

MARKER CODE			



Student Personal Identification Number					

TONGA GOVERNMENT
MINISTRY OF EDUCATION AND TRAINING

TONGA FORM SIX CERTIFICATE 2015

AGRICULTURAL SCIENCE

QUESTION AND ANSWER BOOKLET

Time Allowed: 3 Hours

INSTRUCTIONS

This examination has **TWO** Sections. All Sections are **COMPULSORY**.

Section	Description	Marks	Suggested Time Allowed
A	Multiple Choice	10	18 Min
B	B.1 Agricultural System	9	17 Min
	B.2 Soils	13	23 Min
	B.3 Plant Production and Plant Protection	27	49 Min
	B.4 Animal Production and Animal Protection	23	41 Min
	B.5 Agricultural Management and Agricultural Marketing	18	32 Min
	TOTAL	100	3 Hours

1. Answer all questions in the spaces provided.
2. Write your **Student Personal Identification Number (SPIN)** in the box at the top right hand corner of this page and on the last page of this booklet.
3. Check that this booklet contains pages 2-21 in the correct order. Page 22 has been deliberately left blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL MARKS

100

SECTION A: MULTIPLE CHOICE**(10 Marks)**

Answer ALL Questions in this section, by circling the letter in front of the best answer.

Each question is worth one mark.

1. A **factor** that does **not** influence climate is _____

A. wind.
B. rainfall.
C. soil water.
D. temperature.

1 Mark	
1	
0	
NR	

2. A **cause** for biological weathering of rocks is _____

A. ice.
B. water.
C. temperature.
D. micro-organisms.

1 Mark	
1	
0	
NR	

3. The best **soilless media** is known to be _____.

A. peat
B. field soil
C. black Magic
D. coconut husk

1 Mark	
1	
0	
NR	

4. Some **seeds** take **longer** to **germinate** than others. This is due to _____

A. disease and pest infection.
B. thin seed coats and shorter dormancy periods.
C. thick seed coats and longer dormancy periods.
D. unfavourable storage and soil environmental conditions.

1 Mark	
1	
0	
NR	

5. **Caterpillars** and **snails** feed on vegetables and have **similar mouthparts**. The type of mouthparts these pests have are _____

A. boring
B. sucking
C. grinding
D. chewing

1 Mark	
1	
0	
NR	

6. The main **plant diseases** caused by **organisms** are

- A. fungi, bacteria, viruses and worms.
- B. fungi, bacteria, viruses and nematodes.
- C. algae, bacteria, viruses and nematodes
- D. fungi, bacteria, protozoa and nematodes.

1 Mark	
1	
0	
NR	

7. The cattle **breed** that produces the **highest milk fat** is _____

- A. jersey.
- B. ayrshire.
- C. friesland.
- D. guernsey.

1 Mark	
1	
0	
NR	

8. **Large White** pig breeds have superior characteristics over **Local pig breeds**. **Local pig breeds**, however, are well known for their ability to:

- A. produce large litters of piglets.
- B. fight against pest and diseases.
- C. survive in poorly managed conditions.
- D. utilize feed efficiently (good feed converters).

1 Mark	
1	
0	
NR	

9. The **price** of pork in the market will increase if _____ decreases.

- A. quality
- B. texture
- C. quantity
- D. demand

1 Mark	
1	
0	
NR	

10. The main **resources** of a farm are _____.

- A. labour, crop and land.
- B. land, labour and capital.
- C. building, stocks and pasture.
- D. building, pasture and legumes.

1 Mark	
1	
0	
NR	

SECTION B.1 THE AGRICULTURE ECOSYSTEM**(9 Marks)**

Study **Table 1** below and answer the questions that follow.

Table 1: The similarity and differences between Natural Ecosystem (Toloa Forestry) and Agro-ecosystem (Lafalafa Corn Plantation).

Parameter Compared	Natural Ecosystem (Toloa Forest)	Agro-ecosystem (Lafalafa Corn Plantation)
Weight of Soil collected	1 kg	1 kg
Soil Colour	Black	Light Brown
Texture	Loamy	Fine clay loam
Number of Earthworm found	32	4
pH	7.6	5.5
Salinity	66	133
Drainage of water per minute	30 sec	85 sec
Colour of drainage water	Clear	Brown
Number of bees found	1 bee hive found with hundreds of bees	4 bees found

- a. Identify **two farming activities** that caused the **decrease** in the number of earthworms in Lafalafa Corn Plantation.

i. _____

1 Mark	
1	
0	
NR	

ii. _____

1 Mark	
1	
0	
NR	

- b. **Analyze** the data in Table 1 on page 4 and **explain** why the **pH** and **Salinity** of soil formed at Toloa Forest are different compared to that of Lafalafa Soil.

3 Marks	
3	
2	
1	
0	
NR	

- c. **Describe one farming practice** that affects the **size of soil particles** and **growth** of corn in Lafalafa Farm.

2 Marks	
2	
1	
0	
NR	

- d. **Describe** how the farming practices can be changed to improve the growth of corns in Lafalafa Farm.

2 Marks	
2	
1	
0	
NR	

Section B.2 SOILS**(13 Marks)**

- a. Ha'apai High School Students who grew vegetables in sandy soil are prone to drought. To ensure the plants have enough water available in the soil, their teacher advised them to consider the following management practices:
- Add water by irrigation Or
 - Add compost material
- i. Identify the management practice that would BEST improve the water availability for plant's growth.

Management Practice:

1 Mark	
1	
0	
NR	

Use this management practice to answer ii. below and iii. on page 7.

- ii. **Describe** how this management practice can improve **soil water availability** for plant growth.

2 Marks	
2	
1	
0	
NR	

iii. **Compare** the **TWO Management Practices** and **explain** why your choice of management practice is **BETTER** for improving soil water availability, in relation to:

- Physical properties of the soil.
- Plant growth

3 Marks	
3	
2	
1	
0	
NR	

b. **Describe** how the size of soil particles affect both **nutrient retention** and **plant growth**.

2 Marks	
2	
1	
0	
NR	

- c. Plots of corn plants grown on clay soil appeared to be growing poorly. An Extension Officer from MAFF advised that the corns growth can be improved by the following management practices:

- Apply poultry manure or
- Add lime.

- i. Identify the **management practice** that would BEST improve nutrient availability for plant growth.

1 Mark	
1	
0	
NR	

Use your chosen management practice above to answer (ii) and (iii) below.

- ii. **Describe** how this management practice **improves nutrient availability**.

2 Marks	
2	
1	
0	
NR	

- iii. **Describe** why your chosen management practice is **better** for **improving corn growth**, in relation to:

- Chemical properties, and
- Physical properties

2 Marks	
2	
1	
0	
NR	

SECTION B.3 PLANT PRODUCTION AND PLANT PROTECTION (27 Marks)

- a. **Identify** and **describe TWO** environmental conditions that leads to successful **seed germination**.

i. Environment ONE:

Description:

1 Mark	
1	
0	
NR	

ii. Environment TWO:

Description:

1 Mark	
1	
0	
NR	

2 Marks	
2	
1	
0	
NR	

- b. Many seeds have periods of **dormancy** which must be **broken** before they can germinate.

Describe **TWO** methods that is used to **break seed dormancy** and **explain** how each method helps the **seed to germinate**.

Method ONE:

Explanation:

Method TWO:

Explanation:

1 Mark	
1	
0	
NR	

3 Marks	
3	
2	
1	
0	
NR	

1 Mark	
1	
0	
NR	

3 Marks	
3	
2	
1	
0	
NR	

c. Tomatoes are small and can be sown:

- Individually into trays and then transplanted or
- Direct sowing into ground.

i. Identify the method that would best produce a large number of tomato seedlings.

Method:

Use this method to answer (ii) and (iii) below.

1 Mark	
1	
0	
NR	

ii. **Describe how** your chosen method leads to the production of a large number of tomato seedlings.

2 Marks	
2	
1	
0	
NR	

iii. **Describe** reasons why your chosen method is better in producing a large number of seedling, in relation to:

- Ease of maintenance
- Growth rates of seedling

2 Marks	
2	
1	
0	
NR	

- d. A tomato grower from Vaini has an insect pest problem in his plantation. The maggots of Fruit Flies damage the fruits and skin of tomatoes by feeding on them. This pest damage causes scarring, and rotting of fruits, and making the fruit unsaleable.

The MAFFF Extension Officer advised TWO possible management practices in order to control the pest:

- Spray with organic pesticides Kava Fisi
- Spray with Orthene (Synthetic Pesticides)

- i. **Identify** the management practice that would have the **LEAST negative effect** on the environment.

Management practice:

1 Mark	
1	
0	
NR	

Use the management practice you chose above to answer (ii) and (iii) below.

- ii. **Describe** the effects of this management practice on the environment.

2 Marks	
2	
1	
0	
NR	

iii. **Explain**, and **give reasons** why your chosen management practice is better for controlling the pest, in relation to:

- Soil
- Water

3 Marks	
3	
2	
1	
0	
NR	

iv. **Describe** the **negative effects** of **synthetic pesticide** on environment.

2 Marks	
2	
1	
0	
NR	

SECTION B. 4 ANIMAL PRODUCTION AND ANIMAL PROTECTION

(23 Marks)

The diagram below shows **Monogastric** and **Ruminant** digestive systems.

Diagram A

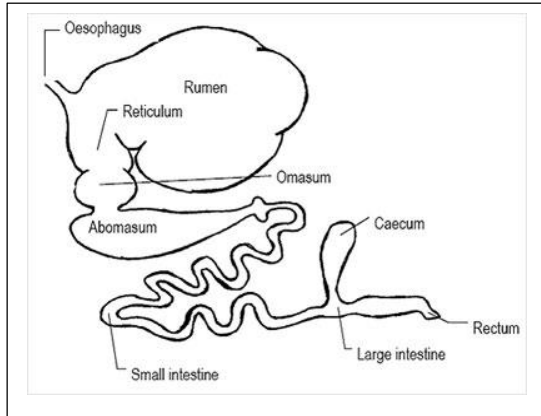
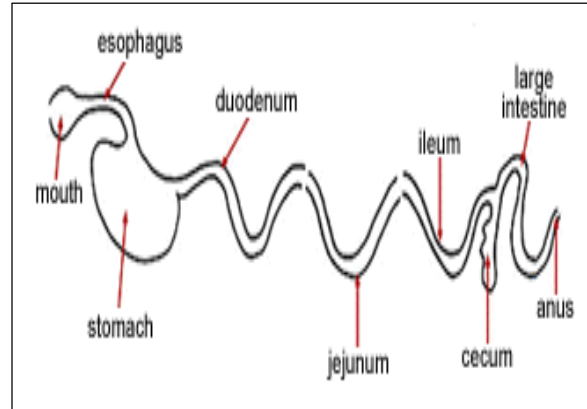


Diagram B



a. **Identify** the digestive system organs belonging to:

i. Monogastric animals

Give the reasons for your choice.

1 Mark	
1	
0	
NR	

2 Marks	
2	
1	
0	
NR	

ii. Ruminant:

Give the reasons for your choice.

1 Mark

1

0

NR

2 Marks

2

1

0

NR

iii. **Discuss** the **differences** of the **monogastric** and **ruminant** digestive systems.

4 Marks

4

3

2

1

0

NR

- b. Calving problems occur on many beef farms in Tonga. The Toloa Farm Manager is considering the following management practices to reduce calving problems:

- Selling all cows that have repeated calving problems Or
- Decreasing the amount of feed given to pregnant cows before calving.

The Toloa Farm Manager decided the selling of cows with repeated calving problems is the best management practice to reduce calving problems in their farm.

- i. **Describe** how this management practice **reduces calving problems**.

2 Marks	
2	
1	
0	
NR	

Describe the **signs** that a cow has calving problems.

2 Marks	
2	
1	
0	
NR	

- ii. **Explain** how selling cows with repeated calving problems will **reduce** calving problems in the future.

3 Marks	
3	
2	
1	
0	
NR	

**SECTION B.5 AGRICULTURAL MANAGEMENT AND AGRICULTURAL
MARKETING (18 Marks)**

Tonga is no different to other countries in wanting to protect the movement of people, agricultural and food products across borders. Our country adopted an integrated approach to Biosecurity by establishing a Quarantine Department to oversee the movement of animal, and plant products across borders.

- a. Define Biosecurity.

1 Mark	
1	
0	
NR	

- b. The Quarantine Department ensuring the security of our Border Security by:

- Recruiting and training 10 new staff at Airports and Wharfs to 100% screening of aircrafts and vessels and cargo containers.
- Introducing new X – Ray Machines at Fua'amotu Airport and Queen Salote Wharf.

A farmer from Ha'asini wants to export containers of watermelon to New Zealand market.

- i. **Identify** and **describe ONE** security practice from that above, in order to manage a successful control of **Fruit Flies movement** to New Zealand.

Security Practice

Description

1 Mark	
1	
0	
NR	

2 Marks	
2	
1	
0	
NR	

- ii. In comparing the **TWO Security Practices** on page 18, which one would lead to a successful control of **FOOT AND MOUTH DISEASES** entering our Border?

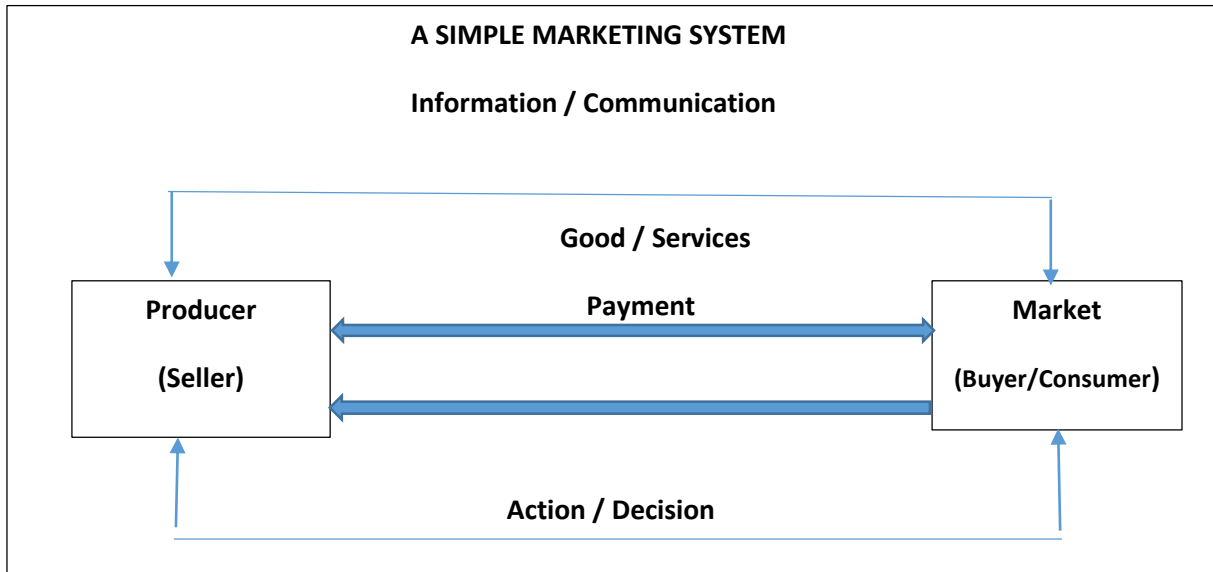
Discuss your **reasons**.

3 Marks	
3	
2	
1	
0	
NR	

- iii. Explain the **impact** of Biosecurity in our Trade Opportunities with New Zealand Market.

3 Marks	
3	
2	
1	
0	
NR	

Study the Simple Marketing System below and answer the questions that follow:



The export of our watermelon products to New Zealand market passes through a number of **Market Chains** before it reaches the end user (consumer/buyer).

- i. Identify **ONE** Market Chain which watermelon passes through before it reaches the consumers.

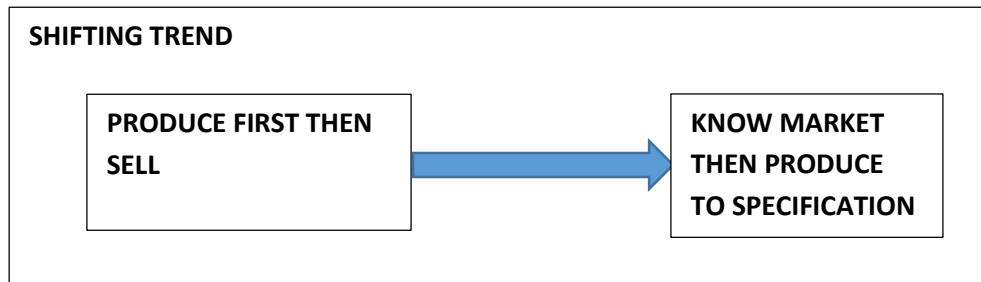
1 Mark	
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NR	

The New Zealand buyer wants to buy only 3 – 4 kg of Sugarbelle watermelon. However, a farmer from Nuku'alofa harvested two tons of under grade watermelon, of which the exporter rejected.

- ii. Describe the **impact** of not following the criteria set by the New Zealand market.

2 Marks	
2	
1	
0	
NR	

Study the Market Trend of Watermelon below and answer the questions that follow:



- iii. **Compare** and discuss the shifting of Market Trend from '*produces first then sell*' to '*know the Market then produce to specification*'.

3 Marks	
3	
2	
1	
0	
NR	

- iv. **Describe** the **advantages** of shifting from '*produce first then sell*' to '*know the Market then produce to specification*' for future watermelon growers.

2 Marks	
2	
1	
0	
NR	

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**TONGA FORM SIX CERTIFICATE
AGRICULTURE 2015
(FOR MARKER'S
ONLY)**

SECTION A	Marker	Check Marker
Multiple Choice		
	10	
SECTION B	Marker	Check Marker
B1		
	9	
B2		
	13	
B3		
	27	
B4		
	23	
B5		
	18	
TOTAL		
	100	