



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P2

FEBRUARY/MARCH 2014

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions in the ANSWER BOOK.
2. Start EACH question on a NEW page.
3. Read ALL the questions carefully and answer only what is asked.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Non-programmable calculators may be used.
6. Show ALL your calculations, including a formula, where applicable.
7. Write neatly and legibly.

SECTION A**QUESTION 1**

1.1 Various options are given 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 A.

1.1.1 ONE of the following is NOT associated with the advantages of free marketing:

- A Stabilising the prices of agricultural products
- B Sales are for cash
- C Selling quality products
- D No delay in receiving payments

1.1.2 The following factors hamper the marketing of agricultural products:

- (i) Perishability
- (ii) Large volume with relatively low unit values
- (iii) Seasonal fluctuation in production
- (iv) Prices of other agricultural products
- (v) Market information

Choose the MOST CORRECT combination:

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

1.1.3 A business strategy where the farmer includes different production enterprises to reduce risk:

- A Diversification
- B Consolidation
- C Specialisation
- D Cash Flow Budget

1.1.4 The demand for agricultural products is relatively stable or inelastic because ...

- A the consumer's income increases.
- B the fibres are used in the fashion industry.
- C of the price of the products.
- D it is a source of food for animals and humans.

1.1.5 Some farm workers in South Africa receive less than R80 per day. Give the main reason for the 2013 farm workers' strike:

- A Labour, peace and democracy
- B Adequate housing
- C Improved wages for farm workers
- D Safety of farm workers

1.1.6 ONE of the production factors needed to ensure maximum production is ...

- A a farm building.
- B labour.
- C a middle man.
- D transport.

1.1.7 In an agricultural production enterprise ... is an example of a capital item that is permanent and more durable.

- A a tractor
- B a dam
- C salaries
- D fertilisers

1.1.8 The following can be associated with mechanisms to increase the productivity of land:

- (i) Pooling of resources like machinery and fertilisers
- (ii) Continuous overcultivation of land
- (iii) Changing the physical properties of the soil
- (iv) Drainage and irrigation

Choose the MOST CORRECT combination:

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

1.1.9 A characteristic that is determined by one pair of alleles is called a ... crossing.

- A homozygous
- B heterozygous
- C monohybrid
- D dihybrid

1.1.10 A description of two identical alleles for a characteristic in a monohybrid crossing:

- A Homozygosis
- B Heterozygosis
- C Monohybrid
- D Dihybrid

(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	Specifications which give uniformity to a group of products with regard to physical appearance and chemical composition	A	artificial selection
		B	transgenic
		C	natural selection
1.2.2	A level in marketing where the amount demanded and the amount supplied are equal	D	standardisation
		E	grading
1.2.3	Identifying animals for breeding based on human intervention	F	equilibrium
		G	surplus
1.2.4	The sudden but stable hereditary change in the offspring of animals	H	mutation
1.2.5	Genes that are transplanted from one organism into another organism	I	variation
		J	heterozygous

(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 This type of marketing ensures that the producers receive a guaranteed price and protects them against very low prices
- 1.3.2 A production factor associated with a lack of skill and industrial competition
- 1.3.3 The source of farm capital created by borrowing money from a financial institution
- 1.3.4 The type of breeding used to improve the quality of a herd over time, resulting in a pure breed
- 1.3.5 The change in the genetic material of a cell caused by a natural and immediate change in the DNA sequence of a gene

(5 x 2) (10)

1.4 Change the UNDERLINED WORD in each of the following statements to make the statements TRUE. Write only the correct word(s) next to the question number (1.4.1–1.4.5) in the ANSWER BOOK.

1.4.1 A budget gives us the gross margin of each enterprise whereby profit or loss can be determined.

1.4.2 The control system of marketing is used by cotton-producing farmers who have decided to sell their produce through a single agent.

1.4.3 Money or equipment which is accumulated by saving and which is employed in the production process is known as credit.

1.4.4 A production factor involving comprehensive activity and co-ordination of human, physical and financial resources is called labour.

1.4.5 A recessive allele will always affect the phenotype of an individual animal.

(5 x 1) (5)

TOTAL SECTION A: 45

SECTION B

Start this question on a NEW page.

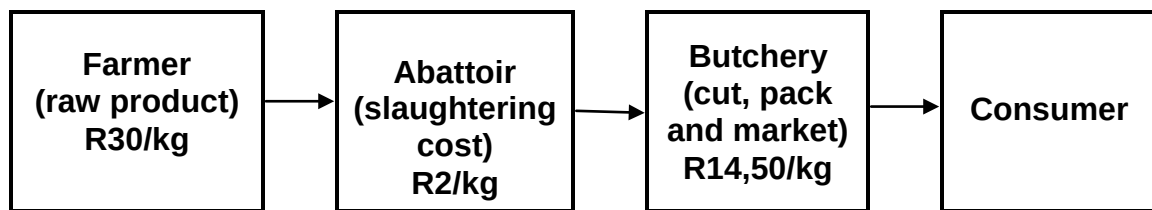
QUESTION 2: AGRICULTURAL MANAGEMENT

- 2.1 The table below represents a particular fruit that was sold at different prices and quantities per week.

PRICE (R)	QUANTITY OF FRUIT (POCKETS)
20	3 500
25	3 000
30	2 000
35	1 800
40	1 200
45	800

- 2.1.1 Use the figures in the table above to draw a line graph to compare the quantity and the price of the fruit over the given period. (6)
- 2.1.2 Identify the aspect of marketing that is visible in the curve drawn in QUESTION 2.1.1. (1)
- 2.1.3 Describe the implication of the marketing aspects represented by the curve. (2)
- 2.1.4 Explain the possible effect of the real income of consumers on the graph in QUESTION 2.1.1. (2)
- 2.2
- A group of entrepreneurs started their own bee farm and trained people from the surrounding area to farm with bees. They started with four hives that eventually grew to three hundred. They produced honey, honeycomb, beeswax, candles and propolis (a natural antiseptic) by hand. They also sold the used brood chambers (chambers in which bees develop) to stock farmers. They hired out hives with swarms of bees to fruit, sunflower and vegetable farmers for pollination services.
- 2.2.1 Define the term *entrepreneur* by referring to the information above. (2)
- 2.2.2 Identify TWO strategies that the entrepreneurs used to increase the market for their enterprise. (2)
- 2.2.3 State the FOUR greatest challenges experienced by the entrepreneurs when they started this business. (4)
- 2.2.4 A business plan is important for a business to be sustainable in future. Identify the information that should be included in such a business plan. (2)

- 2.3 The schematic representation below shows the route of meat from the farm to the consumer.



- 2.3.1 Calculate the following:

- (a) The total price that the consumer will pay for a kilogram (kg) of meat at the butchery. (2)
- (b) The percentage of profit that the butchery makes on this deal if the butchery spends R5/kg on running costs (3)

- 2.3.2 Identify the following aspects in the schematic representation:

- (a) The processor (1)
- (b) The retailer (1)
- (c) The producer (1)

- 2.3.3 Indicate the marketing aspect illustrated by the schematic representation above. (1)

- 2.3.4 Determine ONE disadvantage of this marketing aspect for the consumer. (1)

- 2.4

Siyavuna Developmental Centre runs a project where households grow fresh vegetables for their own use. However, the fresh produce is not only for their own families, as they also have the opportunity to sell their surplus to local markets.

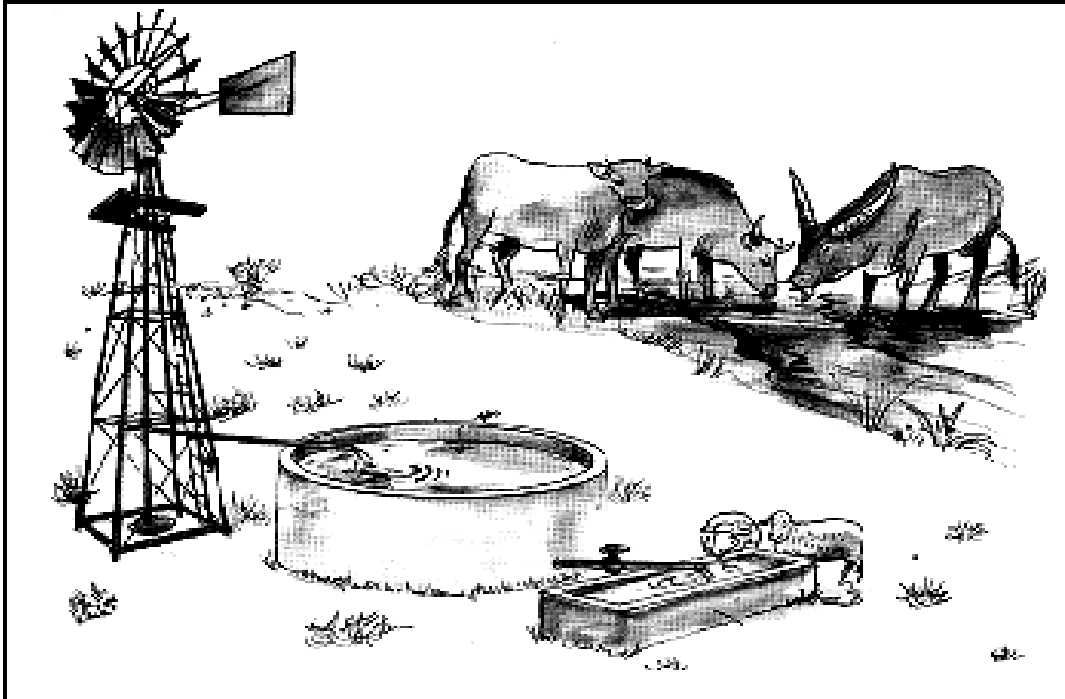
Indicate FOUR factors that could hamper the marketing of the produce by the vegetable growers above.

(4)
[35]

QUESTION 3: PRODUCTION FACTORS AND MANAGEMENT

Start this question on a NEW page.

- 3.1 The illustration below shows some of the capital items used in agricultural production.



- 3.1.1 Identify TWO examples of the following capital items shown in the illustration above: (2)
- (a) Fixed capital items (2)
 - (b) Movable capital items (2)
- 3.1.2 Name TWO sources of capital a farmer can use to obtain fixed capital. (2)
- 3.1.3 Name and explain the problem that could be created if the farmer in the illustration above happens to invest more money than is needed on fixed capital items. (2)

- 3.2 The table below shows the income and expenditure in a farm's financial document from January to April.

	January	February	March	April
Income				
Operating income (sales)	0	0	13 000	30 000
Capital sales (machinery)	0	2 000	0	1 000
Non-farm income (shares/dividends)	2 000	2 000	2 000	2 000
Expenditure				
Operating expenditure (wages)	2 800	6 000	6 000	6 000
Capital expenditure (livestock and machinery)	0	0	17 000	0
Non-farm expenses	2 000	2 000	2 000	2 000
Cash flow summary				
Opening balance	10 000	7 200	3 200	(a)
Total income	2 000	4 000	15 000	(b)
Total expenses	4 800	8 000	25 000	5 500
Profit/Loss	-2 800	-4 000	-10 000	(c)
Closing balance	7 200	3 200	-6 800	(d)

- 3.2.1 Identify the type of budget summary shown in the table above. (1)
- 3.2.2 Determine the April budget summary by calculating the following:
- (a) Opening balance (1)
 - (b) Total income (1)
 - (c) Profit/Loss (1)
 - (d) Closing balance (1)

3.3

FARM WORKERS' SUMMIT TO IMPROVE LIVING CONDITIONS

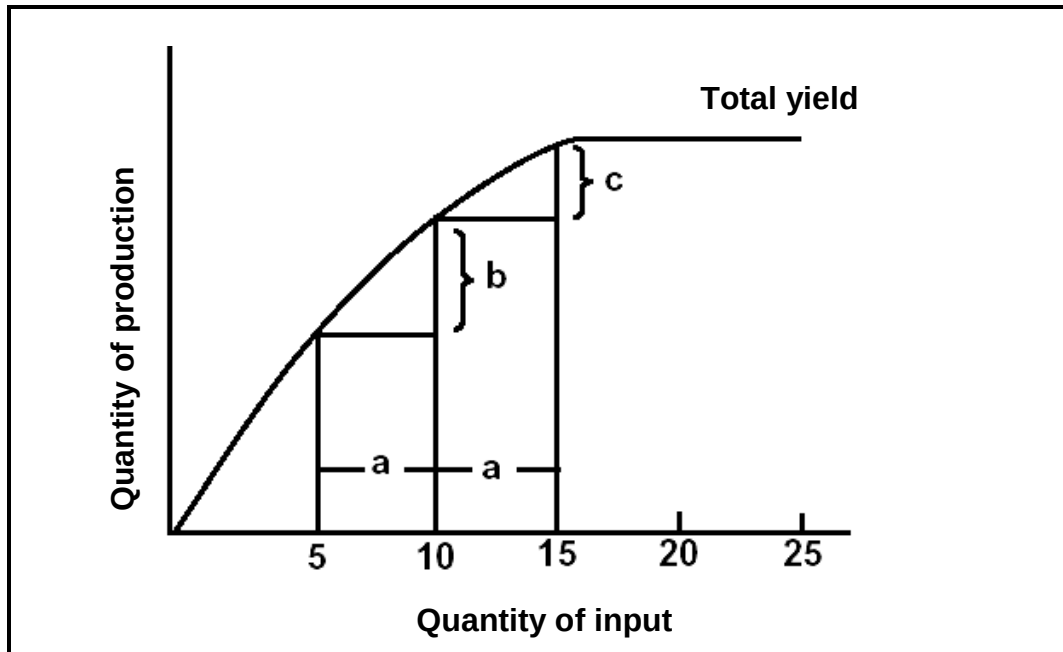
Agricultural unions, the Department of Agriculture, Forestry and Fisheries, provincial Departments of Labour and the Human Rights Commission have agreed to work together to improve the lives of farm workers and dwellers. This meeting was held at the first provincial farm workers' summit.

The summit resolved to establish provincial structures for farm workers and dwellers in order to expose them to basic education and skills development. They also advocated for the development of a policy to govern burials on farms and expanding comprehensive healthcare programmes and social services to farms.

[Adapted from *Farmer's Weekly*, 19 March 2010]

- 3.3.1 Indicate the main aim of the farm workers' summit. (1)
- 3.3.2 Identify a role player that attended the summit and who mainly defended and upheld the dignity of farm workers. (1)
- 3.3.3 Briefly describe how the following changes related to farm labour were handled, as indicated in the case study above:
- (a) Technical proficiency in modern farming (1)
 - (b) Family values of farm workers (1)
 - (c) High percentage of sick leave (1)
- 3.3.4 Briefly discuss the effect of improved living conditions on the productivity of farm workers and on the profitability of the farming sector. (2)

- 3.4 The yield capacity of land is mainly determined by the physical characteristics of the soil. It can be increased to a certain limit by increasing capital and labour inputs per unit or by means of improved technology. A point will be reached where production no longer increases with increased units of input.



- 3.4.1 Identify the problem related to land as a factor of production, as illustrated in the data above. (2)
- 3.4.2 Describe the implication of the problem with land identified in QUESTION 3.4.1 by referring to the graph above. (2)
- 3.4.3 Compare the yield response with regard to quantity of inputs that increase from 5 to 10 and from 10 to 15. (2)
- 3.4.4 Name TWO ways in which a farmer can improve the productivity of the land. (2)

- 3.5 HIV/Aids impacts on the productivity of farm labourers on commercial and subsistence farms which in turn impacts on the productivity of the agricultural sector. It is estimated that seven million agricultural labourers died of HIV/Aids-related diseases in South Africa between 1985 and 2002. Most of these victims were between the ages of 20 and 40.

- 3.5.1 Describe the possible implication of HIV/Aids for the broader agricultural industry. (3)
- 3.5.2 Indicate FOUR actions you would include in a strategic plan that farm managers can use to deal with the impact of HIV/Aids on farming operations. (4)

[35]

QUESTION 4: BASIC AGRICULTURAL GENETICS

Start this question on a NEW page.

- 4.1

A farmer notices that dwarf-size calves (aa) are being born in his herd. He starts selecting bulls (AA) from other unrelated herds that appear to be free of the dwarf factor, as judged by their family background.
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- 4.1.1 Identify the type of breeding system that is practised by this farmer. (1)
- 4.1.2 Name TWO advantages of the breeding system identified in QUESTION 4.1.1. (2)
- 4.1.3 Indicate the most important factor that will determine the success of the selection process by referring to the information above. (1)
- 4.1.4 Briefly motivate why this farmer selects bulls and not cows in this process. (1)
- 4.1.5 Give a term used to describe an animal that is responsible for a recessive genetic trait, such as dwarfism. (1)
- 4.1.6 Determine the genotype of a dwarf calf. (1)
- 4.1.7 Give a reason why dwarfism is considered to be an undesirable characteristic. (1)

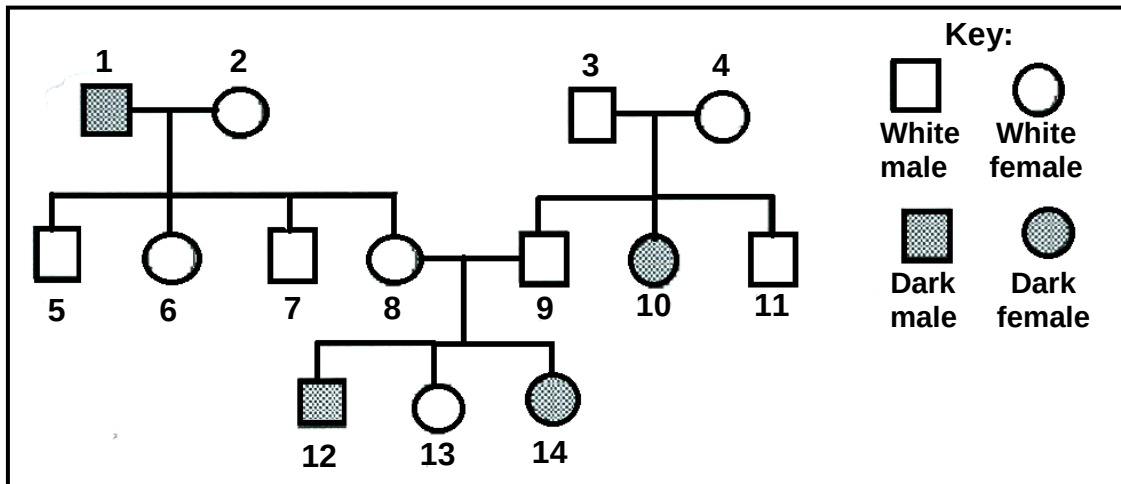
- 4.2 Scientists working at a leading animal research station have identified genes that can be transferred to cattle to produce meat with the desirable characteristics. They have compiled the following findings on their research and presented them as values in the table below.

HERITABILITY				
Characteristic	Weight gain	Lean meat percentage	Meat tenderness	Birth weight
Heritability indicator (%)	85%	28%	60%	47%

- 4.2.1 Identify TWO characteristics that would be most appropriate for improving the herd. Explain your answer. (3)
- 4.2.2 One animal in the herd grows at an average weight gain of 750 g per day, whereas the average weight gain for the herd is 600 g per day. The heritability of weight gain in beef cattle is 85%.
- Calculate a simple estimated breeding value by using the following formula:
- $$EBV = (WA - WH) \times \text{heritability of weight gain}$$
- EBV (estimated breeding value)
 - WA (weight gain of the animal)
 - WH (average weight gain of the herd) (3)
- 4.2.3 Indicate whether the farmer should slaughter this animal or keep it for breeding. Motivate your answer. (3)
- 4.2.4 Suggest a more accurate way of calculating the EBV for this animal. (1)
- 4.3 Modern plant breeding is mainly done through genetic modification, particularly with regard to food crops.
- 4.3.1 Briefly outline the process of developing a genetically modified organism (GMO). (2)
- 4.3.2 Indicate THREE advantages of genetic modification. (3)
- 4.3.3 Name TWO disadvantages (dangers) of this process. (2)
- 4.3.4 Hybridisation in plant breeding is labour-intensive. Justify this statement. (2)

- 4.4 The schematic representation below is an example of a pedigree chart. It shows how traits can be traced back over several generations.

A = white colour
a = dark colour



- 4.4.1 State the genotype of individuals **1** and **8**. (2)
- 4.4.2 Indicate the phenotype of individuals **5** and **12**. (2)
- 4.4.3 Predict which individual (**3** or **10**) would be: (1)
- (a) Homozygous (1)
- (b) Heterozygous (1)
- 4.4.4 Determine, as a percentage, the probability of having a female offspring by referring to the offspring of the first two sets of parents in the schematic representation above. (2)
- [35]**

TOTAL SECTION B: 105
GRAND TOTAL: 150