Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

AGRICULTURAL SCIENCE

ADVANCED SUBSIDIARY LEVEL 8222/1

Paper 1 2 hours 30 minutes

Marks 120 **2022**

Additional Materials: Non-programmable calculator
Ruler

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page.
- Write in dark blue or black pen.
- You may use a soft pencil for any diagrams, graphs or rough working.
- Do not use correction fluid.
- You may use a non-programmable calculator.
- Do not write in the margin *For Examiner's Use*.
- The number of marks is given in brackets [ ] at the end of each question or part question.

Section A

- Answer **all** questions.
- Candidates answer on the Question Paper in the spaces provided.

Section B

- Answer any **two** questions.
- Write your answers on the answer sheets at the end of the booklet.

For Examiner's Use	
Section A	
1	
2	
3	
4	
5	
6	
Section B	
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Total	

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Checker	

This document consists of **19** printed pages and **1** blank page.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

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SECTION A

Answer **all** questions in this section.

1 Fig. 1.1 shows a vertical garden of cabbage using hydroponic methods of farming.

Fig. 1.1

(a) (i) Explain why vertical farming such as the one in Fig.1.1 is a sustainable form of agriculture.

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..... [2]

(ii) Suggest why some communal farmers in Namibia might find it difficult to practice the vertical method of farming.

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..... [3]

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(b) A cabbage farmer had the following balances on the 31 March 2017.

Capital investment	N$ 115 000.00
Cash	N$ 2000.00
Land (at cost)	N$ 100 000.00
Bank overdraft	N$ 15 000.00
Stock (at cost)	N$ 20 000.00
Debtors	N$ 13 000.00
Mortgage loan	N$ 120 000.00
Implements	N$ 25 000.00
Second hand tractor	N$ 50 000.00
Buildings (at cost)	N$ 50 000.00
Creditors	N$ 10 000.00

Use the above data to complete the missing information in the Balance sheet in the spaces numbered **(i) – (vi)**. In each case provide information for the column of assets or liabilities and the amounts (N$).

ASSETS	**N$**	**LIABILITIES**	**N$**
Fixed Assets:		Capital investment	115 000
(i)	.....		
Buildings (at cost)	50 000	Mortgage loan	120 000
(ii)	.....		
Implements (at cost)	25 000		
Current assets:		Current liabilities:	
Stock (at cost)	20 000	**(iii)**	.....
(iv)	.....	Bank overdraft	15 000
(v)	.....		
Total assets	260 000	**(vi)**	.....

[6]

(c) Suggest ways of improving water security in semi-arid areas.

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..... [3]

[14]

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2 An investigation was carried out into the effect of soil pH on the growth of a cereal crop. Ten seedlings were planted in each of 6 samples of soil with different pH values.

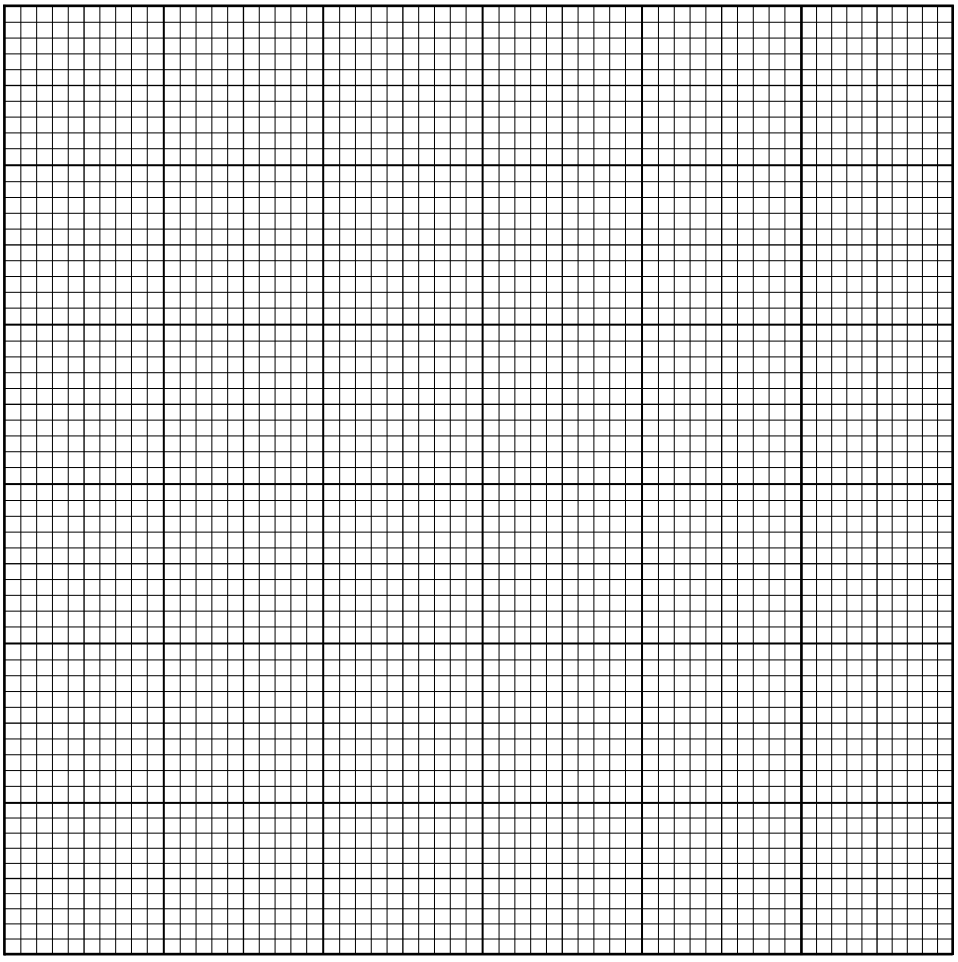
After 50 days the height of each seedling was measured and an average height was calculated.

Table 2.1 shows the results of the investigation.

Table 2.1

plant group	soil pH	average height/cm
1	6.2	30
2	6.4	33
3	6.6	51
4	6.8	54
5	7.2	30
6	7.4	24

(a) (i) Plot a graph to show the average height of the cereal crop and soil pH on the grid below.



[4]

(ii) Describe the trend shown by the data in Table 2.1.

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..... [2]

(b) High salinity in the soil can affect plants in several ways.

(i) Outline **two** factors that can lead to soil salinity.

.....

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..... [2]

(ii) Suggest how soil salinity may lead to wilting in plants.

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..... [3]

(iii) Suggest ways to overcome accumulation of salts in a poorly drained soil.

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..... [2]

[13]

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3 The stems of bean plants may be hairy or without hair (hairless) and the plants may bear purple or white flowers. Each characteristic is controlled by a different gene and each gene has two alleles.

The following symbols are used to represent the alleles involved:

G dominant gene for flower colour

g recessive gene for flower colour

H dominant gene for hairiness

h recessive gene for hairiness

In an experiment, a homozygous bean plant with purple flowers and hairless stem was crossed with a homozygous bean plant with white flowers and hairy stem.

All the resultant F1 plants had purple flowers and hairy stems.

(a) State the genotype of

(i) F1 plants, ... [1]

(ii) parent with purple flowers and hairless stem, ... [1]

(iii) parent with white flowers and hairy stem. ..... [1]

(b) In the set of F2 offspring, Gghh and ggHh were among the genotypes obtained.

(i) Use a genetic diagram to explain the expected offspring genotypes and phenotypes when parents with genotype Gghh and ggHh are crossed.

[4]

(ii) In the cross between Gghh and ggHh, 200 plants were obtained. How many plants would you expect to have white flowers?

..... [1]

(c) Explain the benefits of F1 hybrids.

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..... [2]

(d) Fig. 3.1 shows a process of sexual reproduction in bean plants.

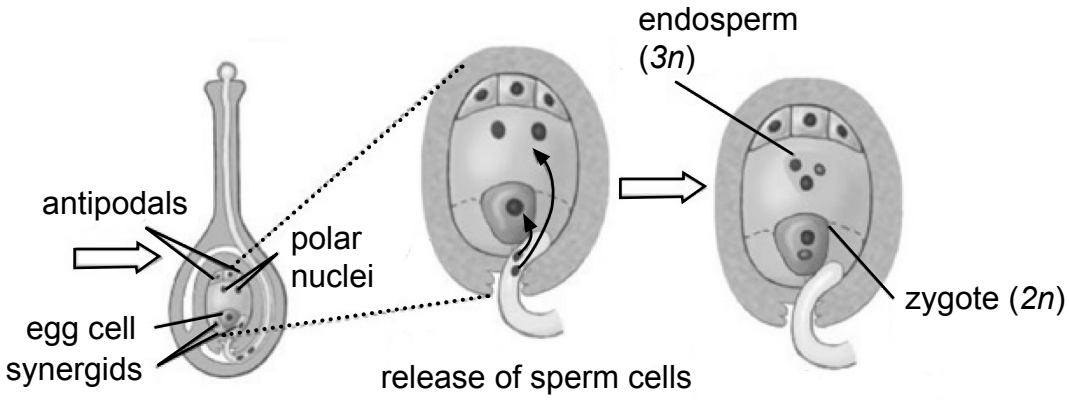

Fig. 3.1

(i) Identify the process shown in Fig. 3.1.

..... [1]

(ii) Describe the events taking place in Fig. 3.1.

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..... [4]

[15]

4 Table 4.1 shows the nutritional composition of two feeds.

Table 4.1

	feed A	feed B
Total digestible nutrients (TDN)	80%	55%
Digestible protein	18%	5%
Crude fibre content	9%	17%

(a) (i) Identify the feed that would be more suitable to young growing farm animals in Table 4.1.

..... [1]

(ii) Explain what is meant by digestibility of animal feeds.

.....

..... [2]

(iii) Analyse the relationship between the crude fibre content and the total digestible nutrients in the feeds.

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..... [2]

(b) Describe how an animal feed can be tested for the presence of protein. Include the positive test result in your answer.

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..... [3]

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(c) Bacteria and viruses are both microscopic agents that can cause diseases. State **three** similar and **one** different way of controlling viruses and bacteria.

Similar ways

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Different way

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..... [4]

[12]

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5 Fig. 5.1 shows a precision planter used in crop farming.

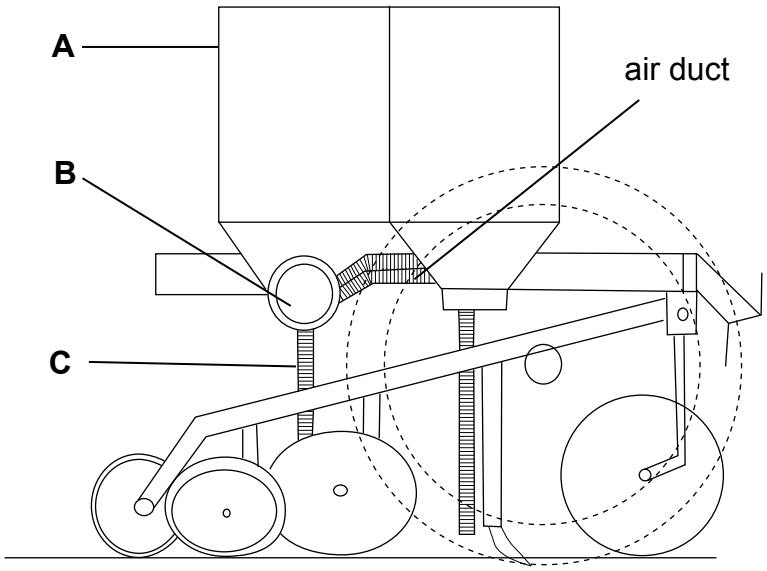

Fig. 5.1

(a) (i) Identify the parts labelled **A**, **B** and **C** on Fig. 5.1.

A .....

B .....

C ..... [3]

(ii) Describe how the use of a precision planter may constitute both advantages and disadvantages in agriculture.

Advantages

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Disadvantages

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..... [4]

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(iii) Suggest **three** ways a farmer can ensure that the planter will offer accurate planting.

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..... [3]

(b) Name the **three** operational principles of a combine harvester.

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..... [3]

[13]

6 Table 6.1 shows some of the income and expenses for a livestock farm for a period of 3 months.

Table 6.1

DATE	ITEM	AMOUNT (N$)
01/01/11	rent paid	750
05/01/11	purchase of fodder	7 500
30/01/11	wages of farm workers	1 200
01/02/11	rent paid	750
15/02/11	sale of heifers	24 000
30/02/11	wages of farm workers	1 200
01/03/11	rent paid	750
06/03/11	purchase of medicine	3 200
20/03/11	auction of calves	16 000
30/03/11	wages of farm workers	1 200

(a) Calculate whether the farmer had made profit or loss during the period of three months. Show your working.

Total profit/loss

..... [3]

(b) The farmer decided to convert all the rented buildings into poultry houses to start farming with chicken. This would be funded from an Agricultural bank.

(i) For the farmer described above, state what is meant by opportunity cost.

..... [1]

(ii) Describe any **two** problems associated with this farmer's source of capital.

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.....

..... [2]

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(c) The government can get involved in agricultural markets by allocating quotas.

(i) Explain what quotas are and the impact they have on the market.

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..... [3]

(ii) Describe how quotas affect the export of live animals from Namibia to South Africa.

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..... [2]

(d) Fig. 6.1 shows a graph of supply and demand of oranges during a growing season.

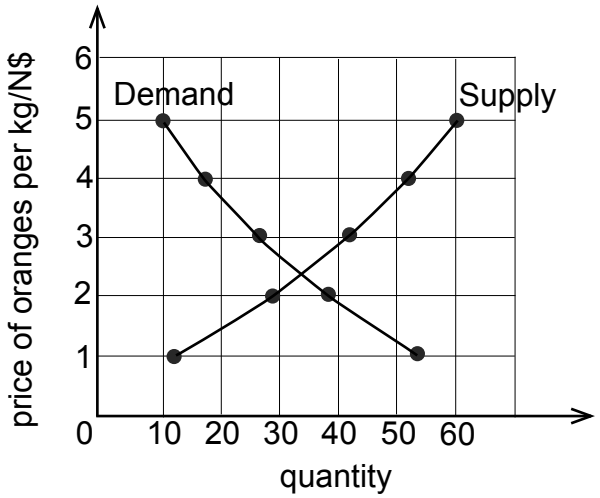

Fig. 6.1

Describe the elasticity of supply and demand in Fig. 6.1.

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..... [2]

[13]

SECTION B

Answer any **two** questions.

Write your answers on the answer sheets provided at the back of the booklet.
Use labelled or annotated diagrams where they can help to make your answers more understandable.

7 **(a)** Explain the terms *locus* and *heritability*. [2]

(b) **(i)** Outline factors that can cause infertility in cattle. [5]

(ii) Discuss how artificial insemination and Multiple Ovulation Embryo Transfer (MOET) can be used to overcome some types of infertility in cattle. [4]

(c) Describe how record keeping can help a farmer to carry out a successful breeding plan. [3]

(d) Describe the process of oogenesis, up to the stage of ovulation. [6]

[20]

8 **(a)** Discuss how plant spacing and planting depth influence vegetable production. [4]

(b) Describe ways a farmer can ensure the shelf life of spinach is improved after harvesting. [2]

(c) **(i)** Discuss the importance of Biological Nitrogen Fixation (BNF) in agriculture. [5]

(ii) Interveinal chlorosis can be caused by the deficiency of certain nutrients. Name the micronutrient that can cause interveinal chlorosis when deficient and describe how the deficiency may be corrected. [4]

(iii) Explain how soil colour can be an important indicator in crop farming. [5]

[20]

9 **(a)** Mechanisation may lead to soil compaction.

(i) Explain why soil compaction should be avoided. [6]

(ii) Describe methods that farmers should employ to make farming more sustainable. [6]

(b) Explain how the use of biotechnology can lead to livestock improvement. [4]

(c) Discuss the environmental concerns of biotechnology. [4]

[20]

10 **(a)** Discuss challenges experienced in agricultural extension services. [6]

(b) Discuss the negative features of monopolies as an example of imperfect competition in the marketing of agricultural products. [5]

(c) Explain how international trade agreements can impact the trade of agricultural products positively. [6]

(d) Describe how the government can ease the challenges encountered by farmers with regard to the marketing of their produce. [3]

[20]

Answer Sheets for Section B

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