

Unit ID: 890

Domain FOUNDATION NUMERACY SKILLS

**Title: Apply knowledge of pre-basic
 mathematics in different context**

Level: 2

Credits: 6

Purpose

This unit standard specifies the competencies required to apply knowledge of pre-basic mathematics in different contexts. It includes application of knowledge of algebraic fundamentals to perform basic calculations, knowledge of mensuration and percentage, knowledge of factors and fractions, apply knowledge of exponents (indices) and logarithms to simplify algebraic and logarithmic expressions and carry out simple manipulations, solve and manipulate linear equations and technical formulae, apply knowledge of geometry, trigonometry and graphs in solving simple physical problems. This unit standard is intended for people in different contexts, requiring pre-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. Assessment evidence may be collected at any realistic place where logical collection of such evidence can be achieved.
4. The correct use of the suitable technical terminology must be stressed, especially in formulating definitions and principles.
5. 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 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 Mathematical properties of zero and one are explained.
- 1.7 Polynomials are defined.
- 1.8 Multiplication of a monomial or a binomial expression by a monomial, binomial or trinomial expression is performed.
- 1.9 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 and perimeter of different figures and/or objects is performed.
- 2.3 Calculation of the area and/or surface area of different figures and/or objects is performed.
- 2.4 Volume of different objects (figures) is calculated.
- 2.5 Practical problems involving percentage calculations are solved.

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.

Performance Criteria

- 3.1 The principle relationship between factorization and multiplication is explained.
- 3.2 Factorization of polynomial is performed.
- 3.3 Terms that have a common factor are regrouped.
- 3.4 Highest Common Factor (HCF) and Lowest Common Multiple (LCM) of not more than three numerical or monomial algebraic expressions are determined by making use of factorization.
- 3.5 Addition and subtraction of algebraic fractions by first factorizing the numerator and denominator is performed (polynomial numerators are excluded).

Element 4: Apply knowledge of exponents (indices) and logarithms and carry out simple manipulations.

Range

The laws of exponents show the power of elementary algebra and lay the groundwork for logarithms. The laws are: $a^m a^n = a^{m+n}$, $\frac{a^m}{a^n} = a^{m-n}$, $(a^m)^n = a^{m \cdot n}$, $(a \cdot b)^m = a^m b^m$, $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$, $a^0 = 1$, $a^{-1} = \frac{1}{a}$, $a^{-m} = \frac{1}{a^m}$ 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 , $\log_a a = 1$ and $\ln x = \log_e x$.

Performance Criteria

- 4.1 Sign, coefficient, radix (base) and exponent of a power are identified.
- 4.2 The laws for exponents are reproduced.

- 4.3 The laws for exponents in simplifying algebraic expressions are applied (the exponents may only be whole numbers).
- 4.4 The term logarithm is defined and laws of logarithm are expressed.
- 4.5 Simple logarithmic expressions are simplified without a scientific pocket calculator.
- 4.6 Simple manipulations with logarithms are carried out with and without a scientific pocket calculator.

Element 5: Solve and manipulate equations 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.

Performance Criteria

- 5.1 Linear equations are properly solved.
- 5.2 Linear equations from formulated problems are set and solved.
- 5.3 Technical formulae are manipulated by changing the subject of a given formula to any other subject.
- 5.4 The value of a new subject is determined by substituting the values of the known quantities.
- 5.5 Problems on distance, speed, time and revolutions are solved.

Element 6: Apply knowledge of geometry.

Performance Criteria

- 6.1 Types of angles and triangles are distinguished.
- 6.2 Calculations related to unknown angles in triangles are performed.
- 6.3 The relation between an exterior angle and the opposite interior is explained and applied in calculations on triangles.
- 6.4 The properties of an isosceles triangle are explained and applied in simple numerical problems.
- 6.5 The conditions for two triangles to be congruent are explained by means of a drawing.
- 6.6 Pythagoras theorem is applied to determine the unknown side of a right-angled triangle.

6.7 A right-angled triangle is constructed by means of the 3-4-5 method.

Element 7: Apply knowledge of trigonometry.

Performance Criteria

- 7.1 The trigonometric ratio of a given angle is determined.
- 7.2 The magnitude of the angle for a given ratio is determined.
- 7.3 The three functions (sine, cosine and tangent) are explained in terms of the sides of a given right-angled triangle with a given angle of reference.
- 7.4 Angles (dimensions) of the right-angle triangle are solved using trigonometric functions.
- 7.5 A sine curve is sketched by means of a circle with unit radius as well as the table method.

Element 8: Solve graphs of linear equations.

Performance Criteria

- 8.1 The meaning of direct relation in linear graphs is explained.
- 8.2 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.
- 8.3 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.
- 8.4 Gradient and y-intercept from a given graph is determined.
- 8.5 The concept of inverse relation in rectangular hyperbola is explained.
- 8.6 The term infinity in relation to rectangular hyperbola is explained.
- 8.7 A rectangular hyperbola $y = c/x$ is drawn with the aid of a table of function values, where x is not 0 and y is not 0.
- 8.8 The intersection between a straight line and a rectangular hyperbola is determined graphically.

Registration Data

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