



# basic education

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

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 12**

**AGRICULTURAL SCIENCES P2**

**NOVEMBER 2010**

**MARKS: 150**

**TIME: 2½ hours**

**This question paper consists of 18 pages and 1 answer sheet.**

**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 the questions carefully and make sure you answer what is asked.
6. Number the answers correctly according to the numbering system used in this question paper.
7. Non-programmable calculators may be used.
8. Place your ANSWER SHEET for SECTION A (QUESTION 1) in your ANSWER BOOK.
9. Write neatly and legibly.

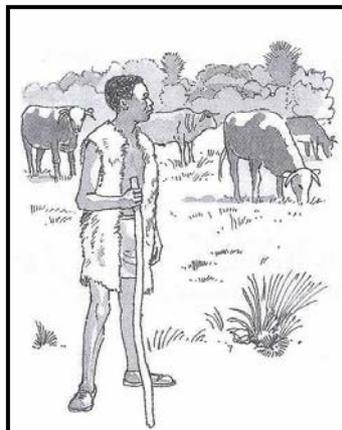
**SECTION A****QUESTION 1**

- 1.1 Various options are provided as possible answers to the following questions. Choose the answer and make a cross (X) in the block (A – D) next to the question number (1.1.1 – 1.1.10) on the attached ANSWER SHEET. NO marks will be allocated if more than one cross (X) appears for an answer.

EXAMPLE:

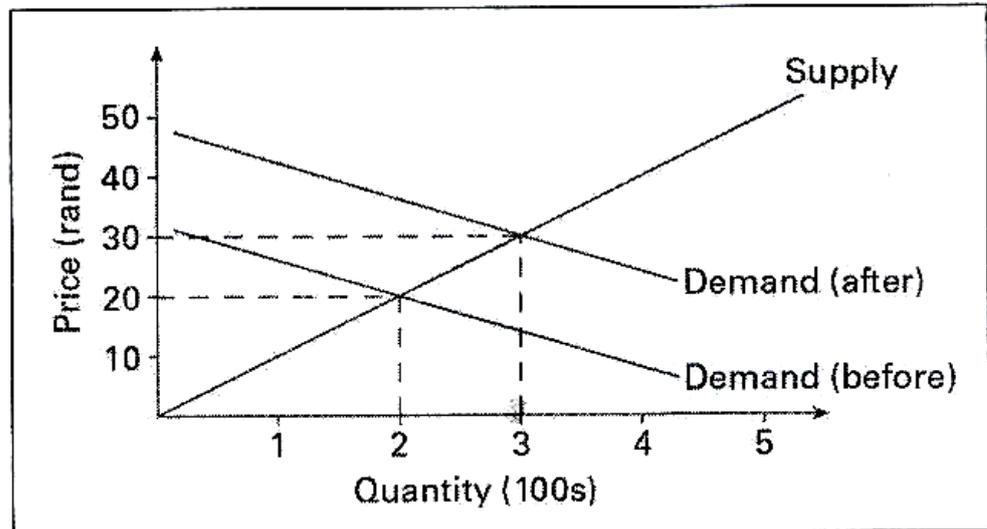
1.1.11	<input checked="" type="checkbox"/>	A	B	C	D
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- 1.1.1 The most important planning document that a farmer will use to manage his/her expenditure during the financial year is the ...
- A inventory of farm assets.
  - B soil map.
  - C cheque book statement.
  - D farm budget.
- 1.1.2 Farmers in a rural area of the country lost stock through theft. This had a direct influence on the ... of their farming enterprises.
- A risk management
  - B health programme
  - C labourers
  - D pasture evaluation
- 1.1.3 The picture below shows a farmer observing and counting a herd of cattle. This data will be inserted on a record sheet. The management principle that is illustrated reflects ...



- A motivation.
- B coordination.
- C leadership.
- D control.

- 1.1.4 The graph below illustrates interaction between demand and supply. The effect of an increase in demand could best be described as ...



- A an increase in the equilibrium price of the product.  
 B a decrease in the equilibrium price of the product.  
 C a decrease in the supply of the product.  
 D a decrease in the quantity of the product.
- 1.1.5 The economic characteristic of agricultural land which makes it a good long-term investment is its ...
- A location.  
 B management.  
 C durability.  
 D risk.
- 1.1.6 The source of credit that a farmer would normally use to purchase land and to finance its improvement which includes fences, buildings and boreholes:
- A Cash loan agency  
 B Commercial bank cheque overdraft account  
 C Land Bank loan  
 D Own capital
- 1.1.7 The type of capital that is regarded as permanent and durable is ...
- A a tractor.  
 B a dam.  
 C the wages of farm workers.  
 D fuel for the tractor.

1.1.8 ONE of the following statements CANNOT be classified as an entrepreneurial ability:

- A To achieve the objectives of the enterprise
- B To keep the labourers productive and satisfied
- C To be dominant and enforce your own opinions
- D To be dynamic and adaptable to change and development

1.1.9 The hybrid Braford (BH) cow was crossed with the homozygous Brahman (BB) bull. This crossing resulted in the genotypic ratio of ... in the F<sub>1</sub>-generation.

- A 1 : 2 : 1
- B 3 : 1
- C 75% : 25%
- D 1 : 1

1.1.10 ONE of the following is NOT a valid gene for seed colour in a pea plant:

- A Aa
- B Ab
- C Bb
- D Cc

(10 x 2) (20)

- 1.2 Choose a description from COLUMN A that matches a concept/phrase in COLUMN B. Write only the letter (A – J) next to the question number (1.2.1 – 1.2.5) on the attached ANSWER SHEET, for example 1.2.6 N.

COLUMN A		COLUMN B
1.2.1	A plan set up by the farmer to make provision for aspects like soil preparation, planting, crop care, harvesting and marketing	A mass selection B undercapitalisation C upgrading
1.2.2	Too much money invested in relation to other production factors	D production plan E overcapitalisation
1.2.3	The selection of an animal based on the quality of the animal ancestors	F business plan G progeny selection
1.2.4	The successive use of a pure-bred bull on a hybrid herd of cows with the aim of eventually building up a particular breed	H index value I pedigree selection
1.2.5	The selection that is based on the quality of its offspring	J atavism

(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) on the attached ANSWER SHEET.

- 1.3.1 The long-term aim of the farming business that is set up during a strategic planning session
- 1.3.2 The path that an agricultural product follows from the farmer to the hands of the consumer
- 1.3.3 The production factor that represents equipment, seed, fertilisers and chemicals used in the growing of crops
- 1.3.4 The change of a characteristic from one extreme to another with most of the individuals performing at the average
- 1.3.5 When one gene completely overshadows the effect of the other gene in connection with a heredity factor

(5 x 2)

(10)

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

1.4.1 Organising involves the checking and verification of the results of decision-making.

1.4.2 Grading is the provision of preset specifications, which will give uniformity to a group of products.

1.4.3 Movable capital refers to capital goods that are used for one production season only, for example fuel, fertiliser and feeds.

1.4.4 Casual labour is employed during peak periods, often for a specific task, such as harvesting.

1.4.5 Atavism is the ability of an individual to transmit particular characteristics to the progeny. (5 x 1) (5)

**TOTAL SECTION A: 45**

**SECTION B**

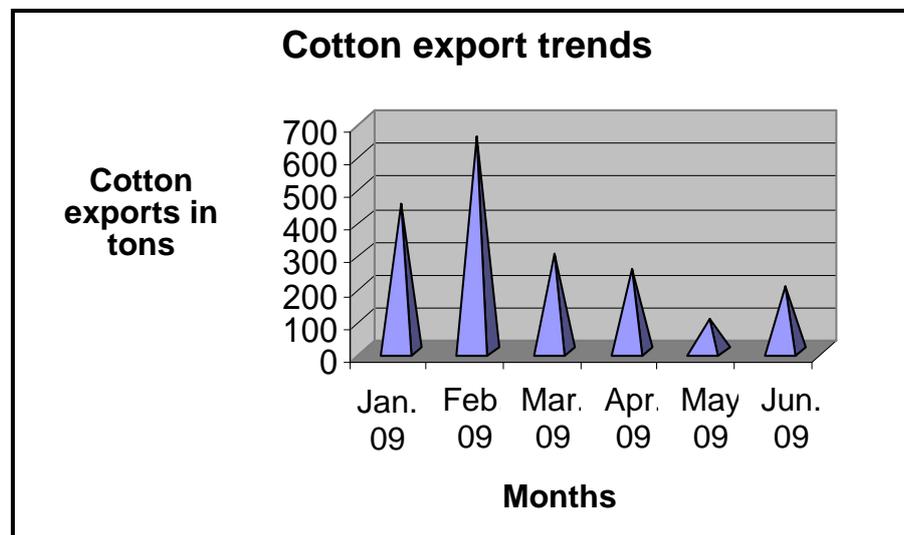
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**QUESTION 2: AGRICULTURAL MANAGEMENT**

2.1 Ten subsistence farmers in a coastal province of the country are producing amadumbe (*Colocasia esculenta*) for household consumption. The edible organs are the corms that are baked, cooked or roasted. They farm individually with no definite market to sell their produce. Their production per hectare is much more than what an individual family can consume, thus resulting in oversupply. They are keen to expand their area of production and turn it into a commercial enterprise. This requires entrepreneurial and marketing skills, which they do not have.

- 2.1.1 A free marketing system is preferred by these farmers. Describe THREE advantages of this marketing system. (3)
- 2.1.2 Suggest THREE ways in which the farmers will solve their challenge of oversupply in the future. (3)
- 2.1.3 Name FOUR entrepreneurial skills that will be required by these farmers to ensure that their business is completely commercialised. (4)

2.2 The graph below illustrates the cotton export price trends which were directly affected by demand and supply over a period of six months.



- 2.2.1 Indicate the month when there was the least demand for cotton in the export market. (1)
- 2.2.2 Determine the approximate quantity of cotton exported in March. (1)

2.2.3 Describe the possible implication on export if the supply of cotton in May was to be higher than the demand. (2)

2.2.4 State FOUR factors that will determine the supply of cotton in the world markets. (4)

2.3 A farmer in KwaZulu-Natal plans to plant 200 ha of sugar cane in the following year and therefore keeps record of marketing trends of sugar cane. The table below summarises the results that this farmer needs in the decision-making process.

	TIME (YEARS)			
	2005	2006	2007	2008
Quantity of sugar cane supplied (million ton)	180	170	200	220
Price per ton (R/ton)	450	500	650	720
Quantity of sugar cane demanded (million ton)	230	210	175	165

2.3.1 Draw a line graph to indicate the changes in the price of sugar cane from 2005 to 2008. (4)

2.3.2 Indicate the TWO factors that will possibly influence the price of sugar cane over a period of time by using the data which is supplied above. (2)

2.3.3 With reference to the data supplied for 2008, it is not recommended that this farmer continues with sugar cane farming. Justify this statement by giving a reason. (2)

2.4 The tables below represent the financial statements of two farmers involved in egg production.

**FARMER A:**

EXPENDITURE ITEMS/EXPENSES (RANDS)		INCOME (RANDS)		Profit
Cost price of layers	13 500	Eggs	25 200	
Feed	9 500	Sales of layers	6 700	
Electricity, water and wages	6 000	Sale of manure	5 400	
Gas for heating	400			
Egg trays	2 100			
Veterinary care	1 200			
Maintenance	800			
<b>Total:</b>				

**FARMER B:**

EXPENDITURE ITEMS/EXPENSES (RANDS)		INCOME (RANDS)		Profit
Cost price of layers	13 500	Eggs	25 500	
Feed	9 500	Sales of layers	6 700	
Electricity, water and wages	6 000			
Gas for heating	400			
Egg trays	2 100			
Veterinary care	1 200			
Maintenance	800			
<b>Total:</b>				

- 2.4.1 Calculate the net profit of FARMERS A and B. (4)
- 2.4.2 Identify the most successful farmer based on your calculation in QUESTION 2.4.1. Give a reason to support your answer. (2)
- 2.4.3 Describe THREE components of a cash-flow budget as it is represented in the data above. (3)

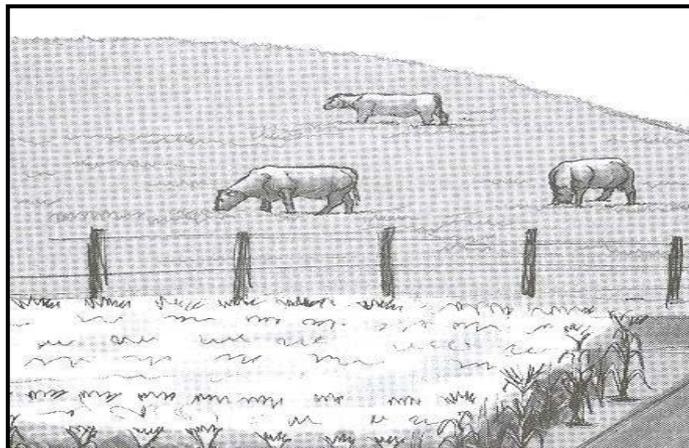
**[35]**

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### QUESTION 3: PRODUCTION FACTORS AND MANAGEMENT

3.1 Agricultural management can be defined as a comprehensive activity, involving the combination and coordination of human, physical and financial resources. These factors are combined in a way which produces a commodity or a service which is both wanted and can be offered at a price which will be paid. This process also includes making the working environment for those involved agreeable and acceptable.

- 3.1.1 Identify FOUR main factors that need to be combined in the management of a farm. (4)
- 3.1.2 Indicate the management principle (function) that will ensure that objectives are pursued. (1)
- 3.1.3 State TWO external influences that may affect the farm as a business. (2)
- 3.1.4 The picture below represents land as a physical resource that is utilised in agricultural management. Briefly describe THREE economical characteristics of land. (3)



3.2 Last year 260 of Leliefontein Farm Estate's farm workers, who have lived on the Bosmans' farm for eight generations, became shareholders of several entities, paid for by the government's land reform programme.

The workers qualified for grants totalling R29 million and they used R22,3 million to buy a 50% stake in the companies of the best wine lands in the Cape.

Through the launch of the farm worker equity scheme in October 2008, these workers have attended several training courses in management, team building and financial skills offered by AgriBEE.

[Adapted from: *Farmers' Weekly*, 2009/10/23]

- 3.2.1 Identify a scheme that was launched in October 2008. (1)
- 3.2.2 Name TWO ways in which this scheme has benefited the farm workers. (2)
- 3.2.3 Name a labour challenge that has been addressed through this scheme. (1)
- 3.2.4 Name an Act that corresponds to your response in QUESTION 3.2.3. (1)
- 3.2.5 Farming is a business and to manage it successfully, several skills are needed. State TWO such skills that the Leliefontein farm workers have been empowered with. (2)
- 3.2.6 Identify labour legislation associated with the rights and responsibilities of farm labourers. (1)
- 3.2.7 Indicate the type of labourers that are working on the Leliefontein Farm Estate. Justify your answer. (2)
- 3.3 The advertisement below appeared in a newspaper under the heading: Vacancies/Employment Offered.

Farm manager and farm worker required for a progressive poultry breeding farm and hatchery (two vacant positions). Apply by sending a CV to the owner at the e-mail address indicated below. Competitive salaries and other benefits are offered.

[PBFHfarms@chicken.co.za](mailto:PBFHfarms@chicken.co.za)

The owner then compiled the following brief summaries of the CVs from applicants:

CANDIDATE A	CANDIDATE B
Computer literate, experience in export marketing, financial experience and has been a greenhouse manager. Hard-working, self-motivated with good organisational skills. Agricultural degree in financial and business planning.	10 years' experience working with sheep, cattle, horses, poultry and maize on different farms. Tractor operator and completed a basic course on maintenance of farm equipment.

3.3.1 A panel was appointed to interview the candidates for each position. The following grid was provided to evaluate all the candidates that were selected for the interview. Evaluate EACH of the candidates mentioned above using the following grid:

Adopt the following rating: 3 = good; 2 = fair; 1 = weak

CANDIDATES	QUALIFICATIONS LEVEL	MANAGEMENT SKILLS	TECHNICAL SKILLS
Candidate A			
Candidate B			

(6)

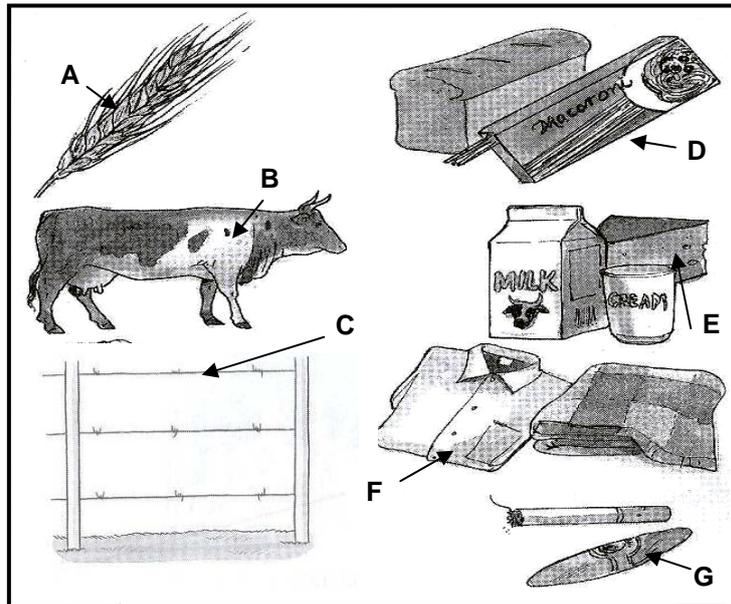
3.3.2 Identify a candidate from the evaluation in QUESTION 3.3.1 that would be most suitable for each of the following positions on the farm and motivate your choice in each case:

(a) Farm manager (2)

(b) Farm worker (2)

3.3.3 Identify a candidate from the candidates indicated as A and B in QUESTION 3.3.1 that would NOT be suitable to work in the workshop on the farm. (1)

3.4 The diagram below represents products and capital items in agriculture.



- 3.4.1 Identify the problem with regard to capital that the farmer faces when using a loan. (1)
- 3.4.2 Identify the appropriate capital items (labelled A – G) from the diagram above that is best described by the following statements: (1)
- (a) The letter that represent a fixed capital item (1)
  - (b) The letter that represents a movable capital item (1)
- 3.4.3 Give a reason why risk is possibly reduced when producing product **E** on the farm. (1)
- [35]**

Start this question on a NEW page.

#### 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 F<sub>1</sub>-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 F<sub>1</sub>-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 (2)

(b) Recessive gene (2)

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 The Bapedi are people of the Limpopo Province residing in the areas around Polokwane. Traditional livestock, especially cattle, are still valued for their fertility and productivity by these people.

Traditional Bapedi breeding is done between cattle-owning households (neighbours, friends or relatives) to increase the fertility and production of the herd. Milk and meat production are increased by driving the cattle to places of fodder that is believed to increase the fertility of the stock.

Cattle diseases such as *nyoko* (gall sickness) and *letšhollo* (diarrhoea) that cause poor production and even deaths are controlled locally and traditional plant medicine is applied for preventative and remedial purposes.

4.2.1 Indicate whether the basic types of breeding methods used are inbreeding or cross-breeding. Give a reason for your answer. (2)

4.2.2 Identify the type of medicine used to treat cattle diseases by the Bapedi people. (1)

4.2.3 Explain why the traditionally bred cattle are still valued. (1)

4.2.4 Briefly explain how fertility is maintained among cattle that are kept by the Bapedi people mentioned in the paragraph above. (2)

4.3 Variation is a phenomenon that causes the offspring to be slightly different from their parents.

4.3.1 Indicate the TWO internal causes of variation. (2)

4.3.2 Explain TWO important roles of genetic variation in a breeding programme. (2)

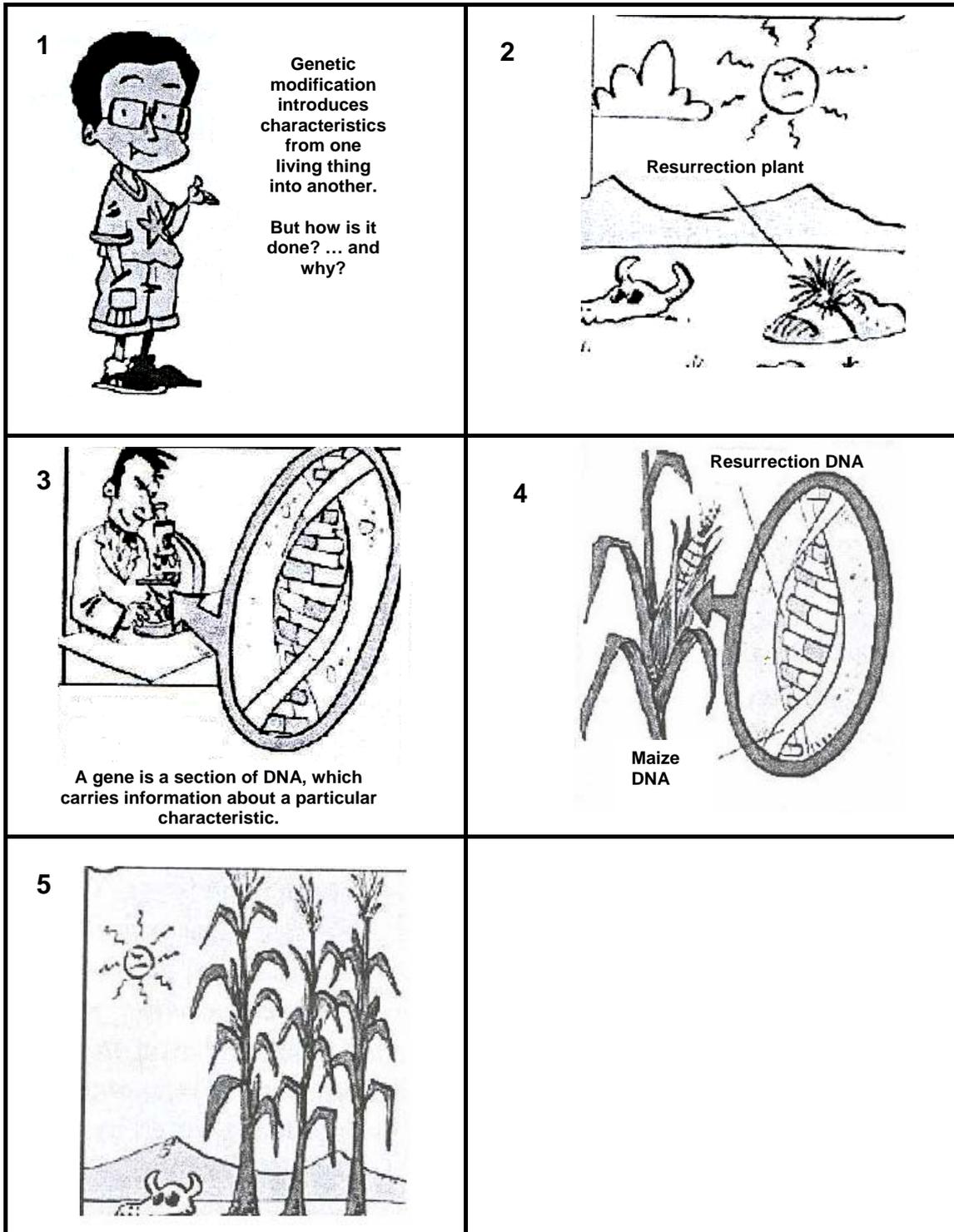
4.4 Pure-bred Shorthorn cattle may be either red or white. The red colour is the dominant characteristic but when they are crossed, their hybrid offspring are neither red nor white. They are roan, which is a combination of red and white and represents incomplete dominance.

4.4.1 R is used to represent the genotype for red colour. Indicate the letter that you would use for the white colour. Motivate your answer. (2)

4.4.2 Determine the genotype for roan cattle. Explain your answer. (2)

4.4.3 Draw a schematic representation of the crossing between a homozygotic red Shorthorn bull and a white Shorthorn cow to predict the possible phenotypes and genotypes of the offspring. (6)

4.5 The cartoon below summarises the process to develop a GMO crop.



- 4.5.1 Briefly outline the process followed in the technique to develop a GMO cultivar as illustrated in the cartoon. (3)
- 4.5.2 Name TWO possible benefits of GMO maize cultivars for commercial agriculture. (2)
- [35]**
- TOTAL SECTION B: 105**  
**GRAND TOTAL: 150**

CENTRE NUMBER: 

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EXAMINATION NUMBER: 

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**SECTION A**

**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 x 2) (20)

**QUESTION 1.2**

1.2.1	
1.2.2	
1.2.3	
1.2.4	
1.2.5	

(5 x 2) (10)

**QUESTION 1.3**

1.3.1 \_\_\_\_\_

1.3.2 \_\_\_\_\_

1.3.3 \_\_\_\_\_

1.3.4 \_\_\_\_\_

1.3.5 \_\_\_\_\_

(5 x 2) (10)

**QUESTION 1.4**

1.4.1 \_\_\_\_\_

1.4.2 \_\_\_\_\_

1.4.3 \_\_\_\_\_

1.4.4 \_\_\_\_\_

1.4.5 \_\_\_\_\_

(5 x 1) (5)

**TOTAL SECTION A: 45**