

Adult Basic Education

Level II Mathematics

Mathematics 2017

Geometry

Curriculum Guide

Suggested Resource: *Prism Math Blue Student Workbook (Canadian Edition).* McGraw-Hill Ryerson. 2005. ISBN 13: 978-0-07-096033-6 (10:0-07-096033-X).

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



Table of Contents

| | |
|---|----|
| To the Instructor..... | 3 |
| Introduction to Mathematics 2017: Geometry | 3 |
| Curriculum Guide..... | 5 |
| Study Guide..... | 6 |
| Resources..... | 6 |
| Recommended Evaluation..... | 7 |
| Unit 1: Lines, Angles and Figures —Suggestions for Teaching, Learning and Assessment..... | 8 |
| Unit 2: Perimeter, Area and Volume —Suggestions for Teaching, Learning and Assessment..... | 10 |

To the Instructor

Introduction to Mathematics 2017: Geometry

This course is seventh 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. In this course, students will study lines, angles, figures, perimeters, areas and volumes.

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 2017: Geometry 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, ***Lines, Angles and Figures***, will cover the following course outcomes:

- 1.01 Name points, lines and line segments.
- 1.02 Name rays and angles.
- 1.03 Use a protractor to measure angles.
- 1.04 Determine whether an angle is right, acute or obtuse.
- 1.05 Identify opposite and supplementary angles.
- 1.06 Identify parallel lines.
- 1.07 Identify transversals and corresponding angles.
- 1.08 Identify perpendicular lines.
- 1.09 Identify the following types of triangles: acute, right and obtuse.
- 1.10 Identify the following types of triangles: scalene, isosceles and equilateral.
- 1.11 Identify the following types of quadrilaterals: parallelogram, rectangle, rhombus and square.

To the Instructor

The second unit, ***Perimeter, Area and Volume***, will cover the following course outcomes:

- 2.01 Calculate the perimeter of geometric figures.
- 2.02 Calculate the circumference of circles.
- 2.03 Calculate the diameter and radius of a circle given the circumference.
- 2.04 Calculate the area of rectangles, triangles, circles, and irregular figures.
- 2.05 Calculate the surface area of geometric figures.
- 2.06 Calculate the volume of rectangular prisms, triangular prisms, and cylinders.
- 2.07 Solve word problems related to perimeter, circumference, area and volume of geometric figures.

To the Instructor

Students are required to complete three assignments and two unit tests 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 | Unit Number – Unit Title |
|---|--|
| Outcomes Specific curriculum outcomes for the unit. | Notes for Teaching and Learning Suggested activities, elaboration of outcomes, and background information. |

| Suggestions for Assessment | Resources |
|--|--|
| Suggestions for assessing students' achievement of outcomes. | Recommended resources that address outcomes. |

To the Instructor

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% |
| Unit Tests | <u>50%</u> |
| Total | 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: Lines, Angles and Figures —Suggestions for Teaching, Learning and Assessment

| Outcomes | Notes for Teaching and Learning |
|---|---|
| <p>1.01 Name points, lines and line segments.</p> <p>1.02 Name rays and angles.</p> <p>1.03 Use a protractor to measure angles.</p> <p>1.04 Determine whether an angle is right, acute or obtuse.</p> <p>1.05 Identify opposite and supplementary angles.</p> <p>1.06 Identify parallel lines.</p> <p>1.07 Identify transversals and corresponding angles.</p> <p>1.08 Identify perpendicular lines.</p> <p>1.09 Identify the following types of triangles: acute, right and obtuse.</p> <p>1.10 Identify the following types of triangles: scalene, isosceles and equilateral.</p> <p>1.11 Identify the following types of quadrilaterals: parallelogram, rectangle, rhombus and square.</p> | <ul style="list-style-type: none">Geometry was developed centuries ago when people needed a way to measure land.Geometry comes from the Greek words <i>ge</i> (meaning Earth) and <i>metron</i> (meaning measure).Geometry is a branch of mathematics used today in land measurement, in architecture, construction, navigation, and many other applications.A point can be thought of as a spatial location that has no length or width.Ensure that students understand that when naming rays, the endpoint is always mentioned first.Remind students that appearances are deceiving and to not assume lines are parallel unless it is stated that they are.When naming an angle, the vertex is written alone, as in $\angle A$ or it is in the middle of the two other points, as in $\angle BAC$ (A is the vertex).Ensure students understand that angles are often measured in degrees. Students can use the minute hand on a clock to visualize degrees; for example, the minute hand travels 360 degrees in 1 hour, 180 degrees in 30 minutes, 90 degrees in 15 minutes, etc.Point out to students that a small square is often located at the vertex of a right angle. |

Unit 1: Lines, Angles and Figures —Suggestions for Teaching, Learning and Assessment

| Suggestions for Assessment | Recommended resources that address outcomes. |
|--|---|
| <ul style="list-style-type: none">Instructors may ask students to complete the <i>Chapter 10 Pre-test</i> to determine their prior knowledge of geometry.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. It is recommended that this grade be 80% or above.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 <i>Teacher's Edition</i>. 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 <i>Teacher's Edition</i>. 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 <i>Teacher's Edition</i> (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 <i>Teacher's Edition</i>.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. | <ul style="list-style-type: none"><i>Prism Math (Blue)</i>, page 156. Answers on the same pages of the <i>Prism Math (Blue) Teacher's Edition</i>.<i>Prism Math (Blue) Teacher's Edition</i>, pages 265-277. |

Unit 2: Perimeter, Area and Volume — Suggestions for Teaching, Learning and Assessment

| Outcomes | Notes for Teaching and Learning |
|---|---|
| <p>2.01 Calculate the perimeter of geometric figures.</p> <p>2.02 Calculate the circumference of circles.</p> <p>2.03 Calculate the diameter and radius of a circle given the circumference.</p> <p>2.04 Calculate the area of rectangles, triangles, circles, and irregular figures.</p> <p>2.05 Calculate the surface area of geometric figures.</p> <p>2.06 Calculate the volume of rectangular prisms, triangular prisms, and cylinders.</p> <p>2.07 Solve word problems related to perimeter, circumference, area and volume of geometric figures.</p> | <ul style="list-style-type: none"> • This unit requires formulas for perimeter, circumference, area, surface area and volume. Ideally, students should learn and remember formulas, but instructors may provide a formula sheet to students if necessary. • Students should understand that the perimeter of a geometric figure is the distance around the outside edges. The area is the amount of surface inside the figure. The volume is the amount, or capacity, of liquid the figure will contain if filled. • Encourage students to write out all formulas, calculations and units when completing the Required Work. • Remind students to use linear units when writing perimeter/circumference, square units when writing area and cubic units when writing volume. • Ensure students understand how to break apart composite figures when calculating area. • Ensure students understand how to calculate the height of certain triangles. Depending how the triangle is constructed, it may be necessary to extend the base. Extended lines are often represented by broken lines in mathematics texts. • Some students may prefer to use 0.5 instead of $\frac{1}{2}$ in the formula for calculating the area of a triangle. • It is important for students to understand the difference between diameter and radius. • Instructors may want to discuss pi with students as an extension to the assigned exercises. Students may not realize the uniqueness of pi as a number. • Ensure that students understand that when finding the circumference of a circle, you can use either the diameter or the radius in your calculations, but when finding the area and volume of a circle, it is the radius that must be used. |

Unit 2: Perimeter, Area and Volume — Suggestions for Teaching, Learning and Assessment

| Outcomes | Notes for Teaching and Learning |
|-----------------|--|
| | <ul style="list-style-type: none">• Ensure that students understand how to square the radius ($r \times r$). Some students may make the error of multiplying the radius by 2.• Volume can be thought of as the space inside a solid shape. The volume of a solid is how many cubic units it takes to fill the solid. |

Unit 2: Perimeter, Area and Volume — Suggestions for Teaching, Learning and Assessment

| Suggestions for Assessment | Recommended resources that address outcomes. |
|---|--|
| <ul style="list-style-type: none">Instructors may ask students to complete the <i>Chapters 11-12 Pre-tests</i> to determine their prior knowledge of perimeter, area and volume.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. It is recommended that this grade be 80% or above.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 <i>Teacher's Edition</i>. 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 <i>Teacher's Edition</i>. 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 <i>Teacher's Edition</i> (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 <i>Teacher's Edition</i>.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. | <ul style="list-style-type: none"><i>Prism Math (Blue)</i>, pages 170 and 188. Answers on the same pages of the <i>Prism Math (Blue) Teacher's Edition</i>.<i>Prism Math (Blue) Teacher's Edition</i>, pages 265-277. |