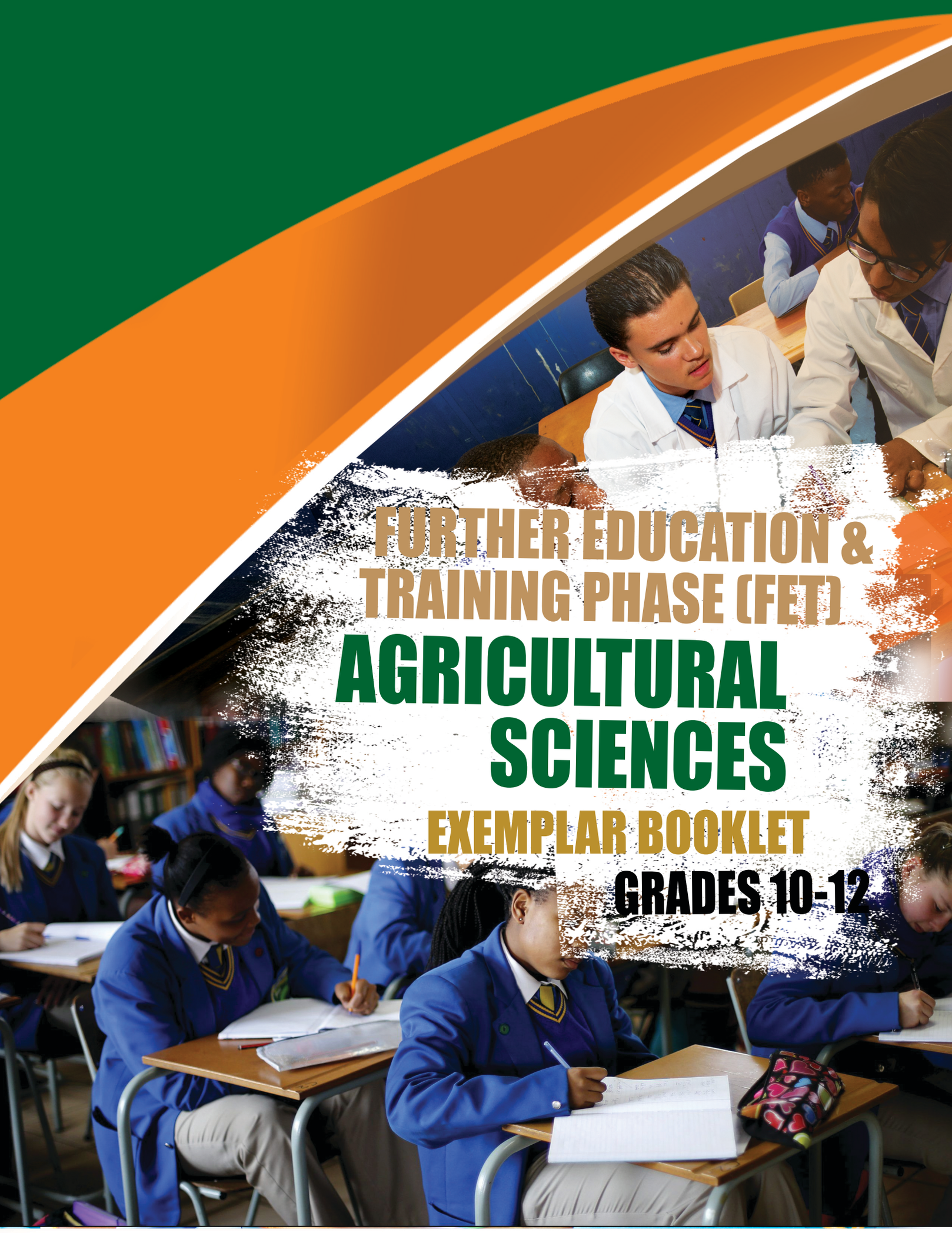


FURTHER EDUCATION & TRAINING PHASE (FET)

AGRICULTURAL SCIENCES

EXEMPLAR BOOKLET

GRADES 10-12

basic education
Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

Read to Lead
A Reading Nation is a Leading Nation

2030 NDP

FOREWORD

The Department of Basic Education has pleasure in releasing a subject exemplar booklet for School Based Assessment (SBA) to assist and guide teachers with the setting and development of standardised SBA tasks and assessment tools. The SBA booklets have been written by teams of subject specialists to assist teachers to adapt teaching and learning methods to improve learner performance and the quality and management of SBA.

The primary purpose of this SBA exemplar booklet is to improve the quality of teaching and assessment (both formal and informal) as well as the learner's process of learning and understanding of the subject content. Assessment of and for learning is an ongoing process that develops from the interaction of teaching, learning and assessment. To improve learner performance, assessment needs to support and drive focused, effective teaching.

School Based Assessment forms an integral part of teaching and learning, its value as a yardstick of effective quality learning and teaching is firmly recognised. Through assessment, the needs of the learner are not only diagnosed for remediation, but it also assists to improve the quality of teaching and learning. The information provided through quality assessment is therefore valuable for teacher planning as part of improving learning outcomes.

Assessment tasks should be designed with care to cover the prescribed content and skills of the subject as well as include the correct range of cognitive demand and levels of difficulty. For fair assessment practice, the teacher must ensure that the learner understands the content and has been exposed to extensive informal assessment opportunities before doing a formal assessment activity.

The exemplar tasks contained in this booklet, developed to the best standard in the subject, is aimed to illustrate best practices in terms of setting formal and informal assessment. Teachers are encouraged to use the exemplar tasks as models to set their own formal and informal assessment activities.

MR HM MWELI

DIRECTOR-GENERAL

DATE: 13/09/2017

Table of Contents

1. Introduction

Assessment is a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment. It involves four steps: generating and collecting evidence of achievement, evaluating this evidence, recording the findings and using this information to understand and assist in the learners' development to improve the process of learning and teaching. Assessment should be both informal (Assessment for Learning) and formal (Assessment of Learning). In both cases regular feedback should be provided to learners to enhance the learning experience.

School-based assessment (SBA) forms part of the formal assessment component. It is a purposive collection of learners' work that tells the story of the learners' efforts, progress or achievement in attaining knowledge (content, concepts and skills) in the subject. The advantages of school-based assessment can be summarised as follows:

- It provides a more balanced and trustworthy assessment system, increasing the range and diversity of assessment tasks.
- It improves the reliability of assessment because judgements are based on many observations of the learner over an extended period of time.
- It empowers teachers to become part of the assessment process and enhances collaboration and sharing of expertise within and across schools.
- It has a professional development function, building up practical skills in teacher assessment, which can then be transferred to other areas of the curriculum.

School-based assessment forms part of a year-long formal Programme of Assessment in each grade and subject. The assessment tasks should be carefully designed to cover the content of the subject as well as the range of skills and cognitive levels that have been identified in specific aims. Tests, practical tasks, assignments and projects make up the SBA component in Agricultural Sciences.

Teachers should ensure learners understand the assessment criteria and have extensive experience using it for self- and peer assessment in informal situations before conducting a planned formal assessment activity. Teachers should also have used these criteria for informal assessment and teaching purposes before they conduct any formal assessment so that learners are familiar with the criteria and the assessment process.

2. Aims of the project

Through this publication it is envisaged that TEACHER capacity will be increased in respect of each of the following:

- Differentiating among the nature of the different types of assessment tasks (assignments, projects, practical tasks, tests and examinations)
- Developing assessment tasks that are balanced in terms of cognitive levels, topics and skills
- Developing a marking guideline that:
    - is appropriate to the task
    - clearly shows mark allocation and distribution
    - includes alternative answers
- Developing tasks that contain a variety of question types

Through this publication it is also envisaged that LEARNERS will benefit by:

- developing an understanding of the differences amongst the nature of the various types of assessment tasks
- being exposed to assessment tasks that are of the same standard as those that they are exposed to during the course of the year

3. Programme of formal assessment in Agricultural Sciences

- This includes all assessment tasks that make up the formal programme of assessment for the year.
- Formal assessment tasks are marked and recorded by the teacher for promotion and certification purposes.
- All tasks must be subjected to pre- and post-moderation to ensure that appropriate standards are maintained.
- The table that follows shows the number and types of assessment tasks required in the Grade 10 and 11 year.

PROGRAMME OF ASSESSMENT

Grade 10 and 11

Formal Assessment: Grade 10-11 (6 tasks)			Term 4: Promotion mark
Term 1	**Term 2**	**Term 3**	
Task-based assessment 1: 25% Controlled test 1: 75%	Task-based assessment 2: 25% Mid-year Examination: 75%	Task-based assessment 3: 25% Controlled test 2: 75%	**SBA: 25%** **Task-based assessment**: (Weighting) Practical investigation: 20 marks Assignment: 20 marks Research project: 20 marks **Test-based assessment**: (Weighting) Controlled test 1: 10 marks Controlled test 2: 10 marks Mid-year Examination: 20 marks **Total**: 100 **End-of-year examination: 75%** Paper 1: 150 Paper 2: 150 **Total 300**
100	**100**	**100**	**Total progression mark:** **400**

The table that follows shows the number and types of assessment tasks required in the Grade 12 year

Grade 12

Formal Assessment: Grade 12 (7 tasks)			Certification mark
Term 1	**Term 2**	**Term 3**	
Task-based assessment 1: 25% Controlled test 1: 75%	Task-based assessment 2: 25% Mid-year Examination: 75%	Task-based assessment 3: 25% Controlled test 2: 25% Trail Examination: 50%	**SBA (internal): 25%** **Task-based assessment**: (Weighting) Practical investigation 1: 20 marks Practical investigation 2: 20 marks Assignment: 20 marks **Test-based assessment**: (Weighting) Controlled test 1: 5 marks Controlled test 2: 5 marks Mid-year Examination: 10 marks Trial Examination: 20 marks **Total**: 100 **End-of-year examination (external): 75%** Paper 1: 150 Paper 2: 150 **Total 300**

NOTE: The SBA mark must be converted to 25% and the external examination counts 75% of the final mark.

A description of the requirements for each of the different types of assessment tasks follows below.

TYPES OF FORMAL ASSESSMENT

Practical investigation (Grade 10 - 12)

The purpose and focus of a practical investigation is to develop and assess a learner's science investigative skills and can take the form of *hands-on activities* or *hypothesis testing*.

At least ***one practical investigation*** must be assessed formally and recorded in Grade 10 and 11 but **two** in Grade 12.

Learners should be given enough *contact time* to conduct a practical investigation and obtain results. Learners should use *non-contact time* to prepare for the practical investigation and also to write it up. In a practical investigation Agricultural Sciences learners will be assessed on their ability to cope with the following skills:

SKILLS	ELABORATION
Follow instructions	
Make accurate observations	• Matching objects or processes or items that are similar and identifying differences. • Describing objects. • Describing processes. • Identifying differences and similarities in diagrams, objects, words and data. • Identifying problems. • Classifying an object or process from given information. • Observing features and differences in given situations with minimal information.
Work safely	• Taking precautions.
Manipulate and use apparatus effectively	• Assembling common apparatus. • Handling equipment, apparatus and chemicals.
Measure accurately	• Reading linear and two-dimensional scales. • Scaling. • Measuring out quantities. • Making valid measurements of variables, repeating measurements to obtain an average where necessary in all quantitative work. • Recognising, or supply the correct units for common measurements • Counting systematically.
Handle materials Appropriately	• Preparing materials and staining slides. • Handling materials.
Gather data	• Collecting data (information).
Record data appropriately – drawings, graphs, etc.	• Collecting and organising data in: - Diagrams; - Tables; and - Graphs. • Constructing a pie chart, line graph, histogram or bar chart as suited to the data, choosing suitable axes and scales.

Research project / task (Grades 10 and 11)

A maximum of *three weeks of non-contact time* should be spent on a research project or task. Contact time should be built in for guidance, tracking progress and support and such time will be determined by the situation at hand.

When designing a research task, Agricultural Sciences teachers/facilitators must ensure that:

- It is an investigative task;
- It addresses all the relevant content;
- It is a long-term task;

- Detailed guidelines are provided and, where appropriate, relevant resources should be made known and/or provided to learners;
- It focuses on accessing knowledge through literature research and primary sources such as people, texts, etc.

Tasks may include a *model* and/or *display* or a *practical investigation*, but must be accompanied by a written presentation.

Assignments (Grade 10 – 12)

An assignment is a *short task* of 1 to 1½ hours and includes activities such the analysis and interpretation of data, and the drawing / justifying of conclusions. It could further include an activity that the learners do that simulates an agricultural activity or action. This could include the building of *models*, *computer simulations*, *planning documents*, *data gathered from experiments*, etc. These tasks are based on a specific agricultural activity.

TERM 1: ASSIGNMENT:

TOPIC: Agro-ecology and the influence of weather phenomena on agricultural production.

PRACTICAL NO.____ **GRADE: 10**

NAME: _____ **DATE**: _____

Overview

During the current drought (2015/2016) in South Africa, it became evident that we are not at all prepared to face a drought of this extent. Furthermore, long-term weather predictions showed that the expected "La Nina" event might not be as strong as suggested earlier.

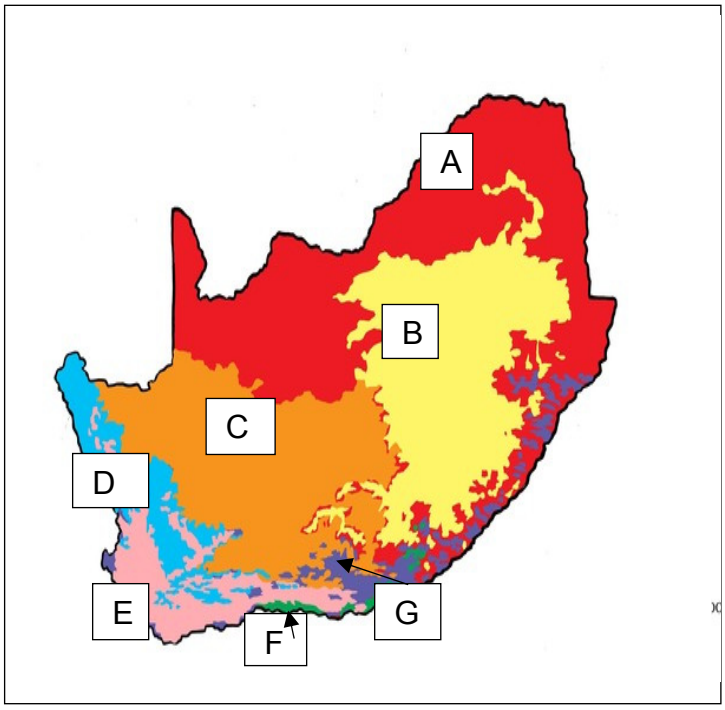
The average rainfall in South Africa (and temperature) has an influence on the biomes prevalent in certain areas and also on the land-use of that area. In a drought like the current one, land-use alters, having an influence on the food security of that area and the country as a whole. This assignment aims to connect all the dots in our understanding of weather phenomena and its influence on our lives. (But first we need to collect some background.)

LEARNING OBJECTIVES: Specifics

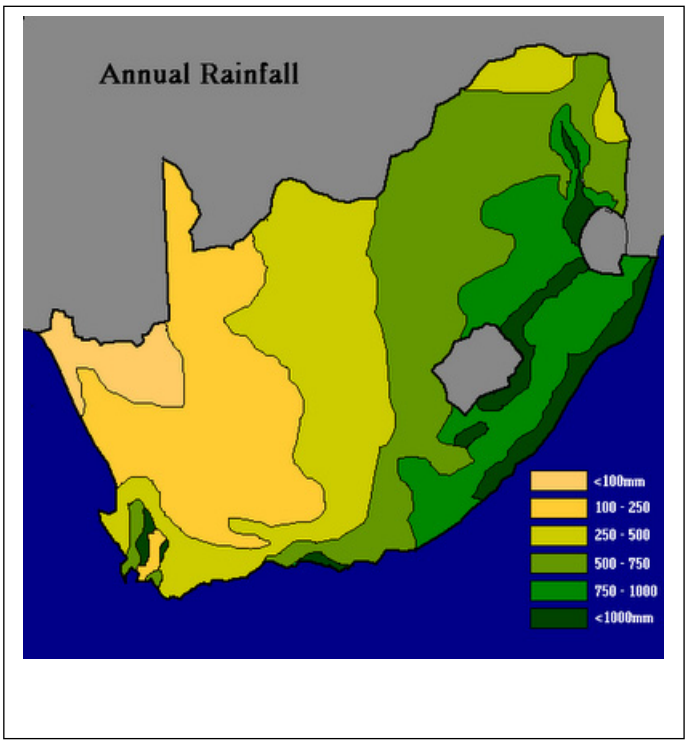
Expectations: Educator	**Expectation: Learner (Outcome)**
• Explain to the learners the different biomes in South Africa and how it is connected to climate • Explain the influence of adverse weather conditions on agricultural production and how it connects to feed security.	• To understand the role of climate on the vegetation and agricultural possibilities in South Africa • To understand the role of weather phenomena on agricultural production • To see the importance of planning for the unexpected in agricultural enterprises

1. Study the following maps and answer the questions that follows:

Biomes of South Africa



Rainfall in South Africa



1.1 Identify biomes A-G (8)

1.2 Provide a short description of each of these biomes (8x2) (16)

1.3 Write a short paragraph on the influence of climate on the occurrence of biomes (6)

[30]

2.1 Indicate TWO agricultural practices related to each biome (8x2) (16)

2.2 Briefly explain the influence of a severe drought on land use practices in biome A and biome C respectively (2x3) (6)

2.3 Provide a definition for the term " food security" (4)

2.4 Justify the following statement "Food security is not a function of availability of food but rather of economics" (6)

[32]

3.1 Provide a brief description of the following and their resulting influence on South Africa's weather

a) El Nino
b) La Nina
c) Global warming
d) The greenhouse effect (4x3) (12)

3.2 It is evident that climate change is a reality that farmers need to take into account for their future production planning. Suggest methods whereby farmers can adapt their farming practices to suit the changing climatic conditions. (4)

3.3 The approach of commercial farmers to combat the ever-changing climatic conditions is different than that of the small-scale subsistence farmer. Suggest methods whereby the subsistence farmer can ensure continuous production, therefore improving his family' food security (3)

[23]

Total : 80

TERM 2: PRACTICAL INVESTIGATION/ ASSIGNMENT.

TOPIC: Sustainable Natural Resource Utilisation

PRACTICAL NO.____ **GRADE: 10**

NAME: _____ **DATE**: _____

Overview

Water is one of South Africa's most valuable and restricted natural resources.
Not all communities have access to water by simply opening a tap.
This is an investigative exercise to make learners aware of water sources and the challenges regarding our water – that it does not simply come from a tap and will differ from area to area.

LEARNING OBJECTIVES: Specifics

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Expectations: Educator	Expectations: Learner (Outcome)
• Needs to explain the safe use of all resources including water, soil, herbicides and pesticides and others • Discuss the concept of pollution of resources • Make learners aware that South-Africa is a water-scarce country • Production must be optimised for every litre of water used	• Needs to understand the importance of the prevention of pollution of all natural resources • Needs to realise that in South Africa not all communities have access to water by simply opening a tap. • Understand the issues regarding water usage.

Instructions:

SECTION A: <u>Marks will not be awarded for Section A</u>

1. Divide the class into groups of five learners.

2. Allocate each group a part of the local area to study, which includes residential and agricultural land.

3. Each group must visit their area and find out:
   a) Where do people get their water from?
   b) What problems do they experience getting water?
   c) Are there problems with the water itself, e.g. quality, quantity and colouring?
   d) What do people mainly use the water for?

4. Findings should be recorded in a table and reported to the class.

5. Groups must draw simple maps of the areas they have studied.

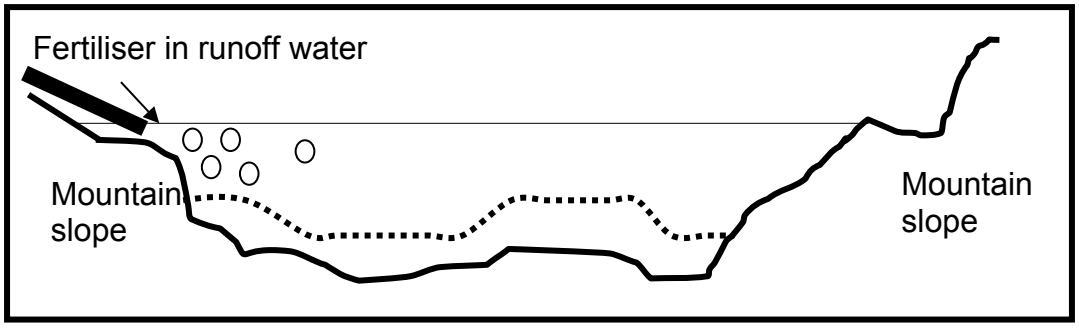
6 Groups draw up a class record of all the water resources, their water challenges and their uses in one table.

7. Combine all the group's maps to give a picture of water sources in the whole area.

SECTION B: Individual work: Marks will be awarded

1.1 Define water quality in terms of use for agricultural irrigation purposes. **(3)**

2.1 The following diagram shows a dam that is situated between slopes of a mountain where wheat is grown. Farmers use fertilisers to increase crop yield. When sprinklers are used to supply water to the wheat, some fertilisers ends up in the dam.



2.1.1 What do we call it when excessive nutrients land up in a water body? (1)

2.1.2 Explain ONE danger of the excessive use of fertilisers to the water environment. (3)

2.1.3 Indicate TWO other sources of pollution on a farm. (2)

2.2.3 Discuss FOUR different management strategies that a farmer can adopt to prevent and control water pollution. (8)

[14]

3 The table below contains information on changes that occur in a river, downstream from a sewage outflow.

Distance downstream from the point of entry of sewage (m)	Number (arbitrary units)		
	Bacteria	Algae	Fish
0	88	20	20
100	79	8	6
200	73	7	1
300	60	21	0
400	51	40	0
500	48	70	0
600	44	83	0
700	42	90	0
800	39	84	0
900	36	68	4
1000	35	55	20

3.1 Explain why the number of bacteria was the highest at 0 metres. (1)

3.2 Draw a line graph of the number of bacteria found at specific distances downstream from the sewage outflow. (5)

3.3. Draw a conclusion regarding sewage pollution and the number of bacteria found in the water. (3)

3.4 Indicate the health concerns for human consumption regarding sewage in irrigation water. (3)

[12]

4 Read the article on dams in South Africa and answer the questions.

Dams in South Africa

The Gariep dam is the largest storage reservoir in South Africa with a total storage capacity of 5341 million cubic meters when full. It is located on the Orange River between the Eastern Cape to the south and te Free State to the north and about 30km north east of Colesburg. It is situated in a gorge at the entrance to the Ruigte Valley some 5 km east of Norvalspruit. Constructed in 1972, it stores water from the Orange River in a 100km long reservoir which has a surface area of 350 square kilometers.

The dams forms part of the Orange River Project, one of the largest African irrigation projects, which was started in 1966. Its purpose is to provide water for the irrigation of 22400 hectares of land for agricultural use and, at the same time, to provide drinking water to the cities of Bloemfontein and Port Elizabeth and at the same time, provide " peak power" for the National power supply network.

Dam	Full supply capacity ($x10^6m^2$)	River
Gariep	5041	Orange
Vanderkloof	3171	Orange
Sterkfontein	2616	Nuwejaarspruit
Nuwejaarspruit(Vaal)	2603	Vaal
Pongolapoort	2445	Pongola
Bloemhof	1264	Vaal

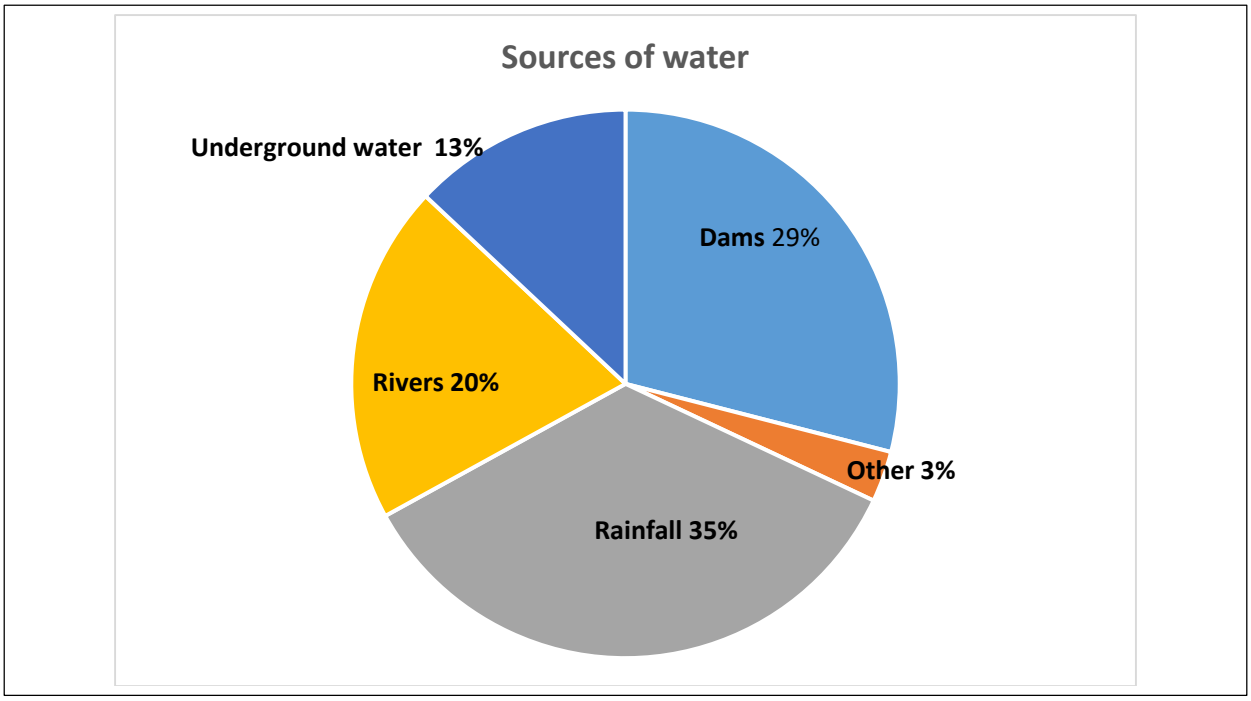
4.1 The Gariep is the largest storage dam in South Africa. Explain the importance of this reservoir. (3)

4.2 Use the information from the table and determine the difference in storage capacity between the largest and smallest dams in South Africa. (4)

4.3. List THREE purposes of dams in South Africa. (3)

4.4 Use the information from the table to draw a bar graph to indicate the dams and their capacity to store water. (5)
[15]

5. The following pie chart shows the sources of water in South Africa. Study the chart and answer the questions that follow:



5.1 Rainfall is seasonal and uneven in South Africa. In the summer of 2015/ 2016, the agricultural sector was adversely affected by the severe drought and farmers had to make special plans to survive.

5.1.1 Suggest THREE methods whereby farmers can ensure that they can still have enough water to be productive in a very dry season. (3)

5.1.2 Intensification is a method whereby famers can produce more from a smaller unit of land. Indicate TWO crop intensification methods whereby a farmer can also reduce the use of water. (2)

5.2 Irrigation in South Africa depends on the level of finance and management skills available to the farmer.

5.2.1 Collect pictures of FOUR different irrigation systems used in South Africa. Describe the irrigation systems in terms of finance and management skills needed. (4 × 3) (12)

5.2.2 Discuss and motivate the most water-efficient irrigation system mentioned in Question 4.2.1. (4)

[21]

TOTAL 65

TERM 3: ASSIGNMENT

TOPIC: Animal studies: General importance, economic value and classification of farm animals

PRACTICAL NO.____ **GRADE: 10**

NAME: _____ **DATE**: _____

Overview

The activity focuses on:

- The different breeds representing domesticated farm animals.
- The economic importance of livestock farming.
- Agriculture, or farming, is a primary industry. Farmers cultivate crops and rear animals to produce food and other products. Agriculture is affected by many of the same factors and concerns as other types of industries.
- There are a range of agricultural operations from large commercial farms to small subsistence farms. All of these farms work to supply the constant demand for agricultural produce.

LEARNING OBJECTIVES: Specifics

Expectations: Educator

- Explain the information provided and apply it.
- Explain input, output and processes involved in farming.
- Be able to identify and recognise different farming systems and their role in the economy and transfer that knowledge to learners.

Expectations: Learner (Outcome)

- To understand the role of farms and farming systems in the economy.
- To understand the inputs regarding agricultural production, the processes involved and the resulting outputs in farming systems.
- Allows students to examine their attitudes and opinions on food production and land care.
- To differentiate between the different breeds of animals and farming systems that are used in animal production.

PRE-VIEWING ACTIVITIES:

The teacher should have taught the different breeds of animals, with possibly a collection of pictures and/or slide shows.

Different farming systems should have been discussed.

Educator to provide background information regarding the following concepts:

Like any other industry, farming is a system of inputs, processes and outputs.
Inputs will be physical (land, sun, rain), human (labour) and capital (money for livestock and feed, seeds, equipment, wages).

Processes are the activities on the farm that turn inputs into outputs. For example, feeding and caring for the animals or planting and tending to the crops.
Outputs are products farmers sell at market or use to feed and clothe their families. Barley, hops, wheat, hay and straw are products from crops; and meat, wool, leather and cheese are products from animals.
Farms can be categorised according to what is being grown or reared, the size of the operation and the agricultural techniques being used.

EXAMPLE

In a sheep farm, the **inputs** will include the sun and water required by the grass, the purchase of breeding stock and the farmer's labour.

The **processes** will include herding and caring for the sheep and lambs.

Finally, the **outputs** will include wool and meat

Some interesting information:

Farming Systems

Subsistence or commercial?

- Subsistence farming is when crops and animals are produced by a farmer to feed their family, rather than to take to market.
- Commercial farming is when crops and animals are produced to sell at market for a profit.

Sedentary or nomadic?

- Sedentary farming is when a farm is based in the same location all the time.
- Nomadic farming is when a farmer moves from one place to another.

Arable, pastoral or mixed?

- Arable farms grow **crops**. Crops are plants that are harvested from the ground to be eaten or sold.
- Pastoral farms rear **animals** – either for animal by-products such as milk, eggs or wool, or for meat.
- Mixed farms grow crops **and** rear animals.

Question 1

The diagrams below illustrate different animals and breeds of animals. Answer the following questions on each:

1. Identify the breed of the animal.
2. Name the main product or production purposes of the animal. (20)

A

1. ……

2. ……

B

1. ……

2. ……

C

1. ……

2. ……

D

1. ……

2. ……

1. ……

2. ……

F.

1. ……

2. ……

G.  1. ……. 2. …….	H.  1. ……. 2. …….
I.  1. ……. 2. …….	J  1. ……. 2. …….

Question 2: Study the following pictures and complete the table that follows:

1

2

3

4

5

6

7

8

Complete the table by identifying the inputs, processes and outputs for the required illustrations.
(Learners must provide at least 2 answers in each block to earn one mark.)

Illustration	Inputs	Processes	Outputs
1			
2			
3			
4			
5			
6			
7			
8			

(24)

Question 3

Study the illustrations carefully and identify the farming system illustrated by writing the correct word under the provided terms.

Illustration No.	Sedentary or nomadic	Subsistence or commercial	Arable, pastoral or mixed	Extensive or intensive
1				
2				
3				
4				
5				
6				
7				
8				

(32)

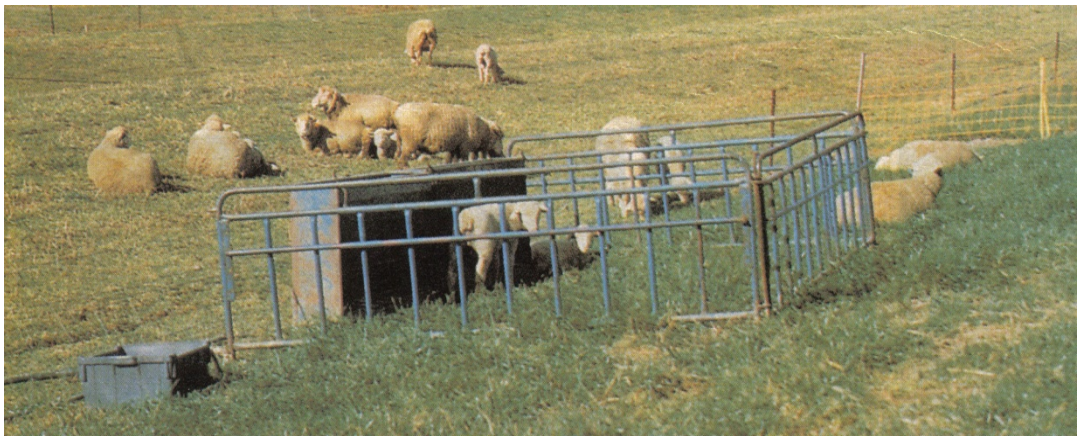
Question 4

4.1 Provide a definition for the term “food security”.

4.2 Compare food security in farming systems 1 and 7.

4.3 Justify the following statement “Food security is not a function of availability of food but rather of economics”.

Question 5



5.1 What type of feeding method is illustrated above? …..... (1)

5.2 What is the aim of this feeding method? …..... …..... (2)

[3]

Question 6

Beef cattle are bred for the production of meat.

A farmer has put two weaners on a 112-day growth test. The growth tempo of the two animals is shown in the table below.

Answer the questions that follow.

Mass gain of the two animals over the 112-day period

Calf number	Mass gained in kilograms							
	Mass at start	Week 2	Week 4	Week 6	Week 8	Week 10	Week 12	Fodder eaten
LTS263	285	315	325	355	395	425	450	954
LTS259	280	290	320	345	382	410	430	912

6.1 Draw a line graph to show the increase in mass of both the weaners over the 112-day period. (12)

6.2 Calculate the ADI (average daily increase) of both weaners. **(9)**

6.3 Which animal would be the most economical to feed? Give a reason for your answer. **(3)**

Question 7

Study photograph A and B and answer the questions that follow.

A

B

7.1 Which dairy cattle breed is illustrated above?

……..... (1)

7.2 What are the advantages of this breed over other dairy breeds? (3)

…….....

7.3 Compare the differences between the bull and cow with regard to their body structure. (4)

…….....

7.4 Name two dual-purpose breeds bred in South Africa.

……..... (2)

[125]

GRADE 11

TERM 1: PRACTICAL INVESTIGATION

TOPIC: Soil Science: Soil texture, structure and plant nutrients

Practical No. _____

NAME: _____ **DATE**:

Overview

Soil supports the growth of plants. To grow plants we need to know about the soil in which they grow. Different soils have different characteristics. These describe how the soil behaves in terms of providing air, water and nutrients to the plant. The characteristics of soil are influenced by soil texture, structure, colour and temperature.

LEARNING OBJECTIVES

Expectations: Educator

Explain the following to learners:

- Plants need soil in order to grow and plants get the nutrients from the soil.
- The different soil textures and how they influence aeration, permeability and water-holding capacity of soils.
- The different soil structure types/
- Soil science must have been completed before this worksheet can be completed.

Expectation: Learner (Outcome)

- To be able to identify the soil texture from a given sample.
- To understand the role of pH in the availability of nutrients to the plants.
- To be able to identify soil structure and how it influences plant growth.

Instructions: The Soil Science and Plant Sciences sections can be done as a whole or only sections thereof can be dealt with.

Instructions : Section A:

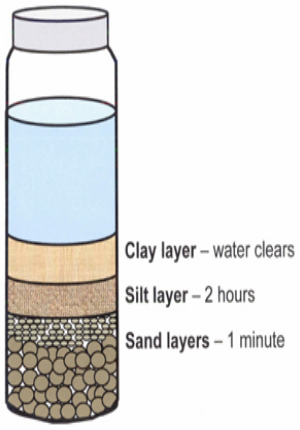
<table>
<tr>
<td> 

1

1.3 cm clay = 1.3/6.5 x 100
= 20% clay

1.1cm of silt = 1.1/6.5 x 100
=17% silt

2.3cm of sand = 2.3/6.5 x 100
= 35% sand

1.8cm of gravel = 1.8/6.5 x100
= 28%</td>
<td> 
</td>
<td>Each learner must bring 1 cup (250 ml) of their garden soil to class. A plastic container with square sides must also be available. Add 250 ml of soil to about 500 ml of water in the container and allow soil to settle (about 3 days).
Ensure that each learner's container is properly marked.
The different soil particles will settle as indicated in the 1st illustration. Measure the thickness of the layers and calculate the % of each soil particle as illustrated in drawing 1.</td>
</tr>
</table>

Answer the questions that follow:

1. Use the textural diagram on page 23 to determine your sample's texture.
   (3x3 for calculations, 1 for final answer) (10)

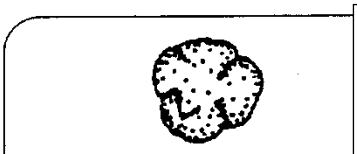
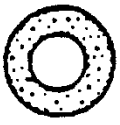
2. Determine the soil textures of the two soils tested as in the ARC soil analysis result on page 23
   2.1 Sample/Monster 10719
   2.2 Sample/Monster 10720
   (2 each) (4)

3. Based on your answers above for the determined soil textures, compare the following:
   Water-holding capacity
   Pore space
   Cultivation potential
   Suitability for crop production (2 each) (8)

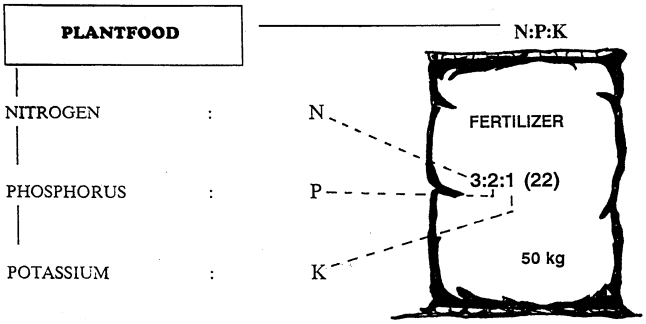
4. For the analysis by the ARC of a soil sample as seen on page 23, certain steps/processes must be adhered to when taking the soil sample. Discuss these steps/processes to ensure that a representative soil sample is taken. (8)

5. Using the information on page 23, which nutrients will be least available in soil sample 10719 and which nutrients will also be affected in sample 10720?
   (Hint – the pH is important/ Figure 4) (10)

6. The veld method of determining soil texture is to take a moist soil sample and roll it in a worm or a ball. This can roughly indicate the soil texture of the sample.
Complete the following table on the veld method of determining the soil texture.

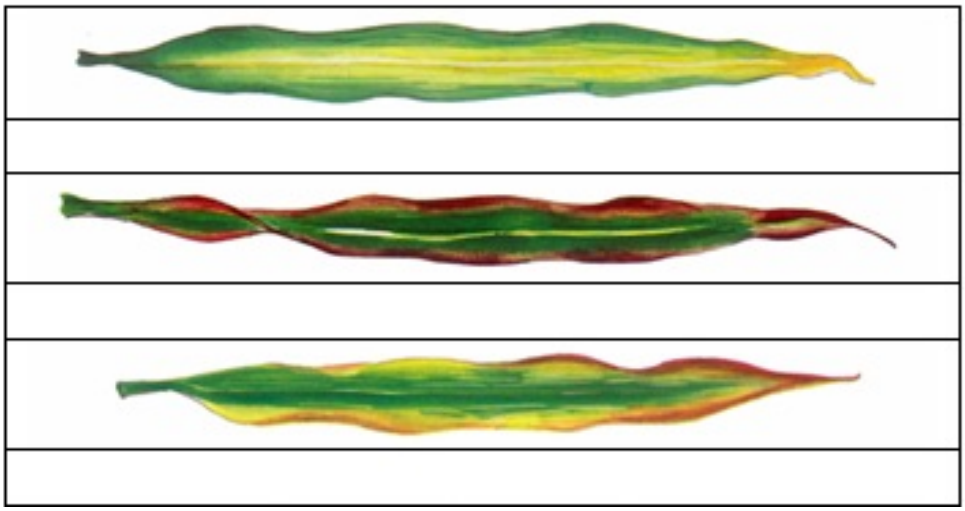
Form:	Texture type: (7)	Description:(7x2) (14)
		
		
		
		
		
		
		

7. The recommendation from the ARC is to add 3:2:1 fertiliser during planting time.



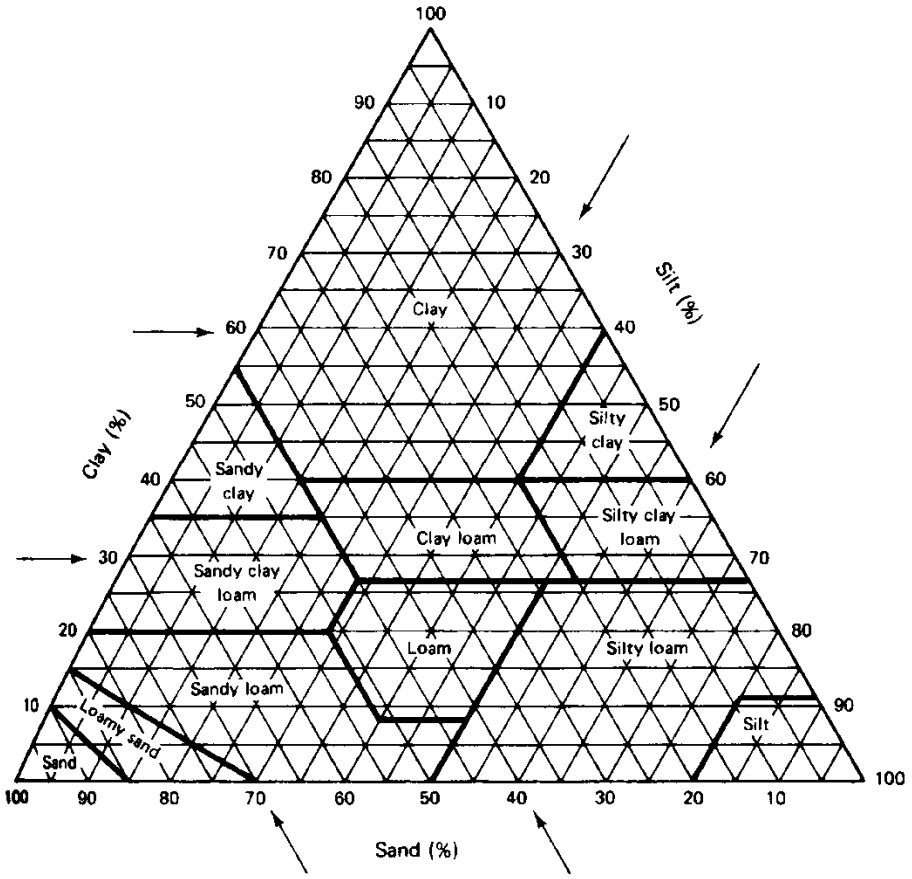
7.1 Use the information above to calculate the amount of each nutrient available in the mixture as indicated above in 100 kg of the fertiliser. (10)

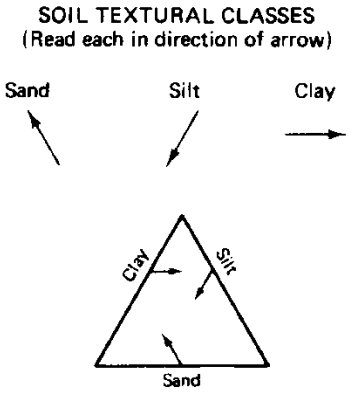
8. During a field inspection of the planted crops, the following symptoms on maize leaves were observed as illustrated below. Carefully study these symptoms and present your findings in a table (from top to bottom) under the following headings.



8.1 Nutrient deficiency
8.2 Visible signs
8.3 Correction measures (9)

Total: [80]





SIZE LIMITS OF SOIL SEPARATES	
Name of separate	Dia. (range)
	Millimeters
Very coarse sand	2.00 1.000
Coarse sand	1.00 0.500
Medium sand	0.50 0.250
Fine sand	0.25 0.100
Very fine sand	0.10 0.050
Silt	0.05 0.002
Clay	Below 0.002

FIGURE 1: Guide for textural classification by the U.S. System for Texture Designations.

Fertilisation of soil (Interpretation of data)

Table 3: ARC soil analysis results.

Sample #	pH	P	K	Ca	Mg	Na	Sand	Clay	Loam
10719	4.9	21.4	197	601	224	15.4	72	15	13
10720	5.5	20.2	154	1653	450	18.1	40	28	32

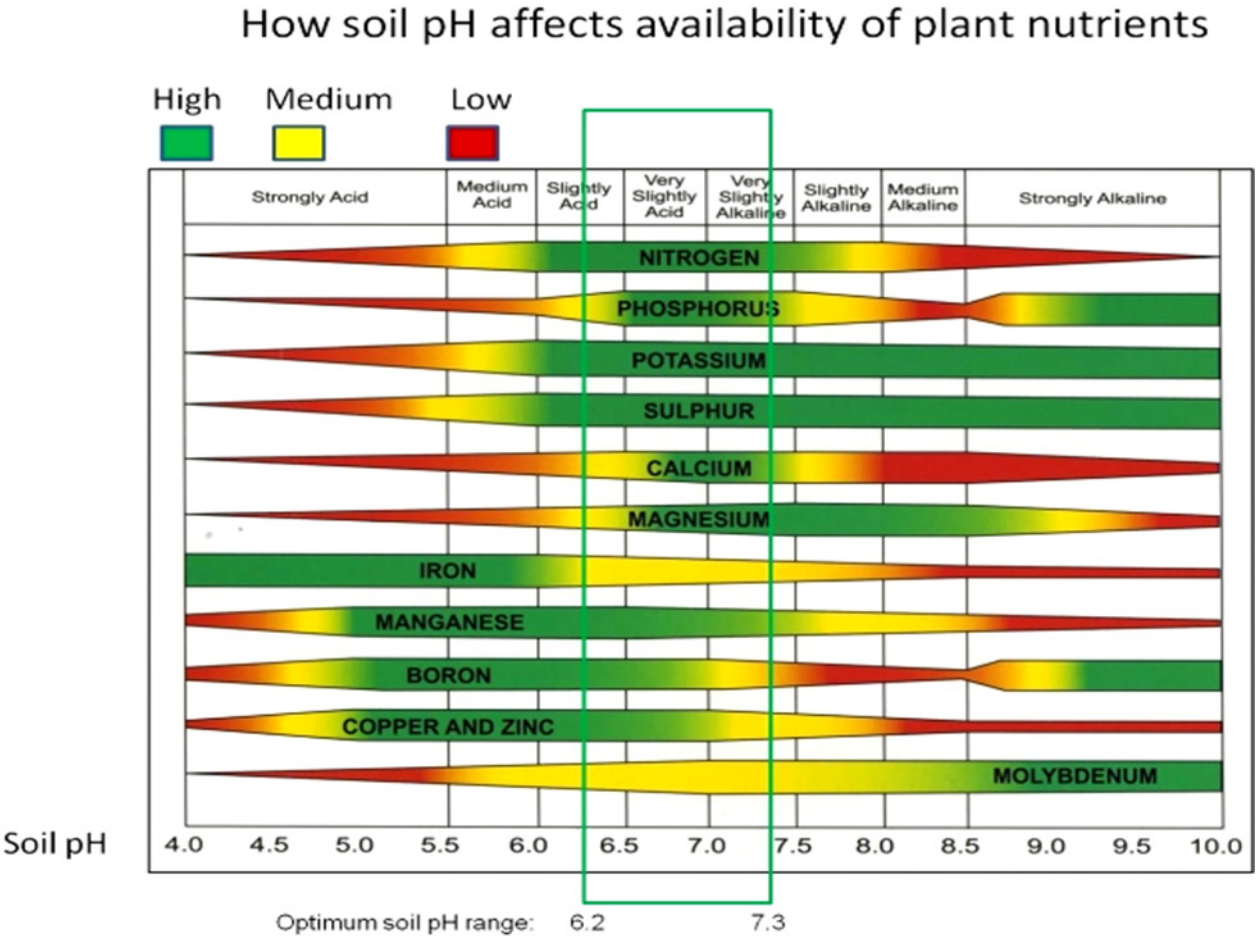
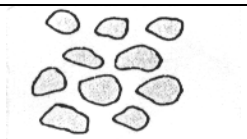
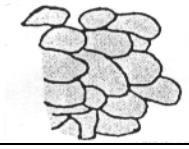
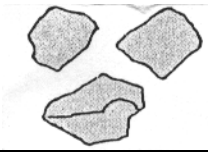
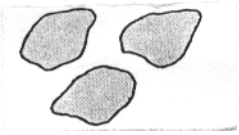
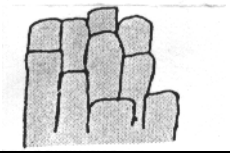
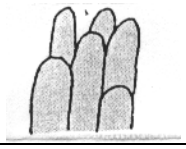
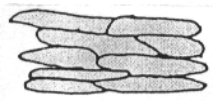
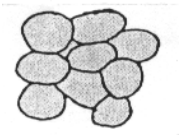
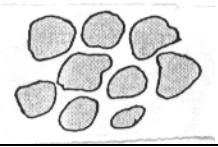

How soil pH affects availability of plant nutrients
High
Medium
Low
Strongly Acid
Medium Acid
Slightly Acid
Very Slightly Acid
Very Slightly Alkaline
Slightly Alkaline
Medium Alkaline
Strongly Alkaline
NITROGEN
PHOSPHORUS
POTASSIUM
SULPHUR
CALCIUM
MAGNESIUM
IRON
MANGANESE
BORON
COPPER AND ZINC
MOLYBDENUM
Soil pH
4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0
Optimum soil pH range: 6.2 7.3

Figure 4

Section B: IDENTIFYING SOIL STRUCTURE

1. Complete the following table.
   Study each of the illustrations of the soil structures and soil texture images. Give the name and description for each representation (form). Also indicate the primary types of each form of soil structure.

PRIMARY TYPE	TYPE	FORM	DESCRIPTION
Amorphous	Single grain		
Blocky	Massive		
	Blocky-shaped		
	Sub-angular		
Prismatic	Prism-shaped		
	Columnar		
Platy	Platy-shaped		
Spheroidal	Granular		
	Crumb-shaped		(18)

Term 2 : RESEARCH PROJECT

Topic: Plant Nutrition

PRACTICAL NO. **GRADE: 11**

NAME: _____ **DATE**: _____

Introduction/Overview

The activity focuses on plant nutrition, the role of photosynthesis, respiration, storage organs, mineralisation, nutrients uptake and organic and inorganic fertilisers and water. Hence it provides learners with the opportunity to understand how plants produce food.

LEARNING OBJECTIVES

Expectations: Educator

- Define what photosynthesis is and requirements for it to take place.
- Explain the role of photosynthesis in food production and food security.
- Explain the role of water in the uptake of nutrients by the plant.
- Plants need soil in order to grow and plants get the nutrients from the soil.

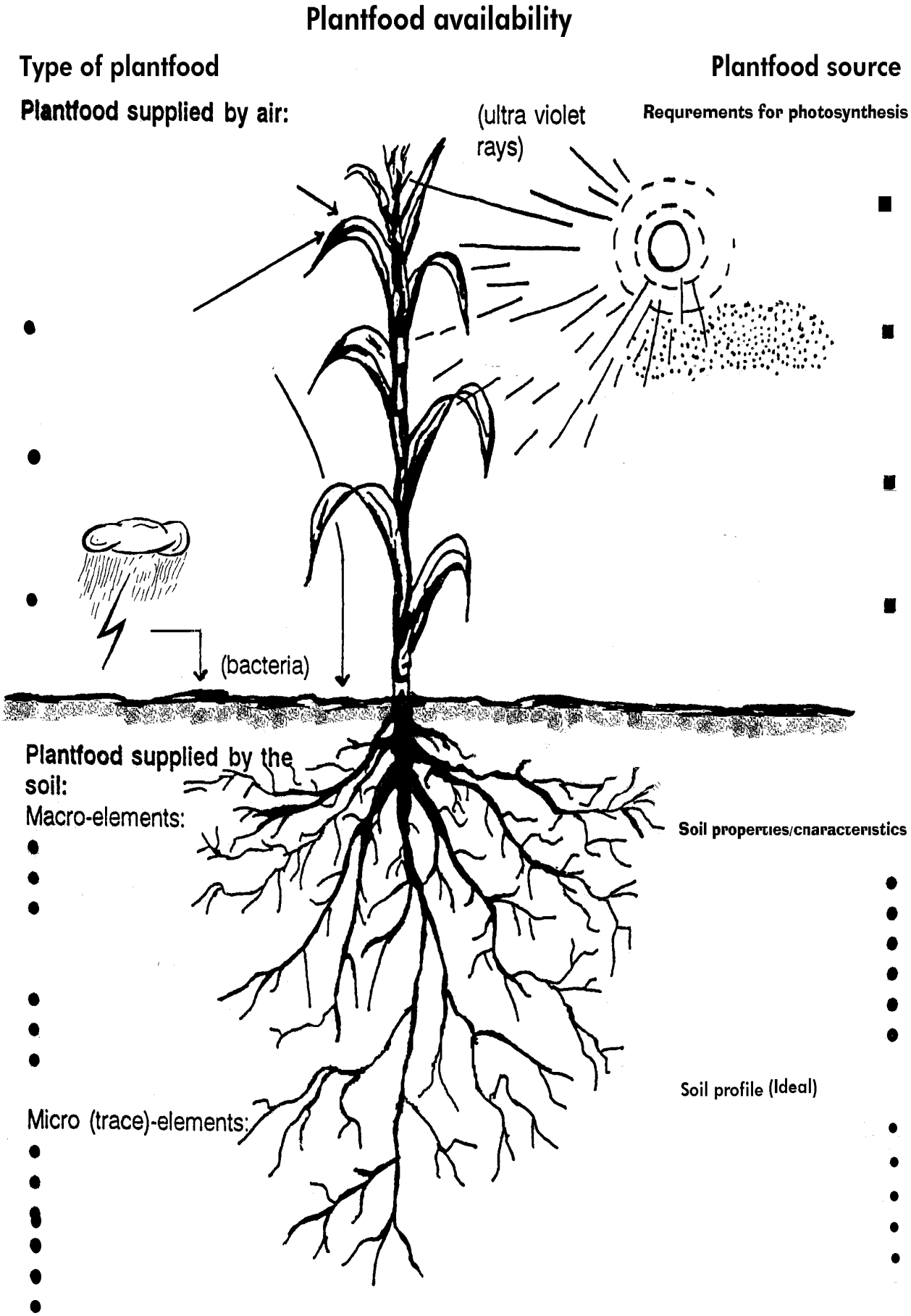
.

Expectations: Learner (Outcome)

- To understand the importance and the role of photosynthesis in life.
- To understand the role of water in the uptake of nutrients in the plant.
- To know the differences between macro- and micro-elements and their role in mineral nutrition.
- To understand the role of plants in minimising the accumulation of carbon in the atmosphere.

Worksheet 1:

Study the picture below and complete it by providing the correct/suitable labels for each of the bullets. **Total : (30)**



RESEARCH PROJECT **GRADE: 11**

Topic: Plant Nutrition: Fertilisation (Nitrogen)

NAME: _____ **DATE**: _____

Introduction/Overview

The activity focuses on the influence of fertilisers (nitrogen) on plant growth and allows students to examine this through a practical task.

Expectations: Educator

- Explain the role of the different macro- and micro-minerals in plant growth.

Expectations: Learner (Outcome)

- To be able to set up an experiment
- To accurately record findings
- To be able to present findings
- To be able to discuss results and draw a conclusion

LEARNING OBJECTIVES: Specifics

- To examine the effect of different levels of nitrogen application on plant production. To describe these effects in terms of how they affect production.

(The practical component of this task can be group work but the reporting must be individual work)

Section A

1. Do a literature research on plant nutrition, specifically with regards to nitrogen fertilisers and the role there-off in plant growth. Your report must refer to the functions of nitrogen in plants as well as touch on the so-called “green revolution” and its role in food security.

   - **Aim**: To Investigate the influence of nitrogen fertilisers on plant growth

   - **Hypothesis:**
     The learner must be able to formulate a hypothesis and do the hypothesis testing.

   - **Materials**
     - 12 x 15 cm diameter planting pots or planting bags
     - 12 spinach seedlings of the same size
     - Straight nitrogen fertiliser (e.g. LAN 28% N)
     - Water

   - **Method**

     1. Fill planting bags/pots with soil of the same source (preferably potting soil)
     2. Plant one seedling in each/ bag/pot
     3. Measure the size of each seedling above soil level (length)

4. Measure out the amount of LAN to achieve 0 kg N/ha, 100 kg N/ha, 200 kg N/ha and 300 kg N/ha

0 kg N/Ha	0 g Nitrogen
100 kg N/ha	17.66 g LAN /bag
200 kg N/ha	35.32 g LAN/bag
300 kg N/ha	52.98 g LAN/bag

5. You must have three replications of each treatment. Thus three bags receive 0 kg LAN, three bags receive 66g of LAN, three bags receive 35.32 g of LAN and three bags receive 52.98 g of LAN.
6. All the bags must get the exact same amount of water twice a week.
7. Measure the above growth of the plants on a weekly basis
8. Place the average cumulative growth of each treatment on a line graph. Use the same axis set for all treatments.
9. After 5 weeks, uproot all plants, weigh them and present the average weight of each treatment on a bar graph.

- **Discuss** the results.
- Draw a **conclusion** from the results.

Section B

2.1 Formulate a hypothesis for this investigation. . (4)

……

……

2.1.1 Name the dependent variable in the investigation. (1)

2.1.2 Name the independent variable in the investigation. (1)

……

……..

2.1.3 Explain TWO precautions that you will have to take when doing the Investigation to ensure that your results are reliable. (4)

2.1.5 Explain why it is necessary to have at least three repetitions of every treatment. (2)

2.1.6 Briefly discuss the role of the 0 Kg/ha treatment. (2)

2.1.7 **Hypothesis** (1)

(a) Supports hypothesis \ Hypothesis not rejected.

YES	NO

(b) Does not support hypothesis \ Hypothesis is rejected.

YES	NO

Assessment tools

<table>
<tr><th>Heading/ Topic</th><th>Assessment Criteria</th><th>Learner's mark</th></tr>
<tr><td>Literature research</td><td>Functions of nitrogen and its role in plant growth (5)
The role of nitrogen in the "green revolution" (3)
Sources of nitrogen for agricultural use (2)
(10)</td><td>----/10</td></tr>
<tr><td>Graph of cumulative growth

Graph of weight</td><td>
<table>
<tr><th>Criteria</th><th>Yes: 1</th><th>No: 0</th></tr>
<tr><td>1. line graph</td><td></td><td></td></tr>
<tr><td>2. axes are labelled</td><td></td><td></td></tr>
<tr><td>3. points are plotted accurately</td><td></td><td></td></tr>
<tr><td>4. units are indicated</td><td></td><td></td></tr>
<tr><td>5. values and correct headings</td><td></td><td></td></tr>
<tr><td>6. correct scale</td><td></td><td></td></tr>
</table>

<table>
<tr><th>Criteria</th><th>Yes: 1</th><th>No: 0</th></tr>
<tr><td>1. line graph</td><td></td><td></td></tr>
<tr><td>2. axes are labelled</td><td></td><td></td></tr>
<tr><td>3. points are plotted accurately</td><td></td><td></td></tr>
<tr><td>4. units are indicated</td><td></td><td></td></tr>
<tr><td>5. values and correct headings</td><td></td><td></td></tr>
<tr><td>6. correct scale</td><td></td><td></td></tr>
</table>
</td><td>-----/6

------/6</td></tr>
<tr><td>Discussion of results</td><td>Differentiation between the results of the different N-levels</td><td>-------/5</td></tr>
<tr><td>Conclusion</td><td>The learners draws the correct conclusion with regard to N-fertiliser and plant growth</td><td>-------/3</td></tr>
<tr><td>Resources</td><td>Referencing in text:
Referencing in text but some elements missing. √ (1) or
Referencing in text correctly stated; (author surname, date of publication and page number) after a fact was mentioned from the relevant resource. √√ (2)
Referencing list at the end of the report:
Number of resources used:
›2 = √ (1)
Referencing list is missing some</td><td></td></tr>
</table>

	elements = √ (1) or Referencing technique is correct. Sources are listed alphabetically at end of the report. The following sequence was used for each source: Authors, date of publication and title of books, and publishers = √√ (2)	**-------/5**

Total : 50

Term 3 : ASSIGNMENT

TOPIC: Plant Science: Vegetative reproduction

PRACTICAL NUMBER **GRADE: 11**

NAME: _____ **DATE**: _____

Introduction/Overview

The activity focuses on vegetative reproduction and allows learners to understand how asexual reproduction takes place.

Expectations: Educator

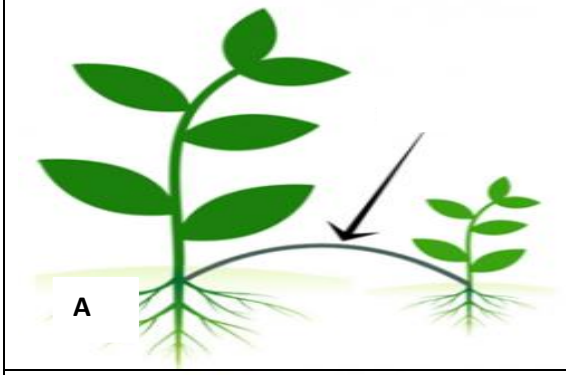
- Explain vegetative reproduction and provide examples.
- Describe the different forms of vegetative reproduction.
- Differentiate between sexual and asexual reproduction.

Expectations: Learner (Outcome)

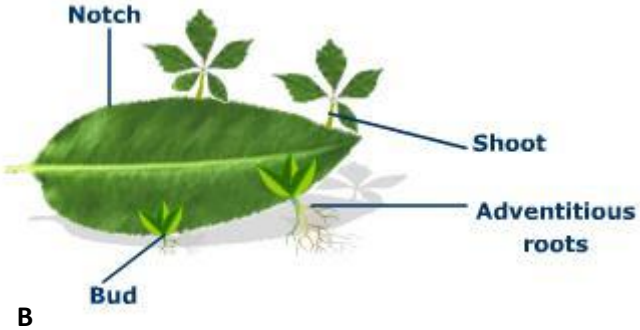
- To understand vegetative reproduction and how it takes place.
- To identify different vegetative parts that play a role in vegetative reproduction.
- Understand the difference between sexual and asexual reproduction.
- To be able to identify storage of different crops

Instructions:

Study the different modes of vegetative reproduction and complete the following table. Learners can bring examples of plants that reproduce vegetatively instead of using the diagrams, e.g. potato, onion.



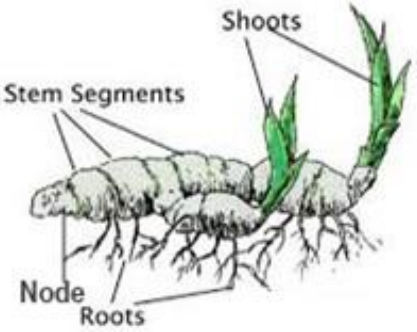
A


Notch
Shoot
Adventitious roots
Bud

B

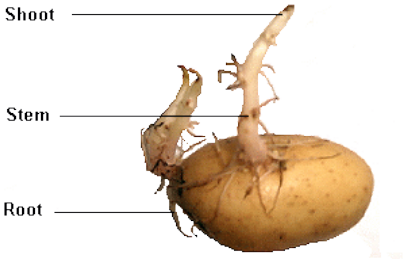

scale leaf

C

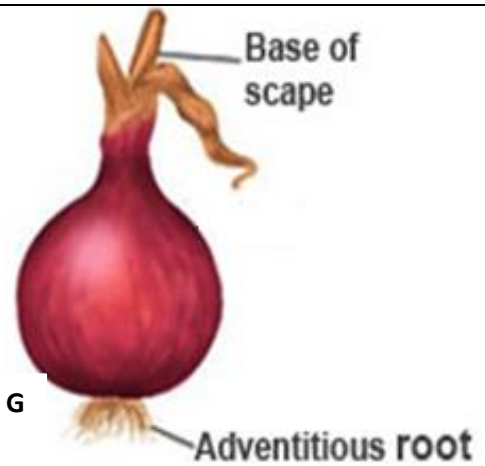

Shoots
Stem Segments
Node
Roots

D

E


Shoot
Stem
Root

F


Base of scape
Adventitious root

G

H

Complete the following table

Figure	Vegetative mode	Description	Examples
A	(1)	(2)	(2)
B			
C			
D			
E			
F			
G			
H			**[40]**

GRADE 12. PRACTICAL INVESTIGATION

TOPIC: Animal Nutrition

PRACTICAL NO. _____

NAME: _____ **DATE**: _____

Introduction/Overview

The activity focuses on animal nutrition, selection and identification of feeds and calculations in Pearson Square, nutritive value and interpretation of the various values. This practical consists of ___ sections
Section A: Feed identification
Section B: Feed selection and calculation skills

Learning objectives

Expectations: Educator

- Select appropriate feeds from the given scenario.
- Able to do various calculations in feeds and feeding.
- Interpreted the calculated information into the relevant fields.
- Understanding of ruminant feeding.

Expectations: Learner (Outcome)

- To strengthen calculation skills.
- Make the correct choices in feed selection for circumstances.
- To familiarise the learners with various feed types and visible samples for selection.
- Choosing feeds based on their nutritive value for balancing purposes.
- Using the correct method in feed balancing and calculating and interpreting ratios, % and value of feeds.
- To answer the questions provided.

Instructions:
For **Section A,** the learners will be divided into groups by the facilitator. Each group will be provided with five feeds and a sheet containing pictures of different types of feeds/supplements. The group must identify the type of the numbered feed/supplement and categorise it according to the table provided.
Section B is an individual activity.
List of materials and resources:
Feed samples collected by the educator prior to the practical (for comparison with picture charts provided later), colour-printed feed sample charts, calculator and worksheets.
In class: markers, flip-chart paper
Evaluation

- Section A: Group assessment: Based on correctness of selected items
- Section B: Individual assessment: Marking of answers based on questions in worksheet.

GROUP NAMES: ..... **DATE:** .....

SECTION A

Section A (20)

Time: 55 minutes

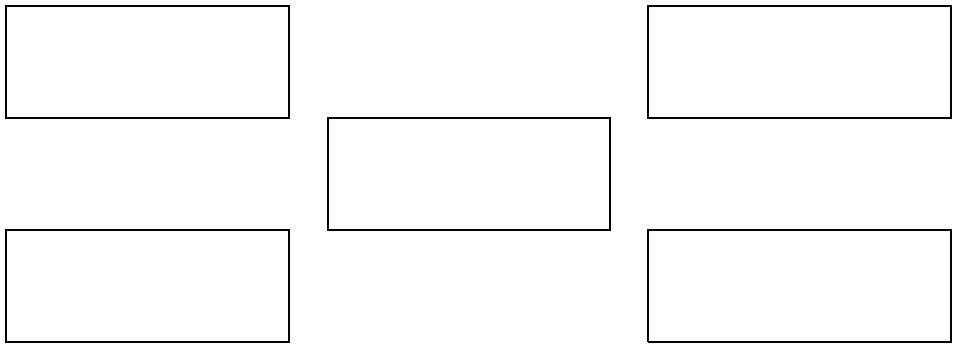
Feed Number	Identify Feed	Choose: Protein/ Carbohydrates/ Minerals	Choose: Concentrate/ Roughage/ Supplement	Briefly describe use of feed
1				
2				
3				
4				
5				

SECTION B

Answer the following questions in your practical workbook:

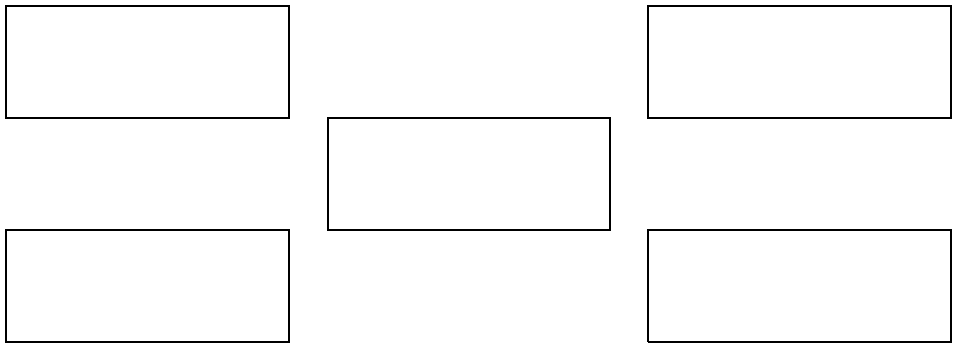
1. 20 kg of a feed with a moisture content of 10% is ingested and 16 kg manure with a moisture content of 50% is excreted by a farm animal. Determine the coefficient of digestibility of this feed and identify the possible feed that was used in this digestibility trial from the list of feeds in the additional information sheet. (8)

2. By making use of the Pearson square method, determine the ratio in which feeds numbered 2 and 4 should be mixed to satisfy the needs of farm animals that require a crude protein (CP) value of 18%. Make use of the nutritional information supplied in the attached additional information sheet. (7)



3. Compile a ration for dairy cows with a protein content of at least 16% using the Pearson square. The cows must walk 1 km every day between the pasture and the parlor for milking. Show all calculations.

   NB: The ration must adhere to the following requirements:
   - *Consist of one roughage and one concentrate. One feed must be a carbohydrate.*
   - *Must provide the most available energy.*
   - *Should be the most cost effective.*
   - *Select the feeds marked with an *asterisk in the feed table on the information page.*



(8)

3.1. Show the ratio of the feeds used in the mixture. (2)

3.2 Show the % of the feeds used in the mixture as determined by your calculation. (2)

3.3 Cost calculation.
Using the information below, calculate the cost of 100 kg of feed mixture. Motivate your answer (6)

Feed	Cost per ton
Kikuyu*	R 1 438
Clover*	R 862
Cottonseed*	R 5 200
Hominy Chop	R 900
Maize	R 1 900
Lucerne Hay	R 3 000

4. Use the available information and give a complete outlay of the feed composition of feed number 5. (5)

5. Identify a feed from the list provided on the information sheet that would be the most suited to use in each of the following cases:

   a. A supplement to increase the crude protein value of the feed mixture in a cost-effective way.

   b. A roughage with a very high protein content.

   c. A component of a lick that is given to supplement phosphorus and calcium minerals.

   d. A feed with the lowest nutritional value.

   e. A feed from animal origin that is used as a protein source.

   f. This feed/supplement cannot be given to ruminants for the production of grass-fed cattle. (6)

6. Study the label attached on page 47 and answer the questions that follow.

   a. Describe the danger that this type of feeds poses to livestock. (3)

   b. Suggest possible precautions that may limit the possible dangerous effects. (2)

   c. Name the animals that should or should not have access to this feed. (2)

   d. How animals should be treated if affected by this feed. (1)

   e. What time of the year is likeliest and what is the reason for providing this feed to farm animals. (3)

   f. Gut symbionts in herbivores: Mammals cannot digest cellulose. Briefly explain this statement. (5)

7. Nutritive ratio (NR) is the sum of the digestible carbohydrates, protein and 2.3 times the fat (together known as the TDN) divided by the digestible protein. It is thus the ratio of digestible protein to the other nutrients in the feed or the TDN (total digestible nutrients).

   7.1 Use the table on page 47 to determine the NR for the following feeds. Write your answer in the following table.

Feed	NR	Wide/Narrow	Suitable for Encircle you answer
Cottonseed			Growth Production Maintenance Fattening
Maize meal			Growth Production Maintenance Fattening
Wheat straw			Growth Production Maintenance Fattening

(15)

Section B [75]
Total: 95

FEED	DM %	TDN %	CP %	CF %	ME/g	ASH %	Ca %	P %	K %
Bone meal	95	16	13	1		77	27.00	12.74	0.2
Maize silage	24	65	11	20		5	0.24	0.26	1.2
Maize meal*	88	88	9	2	13.5	2	0.02	0.30	0.4
Homny Chop*	90	70	8.6		10.6		.3	2.7	
Lucerne hay*	89	58	17	30	9.2	9	1.40	0.24	2.0
Oat hay	90	54	10	31		8	0.40	0.27	1.6
Oat grain	89	76	13	11		4	0.05	0.41	0.5
Poultry manure	89	38	28	13		33	10.20	2.80	2.3
Rice grain	89	79	8	10		5	0.07	0.32	0.4
Sorghum meal	89	82	11	3		2	0.04	0.32	0.4
Soybean meal	91	84	49	6		7	0.38	0.71	2.3
Sunflower seed	92	65	38	20		8	0.44	0.97	1.2
Urea 46%N	99	0	288	0		0	0.00	0.00	0.0
Wheat straw	91	42	3	43		8	0.16	0.05	1.3
Wheat grain	89	88	14	3		2	0.05	0.43	0.5
Kikuyu*	20	13	3.7		2		0.4	.4	
Clover*	15	10	3.6		1.5		2.3	.5	
Cottonseed*	92	86	42		12.1		2.0	10	

SEE ADDENDUM A FOR ADDITIONAL INFORMATION:

AGRICULTURAL SCIENCES: PRACTICAL INVESTIGATION

ADDITIONAL INFORMATION
(GRADE 12)

- **DM: Dry material**
- **TDN: Total Digestible Nutrients**
- **CP: Crude Protein**
- **DP – Digestible Protein is 65% the value of CP**
- **CF: Crude Fibre**
- **ASH: Ash content**

TERM 2: ASSIGNMENT

TOPIC: Agricultural Genetics

PRACTICAL NO. _____

NAME: _____ **DATE**: _____

Introduction/Overview

The activity focuses agricultural genetics and the principles of breeding

Learning objectives

Expectations: Educator

- Explain the basic principles of genetics and inheritance
- Explain Mendel's laws and application thereof in breeding
- Explain the application of the above
- Discuss the types of breeding in animal husbandry

Expectations: Learner (Outcome)

- Explain and apply breeding and selection principles for effective crop and animal production
- To be able to apply Mendel's laws in genetics
- Be able to do various monohybrid and dihybrid crossings

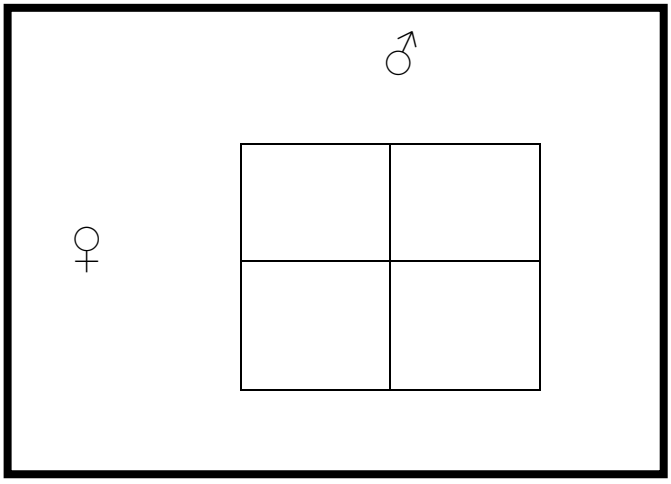
Introduction: In this investigation you will use the basic principles of genetics to do a study of a practical phenomenon found in modern farming. You will be provided with sufficient information to answer specific questions about this case study.

Marlow together with Konsortium Merino's™ are seeking to breed a sheep with specific characteristics. One of these features is a sheep that does not have horns at all (polled). In an attempt to achieve this outcome by selection, a polled ram and ewe are allowed to breed. Over a certain period the ewe delivers three polled lambs and one with horns.

Answer the following questions from the given information:

1.1 Which characteristic (polled / horns) do you see as being dominant? Motivate your answer. (3)

1.2. Complete the Punnet square below to illustrate the abovementioned cross. (use the letters H/h) (4)



1.3. Indicate the phenotype of the ram. (1)

1.4. State what this type of dominance is known as. (2)

1.5. Assume that the above lamb with horns was a male and the other three were all ewes, these are then allowed to mate. Use the following tables to show the two possible pairings and their offspring's genotypes. Use the following Punnet squares to show the possible pairings and their offspring's genotypes. (8)

♀ \ ♂		

♀ \ ♂		

1.6. With reference to the example above, explain the meaning of homozygosity. (3)

_____

_____

_____

_____

1.7.1 Marlow makes the pairing of the Consortium sheep even more complex by also taking the length of the wool into consideration. If a dihybrid cross between a homozygous female with horns and short wool and heterozygous, polled ram with long wool were to occur, give the phenotypic composition of the offspring in the form of a Punnet square. Assume that a sheep with short wool (r) is a recessive trait and a sheep with long wool (R) is a dominant gene. (9)

1.7.2 Provide the possible genotypes of the following phenotypes: (4)

Shortwool with horns : _____

Polled shortwool : _____

Longwool with horns : _____

Longwoolled ewe : _____

2. Name the phenomenon where there is a black sheep in the offspring and the parents and grandparents are all white. (2)

_____

3 Explain the meaning of incomplete and co-dominance by making use of a cross between a black merino ram and a white merino ewe. (4)

_____

_____

_____

4. Scientists working at a leading animal research station have identified genes that can be transferred to cattle to produce meat with desirable characteristics. They have compiled the following findings on their research and presented them as values in the following table.

Characteristics	Slaughter weight gain	Lean meat percentage	Meat tenderness	Birth weight
Heritability Indicator (%)	85%	28%	60%	47%

4.1 Identify TWO characteristics that would be most appropriate for improving the herd. Explain your answer. (4)

4.2 Evaluate the effectiveness of the selection of lean meat percentage in improving the herd. Justify your answer. (3)

5. The farmer notices that one animal in the herd seems to grow bigger than the others. Its slaughter weight is 750 kg, whereas the average slaughter weight of the herd is 660 kg. The heritability of weight gain in beef cattle is 85%.

5.1 Calculate a simple estimated breeding value of the slaughter weight of an animal. (5)

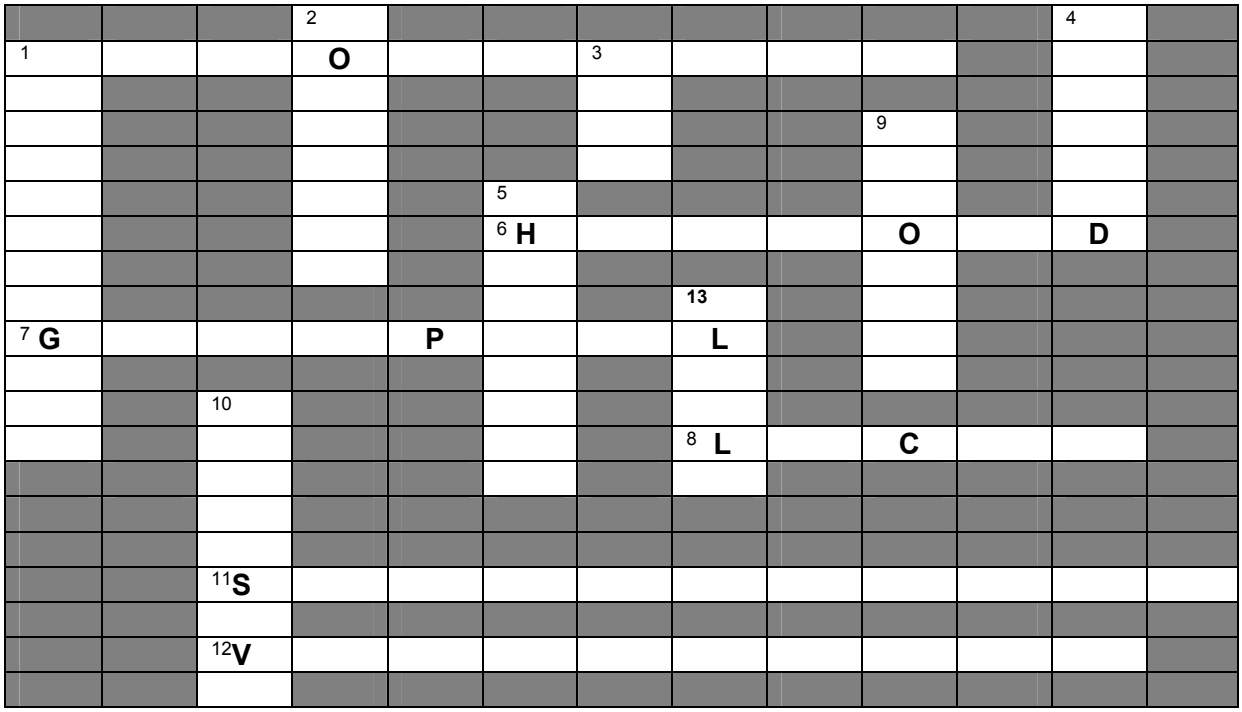
5.2 Indicate whether the farmer should slaughter this animal or keep it for breeding purposes. Motivate your answer. (3)

5.3 Suggest a more accurate way of determining the EBV for this animal. (2)

5.4 Explain how a farmer can prevent inbreeding depression in his herd. (3)

Crossword

6.1



Across

1. When both alleles controlling a particular trait in an individual are the same
6. Cells that contain half of a set of genetic material (n). Chromosomes are unpaired
7. The total collection of genes making up all the individuals in a population (every gene of every member of the population)
8. The particular position occupied by a gene on a chromosome
11. Mendel's law that states that for each characteristic, a plant possesses "two factors" (genes) which separate so that each gamete contains only one of these factors
12. Differences between individuals within a population

Down

1. When the two alleles for a particular trait in an individual are different
2. An allele that is always expressed in the phenotype
3. A short piece of DNA containing a particular nucleotide sequence carrying a specific trait, e.g. tallness
4. Cells contain a complete set of genetic genetic material. Chromosomes appear as homologous pairs (double pair)
5. The physical appearance, behaviour and physiology of an individual due to the expression of genes
9. The genetic make-up of an individual
10. An allele that is expressed in the phenotype if not accompanied by a dominant allele; it is hidden or masked by the dominant allele
13. Different forms of a gene which occur at the same locus (position) on homologous chromosomes

(13)

Question 7

7.1 Use Mendel's law of independent assortment to explain hybrid vigour. (5)

7.2 You have a tall plant with big seeds (TTBB) and a short plant with small seeds (ttbb). The desirable traits is a short plant with big seeds.

(In plant breeding only homozygous plants are used for the production of seed.)

Use the Punnet square to illustrate your answer. (7)

Total: 80

TOPIC: Agricultural economics:
Marketing

PRACTICAL NO. _____ **GRADE: 12**

NAME: _____ **DATE**: _____

Introduction/Overview

The activity focuses on agricultural economics: marketing, supply and demand and diminishing returns. Interpretation of information and skills in drawing graphs form part of this worksheet.

Learning objectives

Expectations: Educator

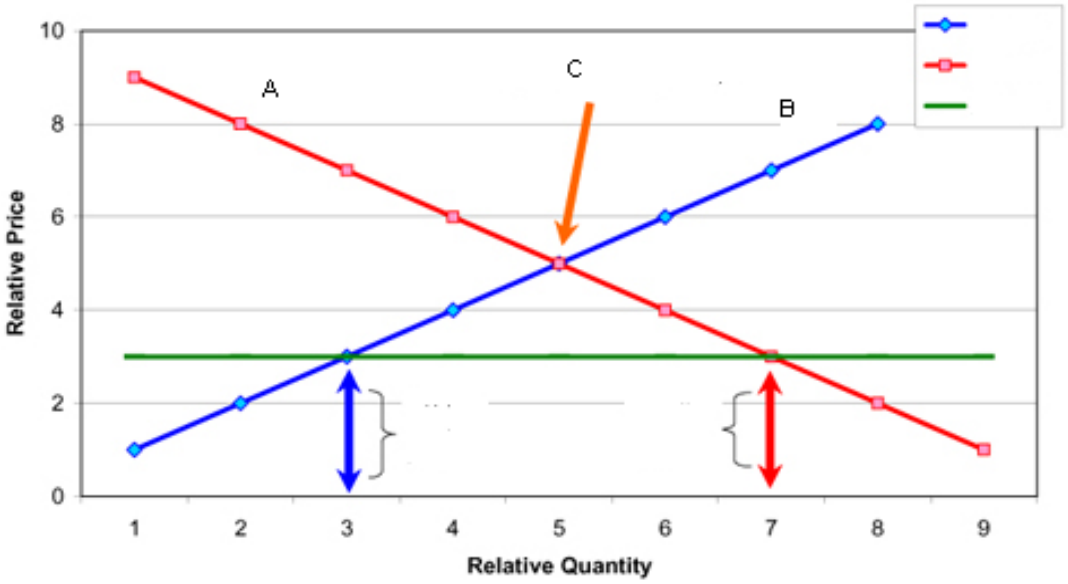
1) Explain the principles of marketing
2) Explain soil economic principles

Expectations: Learner (Outcome)

- To strengthen interpretation of information
- Drawing of graphs
- Understanding supply and demand
- Understanding diminishing return as a economic factor of soil
- Understanding seasonality of production
- Do calculations in agricultural economics
- Interpret provided information and application

Learner's worksheet

1 Study the graph and answer the questions that follow.



1.1 What principles are depicted by the graph?

_____
_____ (2)

1.2 What is indicated by

1.2.1 Line A _____
1.2.2 Line B _____
1.2.3 Point C _____ (3)

1.3 Briefly explain what is happening at point C.

_____
_____
_____ (2)

1.4 Mention any TWO factors that can influence A.

_____
_____ (2)

1.5 Mention any TWO factors that can influence B.

_____
_____ (2)

2 Use the following information and draw a line graph and answer the questions .

Production kg	Fertiliser kg
500	20
700	50
1400	100
2100	150
3000	200
3150	250

3400	300
3600	350
3600	400
3500	450
3400	500

2.1 Draw the graph by using graph paper. (4)

2.2 Which economic aspect of soil is depicted by the graph?
(2)

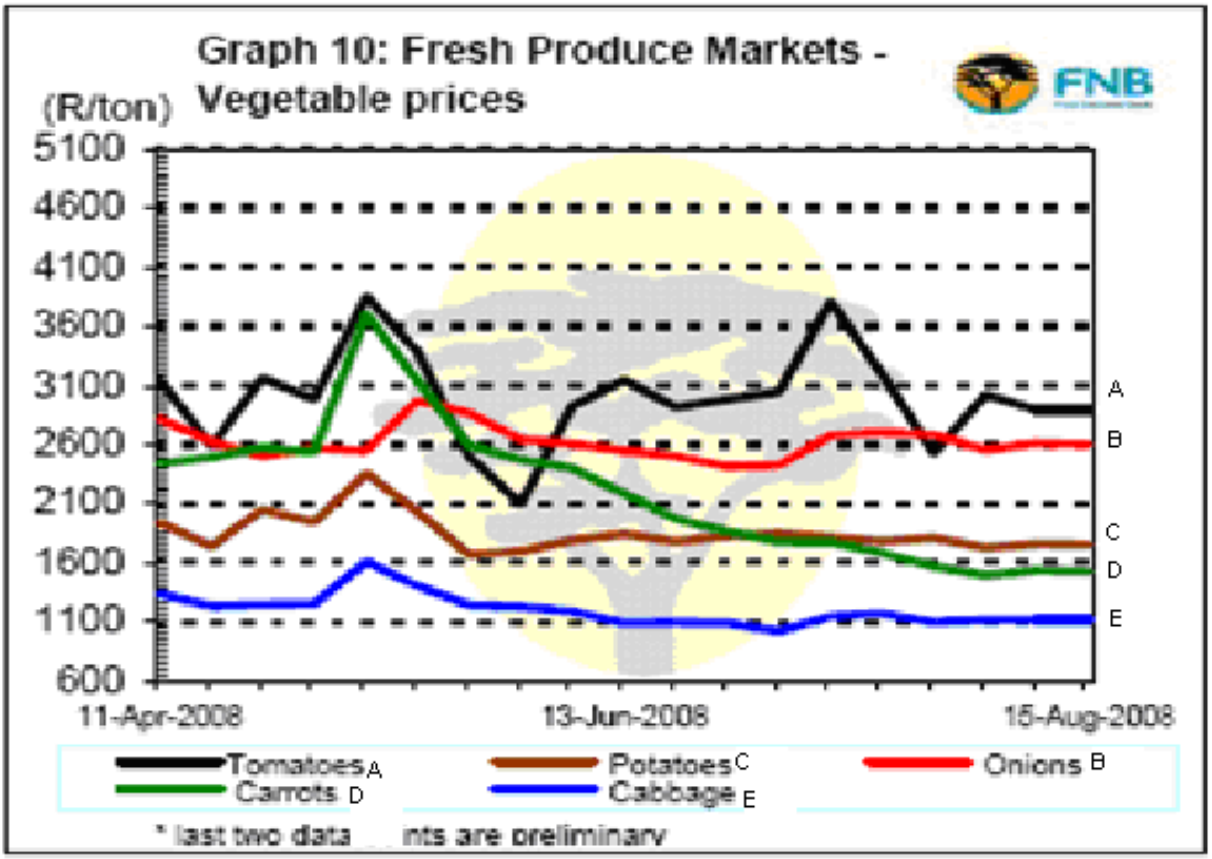
_____

2.2 Indicate with a cross on the graph the most profitable point.
(2)

2.3 Explain why you chose that specific point in 2.2.
(2)

_____
_____
_____
_____

3 Study the graph and answer the questions.



3.1 What product's price stayed constant over the period? (2)

_____

3.2 In which crop did the price fluctuate the most over the period? (2)

_____

3.3 Calculate the price difference for your answer in 3.2. (2)

_____

3.4 Provide reasons for the rise in all prices during May? (2)

_____
_____

3.5 Calculate the amount of money the farmer received on 13 June for 1500 kg of onions. Show all calculations. (2)

_____
_____
_____

3.6 The price of which crop decreased the most over the period? (1)

_____

3.7 Calculate the difference in 3.6. (2)

_____
_____
_____

4 A budget is a plan of the future income and expenses of a farm business. The following is a draft of a farm budget.

CROP PRODUCTION BUDGET

EXPECTED EXPENSES			
Item	**Quantity**	**Value**	**Total price**
Seed	2 kg	R40/kg	**(a)**
Fertilisers	850 kg	R280/50 kg	R4 760
Transport of fertilisers	17 bags	R5/bag	**(b)**
Pesticide	500 g	R187/500 g	R187
Wages for workers per week	4 workers	R400	**(c)**
Packaging materials	1 500 units	R1/unit	**(d)**
Transport to markets	6 trips	R300/trip	**(e)**
Total expected expenses			**(f)**
EXPECTED INCOME			
Item	**Quantity**	**Value**	**Total price**
Harvested crops	1 500 bags	R15/bag	**(g)**
Total expected income			

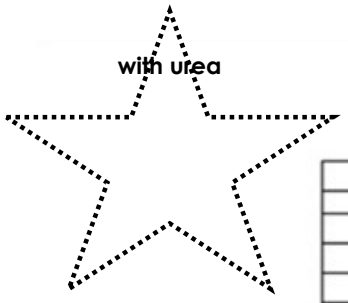
4.1 Calculate the missing amounts **(a)**–**(g)**. (7)

4.2 Calculate the profit or loss. Motivate your answer. (3)

4.3 Tabulate the inputs and expenses according to fixed costs and variable costs. (9)

4.4 Provide a definition for the term “breakeven point” (2)

Total 55



REAL CLOSE ™

Guaranteed Analysis

Crude Protein	Min.	70.0%
(This includes a maximum of 50.0% equivalent crude protein from non-protein nitrogen.)		
Crude Fat	Min.	3.0%
Crude Fiber	Max.	12.0%
Calcium (Ca) Min. 0.9%	Max.	1.4%
Phosphorus (P)	Min.	0.1%
Potassium (K)	Min.	4.0%
Magnesium (Mg)	Min.	0.4%
Sodium (Na)	Max.	1.3%
Chloride (Cl)	Min.	18.0%
Sulfur (s)	Min.	4.4%
Moisture	Max.	12.0%

INGREDIENT

Condensed Molasses Fermentation Soluble Dried

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

This product was manufactured in a facility that does not handle or store animal protein products prohibited in ruminant feed as described in 21 CFR section 589.2000

Direction for Use

Mix this product with grain and roughage to provide .5 to 1.0 lbs per head per day (basis a 1,000 pound animal) in the complete feed.

WARNING: EXCESSIVE CONSUMPTION MAY RESULT IN ADVERSE TOXIC REACTION - USE ONLY AS DIRECTED.

NET WEIGHT- 2,000 lbs (907 kg)

Manufactured by Feed Sources, LLC, Hagerman, NM 88232
Plant: U.P. 909-476-0843

Feeds to identify

Oats

Cottonseed

Crushed Maize

Poultry Manure

Lucern

Roughages

Succulent Roughages

Succulent

Japanese Radish

Lucerne

Clover

Green Chop

Silage

Silage

Dry Roughages

Minerals, Vitamins and Other

Vitamins

Vitamin E

Vitamin A

NPN - Non-Protein Nitrogen

Minerals

Dicalcium Phosphate

Bone Meal

Plain White Salt

Trace Mineral Salt (TMS)

Sulphur

Protein Feeds

Animal Origin

Dried Milk

Dried Whey

Meat and Bone Meal

Feather Meal

Fish Meal

Blood Meal

Plant Origin

Cottonseed Meal

Soybean Meal

Soybeans

Whole Cottonseed

Energy feeds

Oats

Barley

Wheat

Corn

Milo

Proso Millet

Rye

Soybeans

Molasses

Distiller's Grains

Memoranda

Gr 10: Term1 : Assignment

Topic: Agro-ecology and the influence of weather phenomena on agricultural production

1.1	A – Savannah Biome √ B – Grassland Biome √ C – Nama Karoo Biome √ D – Succulent Karoo Biome√	E – Fynbos Biome√ F – Forest Biome√ G – Thicket Biome√	**(7)**
1.2	Savannah Biome –	A mixture of grasses and scattered trees√ Hot to very hot summers, √ with a moderate rainfall (650 mm - 1000 mm/year). √ Mild winters√ with little or no frost√	Any 3
	Grassland Biome –	Mainly grasses with smaller, softer type trees√ Warm summers √with moderate rainfall√ (400-800 mm/year.) Cold winters with frost √	Any 3
	Nama Karoo Biome –	Short, hardy grasses and shrubs√ Hot summers√ with low (100-400 mm/ year) rainfall year round√ Cold winters with frost√	Any 3
	Succulent Karoo Biome –	Mostly succulent plants that can store water √ Hot, dry summers √ with very low rainfall (20-290 mm/year√). Moderate winters with no frost√	Any 3
	Fynbos Biome –	Plants are unique, e.g. heathers, reeds, proteas and shrubs with leathery leaves√. Hot, dry summers√ High rainfall in winter (400-1200 mm/year.) √ Sometimes snows in winter√	Any 3
	Forrest Biome –	Plants mostly consist of tall trees with smaller shrubs underneath and little or no grasses√. Warm summers√ and moderate winters with no frost√. High rainfall (800-	Any 3

		1000 mm)/year, year round√.	
	Thicket Biome –	Plants are small trees and shrubs that grow closely together with little or no grasses√. Hot summers√ with moderate summer rainfall (400-800 mm/year). √ Mild winters with no frost√	Any 3
			(21)
1.3	Climate is the most determining factor regarding the formation of biomes. √ The two most important climatic factors are rainfall√ and temperature. √ Rainfall is the season√ that it rains in and the amount of rainfall per year is the determining factor√. Temperature varies according to the slope and aspect√ of the land and also the altitude√		**(7)**
			[35]
2.1	Grassland biome – Mainly grass crops such as maize and other crops that need summer rains. √ Grazing animals√		(2)
	Savannah biome – Growing citrus and other subtropical fruits√. Beef cattle, game animals and goats√		(2)
	Nama Karoo biome – No crop production because of lack of water √ Sheep for mutton √and wool production√		(2)
	Succulent Karoo – Almost no agricultural activities but occasional sheep farming√ and Rooibos √		(2)
	Fynbos biome – Wheat, √grapes and fruit such as pears, apples and peaches√		(2)
	Forest biome – Timber√ and trees such as pine and eucalyptus√		(2)
	Thicket biome – Sugar cane√ and game animals√		(2)
			(14)
2.2	Drought in Biome A (Savannah) will lead to lack of grazing for the cattle and game animals. √ Because it is a fairly dry biome, there is usually very little reserve grazing carried over from year to year and animals succumb due to hunger √The citrus and fruit crops are also reduced. √		(3)
	Biome C (Nama Karoo) is dry as it is and drought there will lead to lack of feed for sheep, √ thus reducing the mutton and wool output√√		

(3)

Food Security – Refers to the availability √of and access to√ food by all people. **(6)**

2.3

Globally there is enough food available. √ The distribution, √ however, is a problem because it is very costly to transport food and keep it fresh. √ The developed world is throwing food away, √ while the developing world has a shortage but cannot afford to move the food. √ This problem is also prevalent in countries where there is a large difference in the socio-economical abilities √ of the population. (2)

2.4

Any

a) El nino is the result of a change in direction of flow of water in the Pacific Ocean from west to east vs east to west in normal years√. This leads to a warming of the water√ along the east coast of Southern America and results in a severe drought in the southern parts of Africa. √ **(4)**

3.1

(3)

b) La Nina is the opposite of El Nino√ and leads to cooler than normal temperatures in the water of the Pacific Ocean along the South American coast. √ This leads to higher than normal rainfall in the southern parts of Africa√

(3)

c) Global warming is the result of the increasing level of greenhouse gases in the atmosphere. √ These gases absorb heat energy√ and cause the temperature in the atmosphere to rise. √ This effect is called global warming.

(3)

d) The greenhouse effect is when some of the sun's short wave energy is being absorbed by the air, land and water bodies of the earth. √These entities release energy back to the atmosphere where it gets trapped by greenhouse gases√ and reflects back to earth, where it heats up the surface and air. √ (3)

(12)

3.2

Farmers need to adapt their farming practices to farm with the ever-changing climate. √ This includes selecting the correct crops√ for their specific climatic conditions, conservation farming, √ looking at methods to use available water more efficiently√ and enhancing production / units of water used. √ Options such as water harvesting √and mulching can also be considered. √

Any (4)

3.3

Subsistence farmers need to reduce evaporation levels√ from the soil and evapotranspiration from the plants. √ This can be done by providing a mulch on the soil to keep the soil temperature down and

Any

reduce evaporation. √ Furthermore the method of irrigation also needs to reduce evaporation. √ Wind breaks will also reduce evapotranspiration from plants√ (3)

TOTAL:

(80)

Gr 10: Term 2: **PRACTICAL INVESTIGATION/ASSIGNMENT**

TOPIC: Sustainable Natural Resource Utilisation

1. The aspects of water quality that are important for agricultural production are
   - Salinity/ acidity of the water✓
   - The amount of polluting organisms (bacteria) in the water✓
   - Chemical compounds (heavy metals) in the water✓ (3)

2.1.1 Eutrophication (1)

2.1.2 Excessive fertiliser ends up in the water sources leading to an accumulation of minerals in the water. ✓ Thereby altering the pH of the water, therefore making it unsuitable to irrigate pH sensitive crops✓ Excessive N fertiliser promotes the growth of algae and other plant material, reducing the available oxygen for aquatic life✓ (3)

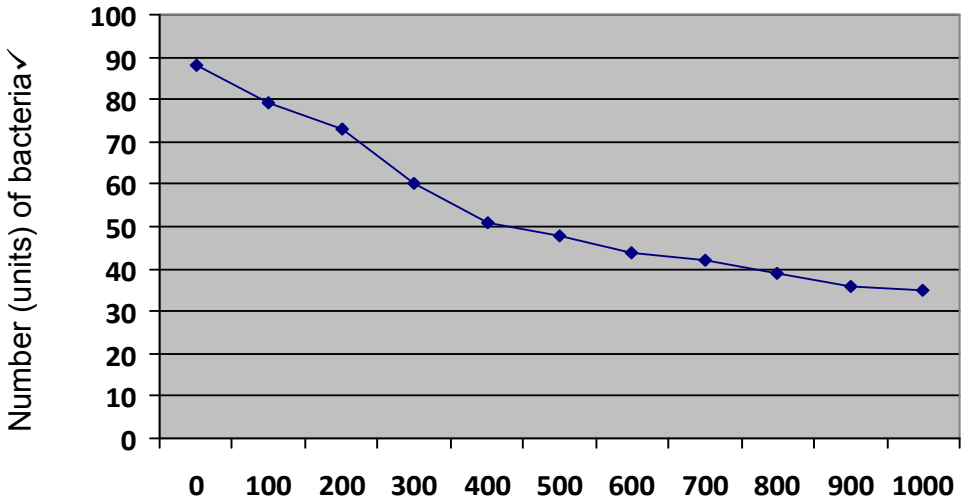
2.1.3 Herbicides✓ and pesticides✓ (2)

2.1.4 Prevent soil erosion and over irrigation✓ to limit soil run-off and sediment accumulation in water sources✓
Do not over-fertilise, ✓ so that excess fertiliser does not seep into the water sources✓
Manage the spraying of agricultural chemicals such as herbicides and pesticides closely and keep to the prescribed dosage✓ to prevent accumulation into water sources.
Prevent livestock from gathering on the edge of water bodies✓ to prevent accumulation of manure that contaminates water with nutrients and bacteria✓
(8)

3.1 The bacteria in the sewage is undiluted at point of entry, therefore the high numbers. ✓ (1)

Bacteria levels from sewage source of entry✓

3.2



(5)

3.3 Correct plotting : ✓✓ Distance from entry point (m) ✓ (3)

3.4 The amount of bacteria reduces✓ from sewage point of entry✓ as it gets diluted by the water✓ (3)

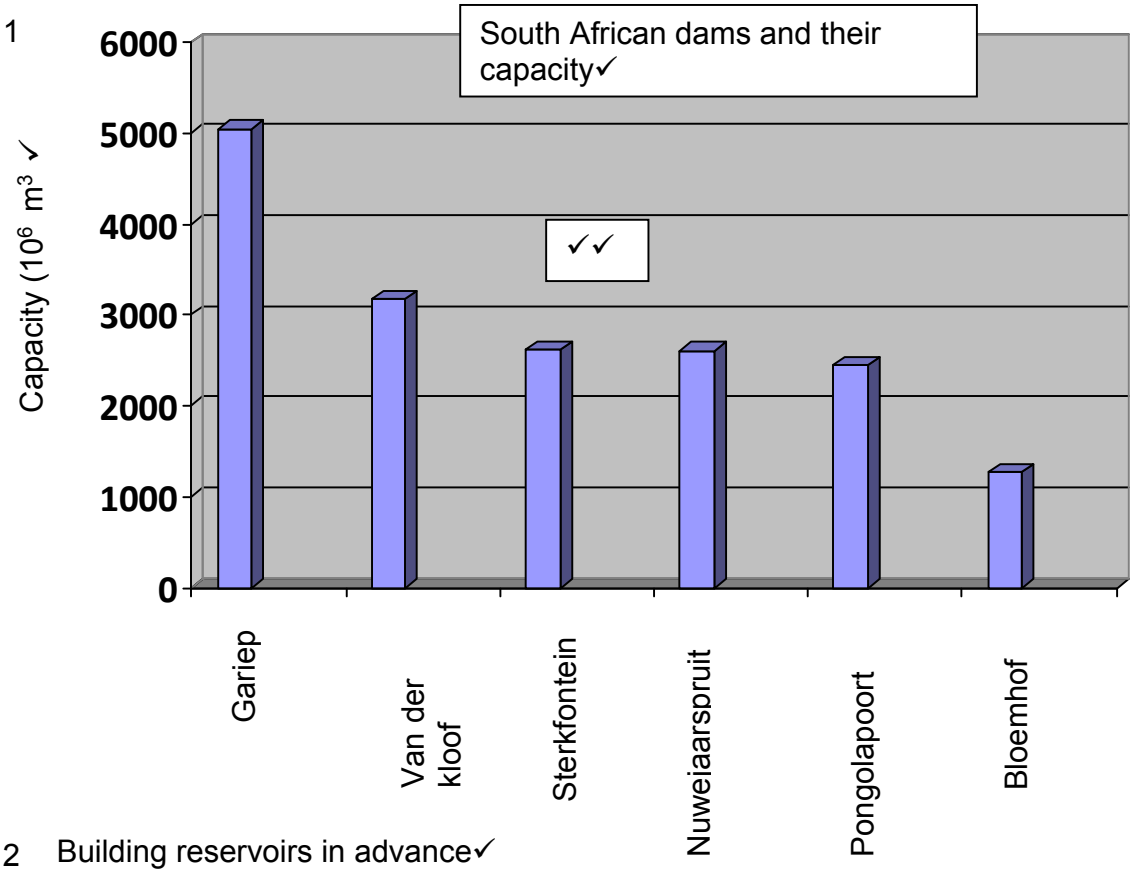
4.1 Health concerns involve the spreading of diseases✓ caused by bacteria ✓such as gastro-intestinal diseases and cholera✓ (3)

4.2 The Gariep Dam is part of the Orange River Irrigation Project providing water for 22400 ha of agricultural land✓ (4)
Drinking water for Bloemfontein and Port Elizabeth✓ (3)
Providing electricity for the national grid✓

4.3 5041✓- 1264✓ = 3777 x 10^{6} m^{3}✓✓ (5)

4.4 Irrigation✓, household water, ✓ electricity supply✓ and manufacturing✓ (3)
(any 3)

5.1.1



(2)

5.1.2 Building reservoirs in advance✓
Use water conservation cultivation methods, e.g. minimum tillage and mulching ✓
Reduce evapotranspiration tunnels/ glass houses✓
Use grey water where possible✓
Use drip irrigation instead of flood irrigation (any3) (12)

5.2.1 Tunnels, ✓ glass houses, ✓ planting in bags to reduce area that needs to be irrigated✓

5.2.2 According to the pictures collected: The possibilities are:
Centre pivot irrigation: ✓Very expensive, ✓ needs a reservoir and a pump as well as electricity✓
Dragline irrigation. ✓ Needs a pump, electricity and labour ✓ to move the draglines✓
Drip irrigation✓Needs a pump and electricity✓✓
Flood irrigation. ✓ Least expensive when done against a slope, ✓ no electricity – labour only, but least efficient on the amount of water used✓
Drip irrigation✓Controlled amounts ✓of water are deposited where it is needed. ✓Less time for evaporation to take place since it is at the roots of the plants✓ (4)

Total : **[65]**

TERM 3: ASSIGNMENT

TOPIC: Animal studies: General importance, economic value and classification of farm animals

Question 1

A 1. Nguni√
2. Beef√
B. 1. Kolbroek pig√
2. Beef√
C. 1. Ronderib-Afrikaner√
2. Beef√
D. 1. Afrikaner√
2. Beef√
E. 1. Angora goat√
2. Angora hair√
F. 1. Friesian √
2. Draught horse√
G. 1. Jersey√
2. Milk√
H. 1. Boer goat√
2. Beef√
I. 1. Toggenburg dairy goat√
2. Milk√
J. 1. Merino√
2. Wool√ **(20)**

Question 2:Inputs, processes and outputs for the required illustrations.

Illustration	Inputs	Processes	Outputs
1. Communal cattle farming	**Sun, rainfall, grass, livestock**	**Herding of animals, Animal management practices**	**Animal derived products, e.g. meat, hides**
2. Intensive animal production	**Housing facilities, Animal feed, Animal healthcare products, water**	**Animal management Practices, Harvesting (slaughtering)**	**Animal derived products, e.g. meat**
3. Extensive animal	**Sun, rainfall, grass, livestock**	**Herding of animals, Animal management**	**Animal derived products, e.g.**

production		**practices. Slaughtering**	**meat, hides**
4. Extensive animal production	**Sun, rainfall, grass, livestock**	**Herding of animals, Animal management practices Slaughtering**	**Animal derived products, e.g. meat, hides**
5. Extensive animal production	**Sun, rainfall, grass, livestock**	**Herding of animals, Animal management practices Slaughtering**	**Animal derived products, e.g. meat, hides**
6. Extensive animal production	**Sun, rainfall, grass, livestock**	**Herding of animals, Animal management practices**	**Animal derived products, e.g. meat, hides**
7. Intensive animal production	**Housing facilities, Animal feed, Animal healthcare products, water**	**Animal management practices, Harvesting (slaughtering)**	**Animal derived products, e.g. meat**
8. Extensive animal production	**Sun, rainfall, grass, livestock**	**Herding of animals, Animal management practices Slaughtering**	**Animal derived products, e.g. meat, hides**

(24)

Question 3

Study the illustrations carefully and identify the farming system illustrated by writing the correct word under the provided terms.

Illustration no.	Sedentary or nomadic	Subsistence or commercial	Arable, pastoral or mixed	Extensive or intensive
1	Nomadic	Subsistence	Pastoral	Extensive
2	Sedentary	Commercial	Pastoral	Intensive
3	Either	Commercial	Pastoral	Extensive
4	Either	Commercial	Pastoral	Extensive
5	Sedentary	Subsistence	Pastoral	Extensive
6	Sedentary	Subsistence	Pastoral	Extensive
7	Sedentary	Commercial	Pastoral	Intensive
8	Either	Commercial	Pastoral	Extensive

(32)

Question 4.

4.1 Food Security – Refers to the availability √of and access to√ food by all people (2)

4.2 System 1 is a communal farming system. Food security of the community can be compromised due to lack of management of the animals, leading to losses. √
It can be classified as subsistence farming√ System 7 is a commercial feedlot. √
Management is strict and there are enough financial resources and food security in the community is normally be compromised√ (4)

4.3 Globally there is enough food available. √ The distribution, √ however is a problem because it is very costly to transport food and keep it fresh. √ The developed world is throwing food away, √ while the developing world has a shortage but cannot afford to move the food. √ This problem is also prevalent in countries where there is a large difference in the socio-economical abilities √ of the population. (6)

Question 5

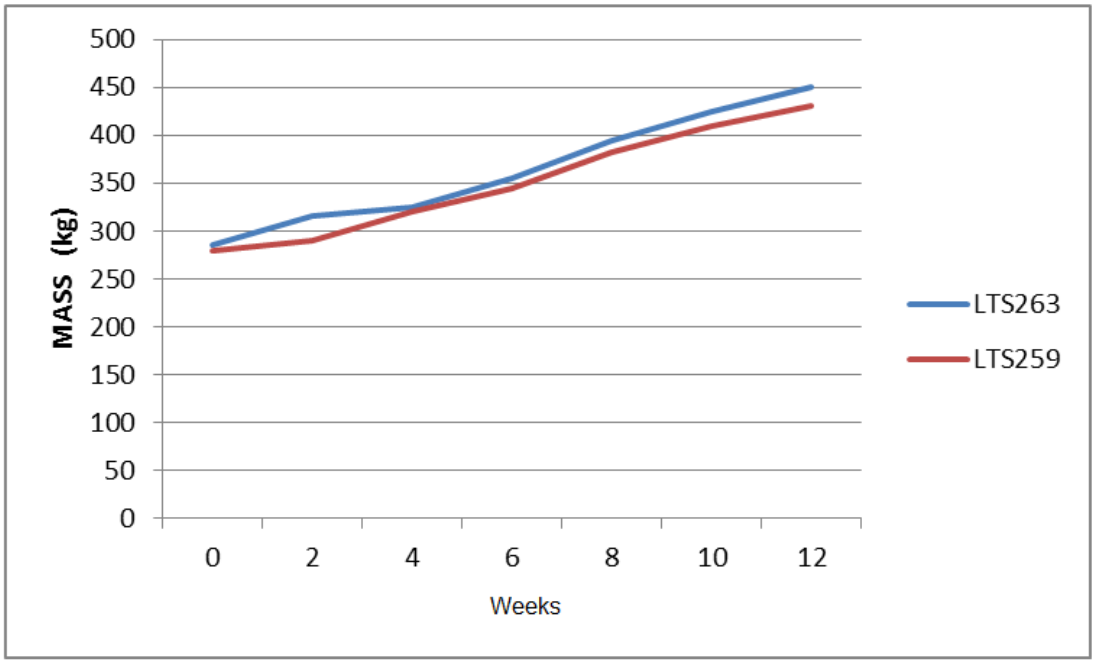
5.1 Creep feeding√

5.2 Given to lambs/calves so that they can get used to the intake of solid food√ just before they are weaned. √ (3)

Question 6

6.1

Increase in mass of two weaners on a growth test over period of 112 days



Assessment criteria:

Heading	1 √
Y-axis: Name Unit Scale	1 √ 1 √ 1 √
X-axis: Name Scale	1 √ 1 √
Correct type of graph	1 √
Key	1 √
Joining of points	1 √
Plotting	3 (All correct) √√√ 2 (7-13 correct) √√ 1 (1-6 correct) √

(12)

6.2 Increase in mass = End mass - Mass at start √

LTS 263 = 450 - 285√
= 165kg√

ADI = 165 / 112√
= 1,47kg per day√

LTS 259 = 430 - 280√
= 150kg√

ADI = 150 / 112√
= 1,34kg per day√ (any 8) **(8)**

6.3 LTS 263√ because it had the best feed conversion ratio.√
(ADI = mass of fodder eaten divided by mass increase)
(263 = 1 : 5,78 259 = 1 : 6,08) √ **(2)**

Question 7

7.1 Holstein√ **(1)**

7.2 High milk yield, √ white milk √ with low solids√ **(3)**

7.3 The cow is lighter in the hind quarter and heavier in the front quarter √.
The bull is heavier in the hind quarter and lighter in the front quarter.√
The bull must have male characteristics √ and the cow female characteristics√
The bull has a muscular body with a strong featured head. √
The cow has softer features with a slender neck.√ (any 4) **(4)**

7.4 Pinzgauer, Simmentaler, Rooipoenskop (any 2) **(2)**

Total: 125

Gr 11 **Topic: Soil Science**: **Soil texture, structure and plant nutrients.**

Memorandum:

Question 1 – own answer: Use example to give guidelines on the answer. (10)

Question 2

Sample 10719 = 72% Sand; 15% Clay & 13% Loam – Sandy loam√ √ (2)
Sample 10720 = 40% Sand; 28% Clay & 32% Loam – Clay Loam √√ (2)

Question3

	Water-holding capacity	Pore space	Cultivation potential	Suitability for crop production
Sandy Loam	Low - medium	Large	Easy - good	Good
Clay Loam	Medium - high	Small - Tend to compact	Medium to poor	Medium to poor (8)

Question 4

Steps in taking a representative soil sample
-Take samples before lime, fertiliser, or manure are added. Use only clean equipment for collecting soil samples. ✓
- Top- and subsoil samples must be taken separately. ✓
- Sample where the crop will be planted. ✓
Avoid unusual areas. Avoid sampling in small areas where you know that conditions are different from the rest of the field (for example, former manure piles, fertiliser bands, or fence lines). ✓
- Each sample should consist of subsamples taken from 15 to 20 locations within the sampling area. ✓
Avoid contaminating the sample✓

- Use clean sampling tools and avoid contaminating the sample during mixing or packaging. A small amount of fertiliser residue on tools or hands, for instance, can cause serious contamination of the soil sample. ✓
- Do not include mulch or vegetation in the sample. ✓
- Do not use galvanised metal, brass, or bronze tools to collect sample that will be tested for micronutrients (such as zinc). ✓

Take the soil sample to the correct depth✓
Sample the part of the soil where the plant roots will grow. ✓

- For most annual and perennial crops, sample from the surface down to about 6 to 8 inches (Figure 4) or to the depth of tillage.
- Carefully mix all samples together

Place all of the soil subsamples from a single sampling area in a clean container and mix thoroughly. ✓
Label each sample correctly to ensure easy identification by the lab. ✓ (Any 8)

Question 5

Nutrient availability

Sample 10719	Sample 10720
• Nitrogen✓ • Phosphorus✓ • Potassium✓ • Sulphur✓ • Calcium✓ • Magnesium✓ • Molybdenum✓	• Calcium✓ • Phosphorus✓ • Magnesium✓ **(10)**

Question 6: Field method of determining soil texture

Question 7

Fertiliser mixtures

The mixture contains – 3 parts N
– 2 parts P
– 1 part K and the amount of nutrients✓ in 100kg is 22kg✓

Calculation of % plant nutrients in the mixture 2:3:2 (22):

First add the nutrients in the mixture ∴ 3 + 2 + 1 = 6✓✓

Mass / % of N in 100kg = 3/6 x 22 = 11 kg/100kg (%) **N** is available in the mixture✓✓

Mass / % of P in 100kg = 2/6 x 22 = 7.3 kg/100kg (%) **P** is available in the mixture✓✓

Mass / % of K in 100kg = 1/6 x 22 = 3.7 kg/100kg (%) **K** is available in the mixture✓✓ **(10)**

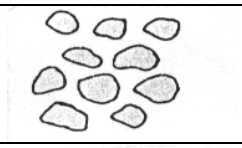
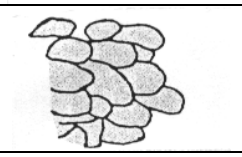
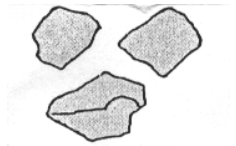
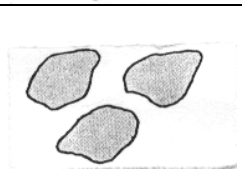
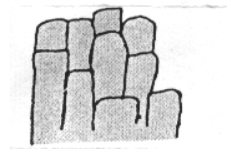
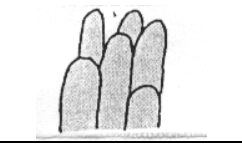
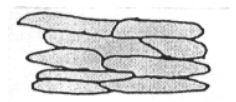
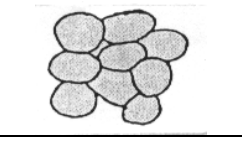
Question 8: Nutrient deficiencies

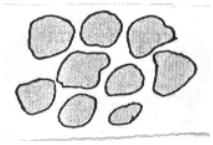
Nutrient	Visible signs	Correction measures
N✓	Chlorosis in the form of a V along the centre of the leaf✓	Urea/LAN fertilisation after planting or enough N in the fertiliser mixture, nitrogen leaches easily from the soil. ✓
P✓	Purple discolouring and dying of leaf on the outside. ✓	Fertilisation with superphosphate before planting or during planting, does not leach✓
K✓	Chlorosis in the form of a V around the outside of the leaf. ✓	Potassium sulphate or potassium chloride fertilisers, immediately available to plants, does not leach. ✓

(9)
Total: 80

SECTION B: Soil Structure.

1. Complete the following table. Study each of the following soil structures and soil textures. Give the name (type) and description opposite each representation (Form).

PRIMARY TYPE	TYPE	FORM	DESCRIPTION
Amorphous	Single grain		Structureless, no binding between soil particles, and no structure ✓✓
Blocky	Massive		Soil particles bind together to form massive unit✓✓
	Blocky-shaped		Soil particles form large block-like shapes. This structure is common in the subsoil. It is moderately suitable for crops. ✓✓
	Sub-angular		Aggregates have flat and rounded corners ✓✓
Prismatic	Prism-shaped		Soil particles are arranged in large upright columns that stand vertically in the soil. This structure is common in the subsoil. It is less suitable for crop production. ✓✓
	Columnar		Soil particles are arranged in large upright columns rounded at the top that stand vertically in the soil ✓✓
Platy	Platy-shaped		Soil particles are arranged into thin compacted plates found on top of bare soil. This structure is common in the deeper parts of the topsoil. This structure stops root growth, water and air movement through the soil. ✓✓
Spheroidal	Granular		Round aggregates non porous ✓✓

	Crumb-shaped		Soil particles are arranged in a rounded form (like bread crumbs). This structure is common in the topsoil. It is very suitable for crop production. ✓✓ **(18)**

Marking guideline: Gr 11: Plant food availability

Plant food supplied by air: • Nitrogen • CO_2 • H_2O **(3)**	**Plant food:** Requirements for photosynthesis: • Sunlight • Temperature • Carbon dioxide • Water (4)
Plant food supplied by soil: Macro-elements • Nitrogen • Potassium • Phosphorus • Calcium • Magnesium • Sulphur **(6)**	**Soil properties/ Characteristics** • Texture • Structure • Soil colour • Soil temperature • Water-holding capacity • Soil aeration (6)
Plant food supplied by soil: Micro-elements • Iron • Manganese • Copper • Zinc • Molybdanium • Boron • Cobalt **(Any 6)**	**Soil Profile (Ideal)** • O- Horizon • A- Horizon • B- horizon • C- Horizon • R- Horizon (5) **Total : 30**

Marking Guideline: Research project: Plant Nutrition/ Nitrogen fertilisers

Literature study: Nitrogen

Nitrogen is a macro-element needed in plant nutrition.√
Nitrogen makes up an essential part in the protein molecule / forms amino-acids. √
These proteins act as enzymes that stimulate growth processes, √ resulting in vegetative growth. √
If enough nitrogen is present, more carbohydrates are changed to proteins, resulting in juicier, more nutritious plants√ (5)

The Green Revolution was a period of time (± 1940-1960) when research√ improved the production potential of especially maize and rice√ preventing a world-wide famine. The use of synthetic fertilisers to enhance production was also promoted, improving the production by especially large-scale commercial farmers√ (3)

Sources of nitrogen:
Synthetic sources such as amonium sulphate and limestone ammonium sulphate√
Natural sources by planting legumes or clovers that fixate nitrogen in the soil, once it is ploughed back for use by other plants√ (Green manure)
Animal manure√ (Any) (2)

The hypothesis
An increase√ in nitrogen fertiliser √ wil result in and increase√ plant production√ (4)

Discussion of results:
Here the learner should, for example, statethat at the level of 100 kg N/ ha, the accumulated growth was XXX grams /week…, etc.
Growth from **each** level of nitrogen application should be discussed and an indication of which level did the best and which level performed the worst should be given.
(Remember, it is *possible* that at the highest level of nitrogen application it is possible that plant growth is stunted due to nitrogen toxicity.)

Conclusion:
Should read something like…
The application of nitrogen fertilisers improves plant production. √ The more nitrogen applied, the better plant growth will be… then depending on your situation maybe…√ Plant growth at the 300 kg N/ha seems to reduce due to possible nitrogen toxicity. √

Referencing:
Burger, W. & Rose, Z. (2012). Agricultural Sciences Gr 11. Macmillan. Pp 238-245
See rubric.

2.1 Hypothesis – Given
2.1.1 Dependent variable – plant growth in g/week
2.1.2 Independent variable – rates of fertiliser (kg/ha)
2.1.3 Two precautions to make sure results are reliable….

All plants must receive the exact same amount of water√ to prevent an interaction effect√

All plants must be planted in soil from the same source√√

Plants must be subjected to the same environmental conditions√√
(Any 2x 2) (4)

2.1.5 Three repetitions are needed to make sure that the experiment is vallid√√ (2)

2.1.6 The 0 N/ha is the control (2)

2.1.7 Hypothesis rejected / accepted depending on your results (1)

Mark graphs according to rubrics given.

Figure	*Vegetative mode*	Description	Examples
A	*Runners* *(1)*	Stems that grow along the ground. New plants and roots grow out at the nodes (2)	Strawberries/ Hen & Chickens (2)
B	*Plantlets / Offsets*	New plants develop on the stem of the parent plant. The offsets may have their own roots or be connected at the stem above the soil	Prickly pears Pineapple
C	*Corm*	Corms are short, thick underground stems. There are buds at the bottom of the scale – like leaves that develop into new plants	Gladiolas Freesias Crocus
D	*Tuberous Roots*	Tuberous roots are roots that store food. Buds form at the stem end, which develop into new plants using the stored food	Sweet Potatoes Cassava Dahlias
E	*Rhizomes*	Underground stems with buds at the joints of scale-like leaves. Rhizomes grow larger every year and plants form at the buds to form clumps of plants	Canna Bamboo Ginger Some grasses
F	*Tubers*	Tubers are the swollen ends of underground stems. Buds on the tubers grow into new plants	Potatoes Yams
G	*Bulbs*	Bulbs are small underground stems covered in fleshy leaves. New green leaves and a flower stalk develop from the bulb in the growing season. Buds that develop into new bulbs	Onion Garlic
H	*Stem cuttings (Hardwood cuttings)*	Cuttings to be taken from the previous year's growth – normally in winter. Then rooted. (Rooting hormones increases success)	Trees Shrubs **[40]**

Gr 11: Vegetative reproduction : Memorandum

Number	Identify	Protein / Carbohydrates/ Minerals	Concentrate / roughage/ supplement	Use
1	Bone meal	**Minerals** √	**Supplement** √	Ca + P supplement in a lick √
2	Maize meal	**Carbohydrates** √	**Concentrate** √	Fattening Energy source √
3	Oat grain	**Carbohydrates** √	**Concentrate** √	Fattening Energy source √
4	Poultry manure	**Protein** √	**Concentrate** √	Production and growth √
5	Lucerne hay	**Protein** √	**Roughage**√	Production and growth √

AGRICULTURAL SCIENCES

Grade 12
Practical Investigation
MEMO
Topic: Animal Nutrition

(20)

SECTION B

Questions:

1. DM of feed: 20 – (10/100 X 20) = 18 kg √

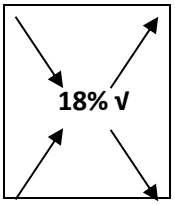
   DM of Manure: 16 – (50/100 X 16) = 8 kg √
   Coefficient of digestibility:
   Dry material intake (kg) – Dry material of manure (kg) X 100 √
   Dry material intake (kg)

   = 18kg – 8kg X 100 √
   18kg √
   = 55.5% √

   Oat hay √: (Reason) 10% moisture content + TDN are very close to 50% √

(8)

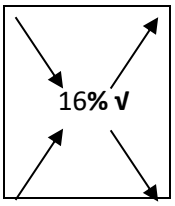
2. Feed 2: Maize meal √ 10 parts Maize meal√√



Feed 4: Poultry Manure √ 9 dele Poultry Manure√√

(7)

3. Feed: Lusern Hay 17% √ 7.4 parts Lusern Hay √√



Feed: Hominy chop 8.6% √ 1 part Hominy chop √√

NB _ The correct feeds must be selected √ (8)

3.1 Ratio: 1 part Hominy chop: 7.4 Parts Lucerne Hay✓✓ (2)

3.2 1/8 * 100 = 11.91% Hominy chop and 7/8 * 100 = 88.09% Lucerne✓✓ (2)

3.3 Price determination

3.3.1 Lucerne – R 3000 per ton = 3000/1000 kg = R3 per kg lucerne thus 88.09 kg * R3 = R264.27 ✓✓

3.3.2 Hominy chop – R2900per ton = 2900/1000kg = R2.9 per kg Hominy chop thus 11.91 kg * R2.9 = R34.53✓✓

The total cost for 100 kg of the feed mixture is R262.5 + R36.25 = **R298.8**✓✓

(6)

4 **Lucerne hay** 89% DM √; 58% TDN √; 17% CP √; 30% CF √; 1,4% Ca √

Roughage – high crude fibre content√

Rich in protein – high Crude protein value √

(Any 5) (5)

5. Identification of the feeds:

a. Urea √

b. Lucerne hay √

c. Bone meal √

d. Wheat straw √

e. Poultry manure √

f. Any of animal origin√

(6)

6 Danger : Urea poisoning

a. Urea Poisoning
Urea is very soluble √
Ruminants have a limit to the quantity of urea they can take in √
When urea in a feed is transported, it should be protected from rain √
Feed containing urea in a feeding trough should be protected against rain√

(Any 3) (3)

b. Protect feed against √ rain and ensure that there is enough roughage to prevent over eating√ (2)

c. Urea is suitable for ruminant √ animals but horses, pigs and chickens√ should not be allowed to eat it. /

(2)

d. Vinegar ✓ (1)

e. Winter✓ – grass loses its protein value and protein is needed to feed the rumen bacteria to digest roughage/fibre quicker. ✓✓ (3)

f. Gut simbionts are micro-organisms that digest cellulose and lignin✓ and also have the following functions: Synthesis of amino acids, ✓
Hydrolysis of protein, ✓and the synthesis of vitamins…✓ making these available to the ruminant, since the ruminant cannot do the digestive function ✓

(5)

7

Feed	NB	Wide/Narrow	Suitability
Cottonseed	CP *65% = 27.3 % DP✓ = 86-27.3 / 27.3✓ = 1:2.15✓	Narrow✓	Production/Growth✓
Maizemeal	CP *65% = 5.85% DP✓ = 88-5.85 / 5.85✓ = 1:14.04✓	Wide✓	Fattening✓
Wheat straw	CP*65% = 1.95% DP✓ = 44-1.95 / 1.95✓ = 1:21.56✓	Wide✓	Maintenance✓ Drought feed
It is important that the CP be expressed as DP as indicated in the worksheet before the calculation for NR can be done.			

(15)
Total [95]

Gr 12: Term 2: ASSIGNMENT : GENETICS

1.1 What characteristic (polled / horns) do you see as being dominant? Motivate your answer.

Polled ✓ (3)

The F_1 generation has 75% polled lambs✓✓

1.2 Complete the Punnet square below to illustrate the abovementioned cross. (Use the letters H/h) (4)

♀ \ ♂	H	h
H	HH✓	Hh✓
h	Hh✓	hh✓

1.3. What is the phenotype of the ram? (1)

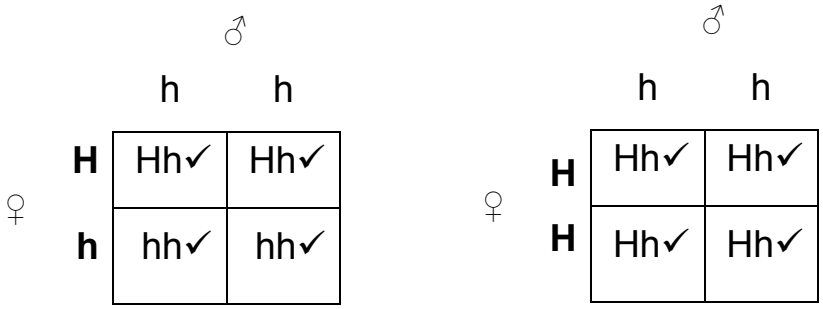
Polled✓

1.4. What is this type of dominance known as? (2)

Complete dominance✓

1.5. Assume that the above lamb with horns was a male and the other three were all ewes, these are then allowed to mate. Use the following tables to show the two possible pairings and their offspring's genotypes.

(8)



1.6. With reference to the example above, explain the meaning of homozygosity/ homozygosis. (3)

In the above case, the ram's genotype has both recessive genes (hh)✓ and in one case the female carries two dominant genes in her genotype✓. When both genes are the same in the genotype, we call it homozygosity/homozygosis.✓

1.7.1 Marlow makes the pairing of the Consortium sheep even more complex by also taking the length of the wool into consideration. If a dihybrid cross between a homozygous female with horns and short wool and heterozygous, polled ram with long wool was to occur, give the phenotypic composition of the offspring in the form of a Punnet square. Assume that a sheep with short wool (r) is a recessive trait and a sheep with long wool (R) is a dominant gene.

(9)

HR ✓	Hr✓	hR✓	hr✓
HhRr✓	Hhrr✓	hhRr✓	hhrr✓

hr✓

1.7.2. Provide the possible genotypes of the following phenotypes: (4)

Shortwool with horns : rrhh ✓
Polled shortwool : rrHh or rrHH ✓
Longwool with horns : Rrhh or RRhh ✓
Longwoolled ewe : Rr or RR ✓

2. Name the phenomenon where there is a black sheep in the offspring and the parents and grandparents are all white. (2)

Atavism ✓✓

3. Explain the meaning of incomplete and co-dominance by making use of a cross between a black merino ram and a white merino ewe. (5)

Incomplete dominance:
The offspring will have grey wool ✓✓

Co-dominance:
The offspring of such a cross will display both the parents' colours. ✓✓

OR

The wool will be white with black spots or black with white blotches.✓✓

4. Scientists working at a leading animal research station have identified genes that can be transferred to cattle to produce meat with desirable characteristics. They have compiled the following findings on their research and presented them as values in the following table:

Characteristics	Slaughter weight gain	Lean meat percentage	Meat tenderness	Birth weight
Heritability Indicator (%)	85%	28%	60%	47%

4.1 Identify TWO characteristics that would be most appropriate for improving the herd. Explain your answer. (4)

Slaughter weight gain ✓and meat tenderness✓. It has the highest heritability (85% & 60%)✓✓

4.2 Evaluate the effectiveness of the selection of lean meat percentage in improving the herd. Justify your answer. (3)

Not very effective. It has a low chance (28%) of heritability and less chance to be transferred to progeny✓✓✓

5. The farmer notices that one animal in the herd seems to grow bigger than the others. Its slaughter weight is 750 kg, whereas the average slaughter weight of the herd is 660 kg. The heritability of weight gain in beef cattle is 85%.

5.1 Calculate a simple estimated breeding value of the slaughter weight of an animal. (5)

EB V = slaughter weight – average herd weight ✓

= 750 kg - 660 kg✓

= 90 kg✓

Thus 90 x 85%✓

= 76.5 kg ✓

5.2 Indicate whether the farmer should slaughter this animal or keep it for breeding purposes. Motivate your answer. (3)

Keep the animal for breeding. ✓ The slaughter weight gain has a heritability of 85 %✓; it has a high chance to be transferred

to the progeny. ✓

5.3 Suggest a more accurate way of calculating the EBV for this animal.

The use of biometrics ✓✓ (biological statistics) (2)

5.4 Explain how a farmer can prevent inbreeding depression in his herd

Through cross-breeding✓ : Unrelated animals should be bred to prevent inbreeding depression✓✓ (3)
[13]

Question 6

			2 D								4 D	
1 H	O	M	**O**	Z	Y	3 G	O	U	S		I	
E			M			E					P	
T			I			N			9 G		L	
E			N			E			E		O	
R			A		5 P				N		I	
O			N		6 **H**	A	P	L	**O**	I	**D**	
Z			T		E				T			
Y					N		13**A**		Y			
7 **G**	E	N	E	**P**	O	O	**L**		P			
O					T		E		E			
U		10R			Y		L					
S		E			P		8 **L**	O	**C**	U	S	
		C			E		E					
		E										
		S										
		11**S**	E	G	R	E	G	A	T	I	O	N
		I										
		12**V**	A	R	I	A	T	I	O	N		
		E										

(13)

7. You have a tall plant with big seeds (TTBB) and a short plant with small seeds (ttbb). The desirable traits is a short plant with big seeds.

7.1 Use the Punnet square to illustrate how these desirable traits can be achieved. (7)

✓✓	**TB**	**Tb**	**tB**	**tb**
TB	TTBB	TTBb	TtBB	TtBb
Tb	TTBb	TTbb	TtBb	Ttbb
tB	TtBB	TtBb	***ttBB***	ttBb
tb	TtBb	Ttbb	ttBb	ttbb

✓✓

(4 ticks for correct gametes)
2 ticks for correct completion
1 tick for indicating the correct specimen

7.2 Use Mendel's law of independent assortment to explain hybrid vigour. (5)
[12]

Mendel's law of independent assortment states that in the case of a dihybrid cross✓ the inheritance of one factor has no influence ✓on the inheritance of the second characteristic,✓ therefore a recombination of characteristics takes place ✓, making hybrid vigour possible✓

Total: 80

TOPIC: Agricultural Economics:
Marketing

PRACTICAL NR. _____ **GRADE: 12**

NAME: _____ **DATUM / DATE**: _____

1.

1.1 Price determination using supply and demand✓✓ (2)

1.2

1.2.1 Demand✓ (1)

1.2.2 Supply✓ (1)

1.2.3 Market equilibrium✓ (1)

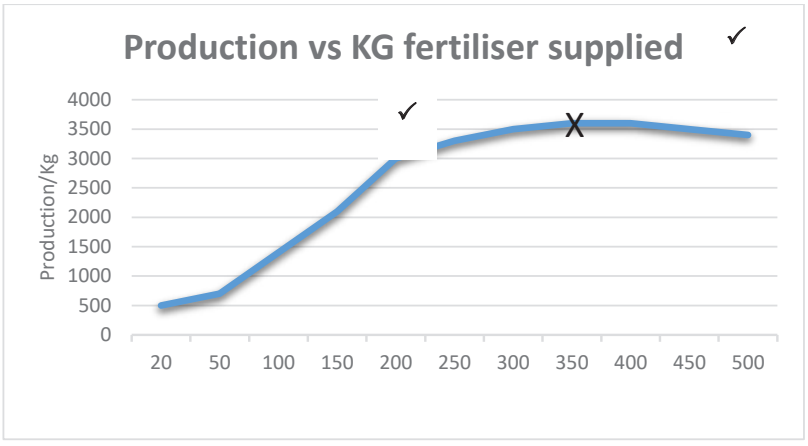
1.3 Market equilibrium is a situation where quantity demanded and quantity supplied are equal and there is no price or quantity to change. ✓✓ (2)

1.4 Factors determining DEMAND • The following factor determine the demand for a given product:
1.Price of the product ✓
2.Income level of the consumer ✓
3.Tastes and preferences of the consumer ✓
4.Prices of related goods which may be substitutes/complementary ✓
5.Expectation about the prices in future ✓ (Any 2) (other factors are also applicable) (2)

1.5 Factors determining SUPPLY-
1. Natural Causes✓
2. Nature of the market✓
3. Techniques in production✓
4. Price of related commodities
5. Input price✓
6. Price of Commodity (Any 2) (other factors are also applicable) (2)

2.

2.1



2.2 L.a.w. of diminishing returns✓
2.3 See Graph✓✓ (2)
2.4 The production for the given crop reach it highest points between 350 kg and 400 kg fertiliser supplied and there after decline when more fertiliser is supplied. ✓✓ (2)

3.
3.1 Products B(onions) ✓ and E(Cabbage) ✓ (2)
3.2 **TOMATOES(A)** ✓✓ (2)
3.3 Price difference = Highest point –Lowest point(R3800✓– R 2100✓ = R1700) ✓✓ (4)
3.4 Possible shortage of product on market, sharp drop due to over supply
3.5 1500 Kg = 1.5Ton X R 2600 = R 3900 /ha✓✓ (2)
3.6 Product D - Carrots ✓ (1)
3.7 Price difference = Highest point –Lowest point(R2500– R 1500✓ = R1000✓) (2)

4.
4.1 a - R 80✓
b – R 85✓
c – R 1600✓
d – R 1500✓
e – R 1800✓
f – R 10 012✓
g – R 22 500✓ (7)
4.2 Profit/Loss = Income – Expenses R 22500 – R10 012✓ = R 12488✓ (2)
Its a Profit The farmers income is more than his expenses
4.3

Fixed		Variable costs	
Wages✓	R 1 600	Transport for produce to market✓	R 1800
		Seed✓	R 80
		Fertiliser✓	R 4 760
		Transport for fertiliser✓	R 85
		Pesticides✓	R 187
		Packaging✓	R 1500
Total Fixed	– R 1 600✓	Total Variable costs	R 8 412✓
			(9)

4.4 Break even point = break-even analysis is a simple tool defining the lowest quantity or cost of product for sales which include both variable and fixed costs. ✓✓ (2)

TOTAL: 55

222 Struben Street, Pretoria, 0001
Private Bag X895, Pretoria, 0001, South Africa
Tel: 012 357 3000 • Fax: 012 323 0601

Private Bag X9035, Cape Town, 8000, South Africa
Tel: 021 486 7000 • Fax: 021 461 8110
Call Centre: 0800 202 933

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