Fontaine invests $20,000 in a financial institution at 10%. Calculate the number of days it will take her investment to earn $1200 in interest.
3. Douglas Fir borrows money from his financial institution at an interest rate of 6.25% per year. If he pays $397.50 in interest after four years, calculate the amount of his loan.
4. Luke Wharm has two years to save $2800 for a winter vacation. He has $10,000 to invest in a financial institution.
   a) Calculate the interest rate he requires to earn enough for his vacation.
   b) Is it likely that Luke will find a financial institution that will offer him this rate? Check with a financial institution or a newspaper.
5. Preston Fawcett has $1000 to invest in a financial institution. He decides to purchase a step bond that guarantees him $4\frac{3}{4}\%$ for the first year, $5\frac{1}{2}\%$ for the second year, and $6\frac{3}{4}\%$ for the third year.
   a) Calculate the total interest he will earn in three years.
   b) Calculate the average interest he will earn in three years

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Lesson Summary

In this lesson, you learned about simple interest. The formula for simple interest is $I = Prt$. You used this formula to determine the amount of interest earned on an investment. You also changed the formula so that you could solve for the other variables. Now that you understand simple interest, we will move on to compound interest in the next lesson.

Before you move on, be sure you have the formulas and examples that you find helpful on your resource sheet.

Notes

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