

**Domain
Title:**

**FOUNDATION NUMERACY SKILLS
Apply knowledge of mathematics in
an agricultural context**

Unit ID: 1951

Level: 3

Credits: 8

Purpose

This unit standard is intended for people who apply knowledge of Mathematics in an agricultural context. People credited with this unit standard are able to apply knowledge of algebraic fundamentals to perform basic calculations; apply knowledge of mensuration and percentages; apply basic knowledge of factors and fractions; solve and manipulate equations, word problems and technical formulae; apply knowledge of geometry; solve graphs of linear equations; apply knowledge of goniometry, angular and peripheral velocity and sectors of circles; apply knowledge of circles; apply knowledge of basic statistics.

This unit standard is intended for people who manage agricultural enterprises as well as people in other occupations that work in managerial positions in agricultural institutions and require mathematic skills.

Special Notes

1. Entry information

Prerequisites:

- *Unit 1153 - Apply basic numeracy skills in a workplace environment*

2. This unit standard gives users exposure to a holistic approach of study and world of work to gain an understanding of the world as a set of related systems, by recognizing that problem solving contexts do not exist in isolation but that they may differ from context to context according to the area of application and in this case in agriculture.
3. Assessment evidence may be collected from a real workplace or a simulated work environment in which agricultural operations are carried out.
4. The assessor must be satisfied that the candidate can demonstrate an understanding of, or competency against, the unit standard as a whole.
5. Glossary of terms
 - “*Goniometry*’ refers to measurement of angles.
6. Regulations and legislation relevant to this unit standard include the following:
 - Labour Act, No. 11, 2007.
 - Occupational Health and Safety Regulations No. 18, 1997
 - And all subsequent amendments to any of the above.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions which meet the accreditation requirements set by the Namibia Qualifications Authority and the Namibia

Training Authority and which comply with the national assessment and moderation requirements. Details of specific accreditation requirements and the national assessment arrangements are available from the Namibia Qualifications Authority on www.namqa.org and the Namibia Training Authority on www.nta.com.na.

Elements and Performance Criteria

Element 1: Apply knowledge of algebraic fundamentals to perform basic calculations

Range

Operations of a scientific pocket calculator may include but are not limited to four basic operations, extraction of roots, involution, memory keys, and special keys e.g. inverting (INV), brackets (), exponential (EXP) pie (π) and Mode (The Mode key allows you to determine what mode the calculator is operating in e.g. statistics mode, scientific mode etc.).

Performance Criteria

- 1.1 Simple calculations are performed using a scientific pocket calculator.
- 1.2 Operational and language signs used in algebra are identified.
- 1.3 The difference between an equation, expression and a polynomial is explained.
- 1.4 Correct order of algebraic operations is applied in calculations.
- 1.5 Addition and subtraction of similar exponential terms and expressions are performed.
- 1.6 Multiplication of a monomial or a binomial expression by a monomial, binomial or trinomial expression is performed.
- 1.7 Long division of polynomials of degree of three or more in one variable is performed.

Element 2: Apply knowledge of mensuration and percentages.

Range

- **Units converted** may include but are not limited to length, distance, area, volume and from one to any of these forms: m, mm, m^2 , mm^2 , mm^3 , m^3 and km.
- **Shapes of figures and/or object** may include but are not limited to rectangular, square, triangular, circular, annulus, sphere, parallelogram, trapezium, cylinder, right cylinder, right cone, cube, right prism, and right pyramid.

Performance Criteria

- 2.1 Units are converted from one form of expression to another.
- 2.2 Calculation of the circumference, perimeter, area and/or surface area of different figures and/or objects is performed.
- 2.3 Practical problems involving percentage calculations are solved.

- 2.4 The surface areas of a cone, cylinder and sphere are calculated.
- 2.5 The volumes of a cone, cylinder and sphere are calculated.
- 2.6 The areas of irregular figures are determined using the mid-ordinate rule.

Element 3: Apply basic knowledge of factors and fractions

Range

- **Factorization** is limited to a monomial common factor and four terms.
- **Fractions** are to be expressed in their simplest forms.
- **The factorization** of polynomials involves up to binomial factors.
- **Quadratic expressions** are limited to quadratic trinomial, perfect squares and difference of squares.

Performance Criteria

- 3.1 The principle relationship between factorization and multiplication is explained.
- 3.2 Factorization of polynomial is performed.
- 3.3 Addition and subtraction of algebraic fractions by first factorizing the numerator and denominator is performed (polynomial numerators are excluded).
- 3.4 A polynomial is factorized by taking out a common factor as a first step followed by taking out a binomial as common factor as a second step.
- 3.5 The difference between two squares and sum of two cubes are factorized.
- 3.6 Highest Common Factor (HCF) and Lowest Common Multiple (LCM) in algebraic expressions is determined by using factorization.
- 3.7 Addition, subtraction, multiplication and division of algebraic fractions are performed by using factorization
- 3.8 Quadratic expressions are factorized.
- 3.9 The remainder and factor theorems are applied to quadratic, cubic equations.

Element 4: Solve and manipulate equations, word problems and technical formulae

Range

- **Manipulation of technical formulae** excludes manipulation with exponents and manipulation by factorization, manipulation by using quadratic formula and by using the laws of logarithm.
- **Manipulation of technical formulae** includes manipulation of exponents, manipulation by factorization, manipulation by using quadratic formula and manipulation of cubes, squares, square roots and cube roots.

Performance Criteria

- 4.1 Linear and quadratic equations are set and solved from formulated problems.
- 4.2 Technical formulae are manipulated by changing the subject of a given formula to any other subject.
- 4.3 Quadratic equations are derived and solved by completing the square, quadratic formula and/or factorization.
- 4.4 Quadratic equations are solved from a given word problem using factorization and/or the quadratic formula.
- 4.5 Simultaneous equations (combination of linear and non-linear) are solved.
- 4.6 The value is determined from advanced technical formulae by manipulation and substitution.
- 4.8 From a given word problem simultaneous linear equations with two unknown quantities are solved.

Element 5: Apply knowledge of geometry

Performance Criteria

- 5.1 Types of angles and triangles are distinguished.
- 5.2 Calculations related to unknown angles in triangles are performed.
- 5.3 The relation between an exterior angle and the opposite interior is explained and applied in calculations on triangles.
- 5.4 The properties of congruent, isosceles triangle are explained and applied in simple numerical problems and drawings.
- 5.5 Pythagoras theorem is applied to determine the unknown side of a right-angled triangle.
- 5.6 A right-angled triangle is constructed by means of the 3-4-5 method.
- 5.7 Given a set of information, the equation of a straight line is found.
- 5.8 Given a set of information, the length of a line segment, the angle of inclination, the gradient and the coordinates of the midpoint of a given segment are determined.
- 5.9 Given a set of information of a circle, the equations of a circle, points of intersection and a tangent to the circle are determined.

Element 6: Solve graphs of linear equations

Performance Criteria

- 6.1 Linear equation of the form $y = mx + c$ in the form $f(x) = mx + c$ are used to identify and calculate variables, constants and function values.

- 6.2 A linear graph ($y = mx + c$) is drawn with the aid of a table of function values with special reference to the choice and determining of a suitable scale.
- 6.3 A linear graph is drawn with the aid of gradient ordinate (offset), gradient Intercept and X- and Y-intercept methods.
- 6.4 Gradient and y-intercept from a given graph is determined.
- 6.5 A parabola is drawn by means of the table method and/or pre-calculations.
- 6.6 Values from linear graphs and parabola are interpreted.
- 6.7 Simultaneous equations involving a linear and quadratic equations are solved graphically.
- 6.8 Given the applicable algebraic equations, respective graphs are drawn.
- 6.9 Given sketched graphs, the applicable equations are determined.

Element 7: Apply knowledge of goniometry, angular and peripheral velocity and sectors of circles

Performance Criteria

- 7.1 The relationships between revolutions, degrees and minutes are stated.
- 7.2 Conversions between degrees, radians, minutes and seconds are explained.
- 7.3 The definition and relationship between degrees, radians and revolutions is indicated.
- 7.4 The concepts of angular and peripheral velocity are defined.
- 7.5 Conversion of revolutions per minute to revolutions per second and vice versa is performed.
- 7.6 Angular velocity is expressed in terms of radians per second.
- 7.7 Peripheral velocity is converted to angular velocity and vice versa.
- 7.8 Calculations involving angular and peripheral velocities are performed.

Element 8: Apply knowledge of circles

Performance Criteria

- 8.1 Concepts of circle, chord and circle segments are explained.
- 8.2 The areas of the circle, sector of a circle and segment of a circle are calculated.
- 8.3 The calculations of the circumference and the length of the arc of the circle are performed.

Element 9: Apply knowledge of basic statistics

Performance Criteria

- 9.1 Calculations involving mean, mode, range, median, standard deviation, cumulative frequency, measures of spread from various forms of data are performed
- 9.2 Frequency distribution tables, frequency histograms, polygons and Scatter Diagrams are understood and drawn.
- 9.3 Calculations involving probability are performed.

Registration Data

Subfield:	Numeracy
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Anticipated review:	2023
Body responsible for review:	Namibia Training Authority