Introduction to *Nelson Advanced Functions and Introductory Calculus*

Nelson Advanced Functions and Introductory Calculus is designed to help you develop skill at creating and analyzing mathematical models to solve real-world problems involving rates of change. In some cases, you will have the chance to practise familiar mathematical skills like solving equations, graphing data, and modelling. You will also have the opportunity to develop your own strategy for solving new types of problems. Throughout this book, you will be encouraged to communicate what you have learned to others.

Varied Instructional Approaches

The different instructional approaches in this book allow you to explore concepts on your own or by working with others. Some lessons may be led by your teacher, while others may be done through the use of hands-on activities. For some lessons, you may be asked to read solved examples on your own to build an understanding of a concept.

There are two kinds of lessons in *Nelson Advanced Functions and Introductory Calculus*, Concept Lessons and *Explorations:*


Concept Lessons

Concept Lessons present concepts and ideas in real-life contexts. In some cases, your teacher may guide your class through a Concept Lesson to build your understanding of new concepts and skills, while in other cases you may be asked to read through the lesson on your own. Each Concept Lesson has solved examples, which will help to clarify your understanding. Following the solved examples are the *Check, Consolidate, Communicate* questions and the *Key Ideas*. The *Key Ideas* summarize the important ideas in the lesson. Concept Lessons also have *Exercise* sections to help consolidate your understanding.

Explorations

The *Explorations* in the **Explorations Appendix** introduce and explore new concepts that will be studied in more detail in the Concept Lessons. Some Explorations require the use of technology, while others do not. Explorations provide a hands-on learning experience that can be done in class or on your own at home. An *Exploration* icon appears in the margin of a Concept Lesson that has an associated *Exploration*.
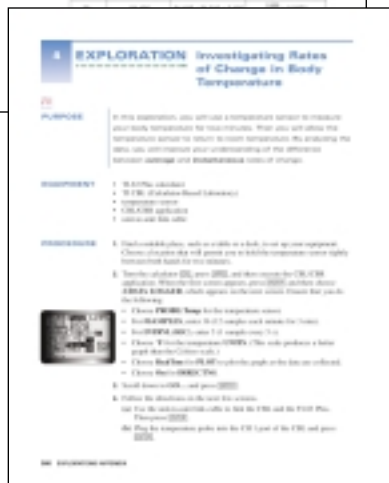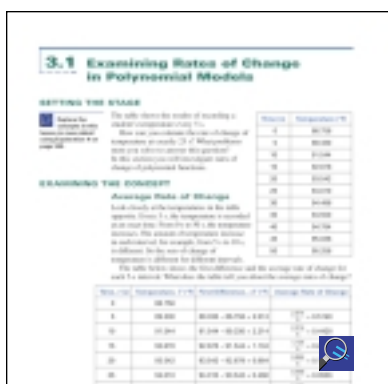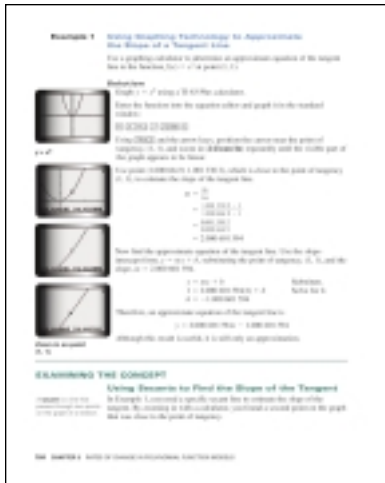
The Role of Technology

The use of graphing technology is integrated throughout this book. For instance, where it is appropriate, some examples are solved with a graphing calculator, in order to develop your skill with this tool. In such cases, step-by-step instructions and screen shots are provided. A calculator is useful because it allows you to determine approximate solutions to real-world problems. The mathematics developed in the course is useful because it provides algebraic techniques that will give exact solutions to these problems. An icon of a calculator graph in the margin denotes that a graphing calculator is needed to complete an activity. The **Technology Appendix** summarizes the key calculator skills of this course.

Features of *Nelson Advanced Functions and Introductory Calculus*

Connections

Mathematics is not just something you do in mathematics class. You use it in other classes and your daily life. It will also be important as you make a career choice. Mathematicians and teachers are not the only people who use mathematics in their careers. At the start of each chapter is a *Chapter Problem* that illustrates how math is used in different careers and situations. There are also two *Challenge* questions that will require you to use the problem solving skills you learn in the chapter.
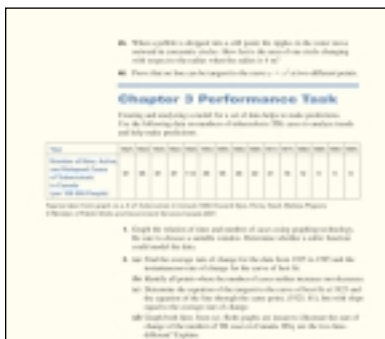
Assessment Features

Performance Tasks

At the end of each **Chapter Review** is a *Performance Task*, which might be a short problem-solving question or a longer experiment or investigation. These *Performance Tasks* may be done at school or at home. Your teacher may assign some of these tasks so that both of you can see how well you understand the concepts of the chapters. You may also decide to do these tasks on your own, for extra practice and review. Some tasks may be done on your own, while for others you will likely work in a group. These tasks, along with quizzes, tests, and exams, allow you to demonstrate your understanding of the important ideas in this course.

Achievement Chart Questions

Within each set of Concept Lesson exercises are four questions, labelled *Knowledge and Understanding; Application; Thinking, Inquiry, Problem Solving*; and *Communication*. You can use these four questions to determine your strengths and weaknesses and, with the help of your teacher, develop a plan for improving your achievement level. There is an additional set of such questions at the end of each section.

Also in each set of exercises is a *Check Your Understanding* question. This question will help you determine whether you understand the main ideas of the section.

Preparation Features

Getting Ready

The *Getting Ready* exercises in each chapter review important ideas from previous grades and chapters that will be starting points for new learning within the chapter. You can use these exercises to determine whether you are ready for the new work to come. If you cannot do some exercises, be sure to ask your teacher or another student for help.

Review Features

Chapter Review   At the end of each chapter is a **Chapter Review**, which consists of three types of questions, *Check Your Understanding questions, Additional Review Questions by Section*, and *Review Questions by Achievement Chart Categories*.

The *Check Your Understanding* questions will help you decide, on your own, whether you understand the important ideas of a chapter. Think about each question and write the answer in your notebook. As you do, you will be creating your own summary of the chapter. You can use your answers to these questions, along with the other **Chapter Review** exercises, to prepare for quizzes, tests, and exams.

The *Review Questions by Section* are grouped according to the individual sections within a chapter. They will help you to reinforce your understanding of the concepts and skills developed in each section. Refer to the appropriate *Key Ideas* and solved examples when answering these questions.

The *Review Questions by Achievement Chart Categories* are grouped according to the four Achievement Chart categories (*Knowledge and Understanding; Application; Thinking, Inquiry, Problem Solving;* and *Communication*). They will help you to reinforce your understanding of the important ideas of the entire chapter. You can use these questions to review your work and prepare for tests.

Chapter Review Test   Each chapter concludes with a chapter review test that you can use to find out whether you are ready for a class test or exam.

Cumulative Review Test   There is a cumulative review test after Chapters 2, 5, and 7. Each test incorporates concepts and ideas from the previous chapters. You can use these tests as another source of review and extra practice when preparing for tests and exams.

Additional Features

Icons

This icon indicates there is an *Exploration* in the **Explorations Appendix** that can be used to introduce the concepts of the Concept Lesson.

This icon indicates graphing technology (software or calculator) is needed to complete the question or *Exploration*.

People of Mathematics

These brief biographies tell you about women and men who have contributed to the world of mathematics, especially in the field of calculus. You may wish to do further research on these mathematicians.

Appendixes

Explorations Appendix   The **Explorations Appendix** consists of 15 hands-on activities that introduce and investigate fundamental concepts of this course. Each *Exploration* is associated with a Concept Lesson. An *Exploration* icon in the margin of the Concept Lesson will direct you to the appropriate *Exploration*.

Technology Appendix   The **Technology Appendix** summarizes the important skills you may have acquired with the TI-83 Plus graphing calculator from previous math courses. New skills, specific to calculus, are also summarized. Where appropriate, *Technology Help* reminders in the margin of lessons will direct you to the appropriate set of instructions in the **Technology Appendix**.

Trigonometry Appendix   The **Trigonometry Appendix** allows you to extend your calculus skills to this additional branch of functions. Explanations and solved examples are used to introduce differentiation of trigonometric functions and applications of this concept. The **Trigonometry Appendix** also contains exercises that enable you to practise your analytical skill with trigonometric functions.