



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2018

**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 | A ✓✓ | | |
| | 1.1.4 | D ✓✓ | | |
| | 1.1.5 | C ✓✓ | | |
| | 1.1.6 | C ✓✓ | | |
| | 1.1.7 | B ✓✓ | | |
| | 1.1.8 | A ✓✓ | | |
| | 1.1.9 | C ✓✓ | | |
| | 1.1.10 | B ✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | B only ✓✓ | | |
| | 1.2.2 | A only ✓✓ | | |
| | 1.2.3 | None ✓✓ | | |
| | 1.2.4 | Both A and B ✓✓ | | |
| | 1.2.5 | A only ✓✓ | (5 x 2) | (10) |
| 1.3 | 1.3.1 | Molecule ✓✓ | | |
| | 1.3.2 | Hydrogenation ✓✓ | | |
| | 1.3.3 | Porosity ✓✓ | | |
| | 1.3.4 | Soil profile ✓✓ | | |
| | 1.3.5 | Mottled ✓✓ | (5 x 2) | (10) |
| 1.4 | 1.4.1 | Mixture ✓ | | |
| | 1.4.2 | Capillary ✓ | | |
| | 1.4.3 | Soil form ✓ | | |
| | 1.4.4 | Colloid ✓ | | |
| | 1.4.5 | Mineralisation ✓ | (5 x 1) | (5) |

TOTAL SECTION A: 45

SECTION B**QUESTION 2: BASIC AGRICULTURAL CHEMISTRY****2.1 Periodic table****2.1.1 Completion of the table**

- (a) 3 ✓
- (b) 63,5 ✓
- (c) 12 ✓
- (d) 24 ✓
- (e) 2 ✓
- (f) 20 ✓ (6)

2.1.2 Common characteristic of elements in

- (a) Period They have the same number of atomic orbitals/
electron shell ✓ (1)
- (b) Group Have the same number of electrons in their outer
orbital ✓ (1)

2.1.3 Difference between halogens and noble gases regarding chemical reactivity

- Halogens/group 17** They are very chemically reactive ✓
- Noble gases/group 18** They are chemically inactive gases ✓ (2)

2.1.4 Reason for a difference in halogen and noble gases

- Halogens** They require one electron to fill their outer shell ✓
- Noble gases** They have a full outer shell ✓ (2)

2.2 Structural formula of compounds**2.2.1 Indication of the functional group**

- (a) A: Hydroxyl/OH ✓ (1)
- (b) C: Carboxyl/ COOH ✓ (1)

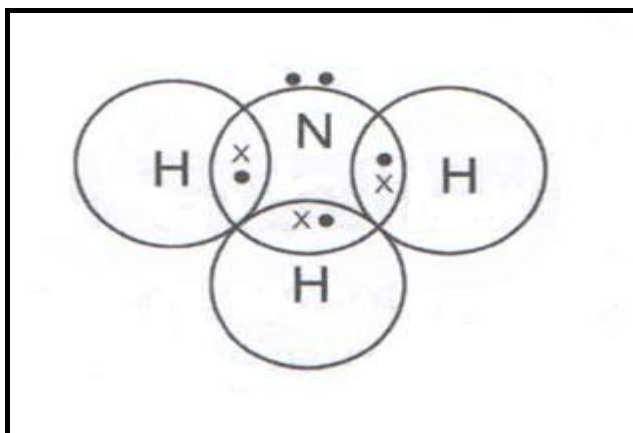
2.2.2 Chemical formula of methanoic

H ✓. COOH ✓ (2)

2.2.3 THREE protective roles of ethane in plants

- It is found in cuticle and therefore protects plants against water loss ✓
- Protects against bacteria, fungi and harmful insects ✓
- Prevents the leaching of minerals during irrigation or rainy days ✓ (3)

2.2.4 Lewis structure of ammonia



Criteria to mark Lewis structure

- Correct elements (H) ✓
 - Correct element (N) ✓
 - Correct number of valence electrons ✓
 - Correct bonding ✓
- (4)

2.2.5 Comparing compound A and B based on structural formula

- | | | |
|---------------------------|---|-----|
| Compound A/ethanol | one hydrogen atom is replaced by a hydroxyl/ OH ✓ | |
| Compound B/ethane | two carbons and six hydrogen atoms combine ✓ | (2) |

2.3 Pyramid of organic compounds

2.3.1 Naming of the organic compound

- | | | |
|----|----------------|-----|
| A: | Carbohydrate ✓ | |
| C: | Protein ✓ | (2) |

2.3.2 Indication of the building block of the compound

- | | | |
|---|---------------------------|-----|
| C | Amino acid ✓ | |
| D | Fatty acid and glycerol ✓ | (2) |

2.3.3 Distinction between simple and complex protein

- Simple proteins are proteins which yield only amino- acids when broken down ✓
 - Complex proteins are simple proteins combined with a non-protein material ✓
- (2)

- 2.3.4 **TWO reasons why compound B is important.**
- Source of energy ✓
 - Forms structural material in plants ✓
 - Provides fibre for the functioning of digestive system ✓
(Any 2)
- (2)
- 2.3.5 **Indication of compound in D as saturated or unsaturated**
Unsaturated ✓
- (1)
- 2.3.6 **Reason**
It has a double bond between carbon atoms ✓
- (1)

[35]**QUESTION 3: SOIL SCIENCE**

- 3.1 3.1.1 **Identification of the structure labeled A**
Prism-like structure
- (1)
- 3.1.2 **THREE malpractices leading to the destruction of structure**
- Excessive cultivation/tillage accelerates the decomposition of organic matter ✓
 - Cultivation of wet soil increases compaction ✓
 - Removal of plant residue prevent building up of organic matter ✓
 - Overgrazing reduces soil organic matter ✓
 - Use of heavy material lead to soil compaction ✓
 - Practising flood irrigation ✓
- (Any 3) (3)
- 3.1.3 **TWO ways to prevent compaction in structure C**
- Application of organic content on soil ✓
 - Reducing tillage/minimum tillage ✓
 - Mulching/soil cover ✓
 - Avoid tillage when the soil is wet ✓
- (Any 2) (2)
- 3.1.4 **Comparing with a reason the structure B and D regarding suitability for cultivation**
- Structure B** Suitable for cultivation ✓ because the peds are softer and more porous ✓
- (2)
- Structure D** Not suitable for cultivation ✓ because it has a limited permeability ✓
- (2)
- 3.2 **Indication of the method to determine soil texture**
- 3.2.1 Texture diagram ✓
- (1)
- 3.2.2 Laser diffraction ✓
- (1)
- 3.2.3 Settling columns ✓
- (1)

3.3 Influence of clay and sand on soil characteristics

3.3.1 **Chemical reactivity** Clay has a larger surface area for chemical reactions because particles are small ✓
Sand has a small surface area for chemical reaction due to bigger particles ✓ (2)

3.3.2 **Fertility** Clay is more fertile because it has a higher cation adsorption capacity ✓
Sand soil is less fertile due to low organic matter and low cation adsorption capacity ✓ (2)

3.3.3 **Erodability** Clay particles are bound together and not easily eroded ✓
Sandy soil is light and loose therefore easily eroded ✓ (2)

3.4 Soil temperature

3.4.1 **Explanation of the trend in soil temperature**
Gradual increase of temperature from 10 hours until it reaches the peak at 28 hours ✓ and declines afterwards ✓ and stabilises from 45–60 hours ✓ (2)

3.4.2 **Table:**
The table showing soil temperature ranges over 60 hours

HOURS	SOIL TEMPERATURE °C
10	23
20	41
30	46
40	44
50	35
60	35

Criteria/rubric/markings guidelines:

- Correct heading ✓
- Table ✓
- Hours and soil temperature ✓
- Correct unit (°C) ✓
- Accuracy of values for hours column ✓
- Accuracy of values for the temperature column ✓ (6)

3.4.3 TWO ways to manipulate temperature other than mulch

- Managing soil moisture content/Irrigation and draining soil ✓
 - Clear plastic cover ✓
 - Shading ✓
 - Controlled environment/greenhouse ✓
 - Tillage practices like deep or shallow ploughing to allow more air circulation
- (Any 2) (2)

3.5 Soil air**3.5.1 Deduction of TWO factors influencing storage and movement of soil air from the scenario**

- Soil condition ✓
 - Soil depth ✓
 - Pore size distribution/porosity ✓
- (Any 2) (2)

3.5.2 Comparison between oxygen and carbon dioxide in soil with those in the atmosphere

Soil air contains a much greater proportion of CO₂ than atmospheric air ✓

Level of oxygen in soil air is less than the oxygen level in the atmosphere ✓

(2)

3.5.3 Relationship between porosity and bulk density

The higher the bulk density ✓ the lesser the pore space ✓

OR

The lower the bulk density ✓ the more the pore space ✓

(2)

[35]

QUESTION 4: SOIL SCIENCE**4.1 Soil horizontal layers****4.1.1 Identification of the letter representing the horizon**

- (a) D ✓
 (b) E ✓
 (c) C ✓
 (d) B ✓ (4)

4.1.2 Soil profiles

- (a) Wet soil
 $\frac{A}{G}$ OR $\frac{O}{G}$ ✓✓ (2)
 $\frac{C}{C}$
- (b) Eroded soil
 $\frac{B}{C}$ ✓✓ (2)

4.2 Soil classification**4.2.1 THREE reasons for soil classification**

- Determining the crop production potential of soil ✓
- Improved soil science communication ✓
- Optimal utilization of country's natural resources ✓
- Valuation of soil ✓
- Scientific planning of a farm ✓
- Development of new regions ✓ (Any 3) (3)

4.2.2 Categories of a binomial soil classification system

- Soil form ✓
- Soil family/soil series ✓ (2)

4.2.3 TWO visible characteristics showing Vertic A horizon

- Strongly developed structure/blocky ✓
- Sticky when wet ✓
- Large cracks ✓
- High plasticity index ✓
- Dark-coloured or red ✓ (Any 2) (2)

4.3 Cation adsorption**4.3.1 Type of acidity in colloid A**

Reserve acidity ✓ (1)

4.3.2 Reason for the reserve acidity

Hydrogen cation ✓ are adsorbed on the surface of colloid ✓ (2)

- 4.3.3 **TWO factors causing acidity**
- Carbon dioxide dissolving in water ✓
 - Application of nitrogen fertilisers containing ammonium ✓
 - Fertilisers containing sulphur which add a hydrogen ✓
 - Acid rain ✓
 - High rainfall leaching basic cations ✓
- (Any 2) (2)

- 4.3.4 **Justification of the brackishness**
Sodium cation ✓ are adsorbed on the colloid ✓ (2)

- 4.3.5 **Chemical substance to reclaim brackishness**
Gypsum ✓ (1)

4.4 Nutrient cycle

- 4.4.1 **Identification of the nutrient cycle**
Carbon cycle ✓ (1)

- 4.4.2 **Processes in A and C**
A – Photosynthesis ✓ (2)
C – Feeding ✓

- 4.4.3 **Indication of the processes in D**
Combustion ✓ (1)

- 4.4.4 **Role of soil organisms in the cycle**
They break down plant and animal remains ✓ to release carbon dioxide into the atmosphere to continue with the cycle ✓ (2)

4.5 Scenario on organic matter content

- 4.5.1 **Identification of farmer with**
(a) **High organic matter content** – Farmer B ✓
(b) **Low organic matter content** – Farmer A ✓ (2)

- 4.5.2 **Explanation of how soil tillage can impact on the level of organic matter content**
Tillage stimulates soil microbes ✓ which feed on the organic matter and therefore lowers organic matter content on soil ✓ (2)

- 4.5.3 **TWO physical effects of high organic matter content on soil**
- Compaction is prevented ✓
 - Soil is well drained/aerated ✓
 - Soil is less susceptible to erosion ✓
 - Improved water absorption ✓
 - Increased water – holding capacity ✓
 - Soil becomes warmer as it absorbs more heat ✓
 - Soil is less inclined to swell when wet ✓
 - Soil cultivates easily ✓
- (Any 2) (2)

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TOTAL SECTION B: 105
GRAND TOTAL: 150