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**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2023

**AGRICULTURAL SCIENCES P2
MARKING GUIDELINE**

MARKS: 150

This marking guideline consists of 9 pages.

SECTION A**QUESTION 1**

| | | | | |
|-----|--------|----------------------------|----------|------|
| 1.1 | 1.1.1 | C ✓✓ | | |
| | 1.1.2 | A ✓✓ | | |
| | 1.1.3 | A ✓✓ | | |
| | 1.1.4 | C ✓✓ | | |
| | 1.1.5 | B ✓✓ | | |
| | 1.1.6 | C ✓✓ | | |
| | 1.1.7 | B ✓✓ | | |
| | 1.1.8 | D ✓✓ | | |
| | 1.1.9 | D ✓✓ | | |
| | 1.1.10 | B ✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | F ✓✓ | | |
| | 1.2.2 | D ✓✓ | | |
| | 1.2.3 | A ✓✓ | | |
| | 1.2.4 | J ✓✓ | | |
| | 1.2.5 | C ✓✓ | (5 x 2) | (10) |
| 1.3 | 1.3.1 | Transpirational pull ✓✓ | | |
| | 1.3.2 | Agricultural lime ✓✓ | | |
| | 1.3.3 | Integrated Pest Control ✓✓ | | |
| | 1.3.4 | Biotechnology ✓✓ | | |
| | 1.3.5 | Soil surveying ✓✓ | (5 x 2) | (10) |
| 1.4 | 1.4.1 | Fertilisation ✓ | | |
| | 1.4.2 | Oxygen ✓ | | |
| | 1.4.3 | Monoculture ✓ | | |
| | 1.4.4 | Legumes ✓ | | |
| | 1.4.5 | Fallow ✓ | (5 x 1) | (5) |

TOTAL SECTION A: 45

SECTION B**QUESTION 2: PLANT STUDIES (NUTRITION)**

- 2.1 2.1.1 **Process shown in the diagram**
Photosynthesis ✓ (1)
- 2.1.2 **Identification of product**
Sugar ✓ (1)
- 2.1.3 **Storage organs for products of photosynthesis**
- Roots ✓
 - Stems ✓
 - Leaves ✓
 - Seeds ✓
- (Any 2 x 1) (2)
- 2.1.4 **Factors influencing the rate of photosynthesis**
- Light intensity ✓
 - Temperature ✓
 - Carbon dioxide concentration ✓
 - Water ✓
- (Any 2 x 1) (2)
- 2.1.5 **Methods of optimising photosynthesis**
- Use of a greenhouse / tunnel ✓
 - Plant density ✓
 - Trellising plants ✓
 - Pruning ✓
- (Any 2 x 1) (2)
- 2.1.6 **Consequences of the absence of photosynthesis**
- Plants and animals will die due to lack of oxygen ✓
 - Animals will die of hunger ✓
 - Global warming ✓ due to absence of plants that absorb carbon dioxide ✓
- (Any 2 x 1) (2)
- 2.2 2.2.1 **Identification of processes A and B**
A – Osmosis ✓
B – Transpiration ✓ (2)
- 2.2.2 **Importance of water movement in plants**
- Transport of nutrients ✓
 - Temperature regulation ✓
 - Uptake of nutrients ✓
- (Any 2 x 1) (2)
- 2.2.3 **Ways plants use to reduce water loss through transpiration**
- Waxy cuticle ✓
 - Hairy leaves ✓
 - Small leaves ✓
 - Stomata on underside of leaves ✓
- (Any 2 x 1) (2)

- 2.3 2.3.1 **Labels**
 B – Micro ✓
 C – Potassium ✓
 D – K⁺ ions ✓
 E – NO₃⁻ / NH₄⁺ ✓
 F – Stunted growth / Leaf chlorosis ✓
 G – Macro ✓ (6 x 1) (6)

- 2.3.2 **Methods that can be used to determine the nutrient status of soils**
 • Soil analysis ✓
 • Plant analysis ✓ (2)

- 2.4 2.4.1 **Difference between passive and active mineral uptake**

| Passive uptake | Active uptake |
|--|---|
| • Nutrients move down the concentration gradient ✓ | • Nutrients move against the concentration gradient ✓ |
| • No energy required ✓ | • Energy in the form of ATP required ✓ |
| • Carrier molecule not required ✓ | • Carrier molecule required ✓ |

(Any 4 x 1) (4)

- 2.4.2 **Factors affecting nutrient availability**
 Soil texture ✓
 Soil pH ✓ (2)

- 2.5 2.5.1 **Classification of fertilisers**
 Farmer A – Organic fertiliser ✓
 Farmer B – Inorganic fertiliser ✓ (2)

- 2.5.2 **Environmental effects of inorganic fertilisers**
 • Can lead to eutrophication ✓
 • Soil acidification ✓
 • Storage and application of nitrogenous fertilisers emits greenhouse gases ✓
 • Can destroy soil food webs ✓ (Any 2 x 1) (2)

- 2.5.3 **An example of a nitrogenous fertiliser**
 Lime ammonium nitrate / Ammonium nitrate ✓ (Any 1 x 1) (1)

[35]

QUESTION 3: PLANT REPRODUCTION AND PROTECTION

- 3.1 3.1.1 **Captions for diagrams 1 and 2**
 Diagram 1 – Stamen / androecium ✓
 Diagram 2 – Pistil / gynoecium ✓ (2)
- 3.1.2 **Function of Part C in diagram 2**
 Fuses with the male gamete ✓ (1)
- 3.1.3 **Identification of flower parts**
 B – stigma ✓
 D – ovary ✓ (2)
- 3.1.4 **Name of process**
 Pollination ✓ (1)
- 3.1.5 **Examples of pollination agents**
 • Insects ✓
 • Birds ✓
 • Water ✓
 • Wind ✓ (Any 2 x 1) (2)
- 3.1.6 **Letter of a part that will develop into:**
 (a) – D ✓
 (b) – C ✓ (2)
- 3.2 3.2.1 **Identification of processes**
 A – Parthenocarpy ✓
 B – Ablactation ✓ (2)
- 3.2.2 **Types of process A**
 • Vegetative parthenocarpy ✓
 • Stimulative parthenocarpy ✓ (2)
- 3.2.3 **Factors that influence the process B**
 • Strong winds ✓
 • Low temperatures / frost ✓
 • Mineral deficiencies ✓
 • Too many fruits ✓
 • Insect pests ✓
 • Deformed flowers ✓ (Any 2 x 1) (2)
- 3.3 **Identification of the process**
- 3.3.1 Germination ✓ (1)
- 3.3.2 **Name of the process**
 Dormancy ✓ (1)

- 3.3.3 **Strategies for overcoming dormancy**
- Priming / soaking seeds ✓
 - Scarification ✓
- (Any 2 x 1) (2)
- 3.3.4 **Requirements for seed germination**
- Favourable temperature
 - Adequate water supply
 - Availability of oxygen
- (Any 1 x 1) (1)
- 3.4 3.4.1 **Name of parts A and B**
- A – Scion ✓
- B – Root stock ✓
- (2)
- 3.4.2 **Classification of reproduction type**
- Asexual reproduction ✓
- (1)
- 3.4.3 **Justification of answer to QUESTION 3.4.2**
- Does not involve the fusion of gametes ✓
- (1)
- 3.4.4 **Advantages of asexual reproduction**
- Fertilisation does not need to take place ✓
 - Avoid overcrowding plants ✓
 - Root stock and scion can be from different varieties ✓
 - Can be used where seed propagation is not practical ✓
 - Produces fruits that are true to type ✓
 - When introducing new cultivars it not necessary to remove the old trees and replace them with young trees ✓
- (Any 2 x 1) (2)
- 3.5 3.5.1 **Identification of the role of weeds in plant disease outbreaks**
- They serve as hosts for pathogens ✓
- (1)
- 3.5.2 **Examples of mechanical weed control methods**
- Fire ✓
 - Cultivation ✓
 - Mowing / Slashing / cutting ✓
- (Any 2 x 1) (2)
- 3.5.3 **Contributions of the state towards plant protection**
- Quarantine services ✓
 - Seed certification systems ✓
 - Legislation ✓
 - Research ✓
 - Depositories ✓
- (Any 3 x 1) (3)
- 3.5.4 **Examples of stored grain pests**
- Rice / Maize weevil ✓
 - Grain beetle ✓
 - Grain / Flour moth ✓
 - Flour beetle ✓
- (Any 2 x 1) (2)

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QUESTION 4: OPTIMAL RESOURCE UTILISATION**4.1 4.1.1 Identification of farming system**

Precision farming ✓

(1)

4.1.2 Key technologies used in precision farming

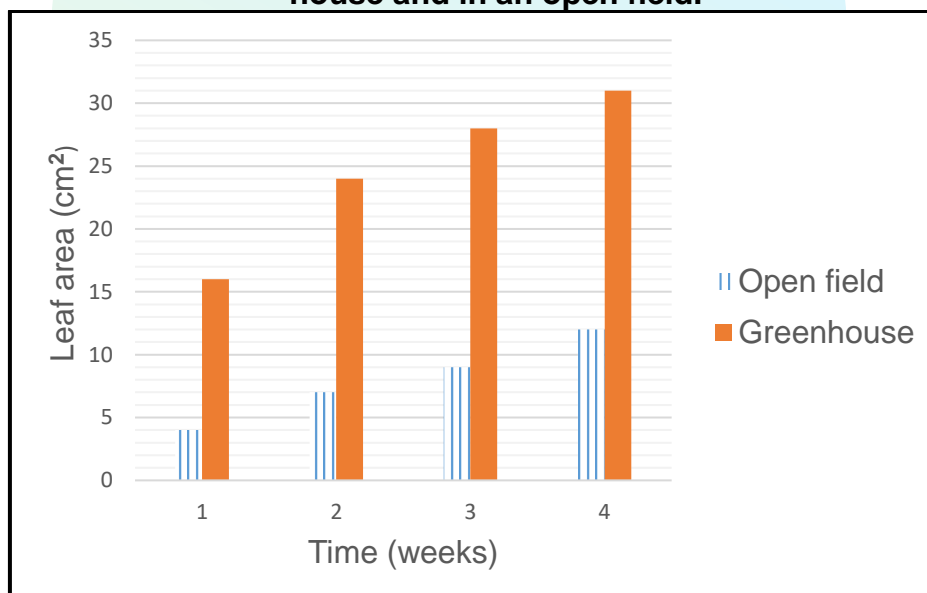
- Global Positioning System / GPS ✓
- Geographical Information System / GIS ✓

(2)

4.1.3 Aims of precision farming

- To allow the farmer to have more precise control over natural variation in soil on the farm ✓
- To enable the farmer to apply inputs only as needed and where needed to ensure optimum production ✓

(2)

4.2 4.2.1 Comparison between the leaf size of spinach grown in a green house and in an open field.

- Correct heading with both variables ✓
- Correct graph type ✓
- Units (Weeks / cm²) ✓
- y-axis: Correct labelling and calibration ✓
- x-axis: Correct labelling and calibration ✓
- Correct plotting (80% and more correct plotting) ✓

(6)

4.2.2 Conclusion that can be drawn from the information in the graph

Plants grown in greenhouses have bigger leaves ✓ than those grown in an open field over 4 weeks. ✓

(2)

4.2.3 Explanation for the differences in leaf sizes

Plants grown in the green house grow faster because temperatures are higher ✓ in the greenhouse, resulting in higher photosynthetic rates. ✓

(2)

- 4.3 4.3.1 **Aims of soil cultivation**
- Bury plant remains ✓
 - Incorporate fertiliser and lime into the soil ✓
 - Control weeds ✓
 - To break up soil crusts ✓
 - Loosen the soil to make root penetration and infiltration easier ✓
- (Any 2 x 1) (2)
- 4.3.2 **Differences between primary and secondary cultivation**
- Primary tillage cut and shatters the soil with deep penetration tools to produce a rough surface finish ✓ whereas secondary tillage aims to level and firm the top part of the soil to produce a smoother surface finish. ✓ (2)
- 4.3.3 **Tools used in primary and secondary cultivation**
- Primary cultivation**
- Ploughs ✓
 - Rippers ✓
- Secondary cultivation**
- Harrows ✓
 - Cultivators ✓
- (Any 2 x 1) (2)
- 4.3.4 **Environmentally friendly cultivation systems**
- Minimum tillage ✓
 - Zero tillage ✓
 - Mulching method ✓
- (Any 2 x 1) (2)
- 4.4 4.4.1 **Identification of process**
- Crop rotation ✓ (1)
- 4.4.2 **Principles of crop rotation shown in the table**
- Crops that require the same nutrients should not follow each other ✓
 - Crops that are affected by the same pests and diseases should not follow each other ✓
 - Shallow rooted crops should be followed by deep rooted crops ✓
- (Any 2 x 1) (2)
- 4.4.3 **Reasons for recommending crop rotation**
- Protects the farmer from total crop failure ✓
 - Maintains soil fertility ✓
 - Improves soil structure ✓
 - Controls pests and diseases ✓
 - Increases soil nitrogen content ✓
- (Any 2 x 1) (2)
- 4.5 4.5.1 **Identification of cultivation system**
- Hydroponics ✓ (1)

4.5.2 **Difference between *hydroponics* and *open field system***

Hydroponics is involves growing plants in a water-based nutrient solution ✓ while the open field involves growing crops directly onto the soil. ✓

(2)

4.5.3 **Examples of growth media that can be used in hydroponics**

Vermiculite ✓

Perlite ✓

(2)

4.5.4 **Advantages of the closed hydroponic system**

- Uniform irrigation ✓
- Savings on water and fertiliser ✓
- No growth medium is necessary ✓

(Any 2 x 1)

(2)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150

