



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

AGRICULTURAL SCIENCES P1

FEBRUARY/MARCH 2009

MEMORANDUM

MARKS: 150

This memorandum consists of 9 pages.

SECTION A/AFDELING A**QUESTION 1.1 / VRAAG 1.1**

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

(10 x 2) (20)

QUESTION 1.2 / VRAAG 1.2

1.2.1	F//
1.2.2	G//
1.2.3	I//
1.2.4	H//
1.2.5	J//

(5 x 2) (10)

QUESTION 1.3 / VRAAG 1.3

- 1.3.1 Soil profile//
- 1.3.2 Capillary movement /
Capillarity//
- 1.3.3 Rhizobium / Nodular bacteria//
- 1.3.4 Eelworms / Nematodes//
- 1.3.5 Plant succession// (5 x 2) (10)

QUESTION 1.4

- 1.4.1 Clay / Colloid
- 1.4.2 Structureless / Amorphous
- 1.4.3 Pistil
- 1.4.4 Compost
- 1.4.5 Drainage
- (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B**QUESTION 2****2.1 Composition of soil (diagram of soil particles)**

- 2.1.1 (a) A
(b) C
(c) B (3)

2.1.2 Sandy soil (1)

2.1.3 Nitrogen (1)

- 2.1.4 • Organic material
• Water
(any one) (1)

2.2 Water tension in the soil (water tension graph)

2.2.1 Dry soil: rapid seepage of water from the ceramic tip into the soil
Wet soil: slower movement of water from the ceramic tip into the soil (2)

2.2.2 1 atmosphere (2)

2.2.3 **Reasons for clay soil having a higher water retention:**
Clay soil has more micropores
Micropores hold the largest volume of water in the soil
Stronger capillary forces in the pores of the soil
Clay soil has better physical characteristics because of better soil structure
Clay soil has more organic matter that increases water retention
(Any 2) (2)

2.2.4 Saturation / Field water capacity (1)

2.2.5 15 atmosphere (1)

2.3 The technique of asexual reproduction

2.3.1 Tissue culture (1)

2.3.2 Laboratory / Greenhouse / Controlled environment (1)

2.3.3 **TWO factors necessary for the development of this plant:**
Light
Food / Soluble nutrients
Water
Space
(Any 2) (2)

- 2.3.4 **TWO advantages for using this technique:**
 Identical plants/clones are produced
 Production of many plants within a short space of time
 Production of healthy plants
 Plantlets are protected from harsh environmental factors
 Plantlets are protected from diseases and pests (Any 2) (2)
- 2.3.5 Plant hormone / Hormone / Rootone or similar example (1)
- 2.4 **TWO methods of propagating this plant**
- 2.4.1 **TWO methods to produce more plants:**
 Good crop care management practice
 Scientific management practices
 Raising seedlings
 Tissue cultures
 Cuttings (Any 2) (2)
- 2.4.2 **ONE way to ensure that plants are not destroyed:**
 Enforcing conservation laws/acts that will protect/regulate its usage
 Education programmes mainly aimed at the youth
 Promoting conservation through marketing programmes (Any 1) (1)
- 2.4.3 **TWO ways to control pests biologically:**
 Introduction of trap crops in the intercropping system
 Planting of insect-resistant cultivars
 Introduction of predators that are natural enemies of the insects (2)
- 2.4.4 Selective herbicide (1)
- 2.4.5 It kills certain groups of plants and does not affect others / It is designed to kill the weeds without damaging the crops. (1)
- 2.5 **Data with regard to a farm (Mr Berg)**
- 2.5.1 **TWO reasons for not planting maize:**
 The soil is shallow / Soil only 60 cm deep
 Poor in nutrients
 Poorly drained / Waterlogged
 Not well aerated (Any 2) (2)
- 2.5.2 **Most suitable field for crop production and ONE reason:**
 Field 1
Reason:
 Well aerated and well drained
 Depth desirable
 Good ratio of sand and clay particles / Favourable texture of sandy

- loam (Any 2) (2)
- 2.5.3 Winter (1)
- 2.5.4 **The importance of locality for this farm:**
Influences the production lines that can be practised on a farm
The soil in a location will determine the type of crop production
The rainfall (climate) in a location will determine the type of crop production
Distance of the farm to the market place will influence cost
(Any 1) (1)
- 2.5.5 **ONE reason for this farm being economically viable:**
It is situated in an area that receives 700 mm rainfall
It has a large surface area (700 ha)
It has possibilities with regard to crop and animal production
(Any 1) (1)
- [35]**

QUESTION 3**3.1 Investigation of the infiltration rate and water for different soil types**

- 3.1.1 (a) Will hold the soil in the container but allow water to drain throughout
(b) The difference in measurements are compared for soils that receive equal treatments / To make a scientific/objective comparison
(c) A stopwatch gives the exact time because the rate of seepage is measured (3)
- 3.1.2 **THREE reasons for good infiltration rate:**
Topsoil contains more organic material
Good developed soil structure
Topsoil has a lower clay content (clay has been washed into the soil)
Topsoil has normally been cultivated / Less compaction (Any 3) (3)
- 3.1.3 The water must be weighed to determine which soil released the most water / has the highest water-holding capacity. (1)

3.2. Lady using indigenous knowledge for the making of clay pots

- 3.2.1 A (1)
- 3.2.2 **THREE physical characteristics of this soil:**
Non-swelling clay / Doesn't shrink and swell in wet and dry situations
Very soft when it's wet
Hard and compact when dry
Particles have a high plasticity
Particles have high cohesion capacity (Any 3) (3)
- 3.2.3 **Characteristics of the soil suitable for this structure:**
Durable for a long period
Hold liquids / Water tight
Doesn't crack
Strong when dry
Leaves a smooth surface (Any 2) (2)
- 3.2.4 Cool / Colder soil (clay soils are normally more wet) (1)

3.3 Pesticides and pest control

3.3.1 Mosquito (1)

3.3.2 **TWO characteristics of the poison substance:**

It is non-biodegradable / does not fully decompose in the soil (plant)

It kills non-target organisms such as the helpful species like bees

It is absorbed in the blood system of the organisms

DDT disturbs the whole ecosystem / negatively affects the food chain (Any 2) (2)

3.3.3 **THREE disadvantages of injudicious use of pesticides:**

Pollution of the soil

Pollution of water resources

Beneficial organisms are poisoned in the ecosystem

Food for human and animal consumption may be contaminated with poison (Any 3) (3)

3.3.4 DDT / Dieldrin / Insecticide (1)

3.4 Process of photosynthesis

3.4.1 A – Carbon dioxide (CO₂)
B – Oxygen (O₂) (2)

3.4.2 Sunlight
Chlorophyll (2)

3.4.3 Starch (1)

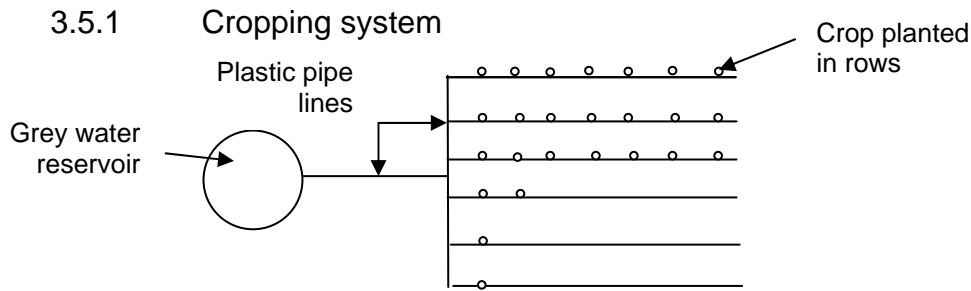
3.4.4 **TWO reasons for storage of product in insoluble form:**

Relatively inactive – will not take part in chemical reactions

Takes up less storage space

Osmotic potential of cell sap is not affected (Any 2) (2)

3.5 **Production systems**



Mark with following checklist:

CRITERIA	Visible / Yes 1 mark	Not visible / No 0 mark
Crops planted with a clear pattern		
Pipes spread between crop plants		
Grey water reservoir is connected to pipe lines		

(3)

3.5.2 **ONE method to increase water retention capacity:**

Mulching

Incorporating organic matter / household waste / compost

Minimum tillage

Organic farming practices

(Any 1)

(1)

3.5.3 **Water/Rainfall**

Soil

(2)

3.5.4 **ONE method to control soil erosion:**

Planting crops in rows across the gradient line

Creation of contour walls

Keep soil under cover in rainy season

Careful soil cultivation practices

Adding organic material to the soil (green manure)

(Any 1)

(1)

[35]

QUESTION 4

4.1 **Soil temperature**

4.1.1 25 cm

(1)

4.1.2 **Difference in soil temperature:**

At 1 cm depth the fluctuation between day and night temperatures is very high.

At 10 cm depth the difference between day and night temperatures is very small.

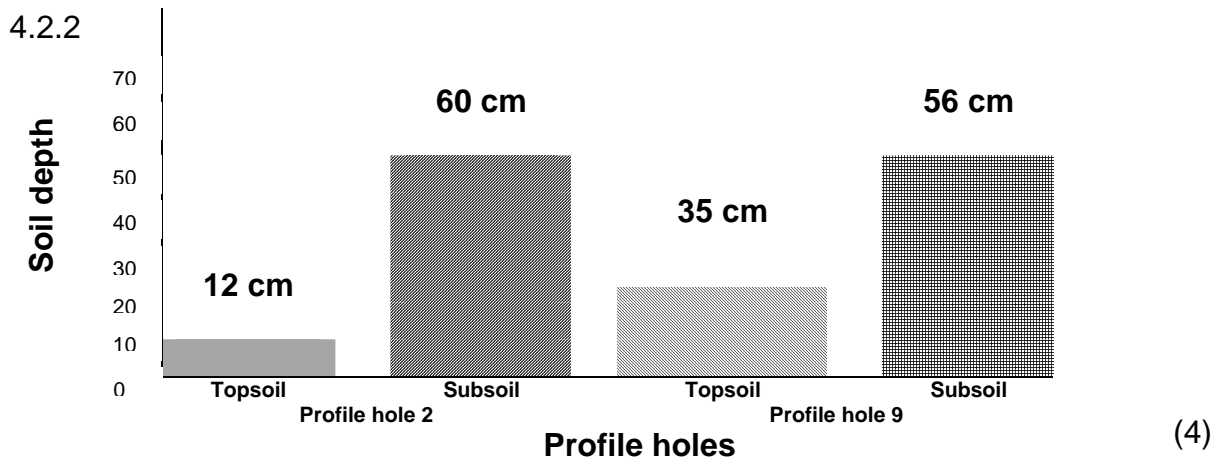
(2)

4.1.3 **Reason for the phenomenon in QUESTION 4.1.2:**
 Variation in soil temperature decreases with an increase in soil depth.
 Mineral soil particles have a higher heat conductivity as soil air therefore the more densely the soil particles are packed the more heat is conducted to the deeper layers of soil.
 At a certain depth there are very little changes in temperature. (1)

4.1.4 **THREE factors influencing soil temperature:**
 Moist or dry atmosphere and cloud cover
 Moisture content of the soil
 Orientation of the land
 Vegetation and soil cover (Any 3) (3)

4.2 **Soil profile holes**

4.2.1 Profile hole 10 and
 Deepest soil overall
 Has the deepest fertile topsoil horizon (fertile part of soil)
 Large soil volume in a deep soil (reserve soil nutrients)
 Large volume of soil can hold more water (water reservoir)
 Large volume of soil for root growth (Any 3) (3)



CRITERIA	INDICATORS		
Correctness	Not a bar graph, incorrect values and no headings 0	Bar graph or correct headings 1	Bar graph and correct values and correct headings 2
Neatness	No neat bars and did not use a ruler for lines and no measured distances 0	Neatly drawn bars or used a ruler for lines or measured distances 1	Neatly drawn bars and used a ruler for lines and measured distances 2
TOTAL	(4)		

4.3 Leaf samples/analysis**4.3.1 Purpose of leaf samples**

To determine the levels of nutrient elements in the plant
 Gives an indication of nutrient imbalances within the plant
 Determine the fertiliser requirements

(Any 2) (2)

4.3.2 December to February

(1)

4.3.3 Morning (10:00 am)/afternoon/during night period
Nutrients are stable/less transpiration/evaporation

(2)

4.3.4 Nutrients may dissolve in water and get washed off plant sample

(1)

4.3.5 Some plastic bags may carry soluble compounds that may add nutrient elements to leaves

(1)

4.4 Alien plants and conservation farming**4.4.1** Conservation of Agricultural Resources Act (CARA)

(1)

4.4.2 Category 1: Declared weeds

Category 2: Declared invader plants (with value)

Category 3: Declared invader plants (mostly ornamental)

(3)

4.4.3 Invade water sources and use valuable water

Encroaching in the pastures decreasing their carrying capacities

Declared weeds can be harmful to humans, animals and the environment, e.g. prickly pear or lantana

Some are poisonous to humans and animals

(Any 3) (3)

4.5 Irrigation**4.5.1** Spray/Sprinkler

Ideal because the sheep will be kept on the pastures permanently

Sheep utilising the pastures may damage drip irrigation pipes

(2)

4.5.2 Renders electronic assistance

Calculates quantities of water required and applied

Applies and controls the irrigation system

Software used in more scientific irrigation

Use for crop growth simulation programmes

(Any 1) (1)

4.5.3

INSTRUMENT	FUNCTION
• Tensiometer	Measures the soil moisture tension through imitating the root action of plants
• A-Pan	Measures the amount of water lost through evaporation
• Rain gauge	Measures the quantity of rain that falls
• Electronic weather station	Collects the required weather data and transmits it to a computer
• Wind meters	Measures the speed at which wind is travelling

(any 2)

(4)
[35]**TOTAL SECTION B: 105****GRAND TOTAL: 150**