



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL SCIENCES P2**

**NOVEMBER 2017**

**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 number (1.1.1–1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 The process of planning production, pricing, promotion and offering goods and services to customers:

- A Selling
- B Business
- C Marketing
- D Buying

1.1.2 ONE of the following factors will influence both the supply of and the demand for an agricultural product:

- A Increased supply of a product
- B Price of a product
- C Range of products available
- D Cost of producing a product

1.1.3 ONE of the following is NOT a requirement for a container used in the packaging of agricultural produce:

The container must ...

- A be strong and rigid to protect the produce from physical damage.
- B be free from visible signs of foreign growth.
- C transmit foreign tastes and odours to the product.
- D be clean and undamaged.

1.1.4 Which of the following statements apply to marketing if the supply of produce decreases?

- (i) The product offered for sale decreases and the price increases
- (ii) The product offered increases and the price decreases
- (iii) The price increases and the demand decreases
- (iv) The producer is prepared to offer the product at an increased price

Choose the CORRECT combination:

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

- 1.1.5 The economic characteristic of land that makes it a fixed production factor:
- A Found in a specific location
  - B Unlimited, provided it is correctly used
  - C Needs to be combined with other factors to be more productive
  - D Provides raw materials
- 1.1.6 Cash flow in a farming industry refers to ...
- A the prediction of income and expenditure.
  - B a plan on how the farmer will accumulate and spend money.
  - C a summary of all income and expenditure in a financial year.
  - D money that is paid into and drawn out of the farmer's bank account.
- 1.1.7 The Unemployment Insurance Act, 2001 (Act 63 of 2001) deals with the following matters:
- (i) Payment of workers while they are unemployed for several months
  - (ii) Equal treatment of all workers on the basis of gender, race and economic background
  - (iii) Payment of female workers who are on maternity leave
  - (iv) Both the employer and the employee contribute to the fund
- Choose the CORRECT combination:
- A (i), (iii) and (iv)
  - B (ii), (iii) and (iv)
  - C (i), (ii) and (iii)
  - D (i), (ii) and (iv)
- 1.1.8 ONE of the following is an example of floating capital in a dairy enterprise:
- A Silage
  - B Breeding cows
  - C Electric fence
  - D Milking machines
- 1.1.9 The allele that overshadows the characteristics of another allele:
- A Recessive
  - B Polygenic
  - C Multiple
  - D Dominant

1.1.10 A mutagen that inserts its DNA into the genome and disrupts the genetic function causing the DNA to fragment:

- A Physical
- B Chemical
- C Biological
- D X- and gamma rays

(10 x 2) (20)

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

COLUMN A		COLUMN B	
1.2.1	Ability to focus on the future by having an idea of where the business will go	A	hedging
		B	selection
1.2.2	A condition in a market when the quantity supplied is more than the quantity demanded	C	overcapitalisation
		D	vision
1.2.3	The reduction of the impact of risk by securing future contracts	E	shortage
		F	undercapitalisation
1.2.4	Buying a 50 kW tractor to cultivate 1 500 hectares of land	G	surplus
1.2.5	A gradual decrease in the performance of animals from generation to generation caused by continual inbreeding	H	inbreeding depression
		I	mission
		J	flexibility

(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 number (1.3.1–1.3.5) in the ANSWER BOOK.

1.3.1 A financial statement that summarises the assets and liabilities of a farming enterprise

1.3.2 A form of security required by a financial institution before granting a loan

1.3.3 The degree to which a characteristic is determined by genes

1.3.4 The type of inheritance which produces a heterozygous offspring with an intermediate phenotype

1.3.5 A genetic cross between parents that have different alleles for one particular gene

(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 number (1.4.1–1.4.5) in the ANSWER BOOK.

1.4.1 A market chain refers to the collection of information about consumers and the existing competition.

1.4.2 Entrepreneur is the human, physical and mental effort used to create goods and services.

1.4.3 Prepotency is the sudden reappearance of a gene which was thought to have completely disappeared.

1.4.4 The ability to modify the genetic make-up of an organism is called allele.

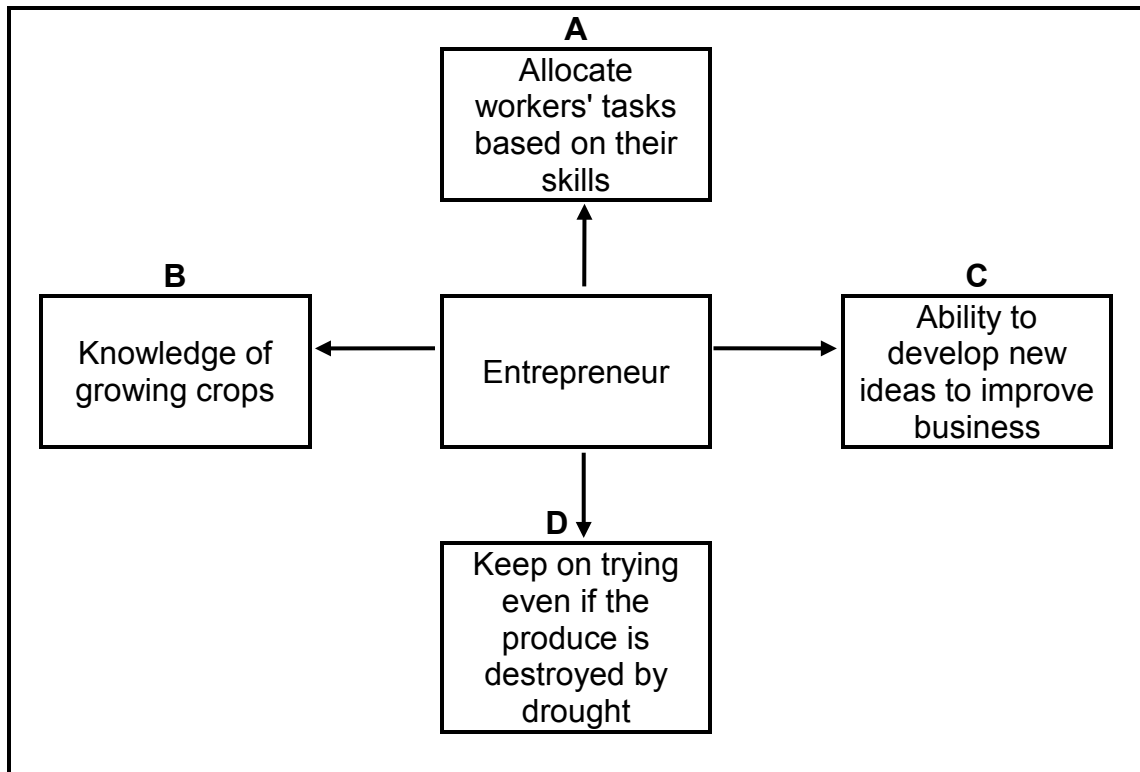
1.4.5 Gene slicing is the turning off of the activities of certain genes contained in the chromosomes of an organism. (5 x 1) (5)

**TOTAL SECTION A: 45**

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

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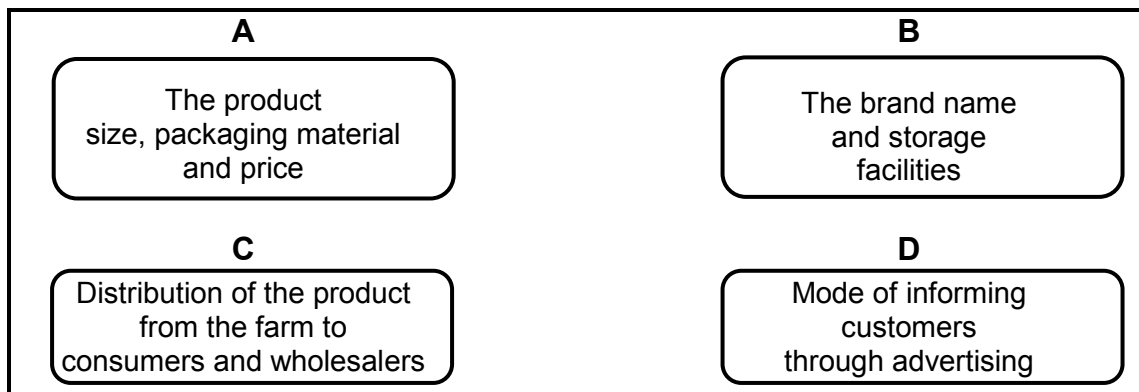
- 2.1 The diagram below shows the success factors of an entrepreneur who wants to have a successful farming enterprise.



- 2.1.1 Identify entrepreneurial success factors **A**, **B**, **C** and **D**. (4)
- 2.1.2 State THREE resources that an entrepreneur requires when starting a farming enterprise. (3)

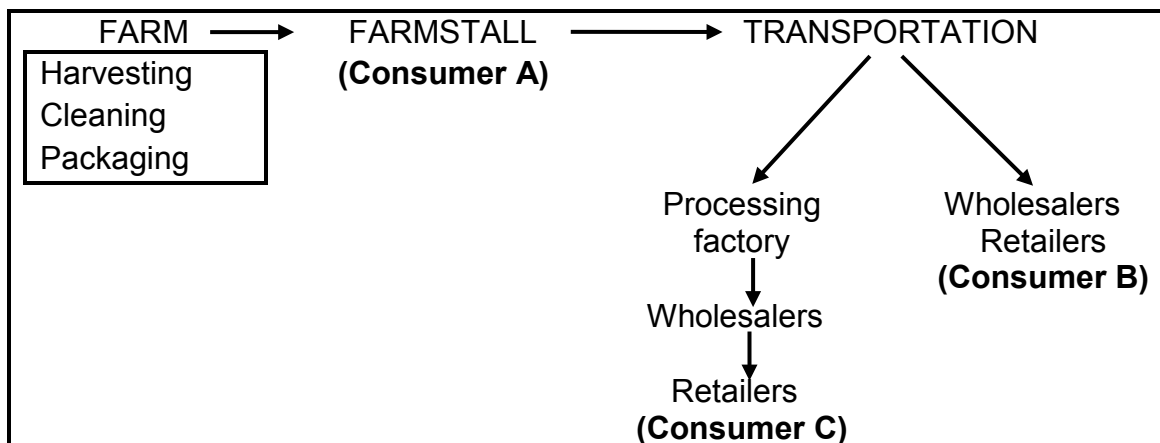
2.2 A farmer produced maize only to feed the family. This farmer decided to increase production and to sell the surplus to local communities.

In the diagram below the farmer's concerns and questions about the new business venture are stated.



- 2.2.1 Refer to the diagram above and identify TWO functions of marketing. (2)
- 2.2.2 Identify the marketing system the farmer intends using. (1)
- 2.2.3 Give a reason for the answer to QUESTION 2.2.2. (1)
- 2.2.4 Advise the farmer about TWO problems which may be experienced with the marketing system identified in QUESTION 2.2.2. (2)

2.3 The flow diagram below represents a marketing process.



- 2.3.1 Refer to the flow diagram above and identify the marketing process. (1)
- 2.3.2 Indicate which consumer (A, B or C) pays the highest price for the product. (1)
- 2.3.3 Give TWO reasons for the answer to QUESTION 2.3.2. (2)
- 2.3.4 Name TWO factors during transportation that could hamper the marketing of the product. (2)



2.4 Identify the marketing approach applicable to EACH of the statements below:

2.4.1 The owner of a local shop closer to the school sells fruit to the learners during break (1)

2.4.2 A farmer sells fresh potatoes and potato chips in packets with different sizes to cater for consumers with different income levels (1)

2.5 A farmer planted 200 ha of sugar cane from 2013 to 2016.

The table below summarises the results that the farmer needs to make a decision.

	TIME (YEAR)			
	2013	2014	2015	2016
Sugar cane supplied (million ton)	180	190	200	220
Price per ton (R/ton)	450	500	650	720
Sugar cane demanded (million ton)	230	210	175	165

2.5.1 Draw a bar graph to indicate the supply and demand of sugar cane from 2013 to 2016. (6)

2.5.2 Refer to the data above and identify TWO factors that influenced the price of sugar cane over a period of time. (2)

2.6 A business plan is a very important tool that is needed to create, manage or expand any agricultural business successfully.

2.6.1 Define the term *business plan*. (2)

2.6.2 Give TWO reasons for drawing up a business plan in the agricultural sector. (2)

2.6.3 State TWO problems encountered when drawing up an agribusiness plan. (2)

**[35]**

**QUESTION 3: PRODUCTION FACTORS**

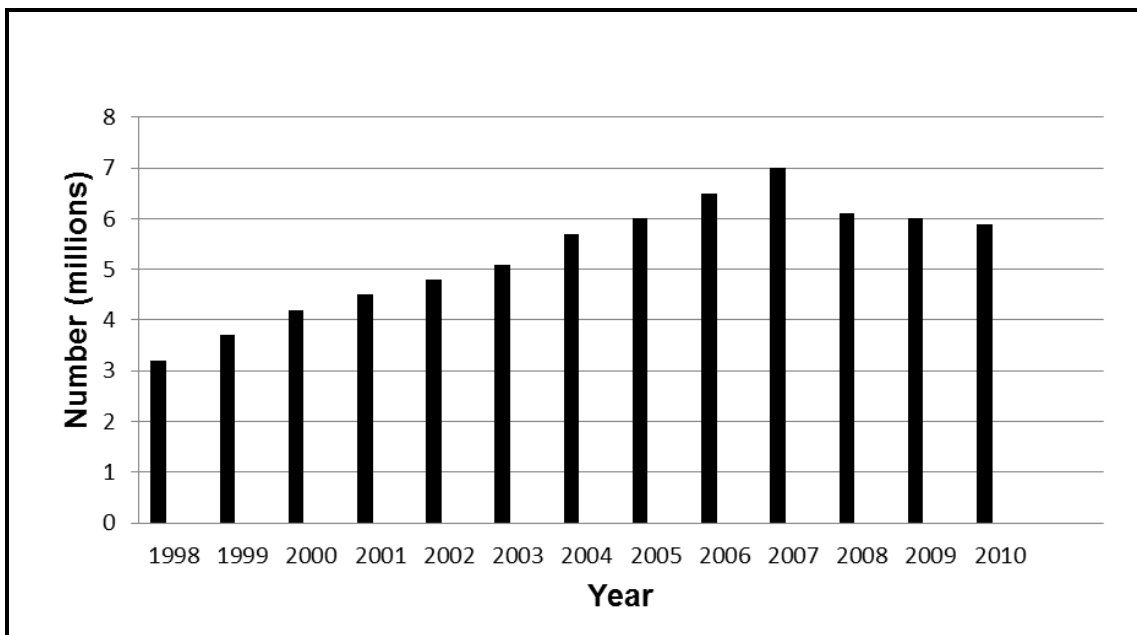
Start this question on a NEW page.

3.1 Study the advertisement below for available job opportunities on a farm.

<b>JOB OPPORTUNITIES</b>	
<b>FARM:</b> MANGO FARM	
<b>NUMBER OF JOBS:</b> 2	
<b>SKILLS/QUALIFICATIONS REQUIRED:</b>	
<b>JOB 1</b>	<b>JOB 2</b>
<ul style="list-style-type: none"> <li>• Diploma in Crop Sciences</li> <li>• Financial skills</li> <li>• Analytical and conceptual skills</li> <li>• Interpersonal skills</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge of operating a harvester</li> <li>• Ability to carry out instructions</li> <li>• Interpersonal skills</li> </ul>

- 3.1.1 Refer to the skills required for JOB 1 and indicate the position that this candidate can hold. (1)
- 3.1.2 Give TWO reasons for the answer to QUESTION 3.1.1. (2)
- 3.1.3 Which skills will enable the candidate for JOB 1 to do the following?
- (a) To analyse situations and make future projections (1)
- (b) To make the farm more profitable (1)
- (c) To communicate well with employees (1)
- 3.1.4 Name the type of temporary labourer the farmer needs for JOB 2. (1)
- 3.1.5 Give a reason for the answer to QUESTION 3.1.4. (1)

3.2 The graph below shows HIV infections among farm workers over a period of 13 years.



3.2.1 Identify the trend of HIV infections among workers over the years. (2)

3.2.2 State THREE measures that possibly resulted in the trend after 2007. (3)

3.2.3 Name THREE results of HIV infections on the productivity of farm workers. (3)

3.3 Labour productivity is the greatest challenge in the farming industry. Performance and productivity will improve if farmers strive to keep labourers happy, satisfied and willing to work.

Suggest a measure that a farmer may apply to reduce the impact of EACH of the following problems:

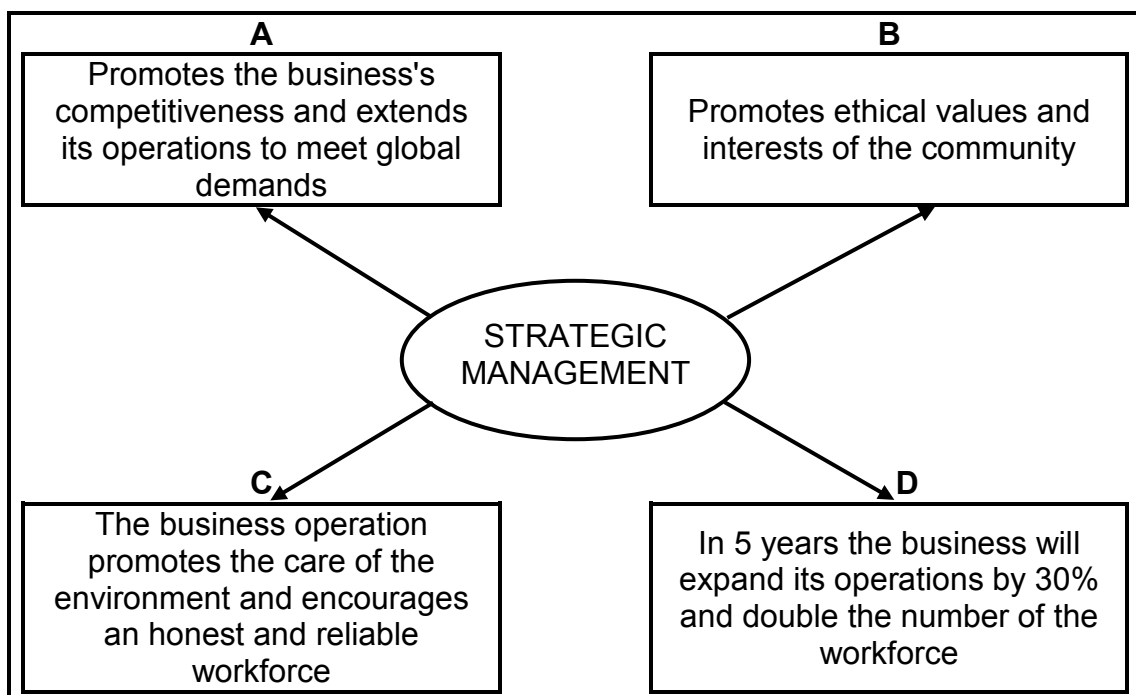
3.3.1 Labourers fail to complete tasks given to them due to fatigue (1)

3.3.2 Labourers are unable to operate farm machinery properly (1)

3.4 A farmer considers investing in a poultry enterprise. The estimated cost of the buildings and facilities is R340 000. The farmer has only R180 000 and needs a loan from the bank for one year, at an interest rate of 11,5% per annum, to make a success of the enterprise. The farmer is planning to sell eggs to the local hospital for R12 000 per week. The farmer will sell broilers for R105 000 over a period of three months.

- 3.4.1 Name ONE type of capital in the scenario. (1)
- 3.4.2 Calculate the amount of money the farmer will repay to the bank after a year. Show ALL calculations. (3)
- 3.4.3 Calculate the estimated total income of this enterprise for a period of three months. Show ALL calculations. (2)
- 3.4.4 The farmer must be able to repay the loan. Give TWO reasons based on the calculation in QUESTION 3.4.3. (2)

3.5 The diagram below shows the strategic management steps to develop a business strategy.



- 3.5.1 Give TWO reasons for developing a business strategy. (2)
- 3.5.2 Identify strategic management steps **A**, **B**, **C** and **D**. (4)

3.6

Water supply is important for farmers to sustain production. With the recent drought, production has been hit hard and forecasters have warned farmers not to underestimate the impact of the drought. It has been estimated that areas hit by the drought received far less rain than in previous years. Furthermore, it has been observed that areas that practise no-till and have low water surface movement, obtained fair yields despite the drought.

[Adapted from *Farmer's Weekly*, 2 September 2016]

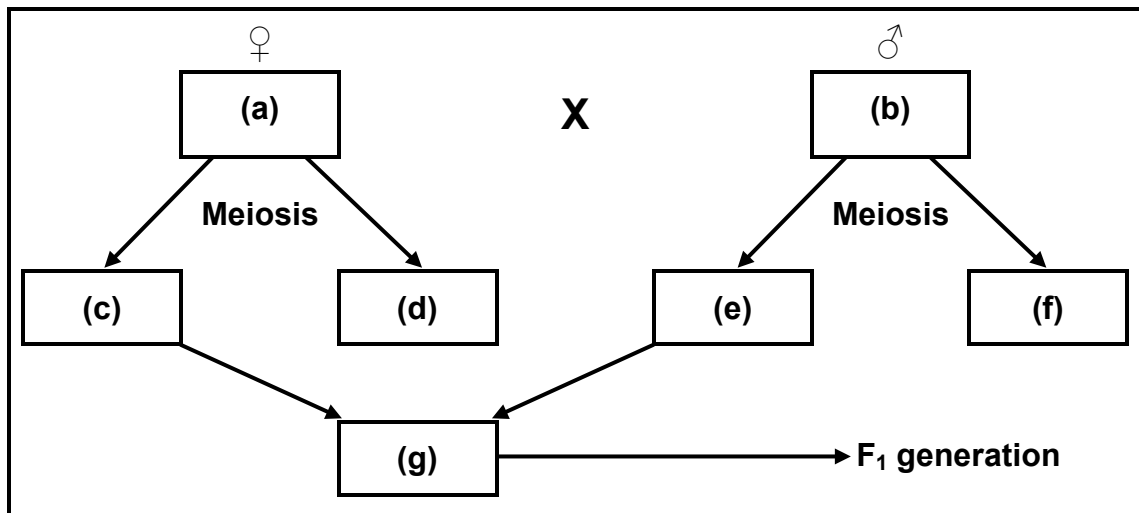
- 3.6.1 Identify the method of increasing land productivity in the scenario above. (1)
- 3.6.2 Identify ONE adaptation measure used to increase the land productivity. (1)
- 3.6.3 Suggest ONE other method plant breeders may use to improve yields in the future. (1)

**[35]**

**QUESTION 4: BASIC AGRICULTURAL GENETICS**

Start this question on a NEW page.

- 4.1 The crossing of a black (BB) male farm animal and a white (WW) female farm animal gave rise to a heterozygous grey offspring in the F<sub>1</sub> generation. The same offspring of the F<sub>1</sub> generation were allowed to breed through inbreeding. Their offspring in the F<sub>2</sub> generation had a phenotypic ratio of 1 : 2 : 1.

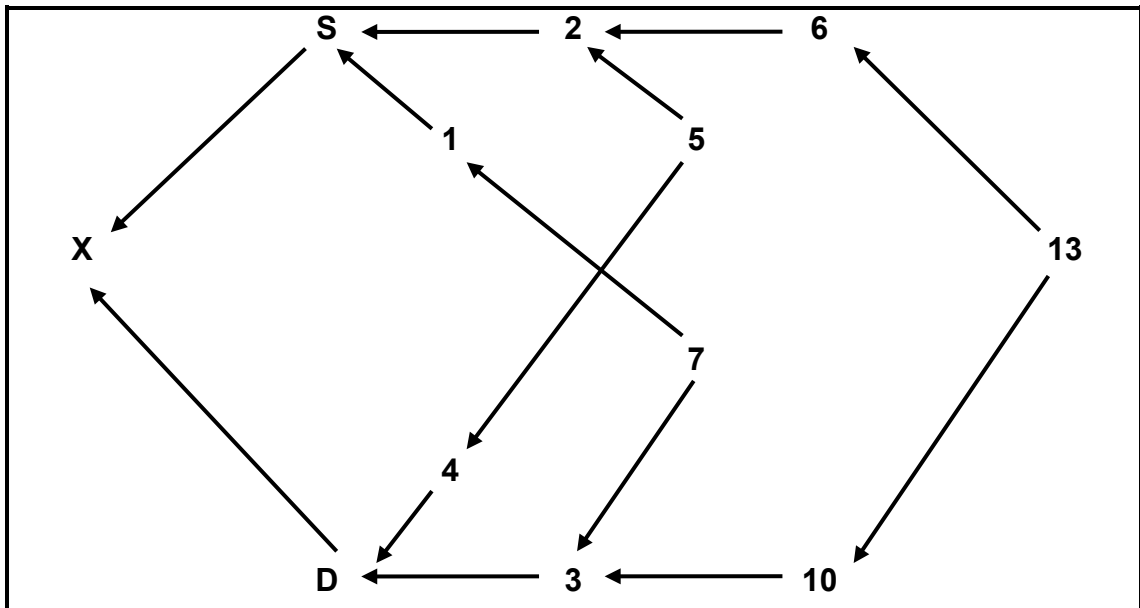


- 4.1.1 Name the type of dominance illustrated above. (1)
- 4.1.2 Give TWO reasons to motivate your answer to QUESTION 4.1.1. (2)
- 4.1.3 Complete the diagram and write down the missing genotype at (a), (b), (c), (e) and (g). (5)

4.2 A recent development in the improvement of maize is the genetic modification that makes it resistant to the maize stalk borer. A soil bacterium, *Bacillus thuringiensis* (Bt), naturally produces a toxin (poison) that kills the maize stalk borer. Genetic engineering techniques are used to transfer the Bt toxin gene from the bacterium to the DNA of maize plants.

- 4.2.1 Identify TWO potential benefits of this genetically modified (GM) crop. (2)
- 4.2.2 Explain how the bacterium in the scenario above is used to modify maize plants genetically. (3)
- 4.2.3 Explain TWO negative effects of GM crops on the environment. (2)

4.3 The flow chart below is a schematic representation of line breeding.



4.3.1 Identify TWO common ancestors of individuals **S** and **D** in the schematic representation above. (2)

4.3.2 Explain TWO ways in which livestock farmers could benefit from upgrading by using a pure-bred breed in their commercial crossbred herd. (2)

4.4 A farmer planted maize seeds with the same gene for height and yield on field A and field B. The seeds in field A produce tall maize with two to three cobs, while the seeds in field B produce short maize with one cob.

4.4.1 Identify the genetic phenomenon referred to in the scenario above. (1)

4.4.2 Name TWO possible external causes of the phenomenon in QUESTION 4.4.1. (2)

4.4.3 State ONE factor of importance of this genetic phenomenon in plant breeding. (1)

4.5 Hereford cattle, which produce heavy and early weaners, are mated with Nguni cattle, which are hardy and disease resistant.

4.5.1 Identify the animal breeding system used by the farmer above. (1)

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

4.5.3 Give TWO reasons why the breeding system above is advantageous to the farmer. (2)

4.5.4 State TWO disadvantages of mating the progeny of Hereford cows with the same Hereford parent bull. (2)

4.6

The accuracy of an estimated breeding value (EBV) is an indication of its reliability and the risk entailed when a specific trait is selected. Traits with a low accuracy are highly unreliable. The table below shows the characteristics with heritability and the accuracy percentages.

CHARACTERISTIC	HERITABILITY %	ACCURACY %
Birth weight	65	80
Fleece weight	68	40
Slaughter weight	61	60

- 4.6.1 Identify TWO characteristics the farmer is likely to select in the table above. (2)
- 4.6.2 Give TWO reasons for the answer to QUESTION 4.6.1. (2)
- 4.6.3 Give TWO reasons why the estimated breeding value is important in a breeding programme. (2)
- [35]**

**TOTAL SECTION B: 105**  
**GRAND TOTAL: 150**