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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

SEPTEMBER 2023

AGRICULTURAL SCIENCES P2

MARKS: **150**

TIME: **2½ hours**

This question paper consists of 14 pages.

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INSTRUCTIONS AND INFORMATION

1. This question paper consists of TWO sections, namely SECTION A and SECTION B.
2. Answer ALL the questions in the ANSWER BOOK.
3. Start each question on a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. You may use a non-programmable calculator.
6. Show ALL calculations, including formulae, where applicable.
7. Write neatly and legibly.

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SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 A marketing channel where producers sell their produce through marketing agencies at large central locations:

A Stock sales
B Fresh produce markets
C Farm gate marketing
D Direct marketing

1.1.2 … is the most cost-effective way of streamlining the value chain of agricultural products.

A Improving road infrastructure
B Building storage facilities
C Marketing collectively by combining loads with other producers
D Using cold storage and refrigerated transport

1.1.3 Identify the correct sequence of phases of the entrepreneurial process.

A Business formation, idea generation, develop a business plan, mobilise resources
B Idea generation, mobilise resources, develop a business plan, business formation
C Idea generation, develop a business plan, mobilise resources, business formation
D Develop a business plan, idea generation, business formation, mobilise resources

1.1.4 The following are examples of technical risks in farming.

(i) Drought and flooding
(ii) Insect infestation
(iii) Changes in interest rates
(iv) Disease outbreaks

Choose the CORRECT combination:

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

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1.1.5 A whole farm budget shows the …

A gross margin.
B net farm income.
C profitability of a single enterprise.
D effect of a change to farm operations on profitability.

1.1.6 A business' cashflow budget shows an income of R700 000, expenditure of R400 000 and a closing balance of R500 000 for a particular month.
The opening balance of the following month will be …

A R300 000.
B R1 100 000.
C R800 000.
D R500 000.

1.1.7 If red coat colour (R) is dominant over white coat colour (r), which of the following cross will result in 1 : 1, red : white coloured progeny?

A RR X rr
B Rr X Rr
C Rr X rr
D rr X rr

1.1.8 The F_1-generation is determined by crossing PP with pp. Then the progeny obtained from them were intercrossed. What will be the ratio of pure breeding flowers to non-pure breeding flowers in F_2?

A 3 pure : 1 non-pure
B 1 pure : 3 non-pure
C 1 pure : 2 non-pure
D 1 pure : 1 non-pure

1.1.9 … makes use of biological vectors such as plasmids to carry foreign genes into cells.

A Lipofection
B Recombinant DNA technique
C Chemical poration
D Bioballistics

1.1.10 … is NOT an example of a chromosomal mutation.

A Substitution
B Deletion
C Duplication
D Translocation (10 x 2) (20)

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1.2 Choose a term/phrase from COLUMN B that matches a description in COLUMN A. Write only the letter (A–H) next to question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, for example 1.2.6 J.

COLUMN A		COLUMN B	
1.2.1	Marketing system with greater fluctuation of prices	A	Controlled marketing
1.2.2	A producer driven approach that focuses on the product	B	Risk sharing
1.2.3	Spreading risk by investing in different enterprises on a farm	C	Overcapitalisation
1.2.4	Return on investment earned through a farm is exceptionally lower than other farms	D	Sales
1.2.5	Differences between individuals of the same species	E	Diversification
		F	Variation
		G	Free marketing
		H	Undercapitalisation

(5 x 2) (10)

1.3 Give ONE word/phrase for each of the following descriptions. Write ONLY the term next to the question numbers (1.3.1 to 1.3.5) in the ANSWER BOOK.

1.3.1 The linked entities that bring a specific product from production to consumer

1.3.2 A measure of the responsiveness of a product's quantity demanded or supplied to a change in its price

1.3.3 The physical and mental effort used to produce goods and services

1.3.4 The process of planning, decision making, organising and controlling the human, financial and physical resources of an organisation to reach its goals

1.3.5 A measure of how well differences in animals' genes account for differences in their traits

(5 x 2) (10)

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1.4 Change the UNDERLINED WORD(S) in each of the following statements to make them TRUE. Write only the answer next to the question numbers (1.4.1 to 1.4.5) in the ANSWER BOOK.

1.4.1 A manager is a person who sets up a business, takes on financial risks in the hope of profit.

1.4.2 A cash analysis is an analysis of the business' strengths, weaknesses, opportunities and threats.

1.4.3 The use of statistics in analysing biological data is called breeding.

1.4.4 Polyploidy is a type of mutation in which there is a change in the number of one or more of the chromosomes in the chromosome set.

1.4.5 Selection is how much better or less than average the offspring of an individual will be for a particular characteristic.

(5 x 1) (5)

TOTAL SECTION A: 45

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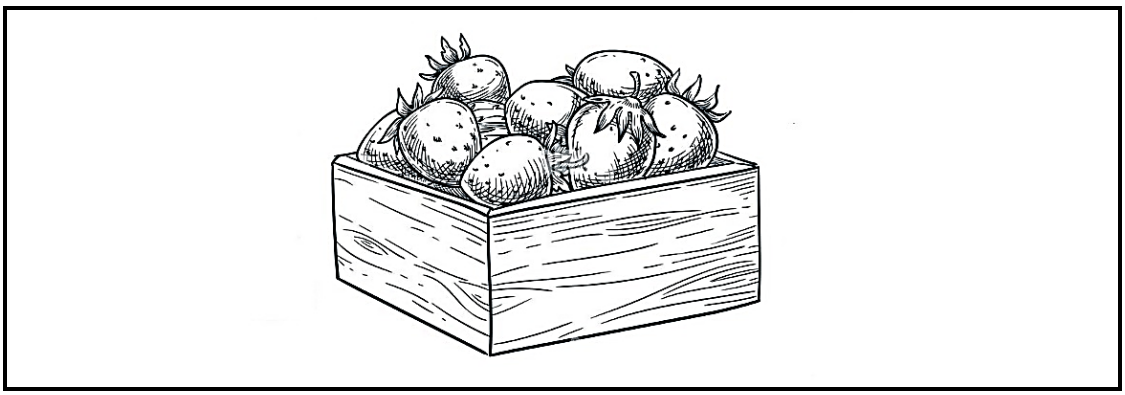
SECTION B

QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING

Start this question on a NEW page.

2.1 The image below shows an example of a marketing function.



2.1.1 Identify the marketing function depicted above. (1)

2.1.2 Outline TWO guidelines that govern the marketing function in QUESTION 2.1.1. (2)

2.1.3 Define the term *marketing.* (2)

2.2 The table below shows the quantities of a product supplied and demanded at different prices.

PRICE	QUANTITY SUPPLIED	QUANTITY DEMANDED
10	20	160
20	40	140
30	60	120
40	80	100
50	100	80
60	120	60
70	140	40

2.2.1 Present the information in the table above in the form of a line graph. (6)

2.2.2 Deduce the equilibrium price from the graph. (1)

2.2.3 Describe the law of supply. (2)

2.2.4 Give TWO factors apart from price that affect the supply of a product. (2)

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2.3 Three farmers use different marketing approaches as explained below.

FARMER A	FARMER B	FARMER C
Seeks to advertise to the widest possible customer base, up to and including the entire market available.	Has a unique product. Promotes and sells the product to a specialised segment of a market.	Decides to provide separate offerings to each different market segment that it targets.

2.3.1 Identify the marketing approaches used by FARMERS **A**, **B** and **C**. (3)

2.3.2 Identify a marketing approach that will be ideal for small businesses. (1)

2.3.3 Motivate your answer to QUESTION 2.3.2 with TWO reasons. (2)

2.4 Analyse the logo below and respond to the questions that follow.

2.4.1 Name the process of placing logos like the one shown above. (1)

2.4.2 The logo shown above is used in sustainable marketing. Define *sustainable marketing*. (1)

2.4.3 State TWO requirements that must be met by packaging in sustainable marketing. (2)

2.5 One of the greatest frustrations farmers faces in agricultural value chains is that they are forced to accept market prices. They have limited bargaining power on both the input and supply side. However, by working together they can have greater influence over the distribution of profits along the value chain.

2.5.1 Identify the main problem faced by farmers. (1)

2.5.2 Deduce the solution that is suggested in the passage. (1)

2.5.3 Identify a marketing system that corresponds to the solution suggested in the passage. (1)

2.5.4 Give TWO advantages of the marketing system identified in QUESTION 2.5.3. (2)

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2.6 A business plan is a document setting out the business's future objectives and strategies of achieving them.

2.6.1 Give TWO reasons to justify the use of business plans in farm business management. (2)

2.6.2 Suggest TWO ways electronic resources can be utilised when drafting business plans. (2)

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QUESTION 3: PRODUCTION FACTORS

Start this question on a NEW page.

3.1 The yield capacity of a piece of land is mainly determined by the physical characteristics of the soil. It can be increased to a certain limit per unit by means of improved technology, however a point will be reached where production no longer increases with increased units of input.

3.1.1 Identify the economic characteristic of land that is described in this scenario. (1)

3.1.2 State TWO ways in which a farmer can improve the productivity of land. (2)

3.1.3 Give TWO functions of land as a production factor. (2)

3.2 The picture below shows farm workers on strike.

3.2.1 Name the piece of legislation that empowers workers to carry out strike action. (1)

3.2.2 State TWO other issues addressed by the piece of legislation mentioned in QUESTION 3.2.1 above. (2)

3.2.3 Give TWO possible causes of strike action by workers on a farm. (2)

3.2.4 Suggest TWO strategies that can be used by farmers to increase labour productivity. (2)

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3.3 The table below shows a summary of income and expenses for a financial year.

Income	**(R)**
Sale of crop products	470 000
Sale of livestock products	220 000
Government subsidy	50 000
Total Income	.....
Expenses	
Seed	23 500
Fertiliser	45 000
Feed	18 200
Processing	28 300
Marketing	12 000
Insurance	7 000
Depreciation	4 500
Total Expenses	.....
Net income	.....

3.3.1 Identify the document shown above. (1)

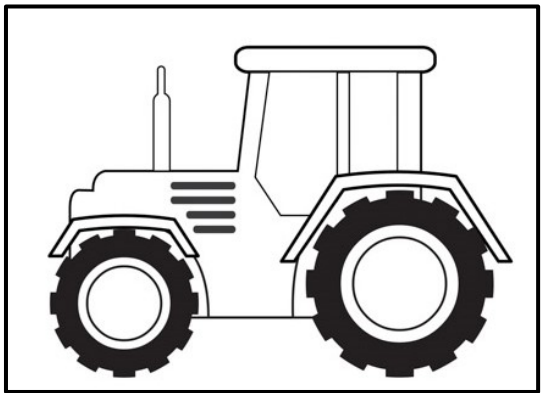
3.3.2 Calculate the net income of the business. (4)

3.3.3 Comment on the farm's profitability. (2)

3.3.4 Identify TWO fixed costs listed in the document above. (2)

3.3.5 State TWO important uses of financial records on farms. (2)

3.4 The diagram below shows an example of a farm asset.



3.4.1 Define the term *asset*. (2)

3.4.2 Identify the type of capital represented by the farm asset shown above. (1)

3.4.3 Determine the type of credit used to finance the capital item shown above. (1)

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3.4.4 Suggest TWO sources of finance that can be used to purchase the asset above. (2)

3.4.5 Name a farm record where you find farm assets like the one shown above is listed. (1)

3.5 The pane below shows forces that affect businesses.

ethical; cash flow; legislation; workforce competence; droughts

3.5.1 Identify TWO internal forces that affect businesses. (2)

3.5.2 Which of the forces above can be improved through in-service training? (1)

3.6 Identify the management skill appropriate in each of the following circumstances:

3.6.1 Being able to interact effectively with different stakeholders and employees (1)

3.6.2 Keeping farm records (1)

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QUESTION 4: BASIC AGRICULTURAL GENETICS

Start this question on a NEW page.

4.1 Analyse the genetic cross below and answer the questions that follow.

P_1	aaBB x AAbb			
Phenotype	Spotted and black		Solid and brown	
F_1 Genotype	**A**			
F_1 phenotype	All Solid and black			
P_2	AB	Ab	**V**	**X**
AB	AABB	AABb		
Ab	AABb	AAbb		
Y				
Z				

4.1.1 Name the type of cross shown above. (1)

4.1.2 Identify the dominant traits. (2)

4.1.3 Determine the genotype **A**. (1)

4.1.4 Name the Mendelian law that is only applicable to the cross above. (1)

4.1.5 Deduce the gametes **V**, **X**, **Y** and **Z** and use them to draw a Punnet square with 4 offspring. (4)

4.1.6 Determine the phenotypic ratio of the F_2 generation. (2)

4.2 In potatoes, plant height is controlled by 3 genes. Each locus has an additive and non-additive allele. A tree with a genotype of AABBCC grows to be 100 cm high, while one with a genotype of aabbcc grows to be 40 cm high.

4.2.1 Determine the contribution of each additive allele to the plant's height. (2)

4.2.2 If you crossed a 100 cm plant and a 40 cm plant to get the F_1 generation. What will be the genotype of the F_1 generation? (1)

4.2.3 Calculate the height of a plant with a genotype of AaBBCc. (3)

4.2.4 Classify the characteristics associated with polygenic inheritance. (1)

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4.3 Identify the mechanism of inheritance applicable to each of the statements below.

4.3.1 The expression of one gene is affected by the expression of one or more independently inherited genes. (1)

4.3.2 Two alleles of the same gene are expressed separately to yield different traits in an individual. (1)

4.3.3 A form of gene interaction in which both alleles of a gene at a locus are partially expressed resulting in an intermediate phenotype. (1)

4.3.4 Three or more kinds of genes occupying the same locus. (1)

4.4 A bull and a cow mate and produce two heifers **A** and **B**. Although the offspring are raised and kept under identical conditions, heifer **A** grows and becomes a top milk producing cow while heifer **B** grows and becomes an average milk producer. The farmer therefore selects **A** to use for further breeding.

4.4.1 Identify the selection method described in the passage above. (1)

4.4.2 Name TWO possible causes of the differences in performance of the heifers. (2)

4.4.3 State TWO uses of selection in animal improvement. (2)

4.5 Identify the breeding system that is associated with each of the statements given below.

4.5.1 Introduces new genetic material but still within the confines of the breed. (1)

4.5.2 Used to strengthen desirable characteristics. (1)

4.5.3 Develop new breeds. (1)

4.5.4 Progeny remains as closely related as possible to an outstanding ancestor. (1)

4.6 Below are some of the potential environmental risks associated with the use of genetically modified organisms. Briefly explain how the use of genetically modified organisms may result in the risks given in each of the QUESTIONS 4.6.1 to 4.6.2.

4.6.1 Creation of herbicide resistant weeds. (2)

4.6.2 Pollution of soil and water bodies. (2)

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TOTAL SECTION B: 105
GRAND TOTAL: 150

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