



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

AGRICULTURAL SCIENCES P1

FEBRUARY/MARCH 2009

MARKS: 150

TIME: 2 hours

This question paper consists of 20 pages and an answer sheet.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. SECTION A (QUESTION 1) must be answered on the attached ANSWER SHEET.
3. SECTION B (QUESTIONS 2 to 4) must be answered in the ANSWER BOOK.
4. Start EACH question from SECTION B on a NEW page.
5. Read ALL the questions carefully and make sure you answer only what is asked.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Place the completed ANSWER SHEET for SECTION A (QUESTION 1) inside the ANSWER BOOK.
8. Write neatly and legibly.

SECTION A**QUESTION 1**

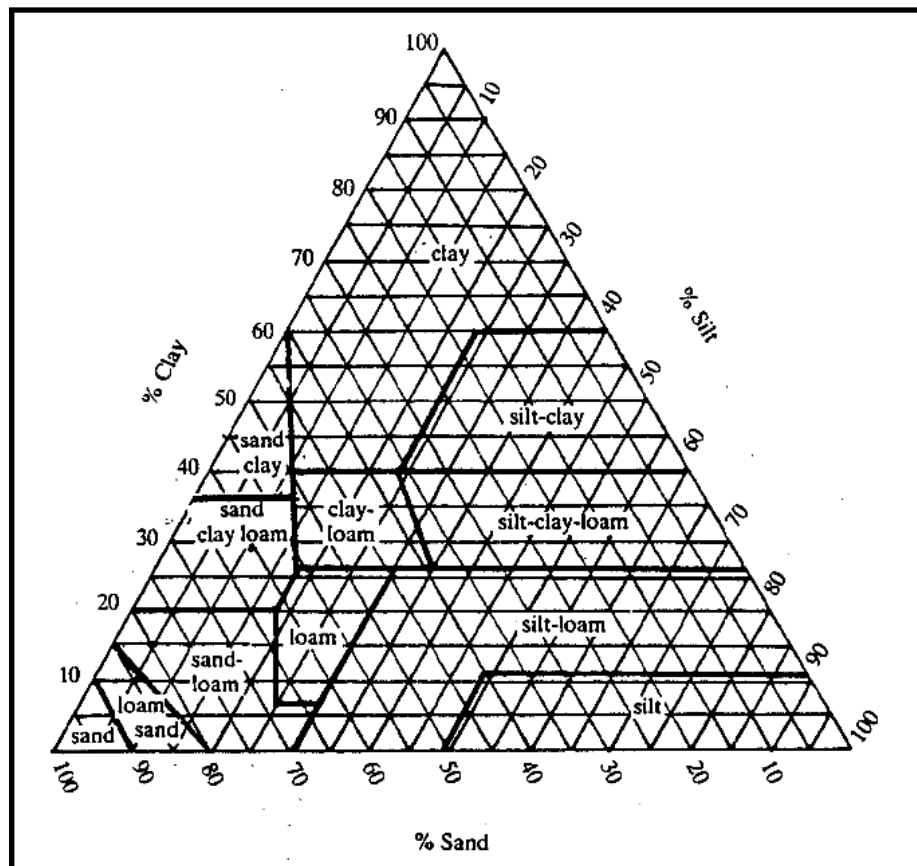
- 1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and make a cross (X) in the block (A – D) next to the question number (1.1.1 – 1.1.10) on the attached ANSWER SHEET.

Example:

1.1.11	<input checked="checked" type="checkbox"/>	A	B	C	D
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- 1.1.1 A soil horizon which shows signs of reduction under waterlogged conditions is the ...
- A B-horizon.
 - B G-horizon.
 - C C-horizon.
 - D E-horizon.
- 1.1.2 When a sandstone rock with a low iron content weathers, it will result in a soil of which the colour would be ...
- A yellow.
 - B light.
 - C dark.
 - D red.

- 1.1.3 The texture diagram below shows sand, silt and clay content for the different texture classes. A soil sample consisting of 20% silt, 60% sand and 20% clay will be classified as ...



- A sand.
B loam.
C loam-sand.
D silt-loam.
- 1.1.4 The ideal condition of a good soil is a proportion of ... respectively between solid soil particles, the macropores and the micropores measured as percentages.
- A 25:25:50
B 25:50:25
C 60:25:15
D 50:25:25
- 1.1.5 Which ONE of the following elements does not fit in with the rest?
- A Potassium
B Copper
C Nitrogen
D Phosphorus

1.1.6 During photosynthesis, ... is the starting molecule from which other complex compounds are formed.

- A fructose
- B maltose
- C galactose
- D glucose

1.1.7 The active absorption of cations in the plant cell takes place by means of ...

- A diffusion.
- B osmosis.
- C a carrier molecule.
- D respiration.

1.1.8 The quantity of nitrogen measured in kilograms in a 50 kg bag of urea (46%) is ... kg.

- A 23
- B 12
- C 46
- D 30

1.1.9 Which ONE of the following is NOT a contributory factor to soil erosion in South Africa?

- A Incorrect cultivation
- B Temperature
- C Slope of land
- D Veld fires

1.1.10 An important requirement for pesticides to be registered is the ...

- A degradability of the pesticide.
- B period of activity.
- C toxicity of the pesticide.
- D proposed price.

(10 x 2) (20)

- 1.2 Choose a word/phrase from COLUMN B that matches a description in COLUMN A. Write only the letter (A – J) next to the question number (1.2.1 – 1.2.5) on the attached ANSWER SHEET, for example 1.2.6 N.

COLUMN A	COLUMN B
1.2.1 Adsorbed hydrogen ions	A conventional tillage
1.2.2 Water held against the force of gravity	B adhesion water
1.2.3 Wheat inflorescence	C fruit setting
1.2.4 A method of organic fertilisation	D active acidity
1.2.5 Keeping plant cover on soil surface	E negatively charged ions
	F reserved acidity
	G field water capacity
	H green manuring
	I spike
	J mulching

(5 x 2) (10)

- 1.3 Give ONE term/phrase for each of the following descriptions. Write only the term/phrase next to the question number (1.3.1 – 1.3.5) on the attached ANSWER SHEET.
- 1.3.1 A vertical section through soil showing the different soil horizons
- 1.3.2 The upward movement of water through micropores in the soil
- 1.3.3 The specific type of symbiotic bacteria that are capable of fixing atmospheric nitrogen in the nodules of legume plant roots
- 1.3.4 The microscopic soil worms that attack plant roots
- 1.3.5 The phenomenon where different plant species succeed each other in an ecosystem (5 x 2) (10)
- 1.4 Change the underlined words in the following statements to make them TRUE. Write the appropriate word next to the question number (1.4.1 – 1.4.5) on the attached ANSWER SHEET.
- 1.4.1 The silt particles in the soil have a diameter smaller than 0,002 mm.
- 1.4.2 A platy soil structure does not have a particular fixed shape.
- 1.4.3 The stamen of the flower consists of the stigma, style and ovary.
- 1.4.4 An organic fertiliser that is made from household waste, kitchen waste, et cetera is called farm manure.
- 1.4.5 Run-off is the method used for the removal of excess water from the soil by natural or artificial means. (5 x 1) (5)

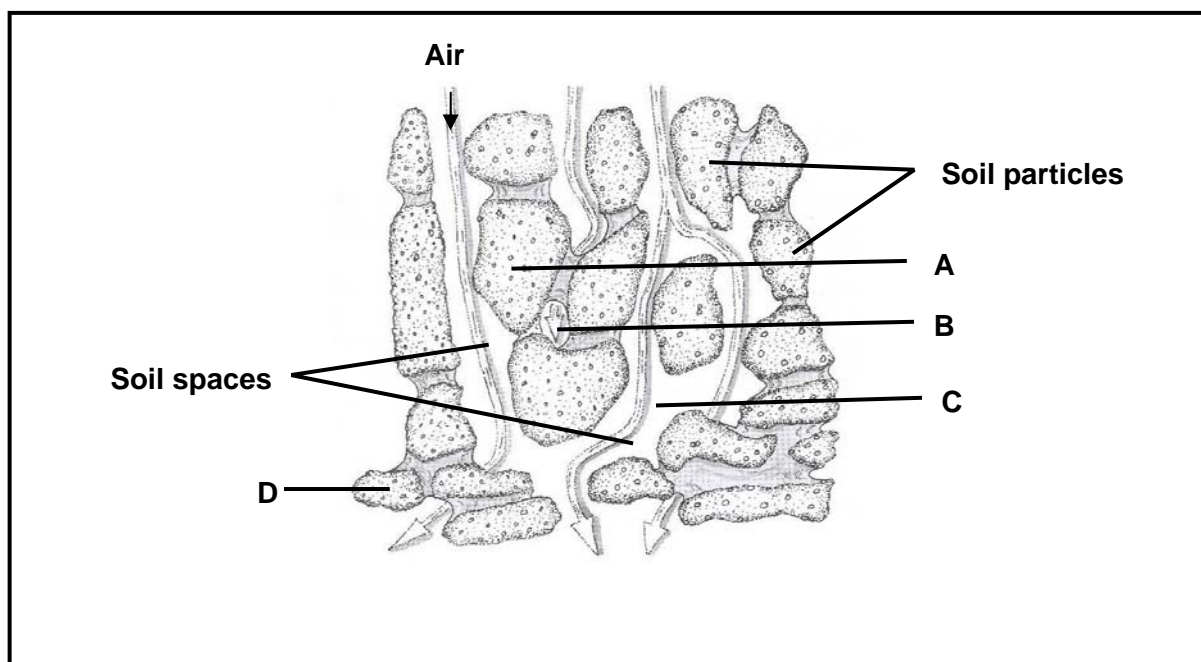
TOTAL SECTION A: 45

SECTION B

Start this question on a NEW page in the ANSWER BOOK.

QUESTION 2

2.1 The following diagram shows the enlarged soil particles present in a soil.



2.1.1 Choose from the labels **A** to **D** the part that would best fit the following descriptions:

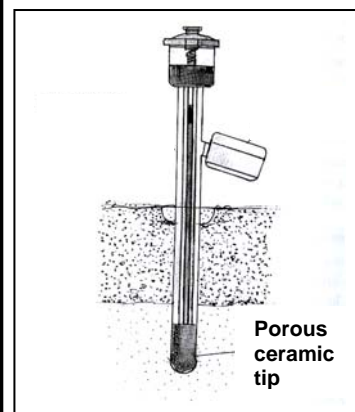
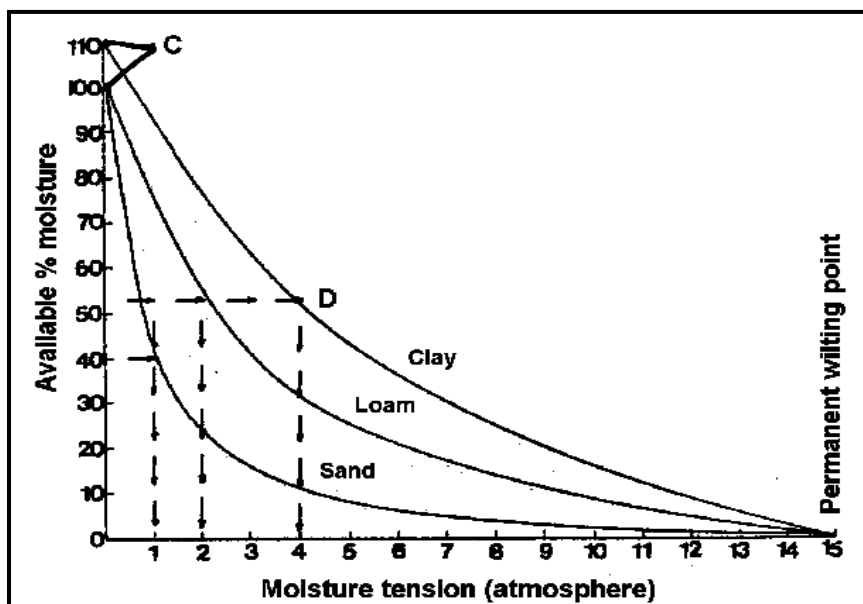
- | | |
|--|-----|
| (a) Sand particle | (1) |
| (b) Macropore | (1) |
| (c) Part that will store water in the soil | (1) |

2.1.2 Indicate the soil fraction which would have the spaces represented by **C** as predominant spaces. (1)

2.1.3 Name the gas that is predominantly found in the spaces in the above soil. (1)

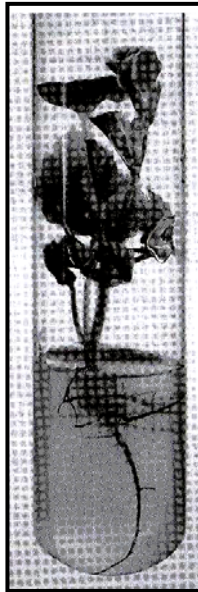
2.1.4 Name a component of soil which is not visible in the above diagram. (1)

- 2.2 The graph below represents available soil moisture compared to the moisture tension for a clay, loam and sandy soil. The diagram on the right represents a device that is used to measure water tension in the soil.



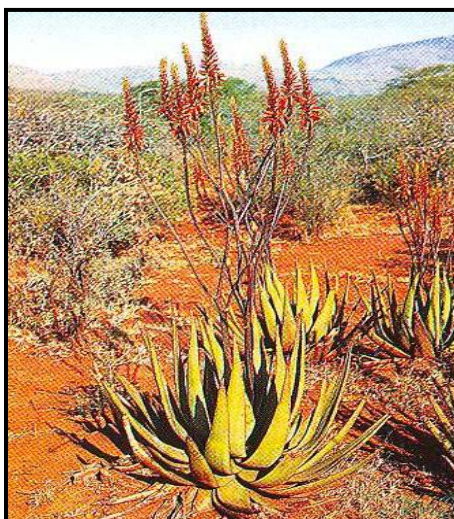
- 2.2.1 During the measurement of soil water tension, the water seeps through the ceramic tip of the device to measure soil water tension. Describe the difference in the rate of water seepage from the ceramic tip into the soil in a dry and in a wet soil. (2)
- 2.2.2 Use the data in the graph and deduce the reading on this device measured in atmosphere at 40% available water content of a sandy soil. (2)
- 2.2.3 Explain why the clay soil can retain a higher percentage of soil moisture. (2)
- 2.2.4 What do we call the situation at C on the graph? (1)
- 2.2.5 Deduce from the graph above the reading measured in atmosphere on this device used to measure water tension at permanent wilting point. (1)

- 2.3 The picture below is based on the technique that is used in the propagation of plants.



- 2.3.1 Identify the asexual reproduction technique that is illustrated above. (1)
- 2.3.2 Name the most suitable structure or place (environment) where this technique can be practised on a large scale. (1)
- 2.3.3 Name any TWO essential factors visible from the picture above that will lead to the development of the plantlet. (2)
- 2.3.4 Name TWO advantages for using this technique in agriculture. (2)
- 2.3.5 Name a type of chemical that could be added to the solution to promote root growth. (1)

- 2.4 Aloes (*Aloe spp*) are indigenous plants that are used traditionally by herbalists because of their medicinal value. Commercial farming that involves tapping their sap to manufacture cosmetic products is in full swing. The plants propagate sexually at the moment. A common insect has been observed parasitising them. Annual and perennial weeds are growing with them and pose a threat of interspecific competition. Consider all possible methods you would apply in answering the questions below.



- 2.4.1 Name TWO methods that can be used for producing more plants so that farmers can ensure the sustainability of their operation. (2)
- 2.4.2 Nature conservationists need to ensure that these plants are not completely destroyed in their natural habitat. Suggest a way to ensure this objective. (1)
- 2.4.3 Describe TWO ways through which pests on these aloes can be controlled biologically. (2)
- 2.4.4 Name a herbicide that will kill weeds without damaging the aloe plants. (1)
- 2.4.5 Justify your answer to QUESTION 2.4.4. (1)

2.5 Mr Berg recently bought a farm in the Eastern Cape. He wants to plan properly before he starts farming. An analysis of the property revealed the following:

- Farm size: 700 ha
- Arable land: 300 ha
- Grazing land: 400 ha
- Annual average rainfall: 700 mm

The arable land is divided as follows:

FIELD	SIZE	CHARACTERISTICS
Field 1	100 ha	Soil depth = 1 m Colour = red Texture = sandy loam
Field 2	50 ha	Soil depth = 60 cm Colour = mottled/grey Texture = clay
Field 3	75 ha	Soil depth = 85 cm Colour = yellow Texture = sandy
Field 4	75 ha	Slope = incline 1,5% Soil depth = 1,5 m Colour = red Texture = loam

The grazing land is divided as follows:

CAMP	SIZE	CHARACTERISTICS
Camp 1	150 ha	Hilly environment with good but slightly sour veld
Camp 2	100 ha	Good veld, red grass
Camp 3	75 ha	Wetland
Camp 4	50 ha	Eragrostis, established pasture
Camp 5	25 ha	Mixed veld

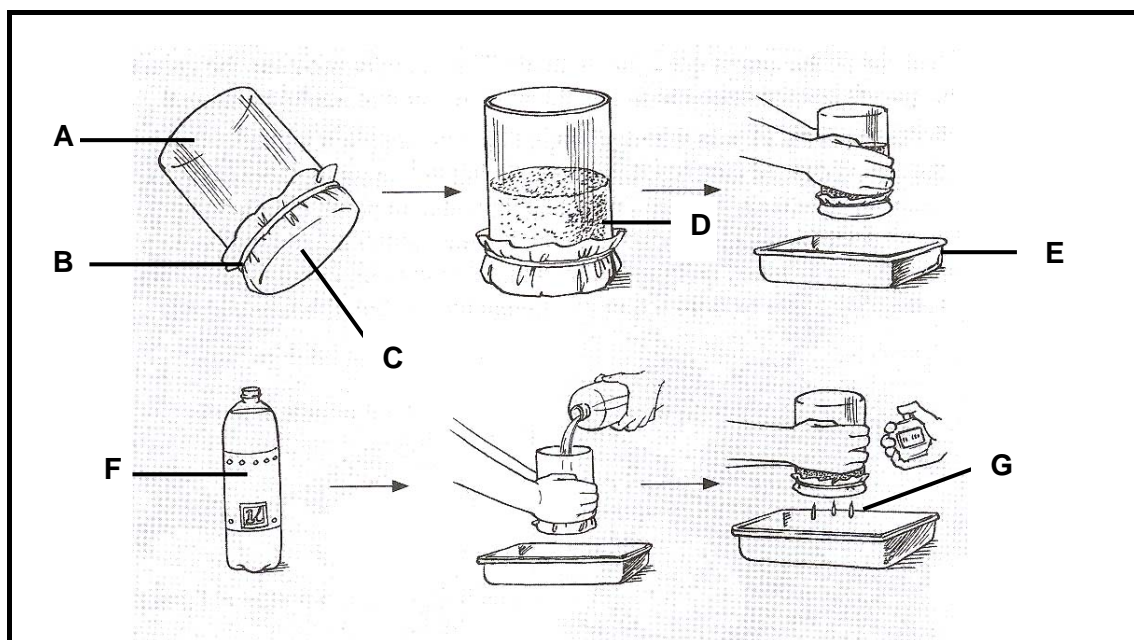
- 2.5.1 Give TWO reasons why it is not advisable to cultivate maize in Field 2. (2)
- 2.5.2 Name the most suitable field to cultivate cash crops. Give a reason for your answer. (2)
- 2.5.3 What time of the year is best to graze Camp 3? (1)
- 2.5.4 State the importance of the locality in the planning of a farm. (1)
- 2.5.5 The farm is an economical viable unit. Deduce from the data above the most important reason to support this statement. (1)

[35]

Start this question on a NEW page in the ANSWER BOOK.

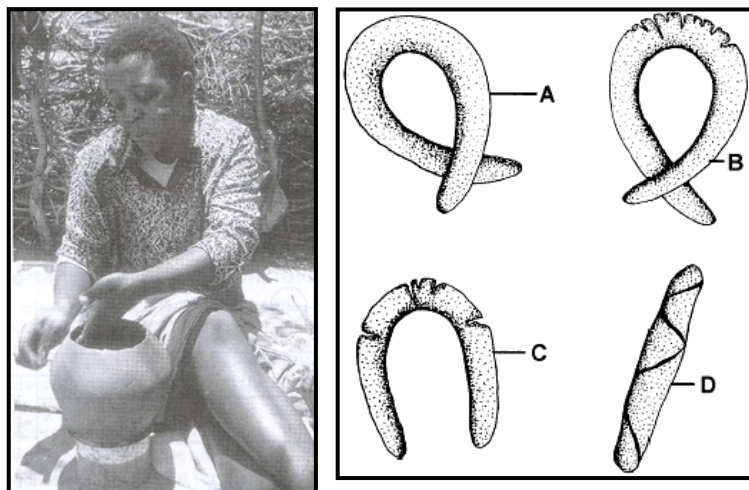
QUESTION 3

- 3.1 The diagrams below indicate a procedure that was followed by Agricultural Sciences learners trying to investigate the infiltration rate and water capacity of four different soil samples taken from soils at different locations.



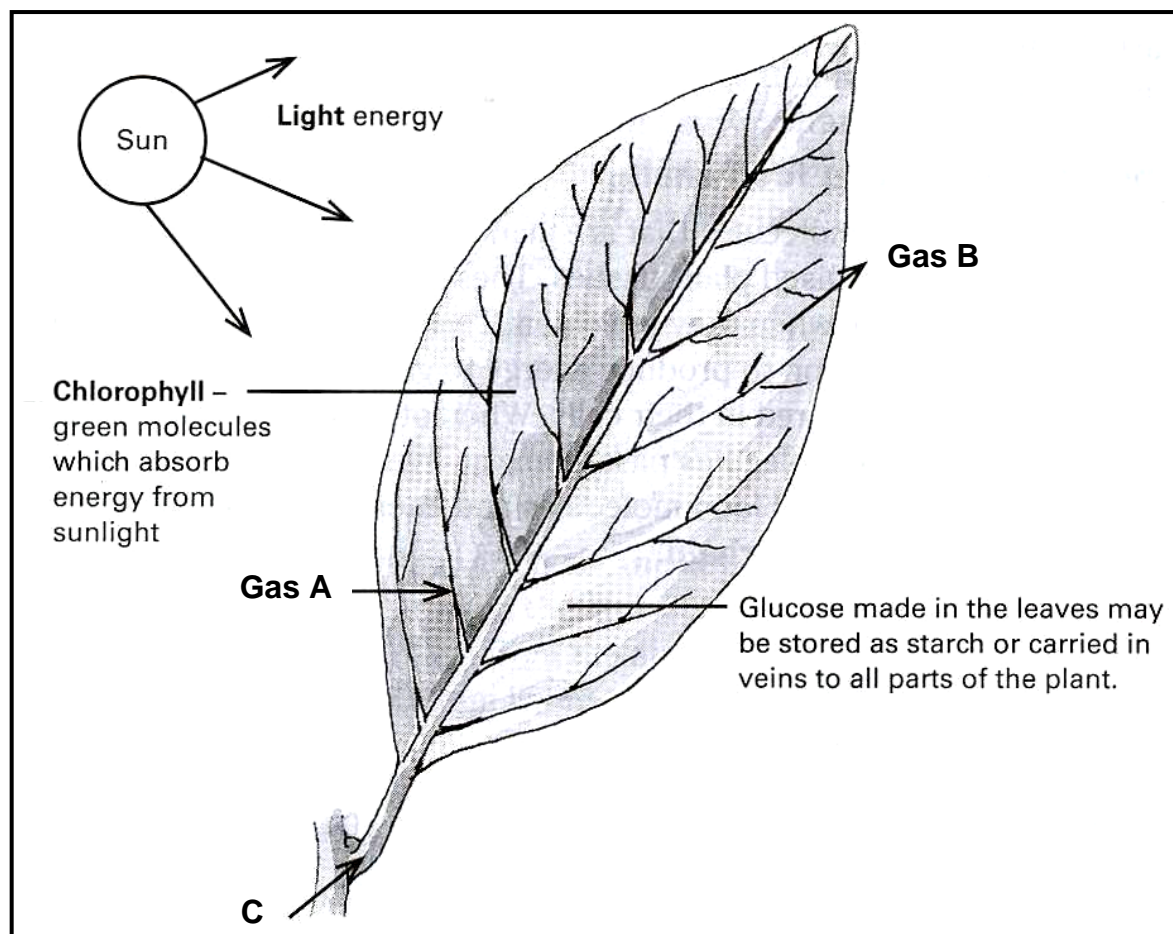
- 3.1.1 Briefly explain the reason for the following actions these learners took during their investigation as indicated above:
- The container was covered at the bottom with a piece of cloth.
 - Equal quantities of each soil sample were used and equal quantities of water were added each time.
 - A stopwatch was used to measure the time. (3)
- 3.1.2 Give THREE possible reasons why the topsoil samples measured higher and faster infiltration rates than the subsoil samples. (3)
- 3.1.3 Give the most important reason for capturing the quantity of water in the container marked **G** in the above diagrams. (1)

- 3.2 The picture below is that of a lady using indigenous knowledge to create articles from soil in her area. The diagrams on the right represent soils which have been rolled into a sausage. This lady collects the soil that she uses for her creations from an area not far from her homestead. The elderly women in her village have taught her how to make these creations.



- 3.2.1 The lady tests the soil every time to make sure that it will be suitable by rolling the possible soil sample in a sausage. Which sausage from the ones above (A – D) would indicate the most suitable soil to use in her creations? (1)
- 3.2.2 List any THREE possible physical characteristics of the soil that this lady needs to make her creations. (3)
- 3.2.3 Make any TWO deductions that would indicate the quality and strength of her final product based on the characteristics of the soil that this lady used. (2)
- 3.2.4 Indicate the possible temperature status of the soil the lady uses in her creations compared to other soils in that area. (1)
- 3.3 DDT is the poisonous chemical that was used in the past as an effective pesticide in agriculture as well as in the Department of Health. With time, it was banned in agriculture because of its disturbance in the ecosystem.
- 3.3.1 Name ONE insect that was controlled by using the above chemical substance which is still used in the prevention of malaria even today. (1)
- 3.3.2 Predict TWO characteristics of the poisonous substance mentioned above that might have contributed to it being banned from use in agriculture. (2)
- 3.3.3 Name THREE disadvantages of injudicious use of pesticides in agriculture. (3)
- 3.3.4 Write down the more scientific name of the pesticide in the paragraph above that was used to control insects. (1)

3.4 The diagram below is an illustration of the process of photosynthesis.



- 3.4.1 Identify the gases labelled **A** and **B**. (2)
- 3.4.2 Name TWO factors visible in the diagram above that act as requirements for photosynthesis. (2)
- 3.4.3 Name the carbohydrate that will be the end product of the dehydration synthesis (condensation reaction) of glucose. (1)
- 3.4.4 Outline TWO reasons why the product mentioned in QUESTION 3.4.3 is stored in the plant in a water insoluble form. (2)

3.5

You are an extension officer and have been approached by a household in a rural area who wants to produce their own vegetables and fruits on sandy soil. This household needs your assistance with the design of a suitable system to produce their crops. They would like to use their household grey water to irrigate their crops.

At their disposal they have the following:

- A 220 litre drum (grey water and rain water)
- Six to eight plastic pipes
- Drippers (a piece of string through a hole in the plastic pipe)

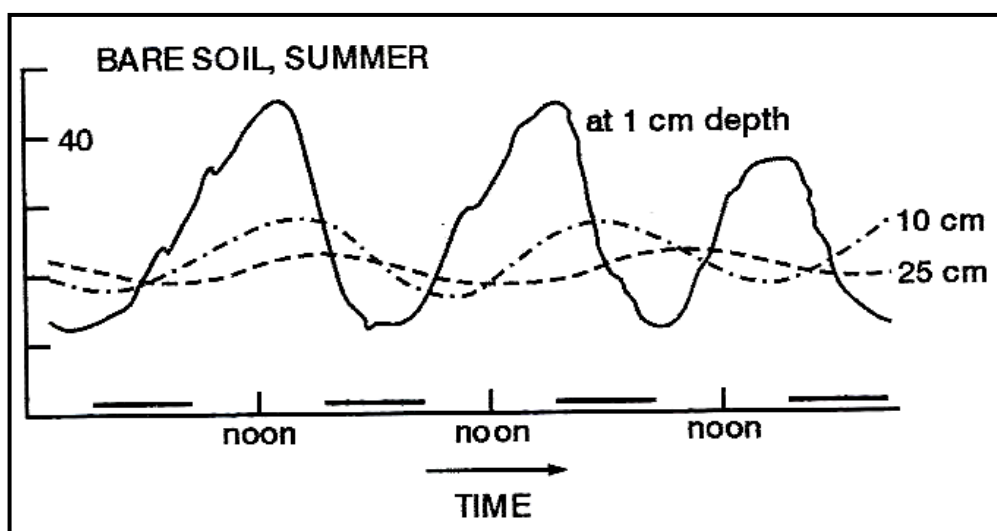
- 3.5.1 Design a cropping system in which they can use their grey water. (3)
- 3.5.2 Suggest a way to increase the water retention capacity of the soil in their situation. (1)
- 3.5.3 Name TWO natural resources that need to be used optimally to ensure that this is a successful production enterprise. (2)
- 3.5.4 Suggest ONE method to control soil erosion in this case study. (1)

[35]

Start this question on a NEW page in the ANSWER BOOK.

QUESTION 4

- 4.1 The graph below represents soil temperatures taken at different depth positions in a soil.

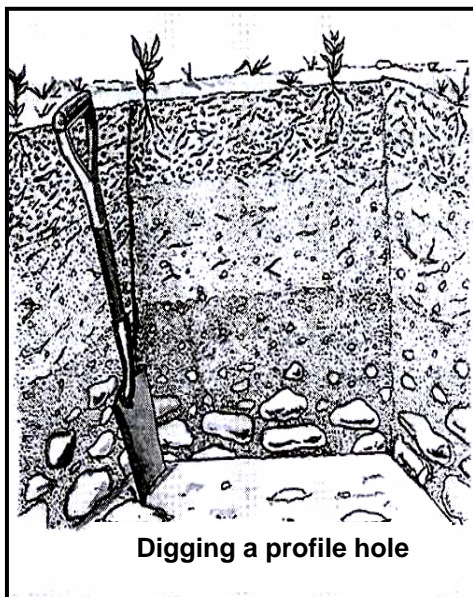


- 4.1.1 Indicate the depth of soil which has the least difference between day and night temperatures. (1)
- 4.1.2 Describe the difference in soil temperature in this soil at a depth of 10 cm and a depth of 1 cm. (2)
- 4.1.3 Give the most important reason for this phenomenon described in QUESTION 4.1.2. (1)
- 4.1.4 Name any THREE other factors that will influence the soil temperature. (3)

4.2

Learners went on a field excursion to a farmer in their area. The theme of this excursion was soil and its importance. The farmer was starting a planning and preparatory process for an orchard on a slope in one part of his farm in a lower rainfall area. He had already dug 10 profile holes evenly spread over this area.

The learners took the opportunity to examine these profile holes. They paired these holes with regard to their position on the slope. They then measured the depth of the topsoil and that of the subsoil (in cm). These results are reflected in the table below.



Profile hole 1		Profile hole 2	
10 cm	55 cm	12 cm	60 cm
Profile hole 3		Profile hole 4	
12 cm	62 cm	14 cm	65 cm
Profile hole 5		Profile hole 6	
15 cm	65 cm	22 cm	59 cm
Profile hole 7		Profile hole 8	
30 cm	55 cm	33 cm	57 cm
Profile hole 9		Profile hole 10	
35 cm	56 cm	38 cm	60 cm

- 4.2.1 Indicate the profile hole which represents the most fertile soil. Give TWO reasons to support your answer. (2)
- 4.2.2 Draw a bar graph to indicate the difference in depth for topsoil compared to subsoil for profile hole 2 compared to profile hole 9. (4)

4.3

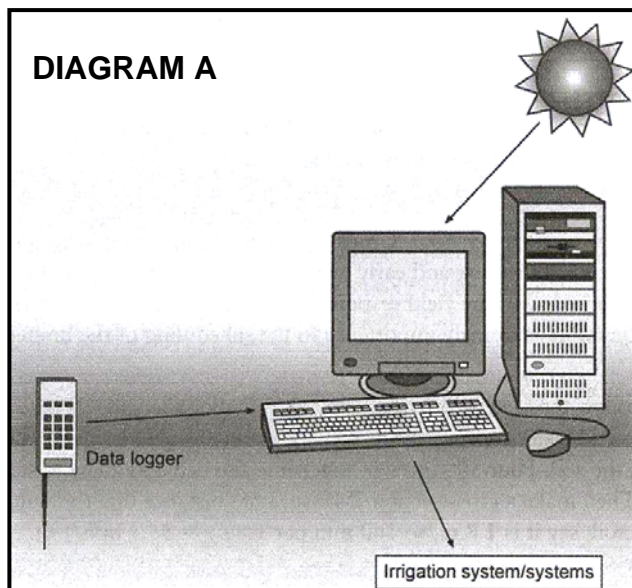
Mandla owns a plot of 1 hectare where he has cultivated peaches. He produces these fruits for the local community and market. Recently he received complaints that his fruits are small and not nutritious. He therefore went to the local agricultural extension officer who advised him to take young, mature and healthy leaves as samples for analysis. He was further advised that these samples should not be washed and that they should be placed in a clean plastic bag and sent to the laboratory.

- 4.3.1 Outline the purpose of leaf analysis. (2)
- 4.3.2 Name the correct time of the year that you would recommend for the picking of peach tree leaf samples. (1)
- 4.3.3 Indicate the most suitable time of the day for Mandla to pick the samples. Motivate your answer. (2)

- 4.3.4 Briefly explain the reason why Mandla is not allowed to wash the samples. (1)
- 4.3.5 Describe the main reason why Mandla should place leaf samples in a clean plastic bag. (1)
- 4.4 The South African plants (flora) are divided into indigenous and exotic groups. The alien plants are further divided into three categories according to the nature of the problem they pose in agricultural ecosystems where they are found.
- 4.4.1 Choose from the following list of laws the ONE that governs agricultural activities in controlling alien plants:
- Restitution Of Land Rights Act (Act 22 of 1994)
 - Land Survey Act (Act 8 of 1997)
 - Plant Breeders' Rights Act (Act 15 of 1976)
 - Conservation of Agricultural Resources Act (Act 43 of 1983) (1)
- 4.4.2 Name the THREE categories of alien plants. (3)
- 4.4.3 Name THREE problems caused by alien plants in agricultural ecosystems. (3)

4.5

A group of farmers who are a part of the Agri-BEE (Black Economic Empowerment) programme are planning an intensive sheep production operation on pastures that need to be irrigated. The sheep will be kept on these pastures on a permanent basis. Selected areas will be utilised using temporary fencing. Assist these farmers in their endeavour by giving them some scientific advice with regard to irrigation.



- 4.5.1 Suggest the most suitable irrigation system for these farmers. Justify your answer by referring to the information above. (2)
- 4.5.2 Indicate the functioning of this modern instrument for scheduled irrigation as indicated in the diagram above. (1)
- 4.5.3 Tabulate at least TWO other instruments (apparatus), apart from the one mentioned in QUESTION 4.5.2, that these farmers need to acquire for optimal irrigation scheduling. Briefly describe the main function of these instruments. (4)

[35]**TOTAL SECTION B: 105****GRAND TOTAL: 150**

SECTION A**EXAMINATION NUMBER:****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 1.2

1.2.1 _____

1.2.2 _____

1.2.3 _____

1.2.4 _____

1.2.5 _____
(5 x 2) (10)**QUESTION 1.3**

1.3.1 _____

1.3.2 _____

1.3.3 _____

1.3.4 _____

1.3.5 _____
(5 x 2) (10)**QUESTION 1.4**

1.4.1 _____

1.4.2 _____

1.4.3 _____

1.4.4 _____

1.4.5 _____
(5 x 1) (5)**TOTAL SECTION A: 45**