



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2019

**AGRICULTURAL SCIENCES P1
MARKING GUIDELINE**

MARKS: 150

This marking guideline consists of 9 pages.

SECTION A**QUESTION 1**

- 1.1 1.1.1 B ✓✓
1.1.2 D ✓✓
1.1.3 B ✓✓
1.1.4 D ✓✓
1.1.5 B ✓✓
1.1.6 C ✓✓
1.1.7 D ✓✓
1.1.8 A ✓✓
1.1.9 B ✓✓
1.1.10 C ✓✓ (10 x 2) (20)
- 1.2 1.2.1 B only ✓✓
1.2.2 None ✓✓
1.2.3 A only ✓✓
1.2.4 Both A and B ✓✓
1.2.5 A only ✓✓ (5 x 2) (10)
- 1.3 1.3.1 Non-essential ✓✓
1.3.2 Lactose ✓✓
1.3.3 Adsorption ✓✓
1.3.4 Permanent Wilting Point ✓✓
1.3.5 Scraping ✓✓ (5 x 2) (10)
- 1.4 1.4.1 Structural ✓
1.4.2 E-horizon ✓
1.4.3 Imbalance ✓
1.4.4 Humus ✓
1.4.5 Binomial ✓ (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B**QUESTION 2: BASIC AGRICULTURAL CHEMISTRY****2.1 Atomic structure**

- 2.1.1 **Identification of the structure**
Atom ✓ (1)
- 2.1.2 **THREE reasons visible in the diagram to support the answer**
- Presence of protons ✓
 - Presence of neutron ✓
 - Presence of electrons ✓
 - Presence of orbital ✓
- (Any 3 x 1) (3)
- 2.1.3 **Indication of the charge of parts**
A – Negative ✓
C – No charge ✓ (2)
- 2.1.4 **Naming the type of ion that will be formed**
(a) Cation ✓ (1)
(b) Anion ✓ (1)

2.2 Chemical bonding

- 2.2.1 **Identification of the chemical bonding**
A – Covalent bond ✓
B – Ionic bond ✓ (2)
- 2.2.2 **Reason for the bonding**
A – Atoms share a pair of bonding electrons ✓
B – Electrons are transferred from one atom to the other ✓ (2)
- 2.2.3 **Importance of the compound A in:**
(a) **Agricultural industry** – Used in the manufacture of fertilisers ✓ (1)
(b) **Household** – Used as a cleaning product ✓ (1)

2.3 Amino acids

- 2.3.1 **Naming of the structures**
Amino acids ✓ (1)
- 2.3.2 **Bond linking structures A and B**
Peptide bond ✓ (1)
- 2.3.3 **Naming the reaction when water is removed when amino acids are joined**
Condensation ✓ (1)

2.3.4 **TWO groups making amino acids**
 Amino group ✓
 Carboxyl group ✓ (2)

2.3.5 **Naming of the compound**
 Protein ✓✓ (2)

2.3.6 **THREE reasons for the importance of proteins**

- Important for growth ✓
- Responsible for the repair of muscles and tissues ✓
- Production of enzymes and hormones ✓
- Production of antibodies ✓
- Involved in the process of cell signalling ✓
- Transports other substances in the body ✓

(Any 3 x 1) (3)

2.4 Carbohydrates

2.4.1 **Classification of the food**
Food A – Polysaccharides ✓
Food B – Disaccharide ✓ (2)

2.4.2 **Chemical formula of the class of food B**
 $C_{12}H_{22}O_{11}$ ✓✓ (2)

2.4.3 **THREE functions of carbohydrates in animals**

- Source of energy for the functioning of animals ✓
- Ensures normal functioning of the digestive system ✓
- Fattening of animals ✓
- Helps to regulate blood glucose ✓
- Breaks down fatty acids and prevents ketosis ✓

(Any 3 x 1) (3)

2.5 Fats and oils

2.5.1 **Tabulation of TWO differences between fats and oils**

Fats	Oils
Solid at room temperature ✓	Liquid at room temperature ✓
High melting point ✓	Low melting point ✓
Contain saturated fatty acids ✓	Contain unsaturated fatty acids ✓

(Any 2 x 2) (4)

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QUESTION 3: SOIL SCIENCE

3.1 Soil texture

3.1.1 Identification of the methods determining texture

Diagram A – Sieve method ✓

Diagram B – Feeling/sausage method ✓

(2)

3.1.2 Prediction of the texture that will remain on top of the sieve

Sand/course texture ✓

(1)

3.1.3 Texture illustrated in method B

Clay ✓

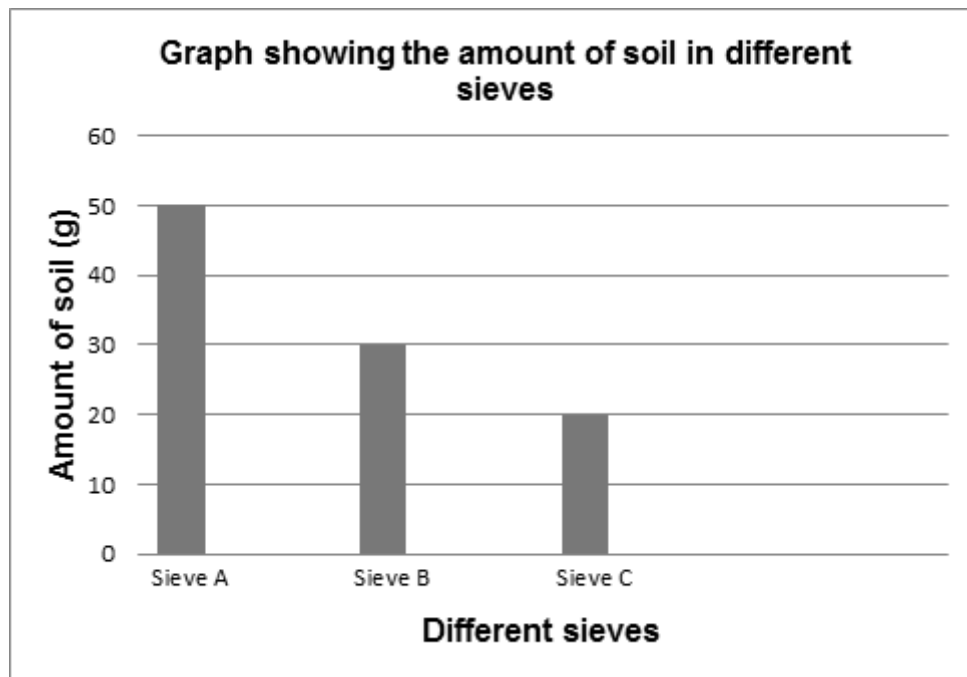
(1)

3.1.4 Reason for the clay texture

It formed a stable ring ✓ without cracks ✓

(2)

3.1.5 Graph



Criteria/rubric/markings guideline

- Correct heading ✓
- X-axis: Correctly calibrated and labelled (Sieves) ✓
- Y-axis: Correctly calibrated and labelled (Amount of soil) ✓
- Bar graph ✓
- Correct unit (g) ✓
- Accuracy ✓

(6 x 1) (6)

3.2 Soil structure

3.2.1 TWO factors influencing aggregation of particles into a structure

- Colloidal matter ✓
- Type of clay mineral present ✓
- Climate ✓
- Alternate moisture and drought ✓
- Plant roots ✓
- Microbial gum ✓
- Iron oxides ✓
- Clay ✓
- Organic matter ✓

(Any 2 x 1) (2)

3.2.2 TWO methods to improve poor soil structure

- Increase organic content of the soil ✓
- Avoid soil disturbances when it is wet or dry ✓
- Plant cover to protect soil from raindrops ✓
- Minimum tillage ✓

(Any 2 x 1) (2)

3.3 Soil moisture

3.3.1 Identification of the water loss

- B** – Transpiration ✓
C – Soil surface evaporation ✓
G – Run off ✓

(3)

3.3.2 Justification of minimising use of nitrogen fertiliser in controlling transpiration

Nitrogen fertilisers increase the leaf surface ✓ and the more the leaves, the more water is lost ✓

(2)

3.3.3 Indication of the letter representing prevention of water loss

- (a) G ✓
(b) C ✓

(1)

(1)

3.3.4 Identification of the movement of water

Capillarity ✓

(1)

3.3.5 Reason for a capillary movement

Water moves upward ✓

(1)

3.4 Soil colour

Indication of factor leading to soil colour

- (a) **Red** – Oxidised iron in the presence of less water and enough oxygen ✓
- (b) **Black/dark** – Presence of organic matter ✓
- (c) **Yellow** – Oxidised iron in the presence of excess water and less oxygen ✓
- (d) **Mottled** – Waterlogging for the part of the year ✓ (4 x 1) (4)

3.5 Soil temperature

Indication of whether the process is a physical, chemical or biological effect of soil temperature

- 3.5.1 Chemical ✓
- 3.5.2 Biological ✓
- 3.5.3 Physical ✓ (3 x 1) (3)

3.6 Calculation of bulk density

$$BD = \frac{\text{Mass of dry soil g}}{\text{Volume of dry soil m}^3} \checkmark$$

$$= \frac{375 \text{ g}}{250 \text{ m}^3} \checkmark$$

$$= 1,5 \text{ g/m}^3 \checkmark \quad (3)$$

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QUESTION 4: SOIL SCIENCE

4.1 Soil horizons

4.1.1 Identification of the labels

- 1 – A horizon ✓
- 2 – Humic A ✓
- 3 – Unconsolidated/unhardened rock ✓
- 4 – R horizon ✓
- 5 – B horizon ✓ (5)

4.1.2 Letter representing horizon enriched with eluvial material

- 5 ✓ (1)

4.1.3 Letters representing TWO horizons that were the last to develop

- 1 ✓
- 5 ✓ (2)

4.2 Procedure when classifying the soil in a sequence

- Demarcate master horizons ✓
 - Identify diagnostic horizons ✓
 - Establish soil form ✓
 - Identify soil series characteristics ✓
 - Establish soil family ✓
- (5)

4.3 Soil acidity and alkalinity**4.3.1 Cation predominant in soils**

- A – Hydrogen ✓
B – Sodium / potassium ✓
- (2)

4.3.2 TWO factors influencing alkalinity

- Sodium adsorbed on soil colloids ✓
 - Carbonates and bicarbonates ✓
 - Irrigation with water rich in sodium ✓
 - Leaking of dams brings soluble salts to the surface ✓ (Any 2 x 1)
- (2)

4.3.3 THREE effects of acidity on plant growth

- Toxic quantities of aluminium occur which is detrimental to plant growth ✓
 - Phosphorus becomes fixated ✓
 - Solubility of molybdenum decreases ✓
 - Very few exchangeable calcium and magnesium ✓ (Any 3 x 1)
- (3)

4.3.4 Choosing the substance to correct acidity and alkalinity

- (a) **A/acidity** – CaCO_3 ✓
(b) **B/alkalinity** – NaSO_4 ✓
- (2)

4.4 Soil micro-organisms**4.4.1 Naming of the bacteria used by learners in an experiment**

- Rhizobium bacteria ✓
- (1)

4.4.2 Reason

- A pea plant is a legume crop ✓ and therefore rhizobium bacteria live on the roots of legume crop and fix nitrogen for them ✓
- (2)

4.4.3 Nutrient cycled during the experiment

- Nitrogen ✓
- (1)

4.4.4 TWO requirements of the bacteria

- Organic nutrients ✓
- Mineral nutrients ✓
- Soil moisture close to field water capacity ✓
- Free oxygen for respiration ✓
- Optimum temperature ✓
- Optimum pH ✓

(Any 2 x 1) (2)

4.4.5 Commenting on the effect of the bacteria on the pea plant

- Pea plant inoculated with bacteria shows improved growth and production ✓ than pea plant grown under normal conditions. ✓

(2)

4.5 Organic matter**4.5.1 TWO chemical effects of organic matter on soil**

- Increased cation adsorption capacity (CAC) ✓
- Increased supply of accessible nitrogen compound in soil ✓
- More plant nutrients are released ✓
- Faster chemical reactions occurring in soil ✓

(Any 2 x 1) (2)

4.5.2 THREE factors affecting the balance between gains and losses of organic matter in soils

- Soil water content ✓
- Climate/Temperature ✓
- Topography ✓
- Soil texture ✓
- Type of vegetation/plant ✓
- Human activities/tillage ✓

(Any 3 x 1) (3)

[35]**TOTAL SECTION B: 105**
GRAND TOTAL: 150