

Unit ID: 891

Domain

FOUNDATION NUMERACY SKILLS

Title:

**Apply knowledge of basic mathematics
in different context**

Level: 3

Credits: 6

Purpose

This unit standard specifies the competencies required to apply knowledge of basic mathematics in different context. It includes competency to apply laws to solve exponential equations and logarithmic expressions, carry out factorization, solve and manipulate equations, word problems and technical formulae, solving linear and quadratic graphs, apply knowledge of goniometry, angular and peripheral velocity and sectors of circles, apply knowledge of circles, apply intermediate knowledge of trigonometry and carry out mensuration on various objects. This unit standard is intended for people in different contexts, requiring basic mathematic skills.

Special Notes

1. 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.
2. This unit standard may be assessed in any context of operation and may be assessed in conjunction with other relevant technical unit standards selected from a particular domain that has a thematic link to this unit standard.
3. Glossary of terms:
 - '*Goniometry*' refers to measurement of angles.
- 4.
5. Assessment evidence may be collected at any realistic place where logical collection of such evidence can be achieved.
6. The correct use of the suitable technical terminology must be stressed, especially in formulating definitions and principles.
7. 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.

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 and the Namibia Training Authority on www.nta.com.na.

Elements and Performance Criteria

Element 1: Apply laws of exponents and logarithms to solve exponential equations and logarithmic expressions.

Range

Laws of exponents: $a^m a^n = a^{m+n}$, $\frac{a^m}{a^n} = a^{m-n}$, $(a^m)^n = a^{m \cdot n}$, $(a \cdot b)^m = a^m b^m$, $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$, $a^0 = 1$, $a^{-1} = \frac{1}{a}$, $a^{-m} = \frac{1}{a^m}$ and $a^{\frac{1}{m}} = \sqrt[m]{a}$.

Laws of logarithm: $\log_a xy = \log_a x + \log_a y$, $\log_a x/y = \log_a x - \log_a y$, $\log_a x^n = n \cdot \log_a x$, $n \cdot \log_a x = \log_a x^n$, $\log_a a = 1$ and $\ln x = \log_e x$.

Performance Criteria

- 1.1 The index laws of exponents and their properties are reproduced.
- 1.2 The laws of indices and the properties are applied to simplify algebraic expressions.
- 1.3 Simple exponential equations are solved.
- 1.4 Logarithmic expressions are simplified using laws of logarithms.
- 1.5 Calculations (limited to simple multiplication, powers and division) are performed by using natural or ordinary logarithms on a scientific calculator.
- 1.6 Changing the radix (base) of a logarithm is performed.

Element 2: Carry out factorization.

Range

The factorization of polynomials involves up to binomial factors.

Performance Criteria

- 2.1 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.
- 2.2 A quadratic trinomial of which the coefficient of x^2 is any whole number is factorized.
- 2.3 The difference between two squares is factorized.
- 2.4 Highest Common Factor (HCF) and Lowest Common Multiple (LCM) in algebraic expressions is determined using factorization.
- 2.5 Multiplication and division of fractions by using factorization is performed, keeping the set limitations in mind.

- 2.6 Addition and subtraction of algebraic fractions is performed using the factorization

Element 3: Solve and manipulate equations, word problems and technical formulae.

Performance Criteria

- 3.1 Quadratic equations are solved from a given word problem using factorization and/or the quadratic formula.
- 3.2 From a given word problem simultaneous linear equations with two unknown quantities are solved. (No fractions may occur in the equations.)
- 3.3 Technical formulae are manipulated by changing the subject of a given formula to any other subject.
- 3.4 The value of a new subject is determined by substituting the values of the known quantities.

Element 4: Solve linear and quadratic graphs.

Performance Criteria

- 4.1 The function values at a specific point for a given linear equation are calculated.
- 4.2 A linear graph is drawn with the aid of gradient ordinate (offset), gradient Y-intercept and X- and Y-intercept methods.
- 4.3 A parabola is drawn by means of the table method and/or pre-calculations.
- 4.4 Values from linear graphs and parabola are interpreted.
- 4.5 Simultaneous linear equations are solved graphically.
- 4.6 Simultaneous equations involving a linear and quadratic equations are solved graphically.

Element 5: Apply knowledge of goniometry, angular and peripheral velocity and sectors of circles.

Performance Criteria

- 5.1 The relationships between revolutions, degrees and minutes are stated.
- 5.2 Conversions between degrees, minutes and decimal values are explained.
- 5.3 The term radian is defined.
- 5.4 The relationship between degrees, radians and revolutions is indicated.
- 5.5 Conversions between radian, degrees, and minutes are explained.

- 5.6 The concepts of angular and peripheral velocity are defined.
- 5.7 Conversion of revolutions per minute to revolutions per second and vice versa is performed.
- 5.8 Angular velocity is expressed in terms of radians per second.
- 5.9 Peripheral velocity is converted to angular velocity and vice versa.
- 5.10 Calculations involving angular and peripheral velocities are performed.

Element 6: Apply knowledge of circles.

Performance Criteria

- 6.1 Concepts of circle, chord and circle segments are explained.
- 6.2 The areas of the circle, sector of a circle and segment of a circle are calculated.
- 6.3 The calculations of the circumference and the length of the arc of the circle are performed.

Element 7: Apply intermediate knowledge of trigonometry.

Performance Criteria

- 7.1 The six trigonometric ratios are defined in terms of the unit circle.
- 7.2 Trigonometric functions are applied to determine angles.
- 7.3 Elevations and depressions are calculated using trigonometric functions.
- 7.4 Graphs of trigonometric functions are drawn and interpreted.

Element 8: Carry out mensuration on various objects .

Performance Criteria

- 8.1 The surface areas of a cone, cylinder and sphere are calculated.
- 8.2 The volumes of a cone, cylinder and sphere are calculated.
- 8.3 The areas of irregular figures are determined using the mid-ordinate rule.

Registration Data

Subfield:	Numeracy
Date first registered:	18 November 2010
Date this version registered:	18 November 2010
Anticipated review:	2015
Body responsible for review:	Namibia Training Authority