



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

AGRICULTURAL SCIENCES P2

NOVEMBER 2016

MARKS: 150

TIME: 2½ hours

This question paper consists of 14 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. Write down the question number (1.1.1–1.1.10), choose the answer and make a cross (X) over the letter (A–D) of your choice in the ANSWER BOOK.

EXAMPLE:

1.1.11 A B C D

- 1.1.1 A measure by a farmer to reduce the risk on his/her income:

- A Insurance
- B Selling
- C Pawning
- D Bartering

- 1.1.2 The law of demand states that ...

- A the greater the number of consumers, the lower the demand for a specific product.
- B the higher the income of consumers, the less demand there will be for a specific product.
- C if the price of a product rises, the demand for it will increase too.
- D if the price of a product falls, the demand for it will increase.

- 1.1.3 Which ONE of the following statements about an entrepreneur is INCORRECT?

An entrepreneur is a person who ...

- A takes risks.
- B only works for somebody else to earn a salary.
- C works hard.
- D has a desire to achieve success.

- 1.1.4 Peaches are summer fruits in South Africa. They are more expensive during winter and at the beginning of spring because the ...

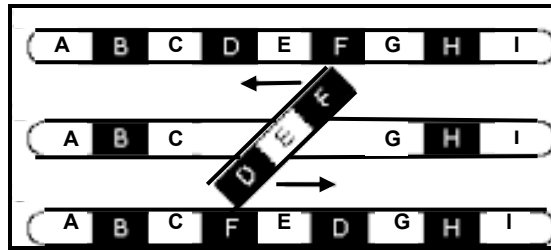
- (i) supply of peaches is strictly controlled during this time.
- (ii) earlier peaches taste better.
- (iii) supply of peaches during winter and spring is still limited.
- (iv) price of peaches is affected by their availability.

Choose the correct combination:

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

- 1.1.5 Which ONE of the following is an internal factor that may influence a farming business?
- A Legislation about labour practices
 - B The capability and competency of the management and farm workers
 - C Values and lifestyle choices of consumers
 - D Exchange rates and taxation
- 1.1.6 The following is NOT a problem associated with capital as a production factor:
- A Subjected to risk
 - B Too little capital is invested
 - C Limited lifespan of goods
 - D Decreased competency of technicians
- 1.1.7 The Labour Relations Act, 1995 (Act 66 of 1995) deals with the following issues:
- (i) The production status of animals
 - (ii) Procedures for the resolution of labour disputes
 - (iii) Ensures that some labourers receive financial training
 - (iv) Ensures social justice and fair working conditions
- Choose the correct combination:
- A (i), (iii) and (iv)
 - B (ii), (iii) and (iv)
 - C (i), (ii) and (iv)
 - D (i), (ii) and (iii)
- 1.1.8 An example of a factor of production with a value that appreciates over time:
- A Equipment
 - B Machinery
 - C Farmland
 - D Money
- 1.1.9 A heterozygous Brahman bull is mated with a heterozygous cow. The expected phenotypic ratio will be ...
- A 3 : 1
 - B 1 : 3 : 1
 - C 1 : 1
 - D 1 : 2 : 1

1.1.10 The image below represents ..., which causes chromosome mutation.



- A deletion
- B translocation
- C inversion
- D duplication

(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	A form of sustainable measure directed at consumers that takes environmental concerns into consideration	A	Internet marketing
		B	overcapitalisation
1.2.2	A management strategy in which the cost of the consequences of unforeseen incidents is shared by several parties	C	variation
		D	specialisation
		E	eco-labelling
1.2.3	Farm worker with a tertiary farming qualification and many years of farming experience	F	heritability
		G	risk sharing
1.2.4	Too much capital is invested in a farming enterprise in relation to the available land and labour	H	labour legislation
		I	undercapitalisation
1.2.5	The difference in the genotypes and phenotypes of cattle of the same breed	J	skilled labour

(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 The way in which price changes a demand or supply curve
- 1.3.2 The movement of money in a business over a specific period of time
- 1.3.3 The total number of gene effects that are inherited by the progeny that will determine its performance for breeding purposes
- 1.3.4 The phenomenon where one gene affects the phenotypic expression of another gene
- 1.3.5 A gradual decrease in the performance from generation to generation due to the continual breeding of related animals (5 x 2) (10)
- 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 number (1.4.1–1.4.5) in the ANSWER BOOK.
- 1.4.1 Value-adding is the alteration of the raw form of a product into a form that is easier for consumers to use.
- 1.4.2 Labour fatigue is the amount of work performed relative to the amount of money that is spent.
- 1.4.3 Electroporation involves using fats as carriers of the required DNA through the cell membrane into a nucleus.
- 1.4.4 Prepotency means that both alleles are equally dominant and visible in the phenotype of the offspring.
- 1.4.5 The purposeful method of deciding which individual plants and animals to choose for breeding to accomplish specific characteristics in the progeny, is called epistasis. (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

After harvesting, most products are taken to a facility where they are cleaned, graded, packed into boxes, stored and then transported to the market.

2.1.1 Identify the functions of agricultural marketing above with regard to each of the following:

(a) Products are taken from the farm to the market. (1)

(b) Products are kept on the farm before they are transported to the market. (1)

2.1.2 Give an economic term used to describe each of the following statements:

(a) Products are packed into boxes. (1)

(b) Products are kept in a cool place to give them a long shelf life. (1)

(c) A product is altered from its raw form. (1)

2.1.3 State TWO advantages of processing agricultural products. (2)

2.2 The table below represents TWO farmers who produce peppers.

FARMER A	FARMER B
<ul style="list-style-type: none"> • Realises that yellow peppers grow faster and have a higher yield • Decides to plant two hectares with a yield of 300 tons • Appoints a middleman to sell the produce to different markets • Produce is sold at R4/kg • Realises that sales are poor and lowers the price to R2/kg 	<ul style="list-style-type: none"> • Does research to determine which pepper is preferred by consumers • Consumers show interest in red peppers • Plants one hectare and produces 150 tons • Produce is sold at R8/kg after calculating the cost of production and profit • Produce is packaged according to consumers' preferences • Secures a contract for the next harvest with local supermarkets and wholesalers

2.2.1 Identify which farmer (**A** or **B**) marketed the produce successfully. (1)

2.2.2 Give a reason for the answer to QUESTION 2.2.1. (1)

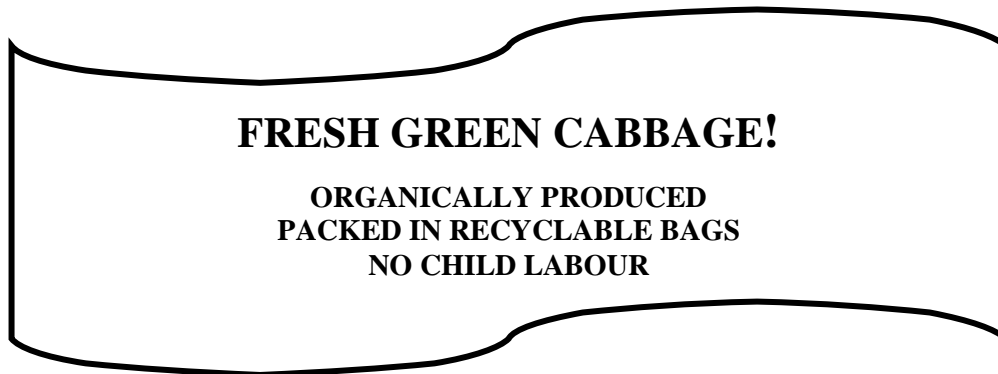
- 2.2.3 State TWO aspects that the farmer in QUESTION 2.2.1 focused on when developing a marketing strategy. (2)
- 2.2.4 Name the marketing strategy used by FARMER B. (1)
- 2.2.5 State TWO ways in which the strategy in QUESTION 2.2.4 can benefit the farmer. (2)

2.3 The table below shows the results of a price experiment on bags of oranges that were sold at different prices per week.

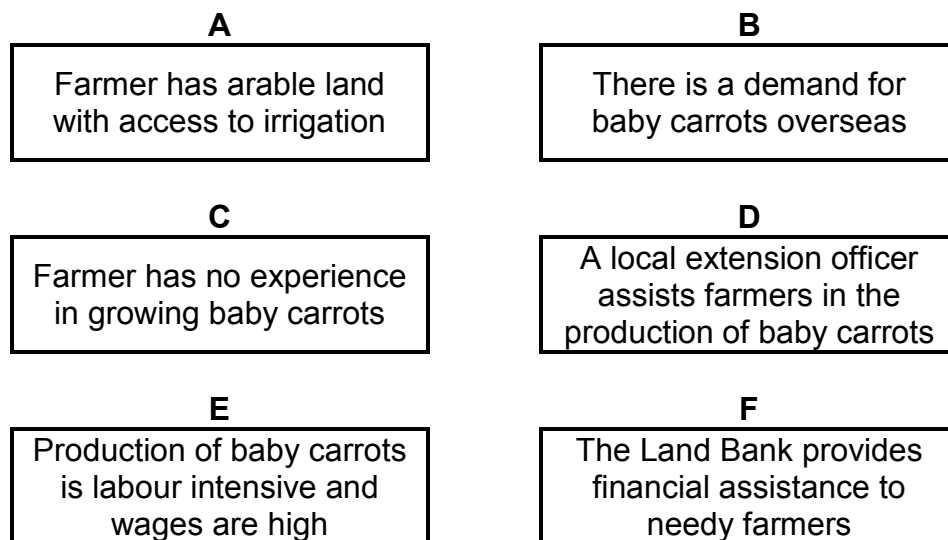
PRICE (RAND PER BAG)	QUANTITY SOLD (BAGS OF ORANGES PER WEEK)	TOTAL REVENUE (R)	FIXED COST (R)	VARIABLE COST (R)	PROFIT (R)
5	2 500	12 500	800	400	11 300
10	1 000	10 000	800	350	8 850
15	500	7 500	800	300	6 400
20	300	6 000	800	250	4 950
25	20	1 000	800	200	0
30	15	450	800	150	-500

- 2.3.1 Formulate a hypothesis for the experiment above. (2)
- 2.3.2 Name ONE factor that influenced the demand for oranges, according to the data above. (1)
- 2.3.3 Explain the influence of the factor in QUESTION 2.3.2. (2)
- 2.3.4 Briefly explain the effect of a rising price on the profit margins, as shown in the data above. (2)

- 2.4 Read and analyse the advertisement below and answer the questions that follow.



- 2.4.1 Identify the type of labelling in the advertisement above. (1)
- 2.4.2 Give TWO reasons in the advertisement to support the answer to QUESTION 2.4.1. (2)
- 2.4.3 The advertisement promotes environmental awareness. Motivate this statement by referring to the advertisement. (1)
- 2.4.4 Name the marketing approach used to promote the product. (1)
- 2.5 The schematic representation below shows the aspects of a SWOT analysis done by an emerging farmer.



- 2.5.1 Link statement **A**, **B**, **C** and **E** in the schematic representation with the elements of a SWOT analysis. (4)
- 2.5.2 Explain how the farmer may use the strengths and opportunities in the schematic representation above to improve the farming enterprise. (2)
- 2.6 Name THREE personal characteristics of a successful entrepreneur. (3)

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QUESTION 3: PRODUCTION FACTORS

Start this question on a NEW page.

- 3.1 The table below shows the population size and available arable land in a certain region over a period of six decades.

YEARS	POPULATION SIZE (million)	ARABLE LAND AVAILABLE (million hectares)
1961	24	15
1971	27	12
1981	30	10
1991	34	8
2001	39	6
2011	47	4

- 3.1.1 Draw a bar graph showing the population size and the arable land available over a period of six decades. (6)
- 3.1.2 State the economic characteristic of land illustrated in the graph in QUESTION 3.1.1. (1)
- 3.1.3 Describe how the characteristic stated in QUESTION 3.1.1 influences agricultural production. (2)
- 3.1.4 Suggest TWO measures a farmer can apply to improve the productivity of land. (2)
- 3.2 The table below shows conditions of employment in a farming business for two employees (**A** and **B**).

CONDITIONS OF EMPLOYMENT	EMPLOYEE A	EMPLOYEE B
Daily rate	R120	R120
Hours of work per day	8	12
Payment for four Sundays/public holidays	R960	R800
Leave credits per three-year cycle	30 days	10 days

- 3.2.1 Identify the employee whose conditions of service are unfair. (1)
- 3.2.2 Give TWO reasons for the answer to QUESTION 3.2.1 by referring to the information in the table above. (2)
- 3.2.3 Give TWO examples of labour legislation that the employee in QUESTION 3.2.1 could use to challenge the employer. (2)

3.3 Name the method to increase labour productivity, which is represented by EACH of the following descriptions:

- 3.3.1 Dairy cattle kraal → Hay stable → Milking parlour
 Refrigerated storeroom ← (1)
- 3.3.2 Sending tractor drivers for a basic course in mechanical engineering (1)
- 3.3.3 Providing workers with free transport between work and home (1)
- 3.3.4 Using a harvester to harvest a 100 ha field (1)

3.4 An emerging broiler and egg farmer wants to draw up a cash flow budget for a month, opening from a zero balance. Workers' wages cost R4 000 per week. Chicken feed costs R7 000 per week, electricity is R2 500 per week and some other costs amount to R1 500 per week. The farmer's income consists of the following:

- Eggs sold for cash to local shops is R10 000 per week.
- Once a month broilers are sold to a slaughter house for R50 000.

- 3.4.1 Draw up a mini cash flow budget for ONE week. (4)
- 3.4.2 Determine the net cash income for ONE month. (3)
- 3.4.3 Explain whether the net income of this business can be guaranteed on the basis of its cash flow. (2)

3.5 Name the problem of capital associated with each of the following statements:

- 3.5.1 A farmer bought three tractors and two luxurious bakkies, which are underutilised. (1)
- 3.5.2 Drastic changes in the climate resulted in a drop in the expected yield. (1)
- 3.5.3 Short-term credit is used to pay labourers. (1)
- 3.5.4 A farmer sold a tractor bought five years ago at a lower price. (1)

3.6 Identify the effective management principle represented by EACH of the following statements:

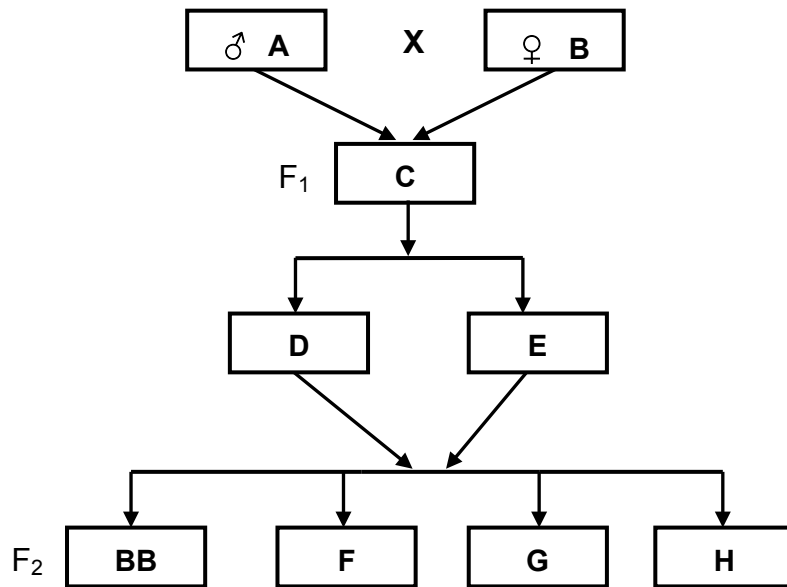
- 3.6.1 Deciding on the size of the farming operation and the output it will give (1)
- 3.6.2 Monitoring all aspects of production (1)

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QUESTION 4: BASIC AGRICULTURAL GENETICS

Start this question on a NEW page.

4.1 A purebred black-faced ram is crossed with a purebred white-faced ewe. B represents the ram's face colour, which is dominant over the white face colour of the ewe.



- 4.1.1 Write down the genotype of parent **B**. (1)
- 4.1.2 Indicate whether parents **A** and **B** are homozygous or heterozygous. (1)
- 4.1.3 Give a reason for the answer to QUESTION 4.1.2. (1)
- 4.1.4 Identify the phenotype in the F₂ generation, as represented by **F**, **G** and **H**. (3)
- 4.1.5 Indicate the genotypic and phenotypic ratio in the F₂ generation. (2)

- 4.2 The table below shows the estimated breeding value (EBV) for specified characteristics in Bonsmara cattle and boer goats.

SPECIES	CHARACTERISTIC	HERITABILITY
Bonsmara	Birth weight	38
	Post-weaning weight	30
	Meat tenderness	65
	Lean meat	38
Boer goat	Birth weight	35
	Post-weaning weight	60
	Lean meat	35
	Fleece weight	12

- 4.2.1 Identify ONE characteristic of EACH animal (Bonsmara cattle and boer goats) that farmers would select for breeding. (2)
- 4.2.2 Give a reason for the choice of characteristics in QUESTION 4.2.1. (2)
- 4.2.3 Give TWO reasons why boer goat farmers will probably not select birth weight, fleece weight and lean meat. (2)

- 4.3 Variation refers to the differences in characteristics between members of the same species. The differences may be caused by both external and internal factors.

Name the environmental factor that has led to EACH of the following variations:

- 4.3.1 Animals at higher altitudes have darker pigmentation than those at lower altitudes. (1)
- 4.3.2 Animals are shorter than other animals with the same gene for tallness due to a nutrient deficiency. (1)
- 4.3.3 Goats kept on steeper slopes have longer and stronger legs than goats kept on flatter slopes. (1)
- 4.3.4 Herefords kept in colder regions have thicker hair than those found in warmer regions. (1)

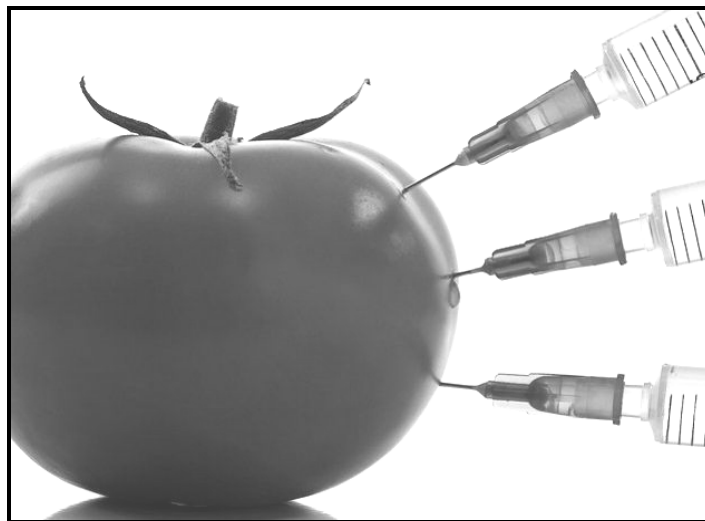
- 4.4 Assume that egg laying in Leghorn laying hens is controlled by three pairs of genes. The net production of a laying hen with the genotype **bbggkk** is 60 eggs per week. Each additive allele contributes five eggs to the net production.

- 4.4.1 Determine the net production of a laying hen with the genotype **BbGgkk**. (3)
- 4.4.2 Name the genotype that will result in 90 eggs. (1)
- 4.4.3 Indicate the type of inheritance that controls egg laying in Leghorn laying hens. (1)

- 4.5 In an animal production unit the following data of heifers has been collected for breeding purposes:

Live mass (kg)	134	135	136	137	138	139	140	141	142	143	144	145	146
Number of animals	10	15	20	30	40	60	75	65	45	35	15	10	5

- 4.5.1 Give the appropriate term for the phenomenon represented by the data above. (1)
- 4.5.2 Determine the number of heifers if 12% of the total number of heifers are selected. (3)
- 4.5.3 Use the data to find the mass of an average heifer. (1)
- 4.5.4 In a normal commercial production unit, what would a farmer do with:
- (a) Heifers with the highest live mass (1)
- (b) Heifers with the lowest live mass (1)
- 4.6 The illustration below shows a technique used by farmers to genetically modify tomatoes.



- 4.6.1 Identify the technique above. (1)
- 4.6.2 State TWO advantages of the technique in QUESTION 4.6.1 for the farmer. (2)
- 4.6.3 Suggest TWO socio-economic implications that plants produced from the technique in QUESTION 4.6.1 and other related techniques have for the farmer. (2)

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TOTAL SECTION B: 105
GRAND TOTAL: 150