Province of the
EASTERN CAPE
EDUCATION

# NATIONAL SENIOR CERTIFICATE

## GRADE 11

## NOVEMBER 2020

# AGRICULTURAL SCIENCES P1
# MARKING GUIDELINE
# (EXEMPLAR)

**MARKS: 150**

This marking guideline 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 | C ✓✓ | | |
| | 1.1.6 | D ✓✓ | | |
| | 1.1.7 | A ✓✓ | | |
| | 1.1.8 | B ✓✓ | | |
| | 1.1.9 | D ✓✓ | | |
| | 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 | B only ✓✓ | | |
| | 1.2.5 | Both A and B ✓✓ | (5 x 2) | (10) |
| 1.3 | 1.3.1 | Halogen ✓✓ | | |
| | 1.3.2 | Lewis structure ✓✓ | | |
| | 1.3.3 | Loam ✓✓ | | |
| | 1.3.4 | Nitrogen ✓✓ | | |
| | 1.3.5 | Colloid ✓✓ | (5 x 2) | (10) |
| 1.4 | 1.4.1 | Cation ✓ | | |
| | 1.4.2 | Hygroscopic ✓ | | |
| | 1.4.3 | Acid ✓ | | |
| | 1.4.4 | Mycorrhiza ✓ | | |
| | 1.4.5 | Illuviation ✓ | (5 x 1) | (5) |

**TOTAL SECTION A: 45**

 

## SECTION B

## QUESTION 2: BASIC AGRICULTURAL CHEMISTRY

### 2.1 Compounds

#### 2.1.1 Classification of compounds

A – Organic ✓
B – Inorganic ✓ (2)

#### 2.1.2 Reason

A – Presence of carbon atom ✓
B – Absence of carbon atom ✓ (2)

#### 2.1.3 Name of compounds with the same molecular formula but different structure

Isomers ✓ (1)

#### 2.1.4 Chemical formula of a compound represented by structure A

- $C_4H_{10}$ ✓✓

**OR**

- $CH_3\ (CH_2)_2\ CH_3$ ✓✓ (2)

#### 2.1.5 Identification of the letter

(a) C ✓
(b) B ✓ (2)

### 2.2 Matter/elements/compounds/mixtures

#### 2.2.1 Identification of substances

**A** – Compound ✓
**B** – Homogeneous mixture ✓
**C** – Heterogeneous mixture ✓ (3)

#### 2.2.2 Difference between an element and a compound

Element is a substance that cannot be broken down by chemical means ✓
Compound is a substance formed when two or more elements are chemically combined ✓ (2)

#### 2.2.3 Distinguishing between homogeneous and heterogeneous mixtures

**Homogeneous** – mixture in which the dissolved solute cannot be separated from the solvent by physical means ✓
**Heterogeneous** – mixture in which the components can be separated by physical means ✓ (2)

## 2.3 Fatty acids

### 2.3.1 Identification of the fatty acid

A – Unsaturated fatty acid ✓
B – Saturated fatty acid ✓ (2)

### 2.3.2 Indication of the letter representing the fatty acid

(a) Originating from plants – A ✓
(b) Solid at room temperature – B ✓
(c) Has a high melting point – B ✓
(d) Liquid at room temperature – A ✓ (4)

### 2.3.3 TWO importance of fats in living organisms

- Provide a source of stored energy ✓
- Source of insulation and temperature control ✓
- Vital part of membrane structure ✓
- Play a role in the flow of energy in and out of living cells ✓
- Assist in signal transduction ✓ (Any 2) (2)

## 2.4 pH values

### 2.4.1 Indicating the pH of substances

**Baking powder** – Alkaline ✓
**Orange juice** – Acidic ✓
**Milk** – Neutral ✓
**Battery acid** – Strongly acidic ✓ (4)

### 2.4.2 Indicating the substance with a high concentration of

(a) **Hydroxide ion** – Baking powder ✓
(b) **Hydrogen ion** – Battery acid ✓ (2)

## 2.5 Monosaccharide

### 2.5.1 Names of the structures

A – Fructose ✓
B – Glucose ✓ (2)

### 2.5.2 Indication of the compound formed from fructose and glucose

Sucrose ✓ (1)

### 2.5.3 TWO elements that are basic composition of carbohydrates

- Carbon ✓
- Hydrogen ✓
- Oxygen ✓ (Any 2) (2)

**[35]**

## QUESTION 3: SOIL SCIENCE

### 3.1 Soil texture

**3.1.1 Indication of the sample**

(a) Sample B ✓
(b) Sample A ✓
(c) Sample B ✓
(d) Sample A ✓ (4)

**3.1.2 Commenting on the pore space of soil sample B by referring to bulk density**

Soil sample B has a high bulk density / 3,2 g/cm3 ✓and therefore lower pore space ✓ (2)

### 3.2 Soil structure

**3.2.1 Identification of the structure**

A – Platy ✓
B – Prism-like/columnar/prismatic ✓
C – Crumb/spheroid ✓ (3)

**3.2.2 Indicating the letter representing the structure**

(a) A ✓
(b) C ✓ (2)

**3.2.3 TWO malpractices leading to the destruction of structure**

- Flood irrigation ✓
- Cultivation of soil when it is too dry or wet ✓
- Ploughing and other tilling methods ✓
- Overgrazing / burning / removal of plant material ✓
- Movement of animals and equipment over wet soil ✓
- Irrigation leading to salt accumulation ✓ (Any 2) (2)

### 3.3 Soil moisture

**3.3.1 Naming the term**

**A** – Saturation point ✓
**B** – Field water capacity ✓ (2)

**3.3.2 Reason**

**A** – Soil is completely filled with water ✓
**B** – Amount of water held in soil after saturation and drainage ✓ (2)

**3.3.3 Plant response grown in soils in Container C and D**

(a) **B** – Plants will grow optimally ✓
(b) **C** – Plants will wither/die ✓ (2)

**3.3.4 Differentiation between *temporal* and *permanent wilting points***

**Temporal wilting** – The point when plants appear wilted only during the hottest part of the day and recover ✓
**Permanent wilting** – Plants do not recover from wilting ✓ (2)

3.4 **Soil colour**

3.4.1 **Differentiation between *homogeneous* and *non-homogeneous soil colour***
**Homogeneous** – Single dominant colour in soil ✓
**Non-homogeneous** – Mixture of soil colours ✓ (2)

3.4.2 **TWO factors determining the colour of soil**
- Presence of water ✓
- Gleying conditions ✓
- Organic material ✓
- Presence of oxides ✓
- Presence of carbonates ✓ (Any 2) (2)

3.5 **Soil gas**

3.5.1 **Indication of the gas deficient in experiment 1**
Oxygen ✓ (1)

3.5.2 **Role the gas could have played if not deficient**
Influenced seed germination ✓ (1)

3.5.3 **Gas high in soil as a result of activities in experiment 2**
Carbon dioxide ✓ (1)

3.5.4 **Reason for the high amount of carbon dioxide**
Released during respiration ✓ of plant roots and soil micro-organisms ✓ (2)

3.6 **Soil temperature**

3.6.1 **Indication of the letter**
(a) A ✓
(b) C ✓
(c) A ✓ (3)

3.6.2 **TWO methods to manipulate soil temperature**
- Irrigation ✓
- Mulching ✓
- Clear plastic covers ✓
- Shading ✓ (Any 2) (2)

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## QUESTION 4: Soil science

### 4.1 Soil horizons

#### 4.1.1 Sketching the soil profile

A
B ✓✓
C
R (2)

#### 4.1.2 Indication of the horizon

(a) E ✓
(b) G ✓ (2)

#### 4.1.3 TWO diagnostic horizons of A horizon

- Humic ✓
- Vertic ✓
- Melanic ✓
- Orthic ✓ (Any 2) (2)

### 4.2 Soil classification

#### 4.2.1 THREE reasons for classification of soil

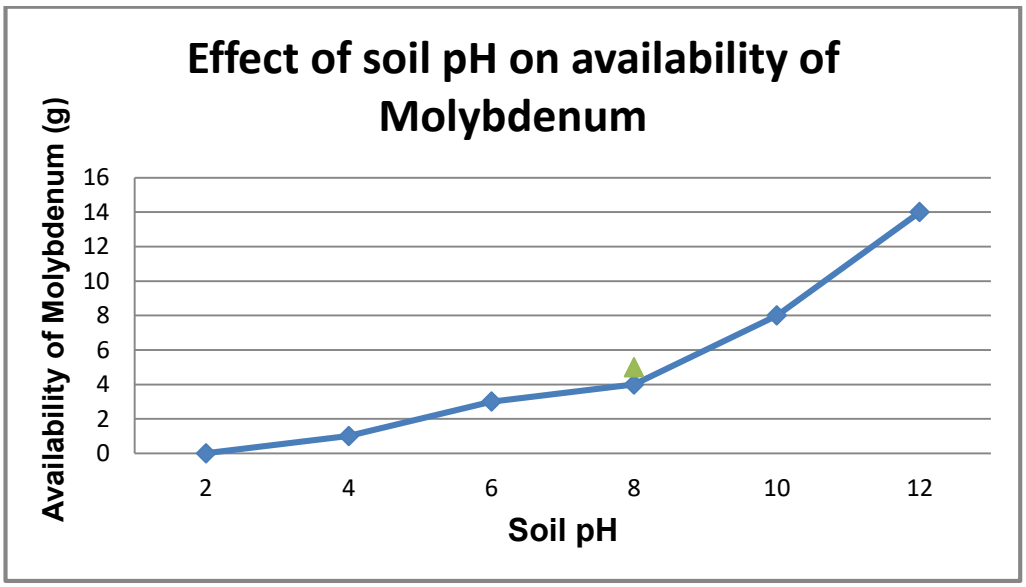
- Optimal utilisation of country's natural resources ✓
- Scientific planning of farm ✓
- Determining the crop production potential of the soil ✓
- Improved soil science communication ✓
- Development of new regions ✓
- Valuation of soils ✓ (Any 3) (3)

#### 4.2.2 System used in South Africa to classify soil

Binomial system ✓ (1)

## 4.3 Soil pH

### 4.3.1 Line graph




**Criteria/rubric/marking guideline**

- Correct heading ✓
- X-axis: Correctly calibrated and labelled (Soil pH) ✓
- Y-axis: Correctly calibrated and labelled (Availability of molybdenum) ✓
- Line graph ✓
- Accuracy ✓
- Correct unit (g) ✓ (6)

### 4.3.2 Deduction of the influence of acidity and alkalinity on the availability of molybdenum

In acid soil/low pH molybdenum is not available ✓
In alkaline soil / high pH molybdenum is more available ✓ (2)

### 4.3.3 Measures to solve problems of:

**(a) Decreased availability of molybdenum in soils with a pH of between 2 and 4**
Application of basic fertilisers such as lime/$CaCO_3$ ✓ (1)

**(b) Toxic quantities of molybdenum in soil with pH of 14**
Application of gypsum/$CaSO_4$ ✓ (1)

## 4.4 Soil colloid

### 4.4.1 Deduction of the process

A – Cation adsorption ✓
B – Cation exchange ✓ (2)

### 4.4.2 Reason for cation exchange

Potassium cation from the soil solution exchanges with the hydrogen adsorbed in the colloid ✓ (1)

4.4.3 **Indication of the hydrogen cation having an effect on plants**
Hydrogen in the soil solution ✓ (1)

4.4.4 **TWO types of colloids**
Organic colloid✓
Inorganic colloid ✓ (2)

4.4.5 **Differentiation between *sodic* and *saline soils* with regard to dominant salts**
**Sodic soil** – Sodium carbonates ✓
**Saline soil** – Chlorides and sulphates of sodium, calcium and magnesium ✓ (2)

4.5 **Soil organisms**

4.5.1 **Classification of the worms into groups of soil organisms**
Macro-organisms ✓ (1)

4.5.2 **TWO conditions for the survival of worms**
- Organic nutrients ✓
- Mineral nutrients (nitrogen/phosphorus/potassium) ✓
- Soil moisture close to field water capacity ✓
- Soil air for respiration✓
- Optimum temperature (temperature between 25 ˚C and 30 ˚C ✓
- Optimum soil pH ✓ (Any 2) (2)

4.5.3 **Explanation of how worms will assist farmers**
- Break down plant and animal remains ✓ to liberate plant nutrients ✓
- Improve soil structure ✓ for increased water retention capacity ✓
- Worm casts is rich in organic matter ✓ which improves soil fertility ✓
- Maintain $CO_2$ concentration ✓ which is used by plants during photosynthesis ✓ (Any 1) (2)

4.6 **Nutrient cycle**

**Nutrient cycle increasing nutrient content in plants**
(a) **Protein content** – Nitrogen cycle ✓ (1)
(b) **Carbohydrate content** – Carbon cycle ✓ (1)
**[35]**

**TOTAL SECTION B: 105**
**GRAND TOTAL: 150**