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**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

$$\frac{45 \times 1 \text{ kg}}{100} \checkmark = 0,45 \text{ kg} \checkmark \quad \text{OR} \quad \frac{45 \times 1\,000 \text{ g}}{100} \checkmark \checkmark = 450 \text{ g}$$

$$0,45 \times 1\,000 = 450 \text{ g} \checkmark \quad \checkmark \quad (3)$$

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** ✓
- B – Topography** ✓
- (1)
(1)
[35]

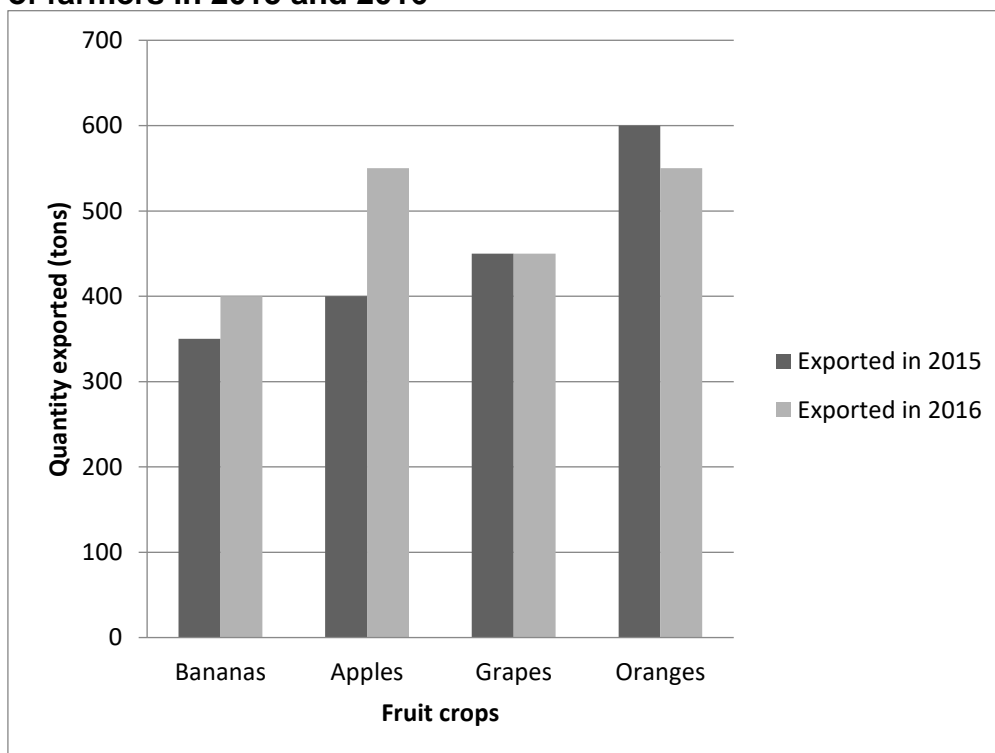
QUESTION 3: PLANT STUDIES

- 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

$$920 \text{ t} - 700 \text{ t} = 220 \text{ t} \checkmark$$

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

$$= 31,4\% \checkmark \quad (3)$$

3.4 3.4.1 Reasons why Lantana camara was declared an invader

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

3.4.2 Exotic/Alien \checkmark (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)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150