



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2012

AGRICULTURAL SCIENCES P1

MARKS: 150

TIME: 2½ hours



This question paper consists of 17 pages, including an answer sheet.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions from BOTH SECTIONS A and B.
2. SECTION A (QUESTION 1) must be answered on the attached ANSWER SHEET.
3. Place your ANSWER SHEET for SECTION A (QUESTION 1) within your ANSWER BOOK.
4. SECTION B (QUESTIONS 2 to 4) must be answered in the ANSWER BOOK.
5. Start each question from SECTION B on a NEW page.
6. Read the questions carefully and make sure you answer what is asked.
7. Number the answers correctly according to the numbering system used in this question paper.
8. DO NOT SPLIT the answers to the questions.
9. 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) over the appropriate letter in the block (A – D) next to the question number (1.1.1 – 1.1.10) on the attached ANSWER SHEET. No marks will be allocated if more than one cross (X) appears for an answer.

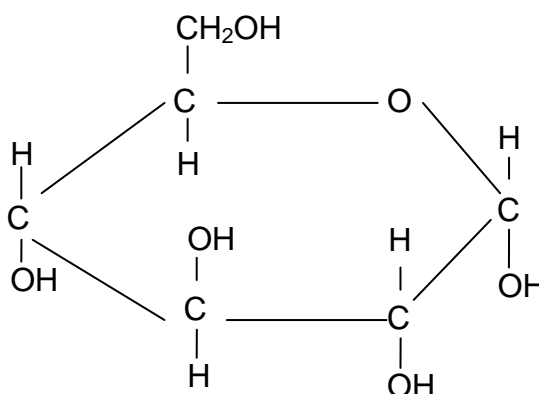
Example: 1.1.11

A	B	C	D
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- 1.1.1 The pH value of pure water is ...

- A 7,0.
B 7,5.
C 6,5.
D 5,0.

- 1.1.2 The formula for the organic compound below is ...

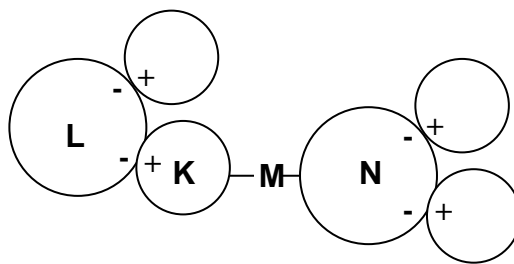


- A $C_5H_{10}O_5$.
B $C_{12}H_{22}O_{11}$.
C $C_6H_{10}O_5$.
D $C_6H_{12}O_6$.

- 1.1.3 When soil is watered, bubbles escape from soil mainly because of the ...

- A mixture of gases.
B hydrogen.
C carbon dioxide.
D oxygen in the soil.

- 1.1.4 The diameter of a colloidal particle varies between ...
- A 10 and 100 nm.
 B 10 and 1 000 nm.
 C 1 and 10 nm.
 D 1 000 and 10 000 nm.
- 1.1.5 The combination of A-horizon over C-horizon represents a/an ...
- A adult soil.
 B young soil.
 C eroded soil.
 D wet soil.
- 1.1.6 Which of the following is the correct statement referring to the characteristics of all polypeptides?
- A Polypeptides are also fatty acids
 B Polypeptides are also known as amino acids if they are linked with glycosidic bonds
 C The amino acids in the polypeptide will be connected by peptide bonds
 D Each amino acid in the polypeptide will possess an amino and a hydroxyl group
- 1.1.7 The type of clay mineral which is inclined to form a platy structure is ...
- A montmorillonite.
 B kaolinite.
 C illite.
 D vermiculite.
- 1.1.8 In the following illustration of water molecule, one of the answers below is the correct order for the parts labelled K to N.

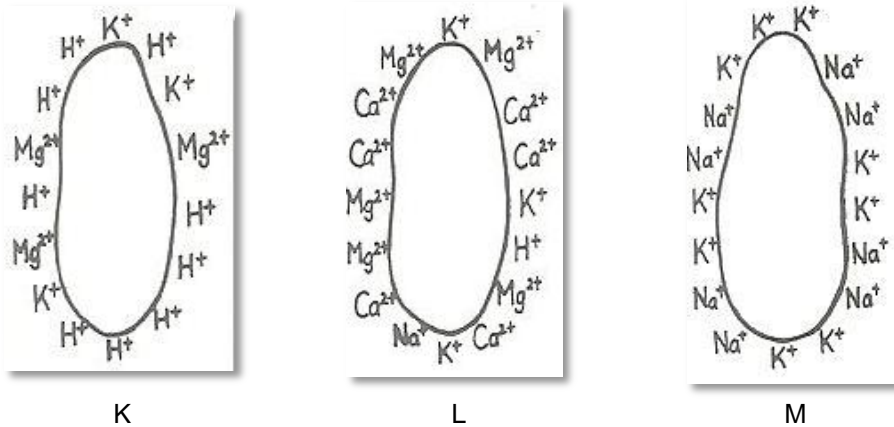


	K	L	M	N
A	oxygen	hydrogen	cohesion	hydrogen
B	hydrogen	oxygen	adhesion	oxygen
C	oxygen	hydrogen	hydrogen bond	oxygen
D	hydrogen	oxygen	hydrogen bond	oxygen

1.1.9 Black brack soil contains an excess of ...

- A sodium carbonate.
- B sodium chloride.
- C sodium sulphate.
- D potassium chloride.

1.1.10 One of the following diagrams represents a sweet soil:



- A M
- B K and M
- C K
- D L

(10x2) (20)

1.2 In the table below, a statement and two answers are given. Decide whether the statement in COLUMN B relates to A only, B only, both A and B or none of the answers in COLUMN A. Choose the correct answer and make a cross (X) in the appropriate block next to the question number (1.2.1 – 1.2.5) on the attached ANSWER SHEET.

Example:

	COLUMN A	COLUMN B
1.2.6	A: Vitamins B: Fats	Organic compounds

Answer:

	The statement refers to:			
	Only A	Only B	A and B	None
1.2.6	A	B	C	D

	COLUMN A	COLUMN B
1.2.1	A: Cellulose B: Lignin	Disaccharides formed from monosaccharaides
1.2.2	A: O-horizon B: A-horizon	Form top soil of the upper surface
1.2.3	A: Series photograph B: Aerial photograph	Soil map that is used during soil survey
1.2.4	A: Soil moisture B: Soil air	Influences soil temperature for optimum crop production
1.2.5	A: Wilting point B: Field capacity	When all the soil pores are filled with air and soil is dry

(5x2) (10)

- 1.3 Give ONE TERM/PHRASE for each of the following descriptions. Write only the term next to the question number (1.3.1 – 1.3.5) on the attached ANSWER SHEET.
- 1.3.1 A weak acid formed when carbon dioxide dissolved in water
- 1.3.2 The ability of soil to hold a given quantity of water after complete saturation and drainage
- 1.3.3 The attraction of positive cations in the soil water to the negative surface of clay particles to create an overall neutral charge
- 1.3.4 The type of bond formed when atoms share electron pairs
- 1.3.5 The phenomenon where carbon dioxide as a greenhouse gas allows the sun's heat into the atmosphere, but does not allow heat to escape back into the space resulting in warmer atmosphere (5x2) (10)
- 1.4 Change the UNDERLINED WORD(S) in the following statements to make them TRUE. Write only the appropriate word(s) next to the question number (1.4.1 – 1.4.5) on the attached ANSWER SHEET.
- 1.4.1 Isomers are atoms which have the same atomic number but have different mass numbers.
- 1.4.2 Artificial removal of excess water accumulated by heavy rains from the soil is referred to as wastage
- 1.4.3 Spillage is the process of physically working the soil such as digging or ploughing to improve conditions for plant growth
- 1.4.4 The chemical reaction which takes place when an acid solution is mixed with an alkaline solution is condensation
- 1.4.5 Chitin is a polysaccharide that occurs in the woody parts of older plants (5x1) (5)

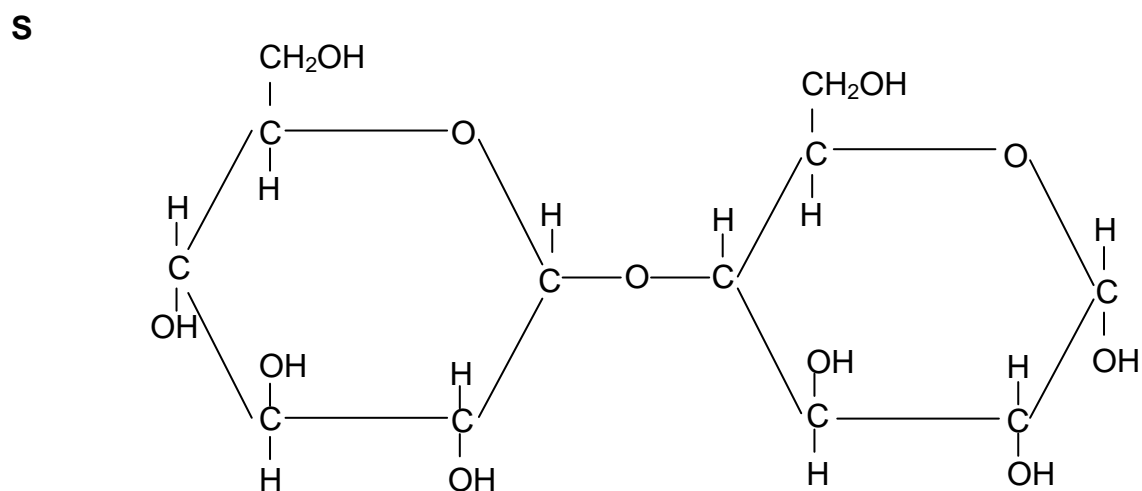
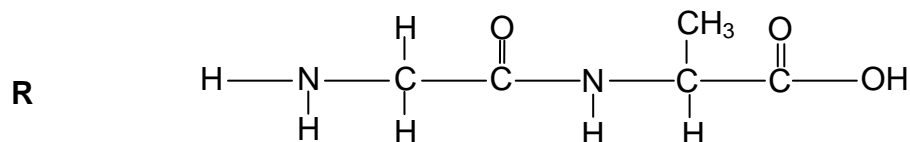
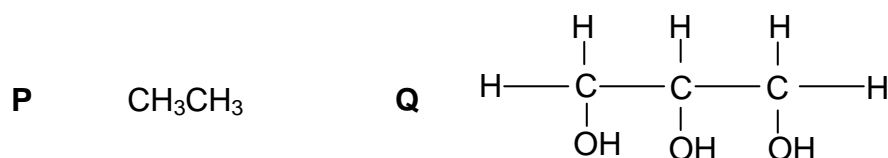
TOTAL SECTION A: 45

SECTION B**START THIS QUESTION ON A NEW PAGE****QUESTION 2: BASIC CHEMISTRY**

2.1 Grade 11 learners were given an investigation to determine the general properties of colloidal system. Clear water and soil were thoroughly mixed in a glass container and then left to settle. The suspended particles settled on the bottom of the container. The large particles settle first, followed by the smaller particles until finally no further settlement took place. The water still showed colouring indicating that some particles have not settled at all, but are still contained in the water. The molecules of a substance forming a solution are homogeneously dispersed among each other.

- 2.1.1 Suggest the name of the particles that are larger than molecules, but not large enough to settle under the influence of gravity. (1)
- 2.1.2 Identify the sentence from the given scenario which describes a molecular solution. (2)
- 2.1.3 Differentiate between colloidal dispersions and colloidal suspension as indicated in the scenario. (2)

2.2 Analyse the following structural formulae of different organic compounds and answer the question that follow:



- 2.2.1 Identify the compound **P**. (1)
- 2.2.2 Deduce TWO functional groups from structure **R** above. (2)
- 2.2.3 Identify the linkage formed in structure **R** of the above organic compounds. (1)
- 2.2.4 To which group of organic compounds would you classify structure **S**? (1)
- 2.2.5 Supply the molecular formula for structure **S**. (1)
- 2.2.6 Suggest the name of an organic compound that can be formed by structure **Q**. (1)

2.3 Read the following case study carefully and then answer questions that follow:

Taking too much saturated fat is very dangerous in human lives as it increases the amount of cholesterol in the blood. In order to reduce the risk of having high cholesterol levels and heart attacks, people are recommended to reduce the total fats in their diet and replace saturated fats with unsaturated fats. The following table shows the total fat content and unsaturated fat content in different types of meat.

Meats	Total fat content (g/100g)	Saturated fat content (g/100g)
Pork steak	2,7	1,1
Pork leg	9,6	4,2
Extra lean beef mince	2,2	0,9
Beef rump steak	4,1	1,7
Beef topside	3,4	1,2

2.3.1 Draw a bar graph showing the saturated fat content and total fat content of different meats type (on the same set of axes). (6)

2.3.2 Deduce TWO negative effect of the high consumption of fats in human health. (2)

2.3.3 Lipids are also having very important functions in living organisms. Justify this statement. (2)

2.4 All matter is made up of very small structures called atoms. Atoms can join together to form a molecule and a compound. Differentiate between matter and an atom. (4)

2.5 Most farm animals depend on crude fibre as their feed. The constitution of crude fibre is mainly cellulose. Suggest the general name of the group of animals which are capable of digesting crude fibre using it as a source of energy. (2)

2.6 Read the following scenario and answer the questions that follow:

Umqombothi is an indigenous intoxicating beverage which is used as an alcoholic drink during the traditional festivals and celebrations in Southern African countries. Its preparation involves the mixing of sorghum and mealies in water and adding a little quantity of yeast. After being covered and staying for few days, the mixture will be ready to be served.

2.6.1 Indicate the process which converts the ingredients into the intoxicating beverage. (1)

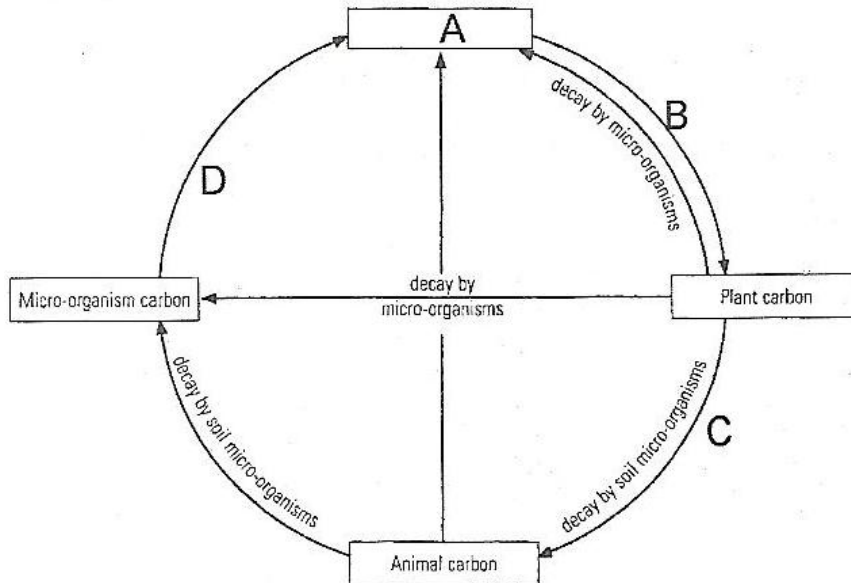
2.6.2 Draw the structural formula of an alcohol which is in this beverage and name it. (3)

2.6.3 Predict what would happen in a situation where all farm workers on a farm become addicted to the use of this alcohol daily. (3)

START THIS QUESTION ON A NEW PAGE

QUESTION 3 SOIL SCIENCE

3.1 Analyse the diagram below and answer the questions that follow:

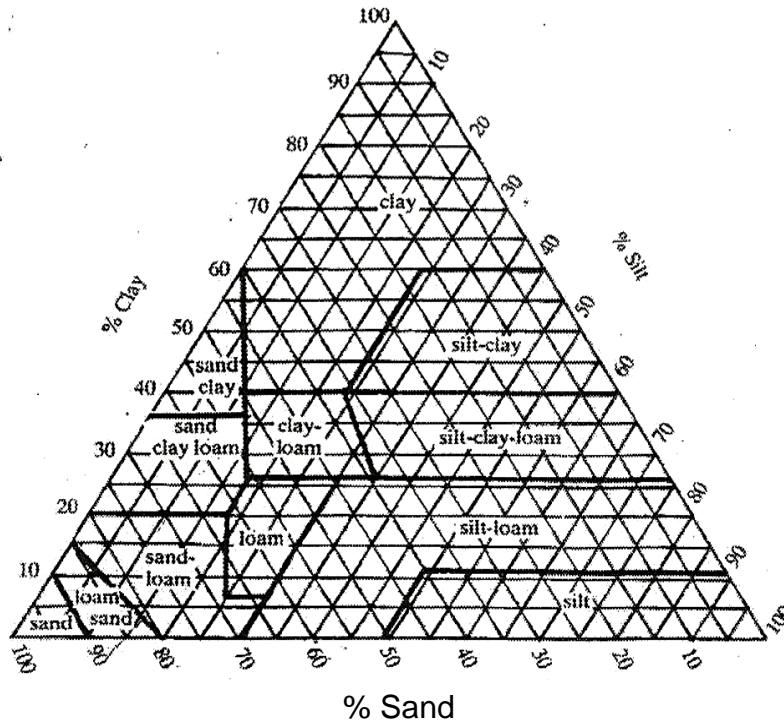


- 3.1.1 Suggest a suitable heading for the process above. (1)
- 3.1.2 What process is indicated by label D? (1)
- 3.1.3 Identify the name of the process labelled C by which plant carbon could be converted to animal carbon. (1)
- 3.1.4 What is represented by A? (1)
- 3.1.5 Deduce any TWO negative effects that would result if letter A can no longer be produced into the atmosphere. (2)
- 3.2 Compare the clay and the sandy textured soil with regard to the following properties:
- 3.2.1 Cohesion (2)
- 3.2.2 Capillarity (2)
- 3.2.3 Water holding capacity (2)
- 3.3 Soil classification is done using a binomial system.
- 3.3.1 Briefly explain the “binomial system” of classifying soils. (1)
- 3.3.2 Outline any TWO reasons why soil is classified. (2)

3.4 A group of learners in a Grade 11 were given equipment to do physical analysis of soil on a certain farm.

After obtaining the percentages of the three major soil fractions, they had to use the texture diagram (shown below) to determine the various textural classes of soils.

Texture diagram used in the RSA.



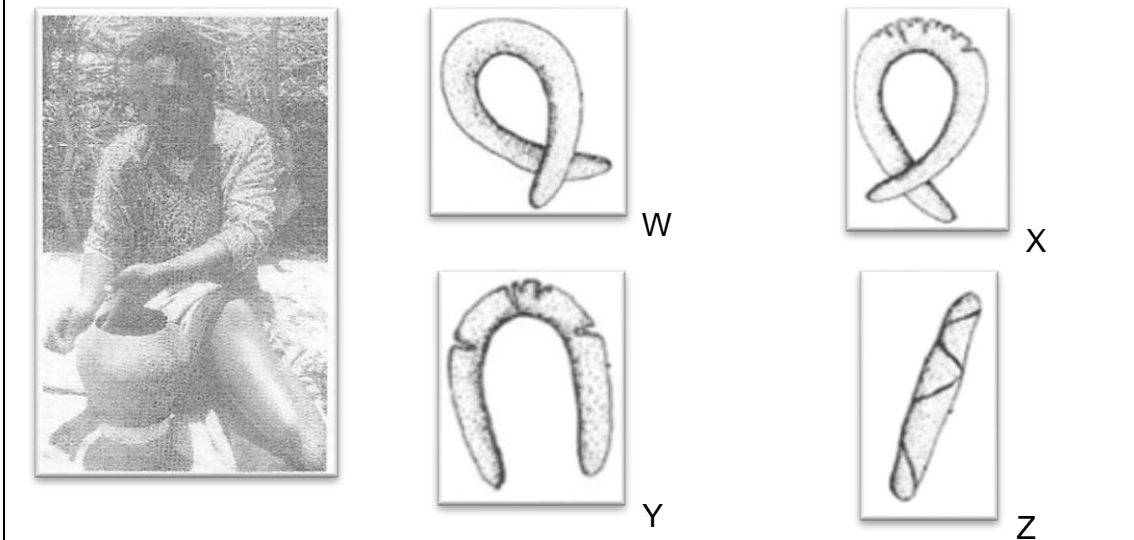
The table below shows some of the results they obtained.

SOIL SAMPLE	% SAND	% SILT	% CLAY
A	55	25	20
B	95	3	2
C	30	20	50

3.4.1 Determine the textural class for the soil sample A, B and C. (3)

3.4.2 Which of the soil samples in the table above would you recommend as the most suitable for cultivation? (1)

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

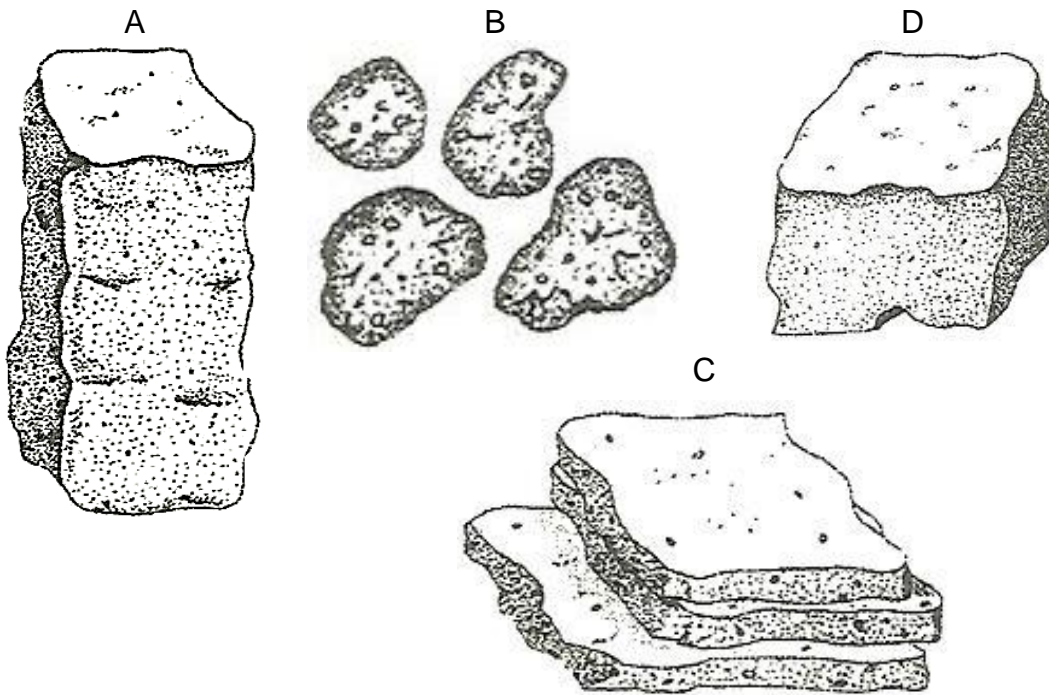


- 3.5.1 The lady tests the soil every time to make sure that it will be suitable by rolling the possible soil sample in a sausage. Which sausage from the ones listed above (W – Z) would indicate the most suitable soil to use in her creations? (1)
- 3.5.2 Indicate the most suitable temperature status of the soil the lady uses in her creation compared to soils in that area. (1)
- 3.6 Soil is the result or function of different soil formation factors. Soil forming processes can be represented by the following equation.
 $S = f(P, R, CL, O, T)$ (Hans Jenny, 1941)
- 3.6.1 Indicate the meaning of each letter or abbreviation as shown in the brackets from the equation above. (5)
- 3.7 Read the following scenario and answer the questions below:

The term density is used to indicate the mass per unit volume of any substance. Therefore in expressing the mass of certain volume of soil, one is able to determine how densely packed the particles are. Grade 11 learners from Lushington High School did an experiment to determine the Bulk density of a soil sample. Their sample of oven dried soil had a mass of 680 g and 80 cm³ as volume.

- 3.7.1 Use the information above to calculate the bulk density of the soil sample. (3)
- 3.7.2 Suggest the ratio or proportion for the ideal condition of good soil between solid soil particles, the macro pores and micro pores measured as percentages. (1)

3.8 The following are various types of soil structures labelled (A – D). Analyse these soil structures and answer the questions below.



3.8.1 Identify the specific name of soil structure labelled A – D above. (4)

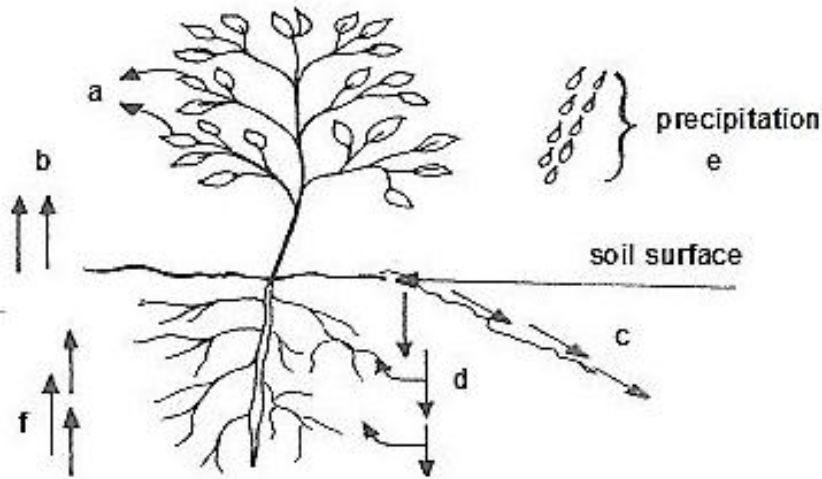
3.8.2 Name ANY factor that plays a role in the development of soil structure. (1)

[35]

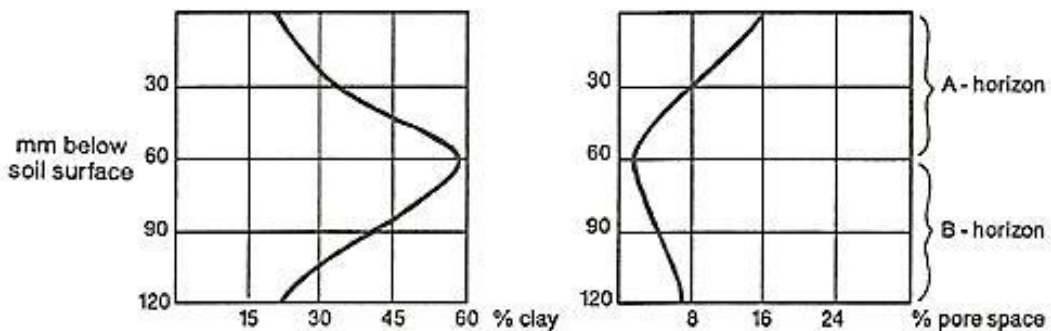
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QUESTION 4 SOIL SCIENCE

4.1 The diagram below is an illustration on how water is lost from the soil:

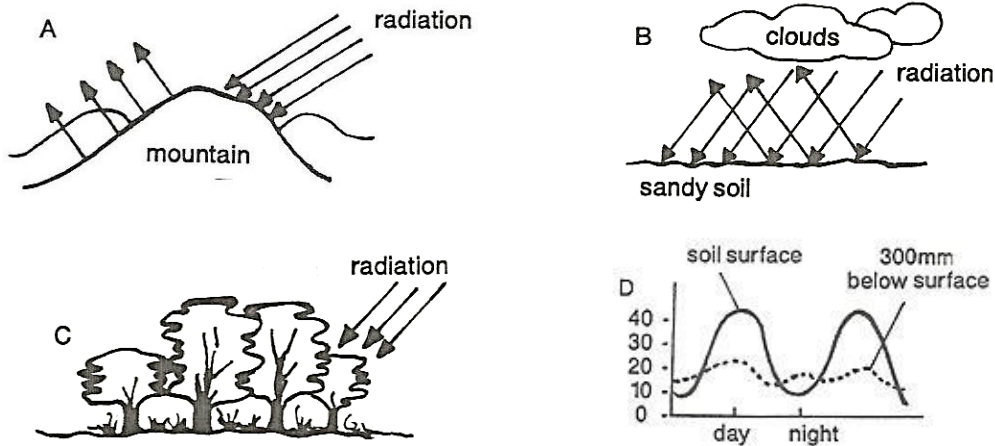


- 4.1.1 Identify the different ways through which water is lost as indicated by the letters numbered *a – d*. (4)
 - 4.1.2 Suggest TWO possible ways to control the water loss as indicated by the letter *d*. (2)
 - 4.1.3 Distinguish between seepage and capillarity. (2)
- 4.2 Analyse the given graphs on the occurrence of clay and the corresponding pore spaces in soil:



- 4.2.1 Identify TWO important types of pores in the soil. (2)
- 4.2.2 How will you describe the texture of soil represented in the graph? (1)
- 4.2.3 Briefly discuss the negative effects of clay textured soil on crop productivity. (4)

4.3 Carefully analyse the diagram below that illustrates the factors which influence soil temperature, and then answer the questions that follow:



4.3.1 Identify the factors A – D on the illustration above. (4)

4.3.2 Briefly explain the general influence of temperature on crop production. (2)

4.4 Read the extract below carefully and then answer questions below:

Soil acidity is associated with the presence of H⁺-ions. Acidity or alkalinity is indicated by the pH-value which ranges from 0 – 14. The pH of soil refers to the acidity and alkalinity of soil solution. Soils can be divided into the following six pH-classes in the box.

Extremely acidic, acid, slightly acidic, alkaline, strongly alkaline, neutral

4.4.1 Categorise the following pH range values by using the pH classes in the box above.

- (a) pH 4,6 – 5,5 (1)
- (b) pH 8,6 – 10,0 (1)
- (c) pH 3,0 – 4,5 (1)
- (d) pH 7,6 – 8,5 (1)
- (e) pH 5,6 – 6,5 (1)

4.4.2 Suggest the pH range values for the neutral soil. (1)

4.5 Organic matter is an active and important component of soil. The soils in South Africa are usually low in organic matter because of the high temperatures and low rainfall. Higher temperatures activate soil microbes which also makes the situation suitable to perform their function better. Organic matter occurs mainly in top soil and exerts an important influence on soil characteristics and its properties.

- 4.5.1 Briefly explain the effect of organic matter on the physical properties of soil. (2)
- 4.5.2 Identify any FOUR major groups of micro-organisms found in the soil. (4)
- 4.5.3 Deduce the role of micro-organisms you have mentioned in QUESTION 4.5.2 above on soil. (2)
- [35]**

TOTAL SECTION B: 105

GRAND TOTAL: 150

ANSWER SHEET

AGRICULTURAL SCIENCES P1

NAME AND SURNAME _____

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

(10x2) (20)

QUESTION 1.2

	ONLY A	ONLY B	BOTH 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

(5x2) (10)

QUESTION 1.3

- 1.3.1 _____
- 1.3.2 _____
- 1.3.3 _____
- 1.3.4 _____
- 1.3.5 _____

(5x2) (10)

QUESTION 1.4

- 1.4.1 _____
- 1.4.2 _____
- 1.4.3 _____
- 1.4.4 _____
- 1.4.5 _____

(5x1) (5)

