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**GENBM201 - BASIC MATHEMATICS**

**BDCPC301 - Apply Basic Mathematics at the Workplace**

**Competence**

**RQF Level: 2 Learning Hours 120**

**Credits: 12**

**Sector: ICT and Multimedia**

**Trade: Computer Application**

**Module Type: General**

**Curriculum: TVET Certificate II in Computer application**

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| **Purpose statement** | This general module provides the skills, knowledge, and attitudes for a learner to be competent in a range of routine tasks and activities. Upon completion of this module the learner will be able to apply algebraic and set concepts, geometric shapes and similarities, descriptive statistical concepts based on related requirements workplace. | | | |
| **Delivery modality** | **Training delivery** | **Assessment** | **Marks allocation** | Total 100% |
| Demonstration  Group discussion  Pairing work  Individual or group work | Formative Assessment | 50% | 100% |
| Summative Assessment | 50% |

**Elements of Competency and Performance Criteria**

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| **Elements of competency** | **Performance criteria** |
| **1. Apply algebraic and set concepts** | 1.1 Operations on Sets of Numbers are correctly applied to solve related problems according to work requirements. |
| 1.2 Proportions, ratios, percentages, and mixtures are properly determined according to work requirements |
| 1.3 Percentages are properly used to calculate discount, commission, profit, loss, interest, and taxes based on workplace |
| 1.4 Linear and quadratic equations are properly solved in accordance with the given situation. |
| **2. Apply geometric shapes and angles properties** | 2.1 Shapes and angles are precisely drawn using geometrical instruments based on workplace. |
| 2.2 Lengths of shapes are accurately calculated based on similar shape properties. |
| 2.3 Shape image are properly determined in accordance with the transformation properties. |
| 2.4 Surface area and volume of common geometrical solids are properly calculated based on formulas. |
| **3. Apply descriptive statistical concepts and calculations** | 3.1 Statistical data are appropriately recorded in relation with the available data |
| 3.2 The measures of central tendency and dispersion of a statistical data are properly calculated using Microsoft Excel based on work requirements |
| 3.3 Statistical data (results) are effectively presented and interpreted communicated using Microsoft Excel based on mathematical representations such as graphs and charts. |

**Course content**

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| **Learning outcomes:** | **At the end of the module the learner should be able to:** |
|  | 1. Apply algebraic set concepts problems 2. Apply geometric shapes and angles properties 3. Apply descriptive statistical concepts and calculations |

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| **Learning outcome 1: Apply algebraic and Set Concepts** | | **Learning hours: 40** |
| **Indicative content** | | |
| * **Operations on Sets of Numbers** * Sets of numbers and its subsets: * Natural numbers, * Integers, * Decimal numbers, * Rational numbers, * Irrational numbers, * Real numbers. * The relationship between sets of numbers. * Four operations on sets of numbers and their properties. * Representation of set problems using Venn diagrams. * Embedding operations on sets of numbers: Model and solve real life problems. * Calculations of Proportions, ratios, percentages, and mixtures * Ratio, proportion, and sharing. * Applying ratio, proportion, and sharing to solve real-life problems. * Direct and indirect proportional relationships in practical contexts. * Percentage and ratios * Mixture problems * **Usage of percentage to calculate discount, commission, profit, loss, interest, and taxes.** * Commission. * Profit and loss. * Loans and savings (Simple interest only). * Taxes and insurance. * **Resolution of linear equations** * Linear equation: * Definition, * Notation and examples of linear equation with one unknown: * Solve linear equations with one unknown * Solve real life problems involving linear equations. * **Resolution of quadratic equations** * Definition and example of a quadratic equation. * Solving quadratic equations by: * Completing squares * Delta (Discriminant) to solve quadratic equations * Factorization * Real life Problems involving quadratic equations. | | |
| **Resources required for the learning outcome** | | |
| **Equipment** | * Teaching manual * Textbooks * White board * Chalkboard | |
| **Materials** | * Marker pens * piece of chalks | |
| **Tools** | * Scientific calculator | |
| **Facilitation techniques** | * + Group discussion   + Demonstration   + Group   + Individual work | |
| **Formative assessment methods** | * Written assessment | |

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| **Learning outcome 2: Apply geometric shapes and angles properties** | | **Learning hours: 60** |
| **Indicative content** | | |
| * **Drawing of geometric shapes and angles using geometrical instruments** * Definition of a geometric figures * Types of geometric shapes: * Regular * Irregular * Drawing regular and irregular shapes * Perimeter & Area of Regular shapes * Perimeter & Area of irregular shapes * Elements of regular shapes: * Interior angles and their sum * Exterior angles and their sum * Construction and Measuring Angles in Degrees * Construction of Median and Mediatrix of a Triangle and Line Segment * Construction of Bisector of angle of a Triangle * Identify vertically opposite angles, corresponding angles, alternate angles, supplementary angles, and their relationships   + **Calculation of Lengths of geometric shapes using properties of similarities** * Basic units of length: * Imperial/ English system * Metric system (International system) * Converting basic units of length form Imperial to metric system * Midpoint theorem. * Thales’ theorem and its converse. * Application of Thales’ theorem (in triangles and trapeziums)   + **Construction of Shape image using transformation properties (properties of parallel projections, orthogonal projections, central symmetry, reflection, translation, and enlargement**). * Definition of transformation: * Parallel projection. * Orthogonal projection. * Properties of orthogonal and parallel projection. * Image of geometric shape under: * Parallel projection. * Orthogonal projection. * Definition of central symmetry and Construction of an image of an object/geometric shape under central symmetry. * Definition reflection and Construction of an image of an object/geometric shape under reflection. * Definition of rotation and Construction of an image of an object/geometric shape under rotation. * Definition of translation and Construction of an image of an object/geometric shape under translation. * Definition of enlargement and Construction of an image of an object/geometric shape under enlargement. * **Calculation of area and volume of common geometrical solids using formulas.** * Components of solids: * Faces * Edges * Vertices * Surface area and volume of: * Prism * Pyramid * Cylinder * Cone * Sphere | | |
| **Resources required for the indicative content** | | |
| **Equipment** | * Projector * Teaching manual * Textbooks * White board * chalkboard | |
| **Materials** | * Marker pens * Piece of chalks | |
| **Tools** | * Scientific calculator * mathematical set | |
| **Facilitation techniques** | * Demonstration * Presentation of related simulations * Individual works * Group of two trainees’ work. | |
| **Formative assessment methods** | * Written assessment | |

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| **Learning outcome 3: Apply descriptive statistical concepts and calculations** | | **Learning hours: 20** |
| **Indicative content** | | |
| * **Recording statistical data in relation with the available data** * Definition of: * Descriptive statistics * Data * Types of data: * Qualitative * Quantitative * Discrete * Continuous * Ungrouped data. * Frequency distribution table of ungrouped data. * **Calculation of measures of central tendency and measures of dispersion of a statistical data using Microsoft Excel.** * Measures of central tendency for ungrouped data: * Mean * Median * Mode * Measures of dispersion for ungrouped data: * Range * Interquartile range * Variance * Standard deviation * **Constructing, presenting, and communicating statistical data (results) using Microsoft Excel based on mathematical representations: Pie-Charts and Bar-Charts.** * Data display: * Bar charts * Pie chart * Reading statistical graphs. | | |
| **Resources required for the indicative content** | | |
| **Equipment** | * Computer * Teaching manual * Textbooks * White board * Chalkboard | |
| **Materials** | * Marker pens or piece of chalks | |
| **Tools** | * Scientific calculator * Microsoft Excel | |
| **Facilitation techniques** | * Demonstration * Presentation of related simulations * Individual works * Group of two trainees work | |
| **Formative assessment methods** | * Written assessment | |

# **References**

* 1. Board, R. E. (2015). *Mathematics Syllabus for Ordinary Level Senior 1-3.* Kigali.
  2. E, R. (1997). *Algebra I.* Philippines: Wesley Publishing Company, Inc.
  3. E. Ndyabas, F. A. (2017). *Mathematics for Rwanda Schools Senior 3, Student's Book.* Kigali, Rwanda: Longhorn Publishers (Rwanda) Ltd.
  4. Eastone Ndyabasa, F. A. (2017). *Mathematics for Rwanda Schools Senior 2, learner' Book.* Kigali, Rwanda: Longhorn Publishers (Rwanda) Ltd.
  5. R, A. (2004). *Intermediate Algebra for College Students.* New Jersey: Pearson Education, Inc.