education

DEPARTMENT: EDUCATION
MPUMALANGA PROVINCE

Grade 12

Supplementary Study Material

Agricultural science

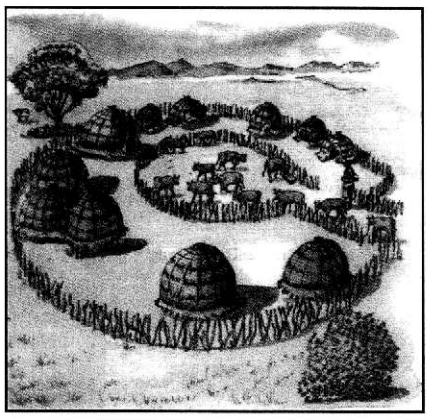
Together Educating the Nation

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the 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. NO marks will be awarded if more than one cross (X) appears for an answer.

1.1.1 The diagram below represents the layout of a typical homestead of indigenous people from South Africa. The main reason for keeping their cattle at the centre of the homestead was for ...



A easy access to a protein source as food.
B traditional reasons and therefore not to anger their ancestors.
C easier handling and collection by the herd boy of the village (kraal).
D protection against predators and other dangers.

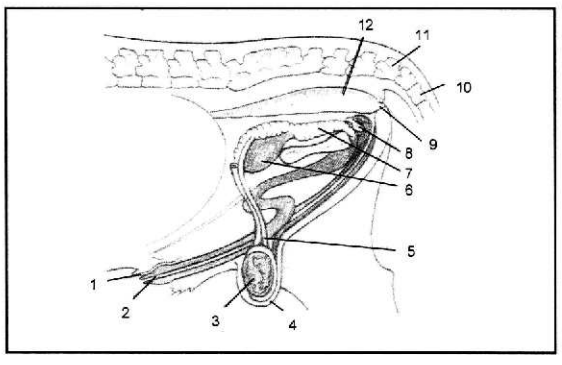
1.1.2 A product of cellulose fermentation in the rumen of a ruminant animal is ...

A glycerol.
B amino acid.
C carbonic acid.
D acetic acid.

1.1.3 A maintenance ration is the quantity of nutrients an animal requires mainly to ...

A support life as well as for production.
B support life.
C support life, for production and for work.
D support production.

QUESTIONS 1.1.4 to 1.1.5 relate to the illustration below.



1.1.4 The primary reproductive organ of the bull in the diagram above is numbered ...

A 1.
B 3.
C 5.
D 7.

1.1.5 The reproductive organ mentioned in QUESTION 1.1.4 is called the primary reproductive organ because it ...

A produces the carrier fluid for spermatozoa.
B produces spermatozoa and testosterone.
C is the largest of the sex organs.
D secretes all the sex hormones.

1.1.6 The Marketing Act of 1968 was developed to control the movement and the pricing of agricultural produce. Choose from the list below the advantages of controlled marketing:

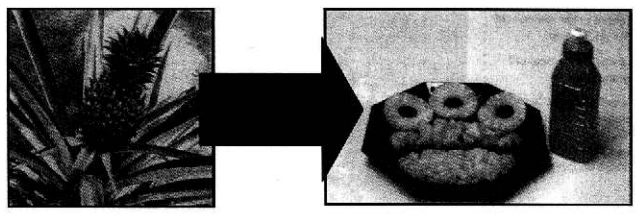
i Consumers end up paying a largely inflated price for food
ii Secures stable prices
iii Creates secure market outlets
iv Larger enterprises obtain international contracts

A i, ii and iii
B ii, iii and iv
C i, ii and iv
D i, iii and iv

1.1.7 A farmer must keep record of his farm assets. These assets are recorded in a/an ...

A enterprise budget.
B inventory.
C balance sheet.
D cash flow budget.

1.1.8 The schematic representation below illustrates the concept of ...



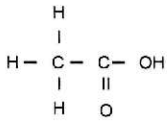
A overcapitalisation.
B cultivation.
C nutrition.
D value adding.

1.1.9 Which ONE of the following characteristics is associated with the alcohol group of organic compounds?

i One or more hydrogen atom(s) of an alkane is replaced by a hydroxyl group
ii 1, 2, 3 propane triol (glycerine)
iii C_4H_9OH
iv An amino-grouping forms part of these substances

A i, ii, iii and iv
B i, ii and iii
C i and ii
D i

1.1.10 What is represented by the following chemical structural formula?



A An oxidation product used in the production of vinegar
B An inorganic substance used as replacement for acetic acid
C An alkaline substance used in the medication of animals
D A carbonic acid produced during carbonisation of mineral water

(10 x 2) (20)

1.2. Choose a word/term from COLUMN B that matches a description in COLUMN A. Write only the letter (A – M) 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	A measure taken to protect an animal against viral infections	A	tenure
1.2.2	Apparatus used to deposit the semen during AI (artificial insemination)	B	insemination
1.2.3	Parasites which are mainly controlled by dosing of liquid medication	C	dipping
1.2.4	The return of land or compensation to those who had land taken away from them in the past	D	blue ticks
1.2.5	The chemical molecule that carries the genetic information	E	restitution
		F	pistolette
		G	deoxyribonucleic acid
		H	vaccination
		I	oats hay
		J	redistribution
		K	lucerne hay
		L	roundworms
		M	RNA

(5 x 2) (10)

ANSWER SHEET

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

	ONLY A	ONLY B	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 1.3

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

1.3 Give ONE word/term for each of the following descriptions. Write only the word/term next to the question number (1.3.1 – 1.3.5) on the attached ANSWER SHEET.

1.3.1 The property of vitamins which is used to divide them into two main groups

1.3.2 A feed has a Total Digestible Nutrient (TDN) content of 85% and a Digestible Protein (DP) content of 10%. Calculate the percentage Digestible Non-nitrogen content of the feed.

1.3.3 The process of differentiation or sorting of agricultural products according to laid down standards

1.3.4 The inclusion of a number of different enterprises in a farming system to minimise the risk

1.3.5 The disaccharide that is formed from two glucose molecules (5 x 2) (10)

1.4 Change the underlined word in the following to make the statements TRUE. Write the word next to the question number (1.4.1 – 1.4.5) on the attached ANSWER SHEET.

1.4.1 <u>Mechanical</u> digestion is the breakdown of food by digestive enzymes.

1.4.2 The number and type of micro-organisms in the <u>abomasum</u> of a ruminant animal depend mainly on the quantity of roughage in the ration.

1.4.3 <u>Availability</u> describes the change in price with a change in demand during the marketing of agricultural products.

1.4.4 <u>Permanent</u> labourers are employed for repetitive tasks such as annual harvesting of a crop.

1.4.5 The enlargement of the thyroid gland is due to a deficiency of <u>cobalt</u>.
(5 x 1) (5)

TOTAL SECTION A: 45

Agricultural Science
Paper 02 November 2008
Memorandum

SECTION A

QUESTION 1.1

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

(10 x 2) (20)

QUESTION 1.2

1.2.1	A✓✓
1.2.2	B✓✓
1.2.3	C✓✓
1.2.4	A✓✓
1.2.5	A✓✓

(5 x 2) (10)

QUESTION 1.3

1.3.1 Blue tongue✓✓

1.3.2 Demand✓✓

1.3.3 Loan / Credit✓✓

1.3.4 Grading✓✓

1.3.5 Glucose✓✓ (5 x 2) (10)

QUESTION 1.4

1.4.1 Urea✓

1.4.2 Secretin✓

1.4.3 Working/Floating/ Production/Short term✓

1.4.4 Capital✓

1.4.5 Heterosis/Hybrid vigour✓

(5 x 1) (5)

TOTAL SECTION A: 45

SECTION B

QUESTION 2

2.1 **Internal parasites of livestock**

2.1.1 **Identification of internal parasites**
A – Round worm
B – Fluke worm
C – Tapeworm (3)

2.1.2 **TWO parasites that need two hosts to complete their life cycles**
Tapeworm
Fluke worm (2)

2.1.3 **TWO economic losses that are caused by internal parasites**
Stock losses due to death
Loss of production (meat, wool, milk, feathers, mohair, etc.)
Degrading of carcasses at abattoirs
Danger to human health by parasites requiring intermediate hosts
Expensive costs of controlling them chemically (Any 2) (2)

2.2 **FOUR services rendered by the state to prevent and control animal diseases and pests**
Preventative measures
Quarantine of imported animals in quarantine stations for six weeks
Quarantine of sick animals on farms for notifiable diseases
Isolation of sick animals to minimise the spread of the disease
Destroying carcasses to prevent the spread of the disease
Controlling the vectors that spread the disease
Vaccination
Dipping animals to prevent tick-borne diseases like heart water

Treatment/Control of the disease
Supply of antibiotics/anthelmintics
Good nursing of sick animals (Any 4) (4)

2.3 **Formulation of FOUR requirements for a poultry house**
The long sides of the building should face north and south to avoid direct summer sun shining into the house
Use wire netting to allow free flow of air/ventilation
The roof should begin 2 m above the ground to minimise ground heat in summer
A double-sloped roof is better than a single-sloped roof for protection against sun and rain
The roof can be made of corrugated iron or thatch to keep it cool in summer and warm in winter
Use concrete floor as it allows easy cleaning when the litter is taken out (Any 4) (4)

2.4 **THREE groups of micro-organisms that are pathogens**
Bacteria
Viruses
Protozoa
Fungi (Any 3) (3)

2.5 **Production of tomatoes by a group of emerging farmers**

2.5.1 **ONE reason for high loss of tomatoes in 2007**
No market to sell the surplus tomatoes harvested in 2007
There was an over production of tomatoes in 2007
The climatic factors might have contributed to the high yields in 2007 (Any 1) (1)

2.5.2 **ONE production factor which was not fully utilised**
Movable capital/the two tractors (1)

2.5.3 **Types of capital**
Movable capital – tractors
Fixed capital – water pump/farmers' houses (Any 1)
Working capital – seeds/fertilisers/fungicides (Any 1) (3)

2.6 **Management and marketing of Mrs Mvubo's farming enterprise**

2.6.1 **TWO skills needed to manage the farm:**
Application of knowledge
Planning skills
Entrepreneurial skills
Adapting to changing circumstances/flexibility skills
Personal and human relations/interpersonal skills (Any 2) (2)

2.6.2 **TWO managerial principles for successful farming:**
Planning
Organisation and co-ordination
Decision making
Control
Motivation (Any 2) (2)

2.6.3 **Identification of ONE factor that makes effective marketing difficult:**
Poor infrastructure(bad roads, lack of pack houses, etc.)
Lack of capital to construct roads/to build the infrastructure
Perishability of the product
Grading and standardisation of the products
Ineffective control over production
Wide distribution of products
Low value in relation to volume
Seasonal fluctuation in production (Any 1) (1)

2.7 **Genetically modified plant**

2.7.1 Determine the genetic characteristics of the organism (plant) (1)

2.7.2 Plasmid / micro-organism/bacterium (1)

2.7.3 DNA which determines the characteristic of a plant is taken from a source (organism) and inserted into another organism to change that organism's genetic structure and characteristics (Any 2) (2)

2.7.4 Genetic engineering/GMO technology/Biotechnology (1)

2.7.5 **TWO advantages for the crop farmer who uses GMO**
Higher production
More resistance to diseases
More resistance to pests
More resistance to chemicals (herbicide resistance)
Better quality products (size, colour, shelf life, taste etc.)
Adaptation to a particular environment (Any 2) (2)
[35]

QUESTION 3

3.1. **Milk production**

3.1.1 Colostrum/beestings (1)

3.1.2 **TWO characteristics of colostrum:**
Yellowish in colour
Contains antibodies
Contains extra nutrients (Any 2) (2)

3.1.3 8 (eight) weeks (1)

3.1.4 2 (two) weeks (1)

3.1.5 **TWO stimuli that affect milk release:**
Massaging the cow's udder
Whistling
Playing a musical instrument to calm the cow (Any 2) (2)

3.1.6 **TWO measures to ensure maximum milk production:**
Providing correct nutrition
Proper control of diseases
Providing proper housing (Any 2) (2)

3.1.7 **TWO environmental conditions that affect milk production:**
Excessive heat/Extreme heat
Excessive cold/Extreme cold (2)

3.2. **Artificial insemination**

3.2.1 Approximately 18 hours (1)

3.2.2 6 to 12 hours after signs of oestrus/Inseminate in the afternoon when signs were detected in the morning and vice versa (1)

3.2.3 12 to 14 hours after first signs of oestrus (1)

3.2.4 Good quality bull/semen is used (1)

3.2.5 **TWO ways of preventing the spread of diseases through AI:**
Use of sterilised/clean apparatus/tools
Use of good quality semen
Avoiding injuries (Any 2) (2)

3.3 **Maize production and price**

3.3.1 Interaction/Relationship/Correlation between maize production and maize price (1)
3.3.2 The price of maize increases with the decrease of maize in maize production and vice versa (2)
3.3.3 R1 400 (2)
3.3.4 **TWO outcomes of drought (El Niño):**
Drop in production/no production due to drought
No supply of maize
Loss of income/profit (Any 2) (2)
3.3.5 (30 x 5) x 1000
= R15 000 (2)
3.3.6 R5 000 – R3 500
= R1 500 (2)

3.4 **Chemical reactions in the soil**

3.4.1 A – amino acids
B – water (H_20)
C – nitrite (3)
3.4.2 Enzymes and micro-organisms work optimally in a temperature of 25 °C. Once the temperature drops below 25 °C, their activities (reactions) will also drop. (2)
3.4.3 Enzymes (1)
3.4.4 Amino group (NH_2) (1)
[35]

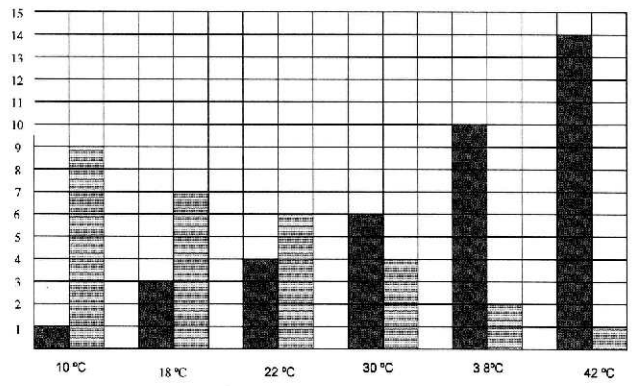
QUESTION 4

4.1 **Alimentary canal and digestion of feed**

4.1.1 A – Chemical breakdown of feed
B – Absorption
C – Assimilation
D – Egestion (4)
4.1.2 (a) G
(b) H
(c) F (3)
4.1.3 **Adaptation of structure for absorption of nutrients:**
Blood capillaries – absorption of digested food
Number of villi – increase absorption surface
Microvilli increase the internal surface area (Any 2) (2)

4.2 **Feeding facility for pigs**

4.2.1



Temperatures (°C):

Water usage
Feed intake (4)

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)**

4.2.2 When environmental temperatures increase to above the optimal levels the farmer will use cooling (open ventilation/fans) and when the environmental temperatures decrease to below the optimal point he will use heating (close ventilation/heaters) (2)

4.3 **Digestion trial for sheep**

Lucerne hay:
10% of 8kg = 10/100 x 8 kg = 0,8 kg
8 kg – 0,8 kg = 7,2 kg
Manure:
50% of 2 kg = 50/100 x 2 kg = 1 kg

Calculation:

$\frac{7,2kg - 1kg}{7,2kg} \times \frac{100}{1}$

=8,6% (3)

4.4 **Labour problems in the farming industry**

4.4.1 **Shortage of labour:**
There is an overall scarcity of labour for the farming industry – working conditions on farm are less attractive (lower salaries)
There is a competition for labour with industries – there are better working conditions and services
Migration of labour from the rural areas to cities – phenomenon in developing countries (3)
4.4.2 **Lack of training:**
Productivity of labour is lower
Lower levels of skills in labour in the farming industry
Limits the use of technology in farming enterprises
Less career opportunities in agriculture (bad management) (Any 2) (2)

4.5 **Methods of marketing**

4.5.1 Free marketing (1)
4.5.2 Direct sales to the public from the farm
Sales are in cash
Immediate payments for products
Farmer determines his/her own price (e.g. R6,00) (Any 1) (1)
4.5.3 No go-between (intermediaries)
Entrepreneurial initiative and drive can be shown
Entrepreneur can work harder
Sales are cash
No delay in payments
Production of quality products is encouraged (Any 1) (1)
4.5.4 Very visible notice boards of product (showing the price)
Clear and visible building (farm stall)
Location next to a busy road
Use of colour and placing the products for everyone to see (Any 2) (2)

4.6 **Genetics factors that affect the production of dairy cattle**

4.6.1 **ONE environmental factor that influences growth and production:**
Climate
Feed supply to animals
Housing facility
Availability of water (Any 1) (1)
4.6.2 **TWO genetic factors that have an influence on milk production:**
Size of udder
Size of animal
Colour of animal (Any 2) (2)
4.6.3 Breeding (related breeding/inbreeding/line breeding/non-related breeding/cross breeding/upgrading) (1)

4.7 **Model of chemical compound**

4.7.1 Hydrogen/H (1)
4.7.2 Glucose (1)
4.7.3 Very soluble (1)
[35]

TOTAL SECTION B: 105

GRAND TOTAL: 150

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	X	B	C	D

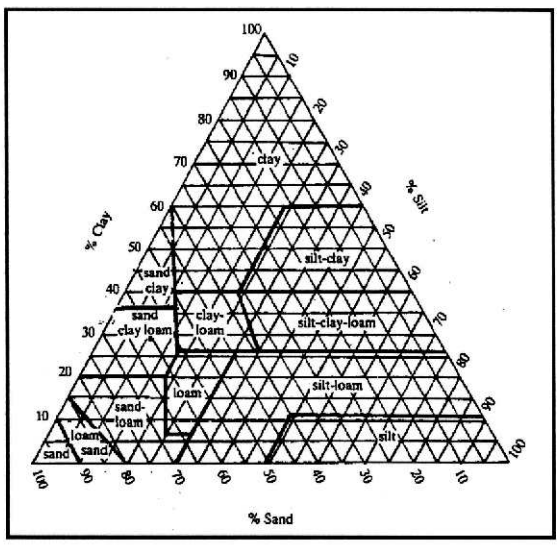
1.1.1 A soil horizon which shows signs of reduction under waterlogged conditions is the ...

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 <u>silt</u> particles in the soil have a diameter smaller than 0,002 mm.

1.4.2 A <u>platy</u> soil structure does not have a particular fixed shape.

1.4.3 The <u>stamen</u> 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 <u>farm manure</u>.

1.4.5 <u>Run-off</u> is the method used for the removal of excess water from the soil by natural or artificial means. (5 x 1) (5)

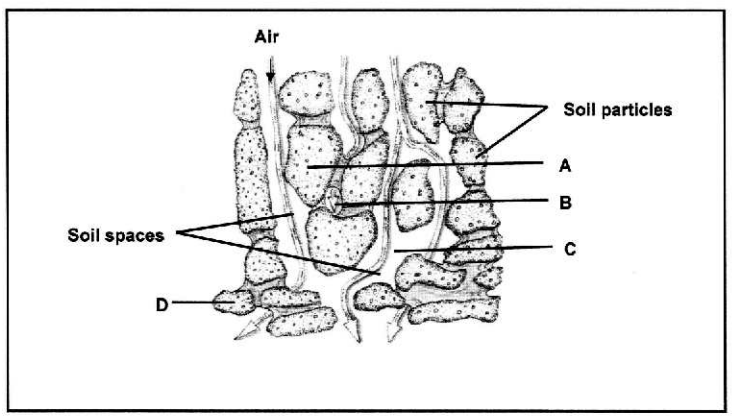
TOTAL SECTION A: 45

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:

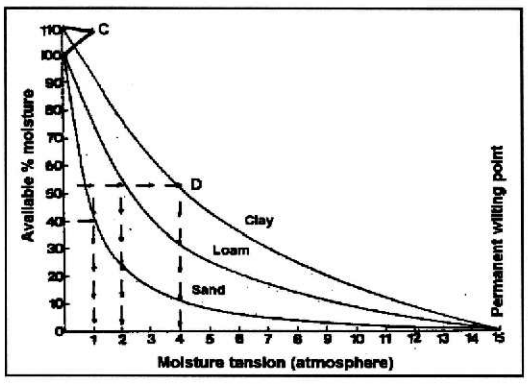
(a) Sand particle (1)
(b) Macropore (1)
(c) Part that will store water in the soil (1)

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)

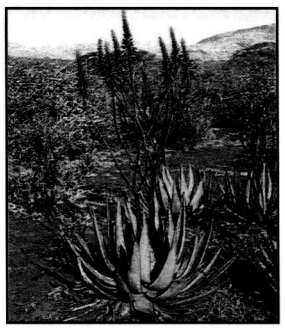
2.3.2 Name the most suitable structure or place (environment) where this technique can be practised on a large scale. (1)

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)

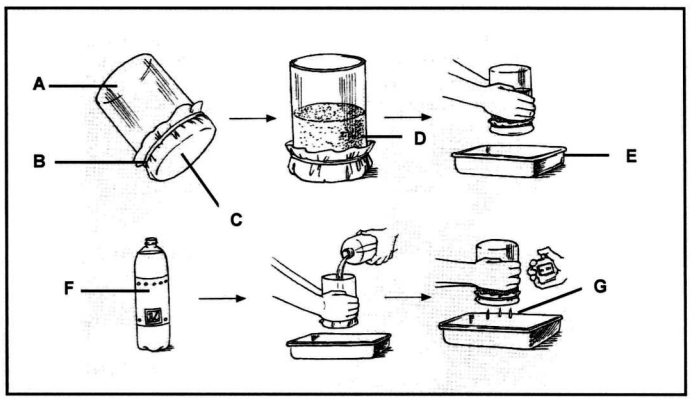
2.5.4 State the importance of the locality in the planning of a farm. (1)

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:

(a) The container was covered at the bottom with a piece of cloth.

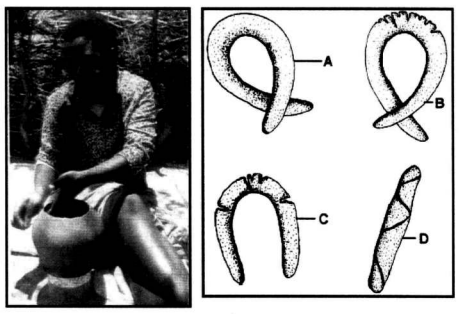
(b) Equal quantities of each soil sample were used and equal quantities of water were added each time.

(c) 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.

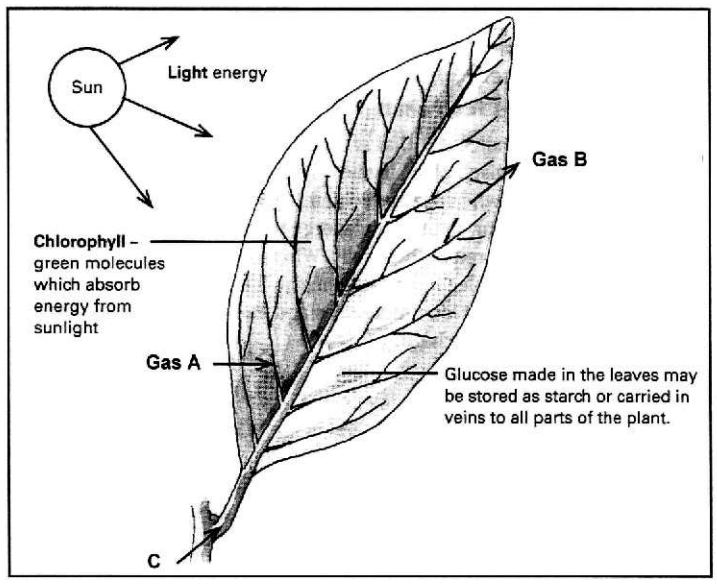
3.3.1 Name ONE insect that was controlled by using the above chemical substance which is still used in the prevention of malaria even today. (1)

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)

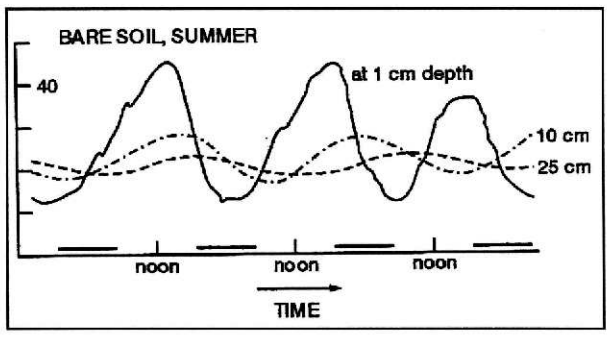
3.5.3 Name TWO natural resources that need to be used optimally to ensure that this is a successful production enterprise. (2)

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)

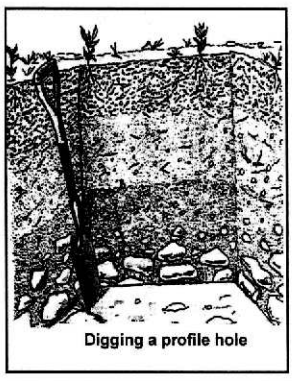
4.1.2 Describe the difference in soil temperature in this soil at a depth of 10 cm and a depth of 1 cm. (2)

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.


Digging a profile hole

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. (3)

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)

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 _____

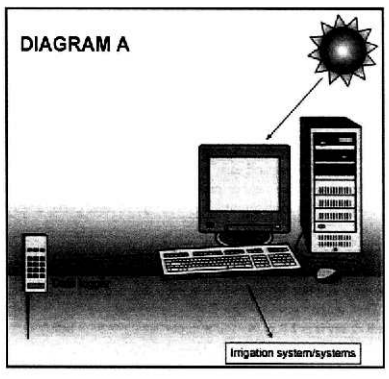
1.4.5 _____

(5 x 1) (5)

TOTAL SECTION A: 45

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.

DIAGRAM A



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

Agricultural Science
Paper 01 Feb/March 2009
Memorandum

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]

Agricultural Science
Paper 01 Feb/March 2009
Memorandum

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 (CO_2)
B – Oxygen (O_2) (2)

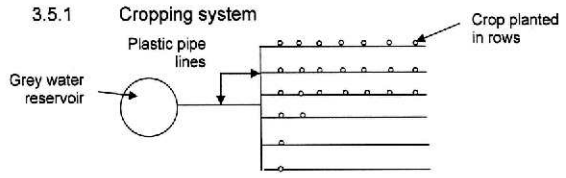
3.4.2 Sunlight
Chlorophyll (2)

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**

3.5.1 Cropping system



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)

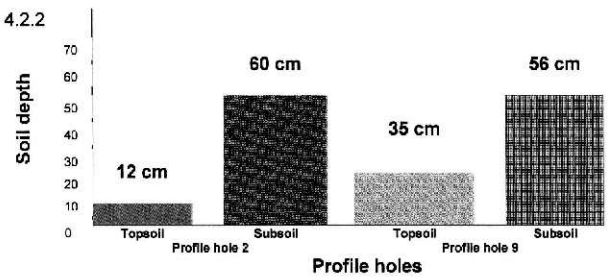
4.1.3 **Reason for the phenomenon in QUESTION 4.1.2:**
Variation in soil temperature decreases with an increase in soil depth.
Mineral soil particles have a higher heat conductivity as soil air therefore the more densely the soil particles are packed the more heat is conducted to the deeper layers of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

4.2.2



(4)

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)**

Agricultural Science
Paper 01 Feb/March 2009
Memorandum

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)

 Please turn over

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

education
DEPARTMENT: EDUCATION
MPUMALANGA PROVINCE

GOAL
EDUCATION FOR ALL

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	X	B	C	D

1.1.1 The concept 'nutritive ratio' is used to give an indication of the ... content of the feed.

A fibre
B mineral
C non-nitrogen compound
D protein

1.1.2 The maintenance ration is the amount of food an animal requires to support ...

A life.
B production.
C life as well as production.
D life, production and work.

1.1.3 Beneficial micro-organisms in the rumen of cattle are ...

A bacteria and viruses.
B protozoa and bacteria.
C fungi and bacteria.
D protozoa and fungi.

1.1.4 The protein which is generally accepted as a standard protein because it has the highest biological value is ...

A fish.
B beef.
C egg.
D legume.

1.1.5 One of the following is NOT an important stage of reproduction:

A Copulation
B Fertilisation
C Ingestion
D Parturition

1.1.6 Milk fever can be related to a deficiency of ...

A phosphorus.
B calcium.
C vitamin D.
D magnesium.

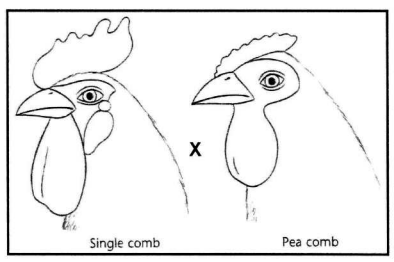
1.1.7 The type of capital that is regarded as a permanent and durable asset is ...

A wages of workers.
B fuel for tractors.
C a dam.
D a tractor.

1.1.8 One of the following factors is NOT a production factor:

A Labour
B Vegetation
C Management
D Soil

1.1.9 The diagrams below illustrate a single-comb cock, with a heterozygote genotype represented by Cc, which is crossed with a pea-comb hen with a genotype represented by cc. Their offspring will have the following phenotype ratio:



A 50% single comb and 50% pea comb
B All single comb
C All pea comb
D 75% single comb and 25% pea comb

1.1.10 NO_3^- (nitrate ion) as a chemical compound has the following characteristics:

i NO_3^- has an electrical charge and is adsorbed onto a negatively charged soil colloid.
ii NO_3^- is an example of a cation.
iii NO_3^- can be a source of nitrogen in the soil solution.
iv NO_3^- is a source of oxygen to anaerobic microbes in waterlogged soils.

Choose the description(s) from the list below that match(es) with the characteristics of the chemical substance above:

A i, ii, iii and iv
B ii, iii and iv
C iii and iv
D iii only (10 x 2) (20)

1.2 In the table below a statement with two possible answers is 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 and make a cross (X) in the block next to the question number (1.2.1 – 1.2.5) on the attached ANSWER SHEET.

Example:

COLUMN A		COLUMN B
A:	Liver	the place where bile is stored in the animal body
B:	Gall bladder	

Answer:

This statement refers to:			
ONLY A	ONLY B	A AND B	NONE
A	~~B~~	C	D

	COLUMN A		COLUMN B
1.2.1	A:	Abomasum	proper functioning of this stomach in the young suckling ruminant is essential
	B:	Omasum	
1.2.2	A:	Salivary amylase	an example of a proteolytic enzyme
	B:	Trypsin	
1.2.3	A:	Fibre	an organic compound found in the feed that will be less digestible
	B:	Cellulose	
1.2.4	A:	Unemployment	repercussions of sudden mechanisation
	B:	Self-employment	
1.2.5	A:	Herbicide resistant	characteristic of genetically modified crops
	B:	Proof of no health risks	

(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 viral disease which is carried by midges from one animal to another during the early summer period after heavy rain

1.3.2 The quantity of the product that can be purchased at any given time by consumers at all possible alternative prices

1.3.3 Money that carries interest and which is supplied to an entrepreneur by a financial institution

1.3.4 The actual sorting process of products according to the standard specifications

1.3.5 The monosaccharide that is formed when maize meal is digested to its final digestive product (5 x 2) (10)

1.4 Change the underlined words in the following statements to make them TRUE. Write only the appropriate word next to the question number (1.4.1 – 1.4.5) on the attached ANSWER SHEET.

1.4.1 Molasses is the compound commonly used as non-protein nitrogen source in ruminant feeds.

1.4.2 The hormone insulin controls the secretion of the pancreatic juice.

1.4.3 Fixed capital is the type of capital that is used for one production season only.

1.4.4 Overcapitalisation refers to a situation where too much management is invested into the farming enterprise in relation to the available soil and labour.

1.4.5 Mutation is the genetic characteristic that is responsible for increased growth and productivity when crossbreeding is applied. (5 x 1) (5)

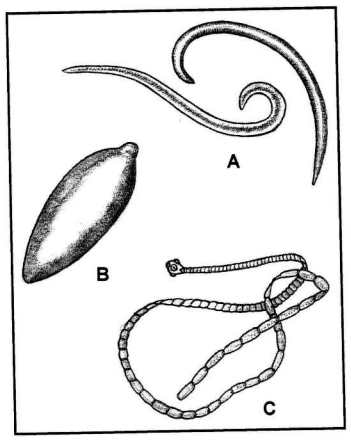
TOTAL SECTION A: 45

SECTION B

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

QUESTION 2

2.1 The diagrams below represent some of the internal parasites found in livestock.



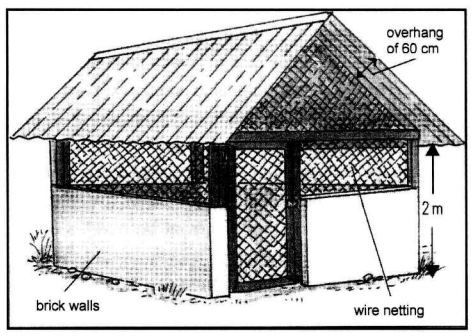
2.1.1 Identify the parasites that are labelled A – C. (3)

2.1.2 Select TWO of these parasites that need two hosts to complete their life cycles. (2)

2.1.3 Briefly state any TWO economic losses that may be caused by these parasites. (2)

2.2 The state has an important role to play in the prevention and control of animal diseases and pests. List FOUR services that the Department of Agriculture renders in this regard. (4)

2.3 Effective poultry production depends largely on proper housing facilities. A common shelter used by small farmers is the deep-litter house shown below.



Formulate FOUR requirements that this poultry farmer considered when the above structure was designed. (4)

2.4 Name THREE groups of micro-organisms that are pathogens and therefore cause diseases in animals. (3)

2.5

CASE STUDY

A group of emerging farmers is involved in the production of tomatoes, mainly for own consumption. They have little knowledge of farming and their highest qualification is Grade 7. Their land covers two hectares and the Department of Agriculture provides them with seeds, fertilisers, a water pump and fungicides.

They use two tractors to plough the two hectares. In 2007 the tomato harvest was too much for each family to consume. This resulted in high losses due to this oversupply of the crop.

2.5.1 Give ONE reason for the high loss of tomatoes in 2007. (1)

2.5.2 Indicate ONE production factor which was not fully utilised in the production process of tomatoes. (1)

2.5.3 Use the information from the case study to give ONE example of EACH of the following types of capital:

(a) Movable capital
(b) Fixed capital
(c) Working capital (3)

2.6 Mrs Mvubo is a young, inexperienced farmer who has bought a farm in a poor socio-economic environment. Her main purpose is to create job opportunities for people in her community and also to improve her entrepreneurial skills.

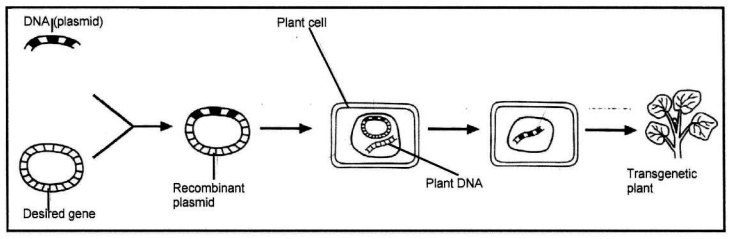
The following animals can be found on the farm: young piglets, layers, goats and beef cattle. The farm has sufficient water for irrigation.

2.6.1 Name TWO skills that Mrs Mvubo must have in order to manage the farm well. (2)

2.6.2 Name TWO managerial principles that a farmer must follow in order to be successful. (2)

2.6.3 Identify ONE factor that can make the effective marketing of her products difficult. (1)

2.7 The schematic representation below illustrates a plant breeding process followed in the development of a new cultivar.



2.7.1 Indicate the main function of DNA (deoxyribonucleic acid) as mentioned in the above diagram. (1)

2.7.2 Name the organism that is used as a vector to transfer genes from one organism to other crop plants. (1)

2.7.3 Briefly explain why the product of the process illustrated above is called a transgenetic plant. (2)

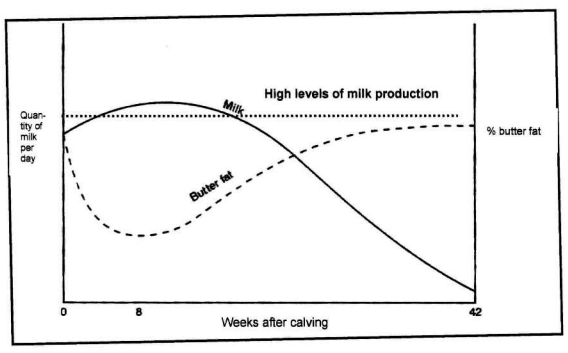
2.7.4 Name the type of technology illustrated in the above diagram. (1)

2.7.5 Describe TWO advantages for the crop farmer who uses plant material that involves the technique mentioned in QUESTION 2.7.4. (2)
[35]

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

QUESTION 3

3.1 The graph below represents a normal lactation curve of dairy cows.



3.1.1 Name the first milk produced by the cow after calving. (1)

3.1.2 State TWO characteristics of the milk mentioned in QUESTION 3.1.1. (2)

3.1.3 Indicate the time in weeks when the cow reaches her maximum production. (1)

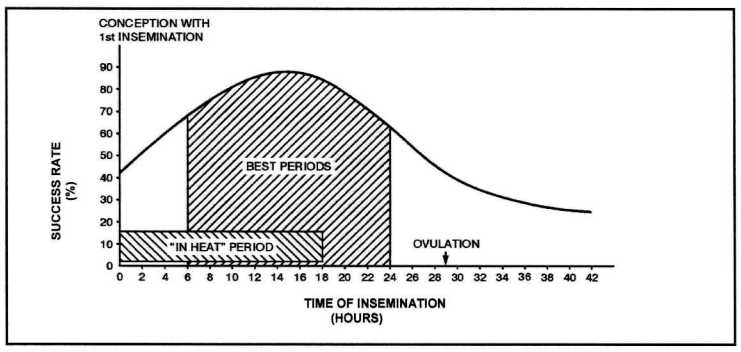
3.1.4 Determine the time in weeks when a cow will be in peak production above the high levels of milk production. (1)

3.1.5 Name at least TWO stimuli that will affect the cow to release milk from her udder. (2)

3.1.6 How can the dairy farmer ensure that the cow produces milk at maximum levels during the full duration of the lactation period? (2)

3.1.7 Which TWO environmental conditions will have a negative effect on a dairy cow's milk production? (2)

3.2 A crucial factor in the insemination technique is to do the procedure at the correct time in the oestrus period. The graph below depicts the optimal time for artificial insemination (AI):



3.2.1 Indicate the time in hours during which the cow will be on heat. (1)

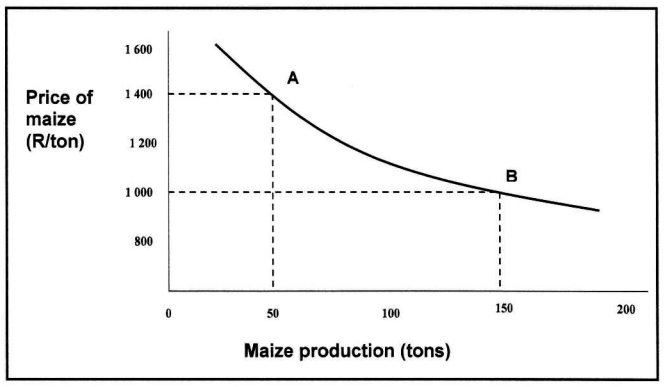
3.2.2 Deduce, from the graph, the best time to inseminate a cow for optimal results. (1)

3.2.3 Determine the time in hours when ovulation will occur. (1)

3.2.4 Give the main reason for the increase in the commercial value of the herd when AI is used. (1)

3.2.5 Name TWO ways in which the spread of diseases can be prevented or controlled when AI is used. (2)

3.3 The price of local maize is mainly determined by international maize prices and the dollar/rand exchange rate. These levels are given and the local grain producer has no influence on them. There are other factors that also affect the production and price of maize like the El Niño phenomenon, the demand for bio-fuels and the cropping system used. Below are possible graphical price estimates of maize production of a small farmer in a maize production area.



3.3.1 Give a suitable caption (heading) for the graph above. (1)

3.3.2 Indicate the relationship between the quantity of maize production and the maize price as illustrated in the graph above. (2)

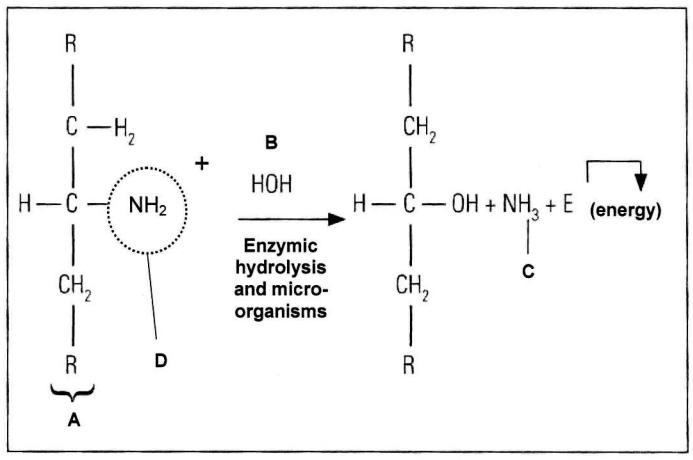
3.3.3 Deduce, from the graph above, the price of maize when the farmer produces 50 tons of maize. (2)

3.3.4 Maize production was affected by drought due to the El Niño phenomenon. Name any TWO outcomes of this situation on the maize production. (2)

3.3.5 The farmer planted 30 ha of maize and the yield obtained was 5 tons per hectare. Calculate the possible gross income per hectare that this farmer will obtain. (2)

3.3.6 The production cost for maize on this farm is given as R3 500,00 per hectare. Calculate the profit per hectare that this farmer will obtain using the data supplied. (2)

3.4 The chemical reaction below occurs in the soil when organic matter is decomposed by the activities of micro-organisms.



3.4.1 Name the substances represented by labels **A**, **B** and **C**. (3)

3.4.2 Briefly describe the effect of temperature in the soil where this reaction occurs. Substantiate your answer by referring to the reaction above. (2)

3.4.3 Name the substance that acts as a catalyst to speed up this chemical reaction. (1)

3.4.4 Name the functional group indicated by label **D**. (1)
[35]

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

QUESTION 4

4.1 There are five stages in the processing of food in the body of an animal to release energy and nutrients into body cells. The schematic representation (DIAGRAM 1) below refers to the path of food through the alimentary canals of animals.

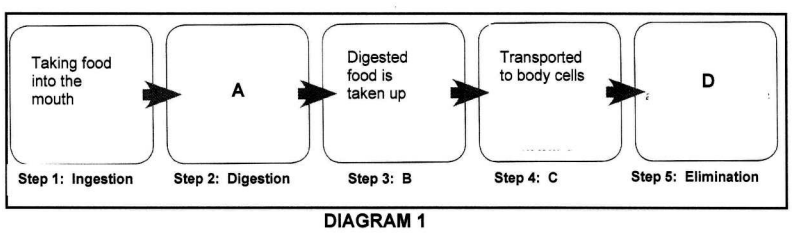


DIAGRAM 1

The diagram below represents the parts of the alimentary canal of a farm animal (DIAGRAM 2).

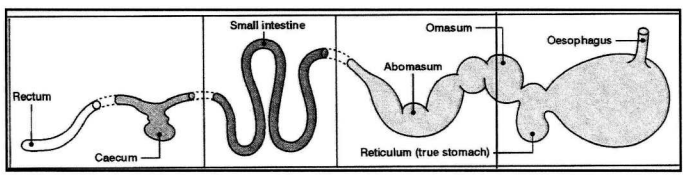


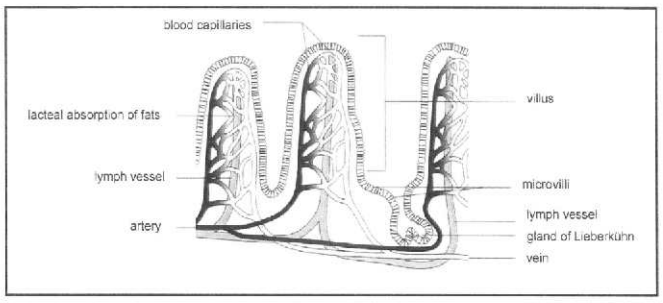
DIAGRAM 2

4.1.1 Write down the missing indicators labelled **A – D** in the schematic representation above (DIAGRAM 1). (4)

4.1.2 Match the part of the alimentary canal of the farm animal indicated by labels **E – H** above (DIAGRAM 2) with the folowing descriptions:

(a) A stomach which is also referred to as the glandular stomach
(b) Absorption of certain fermented products takes place here
(c) Maximum absorption occurs here (3)

4.1.3 The diagram below represents a structure that plays a very important role in the absorption of nutrients.



Identify TWO visible adaptations from the diagram above that make this structure suitable for maximum absorption of nutrients. (2)

4.2 A group of learners studied the feeding facility of pigs over a period of time. The enclosure has water nozzles as a watering facility and an automatic feeder that releases feed as the animals enter the feeding facility. The number of times that the pigs visited the watering facility was measured against the maximum day temperature.

1. Water usage

Times used water facility (per day per pig)	Temperature (°C)
1	10
3	18
4	22
6	30
10	38
14	42

2. Feed intake

Times used feeding facility (per day per pig)	Temperature (°C)
9	10
7	18
6	22
4	30
2	38
1	42

4.2.1 Organise the information collected in the two tables by drawing a bar graph from the data. Include the data from both tables on one graph. (4)

4.2.2 Explain how a farmer would use heat control (heating and cooling facilities) in his pig unit. (2)

4.6 The following list of factors might influence the production of dairy cows from birth to when they are in full production. Use only these listed factors to answer the questions that follow.

Feed supply to animal	Animal growth rate	Housing facility
Animal diseases	Feed conversion ratio	Handling of animals
Climate	Size of animal	Colour of animal
Size of udder	Size of camps	Availability of water

4.6.1 Identify an environmental factor that influences the growth and production of these dairy cows. (1)

4.6.2 Indicate TWO genetic factors that would directly influence the milk production potential of these cows. (2)

4.6.3 Name a method used to improve the genetic factors in a herd of dairy cattle. (1)

4.3 A trial was conducted in a feedlot with sheep to determine the digestibility of experimental lucerne feed. During the experimental period the mass of feed intake was measured as well as the mass of excretion.

A sheep has an intake of 8 kg lucerne hay with a moisture content of 10%. The sheep excretes 2 kg of manure with a moisture content of 50%.

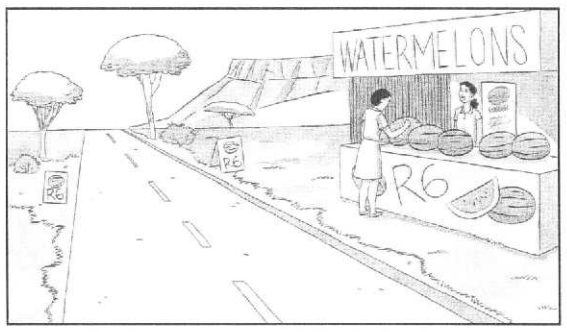
Determine the coefficient of digestibility of the lucerne hay. (3)

4.4 Discuss the following two labour problems in the farming industry:

4.4.1 The shortage of labourers (3)

4.4.2 The lack of training (2)

4.5 The effective marketing of agricultural products is vital for any production enterprise. The illustration below represents a method of marketing agricultural products in a unique way.



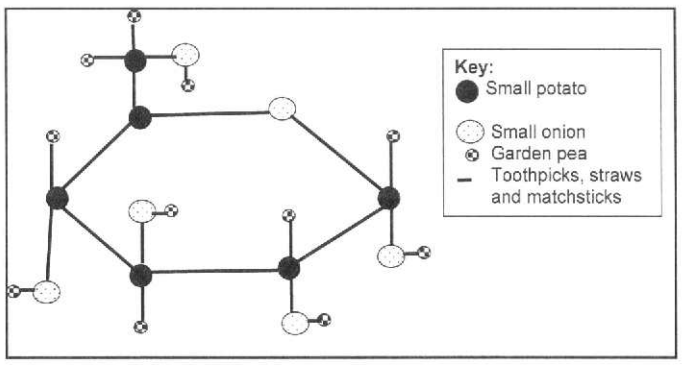
4.5.1 Identify the method of marketing that is represented by the above illustration. (1)

4.5.2 Deduce a possible reason from the illustration to support your answer in QUESTION 4.5.1. (1)

4.5.3 Give ONE reason why the marketing system illustrated above is steadily gaining popularity. (1)

4.5.4 It is vital that the attention of possible consumers (buyers) is attracted in any trading business. Describe TWO ways visible in the above illustration in which the attention of consumers is attracted. (2)

4.7 Learners worked in a group to build models of chemical compounds in an activity in their class. They used matchsticks, straws, toothpicks, small potatoes, garden peas and onions to build their model. The diagram below represents the model that they built in their class group.



4.7.1 Deduce, from the diagram, the chemical element that the garden peas represent. (1)

4.7.2 Determine, from the diagram, the possible carbohydrate that this model represent. (1)

4.7.3 Indicate the solubility of this chemical compound in water. (1)
[35]

TOTAL SECTION B: 105

GRAND TOTAL: 150

ANSWER SHEET

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

	ONLY A	ONLY B	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 1.3

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

Agricultural Science
Paper 02 Feb/March 2009
Memorandum

SECTION A

QUESTION 1.1

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

(10 x 2) (20)

QUESTION 1.2

1.2.1	A✓✓
1.2.2	B✓✓
1.2.3	C✓✓
1.2.4	A✓✓
1.2.5	A✓✓

(5 x 2) (10)

QUESTION 1.3

1.3.1 Blue tongue✓✓

1.3.2 Demand✓✓

1.3.3 Loan / Credit✓✓

1.3.4 Grading✓✓

1.3.5 Glucose✓✓ (5 x 2) (10)

QUESTION 1.4

1.4.1 Urea✓

1.4.2 Secretin✓

1.4.3 Working/Floating/ Production/Short term✓

1.4.4 Capital✓

1.4.5 Heterosis/Hybrid vigour✓

(5 x 1) (5)

TOTAL SECTION A: 45

SECTION B

QUESTION 2

2.1 **Internal parasites of livestock**

2.1.1 **Identification of internal parasites**
A – Round worm
B – Fluke worm
C – Tapeworm (3)

2.1.2 **TWO parasites that need two hosts to complete their life cycles**
Tapeworm
Fluke worm (2)

2.1.3 **TWO economic losses that are caused by internal parasites**
Stock losses due to death
Loss of production (meat, wool, milk, feathers, mohair, etc.)
Degrading of carcasses at abattoirs
Danger to human health by parasites requiring intermediate hosts
Expensive costs of controlling them chemically (Any 2) (2)

2.2 **FOUR services rendered by the state to prevent and control animal diseases and pests**
Preventative measures
Quarantine of imported animals in quarantine stations for six weeks
Quarantine of sick animals on farms for notifiable diseases
Isolation of sick animals to minimise the spread of the disease
Destroying carcasses to prevent the spread of the disease
Controlling the vectors that spread the disease
Vaccination
Dipping animals to prevent tick-borne diseases like heart water

Treatment/Control of the disease
Supply of antibiotics/anthelmintics
Good nursing of sick animals (Any 4) (4)

2.3 **Formulation of FOUR requirements for a poultry house**
The long sides of the building should face north and south to avoid direct summer sun shining into the house
Use wire netting to allow free flow of air/ventilation
The roof should begin 2 m above the ground to minimise ground heat in summer
A double-sloped roof is better than a single-sloped roof for protection against sun and rain
The roof can be made of corrugated iron or thatch to keep it cool in summer and warm in winter
Use concrete floor as it allows easy cleaning when the litter is taken out (Any 4) (4)

2.4 **THREE groups of micro-organisms that are pathogens**
Bacteria
Viruses
Protozoa
Fungi (Any 3) (3)

2.5 **Production of tomatoes by a group of emerging farmers**

2.5.1 **ONE reason for high loss of tomatoes in 2007**
No market to sell the surplus tomatoes harvested in 2007
There was an over production of tomatoes in 2007
The climatic factors might have contributed to the high yields in 2007 (Any 1) (1)

2.5.2 **ONE production factor which was not fully utilised**
Movable capital/the two tractors (1)

2.5.3 **Types of capital**
Movable capital – tractors
Fixed capital – water pump/farmers' houses (Any 1)
Working capital – seeds/fertilisers/fungicides (Any 1) (3)

2.6 **Management and marketing of Mrs Mvubo's farming enterprise**

2.6.1 **TWO skills needed to manage the farm:**
Application of knowledge
Planning skills
Entrepreneurial skills
Adapting to changing circumstances/flexibility skills
Personal and human relations/interpersonal skills (Any 2) (2)

2.6.2 **TWO managerial principles for successful farming:**
Planning
Organisation and co-ordination
Decision making
Control
Motivation (Any 2) (2)

2.6.3 **Identification of ONE factor that makes effective marketing difficult:**
Poor infrastructure(bad roads, lack of pack houses, etc.)
Lack of capital to construct roads/to build the infrastructure
Perishability of the product
Grading and standardisation of the products
Ineffective control over production
Wide distribution of products
Low value in relation to volume
Seasonal fluctuation in production (Any 1) (1)

2.7 **Genetically modified plant**

2.7.1 Determine the genetic characteristics of the organism (plant) (1)

2.7.2 Plasmid / micro-organism/bacterium (1)

2.7.3 DNA which determines the characteristic of a plant is taken from a source (organism) and inserted into another organism to change that organism's genetic structure and characteristics (Any 2) (2)

2.7.4 Genetic engineering/GMO technology/Biotechnology (1)

2.7.5 **TWO advantages for the crop farmer who uses GMO**
Higher production
More resistance to diseases
More resistance to pests
More resistance to chemicals (herbicide resistance)
Better quality products (size, colour, shelf life, taste etc.)
Adaptation to a particular environment (Any 2) (2)
[35]

QUESTION 3

3.1. **Milk production**

3.1.1 Colostrum/beestings (1)

3.1.2 **TWO characteristics of colostrum:**
Yellowish in colour
Contains antibodies
Contains extra nutrients (Any 2) (2)

3.1.3 8 (eight) weeks (1)

3.1.4 2 (two) weeks (1)

3.1.5 **TWO stimuli that affect milk release:**
Massaging the cow's udder
Whistling
Playing a musical instrument to calm the cow (Any 2) (2)

3.1.6 **TWO measures to ensure maximum milk production:**
Providing correct nutrition
Proper control of diseases
Providing proper housing (Any 2) (2)

3.1.7 **TWO environmental conditions that affect milk production:**
Excessive heat/Extreme heat
Excessive cold/Extreme cold (2)

3.2. **Artificial insemination**

3.2.1 Approximately 18 hours (1)

3.2.2 6 to 12 hours after signs of oestrus/Inseminate in the afternoon when signs were detected in the morning and vice versa (1)

3.2.3 12 to 14 hours after first signs of oestrus (1)

3.2.4 Good quality bull/semen is used (1)

3.2.5 **TWO ways of preventing the spread of diseases through AI:**
Use of sterilised/clean apparatus/tools
Use of good quality semen
Avoiding injuries (Any 2) (2)

Agricultural Science
Paper 02 Feb/March 2009
Memorandum

3.3 **Maize production and price**

3.3.1 Interaction/Relationship/Correlation between maize production and maize price (1)
3.3.2 The price of maize increases with the decrease of maize in maize production and vice versa (2)
3.3.3 R1 400 (2)
3.3.4 **TWO outcomes of drought (El Niño):**
Drop in production/no production due to drought
No supply of maize
Loss of income/profit (Any 2) (2)
3.3.5 (30 x 5) x 1000
= R15 000 (2)
3.3.6 R5 000 – R3 500
= R1 500 (2)

3.4 **Chemical reactions in the soil**

3.4.1 A – amino acids
B – water (H_20)
C – nitrite (3)
3.4.2 Enzymes and micro-organisms work optimally in a temperature of 25 °C. Once the temperature drops below 25 °C, their activities (reactions) will also drop. (2)
3.4.3 Enzymes (1)
3.4.4 Amino group (NH_2) (1)
[35]

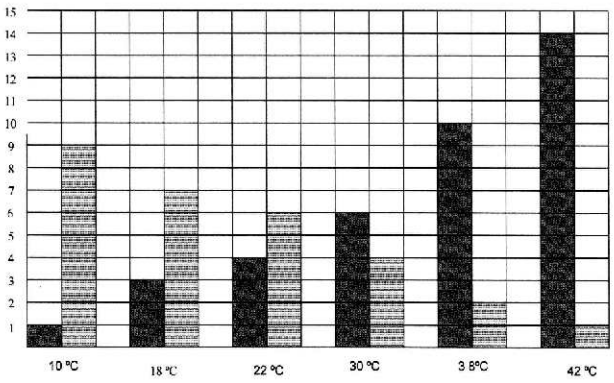
QUESTION 4

4.1 **Alimentary canal and digestion of feed**

4.1.1 A – Chemical breakdown of feed
B – Absorption
C – Assimilation
D – Egestion (4)
4.1.2 (a) G
(b) H
(c) F (3)
4.1.3 **Adaptation of structure for absorption of nutrients:**
Blood capillaries – absorption of digested food
Number of villi – increase absorption surface
Microvilli increase the internal surface area (Any 2) (2)

4.2 **Feeding facility for pigs**

4.2.1



Temperatures (°C):

Water usage
Feed intake (4)

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)**

4.2.2 When environmental temperatures increase to above the optimal levels the farmer will use cooling (open ventilation/fans) and when the environmental temperatures decrease to below the optimal point he will use heating (close ventilation/heaters) (2)

4.3 **Digestion trial for sheep**

Lucerne hay:
10% of 8kg = 10/100 x 8 kg = 0,8 kg
8 kg – 0,8 kg = 7,2 kg
Manure:
50% of 2 kg = 50/100 x 2 kg = 1 kg

Calculation:

$\frac{7,2kg - 1kg}{7,2kg} \times \frac{100}{1}$

=8,6% (3)

4.4 **Labour problems in the farming industry**

4.4.1 **Shortage of labour:**
There is an overall scarcity of labour for the farming industry – working conditions on farm are less attractive (lower salaries)
There is a competition for labour with industries – there are better working conditions and services
Migration of labour from the rural areas to cities – phenomenon in developing countries (3)
4.4.2 **Lack of training:**
Productivity of labour is lower
Lower levels of skills in labour in the farming industry
Limits the use of technology in farming enterprises
Less career opportunities in agriculture (bad management) (Any 2) (2)

4.5 **Methods of marketing**

4.5.1 Free marketing (1)
4.5.2 Direct sales to the public from the farm
Sales are in cash
Immediate payments for products
Farmer determines his/her own price (e.g. R6,00) (Any 1) (1)
4.5.3 No go-between (intermediaries)
Entrepreneurial initiative and drive can be shown
Entrepreneur can work harder
Sales are cash
No delay in payments
Production of quality products is encouraged (Any 1) (1)
4.5.4 Very visible notice boards of product (showing the price)
Clear and visible building (farm stall)
Location next to a busy road
Use of colour and placing the products for everyone to see (Any 2) (2)

4.6 **Genetics factors that affect the production of dairy cattle**

4.6.1 **ONE environmental factor that influences growth and production:**
Climate
Feed supply to animals
Housing facility
Availability of water (Any 1) (1)
4.6.2 **TWO genetic factors that have an influence on milk production:**
Size of udder
Size of animal
Colour of animal (Any 2) (2)
4.6.3 Breeding (related breeding/inbreeding/line breeding/non-related breeding/cross breeding/upgrading) (1)

4.7 **Model of chemical compound**

4.7.1 Hydrogen/H (1)
4.7.2 Glucose (1)
4.7.3 Very soluble (1)
[35]

TOTAL SECTION B: 105

GRAND TOTAL: 150

Notes

Notes

Notes

Notes