

MARKER CODE				



STUDENT ENROLMENT NUMBER (SEN)									

TONGA FORM SIX CERTIFICATE

2022

AGRICULTURAL SCIENCE

QUESTION AND ANSWER BOOKLET

Time allowed: 3 Hours

INSTRUCTIONS:

1. Write your **Student Enrolment Number (SEN)** on the top right-hand corner of this page.
2. This paper consists of **EIGHT SECTIONS** and is out of 80 weighted scores.

SECTION	STRANDS	TOTAL SKILL LEVEL
ONE	NATURAL ECOSYSTEM AND ENVIRONMENT	7
TWO	SOILS	15
THREE	CROP PRODUCTION	11
FOUR	PLANT PROTECTION	7
FIVE	ANIMAL PRODUCTION	11
SIX	ANIMAL PROTECTION	10
SEVEN	AGRICULTURAL MANAGEMENT	14
EIGHT	AGRICULTURAL MARKETING	7
	TOTAL	80

3. Answer ALL QUESTIONS. Write your answers in the spaces provided in this booklet.
4. Use a **BLUE** or **BLACK** ball point pen only for writing. Use a pencil for drawing if required.
5. If you need more spaces for answers, ask the supervisor for extra paper. Write your **Student Enrolment Number (SEN)** on each additional sheet, number the questions clearly and insert them in the appropriate places in this booklet.
6. Check that this booklet contains pages **2-19** in the correct order and that none of the pages is blank.

YOU MUST HAND IN THIS BOOKLET TO THE SUPERVISOR BEFORE YOU LEAVE THE EXAMINATION ROOM.

SECTION ONE: NATURAL ECOSYSTEM AND ENVIRONMENT

Two farmers from ‘Eua, whose properties bank onto a stream, apply nutrients to their gardens. Farmer (1) Sione mixes composted material into the soil before planting vegetables. But Farmer (2) Siale applies fertilizer, spreading this by hand onto the soil surface before watering it.

Use this information to answer a, b and c.

Consider these **TWO** (2) management practices:

1. Using composted material, OR
2. Applying fertilizer.

- a. Select the **management practice** that would have the **least negative effect** on the environment.

Skill level 1	
1	
0	
NR	

Use this selected management practice in (a) to answer questions (b) and (c) below

- b. Explain the **effects** of the selected management practice in (a) on the **environment**.

Skill level 3	
3	
2	
1	
0	
NR	

- c. Give **ONE** (1) reason why your **chosen management practice** is **better** than the other practice when applying nutrients to the garden, in relation to:

- Ease and effectiveness
- The stream.

Skill level 1	
1	
0	
NR	

Mr ‘Oleti’s Bush Allotment (‘*apitukuhau*) located at the Fua’amotu area has been **over-cultivated**.

- d. Describe the **impact of over-cultivation** on the environment.

	Skill level 2	
	2	
	1	
	0	
	NR	

A dairy farmer from Ha'apai whose property has mainly **sandy loam soil** must carry out **irrigation** during the summer, and dispose of **effluent** from the dairy shed.

-
- This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

Skill level 3	
3	
2	
1	
0	
NR	

- [illegible]

Skill level 3	
3	
2	
1	
0	
NR	

Mulching material has been recommended for the commercial growing of Kava and Vanilla.

c. Define **Mulching**.

Skill level 1	
1	
0	
NR	

d. Describe the **characteristics of mulching** and how it minimizes **soil water loss**.

Skill level 2	
2	
1	
0	
NR	

Mulch, Animal manure, Green Manure are all organic fertilizers.

e. Discuss the **importance of Organic fertilizers**.

Skill level 4	
4	
3	
2	
1	
0	
NR	

FERTILISER APPLICATION

Fertilizers are commonly applied to improve the yield and quality of vegetable and fruit crops.

Inorganic Fertilizers that provide the nutrients are nitrogen, phosphorus and potassium.

They are in demand by growers.

- f. Name **ONE** (1) Inorganic **Nitrogen fertilizer** that promotes the growth and development of **leaves**.

Skill level 1	
1	
0	
NR	

- g. Name **ONE** (1) **Inorganic Phosphorus fertilizer** that promotes the growth and development of **roots**.

Skill level 1	
1	
0	
NR	

SECTION THREE:

CROP PRODUCTION

The combination of watering and heating in a Greenhouse produces high **humidity**.

- a. What is **humidity**?

Skill level 1

1

0

NR

- b. Explain how **humidity affects important plant processes** in the growth and development of plants.

Skill level 3

3

2

1

0

NR

Factors affecting Seed Germinations and Seed Dormancy.

- c. Identify **ONE (1) environmental conditions** which lead to successful **seed germination**.

Skill level 1

1

0

NR

- [illegible]

-
-
-
-
-
-

Skill level 2	
2	
1	
0	
NR	

SECTION FOUR:

PLANT PROTECTION

A taro grower from Veitongo has been growing taro in the same place for 5 years. When harvesting each year, he noticed the **rotting of corms (*Pala e foha*)**. Therefore, he decided to spray the taros with insecticides. For the last two years, the yield of taro has been decreasing. The grower is considering the following management practices:

- A. Applying more insecticides OR
B. Rotating the crops.

- a. Select the **management practice** (A or B) that would best control the **rotting of corms** and increase the yield of taro from his garden.

Skill level 1	
1	
0	
NR	

Use this management practice to answer questions (b) and (c) below.

- b. Explain how this **management practice** would **prevent rotting** of taro and increase the yields of produce from the garden.

[illegible]

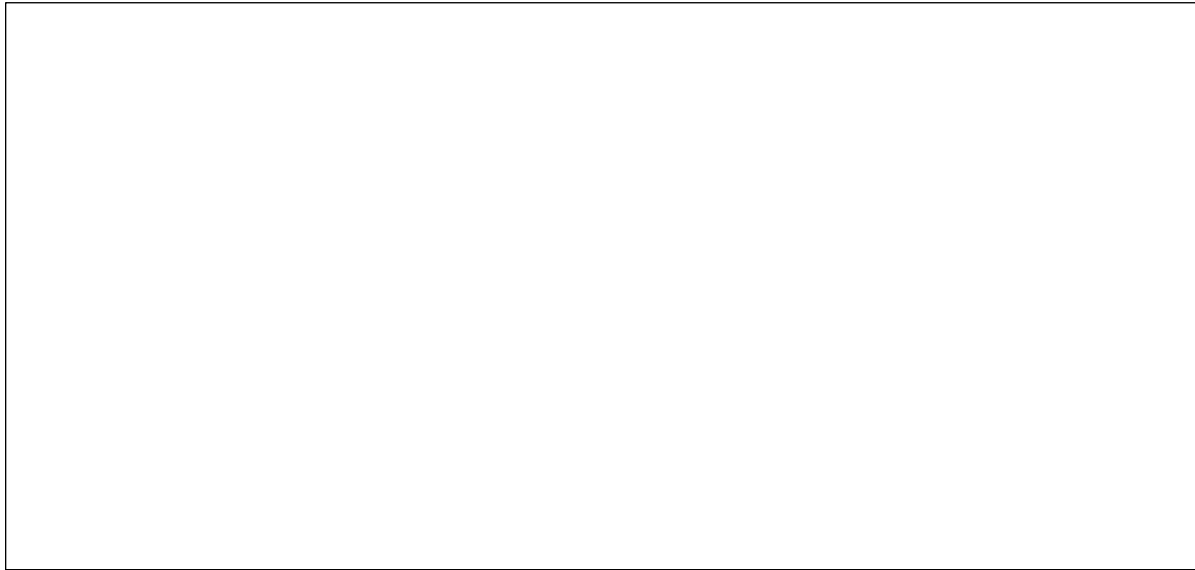
Skill level 3	
3	
2	
1	
0	
NR	

- c. Describe the advantages of **rotating the crops** in the same area.

Skill level 2	
2	
1	
0	
NR	

- d. You work as an Extension Officer for the Ministry of Agriculture.

Draw a diagram of rotating the crops in the same area to assist the control of nematodes.



Skill level 1	
1	
0	
NR	

- A. supplementary feeding with grains
- B. grazing cows in larger areas of leafy pasture

- | Skill level 1 | |
|---------------|--|
| 1 | |
| 0 | |
| NR | |

b. Explain **how** this management practice **increases milk production**.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Skill level 3	
3	
2	
1	
0	
NR	

- c. Discuss why your chosen management practice is **better than the other** for increasing milk production.

Consider the:

- Costs of the management practices
- Ease of using the management practices
- Feed values of the management practices.

[illegible]

	Skill level 4	
	4	
	3	
	2	
	1	
	0	
	NR	

Guinea Grass (**Panicum maximum**) (*Saafa*) is the major pastures available in Tonga.

- d. Describe the **limitations of pasture** as a feed for livestock production.

	Skill level 2	
	2	
	1	
	0	
	NR	

The Toloa Farm Manager decided to resow a paddock with pastures to replace Guinea Grass.

- e. Choose a **pasture grass** to be grown that would result in a pasture suitable for grazing milking cows in Toloa.
-

Skill level 1	
1	
0	
NR	

- A. Culling the infected cows.
- B. Treating the herd with antibiotics such as penicillin at the end of the milking season.

- | Skill level 1 | |
|---------------|--|
| 1 | |
| 0 | |
| NR | |

b. Explain how your chosen **management practice** reduces **mastitis** in the herd.

[illegible]

Skill level 3	
3	
2	
1	
0	
NR	

c. Describe how sheep and cattle become **infected** with **internal worms**.

Skill level 2	
2	
1	
0	
NR	

- d. Explain how **high internal worm** numbers **reduces** the growth and/or productivity of lambs or calves.

Skill level 3	
3	
2	
1	
0	
NR	

Ticks is a significant external parasites of cattle.

- e. What is the **external parasites** that causes **Mange Disease** in Pigs?

Skill level 1	
1	
0	
NR	

SECTION SEVEN: AGRICULTURAL MANAGEMENT

Significant of Market Opportunity.

- a. Define **market opportunity**.

Skill level 1	
1	
0	
NR	

Growers / producers usually have to meet certain quality requirements when supplying a particular market opportunity. In order to meet these quality requirements, they manipulate the management practices that are carried out during the production process for that particular product.

- b. Choose **ONE** (1) export product and discuss **quality requirements** for the selected market opportunity, and why this market opportunity has these quality requirements.

Skill level 4	
4	
3	
2	
1	
0	
NR	

- c. Explain the influence of **storage** of your product in relation to market price.

Skill level 3	
3	
2	
1	
0	
NR	

- d. Explain the **effects of Quarantine** on Agricultural Trade.

Skill level 3	
3	
2	
1	
0	
NR	

- e. Define **Tariffs** in Agricultural Trade.

Skill level 1	
1	
0	
NR	

- f. Describe the **trade barriers** in Agricultural Trade.

Skill level 2	
2	
1	
0	
NR	

Skill level 1	
1	
0	
NR	

- c. Describe your ranking order by **comparing the impact of the market forces** on the demand (price, quantity, or timing) for the selected primary product.

Skill level 2	
2	
1	
0	
NR	

- d. Identify the **marketing opportunities** available for Cassava.

Skill level 1	
1	
0	
NR	