



AGRICULTURAL SCIENCES: PAPER II

Time: 2½ hours

150 marks

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY

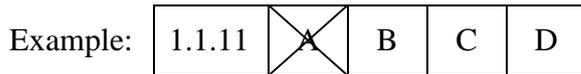
1. This question paper consists of 12 pages, including an Answer Sheet. Please ensure that your examination number is filled in in the space provided on the Answer Sheet and that it is handed in with your Answer Book at the end of the exam.
 2. This question paper is made up of two sections, namely Section A and Section B.
 3. This question paper consists of four questions.
 4. Question 1 must be answered on the Answer Sheet provided. Questions 2, 3, and 4 must be answered in your Answer Book.
 5. Start EACH question on a NEW page.
 6. Number the answers correctly according to the numbering system used in this question paper.
 7. Non-programmable calculators may be used.
 8. Use the total marks that can be awarded for each of Questions 1, 2, 3 and 4 as an indication of the detail required.
 9. It is in your own interest to write legibly and to present your work neatly.
-

SECTION A

QUESTION 1

Answer the following questions on the Answer Sheet provided.

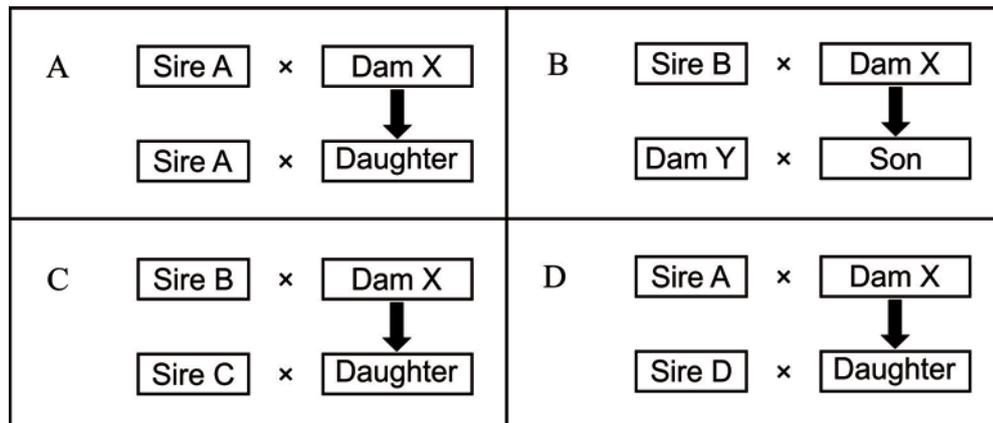
1.1 Various options are provided as possible answers to the following questions. Choose the answer and make a cross (X) in the block (A–D) next to the question number (1.1.1–1.1.10) on the attached Answer Sheet. NO marks will be awarded if more than one cross (X) appears for one answer.



1.1.1 One of these financial management techniques provides an accurate comparison of the relative profitability of enterprises on a farm.

- A A whole farm budget
- B A gross margin budget
- C A farm development budget
- D A return to capital statement

1.1.2 The diagram that best represents an example of line breeding.



1.1.3 The table below consists of hypothetical figures for a 500 ha wheat field.

Machinery loan repayment	R30 000
Planting costs	R35 000
Growing costs	R10 000
Harvesting costs	R15 000
Income from wheat	R200 000

What is the gross margin per hectare for the wheat crop?

- A R220
- B R260
- C R280
- D R320

- 1.1.4 A farmer wants to grow a crop of chickpeas in a camp that has a sandy soil and problems with kikuyu as a weed. The farmer chooses to use herbicide as a pre-emergent spray.

An extract from the herbicide label is shown in the table below.

Crop	Weeds	Rate (ℓ/ha)			Critical comments
		Light soil	Medium soil	Heavy soil	
Chickpeas	Amaranthus Kikuyu Millet Oats	1,5	1,7	2,0	Apply immediately prior to planting
Chickpeas	Kikuyu Millet Eragrostis	1,2	1,2	1,2	Apply after crop has reached three leaf stage

What rate of pre-emergent herbicide should the farmer use?

- A 1,2 ℓ/ha
 - B 1,5 ℓ/ha
 - C 1,7 ℓ/ha
 - D 2,0 ℓ/ha
- 1.1.5 If red and white flowers are crossed and the dominance interaction between the colours is incomplete dominance, the resultant generation will contain:
- A Red flowers and white flowers
 - B Flower with both red and white markings on the petals
 - C Pink flowers
 - D Only red flowers
- 1.1.6 The name given to the marketing strategy where one owner is involved in different parts of the supply chain for a product.
- A Contract selling
 - B Saleyard selling
 - C Vertical integration
 - D Wholesale marketing
- 1.1.7 One of the following is the name of the costs that should be subtracted from total enterprise income to calculate gross margin.
- A Fixed costs
 - B Total farm costs
 - C Variable equity
 - D Variable costs

1.1.8 Farmers in rural areas of the country lost stock through theft. This had a direct influence on the ... of their farming enterprise.

- A risk management
- B health programme
- C labourers
- D pasture evaluation

1.1.9 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 opinion.
- D To be dynamic and adaptable to change and development.

1.1.10 A company's website describes its operation as follows:

"Our business includes grain farms, feed mills, hatcheries, broiler and breeder farms and processing plants."

One of the following best describes this company's marketing strategy.

- A Co-operative
- B Marketing board
- C Direct marketing
- D Vertical integration

(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) on the Answer Sheet provided. E.g. 1.2.6 K.

COLUMN A	COLUMN B
1.2.1 The breeding of two (2) unrelated breeds to create a new hybrid.	A undercapitalisation B line-breeding
1.2.2 The dominance interaction taking place when a white bull is bred to a red cow, resulting in roan offspring.	C incomplete D saving
1.2.3 Too much money invested in relation to other production factors.	E crossbreeding F insurance
1.2.4 An internal source of farming capital.	G overcapitalisation H interest rates
1.2.5 A solution used to reduce the risk of marketing agricultural products.	I complete J credit

(10)

- 1.3 Give ONE word/term/phrase for each of the following descriptions. Write only the word/term/phrase next to the question number (1.3.1–1.3.5) on the attached Answer Sheet.
- 1.3.1 An individual with two alleles of a pair of genes that are not the same for a characteristic. (2)
- 1.3.2 The number of units of a product available for sale. (2)
- 1.3.3 The type of temporary farm worker employed for non-repetitive tasks such as erecting a fence for a farm stall. (2)
- 1.3.4 A form of asset used as surety to the lender in order to obtain a fixed capital item. (2)
- 1.3.5 The type of characteristics that are determined by a large number of genes that are responsible for the continuous variation in the phenotypes. (2)
- 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) on the attached Answer Sheet.
- 1.4.1 A manager is a person who identifies a unique business opportunity, gathers resources and is willing to take the risk of setting up the business. (1)
- 1.4.2 Scarcity is when capital goods lose their value as a result of becoming outdated and inefficient due to wear and tear. (1)
- 1.4.3 In a communal tenure system, a farmer owns a piece of land that has his/her name on the title deed. (1)
- 1.4.4 Atavism is the ability of an individual to transmit particular characteristics to the progeny. (1)
- 1.4.5 Grading is the provision of preset specifications, which will give uniformity to a group of products. (1)

45 marks

SECTION B

QUESTION 2 AGRICULTURAL MANAGEMENT AND MARKETING

Answer this question in the Answer Book.

2.1

A group of subsistence farmers on the south coast of KwaZulu-Natal 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-market system is preferred by these farmers. Describe **THREE** advantages of this marketing system. (3)
- 2.1.2 Suggest **THREE** ways in which this group of 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)
- 2.1.4 Indicate **TWO** possible disadvantages faced by these small-scale farmers when marketing their own produce. (2)

2.2 The table below indicates some of the income and expenses on a farm for the month of August.

EXPENSES			INCOME		
Date	Item bought	Cost (R)	Date	Item sold	Cost (R)
02/08	Transport of eggs @ R2/dozen	R80,00	04/08	40 dozen eggs @ R10/dozen	R400,00
06/08	4 x 50 kg layer feed @ R200/bag	R800,00	06/08	47 dozen eggs @ R10/dozen	R470,00
06/08	Transport of feed @ R5/bag	R20,00	06/08	40 dozen eggs @ R10/dozen	R400,00
06/08	200 egg trays @ R50/100 trays	R100,00	07/08	44 dozen eggs @ R10/dozen	R440,00
06/08	Loan repayment (Std Bank)	R250,00	08/08	43 dozen eggs @ R10/dozen	R430,00
12/08	Transport of free eggs	R80,00	10/08	40 dozen eggs @ R10/dozen	R400,00
15/08	Free 4 dozen eggs for workers	R28,00	11/08	2 dozen eggs for home	R20,00
24/08	4 x 50 kg layer feed	R800,00	26/08	43 dozen eggs @ R10/dozen	R430,00
Total		R2 158,00	Total		R2 990,00

- 2.2.1 Give **TWO** reasons why it is important for a farm manager to keep financial records. (2)
- 2.2.2 Deduce from the table the incentive used by the farmer to motivate the farm labourers. (2)
- 2.2.3 Use the data given above to identify and explain **TWO** ways in which this farmer generated farm capital. (4)

- 2.3 The table below represents the price of lamb and the number of lambs sold by a farmer over a period of six months. Lambs are marketed with an average carcass mass of 22 kg.

	Sept	Oct	Nov	Dec	Jan	Feb
Price (R/kg)	79	81	87	110	75	79
Number of lambs available to be sold	55	60	65	45	50	35

- 2.3.1 Using the data provided in the table above, draw a line graph to show the relationship between the number of lambs sold and the months of the year. (6)
- 2.3.2 Deduce the month in which the farmer had the highest income from the sale of lambs. (2)
- 2.3.3 Refer to the table above and suggest **TWO** marketing strategies this farmer could adopt to increase income of this farming business. (2)
- 2.3.4 Calculate the price per lamb for the following months.
- (a) September (2)
- (b) December (2)
- 2.3.5 Suggest an economic reason for the decrease in the supply of lambs by the farmer in February. (1)

[35]

QUESTION 3 PRODUCTION FACTORS

Start this question on a NEW page.

3.1 The table below shows the financial data of an agricultural production enterprise. The financial data is from January to April 2015.

Assets	Value (R)	Liabilities	Value (R)
Current assets	150 000	Current liabilities	70 600
Medium-term assets	63 000	Medium-term liabilities	15 000
Long-term assets	64 300	Long-term liabilities	20 000
Total assets	277 300	Total liabilities	105 600
NET VALUE			

3.1.1 Identify the type of financial statement given above. (1)

3.1.2 Explain the main purpose of the type of financial statement mentioned in Question 3.1.1. (2)

3.1.3 Define the term *Net Value*. (2)

3.1.4 Calculate the net value from the data in the table above. (2)

3.1.5 A small-scale farmer wants to expand a production unit. There are two options available for the farmer, namely a loan or a grant. Distinguish between a *loan* and a *grant*. (4)

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 **THREE** management principles this farmer has to apply to ensure that the produce is available on specific dates. (3)

3.3 State **THREE** functions of land as a factor in agricultural production. (3)

3.4

Case study

A farmer never attended school and, as a result, could never have a formal job to support the family. The farmer started a small vegetable garden for the family with two casual labourers working in it. Community members wanted to buy vegetables from the farmer. The farmer wanted to help them, but could not afford to do so.

The farmer went to the Land Bank for a loan and advice on the effective use of money. Consequently, the farmer increased the size of the vegetable garden and bought vegetable seeds, tools, fertilisers and insecticides. At last the needs of the community were met.

- 3.4.1 Identify **TWO** examples of floating capital in the case study. (2)
- 3.4.2 Identify the type of labourers employed in this vegetable garden. Give a possible reason for employing this type of labourers. (2)
- 3.4.3 State **TWO** ways in which this farmer was able to increase the productivity of the land. (2)
- 3.4.4 The farmer can manage the business effectively if the objectives for successful management are followed. Name **FOUR** main components of successful management. (4)
- 3.4.5 Differentiate between *medium-term credit* and *short-term credit* as sources of capital for the proper management of the business. Use an example to support your answer. (4)

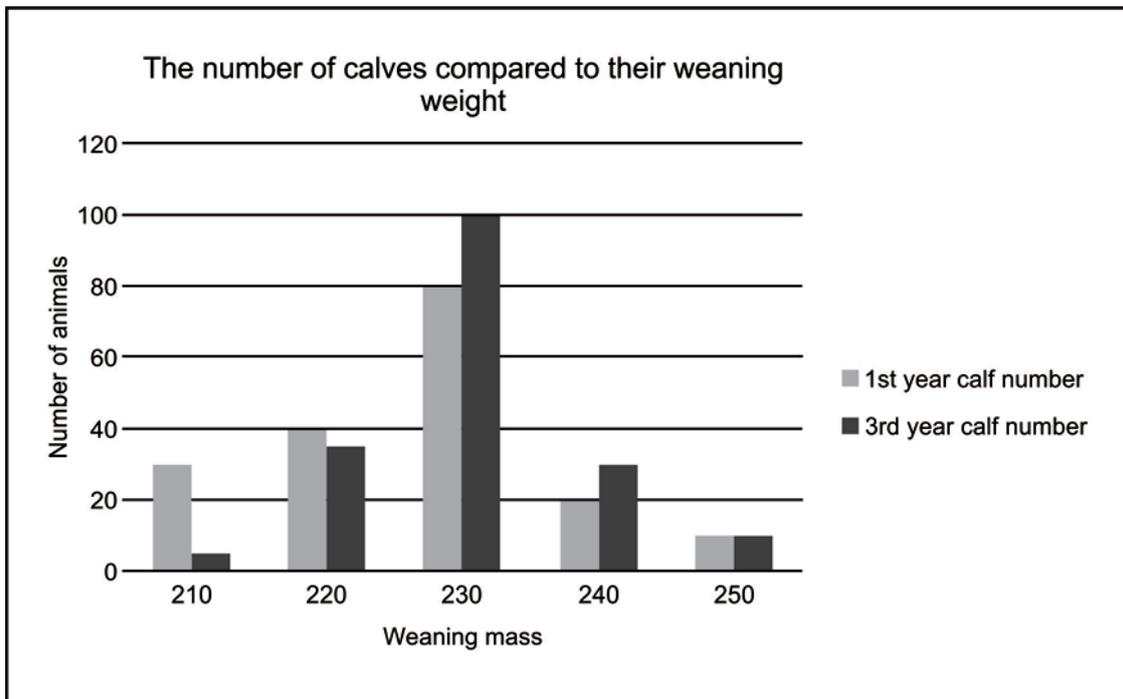
[35]

QUESTION 4 BASIC AGRICULTURAL GENETICS

Start this question on a NEW page.

- 4.1 A black stallion is bred to a black mare. This same pairing is done twice. In one instance the foal is black and in the other the foal is white.
- 4.1.1 Identify the dominance interaction taking place in the example above and assign letters to each colour accordingly. (3)
- 4.1.2 State the genotype of the following individuals:
- (a) The black stallion (1)
- (b) The white foal (1)
- 4.1.3 In each of the cases below, identify the genotype of the two black individuals bred together to achieve these phenotypic ratios.
- (a) All the offspring are homozygous black. (2)
- (b) Some of the offspring are homozygous black, while others are heterozygous black. (2)
- (c) 75% of the offspring are black and 25% of the offspring are white. (2)
- 4.1.4 The farmer wants to produce more white foals, but can only get black mares. Make a suggestion to the farmer to help him achieve this goal. Give reasons to support your answer. (5)

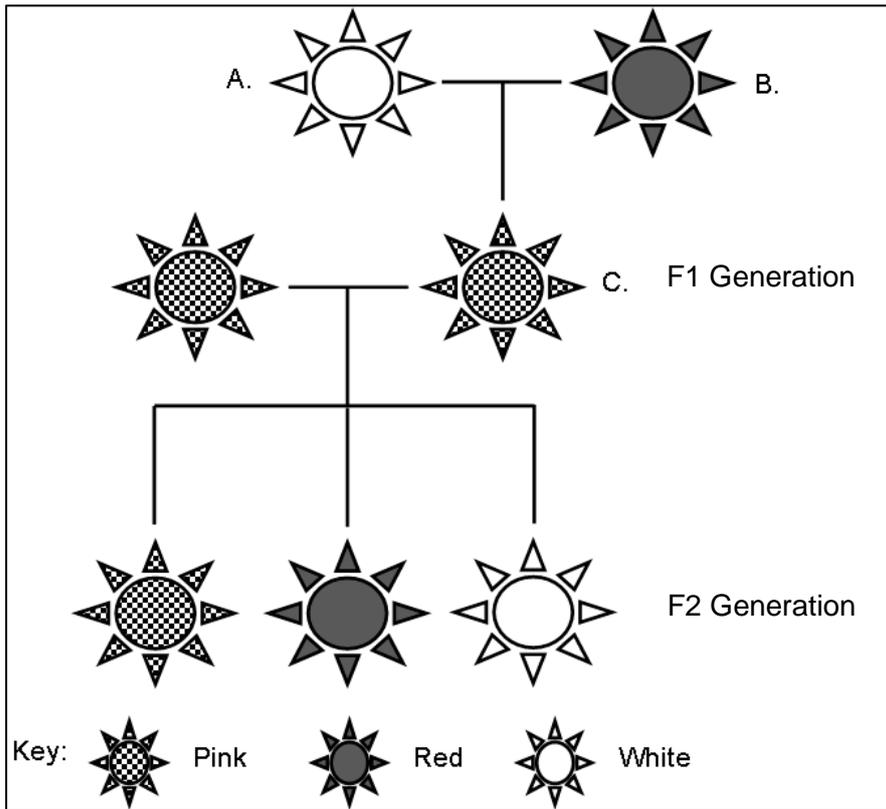
4.2 The graph below shows the number of animals weaned at various weights in two breeding seasons (year one and year three). Refer to the graph and answer the questions that follow.



4.2.1 The aim of this farmer is to improve the weaning weight of the animals. Identify the animals from year one that should be retained as replacement heifers and provide a reason for your answer. (4)

4.2.2 Name **THREE** factors that have an influence on the variation of the weaning mass of the calves. (3)

4.3 The picture below represents a flower breeding system. Refer to the picture below and answer the questions that follow.



- 4.3.1 Name the type of dominance represented in the illustration above. Motivate your answer. (3)
 - 4.3.2 Using the letter W for white and R for red, indicate the genotype of the flowers labelled A, B and C. (3)
 - 4.3.3 Use the Punnett Square to show the expected genotypic and phenotypic ratios of the F2 generation. (6)
- [35]**

105 marks

Total: 150 marks