Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 10

NOVEMBER 2019

AGRICULTURAL SCIENCES P2
MARKING GUIDELINE

MARKS: 150

This marking guideline consists 9 pages.

SECTION A

QUESTION 1

1.1	1.1.1	D √√		
	1.1.2	B √√		
	1.1.3	D √√		
	1.1.4	B √√		
	1.1.5	C √√		
	1.1.6	B √√		
	1.1.7	A √√		
	1.1.8	A √√		
	1.1.9	A √√		
	1.1.10	B √√	(10 x 2)	(20)
1.2	1.2.1	E √√		
	1.2.2	F √√		
	1.2.3	D √√		
	1.2.4	H √√		
	1.2.5	A √√	(5 x 2)	(10)
1.3	1.3.1	Humification √√		
	1.3.2	Cultivar √√		
	1.3.3	Pollution √√		
	1.3.4	Metaphase √√		
	1.3.5	Multicellular √√	(5 x 2)	(10)
1.4	1.4.1	Lithosphere √		
	1.4.2	Deciduous √		
	1.4.3	Soil crusting √		
	1.4.4	Choloroplast √		
	1.4.5	Mitosis √	(5 x 1)	(5)

TOTAL SECTION A: 45

SECTION B

QUESTION 2: SOIL SCIENCES

2.1 Description of soil components

2.1.1 (a) 5% √ (1)

(b) 45% √ (1)

2.1.2 **Functions of oxygen in the soil for plant growth**

- Respiration of plant roots √
- Germination of plant seeds √ (2)

2.1.3 **Calculation of the mineral component in a 1 kg soil sample**

$\frac{45 \text{ X } 1 \text{ kg}}{100}$ √ = 0,45 kg √ **OR** $\frac{45 \text{ X } 1\,000 \text{ g}}{100}$ √ √ = 450 g √

0,45 x 1 000 = 450 g √ (3)

2.1.4 **Difference between gravitational water and hygroscopic water**

- **Gravitational water** is excess water that drains through the soil under the influence of gravity. √
- **Hygroscopic water** is tightly bound to the soil particles. √ (2)

2.1.5 **Human activities that reduce soil organism population**

- Excess fertilisation √
- Pesticides application √
- Poor waste management √
- Over-cultivation (Any 2 x 1) (2)

2.2 2.2.1 Characteristics of minerals

(a) Cleavage √ (1)
(b) Hardness √ (1)
(c) Specific gravity √ (1)
(d) Transparency √ (1)
(e) Tenacity √ (1)

2.2.2 **Formation of secondary minerals and primary minerals**

- **Primary minerals** are minerals formed during the original solidification of the rock under high temperature and pressure √
- **Secondary minerals** are formed when primary minerals undergo chemical change √ (2)

2.2.3 **Examples of secondary minerals**
- Kaolinite √
- Vermiculite √
- Illite √
- Haematite √
- Goethite √ (Any 2 x 1) (2)

2.3 2.3.1 **Types of rocks**
A – Sedimentary rock √
B – Igneous rock √
C – Metamorphic rock √ (3)

2.3.2 **Formation of Rock A and B**
A – Sedimentary rocks are formed when sediment is deposited by wind, water and organisms resulting in them piling up over thousands of years √
B – Igneous rocks are formed when volcanoes erupts and magma comes out and solidifies on the Earth surface √ (2)

2.3.3 **Suitability of rock C for cultivation of deep-rooted crops**
- Metamorphic rock soils are not suitable for deep rooted crops √ (1)

2.3.4 **Motivation**
- The soil formed is not deep √
- The soil is easily compacted √
- The soil is poorly drained √ which is not good for deep rooted crops (Any 2 x 1) (2)

2.4 2.4.1 **Type of weathering**
- Biological √ (1)

2.4.2 **Motivation**
- Plant roots penetrate cracks in the rocks causing them to widen √ (1)

2.4.3 **Other types of weathering**
- Chemical √
- Physical √ (Any 1 x 1) (1)

2.4.4 **Role of oxygen in chemical weathering**
- **Oxygen** speeds up the chemical reaction process on rocks which is called oxidation √
- Where oxygen combines with compound elements in rocks to form oxides or rust √ that weakens the rock structure (2)

2.5 **Soil forming factors**
A – Climate √ (1)
B – Topography √ (1)
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QUESTION 3: PLANT STUDIES

3.1 3.1.1 **Importance of growing maize and wheat in South Africa**

- For making sugars, alcoholic drinks, sugar and syrups √
- Corn oil from maize seeds is used for making margarine and salad oil √
- Source of food for the people and livestock √
- Wheat is used to make flour for bread √
- Used as bio-fuel √ (Any 2 x 1) (2)

3.1.2 **Climatic conditions suitable for winter wheat**

- Needs cool environments with optimum temperature of 20 °C–25 °C (degrees Celsius) √
- Average rainfall of 600–850 mm in the winter season √ (2)

3.1.3 **Discuss why deep, well-drained soil is good for maize**

- Deep soils encourage root development of maize crop √
- Well drained soil is good for aeration √
- Hard layers or compacted soils do not promote root development √ (Any 2 x 1) (2)

3.1.4 **Class of field crops**

(a) Industrial crops √ (1)
(b) Grain crops √ (1)

3.1.5 **Function of fibre**

- To make paper √
- Insulation √
- Timber frames √ (Any 1 x 1) (1)

3.2 3.2.1 **Horticulture**

- This is the science and art of growing fruit, vegetables and flowers √ (1)

3.2.2 **Advantages of genetic engineering in horticulture**

- Develop disease resistant cultivars √
- Increase nutritional content √ (2)

3.2.3 **Factors to consider when choosing vegetable cultivars**

- Adaptation to the environmental conditions/climate √
- Pest and disease resistant √
- Days it takes to mature √
- Yield potential √
- Market demand √ (Any 3 x 1) (3)

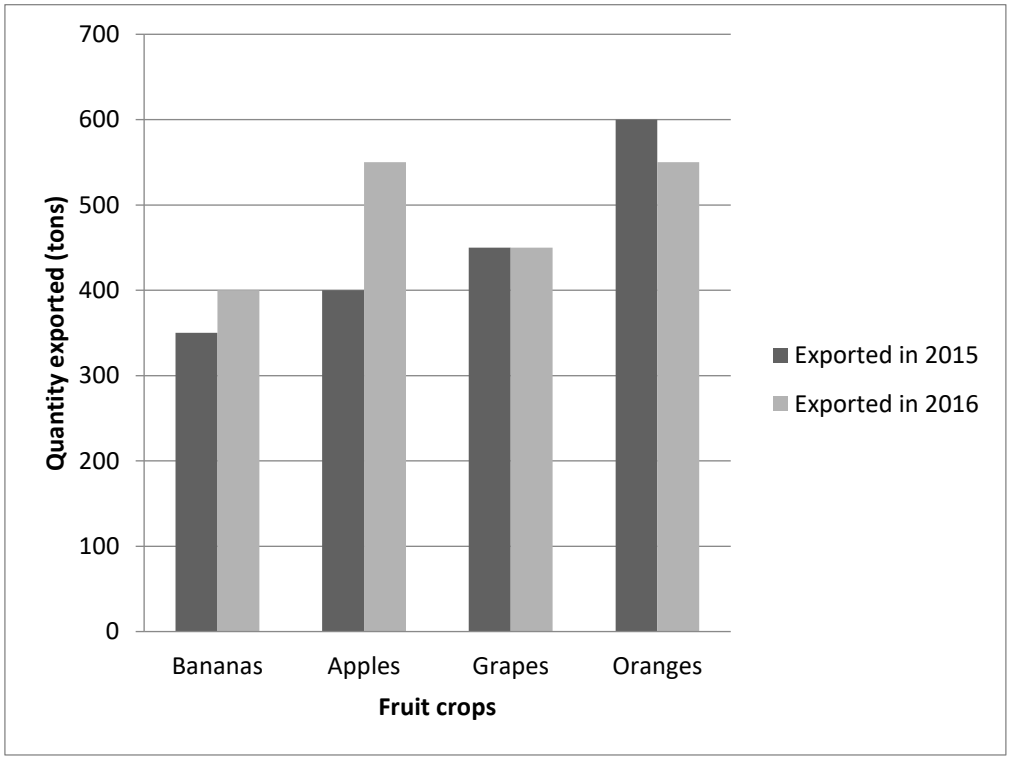
3.2.4 **Economic and environmental benefits of using disease resistant crops**

- The farmer will save money by reducing pesticides applied √
- Reduction of pesticide application reduces pollution to the environment √ (2)

3.2.5 **Classification of vegetable crops**

- Root √
- Stem √
- Leaves√
- Fruits √
- Flowers √ (Any 2 x 1) (2)

3.3 3.3.1 **Bar graph showing quantities of fruit crops exported by a group of farmers in 2015 and 2016**



Marking guideline for the bar graph
• Correct caption √ • Variable on y-axis correctly labelled and calibrated (Quantity exported) √ • Variable on x-axis correctly labelled and calibrated (Fruit crops) √ • Units indicated on y-axis (tons) √ • Bar graph √

(5)

3.3.2 **Fruit crop with highest increase in export**

Apples √√ (2)

3.3.3 **Challenges in exporting bananas**

- Bananas are perishable / quickly rot √
- Bananas are bulk √
- Costly/expensive to transport √ (Any 2 x 1) (2)

3.3.4 **Importance of exporting fruit crops to the economy of South Africa**

- Exporting brings in foreign currency to the country which boosts the economy √ (1)

3.3.5 **Percentage increase of oranges produced**

920 t – 700 t = 220 t √

$\frac{220\text{ t} \times 100}{700\text{ t}}$ √

= 31,4% √ (3)

3.4 3.4.1 **Reasons why Lantana camara was declared an invader**

- It causes drastic loss of indigenous plants √
- It causes depletion of underground water √ (Any 1 x 1) (1)

3.4.2 Exotic/Alien √ (1)

3.4.3 **Reason why Lantana camara's population increases more than indigenous plants**

- Lantana camara has fewer natural pests and diseases that can affect its growth than indigenous plants (1)

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QUESTION 4: SUSTAINABLE NATURAL RESOURCE UTILISATION AND BIOLOGICAL CONCEPTS

4.1 4.1.1 **Tillage system**
- Famer A/Zero tillage √ (1)

4.1.2 **Motivation**
- Zero tillage does not use expensive machines √
- It is sustainable because it reduces rate of soil erosion √
- It promotes organic residue accumulation √
- No soil tillage/cultivation √ (Any 2 x 1) (2)

4.1.3 **Adverse effects of maximum tillage**
- Cause air pollution √
- Cause compaction on the soil √
- Disturb activities of micro and macro-organisms √ (Any 2 x 1) (2)

4.1.4 **Ways to reduce water loss**
- Mulching √
- Plant cover crops √
- Removal of weeds √ (Any 1 x 1) (1)

4.1.5 **Ways to reduce soil erosion in the fields**
- Allow vegetation in grazing fields to recover √
- Sow cover crops √
- Practise zero cultivation/no tilling √
- Contour plough across slopes √
- Reduce ploughing before rain falls √ (Any 1 x 1) (1)

4.1.6 **Consequences of soil degradation to consumers**
- Food shortages because of decrease in production √
- Higher food prices due to shortages √
- Soil pollution threatens food safety √ (Any 2 x 1) (2)

4.2 4.2.1 **Important aspects of soil living organisms**
- Micro-organisms like fungi and bacteria break down/decompose organic matter into soil nutrients √ / It recycles soil nutrients √
- Macro-organisms mix and aerate the soil by burrowing and turning over the soil √
- Living soil organisms improve soil structure √ (Any 2 x 1) (2)

4.2.2 **Assessment of the statement**
- The statement is not true √ (1)

Supporting reasons
- Farming reduces biodiversity and population of soil organisms √
- Use of fertiliser, pesticides and fumigation reduces soil organisms √
- Farming exhaust soil organic matter resulting in decrease of soil organisms √ (Any 2 x 1) (2)

4.2.3 **Waste management techniques**
- Making compost with plant residues √
- Use of biogas digesters √
- Make use of some crop waste to make biofuel and alcoholic drinks √ (Any 2 x 1) (2)

4.2.4 **National Water Act**
- Efficiency – Farmers should use water without wasting it √
- Equity – Farmers should fairly share water resource √ (2)

4.3 4.3.1 **Plant cell**
- Plant cell √ (1)

4.3.2 **Justification**
- The cell has a cell wall √
- Large vacuole √ (Any 1 x 1) (1)

4.3.3 **Labelling**
A – Nucleus √
B – Chloroplast √
C – Vacuole √ (3)

4.3.4 **Functions of chloroplast**
- Site of photosynthesis √
- Contains chlorophyll which absorbs energy from sunlight √
- That will be used to turn carbon dioxide and water to form glucose and oxygen √ (Any 2 x 1) (2)

4.3.5 **Plant tissues and plant organs**
- Plant tissues are a group of similar cells that carry out the same function √
- **Examples** – epidermal tissue/collenchyma tissue/vascular tissue √
- Plant organs are a part of the body that perform a particular function √
- **Examples** – root/stem/and leaves √ (4)

4.4 4.4.1 **Cell division**
- Mitosis √ (1)

4.4.2 **Justification**
- Two daughter cells are produced √ (1)

4.4.3 **Important aspects of mitosis**
- Facilitates growth √
- Replaces worn out cells or tissues √
- Forms the basis of asexual reproduction in plants √ (Any 2 x 1) (2)

4.4.4 **Phases of mitosis**
A – Anaphase √
B – Telophase √ (2)

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TOTAL SECTION B: 105
GRAND TOTAL: 150