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EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE
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SUBJECT:	**AGRICULTURAL SCIENCES**
PAPER:	**2**
DURATION OF PAPER:	**3 HRS**
DATES OF MARKING:	**8TH Dec 2022 – 22 Dec 2022**

SECTION A

QUESTION 1.1

Is learner performance poor, fair or excellent?

The learners' performance in this question was fair compared to previous year's performance.

What may be the reason for the performance observed

- Learners had a challenge in the terminology.
- Due to covid19, learners had a content gap in the foundation phase and needed more revision.
- Most learners had already lost concentration during the time of the examination since the subject was written last.
- Learners did not get enough foundation in grade 10 and 11 since much of their content was trimmed and other formal assessments were also removed.

Suggestions for improvement

- More activities should be given to learners to give them more practise of combination type of question and terminology.
- Questions shouldn't be too tricky and meanings of terms shouldn't be hidden for learners.
- All content subjects must not be written at the end of the examination, as learners tend to lose focus towards the end and will have examination fatigue.

QUESTION 1.2

Is learner performance poor, fair or excellent?

The performance in this subsection was fair.

What may be the reason for the performance observed?

- Most terms that were used were familiar to learners and were found in previous exam papers.
- Questions asked were clear and understood by learners

Suggestions for improvement

- Teachers must keep the good work of exposing learners to those concepts and give different distracters to various option.
- Learners must revise and master concepts in each topic.

QUESTION 1.3

Is learner performance poor, fair or excellent?

The performance in this subsection was poor as some candidates scored zero.

What may be the reason for the performance observed?

- Candidates were not thoroughly prepared; teachers should take time to prepare candidates well using various question banks and terminology quiz and other diverse means to train the learners
- Some Questions were not clear to learners

Misconceptions identified from learner's responses in question.

- In Question 1.3.1 learners confused price fixing with fixed price and in Question 1.3.2 most candidates failed to respond correctly to this question since consolidation which was needed as the correct terminology is not an agricultural sciences concept. In Question 1.3.3 learners confused incomplete dominance with complete dominance and in question 1.3.4 most learners failed to provide the correct spelling for electroporation. In question 1.3.5 learners confused polyploidy with polygenic and diploid.

QUESTION 1.4

Is learner performance poor, fair or excellent?

The performance was poor compared to the previous years.

What may be the reason for the performance observed?

- Learners may have performed poorly because they did not understand the subject language used and they lack skills in answering terminology questions and in recalling concepts.

Misconceptions identified from learners' responses in the question.

Yes, learners confused price fixing with fixed price

Some candidates confused interest with loan in Question1.4.1.

-They wrote alleles instead of genes and others wrote gene mutation in Question 1.4.5

Suggestions for improvement

- Teachers must compile concepts following CAPS document and present them first whenever introducing new topic.
- More revision in concepts/terminology in formal and informal assessments
- More Spelling exercises for Agricultural Sciences terms.
- Teachers must drill the recall skills on learners to master section **A**.

SECTION B

Comment on the performance of learners on subject terminology and use of Subject language.

- Most learners still struggle to link management and marketing concepts to agricultural sciences.
- Terminology is also a merger problem on learners.
- Most of learners managed to answer questions that requires graphical skills and trend analysis, though they still have a challenge in answering data response questions.

Were candidates well prepared for the exam?

- The learners were well prepared because they tried to cover the content gap that was created when grade 10 and 11 content was trimmed during Covid 19 period. The post Covid 19 effects have was not that detrimental to 2022 learner achievement this shows that the educators work extra mile to prepare candidates exposing them to various skills of answering questions.

SECTION 2:

Comment on candidates' performance in <u>individual questions</u>

QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING

General Performance

The performance was fair because majority managed to score between 12-18 marks.

Specify Common errors and misconceptions to assist teaching and learning

Question 2.1 Interpretation of supply graphs

2.1.1 Most learners were able to indicate the quantity of product 1 that was available in month 3 but very few were able to apply subject content to answer question 2.1.2, 2.1.3 and 2.1.4 which require candidates to apply subject knowledge to the given market information.

Question 2.2 Interpretation and application of the flow chart

Question 2.2.1 learners were confusing marketing systems with marketing approaches.

Question 2.2.2 learners failed to identify marketing channel B. They confused fresh produce with cooperative marketing system.

Question 2.2.3 was poorly answered by learners as they failed to differentiate the advantages of farm gate marketing to the farmer and to the customer.

Question 2.3. Interpretation of entrepreneurship scenario.

Question 2.3.1 some learners could not interpret the question, instead of providing the phases of entrepreneurship in the scenario they extracted direct statements from the scenario.

Question 2.4 Interpretation of data and translating it to line graph

2.4 As much as the learners were able to draw the graph correctly, they could not correctly apply the law of supply.

Question 2.5 Interpretation of schematic representation of a marketing chain

Question 2.5.2 (b) was Poorly answered and candidates could not relate the question with the marketing chain stages. Instead of identifying farm as the stage of marketing stage that requires improvement of road infrastructure to reach processing stage, they wrote transport.

Provide suggestions for improvement in relation to Teaching and Learning

- Leaners to be trained in question with cartoons and scenarios to be able to analyse data.
- Frequently writing of activities taken from previous papers can be of benefit
- Teach learners on how to answer questions based on graphs, and scenarios and diagrams
- Drill learners on the criteria used in drawing graphs following the exam guideline.
- Follow up on students who are struggling and grouping them during revisions to address their specific needs.
- Teachers must use CAPS document together with examination guidelines when preparing for their lessons.
- Teachers are encouraged to use previous years examination question papers for classroom activities, home activities and informal class tests to familiarize learners with questioning style.

QUESTION 3: PRODUCTION FACTORS

Specify common errors and misconceptions

Question 3.1 Land as Production factors

Question 3.1.1 most learners confused the economic characteristics of land with economic functions of land. Instead of writing economic functions of land they wrote functions of land.

Question 3.1.2 most learners were disadvantaged as they wrote improving soil fertility and scientific methods as separate points whilst the marking guide did not separate them.

Question 3.2.1 Many learners could not get this question correctly because of the poor interpretation of the graph, they provided land is subject to the law of diminishing returns instead of labour.

Question 3.2.2 Some leaners confused the graph with that of land is subject to the law of diminishing returns, they provided the interpretation of diminishing returns instead of giving the relationship between the number of people employed and output.

Question 3.2.4 some learners were writing general ways of improving labour productivity whilst the question required them to provide ways to improve economic conditions of farm workers.

Question 3.3 Labour legislation

In Question 3.3.1 - 3.3.3 most learners failed to recite the labour legislations in full.

Question 3.4 Balance sheet

Question 3.4.1 Some learners failed to identify assets and liabilities, instead they just provided the definitions of assets and liabilities.

Question 3.4.2 Learners confused the formula for calculating net-worth of the farm with that one of calculating profit/loss of the farm. Instead of writing Total value of assets minus total value of liabilities they write total income – total expenditure. Some wrote the formula wrongly starting with Liabilities minus assets.

Question 3.4.3 Some learners calculated the net worth of the farm correctly but failed to interpret the viability of the enterprise. Instead of writing not viable they wrote that the enterprise was making a loss and also gave wrong reason to support their answer.

Question 3.5.1 Average number of learners managed to identify the types of capitals in the given picture, while others provided the examples instead of giving the types.

Question 3.5.2 The response of the learners to this question was average, although some learners could not write "depreciation" they wrote general problems associated with tractors like unlicensed driver and pollution.

Question 3.6 Management

Question 3.6.1 Most learners had a challenge in providing the correct full definition of management, majority were obtaining one mark instead of two.

Question 3.6.2 Most learners confused the management principles with success factors of entrepreneurship such as risk taker and confidence.

Question 3.6.3 Many learners could not provide the risk management strategies. They provided general risks affecting the business-like technical risks.

Provide suggestions for improvement in relation to Teaching and Learning

- Use of previous question papers so that learners can be familiar with different assessments demanding different cognitive levels.
- Drill learners on terminology when introducing a new topic.
- Teachers should give more scenario based assessments to learns.
- Make use of English when teaching leaners so that they can break the barrier of the language.
- Learners should be exposed to different calculations related to different budgets, balance sheet and cash flow statements.

QUESTION: 4 Basic Agricultural Genetics

General Performance

Most of the learners performed fairly in this question as most of the candidates managed to get an average of 15 marks, whilst a significant percentage managed to score above 22 marks with no candidates scoring total.

Specify common errors and misconceptions

Question 4.1 Breeding systems

Question 4.1.1 (a) and (b) was problematic, Learners confused cross breeding with outcrossing in Question 4.1.1(a).

Question 4.1.1 (b) learners were writing line breeding and upgrading instead of inbreeding. Learners failed to interpret the stimulus from the given crosses.

Question 4.1.2 was embedded into Q4.1.1 (b), it was poorly answered as most learners were giving the definition of linebreeding which they mentioned in 4.1.1(b) instead of giving the definition of inbreeding. Some learners instead of defining they were giving examples of backcrossing.

Question 4.1.3 most candidates were confusing the advantages of inbreeding with disadvantages of inbreeding with some learners writing that the offspring will be uniform.

Question 4.2 Variation

Question 4.2.1 most Learners were able to state the internal causes of variation while a few confused with external factors writing climate, feeding and diseases instead of mutation, meiosis and fertilization. Some learners were writing different types of mutation limiting them to one mark.

Question 4.2.2 was challenging to most learners as they fail to state important aspects of variation in breeding. Most of them were confused by the term aspects of variation in breeding and instead they mentioned advantages of cross breeding.

Question 4.3 Selection methods

Question 4.3.1 most performing learners scored all 4 marks while low performing learners performed poorly as they confused pedigree selection with family selection method in question 4.3.1 and 4.3.2 respectively.

Question 4.4 Application and interpretation of dihybrid Punnet square

Question 4.4.1 Most learners managed to interpret the given dihybrid punnet square to answer Question 4.4.1 (b) but majority had difficulties in deducing the genotype of the female parent in 4.4.1 (a).

Question 4.4.2 Ability to deduce the phenotypes.

Most learners answered correctly (Polled roan) in Question 4.4.2 (a) and horned white

Question 4.4.2 (b), few confuse the phenotype with the genotype. Some leaners also provided all the phenotypes for (a) by mentioning polled, horned roan.

Question 4.5 Sex Chromosomes

Question 4.5.2 a) Few of them got the question correctly, majority confuse the sex chromosomes with the autosomes. They were writing 60 chromosomes instead of 2.

Question 4.5.2 b) Candidates were failing to remove the sex chromosomes for them to correct number of autosomes in horses, they were writing 32 instead of 31.

Question 4.6 Interpretation of heritability table

Question 4.6.1 Majority of learners failed to define heritability concept, they confuse it with prepotency and heredity.

Question 4.6.2 was fairly answered with few learners confusing qualitative traits with quantitative characteristics.

Question 4.6.4 was very challenging as learners failed to deduce the relationship between heritability and EBV, the ended up giving definitions of heritability and EBV.

Question4.7 Interpretation of GM technique in the picture.

Question 4.7.1 Poorly performed, most candidates gave the advantages of GMOs.

Question 4.7.3 Most learners wrote the health and economic effects of GM, instead of the environmental effects.

Suggestions for improvement

- Teachers should exchange knowledge especially with Life science teachers helping them in genetics.
- Must form groups in classes to define and discuss about terms on each and every topic.
- More practice on punnet square method is needed.
- More assessments testing different cognitive levels is needed.
- Extra classes so that they can have enough time for revision.
- Train learners to be able to answer both formal and informal assessment.
- Workshops should be done on teachers based on genetics.

Any other suggestions

- Learners must be given different tasks (witting and oral presentation of concepts)
- Print classrooms with agricultural posters so that every learner can be able to distinguish and identify all the concepts/pictures
- Content subject like Agricultural Science shouldn't be last paper on the exam timetable, whereby learners are very exhausted with exams
- June assessment for paper 2 should also be set provincially for grade 12 like paper1 in order to train learners thoroughly on different questioning techniques.

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.

* A G R S E 2 *

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. 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

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)

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)

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)

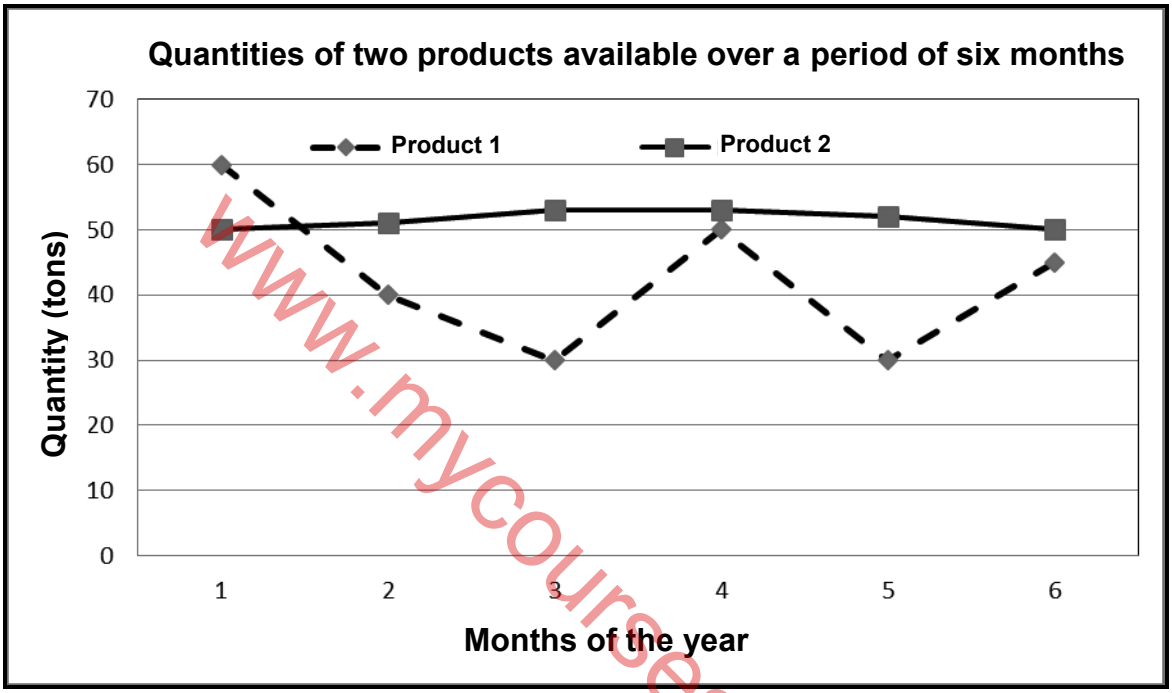
TOTAL SECTION A: 45

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)

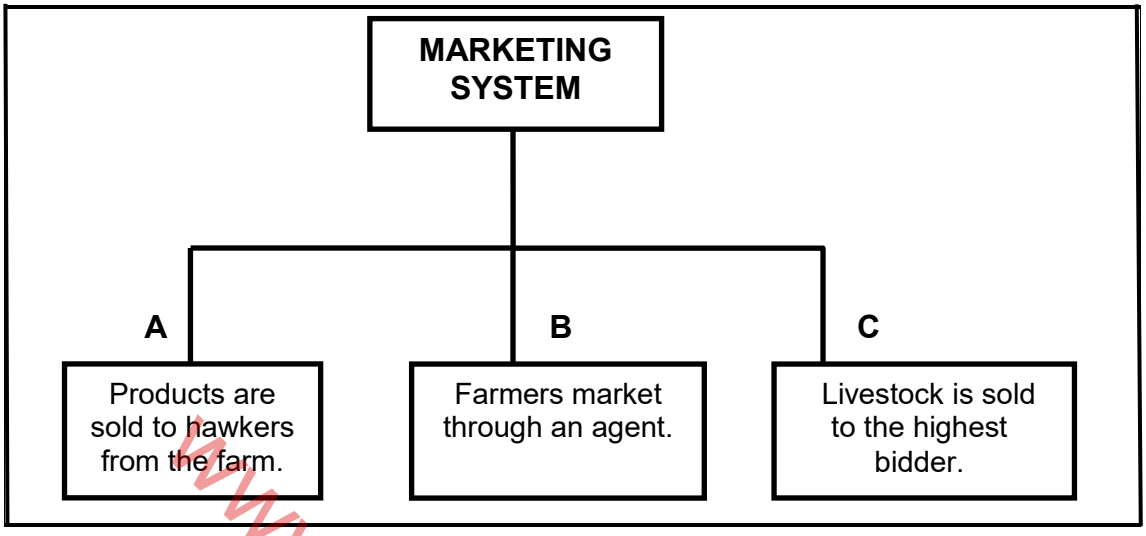
2.1.2 Identify the product that shows constant availability over a six-month period. (1)

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)

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)

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

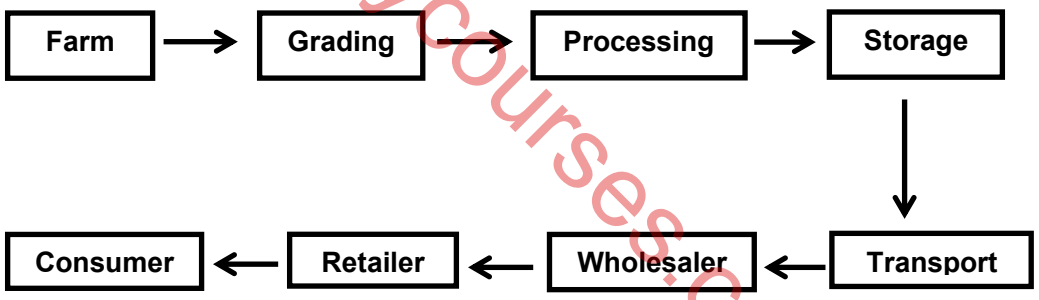
WEEKS	PRICE (RAND)	QUANTITIES OFFERED (BAGS)
1	10	500
2	20	1 000
3	30	1 500
4	40	2 000
5	50	2 500

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)
[35]

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)

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)

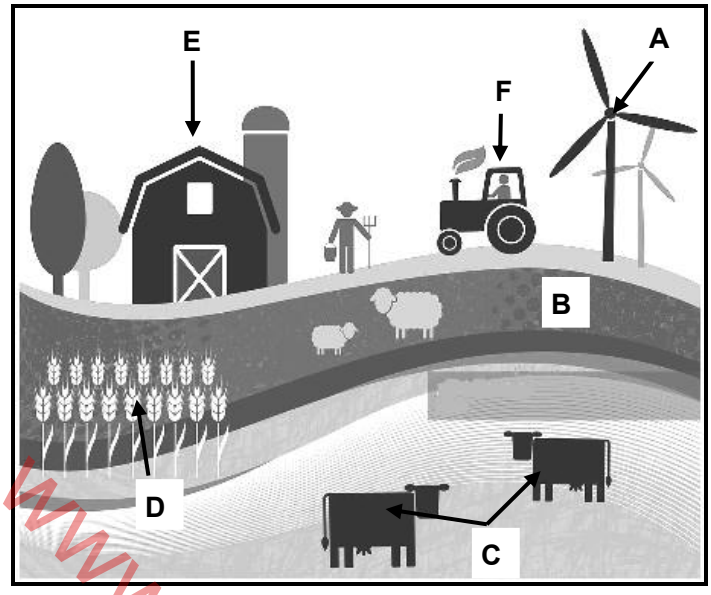
(b) Liability (1)

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)

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)

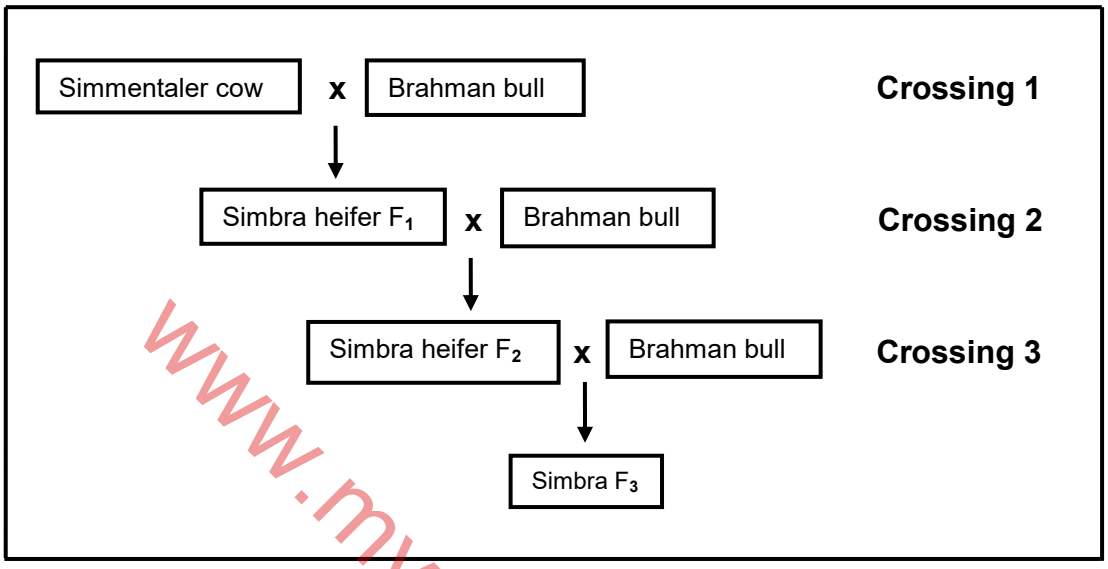
3.6.2 State TWO management principles of a business to be successful. (2)

3.6.3 Name TWO risk management techniques. (2)
[35]

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)

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)

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)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

AGRICULTURAL SCIENCES P2

NOVEMBER 2022

MARKING GUIDELINES

MARKS: 150

Approved

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7/12/2022	7/12/2022	7/12/2022	7/12/2022	7/12/2022

These marking guidelines consist of 11 pages.

SECTION A

QUESTION 1

1.1	1.1.1	C ✓✓		
	1.1.2	B ✓✓		
	1.1.3	D ✓✓		
	1.1.4	A ✓✓		
	1.1.5	B ✓✓		
	1.1.6	D ✓✓		
	1.1.7	C ✓✓		
	1.1.8	A ✓✓		
	1.1.9	D ✓✓		
	1.1.10	C ✓✓	(10 x 2)	(20)
1.2	1.2.1	H ✓✓		
	1.2.2	F ✓✓		
	1.2.3	I ✓✓		
	1.2.4	B ✓✓		
	1.2.5	D ✓✓	(5 x 2)	(10)
1.3	1.3.1	Controlled marketing ✓✓		
	1.3.2	Consolidation ✓✓		
	1.3.3	Incomplete dominance ✓✓		
	1.3.4	Electroporation ✓✓		
	1.3.5	Polyploidy ✓✓	(5 x 2)	(10)
1.4	1.4.1	Fixing ✓		
	1.4.2	Interest ✓		
	1.4.3	Biometrics ✓		
	1.4.4	Atavism/throwback ✓		
	1.4.5	Gene ✓	(5 x 1)	(5)

TOTAL SECTION A: 45

SECTION B

QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING

2.1 Availability of agricultural products over a period of six months

2.1.1 Indication of the quantities of product 1
30 tons ✓ (1)

2.1.2 Identification of the product
Product 2 ✓ (1)

2.1.3 Stating of the problem
- There will be a surplus/spoilage/storage costs ✓
- The price of the product will be less ✓ (Any 1) (1)

2.1.4 Factor hampering marketing of product 1
- Seasonal fluctuation ✓
- Perishability ✓
- Accidents/theft ✓
- Lack of infrastructure ✓
- Lack of capital ✓
- Lack of market information ✓
- Long distances to markets ✓ (Any 1) (1)

2.1.5 TWO factors influencing the demand
- Price ✓
- Change in consumer income/buying power ✓
- Number of consumers ✓
- Tastes and preferences of consumers ✓
- Price of competing/complementing/substitute products ✓
- Range of products available ✓
- Usefulness of the product ✓
- The quality of the product ✓
- Festive season/fashion ✓
- Research ✓
- Socio-economic factors ✓
- Legislation ✓
- Advertising ✓
- Price expectations ✓ (Any 2) (2)

2.2 Marketing system

2.2.1 Identification of the marketing system
Free marketing ✓ (1)

2.2.2 **Identification of the channels**
A - Farm gate marketing ✓ (1)
B - Fresh produce marketing ✓ (1)

2.2.3 **ONE advantage of CHANNEL A/farm gate**
(a) **Farmer -** No market chain costs/no transportation costs/ no intermediaries/higher income/immediate payment ✓ (1)
(b) **Consumer -** Products will be fresh/better quality/lower prices/ have bargaining power ✓ (1)

2.2.4 **ONE disadvantage of CHANNEL C/stock sale to sellers**
- Prices may be lower than the market price ✓
- Seller may not get the expected price/less profit ✓
- Small-scale farmers may not have money to take animals to auction sale ✓ (Any 1) (1)

2.3 **Entrepreneurship**

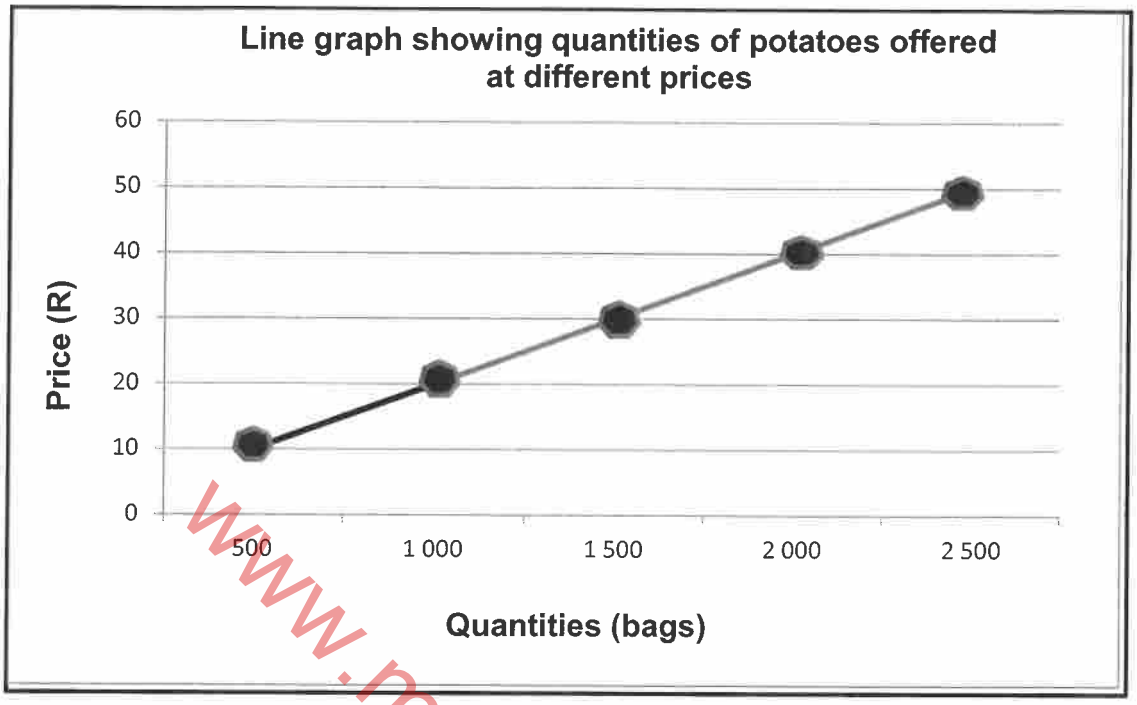
2.3.1 **Identification of THREE phases of entrepreneurship**
- Identifying the opportunity ✓
- Developing a business plan ✓
- Resource mobilization ✓
- Starting and managing the enterprise ✓ (Any 3) (3)

2.3.2 **TWO other reasons for drafting a business plan**
- To test the feasibility/economic viability of the business idea ✓
- Helps to define goals ✓
- Outlines the roles and responsibilities of individuals ✓
- Provides time frames for completion of activities ✓
- Provides guidelines for decision making/to compare progress ✓
- To guide daily operations ✓
- Helps manager to plan for capital requirements ✓
- Provides clear strategies/objectives to follow ✓
- To ensure effective business management ✓
- Allows to foresee problems which reduces risks ✓
- Repositioning the business to deal with changes in a market ✓
- To gain knowledge about marketing opportunities/competitors ✓
- Attract investors/partners ✓ (Any 2) (2)

2.3.3 **Indication of success factors**
(a) Leadership/organization/management/interpersonal skills/ confidence ✓ (1)
(b) Risk taking/confidence/positive thinking ✓ (1)

2.4 Supply

2.4.1 Line graph



CRITERIA/RUBRIC/MARKING GUIDELINE

- Correct heading ✓
- X-axis: Correctly calibrated and labelled (Quantities) ✓
- Y-axis: Correctly calibrated and labelled (Price) ✓
- Correct units (R and bag) ✓
- Line graph ✓
- Accuracy (80%+ correctly plotted) ✓ (6)

2.4.2 Law of supply

- The higher the price ✓ the higher the supply ✓
- The lower the price ✓ the lower the supply ✓ (Any 1) (2)

2.4.3 TWO factors other than price that contributed to supply

- Environmental conditions/nature ✓
- Availability of technology ✓
- Knowledge on production ✓
- Production costs ✓
- Subsidies/taxation/legislation ✓
- Number of suppliers ✓
- Price expectation/profit margin of the product ✓
- Demand of the product ✓
- Seasonal production ✓
- Political instability ✓
- Possibility of increasing/decreasing the supply of goods ✓
- Stability of the product ✓ (Any 2) (2)

2.5 **Marketing chain**

2.5.1 **TWO costs increasing the price of a product**

- Production costs ✓
- Packaging costs ✓
- Processing costs
- Storage costs ✓
- Transportation/distribution costs ✓
- Grading costs ✓ (Any 2) (2)

2.5.2 **Stage at which the agribusiness chain can be improved**

(a) Storage ✓ (1)
(b) Farm ✓ (1)

2.5.3 **TWO ways of making the product known to the consumer**

- Advertising/radio/television/billboards/newspapers/internet/ brochures/posters/flyers ✓
- In-store promotion ✓
- Exhibitions/trade fares ✓
- Sponsorship ✓
- Direct mailing ✓
- Marketing agent ✓
- Personal selling ✓ (Any 2) (2)

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QUESTION 3: PRODUCTION FACTORS

3.1 **Land**

3.1.1 **TWO other economic characteristics of land**

- Is required for production ✓
- Land is fixed/found in a specific environment ✓
- Indestructible ✓
- Land appreciates ✓
- Durability ✓
- Varies in production potential ✓
- Restrictedness ✓
- Passive factor for production/primary production factor ✓
- Source of wealth/can be bought/sold/used as a collateral ✓
- Subjected to the law of diminishing returns ✓ (Any 2) (2)

3.1.2 **TWO ways in which the productivity of land can be improved**

- Improving water management/supply ✓
- Restore land potential/responsible use of pesticides ✓
- Farm land more efficiently/consolidate uneconomic units ✓
- Crop rotation/intercropping/rotational grazing ✓
- Research ✓
- Use of scientific methods/technology/improve soil fertility/ precision farming ✓ (Any 2) (2)

3.1.3 **TWO functions associated with land as a production factor**

- Asset (used as collateral in obtaining loans) ✓
- Provides space for agricultural activities ✓
- Provides food/feeding for humans/animals ✓
- Source of raw materials ✓
- Source of minerals ✓ (Any 2) (2)

3.2 **Labour productivity**

3.2.1 **Identification of the production factor**
Labour ✓ (1)

3.2.2 **Deduction of the relationship**
An increase in the number of workers ✓ resulted to the increase in output ✓ (2)

3.2.3 **TWO labour problems**

- Poor labour management/supervision/late arrival/theft ✓
- Scarcity of labour/lower wages ✓
- Lack of training/skills ✓
- HIV/AIDS/other diseases/absenteeism ✓
- Competition from industries ✓
- Socio-economic problems ✓
- Labour unrest ✓ (Any 2) (2)

3.2.4 **TWO ways to improve the economic conditions of farm workers**

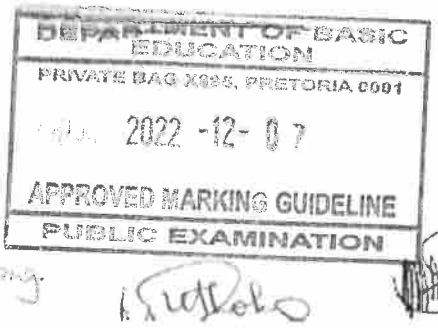
- Paying higher wages ✓
- Providing incentives for workers ✓
- Paying bonuses ✓
- Providing medical insurance/pension ✓
- Supplying them with farm products at reduced prices ✓
- Entering into partnership deal with workers ✓
- Provide education and training to workers ✓ (Any 2) (2)

3.3 **Indication of labour legislations**

3.3.1 Basic Conditions of Employment Act/BCEA (Act 75 of 1997) ✓ (1)

3.3.2 Skills Development Act/SDA (Act 97 of 1998) ✓ (1)

3.3.3 Occupational Health and Safety Act/OHSA (Act 85 of 1993) ✓ (1)



3.4 **Assets and liabilities**

3.4.1 **Identification of**

(a) **An asset**

- Value of the farm ✓
- Value of vehicles ✓
- Cash ✓
- Value of buildings ✓

(Any 1) (1)

(b) **A liability**

- Tractor loan ✓
- Bank overdraft ✓
- Mortgage loan ✓

(Any 1) (1)

3.4.2 **Calculation of the net worth of the farm**

Net worth = Assets – Liabilities ✓
= (R650 000+R50 000+R275 000+R3 500 000) –
(R365 000+R150 000+R4 200 000)
= R4 475 000 ✓ – R4 715 000 ✓
= – R240 000 ✓ (4)

3.4.3 **Indication of the viability of a farming business**

Not viable ✓ (1)

3.4.4 **Reason**

Net worth is negative/–R240 000/no profit/loss/value of assets is less than the value of the liabilities ✓ (1)

3.5 **Capital items**

3.5.1 **Identification of the type of capital**

(a) **C -** Movable capital ✓ (1)
(b) **B -** Fixed capital ✓ (1)

3.5.2 **Indication of the problem of capital in F (tractor)**

Depreciation/loses value/high fuel costs ✓ (1)

3.5.3 **Types of credit**

(a) **D -** Short-term credit ✓ (1)
(b) **E -** Long-term credit ✓ (1)

3.6 **Management**

3.6.1 **Definition of management**

Effective combination and coordination of human, physical and financial resources ✓ to achieve a specific goal, usually maximising profits ✓ (2)

3.6.2 **TWO management principles**

- Planning/setting goals ✓
- Implementation
- Leading/directing ✓
- Organization/coordination ✓
- Decision making ✓
- Communication ✓
- Motivation ✓
- Monitoring ✓
- Control ✓

(Any 2) (2)

3.6.3 **TWO risk management techniques**

- Diversification ✓
- Risk sharing ✓

(2)
[35]

QUESTION 4: BASIC AGRICULTURAL GENETICS

4.1 Breeding systems

4.1.1 **(a) Crossing 1** - Cross breeding ✓ (1)
(b) Crossing 3 - Inbreeding ✓ (1)

4.1.2 **Definition of inbreeding**
The breeding of closely related animals ✓ (1)

4.1.3 **ONE disadvantage of inbreeding**

- Leads to inbreeding depression ✓
- Loss of genetic variation ✓
- Increase the expression of lethal genes ✓
- Undesired genes are made more homozygous ✓
- Undesirable characteristic/deformities can be bred into the progeny ✓
- Leads to reduced vitality ✓
- Less resistance to diseases ✓
- An expensive system ✓

(Any 1) (1)

4.1.4 **TWO advantages of cross breeding**

- Produce hybrid vigour/heterosis ✓
- Development of new breeds ✓
- Increased adaptability ✓
- Increases genetic variation ✓
- More resistant to pests/diseases ✓
- Improves performance of animals ✓

(Any 2) (2)

4.2 **Variation**

4.2.1 **TWO internal causes of variation**
- Mutation ✓
- Meiosis/crossing-over/recombination of genes ✓
- Random fertilisation ✓ (Any 2) (2)

4.2.2 **TWO importance of variation**
- Forms the basis of selection ✓
- Improves existing breeds/cultivars ✓
- Development of new breeds/plant cultivars ✓ (Any 2) (2)

4.3 **Selection**

4.3.1 Pedigree selection ✓ (1)

4.3.2 Family selection ✓ (1)

4.3.3 Mass selection ✓ (1)

4.3.4 Progeny selection ✓ (1)

4.4 **Punnett square**

4.4.1 **The genotype**
(a) Female parent - HhWW ✓ (1)
(b) Number 17 - hR ✓ (1)

4.4.2 **Determination of the phenotype**
(a) Number 9 - Polled and roan ✓ (1)
(b) Number 16 - Horned and white ✓ (1)

4.4.3 **Number of horned roan cattle**
2 ✓ (1)

4.4.4 **Number of polled red cattle**
0 ✓ (1)

4.5 **Sex chromosomes and determination**

4.5.1 **Sex chromosomes**
(a) Number of sex chromosomes in goats - 2 ✓ (1)
(b) Pairs of autosomes in horses - 31 ✓ (1)

4.5.2 **Sex determination**
(a) Indication of the percentage chance - 50% ✓ (1)
(b) Determination of the ratio - 1:1 ✓ (1)

4.6 **Heritability**

4.6.1 **Definition of heritability**
The degree to which a characteristic ✓ is determined by genetic factors ✓ (2)

4.6.2 **Identification of characteristics**
(a) Qualitative - Eye colour ✓ (1)
(b) Quantitative - Milk production/fleece weight ✓ (1)

4.6.3 **Indication of the percentage of the environmental effect**
60% ✓ (1)

4.6.4 **Explanation of the relationship**
- The higher the heritability of the trait ✓ the higher the estimated breeding value ✓
- The lower the heritability of a trait ✓ the lower the estimated breeding value ✓ (Any 1) (2)

4.7 **Genetic modification**

4.7.1 **TWO advantages of genetic modification over traditional breeding methods**
- It is precise ✓
- It is faster ✓
- Not limited to organisms of the same species ✓ (Any 2) (2)

4.7.2 **TWO negative effects of GM crops on the environment**
- Leads to development of super weeds ✓
- Beneficial insects can be killed ✓
- Leads to the excessive use of herbicides/pollution ✓
- Reduces biodiversity ✓ (Any 2) (2)

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TOTAL SECTION B: 105
GRAND TOTAL: 150