EXAMINATION	NATIONAL SENIOR CERTIFICATE
GRADE	12
DATE	MAY/JUNE 2024
SUBJECT	AGRICULTURAL SCIENCES
PAPER	2
MARK TOTAL	150
DURATION (HOURS)	2½
NUMBER OF PAGES	12

SOUTH AFRICAN COMPREHENSIVE ASSESSMENT INSTITUTE

SUID-AFRIKAANSE KOMPREHENSIEWE ASSESSERINGSINSTITUUT

INSTRUCTIONS AND INFORMATION

1. Answer **ALL** the questions.
2. **SECTION A (QUESTION 1)** must be answered on the attached **ANSWER SHEET**.
3. **SECTION B (QUESTIONS 2 TO 4)** must be answered in the **ANSWER BOOK**.
4. Start **EACH** question from **SECTION B** on a **NEW** page.
5. Read **ALL** the questions carefully and make sure you answer only what is asked.
6. Number the answers according to the numbering system used in this question paper.
7. Place your answer sheet for **SECTION A (QUESTION 1)** inside your **ANSWER BOOK**.
8. Write neatly and legibly in **BLUE** pen only.
9. A non-programmable calculator can be used.
10. Show **ALL** calculations.

SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and make a cross (X) on the correct letter next to the question number (1.1.1 – 1.1.10) on the attached **ANSWER SHEET** for example:

1.1.1	**A**	**B**	**C**	**D**

1.1.1 An example of a processing function is ...

A. protection.
B. refrigeration.
C. packing in containers.
D. canning. (2)

1.1.2 Some of the following statements apply to eco-labelling:

i) It is a form of sustainable measurement directed at consumers.
ii) It does not take environmental concerns into account.
iii) It does not make use of index unit for measurement.
iv) It exists for both food and consumer products.

A. (ii) and (iv)
B. (i), (ii), (iii) and (iv)
C. (i), (ii) and (iii)
D. (i), (ii) and (iv) (2)

1.1.3 The marketing of products in an uncontrolled way is ...

A. co-operative marketing.
B. free marketing.
C. commercial marketing.
D. direct marketing. (2)

1.1.4 A characteristic of the demand chain is …

A. efficiency focus.
B. focus on planning and controls.
C. short-term orientation.
D. cash flow and profitability are the key drivers. (2)

1.1.5 The economic characteristic of agricultural land that makes it a good long-term investment is its ...

A. location.
B. management.
C. durability.
D. risk. (2)

1.1.6 The type of labour used to paint roofs on the farm is ... labour.

A. contract
B. casual
C. seasonal
D. permanent (2)

1.1.7 A vegetable farmer's total income after selling cabbage is R30 000. The farmer experienced R45 500 in production and marketing costs. The farmer therefore has made a …

A. profit of R15 500.
B. profit of R61 000.
C. loss of -R15 500.
D. loss of R15 500. (2)

1.1.8 A person who recognises a business opportunity and is willing to take a risk:

A. Labourer.
B. Entrepreneur.
C. Supervisor.
D. Manager. (2)

1.1.9 The visible or observable characteristic produced by the individual's characteristics for example height and hair colour.

A. Genotype.
B. Dominance allele.
C. Phenotype.
D. Recessive allele. (2)

1.1.10 Genetic engineering utilises a process where the genetic material is …

A. removed.
B. selected.
C. inoculated
D. inserted. (2)

(2 x 10) = **[20]**

1.2 Choose a description from **COLUMN B** that matches a term/phrase in **COLUMN A**. Write only the letter (A – J) next to the question numbers (1.2.1 to 1.2.5) on the attached **ANSWER SHEET**, e.g., 1.2.6 L.

COLUMN A		COLUMN B	
1.2.1	Hedging	A	A management strategy in which the cost of the consequences of a risk is distributed among several stakeholders.
1.2.2	Co-operative	B	Animals have a high durability.
1.2.3	Risk sharing	C	Fixed term assets.
1.2.4	Moveable capital	D	The value of assets increasing over time.
1.2.5	Inbreeding	E	Entering into future contracts to ensure a secure market and price.
		F	Medium term investment assets.
		G	Progeny displays a high degree of homozygosity.
		H	The farmer's ability to pay the farm's cash obligations on time.
		I	A business organization owned and operated by and for the benefit of its members.
		J	The transformation of agricultural produce into a different product.

(5 x 2) = **[10]**

1.3 Give the **CORRECT AGRICULTURAL TERM** for each of the following descriptions. Write only the term next to the question number (1.3.1 – 1.3.5) on the attached **ANSWER SHEET**, for example, **1.3.6 Bile**.

1.3.1 The selling and promotion of agricultural products with a special limited utilisation value to a small segment of the market by small and micro-enterprises.

1.3.2 Output per unit labour input.

1.3.3 Position of a gene on a chromosome.

1.3.4 When people use selective breeding to produce new varieties of a species.

1.3.5 The attachment of a second copy of an undesirable gene the wrong way around to make it inactive.

(5 x 2) = **[10]**

1.4 Change the **UNDERLINED WORD(S)** in each of the following statements to make them **TRUE**. Write only the appropriate word(s) next to the question number (1.4.1 – 1.4.5) on the attached **ANSWER SHEET**.

1.4.1 A <u>marketing plan</u> is a tool that helps a farmer to evaluate the business for future prospects.

1.4.2 <u>Management</u> refers to the physical endeavour performed in expectation of remuneration.

1.4.3 A <u>gene</u> is a thread-like structure made up of DNA molecules.

1.4.4 A <u>di-hybrid</u> cross involves cross pollinating two pure breeding plants that differ in only one characteristic.

1.4.5 A <u>parasite</u> is a self-replicating agent used in genetic engineering to introduce foreign DNA into a host, such as a virus or plasmid.

(5 x 1) = **[5]**

TOTAL SECTION A: [45]

SECTION B

QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING

2.1 For marketing to be effective, the farmer needs to plan and develop the production process.

2.1.1 Discuss the following:

a) Grading and standardisation
b) Storage (3 x 2) = (6)

2.2 The price at which a product is sold is very important to the producer.

2.2.1 Describe how prices of agricultural products are determined. (3)

2.2.2 Explain what is meant by the equilibrium price of a product by drawing and referring to a graph. (5)

2.3 The marketing activities and the groups of people that perform them effectively form the basis of an agricultural marketing system.

2.3.1 Explain FOUR principles of co-operatives. (4)

2.3.2 Compare **direct** and **indirect** marketing in terms of cost. (4)

2.3.3 Give TWO important roles of legislation in the effective marketing of agricultural products. (2)

2.4 Entrepreneurship is important in any country since it results in increased production outputs and creates employment.

2.4.1 The entrepreneurial process is one through which the new agri-business is established.
Briefly discuss the FOUR phases in the entrepreneurial process. (8)

2.4.2 Name TWO different types of agri-business plans as applied in two different situations. (2)

2.4.3 Identify a problem that could be encountered when drawing up a business plan. (1)

[35]

QUESTION 3: PRODUCTION FACTORS

3.1 Productivity is important on any farm and a productive farm should be seen as a functional entity.

PHOTOGRAPH A

PHOTOGRAPH B

3.1.1 List TWO functions of land. (2)

3.1.2 Evaluate the farming practices in Photographs **A** and **B** and discuss the techniques how the farmer in Photograph **B** increased land productivity. (4)

3.1.3 Discuss how land productivity can be increased with regard to farming. (2)

3.1.4 Explain ways in which indigenous knowledge can assist in conservation of farming land. (2)

3.2 Labour is one of the key factors of productivity.

3.2.1 Describe FOUR ways you could use to solve the problem of the shortage of farm labourers and discourage them from leaving farms and going to work in cities. (4)

3.2.2 Briefly explain the difference between **permanent** and **temporary** labourers. (4)

3.2.3 Discuss lack of skilled labour as a problem related to labour as a production factor. (2)

3.3 A poultry farmer gathered this data about the financial operations of his/her farm in this financial year. Study the table below and answer the questions that follow.

DESCRIPTION OF ITEM	AMOUNT
Bought 2 000 chicks	R8 each
Paid for labour	R20 000
Sold chicken manure	R28 000
Bought chicken feeders	R21 000
Paid for water	R5 000
Paid for holiday from investments	R12 000
Bought vaccines	R2 500

3.3.1 Use the data above to design a budget for the poultry farmer. (4)

3.3.2 Calculate the profit of the poultry farmer's business. (2)

3.3.3 Indicate if this is a viable and healthy business. Give a reason for your answer. (2)

3.4

What sets farm management apart from other business management is the kind and number of daily duties involved, as well as the many management layers involved in farming. Even among farms, the process will vary depending on the type of farming business involved and the overall size of the business. Specific skills are therefore needed for different farming operations.

3.4.1 Identify TWO reasons from the scenario above to justify why managing a farming business is different from managing a shop. (2)

3.4.2 Mention the specific management skills required in the following:

a) Being able to keep the farm profitable and successful.
b) Being able to deal with labour problems.
c) Being able to deal with unforeseen issues or problems. (3 x 1) = (3)

3.4.3 Outline TWO production risks that a farm manager may experience in crop production. (2)

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QUESTION 4: BASIC AGRICULTURAL GENETICS

4.1 The plant breeder conducted research work with two Bt maize cultivars to determine the lysine content of the seeds in the F1-generation. The gene (A) for high lysine is dominant over the recessive gene (a) for low lysine content. The Bt maize cultivar with heterozygous high lysine content (Aa) was cross- pollinated with the Bt maize cultivar that had a low lysine content (aa) and the F1-generation had 50% maize seeds with low lysine content.

4.1.1 Use the Punnet square to show the crossings of the two cultivars. (4)

4.1.2 Define the following genetic terms:

a) Genotype
b) Recessive gene (2 x 2) = (4)

4.1.3 Apart from the lysine content mentioned above, name TWO other characteristics of genetically modified maize that would support them to survive in a particular environment. (2)

4.2 A table below indicates measured pre-weaning growth rates (g/day) of certain cattle crosses.

PARENTS OF CALVES FROM CROSSING			**PASTURE CONDITIONS**		
			POOR	**AVERAGE**	**GOOD**
CALF NO.	**BULLS**	**COWS**	**AVERAGE DAILY GAIN OF CALVES (g/day)**		
1	**H**	**H**	425	704	827
2	**B**	**B**	658	713	770
3	**B**	**H**	468	773	884
4	**H**	**B**	738	780	872
5	**B**	**F_1**	716	848	858
6	**H**	**F_1**	734	848	880
7	**F_1**	**B**	698	747	821
8	**F_1**	**H**	446	739	855
9	**F_1**	**F_1**	725	848	869

4.2.1 Identify the type of breeding system above in the table above. (1)

4.2.2 Draw a bar graph to indicate the performances of **crossings 1 and 9** on poor and good pasture conditions. (6)

4.3 Three important aspects are considered when selecting individuals for breeding programmes, namely biometrics, heritability and estimated breeding values. Selected individuals may be mated using various breeding systems, such as out-crossing, species crossing and crossbreeding.

4.3.1 Differentiate between selection and heritability. (4)

4.3.2 State TWO advantages of species crossing. (2)

4.3.3 Explain the importance of using estimated breeding values (EBV) in breeding. (2)

4.4 Our previous generations used mass selection and inbreeding as their typical strategies for breeding and improving plants and animals, respectively. A different approach to animal and plant improvement was established, where genes from one organism, the donor, are removed and inserted into another organism, the recipient, in a process known as genetic modification.

4.4.1 Deduce TWO aims of the genetic modification of plants. (2)

4.4.2 Provide TWO advantages of genetic modification over traditional methods. (2)

4.4.3 List TWO disadvantages of inbreeding. (2)

4.4.4 Distinguish between pedigree selection and progeny selection. (4)

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TOTAL SECTION B: [105]

GRAND TOTAL: [150]

ANSWER SHEET: AGRICULTURAL SCIENCES PAPER 2

[ATTACH TO ANSWER BOOK]

SECTION A **TOTAL SECTION: 45**

EXAMINATION NUMBER:

ID NUMBER:

QUESTION 1.1

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

(10 × 2 = 20)

QUESTION 1.2

1.2.1 _____

1.2.2 _____

1.2.3 _____

1.2.4 _____

1.2.5 _____

(5 × 2 =10)

QUESTION 1.3

1.3.1 _____

1.3.2 _____

1.3.3 _____

1.3.4 _____

1.3.5 _____

(5 × 2 = 10)

QUESTION 1.4

1.4.1 _____

1.4.2 _____

1.4.3 _____

1.4.4 _____

1.4.5 _____

(5 × 1 = 5)

_____
45