education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 11

AGRICULTURAL SCIENCES

JUNE 2024

MARKING GUIDELINES

MARKS: 100

These marking guidelines consist of 8 pages.

SECTION A

QUESTION 1

1.1	1.1.1	C ✓		
	1.1.2	D ✓		
	1.1.3	A ✓		
	1.1.4	D ✓		
	1.1.5	A ✓		
	1.1.6	A ✓		
	1.1.7	B ✓		
	1.1.8	C ✓		
	1.1.9	D ✓		
	1.1.10	B ✓	(10 x 1)	(10)
1.2	1.2.1	A only ✓		
	1.2.2	B only ✓		
	1.2.3	B only ✓		
	1.2.4	None ✓		
	1.2.5	Both A and B ✓	(5 x 1)	(5)
1.3	1.3.1	Valence ✓		
	1.3.2	Dispersion ✓		
	1.3.3	Nitrification ✓		
	1.3.4	Chelates ✓		
	1.3.5	Assimilation ✓	(5 x 1)	(5)
1.4	1.4.1	Molecule ✓		
	1.4.2	Saturation ✓		
	1.4.3	Anaerobic ✓		
	1.4.4	pH ✓		
	1.4.5	Mineralisation ✓	(5 x 1)	(5)
			TOTAL SECTION A:	**25**

SECTION B

QUESTION 2

2.1 Organic and inorganic compounds

2.1.1 Identifying TWO isomers

- A ✓ (1)
- C ✓ (1)

2.1.2 Name of the concept

Isomers ✓ (1)

2.1.3 ONE function of structure B

- Universal solvent ✓
- Transports nutrients ✓
- Regulates body temperature ✓
- Necessary for photosynthesis ✓ (Any 1) (1)

2.1.4 The chemical formula of COMPOUND D

$C_6H_{12}O_6$ ✓ (1)

2.2 Uranium

2.2.1 The number of

- **Protons -** 92 ✓ (1)
- **Neutrons -** 146 ✓ (1)
- **Electrons -** 92 ✓ (1)

2.2.2 Differentiate between

- **Mass number -** The number of protons and neutrons in the nucleus ✓ (1)
- **Atomic number -** The number of protons in the nucleus ✓ (1)

2.3 Chemical bonding

2.3.1 TWO types of chemical bonding

DIAGRAM 1 - Covalent bonding ✓ (1)
DIAGRAM 2 - Ionic bonding ✓ (1)

2.3.2 The force that holds electrons together

Electrostatic force ✓ (1)

2.3.3 TWO types of chemical bonding

DIAGRAM 1: Covalent bond - The sharing of electrons ✓ (1)
DIAGRAM 2: Ionic bond - Loss or gain of electrons ✓ (1)

2.4 **Carbon element**

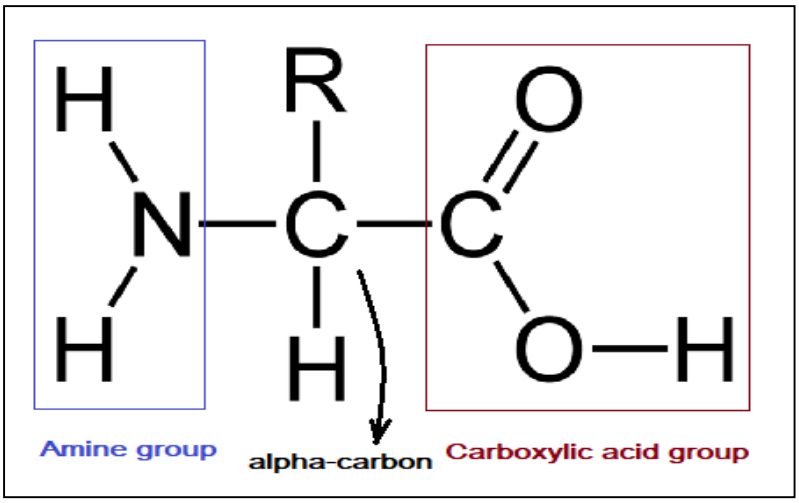
2.4.1 **TWO characteristics of carbon**

- A carbon atom is mostly bonded to hydrogen, oxygen, nitrogen, sulphur or more carbon atoms ✓
- Carbon has four valence electrons ✓
- Carbon chains are formed due to its ability to bond with itself ✓
- Carbon is able to catenate ✓
- It plays an important role in the chemistry of life ✓
- Radioactive carbon (^{14}C) decays to form nitrogen ✓ (Any 2) (2)

2.4.2 **ONE element (gas) that results from decay of radioactive carbon**

Nitrogen ✓ (1)

2.5 **Basic structure of an amino acid**



MARKING GUIDELINES

- Correct drawing ✓
- Amine group and carboxylic acid group ✓
- Bonding ✓ (3)

2.6 **TWO differences between**

SATURATED FATTY ACIDS

- Animal origin ✓
- Solid at room temperature ✓
- Higher melting point ✓
- Increases cholesterol levels ✓
- Have single bonds between carbon atoms ✓ (Any 2) (2)

UNSATURATED FATTY ACIDS

- Plant origin ✓
- Liquid at room temperature ✓
- Lower melting point ✓
- Decreases cholesterol level in the blood ✓
- Single or double bonds between carbon atoms ✓ (Any 2) (2)

[25]

QUESTION 3:

3.1 Soil profile

3.1.1 Indication of the soil horizons

(a) Wet soil - DIAGRAM B ✓ (1)

(b) Adult soil - DIAGRAM A ✓ (1)

3.1.2 ONE characteristic of B-horizon

- Where material from horizons A and E accumulates/high concentration of clay ✓
- A horizon that forms through eluviation ✓ (Any 1) (1)

3.1.3 TWO horizons that form part of substrate

- C ✓
- R ✓ (2)

3.2 Choosing a field method of determining soil texture

3.2.1 The sausage of soil nearly bends into a circle

Sandy clay ✓ (1)

3.2.2 The sausage of soil bends into a circle

Clay ✓ (1)

3.2.3 The sausage of soil bends readily before cracking

Sandy clay loam ✓ (1)

3.2.4 The soil cannot form a sausage

Sand ✓ (1)

3.2.5 The sausage of soil cracks easily on bending

Sandy loam ✓ (1)

3.3 Soil colour

3.3.1 TWO soil colour

- **SOIL A -** Red soil ✓ (1)
- **SOIL B -** Mottled soil ✓ (1)

3.3.2 Identification of the non-homogenous colour

COLUMN B ✓ (1)

3.3.3 TWO characteristics of a grey coloured soil

- Lack of iron ✓
- Absence/shortage of oxygen ✓
- Poorly aerated ✓
- Waterlogged/excess of water ✓ (Any 2) (2)

3.4 **Soil water**

3.4.1 **Calculating the moisture content (%)**

- *% moisture = moist soil mass – dry soil mass x 100*
  Dry soil mass
- 50 g -120 g x 100 ✓
  30 g
- = 25 ✓ % ✓ (3)

3.4.2 **Definition of field water capacity**
The amount of water that remains in the soil ✓ after all the soil pores were fully saturated with water ✓ (2)

3.5 **Soil colloids**

3.5.1 **Scientific name for the soil colloid**
Clay material/inorganic soil colloid ✓ (1)

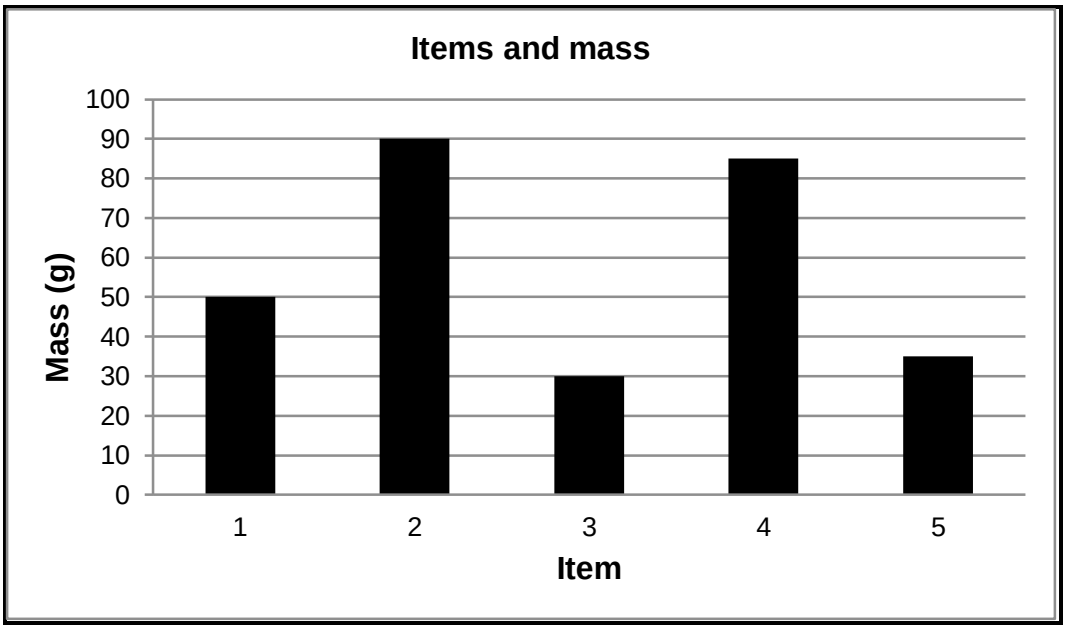
3.5.2 **Indication of the**
Shape - Layered structure and consists of flat platelets ✓ (1)
Electrical charge - Negative electrical charge ✓ (1)

3.5.3 **Explanation of cation exchange capacity (CEC) in the soil**
Cations which are adsorbed on the surface of a soil colloid can be exchanged ✓ this exchange process takes place between the cations which are predominate on the soil colloid ✓ (2)
[25]

QUESTION 4: SOIL ORGANIC MATTER

4.1 Bar graph

4.1.1 Bar graph to show the items and mass



CRITERIA/RUBRIC/MARKING GUIDELINES

- Correct heading with both variables ✓
- X-axis: Correctly calibrated with label (Item) ✓
- Y-axis: Correctly calibrated with label (Mass) ✓
- Correct units (g) ✓
- Bar graph ✓
- Accuracy (80% + correctly plotted) ✓ (6)

4.2 Soil acidity

4.2.1 Identifying the condition

Soil acidity/acidification ✓ (1)

4.2.2 TWO factors that may have influenced soil acidity

- Acid rain ✓
- Carbon dioxide from roots and decomposition ✓
- High rainfall ✓
- Oxidation of sulphides ✓ (Any 2) (2)

4.2.3 TWO methods of preventing soil acidity/acidification

- Apply agricultural lime ✓
- Increase the soil pH ✓
- Improve soil structure ✓ (Any 2) (2)

4.3 **Organic matter in the soil**

4.3.1 **Classification of the living organism in PICTURE B**
Bacteria/micro-organism ✓ (1)

4.3.2 **Reason for the answer**
It is very small/can only be seen through a microscope ✓ (1)

4.3.3 **TWO requirements of living organisms**
- Soil fertility ✓
- Soil moisture ✓
- Soil temperature ✓
- Soil air and aeration ✓
- Light ✓
- Soil pH ✓
- Food and energy supply ✓ (Any 2) (2)

4.4 **The nutrient cycle**

4.4.1 **Identification of the processes**
1 - Photosynthesis ✓ (1)
2 - Anabolism/metabolism ✓ (1)
3 - Decomposition/catabolism ✓ (1)

4.4.2 **Identification of the type of nutrient cycle**
The carbon cycle ✓ (1)

4.4.3 **The form in which the substance is absorbed by plants**
The gas form ✓ (1)

4.5 **Organic matter in the soil**

4.5.1 **TWO practices that will boost the organic matter content**
- Plant cover crops ✓
- Application of compost ✓
- Minimum tillage ✓ (Any 2) (2)

4.5.2 **TWO chemical effects of the decline in organic matter**
- Decrease in the release of carbon dioxide ✓
- Less N, P and S is released ✓
- There are more oxygen in the soil ✓
- Soil fertility is lower ✓ (Any 2) (2)

4.5.3 **Effect of monoculture on the organic matter content**
The organic matter content will be lower ✓ (1)
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TOTAL SECTION B: 75
GRAND TOTAL: 100