
Introduction to *Nelson Mathematics 11*

Underlying Principles of the Program

Nelson Mathematics 11 has been developed to support the Functions and Relations, Grade 11, University Preparation (MCR3U) and Functions, Grade 11, University/College Preparation (MCF3M) courses defined in Ontario Curriculum, Grades 11 and 12: Mathematics, 2000. The student text and *Teacher Resource* present an instructional program based on the following principles for effective mathematics learning and teaching.

Every mathematics student should:

- understand he or she will succeed by accepting responsibility for his or her own learning and working accordingly.
- expect to be shown, through realistic and meaningful contexts, why mathematics is important for the student.
- explore concepts before formalizing, generalizing, or learning technical terminology.
- feel he or she is part of a learning community that encourages meaningful discourse and the use of student-friendly language.
- be given the opportunity to understand fundamental ideas and master essential skills.
- be informed about his or her progress through regular and varied assessments, including self- and peer-assessment, of his or her learning achievements.
- be encouraged and be expected to solve problems, pose questions, explore alternatives, and justify reasoning.
- feel free to select from various strategies, procedures, and tools, including appropriate technologies, when deciding how to approach a problem or conduct research.
- be expected to evaluate different approaches to a problem and report on the limitations, disadvantages, or advantages of a particular approach.
- regard the student text as a complete resource that supports classroom study, independent learning, and review.

Every mathematics teacher should expect *Nelson Mathematics 11* and the *Teacher Resource* to:

- assist the teacher in the planning and delivery of both the U and U/C courses by providing recommended timing, planning, assessment and instructional strategy suggestions appropriate for each course
- match the Ontario curriculum completely in terms of content, intent, and philosophy.
- present instructional strategies that current research and practice have shown to be most effective for learning mathematics.
- support both student and teacher use of technologies that may be unfamiliar.
- support the teacher in any areas of content or instructional methodology that are encouraged by this curriculum.
- help the teacher understand the intent and developmental flow of the material.
- provide an image of a successful learner.

- place appropriate emphasis on the essential Expectations from the curriculum.
- identify what students should know at the start of each chapter; what are the “big ideas” in the chapter; and what are regarded as essential Expectations of students who have completed the chapter.
- provide instructional alternatives for each lesson.
- support the teacher’s professional development by providing general support for key methodologies: use of technology, collaborative groups, and assessment.
- suggest assessment opportunities and provide support for assessment strategies such as portfolios, interviews, projects, journals, rubrics, and observation.
- provide a balanced approach to assessing student learning.
- provide assessment resources keyed to the Achievement Chart for Mathematics.

Nelson Mathematics 11 Addresses Key Curriculum Issues

Note: The material in italics in this section is taken from *The Ontario Curriculum, Grades 11 and 12: Mathematics*, Queen’s Printer for Ontario, 2000. Reproduced with permission.

Addressing the Strands

The material in each course is arranged by strands, which are major content organizers. It is expected that in developing detailed courses of study from this document, teachers will weave together related expectations from different strands, in order to create an overall program that integrates and balances concept development, skill acquisition, and applications.

Financial Applications of Sequences and Series

Nelson Mathematics 11 begins with the study of sequences in Chapter 1. Students explore sequence-generating situations and develop the notation needed to represent a variety of types of sequences. They then use this knowledge to model financial situations involving compound interest. This leads to the development of algebraic skills needed to work with rational exponents, simplify exponential expressions, and solve exponential equations. Chapter 2 introduces students to arithmetic and geometric series. Students apply these series to model a variety of financial situations involving present and future value, amortization tables and annuities. Students use time diagrams throughout this strand to provide a visual image of the financial situations.

Tools for Operating and Communicating with Functions

The concept of function is introduced in Chapter 3. Students use a variety of visual and algebraic representations for functions and develop the algebraic skills and the formal notation needed to work with functions. They investigate the domain and range of a function and use single variable inequalities to discuss their properties. The chapter concludes with a study of transformations of a function. Chapter 4 extends the introductory work on functions to look specifically at quadratic and rational functions. Students develop the algebraic skills required to locate the maximum or minimum values of a quadratic function. Complex numbers are introduced as students study the zeros of quadratic functions. The study of rational functions provides a context for the development of the algebraic skills associated with rational expressions.

Trigonometric Functions

Chapter 5 extends the theme of mathematical modelling begun in grades 9 and 10 to periodic functions. Students investigate general periodic phenomena and then apply their knowledge of trigonometry from grade 10 to create trigonometric models for a rotating object. From this they extend the trigonometric ratios to all possible angles and develop the primary trigonometric functions and their graphs, radian

measure, and analyze the effects of transformations on the trigonometric function graphs. Solving simple linear trigonometric equations emerges naturally from trying to find answers to questions about their models. Chapter 6 completes the study of trigonometry begun in grade 10 by extending the sine law and cosine law to include oblique triangles; developing the exact values of the primary ratios for special angles; and introducing trigonometric identities as a tool for solving trigonometric equations.

Investigations of Loci and Conics (MCR3U only)

Chapter 7 presents a flexible approach to the study of conics for students in the Functions and Relations course. It is self-contained and may be used for both direct instruction or guided independent study.

This table illustrates how the various strands in the Academic course are addressed in the text.

Strand	Substrand	Chapter						
		1	2	3	4	5	6	7
Financial Applications of Sequences and Series	Solving Problems Involving Arithmetic and Geometric Sequences and Series	•	•					
	Solving Problems Involving Compound Interest and Annuities	•	•					
	Solving Problems Involving Financial Decision Making	•	•					
Trigonometric Functions	Solving Problems Involving the Sine Law and the Cosine Law in Oblique Triangles						•	
	Understanding the Meaning and Application of Radian Measure						•	
	Investigating the Relationships Between the Graphs and the Equations of Sinusoidal Functions					•		
	Solving Problems Involving Models of Sinusoidal Functions					•	•	
Tools for Operating and Communicating with Functions	Manipulating Polynomials, Rational Expressions, and Exponential Expressions				•			
	Understanding Inverses and Transformations and Using Function Notation			•				
	Communicating Mathematical Reasoning	•	•	•	•	•	•	•
Investigations of Loci and Conics	Representing Loci							•
	Determining the Equation and the Key Features of a Conic							•
	Solving Problems Involving Applications of the Conics							•

The Process of Inquiry

An important part of every course in the mathematics program is the process of inquiry, in which students develop a systematic method for exploring new problems or unfamiliar situations.

Knowing how to learn mathematics is the underlying expectation that every student in every course needs to achieve.

The inquiry process is a very important instructional approach in *Nelson Mathematics 11*. *Think, Do, Discuss* lessons provide guiding questions that coach the student to draw the mathematical concepts out of the contextual problems presented, modelling the inquiry process for students. Exploration lessons and investigations within lessons, which are found throughout the book, encourage students to put the inquiry process into practice. Each *Chapter Problem* guides students through solving a problem using an inquiry approach, and each *Challenge* invites them to develop their own problem-solving process. The *Performance Tasks* at the end of each stand provide additional opportunities for students to engage in the problem solving and inquiry process. Extensive lesson summaries, solved examples and end of chapter material support the student who wishes to review or independently learn the material.

Mathematical Modelling

An important stage in the inquiry process is that of mathematical modelling, or taking the conditions of a real situation and describing them in mathematical form. A mathematical model can appear in many different ways - as an actual physical model, or as a diagram, a graph, a table of values, an equation, or a computer model. It is important that students understand the relationships among the various mathematical models of a given situation. To do so requires that their experiences in creating mathematical models increase in sophistication as they progress through secondary school. The process of inquiry is highlighted throughout the grades, but the problems, and the models that represent them, become more complex as the students advance through the grades.

In Chapter 1 and Chapter 2, students use time diagrams and the resulting sequences and series extensively to create models of financial situations. They extend their experience using linear and quadratic function models from grades 9 and 10 to include the use of trigonometric function models of periodic phenomena in Chapter 5. Chapter 3 presents a variety of visual models and metaphors that students can use to help them understand the general concept of mathematics function. Throughout the text, but particularly in Chapter 7, students are encouraged to use graphing technology and software programs to create models of mathematical objects.

Skills Development

The Grade 11 and 12 courses in this curriculum build on the knowledge of concepts and the skills developed in the earlier grades, extending students' knowledge in new areas and requiring them to solve more complex problems. Students in Grades 11 and 12 will continue to develop key skills and make connections through the exploration of applications. The understanding of abstract mathematics is central to the curriculum in Grades 11 and 12, and its development may occur in various ways. Skill acquisition is an important part of the program; wherever possible, skills should be introduced as they are needed, in the contexts offered by various topics in the mathematics program.

The choice of some specific concepts and skills in the curriculum has taken into consideration the development of sophisticated yet easily used calculators and computer software. The curriculum has been designed to integrate appropriate technologies into the learning and doing of mathematics, while equipping students with the manipulation skills necessary to understand other aspects of the mathematics that they are learning, to solve meaningful problems, and to continue to learn mathematics with success

in the future. Technology is not used to replace skill acquisition. Rather, technology is required when its use represents either the only way or the most effective way to achieve an expectation.

In addition to the context-based *Think, Do, Discuss* lessons found in *Nelson Mathematics 9* and *Nelson Mathematics 10*, *Nelson Mathematics 11* introduces two new lesson formats designed to develop specific mathematical skills. A “Skill Builder” lesson employs a direct presentation to develop a specific algebraic or manipulative skill followed by a series of practice questions. The text contains lessons that consist of several parts. Some of these lesson components are familiar *Think, Do, Discuss* lessons and others provide direct instruction designed to efficiently draw out a concept or develop a skill.

Technology icons in the text identify lessons addressing Expectations that require the use of technology. Notes in the *Teacher Resource* suggest additional opportunities for the use of technology. The use of screen captures and examples solved using technology encourage students to consider using technology when appropriate.

In addition to the development of new algebraic skills, *Nelson Mathematics 11* provides extensive opportunities to review and refresh skills learned in Grade 10. The *Review of Essential Skills and Knowledge* sections that precede each strand and the *Getting Ready* sections of each chapter supply comprehensive sets of review problems students can use. These review sections target the skills and knowledge specifically required in the chapters that follow.

Teaching Approaches

Students in a mathematics class typically demonstrate diversity in the way they best learn. It is important, therefore, that students have opportunities to learn in a variety of ways. They should explore concepts individually and cooperatively; independently and with teacher direction; through hands-on activities; and through the study of examples followed by practice. As well, the subject of mathematics varies in terms of the type of knowledge (concepts, skills, and processes) that it contains, and competence in each type may be accomplished through various teaching and learning strategies. There is no single, correct way to teach or to learn mathematics. The strategies used should vary according to the object of the learning and the needs of the students.

Nelson Mathematics 11 balances direct instruction with investigation and exploration. Skill Builder lessons target specific skills with direct instruction and provide several appropriate solved examples. The *Think, Do, Discuss* activities in the lessons offer a variety of investigations, formal developments, and directed problem solving experiences. In many lessons, these are supplemented with direct instruction designed to efficiently draw out a complex concept or develop a sophisticated skill. Teachers may choose to use the *Think, Do, Discuss* as a student activity (individual, small group, or whole class), as a teacher-led demonstration, or as a teacher-directed lesson. The *Teacher Resource* suggests at least two different ways to manage each lesson. It also suggests options for delivering each lesson using strategies such as group work, cooperative learning, and independent learning. Hands-on experiences in the *Explorations* provide opportunities to enhance the learning process and may be incorporated into the lessons at the teacher’s discretion.

Technology lessons in the text support the work in sections dealing with Curriculum Expectations that mandate technology use. In those lessons for which the use of technology is optional, the text presents the lesson with technology-neutral language, and the *Teacher Resource* offers specific suggestions for using appropriate technology.

Independent Use of the Text by Students

The design of *Nelson Mathematics 11* supports the independent use of the text by students. The *Key Ideas* section summarizes the main points developed in the lesson. Every lesson has between three and five completely worked examples followed by a large number of practice exercises. Some *Practise, Apply, Solve* questions are labelled with the *Achievement Chart* categories to guide students in understanding how they are being assessed. *Check Your Understanding* questions help students to monitor their developing understanding of the concepts and encourage them to keep notes.

The Chapter Review opens with a *Check Your Understanding* page of questions that prompt students to cumulatively review the essential concepts developed in the chapter. This is followed by additional worked examples and extra practice exercises keyed to the chapter sections. The review section finishes with a summary of the main concepts in the chapter and a *Chapter Review Test*. In addition, at the end of every strand module, *Nelson Mathematics 11* provides a *Cumulative Review Test*. Answers to all exercises, review questions, and *Chapter* and *Cumulative Review* tests are in the text to facilitate student self-assessment, study, and review.

Contextual Learning

Learning is enhanced when embedded in a context. Well-chosen contexts for learning are those that are broad enough to allow students to explore and develop initial understandings, to identify and develop relevant supporting skills, and to gain experience with interesting applications of the new knowledge. Such rich environments open the door for students to see the “big ideas” of mathematics—the major underlying principles, such as pattern or relationship. This ability to understand key principles will encourage students to continue using mathematical reasoning throughout their lives.

Most lessons in *Nelson Mathematics 11* begin with students exploring a contextual situation. This helps students develop an understanding of the mathematical concepts involved and to gain insight into the relevance of the mathematics they are using. Many of the examples and problems are set in real-life contexts, encouraging students to make connections between the real world and the mathematics class. The *Teacher Resource* encourages the use of assessment tasks that combine many Expectations of the curriculum in one response. Skill development, application, and understanding are all assessed.

Education for Exceptional Students

Exceptional students may require program modifications that specifically address their strengths and needs in learning mathematics. Some students will benefit from additional time to internalize important mathematical concepts. In an effort to help students understand concepts, teachers may include more concrete experiences, vary the pace of the learning, use additional examples, or insert cumulative reviews. The appropriate use of technologies (e.g., concrete materials, and dynamic geometry software) will support the teacher in meeting the needs of exceptional students as set out in their Individual Education Plan.

Nelson Mathematics 11 has a number of features designed to assist students who may require some modification or alternative approach in their programme. The open design, extensive use of visuals and colour in the text, and language level make *Nelson Mathematics 11* accessible to most students in the program.

The *Review of Essential Skills and Knowledge* sections in the text and the *Getting Ready* sections in each chapter provide opportunities for diagnostic assessment and remedial intervention. To reinforce basic skills and the understanding of essential concepts, these resources may be used by the student working alone or with the assistance of the teacher, another student, or an adult outside of the classroom setting.

Detailed end-of-chapter review sections provide students with a comprehensive review of the chapter as well as additional solved examples, extra practice exercises and a sample *Chapter Review Test*. The *Cumulative Review Test* at the end of each strand module provides a similar opportunity for reviewing and consolidating the work of an entire strand.

The *Check Your Understanding* questions in the *Practise, Apply, Solve* exercises encourage the students to reflect on the essential ideas developed in each lesson. The corresponding Check Your Understanding page of questions in the Chapter Review provides a framework for reflecting on the work of the entire chapter. Students are encouraged to use these features to help structure and assess the completeness of their notes.

Wherever required by Curriculum Expectations, Technology Lessons in the textbook provide support specific to the use of graphing calculators and computer software. These lessons instruct students on the actual commands and keystrokes needed to perform the operations to complete the subsequent concept development lessons. In every case, the operation is presented along with a description of its mathematical purpose so that students will attach a meaning or function to the set of keystrokes or the command sequence they are learning. The layout of these pages and replicas of the actual calculator and computer displays help students visualize the required operations and their effects.

Nelson Mathematics 11 also challenges students who are talented in mathematics. The *Chapter Challenges*, the C-level questions in *Practise, Apply, Solve* exercises, and the *Performance Tasks* provide opportunities for extremely able students to solve challenging problems and extend their understanding of concepts through formal abstraction and personal inquiry. The *Teacher Resource* also provides suggestions for extension, research, and generalization wherever appropriate.

The Role of Technology in the Curriculum

Technology helps to make students more powerful learners by giving them the means to explore mathematical concepts more effectively. In the time gained by using technology, students can study fundamental ideas in greater depth, develop higher skill levels, and explore more applications.

Various forms of technology have application in many different areas of mathematics learning. Calculators save students time in performing complex arithmetic calculations. Graphing utilities enable students to explore properties of the graphs of functions. Statistical software allows students to collect and analyse data effectively and quickly. Dynamic geometry software allows students to visualize spatial relationships, to test hypotheses, and to investigate the properties of loci. The use of technology in learning and doing mathematics also gives students excellent opportunities to develop their abilities in algorithmic thinking, for example, by creating templates in spreadsheets or by writing sequences of instructions in application programs as part of a problem-solving process.

Nelson Mathematics 11 integrates the use of technology throughout each chapter. Technology Lessons instruct students on the use of the technology required by the Curriculum Expectations. Specifically, these lessons address the use of the TI-83 Plus graphing calculator, spreadsheet software and The Geometer's Sketchpad dynamic geometry software. A *Technology Index* makes it easy for students to look up references to instructions on the use of technology for a specific mathematical purpose.

The *Financial Applications of Sequences and Series* strand is most effectively presented using appropriate technology. Technology lessons and some solved examples in Chapter 1 show students how to use the TI-83 Plus calculator to generate and graph terms of a sequence. Several solved examples demonstrate how the same operations can be carried using spreadsheet software. Students are provided with examples that show how to use the TI-83 Plus to compute powers with rational exponents and graphically solve exponential equations.

Early in Chapter 2, students have the opportunity to conduct an optional investigation that utilizes the TI-83 Plus and CBR unit. A Technology lesson instructs students in the use of spreadsheet software to create an account balance table before the lesson that utilizes the software to study future value and amortization tables. A solved example within that lesson demonstrates the use of the TI-83 Plus to solve the problem. Additional Technology lessons show students how to use the TI-83 Plus to find the sum of a series; use the TI-83 Plus TVM Solver to solve financial problems and create repayment schedules. Students finish the chapter with a lesson in which they employ technology to analyze mortgages under varying conditions.

Graphing technology makes the material in the *Tools for Operating and Communicating with Functions* strand more accessible for students. Technology lessons and solved examples in Chapter 3 show students how to graph functions and their inverses and analyze the domain and range of a function. The use of graphing technology with the exploration of transformations of functions particularly enhances instruction. The graphing technology techniques introduced in grade 10 are used again in Chapter 3 to explore the maximum, minimum and zeros of quadratic functions and determine the properties of rational functions.

Chapter 5 uses graphing technology to graph sinusoidal functions and graphically solve linear trigonometric equations. A Technology lesson on sinusoidal regression extends the line and curve of best-fit work from previous courses to include using regression to validate a model for periodic behaviour. The chapter ends with a guided exploration in which students use digital probes to collect and model periodic data. Several solved examples in Chapter 6 show how graphing technology can be used to verify trigonometric identities and solve complex trigonometric equations.

The Curriculum Expectations do not specifically require the use of technology in the completion of the work in the “Investigations of Loci and Conics” strand. The investigative nature of this material strongly suggests that students use physical models as well as computer models to complete the work of this chapter. While the language of the chapter is technologically neutral, the use of graphing technology and dynamic geometry software will certainly facilitate the completion of this strand. Additional support for the use of technology to support teacher-led instruction or independent student learning appears in the *Teacher Resource* for Chapter 7.

Where Curriculum Expectations require the use of technology, the technology is integrated into the steps of the *Think, Do, Discuss* activities or the steps of a direct instruction lesson.

The *Teacher Resource* identifies additional opportunities for the use of technology in both lessons and practice. Technology-based alternative approaches are also provided for some lessons in the text that are developed with a technology-neutral approach.

English as a Second Language and English Literacy Development (ESL/ELD)

There are several key considerations for teachers of mathematics in planning programs for ESL/ELD students. Teachers must recognize the mathematical skills and knowledge that all students bring to the classroom, and should value the students' knowledge and build on their strengths. Teachers should approach with sensitivity the increased emphasis on communication in mathematics, especially in cooperative learning settings, so that difficulties with language do not inhibit the participation of ESL/ELD students and hinder their success. Students should be encouraged to communicate their thoughts and understandings about mathematics in oral and written form, using the language of mathematics. ESL/ELD students should be encouraged to discuss problems, justify reasons for answers, and compare ideas and strategies within the classroom. Teachers must ensure that reading levels are appropriate to students' abilities and must strive for clarity in the use of mathematical terminology. Where possible, teachers should use visual and interactive methods, including technology, to facilitate the

learning of mathematics, and should make appropriate accommodations and modifications for assessment.

The lessons in *Nelson Mathematics 11* promote communication in the mathematics classroom. Students interact with each other in various ways, depending on the instructional approach being used. They are encouraged to discuss the answers to questions and record discussions and explanations of procedures in their notebooks. Suggestions for the use of journals and portfolios are discussed in the *Teacher Resource*. The use of technology, as promoted in the program, gives ESL students an interactive and visual method of learning mathematics.

The *Check Your Understanding* questions and the questions linked to the four Achievement Chart categories encourage development of written and oral communication skills. The *Teacher Resource* includes notes to help teachers use these questions in the classroom and as a component of their assessment plan for the course. The various assessment strategies and data collection tools in the *Teacher Resource* will allow teachers to select appropriate assessment methods for all students.

Career Education

Teachers should promote students' understanding of the role of mathematics in daily life and its relation to career opportunities by exploring applications of concepts, providing opportunities for career-related project work, and promoting independent investigations. Such activities allow students the opportunity to investigate mathematics-related careers compatible with their interests, aspirations, and abilities.

Chapter Problems reflect a career-related approach. Many of the lesson and problem contexts relate mathematics to real-life jobs and applications. The text also has two features that link mathematics to people and careers: descriptions of various careers and the practical mathematics that they make use of and brief articles on people who have contributed to mathematics and related fields. These features can be used as starting points for research projects, enrichment, extension, or class discussions.

Cooperative Education and Other Workplace Experiences

For students in mathematics, the hands-on experience of work and of cooperative education can reveal career options previously unknown to them and can provide valuable lessons on the application of mathematics in work and society. Cooperative placements in many occupations (e.g., engineering, accounting, banking, dentistry, the skilled trades, teaching, landscape design, computer programming, medicine, and fashion design) can give students greater insight into the value of learning mathematics.

The lessons and the *Practise, Apply, Solve* exercises in *Nelson Mathematics 11* consistently refer to the role of mathematics in the workplace.

Mathematics Anxiety

Mathematics anxiety is a state of mind relating to a student's perception of his or her ability to do mathematics. It is neither grade specific nor exclusively gender related. If it is not addressed, it often leads to mathematics avoidance. To alleviate this anxiety in classrooms, teachers should do the following.

- *Be accepting, patient, and understanding.*
- *Defuse tense situations if they arise.*
- *Make mathematics relevant by connecting the context with the student's life experience.*
- *Offer many opportunities for students to be successful.*
- *Set up programs for peer tutoring.*
- *Use various assessment techniques (journals, interviews, portfolios, projects).*
- *Comment positively on material that is assessed.*
- *Be aware of cultural biases.*

Much mathematics anxiety can be avoided with good teaching techniques. Being aware of situations that can cause tension and working with students in a caring, understanding, and encouraging way can do much to alleviate anxiety.

Each lesson in *Nelson Mathematics 11* models effective teaching techniques. The mathematics is presented in contextual situations that are relevant to male and female teenagers. Extensive solved examples and practice problems along with the review components help students consolidate their learning and prepare for chapter tests and culminating assessment. Every effort has been made to represent Canadian cultural diversity. The *Teacher Resource* suggests strategies for supporting students through group work and other alternative teaching approaches. It also encourages the use of a full range of assessment strategies, including portfolios, interviews, projects, journals, and observation as well as tests and exams.

Assessment

Assessment and evaluation will be based on the provincial curriculum expectations and the achievement levels outlined in this document and in the curriculum policy document for each discipline. When teachers have been provided with the assessment materials described, they will begin to assess their students' achievement according to the guidelines given in these documents.

In order to ensure that assessment and evaluation are valid and reliable, and that they lead to the improvement of student learning, teachers must use assessment and evaluation strategies that:

- *address both what students learn and how well they learn;*
- *are based both on the categories of knowledge and skills and on the achievement level descriptions given in the achievement chart that appears in the curriculum policy document for each discipline;*
- *are varied in nature, administered over a period of time, and designed to provide opportunities for students to demonstrate the full range of their learning;*
- *are appropriate for the learning activities used, the purposes of instruction, and the needs and experiences of the students;*
- *are fair to all students;*
- *accommodate the needs of exceptional students, consistent with the strategies outlined in their Individual Education Plan;*
- *accommodate the needs of students who are learning the language of instruction;*
- *ensure that each student is given clear directions for improvement;*
- *promote students' ability to assess their own learning and to set specific goals;*
- *include the use of samples of students' work that provide evidence of their achievement;*
- *are communicated clearly to students and parents at the beginning of the course and at other appropriate points throughout the course.*

When planning courses and assessment, teachers should review the required curriculum expectations and link them to the categories to which they relate. They should ensure that all the expectations are accounted for in instruction, and that achievement of the expectations is assessed within the appropriate categories. The descriptions of the levels of achievement given in the chart should be used to identify the level at which the student has achieved the expectations. Students should be given numerous and varied opportunities to demonstrate their achievement of the expectations across the four categories. Teachers may find it useful to provide students with examples of work at the different levels of achievement.

Nelson Mathematics 11 provides several features designed to assist the teacher and the student to assess learning. The *Teacher Resource* supplies teachers with powerful and easy to use tools to plan and carry out regular, comprehensive assessment of student work keyed to the categories in the *Achievement Chart*.

- *Getting Ready* sections at the beginning of each chapter provide an opportunity for the student and teacher to assess readiness for the work of the chapter. Answers are in the text. With the assistance of the teacher, each student can determine the skills or concepts that require review.
- The *Chapter Problem* presents an opportunity for students to construct notes, a journal, or a portfolio documenting their progress as the essential concepts and skills are incrementally developed in the chapter. The Teacher Resource provides teachers with model answers and suggested assessment and management strategies, including a fully developed rubric.
- The two *Challenge Problems* in each chapter are challenging performance tasks designed to provide opportunities for students to demonstrate performance at or above provincial standards. The Teacher Resource supplies teachers with fully developed rubrics, model solutions, and assessment and management strategies.
- Each *Practise, Apply, Solve* section has three levels of questions. A-level questions assess mastery of basic skills and understanding of essential concepts. B-level questions assess a student's ability to apply knowledge and understanding to both familiar and unfamiliar contexts. C-level questions extend the ideas of a lesson to challenging problems and situations designed to elicit level 4 performance.
Four questions in each *Practise, Apply, Solve* section are keyed to the *Achievement Chart* categories: Knowledge and Understanding; Thinking, Inquiry, and Problem Solving; Communication; and Application. This provides students with samples of questions that illustrate the areas in which they are being assessed. The *Teacher Resource* supplies management strategies as well as a description of the anticipated level of performance to meet provincial standards and a connection to the *Mathematics Achievement Chart*.
- Each *Practise, Apply, Solve* section also contains one *Check Your Understanding* question. The purpose of this question is to encourage students to reflect on the essential ideas presented in the lesson and consolidate their understanding. The *Teacher Resource* notes for this question provide teachers with suggestions for effectively utilizing this feature as an element of their regular assessment plan.
- The *Check Your Understanding* page in each *Chapter Review* provides students with an opportunity to assess their cumulative understanding of the work of the chapter and to verify the completeness of their notes.
- “Skill Builder” lessons provide many practice questions designed to help the student develop and assess his or her mastery of the skill developed in the lesson.
- Each *Chapter Review* provides additional *Extra Practice* questions and a *Chapter Review Test* with answers supplied in the text so students can assess their learning. The *Teacher Resource* supplies a sample *Chapter Test*, complete with model solutions and assessment strategies.
- The *Cumulative Review Test* at the end of each two-chapter module, with answers in the text, provides students with an opportunity to assess their learning of concepts in an extended unit of work.
- The *Performance Tasks* at the end of each strand module provide rich assessment opportunities that tie together the concepts of both chapters. Each task is designed to be attainable to some degree by any student in the course. The variety of context and duration (less than one class, more than one class) permit students and teachers to select tasks that correspond to individual interests and abilities. The tasks are sufficiently open-ended to permit extensive inquiry and extension, thus providing opportunities for able students to demonstrate a level of performance beyond Provincial Expectations. The *Teacher Resource* provides solution guidelines as well as a fully developed assessment strategy for each task.