Unit ID: 897

Domain **FOUNDATION BUILDING SCIENCE AND DRAWING SKILLS**

Title: **Apply knowledge of basic building science in different contexts**

Level: 2 **Credits: 6**

Purpose

This unit standard specifies the competencies required to apply knowledge of basic building science in different contexts. It includes competencies to apply basic knowledge of drawing instruments, SI units (International Standards of units) and calculations, outline the concept of density, outline the concept of pressure, demonstrate basic knowledge of timber, demonstrate knowledge of structure of materials, demonstrate knowledge of procedure to mix, lay and test concrete, demonstrate knowledge of forces and apply polygon of forces to determines magnitude and direction of forces. This unit standard is intended for people requiring basic building science skills as applied in different contexts.

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. Scientific pocket calculators may be used in solving mathematical problems. Basic instruction must be offered in the practical use and operational abilities of the calculator. A comma has to be used for the decimal sign throughout calculations.

6. $g = 10\ m/s^2$ should be taken as the value for gravitational acceleration in all applicable calculations.

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 basic knowledge of drawing instruments, SI units and calculations.

Range

Basic drawing instruments may include but are not limited to a ruler, protractor, flexi (French) curves and divider.

Plane figures may include but are not limited to triangle, square, circle, rectangle, parallelogram, trapezium and rhombus.

Solid figures may include but are not limited to cube, cylinder, rectangular body, sphere, cone, prism and pyramid.

Performance Criteria

1.1 Basic drawing instruments are identified.

1.2 SI units, prefixes and symbols are identified.

1.3 Drawing instruments are correctly used to produce simple drawings.

1.4 Basic calculations using a calculator are performed

1.5 Simple calculations related to areas and volumes of plane and/or solid figurers are performed.

1.6 Conversions regarding length, area and volume are performed

Element 2: Outline the concept of density.

Performance Criteria

2.1 The three phases of matters and examples of each are given.

2.2 Volumes of liquids in differently sized containers are identified.

2.3 Archimedes' principle is applied to determine the volume of solids.

2.4 Terms mass and weight as well as density and relative density are differentiated.

2.5 The relative density of different building materials is calculated.

Element 3: Outline the concept of pressure.

Range

Descriptions for cisterns to include automatic flushing cisterns, anti-Siphonage, lift or suction pump, force pump and diaphragm pump.

Performance Criteria

3.1 Atmospheric pressure and the properties of gasses are described.

3.2 Charles' law and Boyle's law are defined and applied.

3.3 The effect of the depth and density of a liquid on the pressure exerted is described and corresponding calculations are performed.

3.4 Pascal's law is explained using an example.

3.5 The difference between suction head, delivery head and static head is explained.

3.6 Drawings for high and low level siphonic cisterns are sketched and different components are described.

3.7 The siphon to flushing cisterns is applied.

Element 4: Demonstrate basic knowledge of timber.

Performance Criteria

4.1 Different types and parts of woods are identified and their functions are explained.

4.2 Felling and conversion processes and the periods of the year they are taking place are defined.

4.3 Seasoning of timber is explained by stating the reasons for seasoning timber, methods of seasoning timber, advantages and disadvantages of each method and the ideal method for seasoning wood.

4.4 Moisture content is explained by defining parts of wood that contain moisture.

4.5 The importance of the correct moisture content for the various uses of timber is explained and methods of determining the percentage moisture content in wood are identified.

4.6 The causes and effects of expansion and contraction on the different parts of wood are defined.

4.7 Preservation of timber is explained by stating the reasons for preservation of timber, identifying preservation agents and methods of application and stating advantages and disadvantages of preservation materials.

Element 5: Demonstrate knowledge of structure of materials.

Performance Criteria

5.1 Porosity of various building materials is defined.

5.2 The relationship between porosity and density, porosity and strength and porosity and absorption of water or moisture content is defined.

5.3 The term capillarity is explained.

5.4 Materials and their characteristics that can be used as damp-proof course in a building are listed.

5.5 The reasons for installing a damp-proof course in buildings are stated.

5.6 Building industry standards for damp-proofing are described.

5.7 Prevention of dampness in buildings is described with reference to voids in granular materials, bulking of sand and grading of aggregate.

Element 6: Demonstrate knowledge of procedure related to mix, lay and test concrete.

Range

Grading aggregates to include defining components that make up concrete, identifying types of cements, describing the properties of a good coarse aggregate and good concrete, explain the terms water: cement ration and describing the effect of water on concrete, describing the reasons for grading aggregates, describing the specific requirements for the proportions used in the composition of concrete and explaining bulking of sand, grading and particle shape of aggregates.

Performance Criteria

6.1 The concept of grading aggregates is explained.

6.2 The two methods of mixing concrete are described.

6.3 The laying, compacting, curing and transporting of concrete is described.

6.4 Slump test is defined and the procedure to determine the workability of concrete mix and water content of slump is explained.

Element 7: Demonstrate knowledge of forces.

Performance Criteria

7.1 General concepts related to forces are explained.

7.2 Parallel lines are constructed and used to represent forces.

7.3 Wind and compass directions are expressed.

7.4 Parallelogram of forces is defined and the magnitude and direction of the resultant and/or the equilibrant of two co-planar forces acting on the same point are determined using the parallelogram of forces method.

7.5 The triangle of forces is defined and space and vector diagrams of given systems of forces acting on the same point are drawn.

7.6 The application of Bow's notation is indicated by means of a sketch.

7.7 An unknown force in a triangle is determined by applying Bow's notation.

Element 8: Apply polygon of forces to determine magnitude and direction of forces.

Performance Criteria

8.1 Polygon of forces is defined.

8.2 Polygon of forces is used to graphically determine the magnitude and direction of the resultant, equilibrant and unknown force(s) in a system of forces acting on the same point.

8.3 The funicular or equilibrium/link polygon is defined and used to determine the reactions of forces or loads imposed on a beam, and the counter-reactions of the supports.

8.4 The resultant of the forces acting on a simply supported beam is determined using the funicular or equilibrium/link polygon of forces.

Registration Data

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