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basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P2

NOVEMBER 2022

MARKS: 150

TIME: 2½ hours

This question paper consists of 15 pages.

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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.

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SECTION A

QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A–D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 B.

1.1.1 Market equilibrium occurs when the …

A supply and the demand are not equal.
B supply is more than the demand.
C market supply is equal to the market demand.
D demand is lower than the supply.

1.1.2 The following is NOT a component of selling:

A Management is sales-volume oriented.
B The emphasis is on the consumer's needs.
C The focus is on the seller's needs.
D The emphasis is on the agricultural product.

1.1.3 An operational production plan in a business plan focuses on the …

A number and type of employees.
B recruitment of suitable personnel.
C summary of the enterprise details.
D monitoring of performance and ensuring quality control.

1.1.4 The descriptions below address opportunities that could be realised through the SWOT analysis.

(i) New markets opening to increase sales
(ii) New technologies to improve efficiency of the business
(iii) Limited resources to farm effectively
(iv) Access to a grant from government

Choose the CORRECT combination:

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

1.1.5 The part of the expenditure of a farming enterprise which is NOT influenced by the level of production:

A Demand costs
B Fixed costs
C Supply costs
D Variable costs

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1.1.6 The type of labour hired solely to erect a kraal:

A Permanent
B Seasonal
C Full-time
D Casual

1.1.7 The action by a farmer to address undercapitalisation on the farm:

A Keep old non-viable tractors
B Pay higher wages
C Hire specific machinery
D Invest more money in the bank

1.1.8 The skill that enables the manager to protect the business from monetary losses:

A Financial management
B Decision-making
C Interpersonal
D Problem-solving

1.1.9 The following statements are about Mendel's laws of inheritance:

(i) Pairs of alleles separate randomly during meiosis.
(ii) Pairs of alleles arrange themselves dependently of each other.
(iii) Pairs of alleles arrange themselves independently of each other.
(iv) In a heterozygous state a dominant allele influences the physical appearance of an organism.

Choose the CORRECT combination:

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

1.1.10 An example of a heterozygous genotype for the colour of flowers:

A F^RF^R
B F^WF^W
C F^RF^W
D F^BF^B (10 x 2) (20)

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1.2 Choose a word/term in COLUMN B that matches a description in COLUMN A. Write only the letter (A–J) next to the question numbers (1.2.1 to 1.2.5) in the ANSWER BOOK, e.g. 1.2.6 K.

COLUMN A		COLUMN B	
1.2.1	A form of sustainable agricultural marketing that is responding to the increasing environmental concerns	A	retailer
1.2.2	The type of buyer working as an agent for commission	B	internal
1.2.3	Medium-term investment assets	C	agrimarketing
1.2.4	Forces originating from the farm which have an impact on farm management	D	X-rays
1.2.5	Damages the DNA molecule and causes it to break	E	external
		F	broker
		G	fixed capital
		H	green marketing
		I	movable capital
		J	nitric acid

(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 numbers (1.3.1 to 1.3.5) in the ANSWER BOOK.

1.3.1 The marketing system where the price of a product is decided upon by the government

1.3.2 A practice where uneconomic pieces of farmland are put together to increase productivity

1.3.3 A type of dominance where none of the parent characteristics are visible in the offspring

1.3.4 A technique where an electric current is passed through a solution containing the desired genes

1.3.5 An organism with more than two sets of chromosomes (5 x 2) (10)

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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 numbers (1.4.1 to 1.4.5) in the ANSWER BOOK.

1.4.1 Price monopoly is the setting of the price of goods and services with no bargaining allowed.

1.4.2 The money which is paid back to a financial institution over and above the money borrowed is credit.

1.4.3 Estimated breeding value is the use of statistics to analyse biological data.

1.4.4 The occurrence in chickens of an extra toe after it has been absent for many generations is an example of prepotency.

1.4.5 A small piece of the DNA that carries hereditary information of a characteristic is known as a chromosome. (5 x 1) (5)

TOTAL SECTION A: 45

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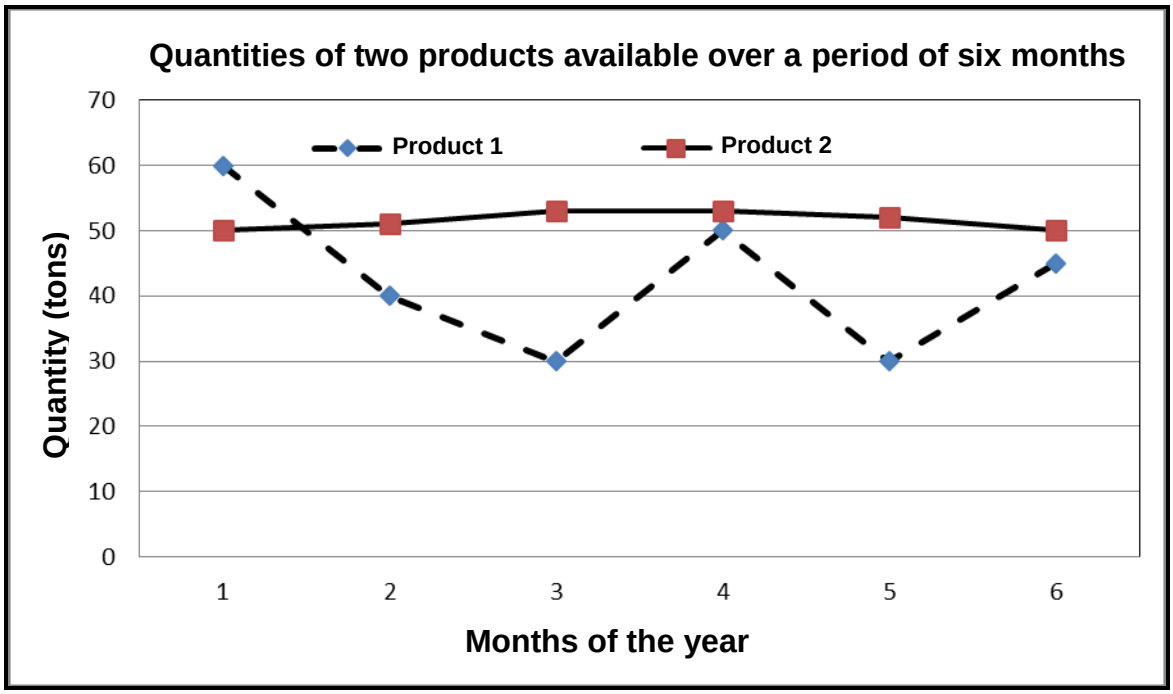
SECTION B

QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING

Start this question on a NEW page.

2.1 The graph below shows quantities of two agricultural products available in a market over a period of six months.



2.1.1 Indicate the quantity of product **1** that was available in month 3. (1)

2.1.2 Identify the product that shows constant availability over a six-month period. (1)

2.1.3 State the problem that may occur in the market with product **2** if the demand is 20 tons. (1)

2.1.4 Name the factor that may hamper the marketing of product **1**. (1)

2.1.5 Name TWO factors that can influence the demand of product **1** and **2**. (2)

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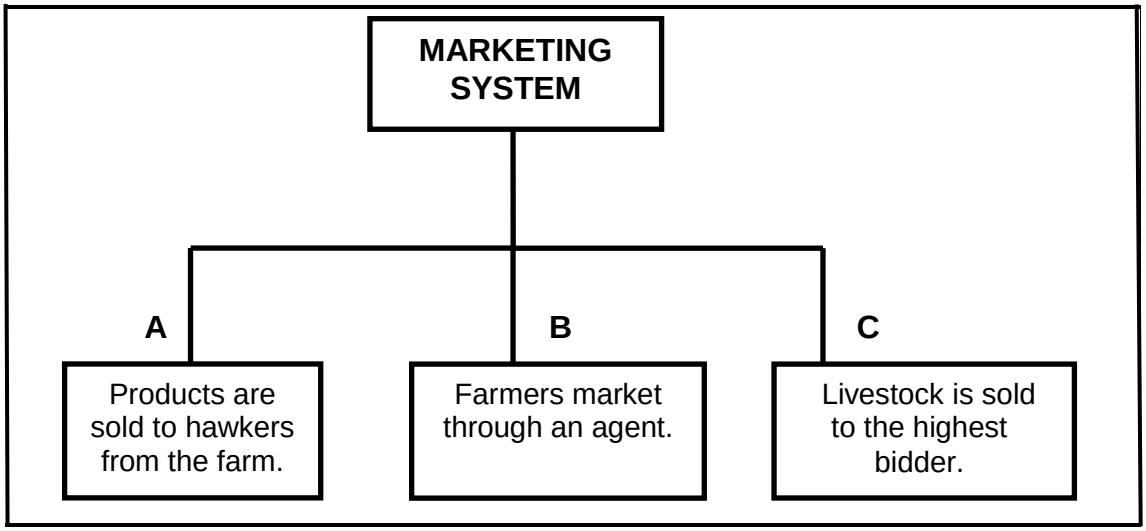
2.2 The flow chart below illustrates the marketing system and the channels used when marketing products.



2.2.1 Identify the marketing system illustrated above. (1)

2.2.2 Identify channels **A** and **B** that are used in the marketing system in QUESTION 2.2.1. (2)

2.2.3 State ONE advantage of channel **A** for EACH of the following:

(a) Farmer (1)

(b) Consumer (1)

2.2.4 Name ONE disadvantage of channel **C** to sellers. (1)

2.3 A group of youth near a livestock farm decided to collect manure from the farm to generate biofuel that is used as a source of energy. They drafted a business plan, which was used to secure funding from a bank, and bought a biogas digester. An old building was used as a factory and skilled personnel was hired to run the business. The business flourished and they started to service the community.

2.3.1 Identify THREE phases of entrepreneurship in the scenario above. (3)

2.3.2 Give TWO other reasons for drafting a business plan, except for the one in the scenario above. (2)

2.3.3 Indicate a success factor of this group which enabled them to do EACH of the following:

(a) For other people to believe in their idea and work with them (1)

(b) Investing in new equipment with the hope of succeeding in the business (1)

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2.4 The table below shows bags of potatoes offered in a market over a period of five weeks.

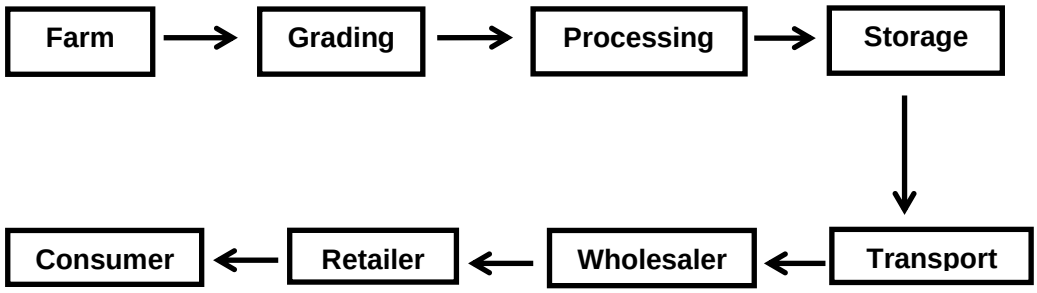
WEEKS	PRICE (RAND)	QUANTITIES OFFERED (BAGS)
1	10	500
2	20	1 000
3	30	1 500
4	40	2 000
5	50	2 500

2.4.1 Draw a line graph showing the quantities of potatoes offered at different prices. (6)

2.4.2 Describe the marketing law applicable to the data provided in the table above. (2)

2.4.3 Name TWO factors, other than the price, that could have contributed to the quantities of potatoes offered. (2)

2.5 The schematic representation below shows the marketing chain stages that the product passes through from the farm to the consumers.



2.5.1 Indicate TWO costs in the schematic representation above that could increase the price of a product when it reaches the consumer. (2)

2.5.2 Identify the stage in the marketing chain above in which the following occurs to improve the agribusiness:

(a) Installing cold rooms to prevent spoilage before transporting to the wholesaler (1)

(b) Improving road infrastructure for the product to reach the processing stage (1)

2.5.3 State TWO ways in which the retailer can make the product known to the consumer. (2)
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QUESTION 3: PRODUCTION FACTORS

Start this question on a NEW page.

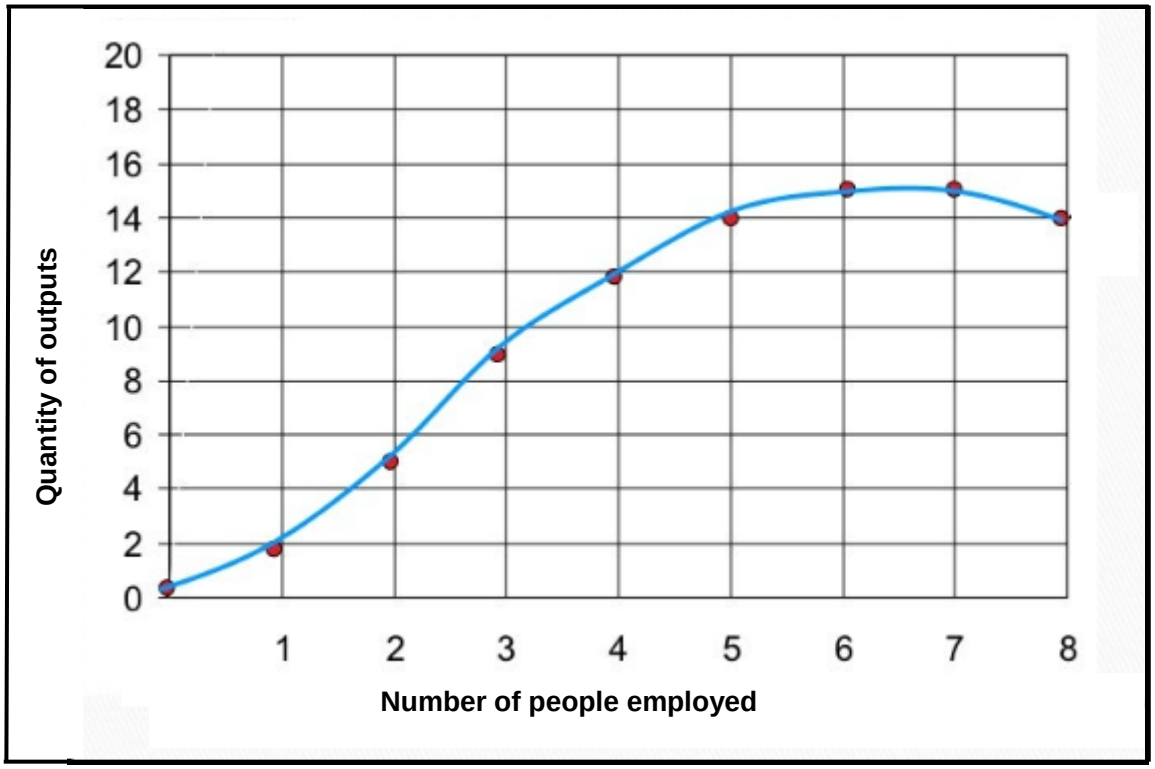
3.1 The availability of agricultural land is limited.

3.1.1 State TWO other economic characteristics of land. (2)

3.1.2 State TWO ways in which the productivity of land can be improved. (2)

3.1.3 State TWO functions associated with land as a production factor. (2)

3.2 The graph below shows the number of people employed by a farmer and their outputs.



3.2.1 Identify the production factor illustrated in the graph above. (1)

3.2.2 Deduce, from the graph above, the relationship between the number of people employed from 1 to 5 and their outputs. (2)

3.2.3 Name TWO problems of labour in a farming enterprise. (2)

3.2.4 State TWO ways in which the farmer can improve the economic conditions of farm workers. (2)

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3.3 Indicate the labour legislation that regulates EACH of the following:

3.3.1 Leave days, working hours, salaries and overtime (1)

3.3.2 Aims to develop and improve the competencies of labourers to operate machinery effectively (1)

3.3.3 Farm workers to wear overalls and gumboots for their daily operations (1)

3.4 The table below provides information on the assets and liabilities on a farm.

	ASSETS/LIABILITIES	VALUE (RAND)
A	Value of the farm	R3 500 000
B	Tractor loan	R365 000
C	Value of vehicles	R275 000
D	Bank overdraft	R150 000
E	Mortgage loan	R4 200 000
F	Cash	R50 000
G	Value of buildings	R650 000

3.4.1 Identify the item from the table above that represents EACH of the following:

(a) Asset (1)

(b) Liability (1)

3.4.2 Use a formula to calculate the net worth of the farm. (4)

3.4.3 Refer to the calculation in QUESTION 3.4.2 to indicate the viability of this farming business. (1)

3.4.4 Give a reason to support the answer to QUESTION 3.4.3. (1)

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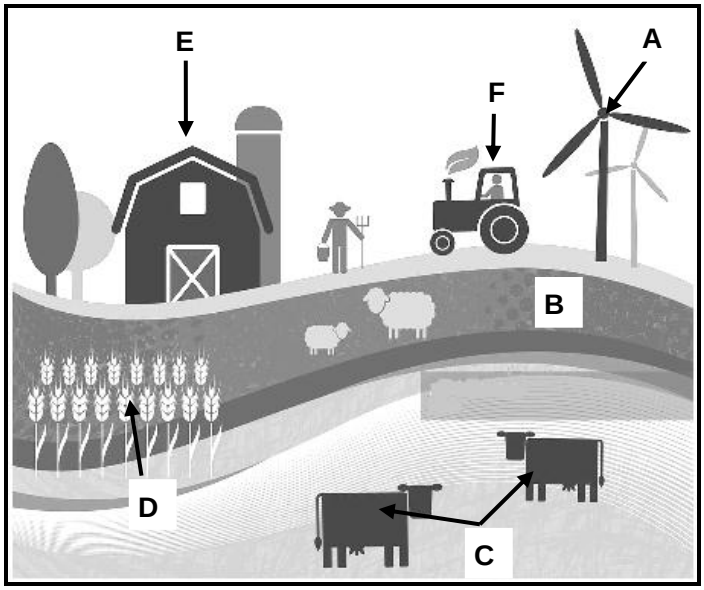
3.5 The picture below represents a farm with different farming enterprises.



3.5.1 Identify the type of capital represented by EACH of the following:

(a) **C** (1)

(b) **B** (1)

3.5.2 Indicate the problem of capital item **F**. (1)

3.5.3 Name a type of credit that is used to acquire EACH of the following capital items represented by:

(a) **D** (1)

(b) **E** (1)

3.6 A farming business should be well managed to be successful and to achieve the intended goals and objectives.

3.6.1 Define the term *management.* (2)

3.6.2 State TWO management principles of a business to be successful. (2)

3.6.3 Name TWO risk management techniques. (2)
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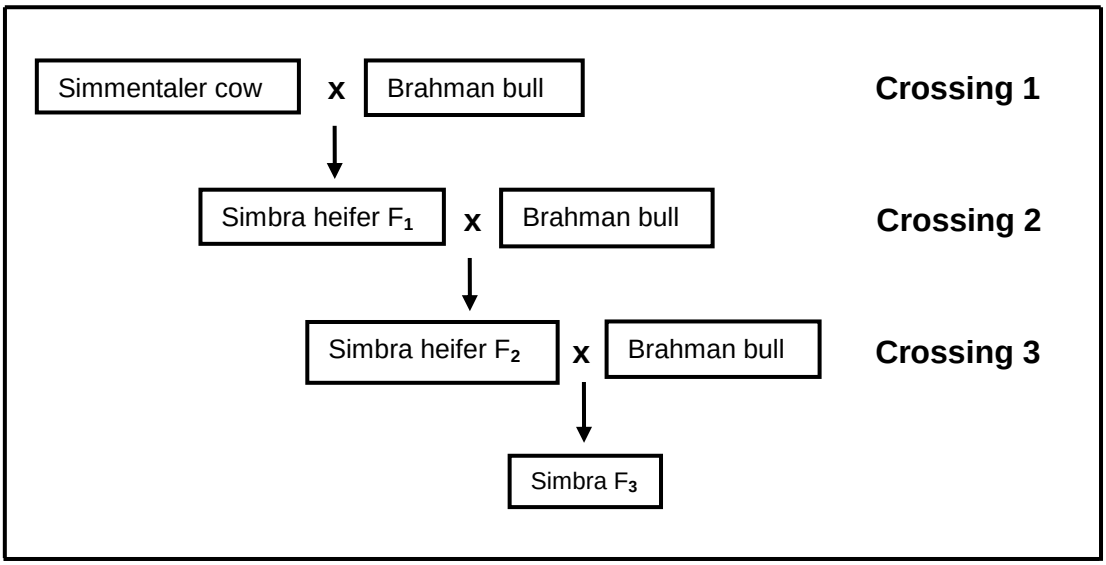
QUESTION 4: BASIC AGRICULTURAL GENETICS

Start this question on a NEW page.

4.1 The illustration below shows the crossing of farm animals where the same bull was used repeatedly to improve the growth rate of the herd.



4.1.1 Name the breeding system represented by EACH of the following:

(a) **Crossing 1** (1)

(b) **Crossing 3** (1)

4.1.2 Define the breeding system represented by **Crossing 3**. (1)

4.1.3 State ONE disadvantage of the breeding system represented by **Crossing 2**. (1)

4.1.4 State TWO advantages of the breeding system represented by **Crossing 1**. (2)

4.2 Variation is caused by both internal and external factors.

4.2.1 State TWO internal causes of variation. (2)

4.2.2 State TWO important aspects of variation in breeding. (2)

4.3 Match the methods of selection below with EACH of the following statements.

mass selection; family selection; progeny selection; pedigree selection

4.3.1 Animals are selected based on the records of their ancestors. (1)

4.3.2 Selection is based on the quality of relatives of its own generation. (1)

4.3.3 Farm animals are selected based on individual performance. (1)

4.3.4 Selection is based on the quality of the offspring. (1)

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4.4 The Punnett square below represents the crossing between a bull, which is heterozygous for both characteristics, and a heterozygous polled white cow.

KEY:

Characteristic 1: **(horn conformation)**
H – polled (no horns)
h – horned

Characteristic 2: **(hair colour)**
W – white
R – red
RW – roan

♀ \ ♂	**HR**	**HW**	**17**	**hW**
HW	1 **HHRW**	2 **HHWW**	3 **HhRW**	4 **HhWW**
HW	5 **HHRW**	6 **HHWW**	7 **HhRW**	8 **HhWW**
hW	9 **HhRW**	10 **HhWW**	11 **hhRW**	12 **hhWW**
hW	13 **HhRW**	14 **HhWW**	15 **hhRW**	16 **hhWW**

4.4.1 Give the genotype of the following individuals:

(a) Female parent (1)

(b) Gamete numbered 17 (1)

4.4.2 Determine the phenotypes of EACH of the following individuals:

(a) Number 9 (1)

(b) Number 16 (1)

4.4.3 Indicate the number of horned roan cattle in the Punnett square above. (1)

4.4.4 Indicate the number of polled red cattle in the Punnett square above. (1)

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4.5 Farm animals have sex chromosomes, known as gonosomes, and body chromosomes, known as autosomes. Horses have 64 chromosomes and goats have 60.

4.5.1 Indicate EACH of the following:

(a) The number of sex chromosomes in goats (1)

(b) The number of pairs of autosomes in horses (1)

4.5.2 If a ram (XY) is mated with an ewe (XX):

(a) Indicate the percentage chance of male offspring that could be produced (1)

(b) Determine the ratio of the male to female offspring (1)

4.6 The table below shows heritability of different characteristics in farm animals.

HEREDITARY CHARACTERISTIC			
	Milk production	**Eye colour**	**Fleece weight**
HERITABILITY (%)	40	70	20

4.6.1 Define the term *heritability*. (2)

4.6.2 Identify the following from the table above:

(a) Qualitative characteristic (1)

(b) Quantitative characteristic (1)

4.6.3 Indicate the percentage of environmental effect on milk production. (1)

4.6.4 Explain the relationship between heritability and the estimated breeding value (EBV). (2)

4.7 Genetic modification is the technique of changing the characteristics of an organism by inserting genes from another organism to the DNA of the original organism.

4.7.1 State TWO advantages of genetic modification over traditional breeding methods. (2)

4.7.2 State TWO negative effects of GM crops on the environment. (2)

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TOTAL SECTION B: 105
GRAND TOTAL: 150

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