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**EASTERN CAPE**  
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**GRADE 11**

**NOVEMBER 2016**

**AGRICULTURAL SCIENCES P2  
MEMORANDUM**

**MARKS: 150**

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This memorandum consists of 10 pages.

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**SECTION A****QUESTION 1**

- 1.1 1.1.1 D ✓✓  
 1.1.2 B ✓✓  
 1.1.3 D ✓✓  
 1.1.4 A ✓✓  
 1.1.5 A ✓✓  
 1.1.6 C ✓✓  
 1.1.7 B ✓✓  
 1.1.8 D ✓✓  
 1.1.9 B ✓✓  
 1.1.10 C ✓✓ (10 x 2) (20)

1.2

COLUMN A	COLUMN B
1.2.1	E ✓✓
1.2.2	D ✓✓
1.2.3	G ✓✓
1.2.4	A ✓✓
1.2.5	H ✓✓

(5 x 2) (10)

- 1.3 1.3.1 Immobilisation ✓✓  
 1.3.2 Pesticides ✓✓  
 1.3.3 Mutation ✓✓  
 1.3.4 Micro irrigation ✓✓  
 1.3.5 Bare cultivation ✓✓ (5 x 2) (10)

- 1.4 1.4.1 Soil surveying ✓  
 1.4.2 Vegetative/asexual reproduction ✓  
 1.4.3 Diffusion ✓  
 1.4.4 Phosphorus ✓  
 1.4.5 Green manuring ✓ (5 x 1) (5)

**TOTAL SECTION A: 45**

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

2.1 2.1.1 **Outline THREE impacts of the situation in the sketch in QUESTION 2.1 on plant nutrient uptake.**

- Fewer surface cavities for nutrients to be absorbed ✓
- Plant nutrients cannot dissolve easily under dry soils ✓
- Chemical activities such as oxidation may decrease ✓
- Liberation of plant nutrients to crops becomes impossible ✓

(Any 3 x 1) (3)

2.1.2 **Indicate ONE traditional method that could minimise or prevent the cracks in the soil.**

- Mulching ✓
- Cover cropping ✓
- Addition of compost/organic matter to the soil ✓

(Any 1 x 1) (1)

2.1.3 **Predict TWO effects of the situation in QUESTION 2.1 on soil macro organisms.**

- Rate of decomposition of organic matter by soil microbes will be lowered ✓
- There will be an increased presence of saprophytic organisms which will result in an increase parasitic organisms ✓
- Mineralisation, mobilisation and nitrogen fixation would all be affected because the activities of soil microbes will decline ✓

(Any 2 x 1) (2)

2.2 2.2.1 **Identify the processes (a) and (b) in QUESTION 2.2.**

- Process (a): Photosynthesis ✓
- Process (b): Respiration ✓

(2)

2.2.2 **Difference between the two processes (photosynthesis and respiration)**

	Photosynthesis	Respiration
(a)	Stores energy ✓	Releases energy ✓
(b)	Produces food ✓	Consumes food ✓

(4)

2.2.3 **List TWO storage organs in which excess starch, sugars, lipids or protein is stored in plants.**

- Roots ✓
- Stems ✓
- Leaves ✓
- Seeds ✓
- Fruit ✓

(Any 2 x 1) (2)

- 2.3 2.3.1 Identify **TWO** pressures in plants that allow water to travel from the roots to the stems and leaves from the scenario above.
- Osmotic flow ✓
  - Root pressure ✓
  - Transpiration pull ✓
- (Any 2 x 1) (2)

- 2.3.2 Differentiate between *osmotic flow* and *transpiration pull* in plants.

<b>Osmotic flow:</b>	it is the flow of water ✓ across a semi permeable membrane ✓  <b>OR</b>  movement of water through cells due to osmosis ✓ caused by an osmotic gradient. ✓
<b>Transpiration pull:</b>	upward pulling force exerted on the water column in plants ✓ when water is lost during transpiration ✓  <b>OR</b>  it is the loss of water from the surface of a plant, ✓ mainly the leaves by evaporation ✓

(4)

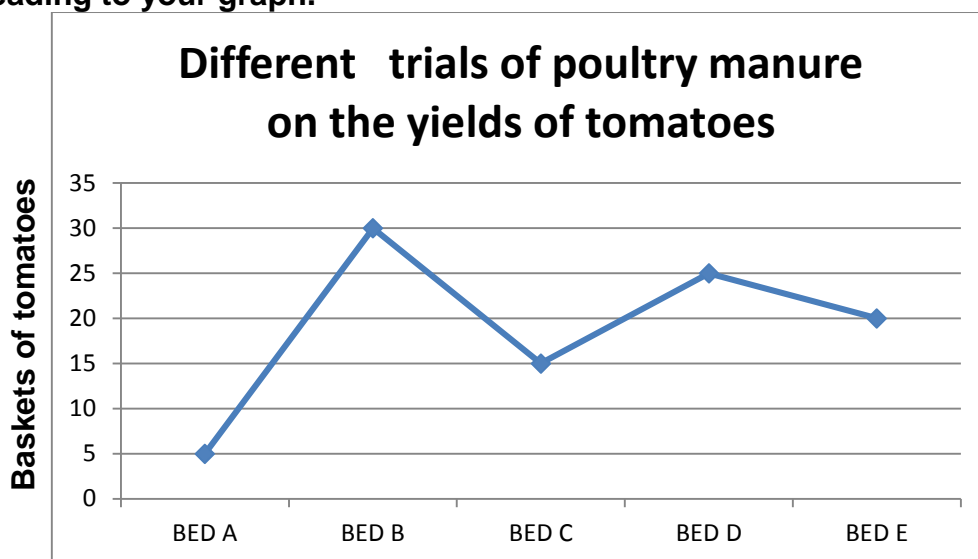
- 2.3.3 Mention the part of the plant modified for the diffusion of water into the atmosphere.  
Stomata/leaf ✓ (1)

- 2.4 2.4.1 Name the bacteria responsible for the formation of the root nodules in QUESTION 2.4.  
Rhizobium bacteria ✓ (1)

- 2.4.2 Mention the element that is fixed in the root nodules by the bacteria.  
Nitrogen ✓ (1)

- 2.4.3 State the importance of soil micro-organisms in the formation of plant nutrients. Mention **TWO** factors.
- Plant and animal remains are broken down to release plant nutrients ✓
  - Certain soil microbes can bind the nitrogen in the atmosphere in the form of ammonium salts ✓
  - While soil micro-organisms are decaying the plant material, carbon dioxide is released into the atmosphere ✓
  - The hyphae explore the soil for nutrients and water transports them to the plant ✓
  - Mycorrhizae transport enough phosphorus to plants in the absence of phosphorus (deficiency) in the soil ✓
- (Any 2 x 1) (2)

- 2.5 Draw the findings of the trials using a line graph and give an appropriate heading to your graph.



Line graph ✓

Correct heading ✓

Correct plotting/proportional plotting ✓

Labelling and units on Y axis ✓

Labelling and units on X axis ✓

(5)

- 2.6 Explain the importance of nutrient element analysis in crop production. Mention TWO factors.

- It is useful to diagnose the cause of poor plant growth ✓
- To confirm soil test or plant symptom diagnosis ✓
- To confirm some nutrient deficiencies and toxicities ✓
- To evaluate the effectiveness of a fertiliser management/application program ✓
- To identify and understand the nutrient efficiency and needs of a crop ✓
- To detect low nutrient levels in the plant ✓

(Any 2 x 1) (2)

- 2.7 State THREE negative impacts of inorganic fertilisers on the environment.

- Accumulation of harmful plant nutrients in water/eutrophication ✓
- Eutrophication causes aquatic plants to grow vigorously, this causes oxygen depletion in water for aquatic animals ✓
- Greenhouse gas emission/emission of nitrous oxide, methane and other gases into the atmosphere ✓
- Ammonium based fertilisers cause soil acidification ✓
- Phosphate fertilisers may contain uranium. Plants absorb the uranium which poses a health risk to humans and animals that eat the plants ✓

(Any 3 x 1) (3)

[35]

**QUESTION 3: PLANT REPRODUCTION**

- 3.1 3.1.1 **Male organ of a flower**  
C/Stamen ✓ (1)
- 3.1.2 **Modified floral leaves which form the pistil**  
A/Carpel ✓ (1)
- 3.1.3 **A part of the pistil that produces egg cells**  
B/Ovary ✓ (1)
- 3.1.4 **A tube connecting the stigma to the ovary**  
D/Style ✓ (1)
- 3.1.5 **Define the underlined description in QUESTION 3.1.**  
Dicotyledonous flowers  
Flowers that produce seed (embryos) ✓ with two cotyledons (seed lobes) ✓ (2)
- 3.2 3.2.1 **Differentiate between fertilisation and double fertilisation.**  
**Fertilisation:**  
It is the fusion of male and female gametes ✓ to form a zygote ✓  
**Double fertilisation**  
In double fertilisation, one male gamete fuses with the ovum to form zygote. ✓ The other male gamete fuses with the two polar nuclei to form the endosperm ✓ (4)
- 3.2.2 **Deduce ONE function of a fruit from the scenario.**  
The fruit protects the seed ✓ (1)
- 3.2.3 **State TWO basic requirements for seed germination.**  
  - Sufficient water/moisture is needed to allow the seed to swell ✓
  - Oxygen is necessary for the growth of the embryo ✓
  - Correct temperature for seed type ✓ (Any 2 x 1) (2)
- 3.3 3.3.1 **Identify the types of asexual reproduction in FIGURE A, B, C and D above.**  
FIGURE A – tuber ✓  
FIGURE B – rhizomes ✓  
FIGURE C – runners ✓  
FIGURE D – stolons ✓ (4)
- 3.3.2 **List TWO disadvantages of using the method in FIGURE A for propagation.**  
  - There is no genetic variation because only identical clones of the parent plants are used ✓
  - Disease and undesirable traits will be inherited by the offspring ✓
  - If it takes place naturally it leads to overcrowding which leads to competition for water, nutrients and space ✓
  - In some cases like tissue culture, it can be expensive ✓ (Any 2 x 1) (2)



**3.3.3 Outline the difference between sexual and vegetative reproduction in plants.**

**Sexual reproduction**

It is the production of a new individual/organism ✓ through the fusion of male/pollen grains and female gametes/stamen. ✓ (2)

**Vegetative/asexual reproduction**

It is the production of new organisms ✓ using plants parts apart from the seeds. ✓

**OR**

The process whereby plants reproduce ✓ without fusion of a male and female gametes. ✓ (2)

(4)

**3.4 Give a brief description of the following terminologies:**

**3.4.1 Herbicides**

Chemicals ✓ used to control or kill weeds ✓

(2)

**3.4.2 Biotechnology**

Application of scientific techniques to modify organisms ✓ with the aim of improving them. ✓

(2)

**3.5 3.5.1 State TWO characteristics of genetic modified crops.**

- Plants that are resistant to diseases, pests and stress ✓
- Fruits and vegetables that stay fresh for longer periods of time ✓
- Plants that poses healthy fats and oils and have increased nutritive value ✓
- Soya beans with higher content of the anti-cancer proteins naturally found in soybeans ✓
- Lignin modifications in trees that will make possible higher fiber extraction rates in the paper and pulp industry ✓
- Production of new substances in plants, including biodegradable plastics and therapeutic vaccines ✓

(Any 2 x 1) (2)

**3.5.2 Formulate TWO reasons why genetic modified crops are unpopular in some communities.**

- Health risks/long term effects not known ✓
- Economic risks/expensive to practice ✓
- Environmental risks/toxic effects on plants and insects ✓
- Beliefs/conservatism/human interference of natural process ✓

(Any 2 x 1) (2)

**3.6 Predict TWO conditions that could influence insect damage in stored seeds such as grains.**

- Not disinfecting the storage system ✓
- Harvesting grains with high moisture content ✓
- Damp and unclean storage system ✓
- Long storage without protection against pest ✓

(Any 2 x 1) (2)



3.7 **State TWO harmful effects of weeds on crops.**

- weeds compete with crops for moisture/space/nutrients/light ✓
  - weeds interfere with the harvesting of crops ✓
  - weeds serve as host plants for insects and pests ✓
  - weeds that are thorny pose health hazards to plants ✓
- (Any 2 x 1) (2)  
[35]

**QUESTION 4: OPTIMAL RESOURCES**4.1 4.1.1 **Identify ONE reason why soil surveys are done from the scenario.**

- For the suitability of a soil for agricultural purposes ✓
  - For the suitability of non-agricultural purposes ✓
- (Any 1 x 1) (1)

4.1.2 **Recommend TWO factors a surveyor should consider in carrying out a soil surveying in an area from the scenario.**

- Physical soil factors ✓
  - Chemical soil factors ✓
  - Biological soil factors ✓
- (Any 2 x 1) (2)

4.1.3 **State TWO benefits of soil survey to a potential farmer.**

- The farmer is able to describe the characteristics of the soils in a given area ✓
  - The farmer is able to classify the soils according to a standard system of classification ✓
  - The farmer is able to make predictions about the behaviour of soils ✓
  - The farmer is able to use the land effectively ✓
  - The farmer is able to identify which areas are good for crops and which areas are good for animals ✓
- (Any 2 x 1) (2)

4.2 4.2.1 **Determine the type of farming practice from the scenario in QUESTION 4.2.**

Precision farming ✓ (1)

4.2.2 **Justify your answer to QUESTION 4.2.1 with ONE reason.**

Precision farming makes use of modern technology ✓ to determine all detailed information about a crop/computers, satellite and positioning systems used in crop production. ✓ (2)

4.2.3 **Suggest TWO advantages of the farming practice in QUESTION 4.2**

- It ensures optimal production/best production with least input cost possible ✓
  - It ensures less damage to the environment ✓
  - It sustains crop production ✓
  - It ensures healthier food for all, through limiting the use of fertilisers and pesticides ✓
- (Any 2 x 1) (2)

4.3 4.3.1 **Identify the irrigation systems labelled A and B in QUESTION 4.3.**

FIGURE A: Furrow irrigation ✓

FIGURE B: Basin irrigation ✓

(2)

4.3.2 **Tabulate TWO disadvantages of the systems in FIGURE A and FIGURE B.**

Furrow irrigation	Basin irrigation
<ul style="list-style-type: none"> <li>Requires a lot of water ✓</li> <li>Water control is difficult ✓</li> <li>Uneven water ✓ distribution ✓</li> <li>Not good for steep slopes ✓</li> </ul>	<ul style="list-style-type: none"> <li>It requires a lot of water ✓</li> <li>Requires a lot of planning ✓</li> <li>Difficult to regulate water volume to each plant ✓</li> </ul>

(Any 2 x 1)

(Any 2 x 1)(4)

Correct table (1)

(5)

4.4 4.4.1 **List TWO advantages of conventional tillage.**

- Impermeable layers are broken up to improve root growth and water absorption ✓
- Seedbeds are prepared for production ✓

(2)

4.4.2 **Suggest THREE aims of primary and secondary soil cultivation from the scenario.**

- To allow water and air movement in the soil ✓
- Assists in weed control ✓
- Helps nutrient up-take by crops ✓
- Destroys harmful insects and nematodes ✓

(Any 3 x 1)

(3)

4.4.3 **Mention ONE traditional way used for primary soil cultivation.**

Ploughing with draught animals/hoeing ✓

(1)

4.5 4.5.1 **Identify the structure in QUESTION 4.5.**

A cage marine aquaculture system/aquaculture/fish farming ✓

(1)

4.5.2 **State ONE advantage of the system above to future fish farmers.**

- For food production ✓
- Fish may be exported for foreign exchange ✓
- For local sales and industries ✓
- Fish oil for medicinal use ✓
- Used as supplement in feed ✓
- Offers employment ✓
- For aesthetic reasons ✓

(Any 1 x 1)

(1)

4.5.3 **List TWO basic requirements to achieve high yields of fish in marine fish farming.**

- Good water supply ✓
- Good quality feed ✓
- Good location ✓
- Reliable power supply ✓
- Good planning and support ✓
- Relevant knowledge and skills ✓
- Good breeds/species ✓

(Any 2 x 1)

(2)

4.5.4 **Indicate TWO ways by which a good location is advantageous to a fish farmer.**

- A good location will help the farmer to get good sales ✓
- Good environment will enhance high yield ✓
- A good location will enable good water supply without the use of water pumps ✓ (Any 2 x 1) (2)

4.6 **Differentiate between hydroponics system and open field system of vegetable production in South Africa.**

Hydroponics

The process of growing plants in liquid or other medium with added nutrients but without soil. ✓

Open field system

It involves knowledge and use of soil and agricultural inputs for crop production ✓ (4)

4.7 **List TWO factors (apart from environmental factors) a farmer should consider in locating an area to build a greenhouse.**

- Proximity to market ✓
- A source of power such as electricity for sensors, computers, etc. ✓
- A nearby source of labour ✓
- Sufficient space for storage area, ablutions for workers ✓ (Any 2 x 1) (2)

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