

education

Department: Education **REPUBLIC OF SOUTH AFRICA**

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P1

MEMORANDUM

NOVEMBER 2008

MARKS: 150

1

This memorandum consists of 10 pages.

Please turn over

SECTION A

QUESTION 1.1

1.1.1	Α	XJJ	С	D
1.1.2	Α	В	XJJ	D
1.1.3	XJJ	В	С	D
1.1.4	XJJ	В	С	D
1.1.5	Α	В	XJJ	D
1.1.6	Α	В	С	Xjj
1.1.7	Α	В	XJJ	D
1.1.8	Α	XJJ	С	D
1.1.9	Α	XJJ	С	D
1.1.10	XJJ	В	С	D
(10 x 2) (20)				

QUESTION 1.3

- 1.3.1 temporary wilting/wilting *JJ*
- 1.3.2 adsorption/cation adsorption//
- 1.3.3 budding
- 1.3.4 mechanical/physical/hoeingJJ
- 1.3.5 precision farming/ agricultural technology

(5 x 2) (10)

QUESTION 1.2

1.2.1	A/E _J
1.2.2	FJJ
1.2.3	GIJ
1.2.4	IJ
1.2.5	Мյ
(5 x 2)	(10)

QUESTION 1.4

- 1.4.1 Hydrogen/Aluminium/Ammonium /H⁺ /Al³⁺ /NH₄⁺ J
- 1.4.2 hetero-trophic/parasitic/ saprophytic √
- 1.4.3 Rhizomes/runners/stolons /
- 1.4.4 **vectors** *√*
- 1.4.5 Hydroponics/aquaculture /

(5 x 1) (5)

Question 1.1.1

Please note:

The most correct answer is B.

Responses AJJ and CJJ could be accepted due to the phrasing of the question.

Question1.4.1

In the cases where \underline{acid} was underlined the following response will be accepted: **Brack / alkaline/**

Question 1.4.3 In the cases where <u>along</u> was underlined the following response will be accepted: **Below/Rhizomes/runners/stolons/**

SECTION B

QUESTION 2

2.1 SALINE SOILS

- the upward motion/movement of water with dissolved salts from the soil water table *J*
 - through the micro-pores \checkmark
 - carrying the salt upwards/salt accumulates on surface *J*

(any 2) (2)

- occurs naturally from minerals in the rock *J*
 - solutes in irrigation water J
 - warm climate and low rainfall conditions J
 - in very hot conditions evaporation rates are very high J

(any 3) (3)

(2)

- Bare patches occur in cultivated fields/kills plants/toxic to plants/lower productivity of plants *J*
 - Soil surface becomes powdery/leads to poor soil structure/soil becomes erodable *J*

2.1.4

- When soil is irrigated with brackish water provision to remove excess salts *J*
 - Heavier irrigation with longer intervals provided drainage is adequate J
 - Irrigation of soils originating from sedimentary rocks must be done judiciously *J*
 - Dams, irrigation canals and water furrows must be cemented out J
 - Good quality irrigation water needed *J*
 - Keep the drainage system in good working order/condition J
 - Plant brack resistant crops *J* (any 4) (4)

2.1.5 Calcium sulphate/Gypsum/plaster of Paris/Ca SO
$$_4$$
 J (1)

SCHEMATIC REPRESENTATION OF REACTIONS IN THE CHLOROPLAST 2.2

	2.2.1	Photosynthesis <i>J</i>	(1)
	2.2.2	 Liquid A: water(H₂0) ↓ Gas B: carbon dioxide(CO₂) ↓ Gas C: oxygen(O₂) ↓ 	(3)
	2.2.3	Chloroplast/chloroplastid J	(1)
	2.2.4	 high growth rate as levels of gas B increaseJ growth rate stabilises at very high levels of gas B/CO₂ J and vice versa 	(2) [7]
2.3	BROAD	CASTING VERSUS BAND PLACING	
	2.3.1	 fertiliser is evenly spread/distribution/scattering/spreader is used for this practice/uniform application by hand J over the whole soil surface J 	(2)
	2.3.2	Yield/output/growth tempo/production J	(1)
	2.3.3	 highly leached soil(sand)/soil with low nutrient levels/acid soil J placing the nutrients closer to the plant will improve growth/ nutrients closer to plants will easily reach the crop roots J 	(2)
	2.3.4	 At lower tempo/rates of fertiliser application, higher yields are obtained by band placing of fertilisers <i>J</i> At higher fertiliser application the broadcasting of fertiliser reached higher yields <i>J</i> 	(2) [7]
2.4	NO-TILL	_	
	2.4.1	 Tillage practice whereby the farmer plants his seed directly into the soil while the residue of the previous crop is still on the field/soil without ploughing the soil. <i>J</i> Whereas conventional tillage involves a range of tillage operation that turns the soil and prepare it for planting.<i>J</i> 	(2)
	2.4.2	 (a) Economic aspects Fuel saving in tractors and implements/less expensive J Quick access to land J Good for resource poor farmers where there is less capital J Costs of buying fertilizer reduced due to correct balance of soil organisms/Cost of employing labour is reduced J Better water management/reduces erosion J 	

- Better water management/reduces erosion \mathbf{V}
- Time saving J•

5 NSC – Memorandum

(b) Crop aspects

- Crop tastes superior
- Vegetables sweeter *J*
- Vegetables have a longer shelf life/better quality
- Higher yields *J*
- Nutrients are better utilised \mathbf{J} (any 1)

2.5 SOIL EROSION AND ENTERPRISES

- Crop (agronomic) enterprises/grain J
- Horticultural enterprises/fruit/vegetable/ornamental production J
- Timber enterprises/forestation J•

[3] [35]

(2)[4]

QUESTION 3

3.1 SOIL SURVEYANCE

- 3.1.1 Iron compounds underwent chemical changes /oxidation of • iron compounds
 - Haematite/minerals in mother/parent rockJ
 - Aerobic conditions/enough oxygen/well aerated
 - Well drained and warm/good air:moisture conditions

(any 3) (3)

- 3.1.2 Contains iron minerals in soil/haematite/augite J •
 - Aerobic conditions J
 - Soil well drained/Good air to water ratio J •
 - (4) Suited for deep rooted crops/good growth conditions *J*
- 3.1.3 Clay moves downwards/washed/eluviated from A/topsoil to • B horizon/sub soil ✓
 - illuviated into the B horizon/sub soil /from the A horizon/topsoil to the B horizon/sub soil J
 - leaching of clay particles with soil water movements J (any 2) • (2)
- 3.1.4 Application of organic material/compost/farm manure/green • manure/guano J
 - Soil under permanent grass cover/crops with good fibrous • root system *J*
 - Ploughing of soil at correct water content \mathbf{J} •
 - Application of lime *J*
 - Crop rotation/ley cropping \mathbf{J} (any 2) (2) •

3.1.5

3.2

(a) Applied at the time of sowing because fertilizers cannot leach

(1)

	easily due to high clay content \checkmark	. ,
	 (b) Spray- or micro-irrigation – good sideward movement of water in soil (per application) <i>J</i> there can be longer intervals between irrigations <i>J</i> more irrigation (addition of water) at one time/less leaching (any 2) 	(2) [14]
PLUM C	RCHARD	
3.2.1	Cross pollination/Cultivar B is used to supply pollen for cross- pollination with Cultivar A/to repel pest/assist in the increase of fruit production/good fruit setting /	(1)
3.2.2	Cultivar B is placed in such a way that these trees are evenly spread in the orchard/close to most of the trees/better pollination by pollinating agents <i>J</i>	(1)
3.2.3	 Insects/bees for cross pollination/good fruit setting <i>J</i> The production of honey/wax as a secondary product <i>J</i> 	(2)
3.2.4	 Work space for movement of traffic or orchard workers and workspace not needed in the row J More effective light penetration on the sides of trees and not needed in the row J Enough root volumes (to the sides) for the trees because roots can reach soil volumes to their sides J Reduce the competition effect between trees from next row and in the rows the competition effect is managed (pruning etc.) J (any 2) 	(2)
3.2.5	photosynthesis/vegetative growth JJ	(2)
3.2.6	 Pruning J Trellising J Leaf management J Row direction J Green house/tunnels/hot house J (any 2) 	(2) [10]
GRAPH	ON AGRICULTURAL CHEMICALS	
3.3.1	 Fungicide – chemical substance used to kill fungi or fungal growth J 	

Herbicide – chemical substance used to kill weeds/plants/herbs J
 (2)

3.3

- 3.3.2 Herbicide/Herbicide expenditure **√** and any 1 of the following:
 - More modern agricultural methods like minimum tillage require more herbicide use *J*
 - more weeds had become resistant to herbicides and require higher doses
 - larger areas might have come into production and require more chemicals/less mechanical control of weeds
 - herbicides have become more expensive *J*

(2) [4]

(1)

3.4 SOIL SURVEYING

- 3.4.1 **Aim**: To determine the exact agricultural value of your soil and use it accordingly/determine the suitability of the soil for agricultural practices/purposes *J*
- 3.4.2 **Included in design**: Steps of surveying process (any order)
 - Aerial photographs of a region are taken and studied J
 - A preliminary indication of the layout, topography, drainage patterns, etc. is made √
 - Survey area is visited and various details are indicated on the aerial photograph J
 - A more intensive soil survey is now done, using soil profiles and test holes and identifying the soil profile *J*
 - The morphological properties of the soil are now indicated (depth, colour, texture, structure, mottling, etc.) √
 - Interpretation of the final data on a soil map is done and a new strategy for implementation is worked out *J*

(6) [7] **[35]**

QUESTION 4

4.1 SOIL BACTERIA

4.1.1	Rhizobium species/Nodular/Nodule bacteria /		
4.1.2	Legumes, lucerne, clover, peas, cowpeas, different type of beans, acacias, peanuts/groundnuts, lupin J+J (any 2)	(2)	
4.1.3	 Mutualism √ 		

• both organisms benefit from this relationship J (2)

- 4.1.4 Bacteria make use of nitrogen gas from soil air to synthesise body proteins *J*
 - The bacteria in the nodules convert nitrogen gas (N_2) to ammonia (NH_3) J
 - The ammonia (NH₃) dissolves in soil water to form ammonium ions (NH₄⁺) J
 - The plant roots can absorb $NH_4^+ J$
 - Bacteria get carbohydrates from the plant roots *J*
 - Proteins in dead bacteria are converted to ammonium compounds and nitrates *J*

(4) [9]

4.2 **EARTHWORMS**

4.2.1	 Location B: highest average = 13,75 or 14 (total / 4) ↓ Location A: lowest average = 1,5 or 2 (total / 4) ↓ 	(2)
4.2.2	 Location A – lowest number of organisms: Area was tilled often which kills organisms/many chemicals used in this area which kill organisms/not much organic material is added to the soil which serves as nutrition for organisms <i>J</i> and Location B – highest number of organisms: back of 	
	classroom with little traffic (undisturbed soil)/lots of organic matter added to the soil when grass is cut/no contamination with hazardous chemicals <i>J</i> Comparisons can also include Location C	(2)
4.2.3	Use less chemicals in garden/add more organic material to soil/only till soil when absolutely necessary ${m J}$	(1) [5]
FERTIL	ISATION PROGRAMME	
4.3.1	 (a) Urea J very soluble / low unit value J (b) Rock phosphate J 	(2)
	improves the release of phosphates/limits phosphate deposition ${m J}$	(2)
	 (c) dolomitic lime J treats acid soil and contains magnesium J 	(2)
4.3.2	 400 mm scenario = 85 kg/ha √ 550 mm scenario = 120 kg/ha √ and 	
	 higher rainfall has a higher yield potential and therefore needs more nitrogen J 	
	 higher rainfall leads to more leaching which requires more nitrogen application J 	
	vise versa	(4)

4.3

9 NSC – Memorandum

[14]

4.3.3	nitrogen levelsdecomposition	levels in the soil fluctuate too much/leaching J position of organic protein J (any 1)		
4.3.4	N in 3:2:5 (35) is: 3+2+5 = 10√ 3/10√ x 35 √ = 10,5% or kg N√	3+2+5 = 10J or $35/10J$ = $3 \times 3,5 J$ = 10,5% or kg NJ	(any 3)	(3)

4.4 **IRRIGATION SYSTEMS**

- 4.4.1 Irrigation system A: sprinkler irrigation *J*
 - Irrigation system B: drip irrigation/micro irrigation *J* (2)

4.4.2 Graph: Efficiency of irrigation system



Irrigation systems√

CRITERIA	INDICATORS		
Heading	No heading 0	Correct heading 1	
Indicators	No indicators 0	Only one axis has an correct indicator 1	Both axes provided with correct indicators 2
Descriptors	No descriptors 0	All bars have correct descriptors 1	
Neatness, size and proportion	No neat bars and did not use a ruler for lines and no measured distances Not in proportion, incorrect size and wrong scale. 0	Neatly drawn bars and used a ruler for lines and measured distances and in perfect proportion and correct size and correct scale 1	
TOTAL	(5)		

[7] **[35]**

TOTAL SECTION B: 105

GRAND TOTAL: 150