Adult Basic Education
Level II Mathematics

Mathematics 2011
Whole Numbers

Curriculum Guide

Level II Mathematics Courses
Mathematics 2011: Whole Numbers
Mathematics 2012: Fractions
Mathematics 2013: Decimals
Mathematics 2014: Percents
Mathematics 2015: Interest
Mathematics 2016: Measurement
Mathematics 2017: Geometry
Mathematics 2018: Statistics and Probability
Mathematics 2019: Algebra Readiness I
Mathematics 2020: Algebra Readiness II

Newfoundland
Labrador

Table of Contents

Introduction to Mathematics 2011: Whole Numbers

This course is first in a series of ten ABE Level II Mathematics courses. This course is recommended for students who have transitioned from ABE Level I into ABE Level II. Such students will likely need this course in order to develop the skills and confidence to continue in Level II and eventually progress to Level III. Likewise, students who left school without a junior high school education will benefit from this course as well. This course covers the basic mathematical operations involving whole numbers: adding, subtracting, multiplying and dividing. The course also introduces students to rounding whole numbers.

Students may/may not have to complete all ABE Level II Mathematics courses. Students are only required to complete sufficient Level II Mathematics courses to ensure success in one of the Level III graduation profiles. For example, a Level II student intending to complete the Degree-Technical Profile (Academic) in Level III may need to complete more Level II Mathematics courses than a student intending to complete the General College Profile (General) in Level III.

Mathematics 2011: Whole Numbers is divided into two units. The outcomes for this course are given below. By completing the **Required Work** in the Study Guide, students will fulfill the outcomes for this course.

The first unit, *Addition and Subtraction,* will cover the following course outcomes:

      1.01   Add whole numbers.
      1.02   Subtract whole numbers.
      1.03   Solve word problems using addition of whole numbers.
      1.04   Solve word problems using subtraction of whole numbers.

The second unit, *Multiplication and Division*, will cover the following course outcomes:

      2.01   Multiply whole numbers.
      2.02   Understand and know the 12X times table.
      2.03   Understand how to round whole numbers.
      2.04   Understand how to estimate products by rounding whole numbers.
      2.05   Divide whole numbers.
      2.06   Solve word problems using multiplication of whole numbers.
      2.07   Solve word problems using division of whole numbers.

Students are required to complete two assignments and one final exam in this course. Instructors have flexibility to substitute another assignment and/or tests, or to adjust the evaluation scheme to meet the needs of individual students.

Curriculum Guide

Each new ABE Level II Mathematics course has a Curriculum Guide for the instructor and a Study Guide for the student. The Curriculum Guide includes the specific curriculum outcomes for the course. Suggestions for teaching, learning and assessment are provided to support student achievement of the outcomes. Some suggestions for teaching, learning and assessment will be repeated in the curriculum guides for the Mathematics courses when appropriate. Each Level II Mathematics course is divided into two units except **Mathematics 2019: Algebra Readiness I** and **Mathematics 2020: Algebra Readiness II**. The two pre-algebra courses are required for any Level II student, who has not successfully completed Grade 9 Mathematics, intending to do the academic mathematics stream in Level III. These two courses are more challenging and have more content than the other Level II Mathematics courses. Each unit is presented in the Curriculum Guide as a **two-page layout of four columns** as illustrated in the figure below.

Curriculum Guide Organization
The Two-Page, Four-Column Spread

Unit Number – Unit Title	
Outcomes	**Notes for Teaching and Learning**
Specific curriculum outcomes for the unit.	Suggested activities, elaboration of outcomes, and background information.

Unit Number – Unit Title	
Suggestions for Assessment	**Resources**
Suggestions for assessing students' achievement of outcomes.	Recommended resources that address outcomes.

Study Guide

The Study Guide provides the student with the name of the text required for the course and specifies the lessons and pages that the student will need to refer to in order to complete the **Required Work** for the course. It guides the student through the course by assigning relevant reading and exercises. Sometimes the Study Guide provides important points for students to think about, to remember or to note. The Study Guide is designed to give students some degree of independence in their work. Instructors should note, however, that there is material in the Curriculum Guide in the *Notes for Teaching and Learning* and *Suggestions for Assessment* columns that is not included in the Study Guide, and instructors will need to review this information and decide how to include it.

Resources

Recommended student resources for this course:

- *Prism Math Blue Student Workbook (Canadian Edition)*. McGraw-Hill Ryerson. 2005. ISBN 13: 978-0-07-096033-6 (10:0-07-096033-X). http://www.mcgrawhill.ca

Recommended instructor resources:

- *Prism Math Blue Teacher's Edition (Canadian Edition)*. McGraw-Hill Ryerson. 2005. ISBN 007096034-8 (9-780070-960343). http://www.mcgrawhill.ca

The *Prism Math Blue Student Workbook* is designed to help struggling students gain a solid understanding of and confidence in numeracy fundamentals. This is a non-grade specific text that is focused on easy-to-understand instructions as well as review materials and assessment opportunities. Feedback from Newfoundland and Labrador ABE instructors in 2010 indicated a desire for one Level II Mathematics student text, and this resource meets this purpose. This resource is also used in adult learning settings in other Atlantic jurisdictions.

To the Instructor

The *Prism Math Blue Teacher's Edition* mirrors the student workbook, but contains the following helpful additions:

- All answers are conveniently provided for each assigned exercise.
- Error Analysis at the bottom of each lesson gives suggestions for responding to and assessing student performance.
- Blackline Masters (BLM's) of chapter tests are contained in this resource. These masters can be photocopied and used by instructors for chapter tests/exams/etc.

Recommended Evaluation

Assigned Exercises	20%
Assignments	30%
Final Exam (entire course)	<u>50%</u>
	100%

The overall pass mark for the course is 50%.

Note: The evaluation scheme recommended above is presented as a suggestion. Institutions may choose an alternate evaluation scheme in order to meet the individual needs of adult learners. The Department of Education has no requirement that a final exam must be given in this course. Instructors/institutions can decide if a final exam is necessary based on their own policies and procedures.

Unit 1: Addition and Subtraction —Suggestions for Teaching, Learning and Assessment

Outcomes	Notes for Teaching and Learning
1.01 Add whole numbers. 1.02 Subtract whole numbers. 1.03 Solve word problems using addition of whole numbers. 1.04 Solve word problems using subtraction of whole numbers.	• Instructors can have students choose one of their addition/subtraction problems and write a brief mathematical story based on the numbers and the sum/difference. • Explain the following place value terms to students: units, tens, hundreds, thousands, etc. • Explain the material presented at the top of each page in the lesson. • Demonstrate and model the correct way to add/subtract whole numbers. • Students should be encouraged to complete all work in this course without a calculator. A calculator can be used to check work, but not to make calculations faster. • Ensure that students understand the terms 'sum" and "difference". • Encourage students to perform mental calculations to the extent possible. • Ensure that students understand that to add larger numbers, they should add the column at the right first, and then move to the left. • Ensure students carry numbers from one column to the next as required when adding whole numbers. • Show students that when adding/subtracting numbers written horizontally, it is easier to re-write numbers vertically such that the units are on top of units, tens on top of tens, and so on. When subtracting, ensure that the larger number is on top. • Explain to students that when subtracting whole numbers subtract the column at the right first and then move to the next column to the left. Continue until all columns are subtracted. • Ensure that students understand how to borrow numbers when subtracting. Also, explain that it may be necessary to borrow more than once in the same problem.

Unit 1: Addition and Subtraction —Suggestions for Teaching, Learning and Assessment

Outcomes	Notes for Teaching and Learning
	• Point out to students that borrowing from zero is impossible. When the digit in the column you want to borrow from is zero, move to the next left column that does not contain zero to borrow. • Note that the language used in word problems tells whether you should add or subtract to solve the word problem.

Unit 1: Addition and Subtraction —Suggestions for Teaching, Learning and Assessment	

Suggestions for Assessment	Recommended resources that address outcomes.
• Instructors may ask students to complete the *Chapter 1 Pre-test* to determine their prior knowledge of mathematical operations with whole numbers. • If a student scores an acceptable grade on the pre-test, it is unnecessary for the student to complete the course as competency will be established. The student should show all calculations on the pre-test, and complete it without using a calculator. • Instructors can use the grade on the pre-test as the final grade for the course. This grade can be entered on the ABE database as part of the official ABE transcript. • Instructors should follow the suggestions given in **Lesson Follow-up and Error Analysis** section found in the *Teacher's Edition*. This section is written in blue and is at the bottom of the page containing each lesson. • Answers for all exercises and word problems are contained in the *Teacher's Edition*. Instructors can quickly assess and provide feedback on student performance. • A chapter test Blackline Master (BLM) corresponding to this unit is found in the assessment section of the *Teacher's Edition* (near the end of the book).This BLM is suitable to be administered to students as part of the official evaluation for the course. Answers are also provided in the *Teacher's Edition*. • Instructors can use their professional judgement to design their own assessment tools (additional exercises and word problems, assignments, tests, exams, etc) to meet the individual needs of students.	• *Prism Math (Blue)*, pages 17-18. Answers on the same pages of the *Prism Math (Blue) Teacher's Edition*. • *Prism Math (Blue) Teacher's Edition*, pages 265-277.

Unit 2: Multiplication and Division —Suggestions for Teaching, Learning and Assessment

Outcomes	Notes for Teaching and Learning
2.01 Multiply whole numbers. 2.02 Understand and know the 12X times table. 2.03 Understand how to round whole numbers. 2.04 Understand how to estimate products by rounding whole numbers. 2.05 Divide whole numbers. 2.06 Solve word problems using multiplication of whole numbers. 2.07 Solve word problems using division of whole numbers.	• Instructors can have students choose one of their multiplication/division exercises and write a brief mathematical story. • Instructors can reinforce place value when discussing the lessons and calculations with students. • Explain and model the calculations contained at the top of each lesson. • Students should be encouraged to complete all work without using a calculator to simply do work faster. A calculator can be used to check work. • Ensure students understand terms like "product", "quotient", "dividend", "divisor" and "remainder". • Encourage students to perform mental calculations to the extent possible. A 12X times table is included with the Study Guide. Students should be encouraged to memorize the table. • Point out to students that multiplication and division are opposite operations in a similar manner that addition and subtraction are opposite operations. • Explain to students what is meant by the "factors" of a number. • Students who have written output issues such as neatness and general organization may benefit from using graph paper to perform calculations. The squares can help students keep digits aligned correctly. • Instructors may wish to point out the "partial products" obtained when multiplying by more than one number. Emphasize the importance of aligning the partial products correctly. • Explain to students that when multiplying numbers written horizontally, rewrite the numbers vertically such that the shorter number is on the bottom and the longer number is on the top. This has the benefit of reducing the number of partial products and making the calculations easier to complete.

Unit 2: Multiplication and Division —Suggestions for Teaching, Learning and Assessment

Outcomes	Notes for Teaching and Learning
	• Students can be informed that although the X sign is commonly used to indicate multiplication, there are other ways to write multiplication; for example, $3 \cdot 2 = 6$, $3(2) = 6$, and $(3)(2) = 6$. • Instructors should encourage students to check a division answer by multiplying the quotient by the divisor and adding the remainder if applicable. The result should be equal to the dividend. • Students should understand multiplication and division involving 1's and 0's. Note that division by 0 is undefined.

Unit 2: Multiplication and Division —Suggestions for Teaching, Learning and Assessment

Suggestions for Assessment	Recommended resources that address outcomes.
• Instructors should follow the suggestions given in **Lesson Follow-up and Error Analysis** section found in the *Teacher's Edition*. This section is written in blue and is at the bottom of the page containing each lesson. • Answers for all exercises and word problems are contained in the *Teacher's Edition*. Instructors can quickly assess and provide feedback on student performance. • A chapter test Blackline Master (BLM) corresponding to this unit is found in the assessment section of the *Teacher's Edition* (near the end of the book).This BLM is suitable to be administered to students as part of the official evaluation for the course. Answers are also provided in the *Teacher's Edition*. • Instructors can use their professional judgement to design their own assessment tools (additional exercises and word problems, assignments, tests, exams, etc) to meet the individual needs of students.	• *Prism Math (Blue) Teacher's Edition*, pages 265-277.