Adult Basic Education (ABE)

Level III Mathematics

Mathematics 3102B

Real-Life Decisions/Properties of Figures Curriculum Guide

Student Resource: *Math at Work 12. McGraw-Hill Ryerson. 2012. ISBN 13:978-1-25-901238-9*

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

Contents

General Information

Introduction

Mathematics 3102B when completed with **Mathematics 3102A and C** is equivalent to the Newfoundland and Labrador senior high school **Mathematics 3202 (Applied**) course.

Pre-requisite

Students must have completed **Mathematics 3102A**.

Resources

The student resource for this course is*:*

Math at Work 12. McGraw-Hill Ryerson. 2012. ISBN 13:978-1-25-901238-9

The instructor resources for this course are:

- *Math at Work 12 Teacher's Resource. McGraw-Hill Ryerson. 2012. ISBN 13:978-1-25-901242-6*
- *The Online Teacher's Resource Centre*
- *Math at Work 12 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 numerically, 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 3102B Outcomes/Achievement Outcomes

Unit 1: Real-Life Decisions

1. Solve problems that involve the acquisition of a vehicle by:
    i. buying
    ii. leasing
    iii. leasing to buy

    a) Describe and explain various options for buying, leasing and leasing to buy a vehicle.
    b) Justify a decision related to buying or leasing or leasing to buy a vehicle, based on factors such as personal finances, intended use, maintenance, warranties, mileage and insurance.
    c) Solve, with or without technology, problems that involve the purchase, lease or lease to purchase a vehicle.
    d) Determine costs of operating a vehicle, including fixed costs, such as extended warranty, insurance and licensing, and ongoing costs such as gas and maintenance.
    e) Identify expenses in operating a small business.
    f) Identify feasible small business options for a given community.
    g) Generate options that might improve the profitability of a small business.
    h) Determine the profit, loss and break-even point for a small business.
    i) Explain factors, such as seasonal variations and hours of operation, which might impact the profitability of a small business.

Unit 2: Properties of Figures

1. Solve problems that involve:
    i. triangles
    ii. quadrilaterals
    iii. regular polygons

a) Describe and illustrate the properties of triangles.
b) Describe and illustrate angle properties of quadrilaterals.
c) Describe and illustrate angle properties of regular polygons.
d) Explain, using examples, why a given property does or does not apply to certain polygons.
e) Describe and illustrate side length and properties of triangles.
f) Describe and illustrate properties of quadrilaterals in terms of side lengths, diagonal lengths and angles of intersection.
g) Describe and illustrate the diagonal properties of regular polygons.
h) Describe and illustrate line symmetry in triangles, quadrilaterals and regular polygons.
i) Identify and explain an application of the properties of polygons in construction, industrial, commercial, domestic and artistic contexts.
j) Solve a contextual problem that involves the application of the properties of polygons.

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: Real-Life Decisions —Suggestions for Teaching and Learning

- Discuss with students the types of things they should consider when purchasing or leasing a new vehicle.
- Review ratios, percentages, fractions and decimals with students.
- Ensure that students understand the difference between buying and leasing a vehicle.
- Discuss with students the advantages and disadvantages when buying/leasing a vehicle depending on personal circumstances.
- Discuss affordability when considering buying/leasing a vehicle.
- Discuss with students the costs of insurance and liability. Students should understand that there are different factors that affect the cost of insurance; e.g., age of driver, gender of driver, previous traffic violations, drinking and driving convictions, previous claim history, type of vehicle, deductibles, etc.
- Discuss with students how mileage allowances, warranty and maintenance obligations affects the overall cost of buying/leasing a vehicle.
- Discuss with students how depreciation affects the overall price of buying/leasing a new vehicle.
- Discuss the pros/cons of the following options when buying/leasing a new vehicle: paying the full price of the vehicle without financing, making a down payment and financing the remainder and financing the full price of the vehicle.
- Discuss with students other factors to consider when buying/leasing a vehicle; e.g., finance/lease term, finance/lease rate, security deposits, kilometer allowances, delivery charges, residual values, maintenance, etc.
- Discuss with students the pros and cons of buying an older vehicle vs a newer one.
- Ensure that students can correctly calculate the total cost of buying/leasing a vehicle once all taxes, fees and finance charges are added.
- Ensure students are able to calculate the effect of payment schedules on the overall cost of the vehicle purchase.
- Ensure students understand that leased vehicles have a mileage allowance and they will be charged when the vehicle is returned.

Unit 1: Real-Life Decisions —Suggestions for Teaching and Learning

- Ensure students understand that the customer is responsible for wear-and-tear items on a leased vehicle and may be charged extra costs upon returning the leased vehicle.
- Ensure students understand that there are online loan calculators that can be used to input principle (purchase price), interest rate and length of the loan to determine the total finance cost.
- Discuss with students the variable costs (e.g. fuel and maintenance) of owning a vehicle.
- Discuss with students how a vehicle cost can be increased when the warranty period has expired.
- Discuss with students expenses that must be incurred to start and operate a small business.
- Ensure that students understand that improved profitability can be achieved by increasing business income and/or reducing expenses.
- Ensure that students are able to calculate net income (profit/loss) based on the revenue generated by the business and the expenses incurred.

Unit 1: Real-Life Decisions —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: Properties of Figures —Suggestions for Teaching and Learning

- A review may be needed of definitions and characteristics of basic geometric shapes and how to name line segments and angles.
- Ensure students can classify equilateral, isosceles and scalene triangles.
- Ensure students can identify whether angles are acute, obtuse, right or straight.
- Students should understand the following properties of triangles: the sum of the angles in a triangle is 180 degrees, an equilateral triangle has 3 equal angles which are acute, an isosceles triangle has two equal angles which are acute (the third angle could be acute, right or obtuse), and a scalene triangle has no equal sides/angles.
- Ensure that students can identify the following types of quadrilaterals: rectangle, isosceles trapezoid, square and parallelogram.
- Students should understand the following properties of parallel lines: the sum of the angles in a quadrilateral is 360 degrees, the opposite angles of a parallelogram are equal, and squares and rectangles have four right angles.
- Students should also understand that the two angles opposite the equal sides of an isosceles trapezoid are equal.
- Ensure students understand the formula $S = 180(n – 2)$ where S represents the sum of the interior angles and n represents the number of sides of the polygon.
- Students should understand the following relationships between angle measures and side lengths in triangles: the side opposite the largest angle is the longest side, the side opposite the smallest angle is the smallest side, and the sum of any two sides must be greater than the length of the third side.
- Students should also note and understand the following properties of quadrilaterals:
    - Both pairs of opposite sides of a rectangle are parallel.
    - Both pairs of opposite sides of a parallelogram are equal.
    - The diagonals of a rectangle are equal.
    - The diagonals of a square are equal.
    - The diagonals of an isosceles trapezoid are equal.

Unit 2: Properties of Figures —Suggestions for Teaching and Learning

- The diagonals of a parallelogram are not equal. The longest diagonal will be opposite the largest side.
- The diagonals of all quadrilaterals studied will intersect at the midpoint of the diagonals.
- The diagonals of a square will intersect to form right angles.
- The sum of the angles where the diagonals of a quadrilateral intersect will be 360 degrees.

- Ensure that students understand line symmetry in triangles, quadrilaterals and regular polygons. A 2-D figure has line symmetry if one half of the figure is a reflection on the other.
- Discuss with students real-life applications using properties of polygons; e.g., flooring tiles, cutting construction materials, quilting, squaring frames of buildings, building design, etc.
- Discuss with students applications of geometric figures in art, painting, pictures, logos, signs, flags, playing cards, etc.

Unit 2: Properties of Figures—Suggestions for Assessment

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