Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2016

AGRICULTURAL SCIENCES P1 MEMORANDUM

MARKS: 150

This memorandum consists of 9 pages.

SECTION A

QUESTION 1

1.1	1.1.1	C √√		
	1.1.2	D √√		
	1.1.3	C √√		
	1.1.4	A √√		
	1.1.5	B √√		
	1.1.6	B √√		
	1.1.7	D √√		
	1.1.8	A √√		
	1.1.9	D √√		
	1.1.10	C √√	(10 x 2)	(20)
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 2)	(10)
1.3	1.3.1	Sucrose √√		
	1.3.2	Periodic table √√		
	1.3.3	Bulk density √√		
	1.3.4	Mottled √√		
	1.3.5	Alkalinity √√	(5 x 2)	(10)
1.4	1.4.1	Covalent bonding √		
	1.4.2	Field water capacity √		
	1.4.3	G-horizon √		
	1.4.4	Immobilisation √		
	1.4.5	Acidity √	(5 x 2)	(10)

TOTAL SECTION A: 45

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SECTION B

QUESTION 2: BASIC AGRICULTURAL CHEMISTRY

2.1 2.1.1 **Identification of compound**
Sodium chloride √ (1)

2.1.2 **Indication of health benefit of sodium chloride**
It inhibits the growth of bacteria √ (1)

2.1.3 **Naming of the parts**
A – Nucleus √
B – Shell/orbit/energy level √
C – Electron √ (3)

2.1.4 **Indication of the group of the elements**
Na – Alkali metals/group 1 √
Cl – Halogens/group V11 √ (2)

2.1.5 **TWO common characteristics of elements in group 17**
- They are electron acceptors. √
- They are chemically reactive √
- Usually poisonous √ (Any 2 x 1) (2)

2.2 **Carbohydrates**

2.2.1 **Disaccharide formed from glucose and fructose**
Sucrose √ (1)

2.2.2 **Disaccharide formed from glucose and galactose**
Lactose √ (1)

2.2.3 **Chemical formula for sucrose and lactose**
$C_{12}H_{22}O_{11}$ √√ (2)

2.2.4 **Importance of starch:**
(a) Racing – It provides energy to animals. √
(b) Selling – It fattens animals. √ (2)

2.3 **Compounds in agriculture**

2.3.1 **Classification of compounds A and C**
A – Organic compound √
C – Inorganic compound √ (2)

2.3.2 **Name of the fatty acid A and B**
A – Unsaturated fatty acid √
B – Saturated fatty acid √ (2)

2.3.3 **Letter representing a fatty acid**
(a) B √
(b) A √ (2)

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2.3.4 **TWO importance of compound C**

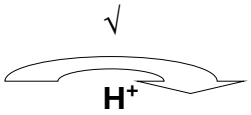
- Acts as a solvent. √
- Facilitates chemical reactions. √
- Acts as a transport medium. √
- It regulates temperature. √
- Main source of hydrogen and oxygen. √
- 80–90% of all living material consists of water. √ (Any 2 x 1) (2)

2.4 **Chemical formula of substances**

2.4.1 **Identification of chemical formula**

(a) Alkali – NaOH √
(b) Acid – HCl √ (2)

2.4.2 **Chemical reaction when HCl dissolves in water**



$HCl + H_2O$ √ $\longrightarrow Cl^- + H_3O^+$ √
(Acid) (water) (chloride) (hydronium ion) (3)

2.5 **Products displayed**

2.5.1 **Identification of the functional group of products A and B.**

Product A and B – Hydroxyl group/OH √ (1)

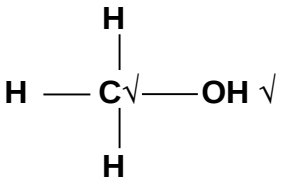
2.5.2 **Scientific name of both products**

Product A – Ethanol √
Product B – Methanol √ (2)

2.5.3 **Identification of product ideal for heating**

Product B √ (1)

2.5.4 **Structural formula of product B**



(2)

2.5.5 **Scientific name of an oxidised ethanol**

Ethanoic acid √ (1)

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QUESTION 3: SOIL SCIENCE

3.1 Soil structure

3.1.1 Identification of the structure

A – Prism-like structure √
D – Platy structure √ (2)

3.1.2 Indication of the letter representing the structure

(a) C √
(b) D √ (2)

3.1.3 Structure recommended for crop production

B √ (1)

3.1.4 THREE reasons for structure recommended

- Improved root penetration √
- Greater water infiltration/retention and availability √
- Improved biological activity √
- Improved organic matter content √
- Improved emergence of seedlings √
- Reduced soil crusting √
- Reduced erosion √ (Any 3 x 1) (3)

3.2 Soil texture

3.2.1 Identification of soil texture

Sample A – Sandy soil √
Sample C – Clay soil √ (2)

3.2.2 ONE reason for each structure identified

<u>Sample A – Sandy</u>

- More macro-pores √
- Less micro-pores √
- High drainage and percolation √ (Any 1 x 1) (1)

<u>Sample C – Clay</u>

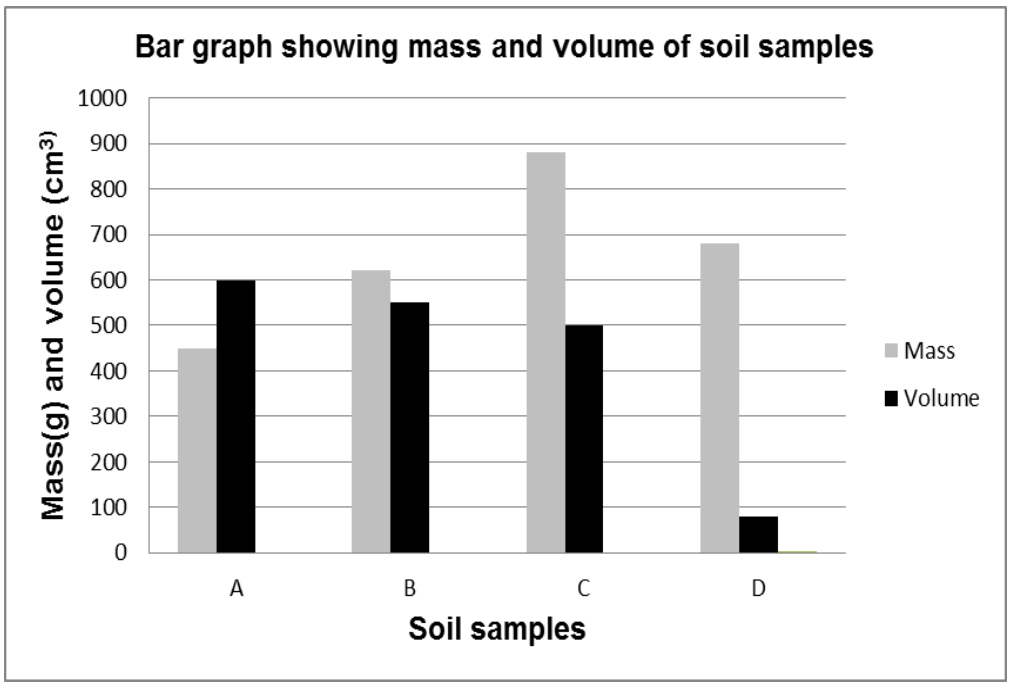
- Less macro-pore √
- More micro-pores √
- No drainage and percolation √ (Any 1 x 1) (1)

3.2.3 Letter representing the sample influencing soil characteristics.

(a) Sample C √
(b) Sample A √
(c) Sample C √
(d) Sample A √ (4)

3.3 Bulk density of soil samples

3.3.1 Bar graph



Marking graph with the following checklist

	Criteria	Yes: 1 mark	No: 0 mark
1.	Bar graph	1	0
2.	Y-axis labelled	1	0
3.	X-axis labelled	1	0
4.	Points correctly plotted	1	0
5.	Correct heading	1	0
6.	Units	1	0

(6)

3.3.2 Identification of undisturbed soil

Soil A √ (1)

3.3.3 TWO reasons

- Has a lower bulk density √
- Has a higher percentage of pore space √ (2)

3.3.4 Calculation of bulk density

$$\text{Bulk density} = \frac{\text{Mass (g)}}{\text{Volume (cm}^3\text{)}} \quad \surd$$

$$= \frac{880 \text{ g}}{500 \text{ cm}^3} \quad \surd$$

$$= 1{,}76 \text{ g/cm}^3 \surd$$

(3)

3.4 **Soil gases**

3.4.1 Carbon dioxide √ (1)

3.4.2 Nitrogen √ (1)

3.4.3 Oxygen √ (1)

3.5 **Indication of plant response to different soil water conditions**

3.5.1 Plants will die √ (1)

3.5.2 Plants will grow optimally √ (1)

3.5.3 Plants will wither √ (1)

3.5.4 Plants will die √ (1)

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QUESTION 4: SOIL SCIENCE

4.1 Soil morphology

4.1.1 Determination of age of the soil
Matured/old soil √ (1)

4.1.2 Reason
- Horizons are clearly differentiated. √√
- Significantly developed soil profile. √√ (Any 1 x 2) (2)

4.1.3 Soil profile

O
A
B
C

OR

O
A
B
C

√√ (2)

4.1.4 Indication of the letter representing a horizon
(a) C √ (1)

(b) B √ (1)

4.1.5 TWO diagnostic horizons of the horizon labelled B
- Humic √
- Vertic √
- Melanic √
- Orthic √ (Any 2 x 1) (2)

4.2 Cation adsorption

4.2.1 Identification of the form of acidity
Labelled A – Reserve acidity √
Labelled B – Active acidity √ (2)

4.2.2 Justification
Reserve acidity – Hydrogen ions are bound onto soil colloid. √
Active acidity – Hydrogen ions are concentrated on soil solution. √ (2)

4.2.3 Indication of the letter representing acidity that have an effect on plant
B √ (1)

4.2.4 Reason
Plants use plant nutrients dissolved in soli solution. √ (1)

4.2.5 Appropriate term for ability of soil to exchange cations
Cation exchange capacity √ (1)

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4.3 **Sodic and saline soils**

Comparing sodic and saline soils

			SODIC SOIL	SALINE SOIL	
4.3.1	(a)	Dominant salts	Sodium carbonates√	Chloride and sulphates of sodium, calcium, magnesium √	(2)
	(b)	Colour	Black √	White √	(2)

4.3.2 **Exchange reaction of sodic soils √**

☐ **Na^+ √ + $CaSO_4$** √ ☐ **Ca^{2+} + $NaSO_4$** √ (3)

4.4 **TWO ways the soil benefit from breaking down of plant and animal residue**

- The decay process √ releases nutrients to the soil. √
- Formation of humus √ leads to improved soil structure. √ (4)

4.5 **Processes during nitrogen cycle**

4.5.1 **Identification of the processes**

A Assimilation √
B Denitrification √
C Nitrification √
D Mineralisation √ (4)

4.5.2 **Soil conditions favouring denitrification**
Wet conditions √ (1)

4.6 **Organic matter**

4.6.1 **THREE practices leading to the decline of organic matter**

- Intensive tillage √
- Monoculture √
- Use of artificial fertilisers √
- Poor veld management and burning √
- Waterlogged soil conditions √
- Overgrazing √
- Removal of crop residue from the field √ (Any 3 x 1) (3)

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TOTAL SECTION B: 105
GRAND TOTAL: 150

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