APPLY BASIC MATHEMATICS FOR SCIENCE

UNIT CODE: 0541 441 07A

TVET CDACC UNIT CODE: SLT/OS/SL/CC/03/5/MA

UNIT DESCRIPTION

This unit describes the competencies required to apply basic mathematics for science. It involves applying: basic arithmetic operations, algebraic equation and expression, binomial expansion, matrices, vector operations, trigonometry and statistical methods.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace functions	**PERFORMANCE CRITERIA** These are assessable statements which specify the required level of performance for each of the elements ***(Bold and italicized terms are elaborated in the range)***
1. Apply basic arithmetic operations	1.1 Addition and subtraction is performed as per arithmetic operation rules 1.2 Multiplication and division is applied as per arithmetic operation rules 1.3 Ratios, ***mathematical proportions*** and percentages is applied as per algebraic rules 1.4 Indices are operated as per laws of indices
2. Apply algebraic equation and expression	2.1 Linear equations are solved as per linear concept 2.2 Simultaneous equation is solved as per ***simultaneous method*** 2.3 Linear graph is interpreted as per linear graph concept 2.4 Quadratic equation is solved as per ***quadratic methods***
3. Apply binomial expansions	3.1 Evaluate binomial expression as per mathematical concepts

	3.2 Formulate binomial theorem as per mathematical concepts 3.3 Pascal's triangle is applied as per mathematical concepts
4. Apply matrices	4.1 2x2 matrix operation is carried out as per mathematics concept. 4.2 Determinant of 2x2 matrix is determined as per mathematics concept. 4.3 Inverse of 2x2 matrix is determined as per mathematics concept 4.2 Simultaneous equations are solved as per matrix concept
5. Apply vector operations	5.1 Vector addition is carried out as per vector concepts 5.2 Vector subtraction is carried out as per vector concepts 5.3 Vector multiplication is carried out as per vector concepts 5.4 Position of vectors are obtained as per vector concept
6. Apply trigonometry	6.1 ***Trigonometric ratios*** are applied as per trigonometric rules. 6.2 Trigonometric operations are performed as per ***trigonometric rules*** 6.3 Angles of elevation and depression are determined as per trigonometric rules.
7. Apply statistical methods	7.1 ***Statistical raw data*** is organized as per job requirement 7.2 ***Statistical data processing*** is carried out as per job requirement 7.3 Statistical Data results are reported as per job requirement

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range May include but not limited to:
1. Mathematical proportions include but not limited to:	• Direct proportion • Inverse proportion
2. Simultaneous methods include but not limited to:	• Elimination method • Substitution • Graphical method
3. Quadratic methods include but not limited to:	• Factorization • Completing squares method • Quadratic formula
4. Trigonometric ratios May include but not limited to:	• Sine • Cosine • Tangent
5. Trigonometric rules include but not limited to:	• Sine rule • Cosine rule • Tangent rule
6. Binomial theorem includes but not limited to:	• Pascal triangle
7. Statistical raw data include but not limited to:	• Grouped data • Ungrouped data
8. Statistical data processing includes but not limited to:	• Mean • Mode • Median • Standard deviation

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Communication
- Observation
- Interpersonal
- Applying fundamental operations (addition, subtraction, division, multiplication)
- Using and applying mathematical formulas
- Problem solving
- Applying statistics
- Drawing graphs

Required knowledge

The individual needs to demonstrate knowledge of:

- Fundamental operations (addition, subtraction, division, multiplication)
- Types and purpose of measuring instruments
- Units of measurement and abbreviations
- Rounding techniques
- Types of fractions
- Types of tables and graphs
- Presentation of data in tables and graphs
- Vector operations
- Matrix operations
- Data presentation

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills, knowledge and range

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Performed addition and subtraction is as per arithmetic operation rules 1.2 Applied multiplication and division as per arithmetic operation rules 1.3 Applied ratios, mathematical proportions and percentages as per algebraic rules 1.4 Operated indices as per laws of indices 2.1 Solved linear equations as per linear concept 2.4 Solved quadratic equation as per quadratic methods 3.1 Evaluated binomial expression as per mathematical concepts 4.1 Carried out 2x2 matrix operation as per mathematics concept. 5.4 Obtained position of vectors as per vector concept 9.2 Performed trigonometric operations as per trigonometric rules 9.2 Angles of elevation and depression are determined as per trigonometric rules. 10.1 statistical raw data is organized as per job requirement 10.2 Statistical data processing is carried out as per job requirement 10.3 Statistical Data results are reported as per job requirement
2. Resource Implications	The following resources should be provided: 2.1 Appropriately simulated environment where assessment can take place. 2.2. Access to relevant work environment. 2.3.Resources relevant to the proposed activities or tasks.

3. Methods of Assessment	Competency may be assessed through: 3.1 Practical Assessment 3.2 Project-Based Assessment 3.3 Portfolio of Evidence 3.4 Written Assessment
4. Context of Assessment	Competency may be assessed in a workplace or simulated workplace
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.