



NATIONAL SENIOR CERTIFICATE EXAMINATION  
NOVEMBER 2023

## **AGRICULTURAL SCIENCES**

### **MARKING GUIDELINES**

Time: 3 hours

300 marks

---

**These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.**

**The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.**

---

**SECTION A****QUESTION 1**

- 1.1    1.1.1 A  
         1.1.2 B  
         1.1.3 A and B  
         1.1.4 B  
         1.1.5 A  
         1.1.6 Neither A nor B
- 1.2    1.2.1 D  
         1.2.2 B  
         1.2.3 A  
         1.2.4 D  
         1.2.5 B  
         1.2.6 A  
         1.2.7 C  
         1.2.8 A  
         1.2.9 C  
         1.2.10 B
- 1.3    1.3.1 A  
         1.3.2 F  
         1.3.3 E  
         1.3.4 G  
         1.3.5 B  
         1.3.6 C
- 1.4    1.4.1 Drenching/dosing gun  
         1.4.2 Leydig  
         1.4.3 Biotechnology  
         1.4.4 Diversification  
         1.4.5 Precision farming/agriculture  
         1.4.6 Grafting
- 1.5    **Rearranged stages of embryo transfer**  
         1.5.1 F  
         1.5.2 A  
         1.5.3 D  
         1.5.4 E  
         1.5.5 B  
         1.5.6 C
- 1.6    1.6.1 Pulse rate  
         1.6.2 Semen  
         1.6.3 Hypoplasia  
         1.6.4 Processing/value adding  
         1.6.5 Mutation  
         1.6.6 Plant hybridisation

**SECTION B****QUESTIONS 2****2.1 Soil classification****2.1.1 Name of the soil classification system of South Africa**

Binomial soil classification systems

**2.1.2 Relating statements to diagnostic topsoil horizons**

- (a) A humic A horizon
- (b) Vertic A horizons
- (c) The organic A horizon
- (d) The orthic A horizon
- (e) Melanic A horizons

**2.1.3 TWO reasons for the classification of soils in agriculture**

- To know which crops to cultivate.
- To estimate agricultural productivity potential of soils.
- How to fertilise the crop correctly.
- How to manage irrigation of the crop.

**2.2 Production factors****2.2.1 Identification of production factors**

**A:** Management/entrepreneur  
**B:** Capital  
**C:** Labour  
**D:** Land

**2.2.2 The income that each of the four production factors generate**

**A: Management/entrepreneur:** Profit  
**B: Capital:** Interest  
**C: Labour:** Wages  
**D: Land:** Rest

**2.2.3 TWO problems associated with each of the following production factors:****B (Capital):**

- Scarcity
- Expensive/high costs
- Risk
- Law of diminishing returns
- Overcapitalisation
- Undercapitalization
- Depreciation

**C (Labour)**

- Lack of skills/training/unskilled labour
- Labour shortages/scarcity
- Diseases (e.g. HIV/Aids, Covid-19)
- Labour unrest/worker's rights
- Economic migrants
- Social problems
- Safety at work in enterprises such as game ranching
- Competition from industries

**2.2.4 THREE economic characteristics of D (land)**

- Land is limited
- Land is fixed and in a fixed location
- Land is not produced
- Primary production factor
- Passive production factor/cannot produce anything by itself
- Land is indestructible
- Value of land appreciates over time
- Land can be bought or sold/is an asset
- Land production potential varies
- Land serves as a collateral

**2.3 Sexual reproduction – different types of fruit****A:** Simple**B:** Compound/aggregate**C:** Accessory**D:** Multiple**E:** Grapes, peaches, plums, apricots, apple, banana, cherry pear, tomato**F:** Raspberries, rose, lotus, strawberries, blackberry**G:** Apples, figs, pear and strawberries**H:** Mulberries, pineapple, osage and orange

## **2.4 Demand and supply**

### **2.4.1 Identification of curves**

**A:** Demand

**B:** Supply

### **2.4.2 The economic term for point C**

Market equilibrium

### **2.4.3 Definition of market equilibrium**

Is a situation in which economic forces such as supply and demand are balanced and in the absence of external influences/the situation in the market where demand is equal to supply

### **2.4.4 Identification of the grey-shaded areas**

**D:** Surplus

**E:** Shortage

### **2.4.5 The relationship between price, demand and supply**

- The higher the price, the higher the supply and the lower the demand.
- OR**
- The lower the price, the lower the supply and the higher the demand.

**QUESTION 3****3.1 3.1.1 Name of the tick**

Blue tick

**3.1.2 ONE animal disease transmitted by blue tick**

- Redwater
- Anaplasmosis/gall sickness

**3.1.3 TWO reasons for eco-friendly**

- Residual action
- Oxpecker compatible

**3.1.4 An appropriate method of applying the chemical**

Pour-on

**3.2 3.2.1 Punnett square method to show the offspring of the F<sub>2</sub> generation**

|   |    |    |
|---|----|----|
|   | R  | W  |
| R | RR | RW |
| W | RW | WW |

**3.2.2 Type of dominance in the offspring of the F<sub>1</sub> generation that are all pink**

Incomplete dominance

**3.2.3 Reason**

Intermediate colour/all offspring are pink/new colour different from both parents

**3.2.4 Phenotypic ratio of the F<sub>2</sub> generation**

1 white : 2 pink : 1 red

**3.3 3.3.1 Identification of the strategies of developing a market**

- A:** Product  
**B:** Price  
**C:** Place  
**D:** Promotion

### 3.3.2 TWO factors that the farmer should consider when planning each of the strategies

#### Price (B):

- Cost
- Demand
- Competition

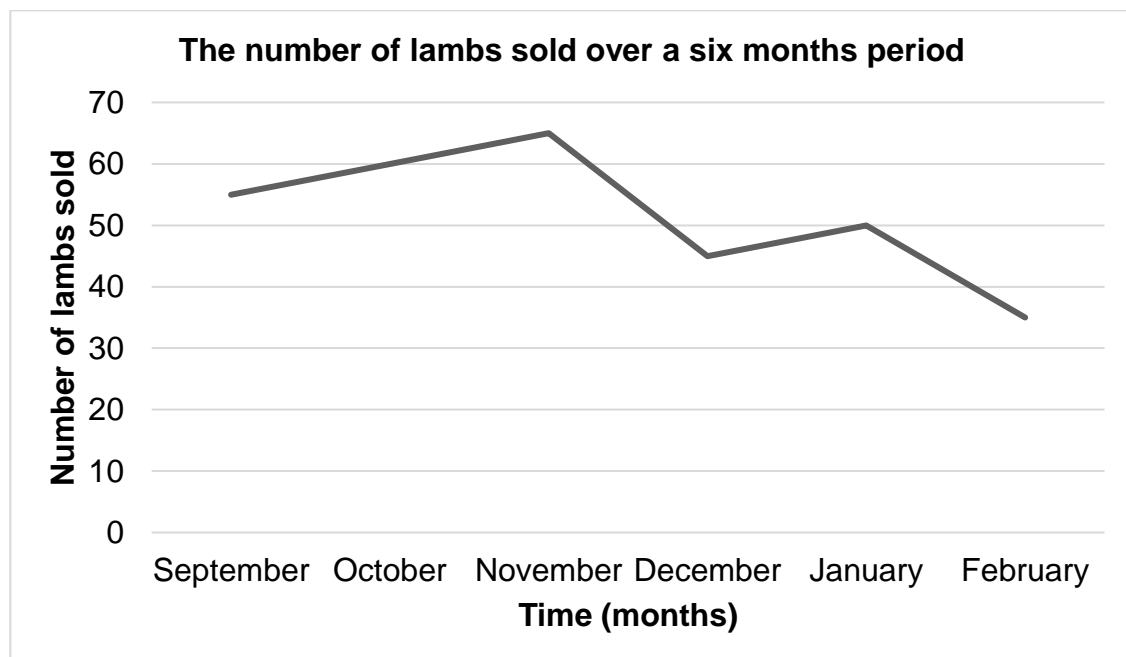
#### Promotion (D):

- Advertising
- In-store promotion
- Direct marketing
- Sponsorship
- Exhibitions/trade fairs
- Personal selling/salespeople

### 3.3.3 FOUR main functions of agricultural marketing

- Transportation
- Storage
- Processing
- Packaging

### 3.4 3.4.1 Line graph



#### Criteria/rubric/marking guidelines

- Correct heading
- Y-axis: Correctly calibrated
- Y-axis: Correct label (number of lambs sold)
- X-axis: Correctly calibrated
- X-axis: Correct label (time)
- Correct unit (months)
- Correct type of graph (line graph)
- Correct plotting

**3.4.2 The month in which the farmer had the highest income**

November

**3.4.3 Calculation of the price per lamb for September**

$$27 \text{ kg} \times R79,00 = R2\,133,00$$

**3.4.4 Calculation of the possible income that could be generated by the farmer in February**

- $27 \text{ kg} \times R79,00 = R2\,133,00$  (per lamb)
- $R2\,133,00 \times 35$  lambs
- R74 655,00

**3.4.5 An economic reason for the decrease in the supply of lambs by the farmer in February**

- Drop in prices for lamb in January
- Festive season is over/biggest demand is over
- Speculating/withholding stock for higher prices
- Scarcity of money after the festive season
- Farmer ran out of stock/no stock available

**3.4.6 TWO marketing strategy this farmer could adopt to increase the income possibilities**

- Market research
- Planning for marketing stage using breeding season
- Promotion/advertising
- Supply more in December/festive season/period of more demand
- Market the lambs when the price is the highest



**QUESTION 4****4.1 4.1.1 Identification of the forms of gametogenesis represented**

- **A:** Spermatogenesis
- **B:** Oogenesis/ovogenesis

**4.1.2 Types of cell division**

- C:** Mitosis
- E:** First meiosis/meiotic division
- G:** Second meiosis/meiotic division

**4.1.3 Labelling**

- D:** Primary oocyte/first order oocyte
- F:** Secondary spermatocyte/second order spermatocyte

**4.1.4 Name the products**

- H:** Spermatids
- I:** Ootids

**4.1.5 The end product of each process**

- J:** Spermatozoa (sperm cells)
- K:** Ovum (egg cell)

**4.2 4.2.1 Identification of the type of marketing system**

Cooperative marketing

**4.2.2 Justify with TWO reasons from the illustration**

Group of farmers working together to meet their economic needs

**4.2.3 THREE agricultural co-operative principles**

- Voluntary and open membership
- Democratic member control
- Members' economic participation/equal contribution
- Autonomy and independence
- Provision of education, training and information to members
- Cooperation among cooperatives
- Concern for community/sustainable development of communities

**4.2.4 TWO benefits or advantages of agri-co-operatives**

- Involvement of more producers increases potential for growth
- Access to professional expertise
- Better bargaining power than individual farmers
- Economies of scale through pooling system
- Access to better infrastructure
- Elimination of the middleman
- Bulk purchasing for inputs brings more chances to negotiate better prices
- Branding can make them more visible to buyers
- A number of government programmes make funding available to cooperatives

**4.2.5 FIVE channels of free marketing**

- Farm gate
- Fresh produce
- Stock sales/auctions
- Direct/contract marketing
- Internet marketing

**4.3 4.3.1 Labels for**

- A:** Rhizome
- B:** Bulb
- C:** Corm
- D:** Tuber

**4.3.2 Definition of double fertilisation**

Double fertilisation occurs when one female gamete unites with two male gametes. One of the male gametes fertilises the egg resulting in the formation of a zygote and the other unites with 2 polar nuclei for the formation of an endosperm.

**4.4 4.4.1 Identification of the type of parasite**

External parasite/exoparasite

**4.4.2 Classification of the parasite based on its life cycle**

Two host (2 – host)

**4.4.3 Identification of the FOUR forms in which the parasite appears during its life cycle**

- Eggs
- Larvae
- Nymphs
- Adults

**4.4.4 FOUR examples of the type of parasite, except ticks**

- Nasal worms
- Mites
- Lice
- Blowflies

**4.4.5 THREE economic losses to the farmer caused by the parasite**

- Expensive to eradicate from herd/medication is expensive
- Costs of building facilities (e.g. dipping tank, spray race, etc.)
- Costs of labour during treatment
- Loss of profit/reduced productivity/death of animals
- Ban of exports and imports

**QUESTION 5****5.1 Precision agriculture****5.1.1 TWO basic principles of precision agriculture**

- Optimal production (best production with least input costs possible)
- Less damage to the environment
- Healthier food for all with less fertilisers and pesticides
- Sustainability of production

**5.1.2 Identification of the main ultra-modern technologies**

- (a) **GIS:** Geographic Information Systems
- (b) **GPS:** Geographic Positioning Systems

**5.2 The different parts of flower****5.2.1 The labels for parts of the flower**

**B:** Style  
**H:** Filament  
**I:** Anther  
**J:** Stamen

**5.2.2 ONE function for**

- (a) **A – Stigma:** To receive/trap pollen grains with the sticky and hairy part
- (b) **D – Ovary:** To produce female reproductive cells (egg cell/ ovum) or ovules (female gametophytes) for fertilisation

**5.3 5.3.1 Identification of the financial record**

Cash flow statement/budget

**5.3.2 TWO items (components) from the table to support cash flow statement**

- Has opening balance
- Has receipts/income
- Has payments/expenses
- Has a closing balance
- Contains cash items
- Contains net cash/profit/loss

### 5.3.3 The financial record to determine the net worth of a farming business

Balance sheet

### 5.3.4 Differentiation

**Enterprise budget:** is a budget for one specific enterprise on the farm

**Whole-farm budget:** is a budget that combines all farming enterprises to show the net returns to the business

### 5.4 5.4.1 Identification of the pattern of inheritance

Atavism/throwback

### 5.4.2 Justification

A recessive gene for red which was switched off and not expressed in the phenotype in the past is now switched on and expressed

### 5.5 5.5.1 The type of farm worker

Permanent/full-time

### 5.5.2 Justification

Employed from 1<sup>st</sup> April 2020 until retirement

### 5.5.3 An item that relates to the labour legislation:

- (a) **Labour Relations Act:**
  - Management of disputes/item number 10
- (b) **Occupational Health and Safety Act:**
  - Protective clothing/item number 8
- (c) **Basic Conditions of Employment Act:**
  - Commencement/item number 3
  - Mode of payment/item number 5
  - Salary: Amount/item number 6
  - Terms of employment/item number 7
- (d) **Skills Development Act:**
  - Training opportunities/item number 9

**5.5.4 TWO ways in which the farm worker could have an impact on the productivity of the farm**

- Absence from work by farm worker due to ill health will lower productivity
- Planning becomes difficult because of unplanned absenteeism
- There is a loss of skills and experience leading to more money needed for training new farm workers
- Labour shortages make it very difficult to complete farm activities on time

**5.6 Identification of the breeding system**

- (a) C
- (b) B
- (c) D
- (d) C
- (e) A

**SECTION C****QUESTION 6****Discussion of pollination****(a) The concept: pollination**

Pollination is the act of transferring pollen grains from the male anther of a flower to the female stigma

**(b) The differences between self-pollination and cross-pollination****Self-pollination**

Occurs when the pollen from the anther is deposited on the stigma of the same flower or another flower on the same plant.

**Cross-pollination**

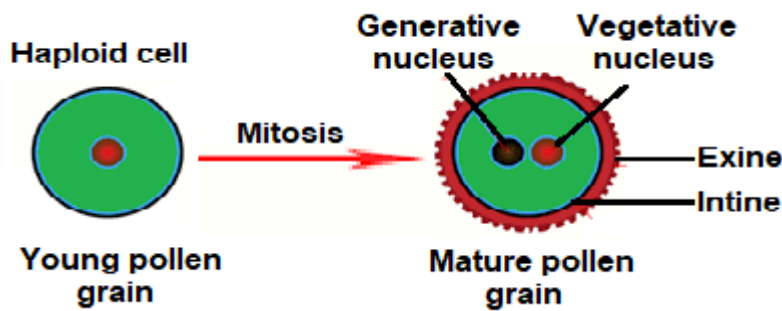
Is the transfer of pollen from the anther of one flower to the stigma of another flower on a different individual of the same species.

**(c) The description of the main agents of pollination**

- Pollination by air: Light and dry pollen grains are carried by air to the other plants.
- Pollination by water: Pollen or the male flower is carried by water current towards the female flower to pollinate.
- Pollination by insects: The bright colours of corolla and nectar attract the insects and pollen grains stick to the body of the insect, which facilitates pollination as it approaches another flower.
- Pollination by animals: Animals and birds interact with the flowers helping with pollination.

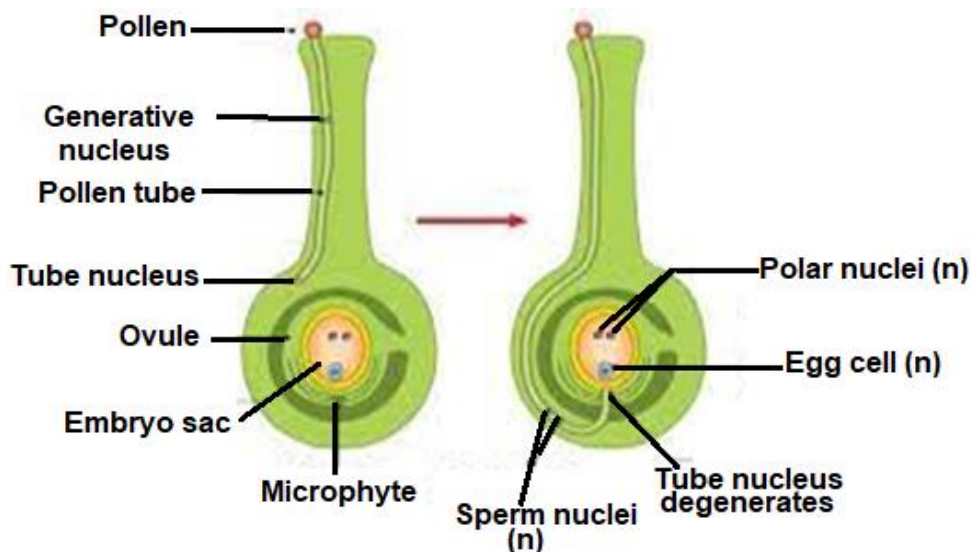
- (d) **The description of structure of a matured/ripe pollen grain and a receptive stigma (use illustration/diagrams to explain)**

The mature pollen grain has a double wall, which consists of a tough outer wall called exine and a thin delicate inner wall called intine. The nucleus of young pollen grain divides by mitosis into two nuclei called generative nucleus and vegetative/pollen tube nucleus. The generative cell divides to form the two male gametes. The vegetative cell is responsible for providing nutrition.



- (e) **The germination of a ripe pollen grain on a receptive stigma until fertilisation (use illustration/diagrams to explain)**

The process of the landing of pollen on the stigma, pollen tube growth and entry of germ cells in the ovule are the events covered in the germination of pollen grain. When the anther ripens the wall between the pollen sacs disappears. Pollen grains are transferred to the receptive stigma. The exine softens and splits open, and the intine grows through the opening and forms a pollen tube which grows down the style of pistil. Pollen tube enters ovary. The tip of the pollen tube bursts open and two male gametes are released into the germ sac.



**Total: 300 marks**