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SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS

AGRICULTURAL SCIENCES P2

MAY/JUNE 2024

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 pages.

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.

SECTION A**QUESTION 1**

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

1.1.1 Selling differs from marketing because it is ...

- A profit-oriented.
- B satisfies consumer wants.
- C product-oriented.
- D based on future growth.

1.1.2 ONE of the statements below applies to eco-labelling:

- A It does not address environmental issues
- B Production promotes environmental care
- C Concerned about consumers only
- D Directed at producers' interest only

1.1.3 The most important document that an entrepreneur needs in order to source funding for a new business venture:

- A SWOT analysis
- B Balance sheet
- C Marketing chain
- D Business plan

1.1.4 The following occurs in a market if the supply of apples exceeds its demand:

- (i) More apples are available and the price will increase
- (ii) Price of apples will decrease and more people will buy apples
- (iii) There will be an excess of apples and price will decrease
- (iv) Price of apples is above the equilibrium price

Choose the CORRECT combination:

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

1.1.5 The following is NOT an economic characteristic of land:

- A Does not vary in production potential
- B Cannot produce by itself
- C Cannot be completely destroyed
- D Has a fixed location

1.1.6 The type of farm worker who is employed to paint the roof of the milking parlour:

- A Permanent worker
- B Casual worker
- C Full-time worker
- D Seasonal worker

1.1.7 A type of credit with a repayment period of 5 to 10 years that is used to buy movable assets:

- A Long term
- B Medium term
- C Short term
- D Current term

1.1.8 The loss of livestock and destruction of crops caused by heavy hailstorms and thunderstorms is an example of ... risk.

- A financial
- B market
- C technical
- D price

1.1.9 The following are the main types of gene mutation:

- (i) Insertion
- (ii) Duplication
- (iii) Inversion
- (iv) Deletion

Choose the CORRECT combination:

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

1.1.10 The survival of lambs under cold conditions due to their thick fur:

- A Natural selection
- B Artificial selection
- C Breeding value
- D Related selection

(10 x 2) (20)

- 1.2 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–J) next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 K.

COLUMN A		COLUMN B	
1.2.1	Unfavourable climatic conditions resulting in a shortage of products	A	demand
1.2.2	A marketing system where the state regulates prices of agricultural products	B	lipofection
1.2.3	A guarantee offered to the lender as security for repayment of a loan	C	co-operative marketing
1.2.4	A written legally binding agreement between a farmer and a farm worker	D	supply
1.2.5	Small bubbles of fat that are used as carriers of selected DNA	E	collateral
		F	biolistics
		G	agreement
		H	controlled marketing
		I	loan insecurity
		J	contract

(5 x 2) (10)

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

- 1.3.1 The relationship between change in price and change in demand
- 1.3.2 A summary of all the income and expenditure showing how revenue from the sales of products and services converts to net profit
- 1.3.3 The offspring produced by a dominant pure breed and homozygous recessive parents
- 1.3.4 The characteristics that are determined by a large number of genes
- 1.3.5 The ability of a parent to pass on its characteristics to its offspring

(5 x 2) (10)

1.4 Change the UNDERLINED WORD 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 Facilitation is the process of assessing and sorting agricultural products according to size and quality.

1.4.2 Fixed costs change with the level of production.

1.4.3 A phenomenon where a pair of genes controls the expression of another pair of genes in an individual is atavism.

1.4.4 Type of mutagenic agent caused by X-ray radiation is biological mutagen.

1.4.5 The decrease in performance with each generation caused by the crossing of two organisms that are closely related is heterosis.

(5 x 1)

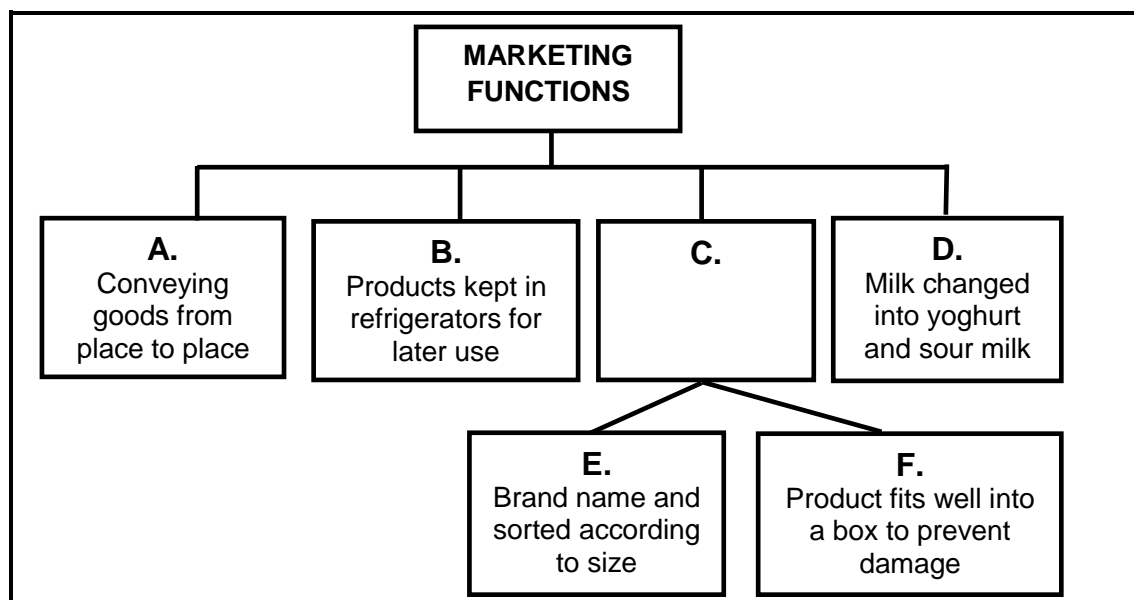
(5)

TOTAL SECTION A: 45

SECTION B**QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING**

Start this question on a NEW page.

2.1 The flow chart below illustrates the marketing functions.



2.1.1 Identify the marketing functions represented by **A**, **B** and **C**. (3)

2.1.2 Indicate the guideline of marketing function **C** represented by **E** and **F**. (2)

2.1.3 State TWO advantages of marketing function **D**. (2)

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

PRICE (R)	POTATOES SUPPLIED (Bags)	POTATOES DEMANDED (Bags)
5	500	2 500
10	1 000	2 000
15	1 500	1 500
20	2 000	1 000
25	2 500	500

2.2.1 Draw a line graph using the information in the table above. (6)

2.2.2 Deduce the law of supply depicted in the table above. (2)

2.2.3 Name the condition in a market when the price of potatoes per bag is at R15. (1)

2.2.4 State TWO factors, other than price, that might have influenced the demand of potatoes. (2)

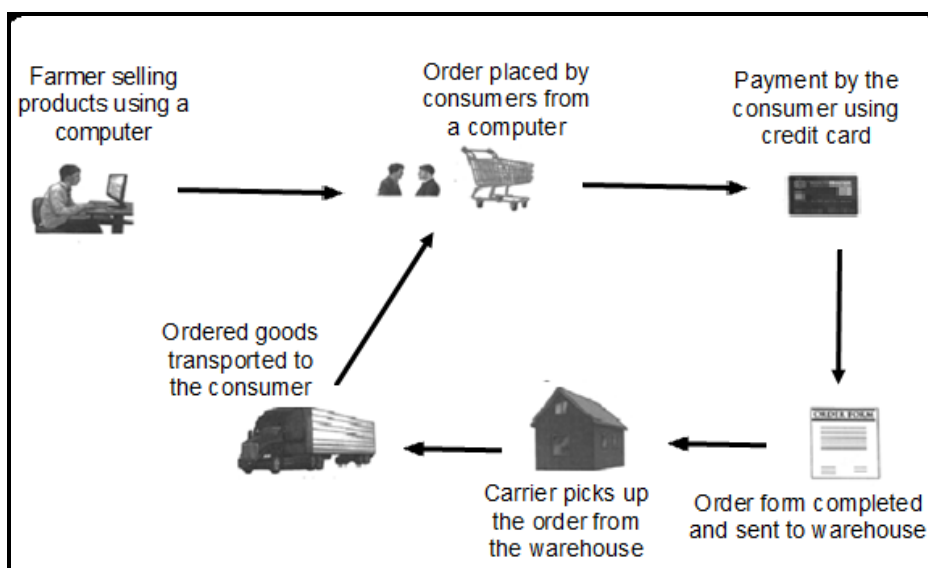
2.3 The approaches below are used by farmers when marketing their produce.

mass marketing; niche marketing; multi-segment marketing;
green marketing

Match each of the statements below with a marketing approach above.

- A Dividing potential customers into groups based on common characteristics and developing a strategy to suit them (1)
- B Marketing products that are packed in recyclable material (1)
- C Addresses the need for a product by a small segment of the market that is not met by the mainstream suppliers (1)

2.4 The illustration below shows a channel used in a free marketing system.

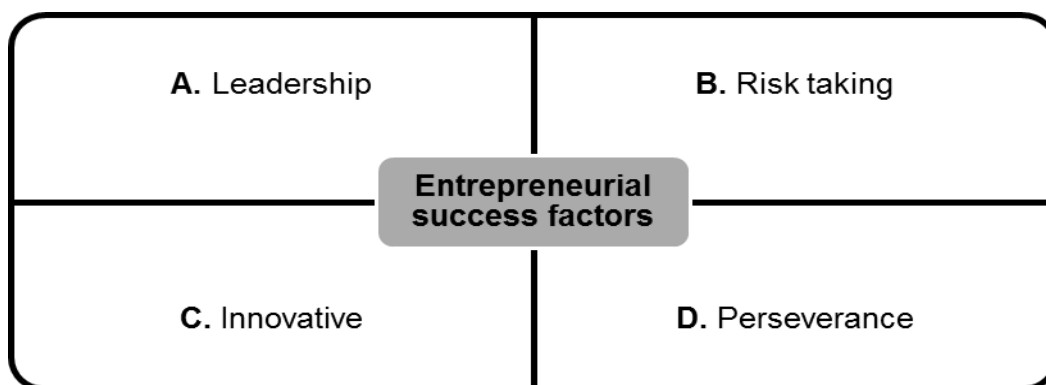


- 2.4.1 Identify the marketing channel shown in the illustration above. (1)
- 2.4.2 State TWO advantages of the marketing channel identified in QUESTION 2.4.1 for the farmer. (2)
- 2.4.3 Name TWO marketing channels other than the one shown in the illustration above. (2)

2.5 Indicate the problem that hampers marketing of agricultural products in EACH of the statements below:

- 2.5.1 Agricultural products have low value in relation to volume. (1)
- 2.5.2 Farmers use agents to fulfil other functions in the marketing chain. (1)
- 2.5.3 Agricultural products have a limited life span on the market. (1)
- 2.5.4 Accidents occurring along the marketing chain. (1)
- 2.5.5 Agricultural products are plenty during certain periods of the year and scarce during other periods. (1)

2.6 The illustration below shows the entrepreneurial success factors.



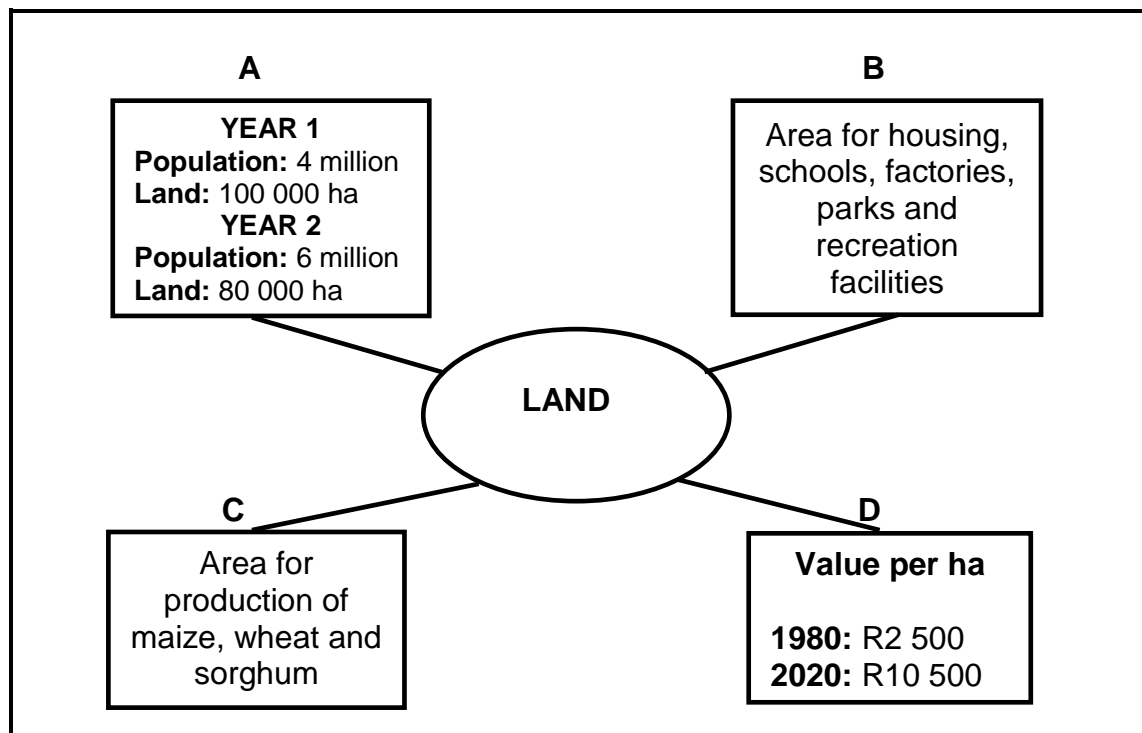
Match each of the descriptions below with the entrepreneurial success factors in the illustration above. Write **ONLY** the letter (**A–D**) next to the question numbers (2.6.1 to 2.6.4).

- 2.6.1 Investing in newly invented farming equipment with the hope that it will increase production (1)
- 2.6.2 When the entrepreneur keeps on trying even when times are difficult (1)
- 2.6.3 The ability to generate new business ideas, overcome challenges and take advantage of opportunities (1)
- 2.6.4 The ability to get other people to believe in your business idea and to work with you towards its realisation (1)
- [35]**

QUESTION 3: PRODUCTION FACTORS

Start this question on a NEW page.

- 3.1 The illustration below indicates the functions and economic characteristics applicable to land as a production factor.



- 3.1.1 Identify the letter (**A–D**) representing the following functions of land:
- (a) Provision of food (1)
 - (b) Provision of space for infrastructure (1)
- 3.1.2 Name the economic characteristic of land represented by **A** and **D**. (2)
- 3.1.3 State TWO ways in which land productivity can be improved. (2)
- 3.1.4 Explain the concept *land is subjected to the law of diminishing return*. (2)

3.2 The following are measures used by a farmer to increase labour productivity on a farm:

- Education
- Mechanisation
- Communication
- Recognition
- Motivation

Match the measures above with EACH of the statements below.

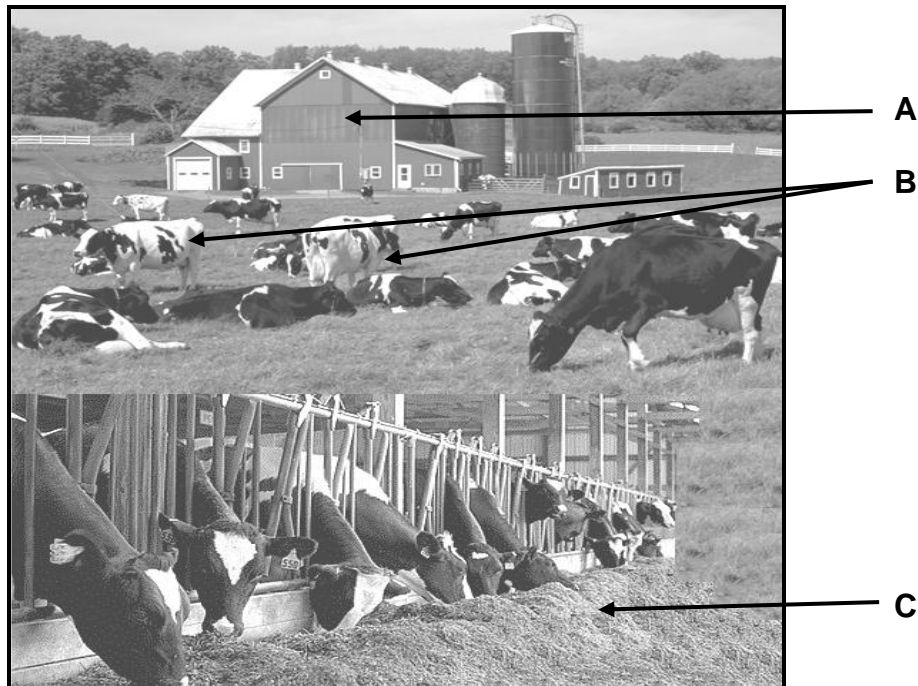
- 3.2.1 There is a bonus system for farm workers when they reach certain targets. (1)
- 3.2.2 Tractor operators attend a workshop and short course on basic operations and management of tractors and equipment. (1)
- 3.2.3 The farm workers are presented with certificates of excellence for performing beyond their normal duty at the annual award ceremony. (1)
- 3.2.4 Staff meetings are held every morning with farm workers to set out the schedule for the day. (1)

3.3 The table below shows the scores attained by two shortlisted candidates for the positions on a farm.

SKILLS	CANDIDATE 1	CANDIDATE 2
Technical	80%	70%
Interpersonal	60%	80%
Management	62%	82%

- 3.3.1 Indicate the candidate (1 or 2) who is best suited for each of the following positions:
- (a) To manage the business optimally (1)
- (b) A technical advisor (1)
- 3.3.2 Give TWO reasons for the answer to QUESTION 3.3.1(a) by referring to the table above. (2)
- 3.3.3 State the labour legislations that regulate EACH of the following:
- (a) A safe working environment for the candidates in QUESTION 3.3.1 (1)
- (b) Participation of the workers' representatives in the decision-making process on the farm (1)

3.4 The picture below shows a farm with different types of capital.



3.4.1 Identify the letter (**A–C**) in the picture above representing the type of capital listed below:

- (a) Working capital (1)
- (b) Movable capital (1)
- (c) Fixed capital (1)

3.4.2 Indicate ONE source of capital for the farmers. (1)

3.5 The information below shows assets and liabilities of a farming business as of February 2023:

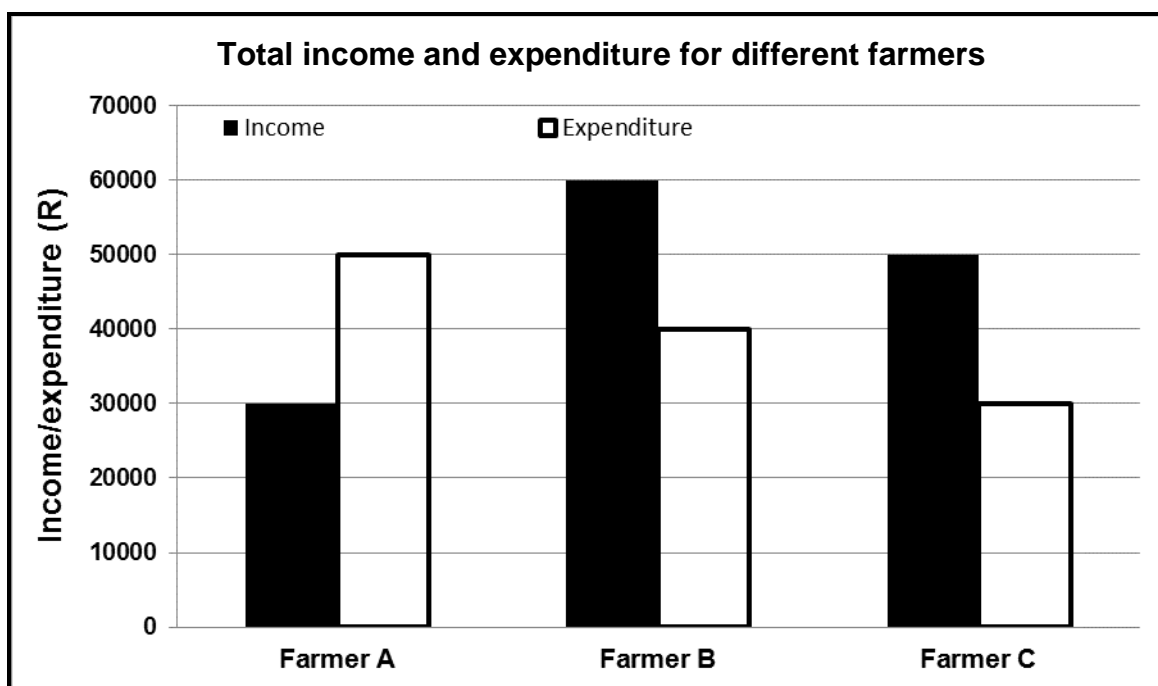
- Loan to buy farming equipment: R1 965 000
- Cash at hand: R1 500 000
- Bank overdraft: R245 000
- Value of a farm: R2 500 000

ASSETS	VALUE (R)	LIABILITIES	VALUE (R)
Cash at hand		Loan	
(a)		(b)	
TOTAL VALUE ASSETS	(c)	TOTAL VALUE LIABILITIES	(d)

3.5.1 Identify the financial statement indicated above. (1)

3.5.2 Identify the missing information for **(a)**, **(b)**, **(c)** and **(d)** in the table using the data. (4)

3.6 The graph below shows income and expenses for three different farmers.



3.6.1 Identify the farmer who generates the highest income in the graph above. (1)

3.6.2 Calculate the profit or loss for farmer A. Show ALL your calculations (3)

3.7 Management is crucial for the smooth running of the farming enterprise.

3.7.1 Below are THREE management principles that farmers should explore when managing the business.

implementation; planning; control

Choose the management principle above that matches EACH of the statements below:

(a) Monitoring results and comparing them with performance standards (1)

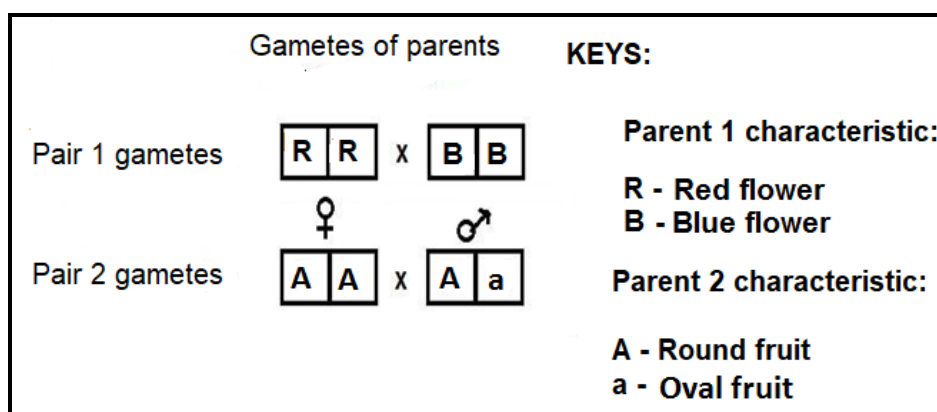
(b) The process of putting plans in motion (1)

3.7.2 State TWO external forces that affect a farming business. (2)
[35]

QUESTION 4: BASIC AGRICULTURAL GENETICS

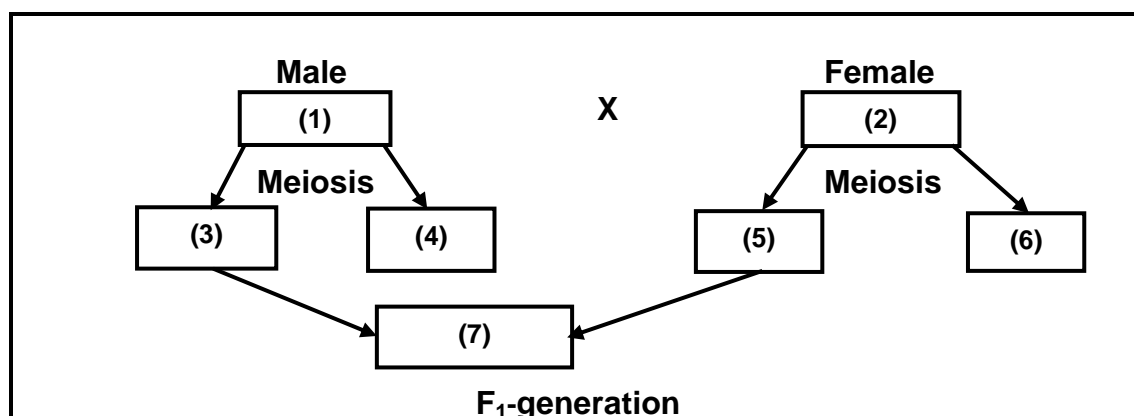
Start this question on a NEW page.

- 4.1 A pink (b) flowered plant is crossed with a heterozygous blue (B) flowered plant.
- 4.1.1 Draw a Punnett square to determine the genotype of the F₁-generation. (4)
- 4.1.2 Calculate the percentage of pink flowers in the F₁-generation. (2)
- 4.1.3 Calculate the number of heterozygous offspring if 350 offspring were produced from the crossing in QUESTION 4.1.2. (2)
- 4.2 The illustration below shows two breeding pairs of plant cultivars on a farm.



- 4.2.1 Refer to the illustration above and identify the pattern of inheritance shown by **Pair 1**. (1)
- 4.2.2 Justify the answer to QUESTION 4.2.1 above. (1)
- 4.2.3 Determine the phenotype of **Pair 2** offspring. (1)
- 4.2.4 Indicate the genotypic ratio of the **Pair 2** offspring. (1)

- 4.3 The schematic representation below illustrates the crossing of a dark (DD) male and a white (dd) female farm animal.



- 4.3.1 Indicate the Mendel's law applicable to the crossing above. (1)
- 4.3.2 Identify the process that took place between (3) and (5) which resulted in (7). (1)
- 4.3.3 Indicate the following from the schematic representation above:
- (a) The phenotype for (2) and (7) (2)
- (b) The genotype for (1) and (6) (2)

- 4.4 Below are the pictures of two male goats that a farmer would select from. The goats were fed with the same feed and raised under the same conditions, but born from different parents on the same day.



- 4.4.1 Give a genetic term that refers to the differences in the goats above. (1)
- 4.4.2 Suggest TWO internal factors, other than meiosis, that might have greatly contributed to the difference in the goats above. (2)
- 4.4.3 State TWO methods used by farmers when selecting farm animals. (2)

4.5

A Holstein dairy farmer experienced udder and leg problems in the herd. After breeding the cows with a Dairy Swiss bull, an immediate improvement was observed. The farmer also noticed an improvement in the growth rate of the calves and better adaptability to hot conditions during the summer months.

4.5.1 Identify the breeding system applicable to the case study above. (1)

4.5.2 Give a reason for the answer to QUESTION 4.5.1. (1)

4.5.3 Indicate TWO advantages of the breeding system identified in QUESTION 4.5.1 according to the case study above. (2)

4.5.4 Differentiate between *inbreeding* with *line breeding*. (2)

4.5.5 Give ONE example of EACH of the breeding systems in QUESTION 4.5.4. (2)

4.6 Genetically modified organisms are created using biotechnology that changes the genetic make-up.

4.6.1 Name TWO potential risks of genetically modified crops to the environment. (2)

4.6.2 Indicate TWO benefits of genetically modified crops. (2)
[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150