Adult Basic Education (ABE)

Level III Mathematics

Mathematics 1102A

Consumerism and Travel/Measuring Length/Measuring Area

Curriculum Guide

Student Resource: *Math at Work 10. McGraw-Hill Ryerson. 2011. ISBN 13:978-007109106-0.*

Level III General College Profile Mathematics (General)
Mathematics 1102A: Consumerism and Travel/Measuring Length/Measuring Area
Mathematics 1102B: Getting Paid/Angles
Mathematics 1102C: Pythagorean Relationship/Trigonometry
Mathematics 2102A: Surface Area/Drawing and Design/Volume and Capacity
Mathematics 2102B: Interpreting Graphs/Banking and Budgeting
Mathematics 2102C: Slope/Right Triangles and Trigonometry
Mathematics 3102A: Measurement and Probability/Data/Linear Relationships
Mathematics 3102B: Real-Life Decisions/Properties of Figures
Mathematics 3102C: Transformations/Trigonometry

Newfoundland Labrador

Contents

General Information

Introduction

Mathematics 1102A when completed with **Mathematics 1102B and C** is equivalent to the Newfoundland and Labrador senior high school **Mathematics 1202 (Applied**) course.

Pre-requisite

Students must have completed Grade 9 mathematics or ABE Level II Mathematics.

Resources

The student resource for this course is*:*

- *Math at Work 10. McGraw-Hill Ryerson. 2011. ISBN 13:978-007109106-0.*

The instructor resources for this course are:

- *Math at Work 10 Teacher's Resource. McGraw-Hill Ryerson. 2011. ISBN 13:978-007109116-9.*
- *The Online Teacher's Resource Centre*
- *Math at Work 10 Teacher's Resource CD-ROM*

Instructors may also supplement with other resources at their discretion.

Study Guide

The Study Guide provides the student with Required Work for the course. It guides the student through the course by assigning relevant reading and exercises from the student resource. 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. There is information in the Curriculum Guide applicable to teaching, learning and assessment that is not included in the Study Guide. Instructors should review this information and decide how to use it when teaching students.

Instructors can also exercise professional judgment and make minor alterations to the Required Work in the Study Guide. For example, an instructor may decide that it is unnecessary to assign students all the exercises to complete within each lesson.

Curriculum Guide

The Curriculum Guide includes the specific curriculum outcomes and achievement indicators for the course. The specific curriculum outcomes are listed in numerical order, and the achievement indicators are listed alphabetically. Suggestions for teaching, learning and assessment are also provided to support student achievement of the outcomes. Some of these suggestions will also be repeated in the curriculum guides for other mathematics courses as appropriate. The curriculum guide also states the pre-requisite for each Level III mathematics course.

Mathematics 1102A Outcomes/Achievement Indicators

Unit 1: Consumerism and Travel

1. Solve problems that involve unit pricing and currency exchange, using proportional reasoning.
    a) Compare the unit price of two or more given items.
    b) Compare, using examples, different sales promotion techniques.
    c) Solve problems that involve determining the best buy, and explain the choice in terms of the cost as well as other factors, such as quality and quantity.
    d) Determine the percent increase or decrease for a given original and new price.
    e) Explain the difference between the selling rate and purchasing rate for currency exchange.
    f) Convert between Canadian currency and foreign currency using formulas, charts and tables.
    g) Solve, using proportional reasoning, a contextual problem that involves currency exchange.
    h) Explain how to estimate the cost of items in Canadian currency while in a foreign country, and explain why this might be important.
2. Demonstrate an understanding of the SI system by:
        i. describing the relationship of the units for length, area, volume, capacity, mass and temperature.
        ii. applying strategies to convert SI units to imperial units.
3. Demonstrate an understanding of the imperial system by:
        i. describing the relationships of the units for length, area, volume, capacity, mass and temperature.
        ii. comparing the American and British imperial units for capacity
        iii. applying strategies to convert imperial units.
    a) Explain how the SI system was developed, and explain its relationship to base ten.
    b) Explain how the imperial system was developed.

c) Compare the American and British imperial measurement system; e.g., gallons, bushels, tons.
d) Identify contexts that involve the SI system.
e) Match the prefixes used for SI units of measure with the powers of ten.
f) Explain, using examples, how and why decimals are used in the SI system.
g) Explain, using examples, how and why fractions are used in the imperial system.
h) Provide an appropriate measurement in SI units for a measurement given in imperial units; e.g., 1 inch is approximately 2.5 cm.
i) Provide an approximate measure in imperial units for a measurement given in SI units; e.g., 1 liter is approximately ¼ US gallon.
j) Convert a given measurement from SI to imperial units by using proportional reasoning (including formulas); e.g., Celsius to Fahrenheit, centimeters to inches.
k) Convert a given measurement from imperial to SI units by using proportional reasoning (including formulas) e.g., Fahrenheit to Celsius, inches to centimeters.

Unit 2: Measuring Length

1. Demonstrate an understanding of the imperial system by:
    i. describing the relationships of the units for length, area, volume, capacity, mass and temperature
    ii. comparing the American and British imperial units for capacity
    iii. applying strategies to convert imperial units to SI units.
2. Solve and verify problems that involve SI and imperial linear measurements, including decimal and fractional measurements.
    a) Write a given linear measurement expressed in one imperial unit in another imperial unit.
    b) Explain, using examples, how and why fractions are used in the imperial system.
    c) Provide an example of a situation in which a fractional linear measurement would be divided by a fraction.
    d) Measure inside diameters, outside diameters, lengths, widths of various given objects, and distances, using various measuring instruments.
    e) Identify a referent for a given common SI or imperial unit of linear measurement.
    f) Estimate a linear measurement, using a referent.
    g) Estimate the dimensions of a given regular 3-D object or 2-D shape, using a referent; e.g., the height of the desk is about three rulers long, so the desk is approximately three feet height
3. Demonstrate an understanding of the SI system by:
    i. describing the relationships of the units for length, area, volume, capacity, mass and temperature
    ii. applying strategies to convert SI units to imperial units.
    a) Write a given linear measurement expressed in one SI unit in another SI unit.
    b) Identify a referent for a given common SI or imperial unit of linear measurement.
    c) Estimate a linear measurement, using a referent.

d) Estimate the dimensions of a given regular 3-D object or 2-D shape, using a referent; e.g., the height of a desk is about three rulers long, so the desk is approximately three feet high.
e) Measure inside diameters, outside diameters, lengths, widths of various given objects, and distances, using various measuring instruments.
f) Provide an approximate measurement in SI units for a measurement given in imperial units; e.g., 1 inch is approximately 2.5 cm.
g) Provide an approximate measure in imperial units for a measurement given in SI units; e.g., 1 liter is approximately ¼ US gallon.
h) Convert a given measurement from SI to imperial units by using proportional reasoning (including formulas); e.g., Celsius to Fahrenheit to centimeters to inches.
i) Convert a given measurement from imperial to SI units by using proportional reasoning (including formulas); e.g., Fahrenheit to Celsius, inches to centimeters.

4. Solve problems that require the manipulation and application of formulas related to:
    i. **perimeter**
    ii. area
    iii. the Pythagorean Theorem
    iv. primary trigonometric ratios
    v. income

a) Solve a linear measurement problem including perimeter, circumference, and length.
b) Determine the operation that should be used to solve a linear measurement problem.
c) Create and solve a contextual problem that involves a formula.
d) Describe, using examples, how a given formula is used in a trade or occupation.
e) Solve a contextual problem that involves the application of a formula that does not require manipulation.
f) Solve a contextual problem that involves the application of a formula that does require manipulation.

g) Determine, using a variety of strategies, the midpoint of a linear measurement such as length, height, width, depth, diagonal and diameter of 3-D object, and explain the strategies.
h) Determine if a solution to a linear measurement is reasonable.
i) Identify and correct errors in a solution to a problem that involves a formula.

Unit 3: Measuring Area

1. Solve problems that involve SI and imperial area measurements of regular, composite and irregular 2-D shapes and 3-D objects, including decimal and fractional measurements, verify the solutions.
    a) Identify and compare referents for area measurements in SI and imperial units.
    b) Estimate an area, using a referent.
    c) Estimate the area of a given regular, composite or irregular 2-D shape, using a SI square grid and an imperial square grid.
    d) Determine if a solution to a problem that involves an area measurement is reasonable.
    e) Identify a situation where a given SI or imperial area unit would be used.
    f) Write a given measurement expressed in one SI unit squared in another SI unit squared.
    g) Write a given area measurement expressed in one imperial unit squared in another imperial unit squared.
2. Solve problems that require the manipulation and application of formulas related to:
    i. perimeter
    ii. area
    iii. the Pythagorean Theorem
    iv. primary trigonometric ratios
    v. income

    a) Solve a contextual problem that involves the area of a regular, a composite or an irregular 2-D shape.

b) Solve a problem, using formulas for determining the areas of regular, composite and irregular 2-D shapes, including circles.
c) Solve a contextual problem that involves the application of a formula that does not require manipulation.
d) Solve a contextual problem that involves the application of a formula that does require manipulation.
e) Create and solve a contextual problem that involves a formula.
f) Identify and correct errors in a solution that involves a formula.
g) Explain, using examples, the effect of changing the measurement of one or more dimensions on area and perimeter of a rectangle.
h) Solve a problem that involves determining the surface area of 3-D objects, including right cylinders and cones.

Recommended Evaluation

Written Notes (Including all the Required Work)	10%
Assignments	30%
Tests/Quizzes	60%
Total	**100%**

Instructors have the discretion to make minor changes to this evaluation scheme.

Unit 1: Consumerism and Travel—Suggestions for Teaching and Learning

- Instructors should read pages 9-53 in the Math at Work 10 Teacher's Resource (TR).
- Ensure students understand the mathematical concepts listed under "Planning Notes", TR, page 9.
- Ensure students understand the concept of unit pricing.
- Discuss with students that some grocery stores provide unit pricing on a special shelf label. Encourage students to find and use this label when making purchasing decisions.
- Discuss various sales promotions stores often use to sell items; for example, soft drinks being sold 4 for $5 vs 1 for $1.49.
- Engage students in a discussion about factors that may influence a "better buy"; for example, buying in bulk to save on the unit price may not be helpful if products are wasted or go beyond the expiry date.
- Ensure students fully understand how to calculate the % increase and decrease for a given original and new price.
- Discuss with students the difference systems of currencies countries use; for example, Canada and the US use the dollar, England uses the pound and France uses the Euro.
- Discuss with students how to estimate the cost of an item in a foreign country in Canadian currency.
- Students may be interested in knowing that the US is the only country beside Myanmar and Liberia that does not use the metric system as its official measurement system.
- Students should be aware that differences do exist between the US and British imperial measurement system. One noticeable difference is that the MPG for a car sold in the Canada, which is based on the British imperial measurement system, would be higher than the same car sold in the US, which is based on the US gallon.
- Discuss with students that although the SI system is used throughout Canada for such things as speed limits, there are some instances where the imperial system is used; for example, in baking, construction and golf.

Unit 1: Consumerism and Travel—Suggestions for Teaching and Learning

- Students may be familiar with the fact that wrenches and sockets come in both metric and imperial sizes.
- Discuss with students that the SI system uses base 10, and that everything is a multiple of 10. Conversions are easily done by multiplying or dividing by a multiple of 10. Imperial measurements use fractions to divide measurements into smaller segments.
- Encourage students to research Air Canada Flight 143 (Gimli Glider) to see the consequences of miscalculating unit conversions between the metric and imperial systems. It's also an interesting story of heroism and piloting skill.

Unit 1: Consumerism and Travel—Suggestions for Assessment

- Instructors can use the BLM's on the CD-ROM to further reinforce the unit concepts.
- The BLM's on the CD-ROM can be useful for developing unit tests and the final exam.
- Instructors have discretion to combine the last unit test with the final exam if beneficial to the student.
- Students must pass the final exam with a minimum grade of 50% to receive credit for this course.
- Instructors should encourage students to reflect on the math concepts in this unit to relate to everyday life.
- Instructors should engage students in discussions to verbalize student thinking on the math concepts.
- Instructors should require students to always show complete calculations with correct units when relevant.
- Instructors can use their own professional judgment to design assessment tools (additional exercises, word problems, assignments, reflections, math journals, etc.) to meet individual student needs.

Unit 2: Measuring Length—Suggestions for Teaching and Learning

- Students should understand that linear measurement is used to express distances (length).
- Since imperial measures are based on traditional measurements (a foot is the approximate size of a man's foot) rather than a base 10 system, imperial measurements often use fractions for smaller lengths.
- Instructors should encourage students to use mental math and estimation as appropriate.
- Technology such as calculators is appropriate in situations where the numbers involved may make mental estimation and pencil/paper calculations too complex.
- Instructors should ensure that students understand how to use and read a ruler/tape in both metric and imperial measurements.
- Ensure that students know that a referent is one object that can be used to help estimate a measurement. Discuss types and potential use of referents in everyday life.
- Ensure that students understand the relationship between imperial and SI linear units.
- Ensure that students understand how to set up and solve problems using proportional reasoning.
- Instructors should discuss the importance of math in the skilled trades; for example, a carpenter using perimeter to measure the dimensions of a room to install baseboards.
- Students can investigate online the baggage policy of airlines as it relates to the maximum linear dimensions.
- Ensure that students know strategies for determining the midpoint of a linear measurement.
- Discuss with students situations where finding the midpoint of a linear measurement is useful; for example, hanging a picture frame.

Unit 2: Measuring Length—Suggestions for Assessment

- Instructors can use the BLM's on the CD-ROM to further reinforce the unit concepts.
- The BLM's on the CD-ROM can be useful for developing unit tests and the final exam.
- Instructors have discretion to combine the last unit test with the final exam if beneficial to the student.
- Students must pass the final exam with a minimum grade of 50% to receive credit for this course.
- Instructors should encourage students to reflect on the math concepts in this unit to relate to everyday life.
- Instructors should engage students in discussions to verbalize student thinking on the math concepts.
- Instructors should require students to always show complete calculations with correct units when relevant.
- Instructors can use their own professional judgment to design assessment tools (additional exercises, word problems, assignments, reflections, math journals, etc.) to meet individual student needs.

Unit 3: Measuring Area—Suggestions for Teaching and Learning

- Discuss with students situations where area is given using imperial measurements; for example, flooring materials prices in square feet and dimensions of a new house given in square feet.
- Discuss situations where SI measurements for area is more often used; for example, land surveys and population density stated as number of people per square Km.
- Note to students that it is unlikely in real-life to have to convert from certain units such as from square mm to square cm and from square inches to square feet.
- Ensure students understand the difference between a regular shape (all sides and angles congruent--square) and irregular shapes (all sides and/or angles non-congruent—rectangle).
- Ensure students know and understand area formulae for the given regular and irregular shapes studies in the student text.
- Ensure that students can calculate the areas when all measures are given, requiring no formula manipulation. Students also need to know how to find a measurement when the area and one dimension are given, requiring formula manipulation.
- Discuss with students how are formula can be used to solve practical problems; for example, gyproc needed to complete a basement, laminate flooring needed to cover a bedroom floor and the amount of paint needed to paint a living room.
- Encourage students to draw and label diagrams to model the problems in the student text.
- Ensure students understand can apply the area concept to more complex situations; for example, calculate the area of a wall with a window removed.
- Ensure students understand how to decompose a composite shape in order to make problem solving easier.
- Ensure that students understand that to calculate surface area it is necessary to identify the surfaces or faces, determine the dimensions of each surface and use the correct formula to calculate area.
- Instructors may provide students with nets of 3-D objects to help visualize calculations.

Unit 3 Measuring Area—Suggestions for Assessment

- Instructors can use the BLM's on the CD-ROM to further reinforce the unit concepts.
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