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Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P2

NOVEMBER 2013

MARKS: 150

TIME: 2½ hours

This question paper consists of 14 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 formulae where applicable.
7. Write neatly and legibly.

SECTION A

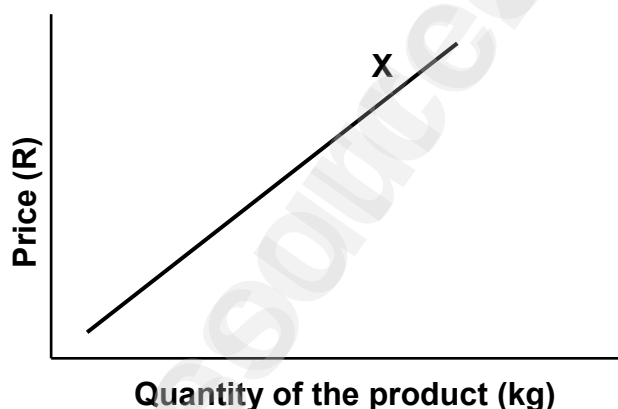
QUESTION 1

- 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 A.

1.1.1 At the beginning of September the prices for summer crops are much higher than at the end of January because ...

- A the summer crops have a better taste and quality in January.
- B the supply of summer crops is limited in September.
- C it is easier to handle summer crops at the end of January.
- D the demand for summer crops is unpredictable.

1.1.2 The straight line (X) in the graph below represents the ... of an agricultural product.



- A market equilibrium
- B shortage
- C demand
- D supply

1.1.3 The type of marketing used by African tribes in the time when people started to exchange goods and commodities is known as ...

- A selling.
- B commercial trade.
- C vendor trade.
- D barter trade.

- 1.1.4 The picture below represents the factor that hampers the marketing of agricultural products where a consumer is not happy with the shelf life of potatoes.



Identify the factor represented by the picture above:

- A Long-term production
 - B Perishability
 - C Seasonal fluctuation
 - D Large volume and low unit value
- 1.1.5 A/an ... is a summary of all income and expenditure of an enterprise for a specific period.
- A budget
 - B income statement
 - C business plan
 - D invoice
- 1.1.6 The type of capital used to buy fertilisers for crop production is referred to as ... capital.
- A immovable
 - B floating
 - C movable
 - D fixed
- 1.1.7 The following aspect is directly related to the employment conditions of farm labourers:
- A Mechanisation
 - B Day-to-day planning
 - C Leave
 - D Skills training

1.1.8 The following Act compels the farmer to make sure that the working environment on the farm is always safe:

- A Occupational Health and Safety Act, 1993 (Act 85 of 1993)
- B Compensation for Occupational Injuries and Diseases Act, 1993 (Act 130 of 1993)
- C Labour Relations Act, 1995 (Act 66 of 1995)
- D The Basic Conditions of Employment Act, 1997 (Act 75 of 1997)

1.1.9 The structure that carries hereditary characteristics in plants and animals is the ...

- A mitochondrion.
- B Golgi apparatus.
- C chloroplast.
- D chromosome.

1.1.10 A method of breeding used by most farmers to increase hybrid vigour is known as ...

- A cross-breeding.
- B line breeding.
- C upgrading.
- D inbreeding.

(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 solution used to reduce the risk of marketing agricultural products	A phenotype
		B genotype
1.2.2	An internal source of farming capital	C survival of the fittest
		D interest rates
1.2.3	The law of nature responsible for the selection and adaptation of species	E insurance
		F saving
1.2.4	A characteristic of a genetically modified crop	G credit
		H improved resistance to herbicide
1.2.5	The physical appearance of an organism which is determined by its genetic make-up	I unemployment
		J employment

(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 document that describes the start of a business and indicates its goals and objectives
- 1.3.2 A budget that combines all the enterprises on a farm
- 1.3.3 The type of temporary farm worker employed for non-repetitive tasks such as erecting a fence for a farm stall
- 1.3.4 The crossing of parents where two sets of main alleles are involved
- 1.3.5 A large group of genes where each gene adds to the value of certain phenotypic characteristics in the offspring (5 x 2) (10)
- 1.4 Change the UNDERLINED WORD in each of the following statements to make them TRUE. Write only the appropriate word next to the question number (1.4.1 – 1.4.5) in the ANSWER BOOK.
- 1.4.1 Price determination represents the relationship between a change in price and the change in the demand for the product.
- 1.4.2 The production factor that is durable and usually obtained through long-term credit is labour.
- 1.4.3 The law of greater returns refers to when successive units of one production factor are applied, but do not result in a proportional increase in yield.
- 1.4.4 The amount of money that is paid back to a finance provider over and above the money borrowed is insurance.
- 1.4.5 The sudden appearance of a black calf in a herd of exclusively red cattle is called prepotency. (5 x 1) (5)

TOTAL SECTION A: 45

SECTION B

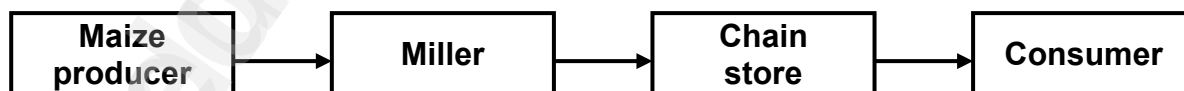
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QUESTION 2: AGRICULTURAL MANAGEMENT

- 2.1 The table below shows agricultural products, prices and percentage changes in prices for 2010 and 2011 on the open market in South Africa.

PRODUCT	2010	2011	PERCENTAGE CHANGES (%)
Yellow maize (R/ton)	1 173	1 760	33
Milk (c/litre)	310	297	-4,4
Wheat (R/ton)	2 245	3 281	32
Beef A2/A3 (c/kg)	2 528	2 722	7
Soy beans (R/ton)	2 520	3 290	23
Lamb A2/A3 (c/kg)	3 660	4 671	22
Pork (c/kg)	1 651	1 629	-1,4
White maize (R/ton)	1 105	1 735	36

- 2.1.1 Draw a bar graph to compare the prices of plant products in 2010 with those in 2011. (6)
- 2.1.2 Identify the product in the table with the highest price increase from 2010 to 2011. (1)
- 2.1.3 Compare the trend in crop and animal product price changes between 2010 and 2011. (2)
- 2.1.4 Explain the effect of wheat price changes between 2010 and 2011 on poor households that are dependent on bread as a staple food. (2)
- 2.1.5 Suggest TWO measures a farmer can take to deal with the decrease in pork prices as illustrated in the table above. (2)
- 2.2 The following illustration represents part of an agribusiness chain.



Identify the link in this agribusiness chain that relates to each of the following descriptions:

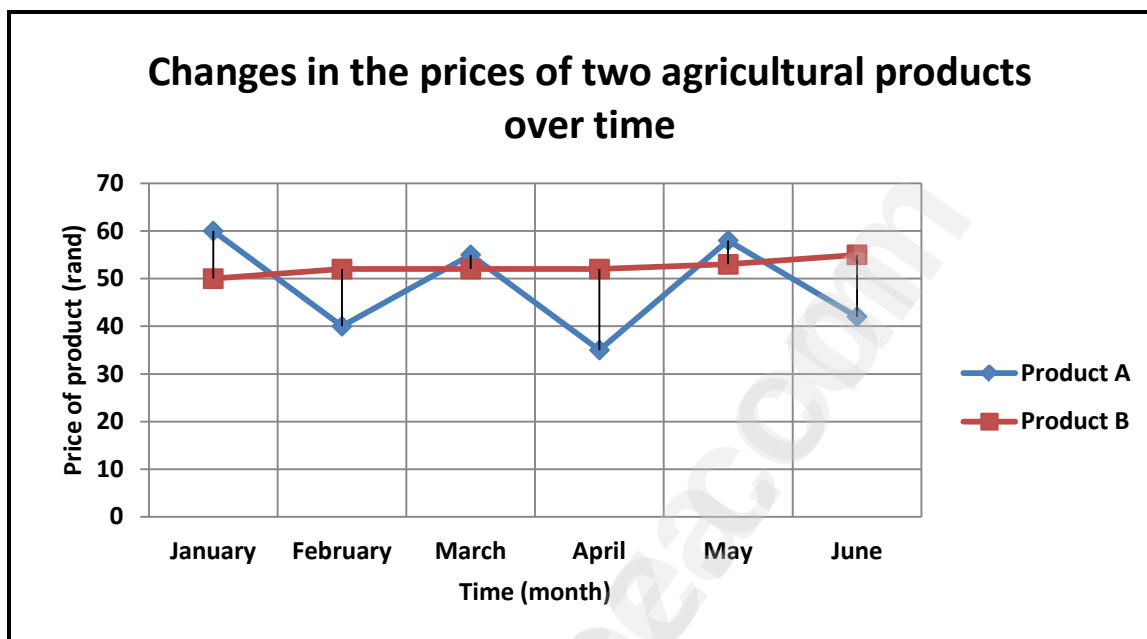
- 2.2.1 A supermarket that keeps a wide variety of goods (1)
- 2.2.2 A factory that has a variety of heavy machines and equipment (1)
- 2.2.3 A family member intending to buy maize meal (1)
- 2.2.4 A farmer who tries to reduce the risk of low maize yield by using irrigation (1)
- 2.2.5 A place where the raw product is packed into smaller and more consumer-friendly units (1)

- 2.3 Meat prices were predicted to trade firm to higher in the medium term as the demand reached a peak point in the build-up towards the Orange Africa Cup of Nations. The tournament started on 12 January 2013 and ended on 17 February 2013. The table below indicates the supply, demand and price of meat during and after the tournament.

DATE	PRICE (R/kg)	SUPPLY (ton)	DEMAND (ton)
6 January	30	10	7
20 January	37	22	20
3 February	43	34	33
10 February	49	36	33
24 February	40	37	23
3 March	35	30	15

- 2.3.1 Predict the expected reaction of farmers to the price of meat during this period. (2)
- 2.3.2 State TWO factors responsible for the increase in the demand for meat during this period. (2)
- 2.3.3 After the tournament there was a surplus of meat. State THREE measures that livestock farmers could have adopted to overcome this surplus situation. (3)

2.4 The graph below shows the price trend in a market system.



2.4.1 Identify the product (**A** or **B**) with prices that are more likely to apply to a free-market system. Give a reason for your answer. (2)

2.4.2 Name TWO possible outlets where agricultural products are sold in such a free-market system. (2)

2.5 The steps below are part of the decision-making process:

- Evaluate alternatives
- Identify the problem with regard to its importance
- Choose and follow the best solution
- Analyse possible alternatives

2.5.1 Rearrange the above steps in the correct sequence. (4)

2.5.2 Identify TWO factors that influence the effectiveness of a decision-making process. (2)
[35]

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QUESTION 3: PRODUCTION FACTORS AND MANAGEMENT

3.1

DELAYS IN THE IMPLEMENTATION OF LAND REFORM POLICY

The land reform programme has failed to deliver the expected outcomes. These failures are attributed to the following: delays in finalising claims; the inappropriateness of the principle of willing buyer and willing seller; most beneficiaries of land claims opted for money instead of land; a lack of support to new beneficiaries on how to farm. As a result, government came up with mid-term review and intervention strategies. On the other hand, equity schemes are one of the possible arrangements commonly used by land reform beneficiaries and private sector partners.

[Adapted from the State of the Nation address, 14 February 2013]

- 3.1.1 Identify TWO challenges experienced by the government during the implementation of land reform policies in the case study above. (2)
- 3.1.2 Name TWO land reform programmes that were not successfully implemented. (2)
- 3.1.3 Give THREE reasons for implementing a land reform programme in South Africa. (3)
- 3.1.4 State TWO aims of equity schemes. (2)

3.2

The table below indicates the different farming enterprises and market partners of a farm. The farmer manages all activities and ensures that produce is ready for specific marketing dates.

ENTERPRISE	FARM PRODUCT	MARKET PARTNER
Cash crop production	Vegetables	Contract with supermarket
Livestock production	Pork Eggs	Butcheries Hostels
Fodder crop production	Hay	Neighbouring livestock farms

- 3.2.1 State TWO risk management strategies that the farmer can employ when marketing farm produce. Justify your answer in each case. (4)
- 3.2.2 Indicate FOUR management principles this farmer has to apply to ensure that the produce is available on specific dates. (4)

3.3

A family in a rural area of the country decided to pursue farming. The father worked for a construction company for 20 years and received a pension package of R189 000,00 which he invested in land to start the farming enterprise. The family had too little capital and they approached the Vukuzenzele Trust for a grant. They were given a total of R80 000,00.

The family used this grant to purchase an irrigation system for R7 000,00 and a tractor for R58 000,00. R15 000,00 was used for pesticides, seeds and fertilisers.

- 3.3.1 Tabulate THREE forms of capital used by the family and give an example of each from the case study above. (6)
- 3.3.2 Name TWO sources of capital that were used by the family in the case study above. (2)
- 3.3.3 Calculate the total value of the assets for this farming enterprise. (2)
- 3.3.4 Define the *net value* of a farming enterprise. (2)

3.4 Farms lose labour to industries at an alarming rate.

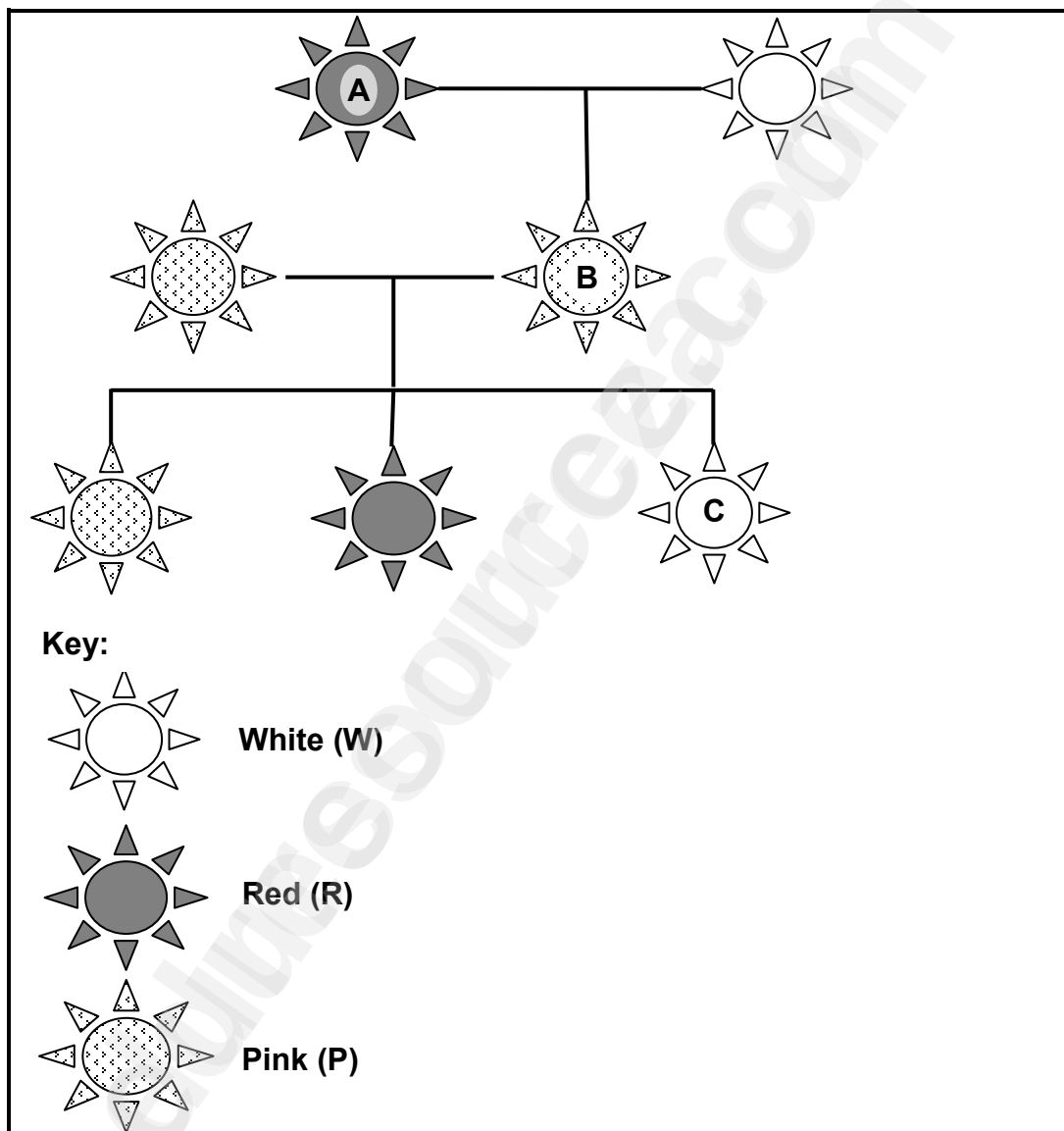
- 3.4.1 State TWO characteristics used to describe a permanent farm labourer. (2)
- 3.4.2 Indicate the TWO main causes of the loss of farm labour to industries. (2)
- 3.4.3 State TWO ways in which farmers can retain their labour. (2)

[35]

Start this question on a NEW page.

QUESTION 4: BASIC AGRICULTURAL GENETICS

- 4.1 The diagram below represents the colour of a flower for three successive generations.



- 4.1.1 Name the type of dominance represented in the illustration above. Motivate your answer. (2)
- 4.1.2 Use letters **W** for white and **R** for red to indicate the genotype and phenotype of flower **B**. (2)

4.2

A farmer receives the following pigs:

- Two females of which one is white and the other is dark
- Two males that are both dark

They are divided into two breeding pairs, each with the following F₁ generation:

Pair 1: A white female crossed with a dark male produces two white and two dark piglets

Pair 2: A dark female crossed with a dark male produces one white and three dark piglets

Use the letters D and d to represent the alleles for the colour of the pigs.

4.2.1 Calculate the percentage of each phenotype of the offspring in Pair 1. (2)

4.2.2 Determine the genotype of the offspring in Pair 2 using a Punnet square. (4)

4.2.3 Determine the phenotypic ratio of the offspring in QUESTION 4.2.2 above. (1)

4.2.4 In an open market, there is a higher demand for white piglets. Which breeding pair (Pair 1 or Pair 2) above will produce the most white piglets? Give a reason for your answer. (2)

4.3 The table below indicates the hereditary values for some characteristics of sheep.

HERITABILITY	HEREDITARY CHARACTERISTICS			
	BIRTH WEIGHT	POST-WEANING GAIN	LEAN MEAT	FLEECE QUALITY
Percentage (%)	33	60	35	17

4.3.1 Identify the characteristic that would be most effective in the improvement of the herd. Motivate your answer. (2)

4.3.2 Evaluate the effectiveness of the selection of fleece quality in improving the flock. Justify your answer. (2)

4.3.3 One sheep in a flock produces an average of 4 kg wool per year, whereas the average wool production per animal for the flock is 3,5 kg. The heritability value of wool production for this breed of sheep is 65%.

Calculate a simple estimated breeding value (EBV) for this flock by using the following formula:

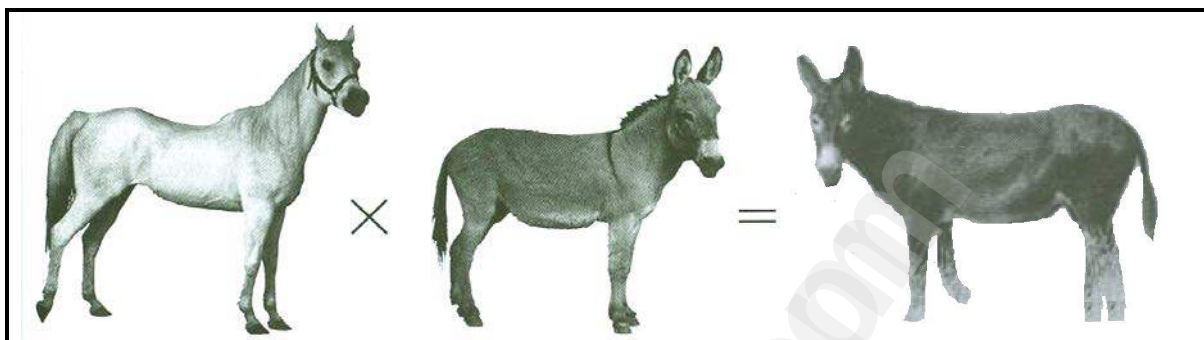
$$\text{EBV} = (\text{WA} - \text{WH}) \times \text{heritability of wool production}$$

where **EBV** = estimated breeding value

WA = wool production of the animal

WH = average wool production of the flock (3)

- 4.4 The diagram below shows a type of breeding system used by some livestock farmers.



- 4.4.1 Identify the type of breeding system illustrated above. (1)
- 4.4.2 Name the type of animal produced by the breeding system in QUESTION 4.4.1. (1)
- 4.4.3 State TWO uses of the animal produced by this system of breeding in farming. (2)
- 4.5 The yield obtained by two maize farmers in a typical maize-growing area is shown in the table below. Farmer A used conventional hybrid seed and Farmer B changed to the latest available genetically modified technology, using a genetically modified seed.

YEAR	FARMER A (Yield in t/ha)	FARMER B (Yield in t/ha)
2008	10	10
2009	11	11
2010	9	9
2011	11	11
2012	10	15
2013	11	17

- 4.5.1 Determine the difference in yield (t/ha) in 2013 between Farmer A and Farmer B by referring to the table above. Show ALL calculations. (2)
- 4.5.2 Identify the year Farmer B changed to GMOs. Justify your answer. (2)
- 4.5.3 Name TWO techniques used to develop genetically modified plants. (2)
- 4.5.4 Differentiate between *conventional hybrid seed* and *GMO seed*. (2)
- 4.5.5 State THREE advantages of genetic engineering. (3)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150