



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2013

**AGRICULTURAL SCIENCES P2
MEMORANDUM**

MARKS: 150

This memorandum consists of 9 pages.

SECTION A**QUESTION 1.1**

1.1.1	A	B	C	D
1.1.2	A	B	C	D
1.1.3	A	B	C	D
1.1.4	A	B	C	D
1.1.5	A	B	C	D
1.1.6	A	B	C	D
1.1.7	A	B	C	D
1.1.8	A	B	C	D
1.1.9	A	B	C	D
1.1.10	A	B	C	D

(10 x 2) (20)

QUESTION 1.3

1.3.1	Tensiometer √√
1.3.2	Selection √√
1.3.3	Harrowing √√
1.3.4	Irrigation √√
1.3.5	Phloem √√

(5 x 2) (10)

QUESTION 1.2

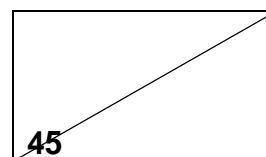
	A ONLY	B ONLY	A and B	None
1.2.1	A	B	C	D
1.2.2	A	B	C	D
1.2.3	A	B	C	D
1.2.4	A	B	C	D
1.2.5	A	B	C	D

(5 x 2) (10)

QUESTION 1.4

1.4.1	nitrification √
1.4.2	weeds √
1.4.3	broadcasting √
1.4.4	flood / basin / furrow irrigation √
1.4.5	quarantine / isolation √

(5 x 1) (5)



SECTION B

QUESTION 2: PLANT STUDIES

- 2.1 2.1.1
- | PHOTOSYNTHESIS | RESPIRATION |
|---------------------------------------------------|----------------------------------------------------|
| Anabolic / building process ✓ | Catabolic / breaking down process ✓ |
| Carbohydrates are stored ✓ | Carbohydrates are broken down ✓ |
| CO ₂ is absorbed from the atmosphere ✓ | O ₂ is absorbed from the atmosphere ✓ |
| O ₂ is released into the atmosphere ✓ | CO ₂ is released into the atmosphere ✓ |
| H ₂ O is absorbed from the soil ✓ | H ₂ O is released into the atmosphere ✓ |
| Energy is used ✓ | Energy is produced ✓ |
| Uses light energy ✓ | Does not use light energy ✓ |
- (Any 2 x 1) (Any 2 x 1) (4)
- 2.1.2
- Light intensity ✓
 - Availability of carbon dioxide ✓
 - Availability of water ✓
 - Temperature of air ✓
- (Any 3 x 1) (3)
- 2.1.3
- Thick cuticles ✓
 - Small, sunken stomata ✓
 - Hairy leaves / trichomes ✓
 - Small leaf surfaces ✓
 - Curled / folded leaves ✓
 - Deciduousness ✓
- (Any 3 x 1) (3)
- 2.1.4
- It produces atmospheric oxygen which is important for the cellular respiration of all living organisms. ✓
 - It produces chemical energy which is stored in food and used by all living organisms for metabolic processes. ✓
 - The oxygen that accumulates in the atmosphere forms a layer of ozone that protects living organisms. ✓
- (3 x 1) (3)
- 2.2 2.2.1
- Soil pH / soil reaction ✓
 - Presence of other nutrients ✓
 - Leaching ✓
 - Crop removal / deforestation / clean clearing ✓
 - Oxidation and reduction ✓
 - Burning ✓
 - Erosion / soil pollution ✓
 - Microbial activity ✓
 - Precipitation ✓
 - Immobilisation ✓
 - Absorption ✓
- (Any 4 x 1) (4)
- 2.2.2
- Soil sample analysis ✓
 - Plant / leaf sample analysis ✓
- (2)

- 2.3 2.3.1 • The figure **22** indicates the percentage mass of the fertiliser that actually contains the elements. ✓
 • **OR**
 • **22** indicates the total amount of nutrients in 100 kg of the mixture ✓
 • **OR**
 • **22** indicates that the fertiliser contains 22% mixture of N.P.K ✓ (1)
- 2.3.2 N = 6
 P = 1
 K = 5

 $6 + 1 + 5 \checkmark = 12 \checkmark$

 Total nutrients in the mixture = 22

 $\%K = \frac{5}{12} \times 22 \checkmark$
 $= \frac{110}{12} \checkmark$
 $= 9,17 \checkmark$ (4)
- 2.4 2.4.1 • Improves soil structure and texture / binds soil particles together to form aggregates ✓
 • It improves the water holding capacity of the soil ✓
 • It reduces soil compaction ✓
 • It improves penetrability of the soil for moisture, mineral nutrients and gases ✓
 • It improves soil aeration ✓
 • Prevents water run-off and erosion ✓
 • Soil will have dark brown colour which absorb heat ✓
 • Reduces stickiness of clay and therefore improves till ability ✓
 (Any 3 x 1) (3)
- 2.4.2 • Storage and handling of the manure ✓
 • The type of animal ✓
 • The age of the animal and the type of feed ✓
 • Nature and quantity of bedding ✓ (Any 3 x 1) (3)
- 2.5 2.5.1 Ovary ✓ (1)
- 2.5.2 Stigma ✓ (1)
- 2.5.3 Pistil / carpel ✓ (1)
- 2.5.4 • Colourful petals attract insects and birds to flowers. ✓
 • Flowers visited by night insects have less bright colours but are often strongly scented. ✓
 • It helps with pollination. ✓ (2)

QUESTION 3: OPTIMAL RESOURCE UTILISATION

- 3.1 3.1.1
- To loosen the soil for better root penetration ✓
 - To incorporate green manure or crop residues ✓
 - To prepare land for surface-flow irrigation purposes ✓
 - To destroy impermeable layers in the subsoil which prevent deep root penetration and water percolation ✓
 - To prepare the soil for seedbed or crop establishment ✓
 - To incorporate lime or fertilisers ✓
 - To control weeds ✓
 - To improve soil aeration ✓
 - To destroy the soil crust and improve infiltration ✓
- (Any 3 x 1) (3)

3.1.2 **Primary soil cultivation**

It involves the first intensive operations / which cut, turn and shatter the soil / and leave a rough surface. / Implements such as mould boards disc and or chisel ploughs, rotary tillers and cultivators are used. ✓ (1)

Secondary soil cultivation

It involves seedbed finishing operations such as levelling / pulverising / firming the top / destroying soil crust / ridging. / Implements used include disk harrows, / zigzag spike tooth harrows / cultivators / ridges / hoes / shovels and rakes. ✓ (1) (2)

3.2 3.2.1 **Irrigation scheduling**

It is a generic term applied to any technique / practice that is intended to help a farmer in determining when ✓ and how to irrigate. ✓ (2)

- 3.2.2
- To maintain adequate water supply to the plant in order to avoid water stress and wilting ✓
 - To avoid unnecessary draining away of water when the soil water holding capacity is exceeded by water quantity. ✓
 - To optimise the water utilisation by the plant as opposed to shortage or excess. ✓
 - To establish how much water is lost due to transpiration and evaporation. ✓
- (Any 3 x 1) (3)

- 3.2.3
- Installation costs are relatively lower than for sprinkler irrigation. ✓
 - Easily allows application of field operations such as weed and pest control. ✓
 - Considerable water savings are realised because the wind does not interfere with water drops from emitters. ✓
 - Saves labour since there is no pulling or changing of pipe stations required during irrigation. ✓
 - Better growth of plants is achieved due to efficiency of water application. ✓
 - Well adapted to any terrain slope including steep hills. ✓
- (Any 3 x 1) (3)

- 3.2.4
- Total dissolved salts in the water ✓
 - Sodium adsorption ratio ✓
 - Presence of toxic ions ✓
 - Organic and inorganic content ✓
- (Any 2 x 1) (2)

3.2.5 Evaporation pan ✓ (1)

3.2.6 Evapo-transpiration = evaporation from pan x crop factor ✓✓
OR
 $E_t = E_o \times F$ ✓✓ (2)

3.3	3.3.1	Hydroponic system	Field system	
		More expensive to establish ✓	Low initial start-up capital required ✓	
		Requires technical expertise ✓	Lower level of expertise required to run it ✓	
		Low space requirement ✓	Higher space required ✓	
		High yield per hectare ✓	Lower yield per hectare ✓	
		High security of production ✓	Security of production lower ✓	
		High quality of product ✓	Lower quality of product ✓	
		Expensive to maintain ✓	Not very expensive to maintain ✓	
		(Any 2 x 1)	(Any 2 x 1)	(4)

- 3.3.2
- Coco peat / coir ✓
 - Wood fibre ✓
 - Peat moss ✓
 - Sawdust ✓
 - Straw bales ✓
 - Vermiculite ✓
 - Rock wool ✓
 - Clay pebbles ✓
- (Any 2 x 1) (2)

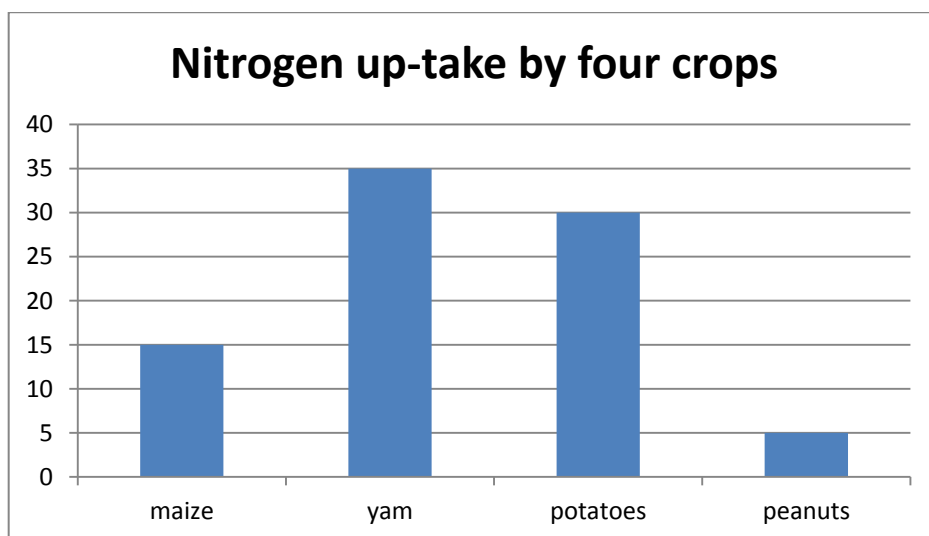
3.4 3.4.1 Aqua culture ✓ (1)

- 3.4.2
- Feed management ✓
 - Dissolved oxygen ✓
 - Optimal temperature for growth ✓
 - pH of 6–8 ✓
 - Maintenance ✓
 - Addition of nitrogenous compounds ✓
 - Disease control ✓
 - Good water quality ✓
 - Protection against predation ✓
 - System which ensures efficient harvesting ✓
- (Any 3 x 1) (3)

- 3.4.3
- Market price and demand ✓
 - Hardiness and adaptability under high densities ✓
 - Knowledge of the species ✓
 - Simple larval development ✓
 - Reproduction capacity in captivity ✓
 - Water temperature ✓
 - Prevailing climatic conditions ✓
 - Water quality and effluent control ✓
 - Lack of competent management skills in aquaculture ✓
 - Some fish species e.g. catfish are very complicated to rear; thus making them very risky to farm ✓
 - Ecosystem factors e.g. issues concerning control of predatory birds and other species ✓
 - High fish farming equipment ✓
 - Costs high feed ✓
 - Production cost ✓
 - High fish transportation cost ✓
 - Availability of suitable financing for aquaculture development ✓
 - Availability of aquaculture information and research ✓
 - Regulatory jurisdiction for aquaculture e.g. regulation of game ✓
 - Poaching and vandalism ✓
- (Any 2 x 1) (2)
- 3.5 3.5.1 Drainage – removal of excess surface or underground water ✓ by artificial or natural way from an area ✓ (2)
- 3.5.2
- Open drains ✓
 - Rock drains ✓
 - Pipe drains ✓
- (3)
[35]

QUESTION 4

4.1 4.1.1



- Correct heading / title ✓
 - Correct labelling of Y-axis and X-axis ✓
 - Correct scaling, using ruler ✓
 - Bar graph ✓
- (4)

- 4.1.2 $35 - 5 \sqrt{} = 30 \sqrt{}$ (2)
- 4.2 4.2.1 Crop rotation $\sqrt{}$ (1)
- 4.2.2 Beans is a legume and the nitrogen fixing bacteria in the root nodules $\sqrt{}$
fixes nitrogen in the soil / add nitrogen to the soil $\sqrt{}$ (2)
- 4.2.3
 - Profitability / crops should have a good market value $\sqrt{}$
 - Pest management $\sqrt{}$
 - Soil moisture and soil fertility $\sqrt{}$
 - Residue management / management skills $\sqrt{}$
 - Crop choice / legumes / companion crop $\sqrt{}$
 - Climate $\sqrt{}$
 - Number of labourers and skills $\sqrt{}$
 - Demand $\sqrt{}$
 - Machinery $\sqrt{}$
 - Crops affected by same pests / diseases or weeds should not be planted in the same soil year after year $\sqrt{}$
 - Crops that require same nutrients from soil should not be planted in the same soil year after year $\sqrt{}$
 - Crops that are expensive to grow and harvest should not be included in the rotation system. $\sqrt{}$ (Any 4 x 1) (4)
- 4.3 4.3.1
 - It provides breeding material for conventional plant breeding. $\sqrt{}$
 - It contributes to the conservation and use of plant genetic resources. $\sqrt{}$
 - It contributes to food safety. $\sqrt{}$
 - It provides additional income to farmers. $\sqrt{}$
 - Desirable traits such as disease-resistance can be induced $\sqrt{}$
 - Plants can be mutated to bear more fruit, flowers and seeds to increase production. $\sqrt{}$
 - Tomato breeding concentrates on disease and pest resistance. $\sqrt{}$ (Any 3 x 1) (3)
- 4.3.2
 - Environmental risk / toxic effects on plants and useful insects $\sqrt{}$
 - Economic risk / small scale farmers / nations may not be able to afford it $\sqrt{}$
 - Health risk / food safety is at risk due to unexpected side effects, causes allergies or toxins $\sqrt{}$
 - Production of mutant weed species / super weeds which are difficult to control $\sqrt{}$
 - Unknown effects on non-target organisms $\sqrt{}$
 - GM crops have a negative impact on biodiversity (Any 3 x 1) (3)

- 4.4 4.4.1 FIGURE 4.4A = Budding ✓
FIGURE 4.4B = Grafting ✓ (2)
- 4.4.2
- It is faster than sexual reproduction because only one parent plant is needed for propagation. ✓
 - Large numbers of offspring can be produced quickly. ✓
 - New plants can be produced from existing plants without using seeds. ✓
 - Pollination agents are not necessary to transfer pollen from one parent plant to another. ✓
 - No fertilisation is necessary. ✓
 - The progeny is genetically identical to the parent plant. Desirable traits are therefore carried from the parent to the new offspring. ✓
 - By selecting just the best plants for propagation, a healthy and desirable progeny is formed. ✓
 - Germination of seeds is unnecessary ✓
 - New plants that develop from the parent plant are adapted to and can thrive in the areas where the parent plants grow. ✓
 - Many horticultural crops cannot be propagated by seed because they produce sterile seeds. ✓
 - Plant propagated by vegetative methods produce flowers and fruits much earlier than seed produced plants ✓ (Any 4 x 1) (4)
- 4.5 4.5.1
- Poor germination and growth ✓
 - Leaf damage resulting in poor photosynthesis ✓
 - Damage to plant tissue leading to secondary infections and pests ✓
 - Damage to roots and stems causing plants to fall or lodge ✓
 - Damage to fruit or grain, rendering it unsellable. ✓
 - Deformation and mottling of plant parts. ✓ (Any 4 x 1) (4)
- 4.5.2
- Preventing the importation of diseased / pest infested plants. ✓
 - Imposing control measures when a disease or pest threatens to become very destructive. ✓
 - Passing of legislation for plant protection. ✓
 - Plant protection research institutes ✓
 - Quarantine measures ✓ (Any 3 x 1) (3)
- 4.5.3
- Identify and monitor pests. ✓
 - Setting action thresholds. ✓
 - Choose appropriate control methods. ✓
 - Monitor and evaluate the results. ✓ (Any 3 x 1) (3)
- [35]

TOTAL SECTION B: 105
GRAND TOTAL: 150