

MARKER CODE			



Student Personal Identification Number					

TONGA GOVERNMENT
MINISTRY OF EDUCATION AND TRAINING

TONGA SCHOOL CERTIFICATE 2015

AGRICULTURAL SCIENCE

QUESTION AND ANSWER BOOKLET

Time Allowed: Three Hours

INSTRUCTIONS

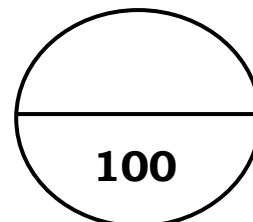
- This paper has **FOUR Sections** and is out of **100 MARKS**.

TOPIC	Pages	Total	Time (mins)
QUESTION ONE: Soil Nature, Properties, Fertility And management.	2 - 8	25	38
QUESTION TWO: Crop Production	9-16	30	45
QUESTION THREE ; Animal Production	17-23	35	52
QUESTION FOUR : Agricultural Industry	24-25	10	15
TOTAL	26 pages	100 marks	150 mins

- Write your **Student Personal Identification Number (SPIN)** on the top right hand corner of this page and on page 27.
- Answer ALL the questions in the spaces provided in this booklet.
- Use **BLUE** or **BLACK** ball point pen. DO NOT write in pencil.
- If you need more space for any answer, ask the supervisor for extra paper.
- Check that your paper consists of pages 2-27 in the correct order. Page 26 has been deliberately left blank.

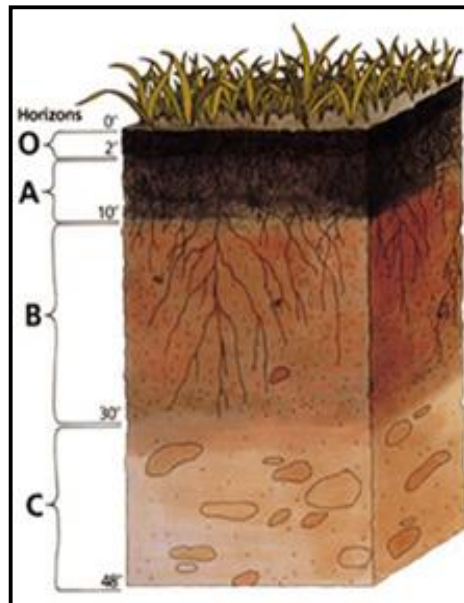
YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL MARKS



QUESTION ONE:**SOIL****(25 Marks)****A) SOIL NATURE AND PROPERTIES****(10 Marks)**

- 1) Study the diagram below carefully then answer the questions that follow.



Circle the letter of the best answer.

- i) Which horizon does decomposition takes place?

- A. Horizon B
B. Horizon C
C. Horizon D
D. Horizon O

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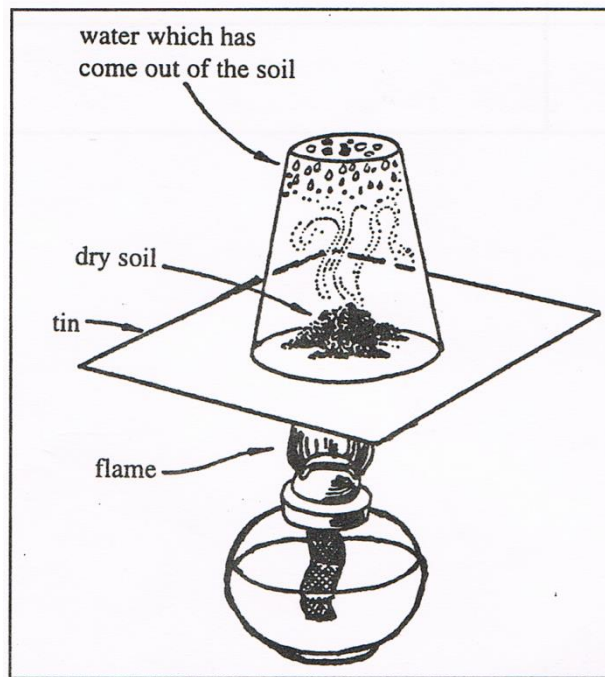
- ii) **Horizon A** and **B** are called agricultural soil. Explain why?

3 Marks	
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iii) Describe why is it important to study the history of soil?

2 Marks	
2	
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2) Study the experiment below carefully, then answer the questions that follow.



Circle the letter of the best answer.

i) What is the purpose of this experiment?

- A. To determine the infiltration rate of soil.
- B. To find out the type of soil particles.
- C. To find out the water holding capacity of soil.
- D. Testing the type of soil water held up by soil particle.

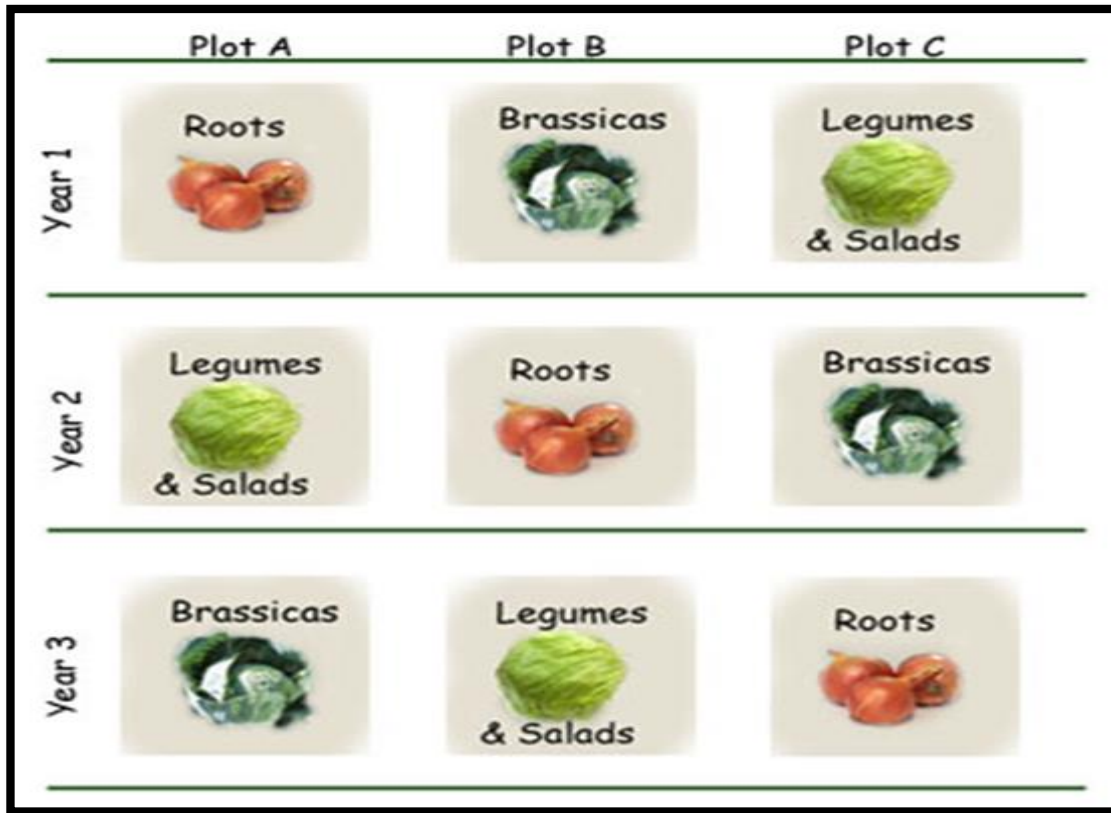
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- iii) Analyse the experiment in page 3, by explaining the availability of soil water to plant.

3 Marks	
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B) SOIL FERTILITY AND MANAGEMENT**(15 Marks)**

- 1) A farmer divided up his land into three plots, plot **A**, **B** and **C**. He cultivate each plot with three different vegetables every growing season as indicated in the diagram below.



Circle the letter of the best answer.

- i) What is the cropping system illustrated in the diagram above?
- A. Crop rotation.
 - B. Inter cropping
 - C. Mono cropping.
 - D. Mixed cropping.

1 Mark	
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NR	

- ii) Analyse the sequence of crops allocated in each plot from year 1 to year 3, and explain why legume crops are planted after root crops.

3 Marks	
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2	
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NR	

- iv) How did this cropping system maintain the fertility of the soil?

2 Marks	
2	
1	
0	
NR	

- 2) The table below contain three different types of inorganic fertilizers found at the Agriculture store in Nukualofa. Use this information and your own knowledge to answer the questions that follow.

Urea	Supper phosphate	Muriate of Potash
35-0-0	0-0-24	0-34-0

- i) What does **fertilizer grade** stand for?

1 Mark	
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NR	

- ii) Express the fertilizer grade in percentage for the given fertilizers on page 6.

1 Mark	
1	
0	
NR	

- iii) Which of the given fertilizers will best improve the yield of Chinese cabbage?

1 Mark	
1	
0	
NR	

- v) Select the best method of fertilizer application and describe how you apply it into Chinese cabbage.

2 Marks	
2	
1	
0	
NR	

- 3) Study the diagram below than answer the questions that follow.

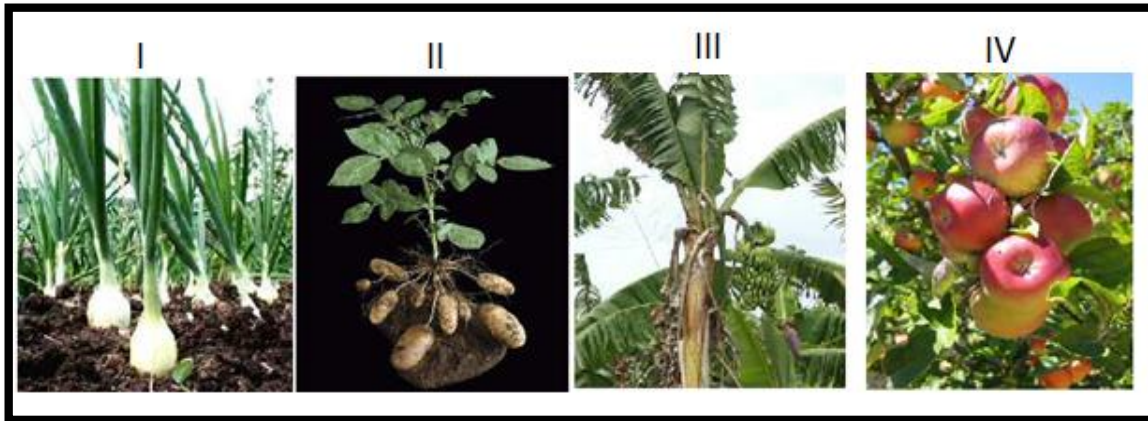


- i) Discuss by predicting what will happen to **soil structure**, **soil nutrients** and **crop's yield** if you continue using the farming practices shown above for 10 years.

4 Marks	
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QUESTION TWO:**CROP PRODUCTION****(30 Marks)****A) PLANT PROPAGATION****(5 Marks)**

- 1) Study the diagrams below carefully then answer **Questions 1 & 2**



Circle the letter of the best answer.

- i) Which of the crops above is an example of **bulb propagation**?

- A. I
B. II
C. III
D. IV

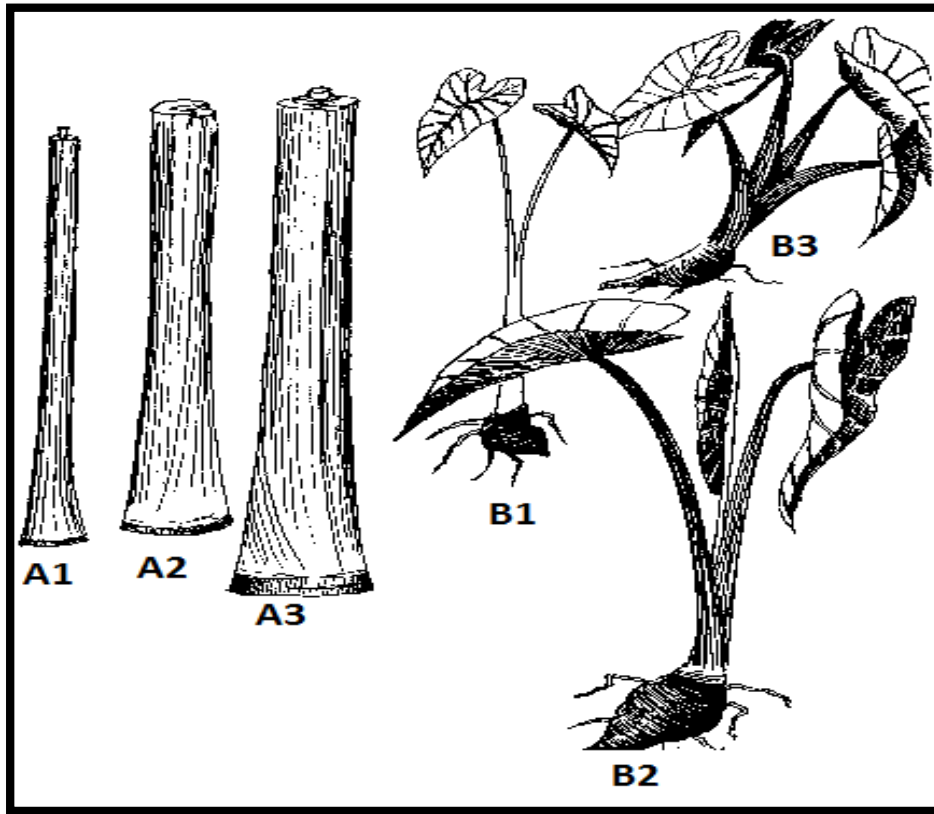
1 Mark	
1	
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NR	

- ii) Which of the crops above can be propagated sexually and asexually?

- A. I
B. II
C. III
D. IV

1 Mark	
1	
0	
NR	

- 2) Study the different planting material of Taro Tonga (*Colcasia esculena*) below and then answer the questions that follow.



- i) In general, which size of planting material produces good yield?

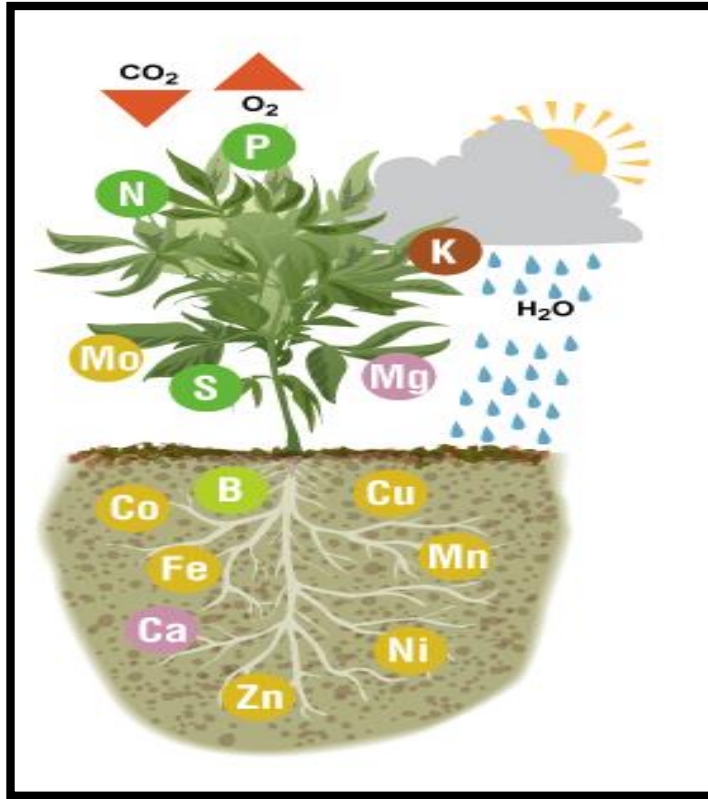
- ii) Give TWO reasons for your selection in **Question 1** above.

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NR	

2 Marks	
2	
1	
0	
NR	

B) PLANT NUTRITION**(10 Marks)**

- 1) Study the diagram below on nutrient elements that are used by plant, then answer the questions that follow.



- i) Which nutrient element is **abundantly** available to be used by plant?

- A. N
B. Mn
C. CO₂
D. Zn

1 Mark	
1	
0	
NR	

- ii) Name **ONE** farming activity that could improve soil nutrients.

1 Mark	
1	
0	
NR	

- iii) Identify **THREE trace elements** from the diagram on page 11 and write down the forms in which they are absorbed by plants.

SYMBOLS OF TRACE ELEMENTS	ABSORPTION FORM
i.	i.
ii.	ii.
iii.	iii.

3 Marks	
3	
2	
1	
0	
NR	

- 2) Sione Finau, a local farmer have notice the following deficiency symptoms on the leaves of the bean at his backyard vegetable, as shown in the diagram above. *(Yellowing of older leaves)*



- i) Which nutrient is deficient resulting in the symptoms shown in the diagram above?

1 Mark	
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- ii) What **organic fertilizer** would you advise the farmer to use in order to solve the problem shown in the photograph above. Give a reason for your answer.

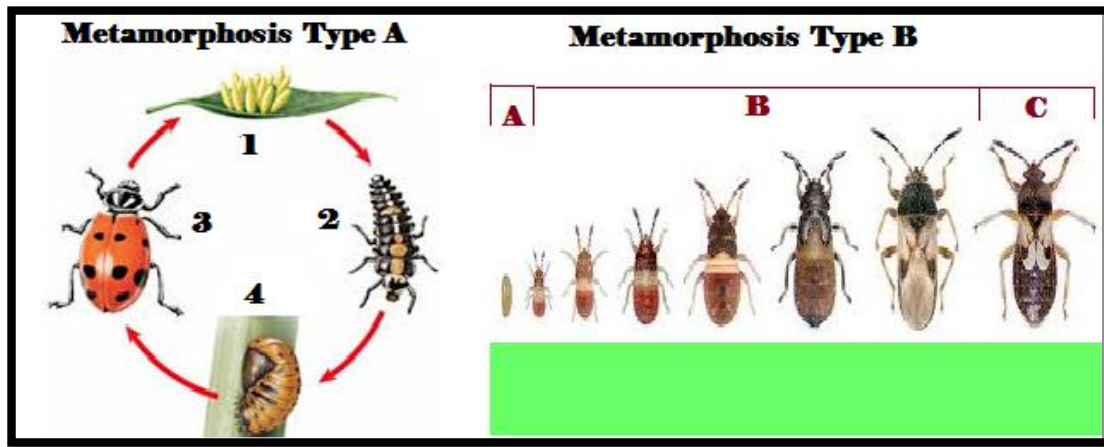
Organic fertilizer: _____

Justification: _____

4 Marks	
4	
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2	
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C) PLANT HEALTH**(10 Marks)**

- 1) Study the diagram below, then answer the following questions.



- i) What is “**Metamorphosis Type B**” called?

1 Mark	
1	
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NR	

- ii) **Stage 2** of **Metamorphosis Type A** is the most destructive stage on crops. Give TWO reasons as to why Stage 2 is the most destructive stage on crops.

2 Marks	
2	
1	
0	
NR	

- iii) Explain why IPM control measure is the best way to control pests in Tonga. Justify your answer.

4 Marks	
4	
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- 2) The diagram below shows a yam that is affected by disease. Spot the leaves carefully.

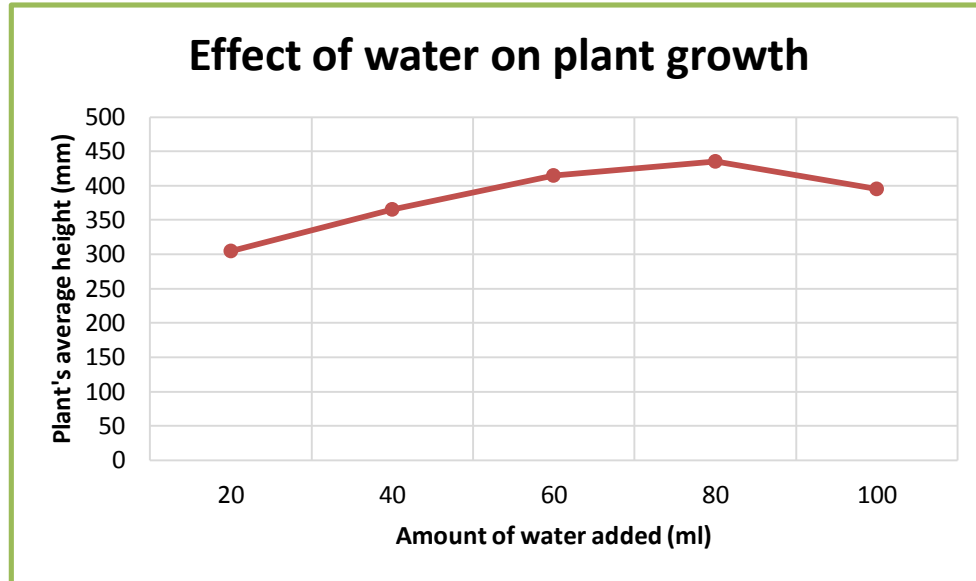


- i) Explain how to control the spread of the disease shown above.

3 Marks	
3	
2	
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D) ENVIRONMENTAL EFFECT**(5 Marks)**

Rainfall has significant effects on plant growth-rate. The graph below shows how plants growth-rate respond to additional amount of water.



- i) Determine the right amount of water to be added to the plant in order to obtain maximum growth.

1 Mark	
1	
0	
NR	

- ii) Name **ONE** effect of water on plant growth.

1 Mark	
1	
0	
NR	

- iv) Name **ONE** farming practice that will help to conserve water in the soil.

1 Mark	
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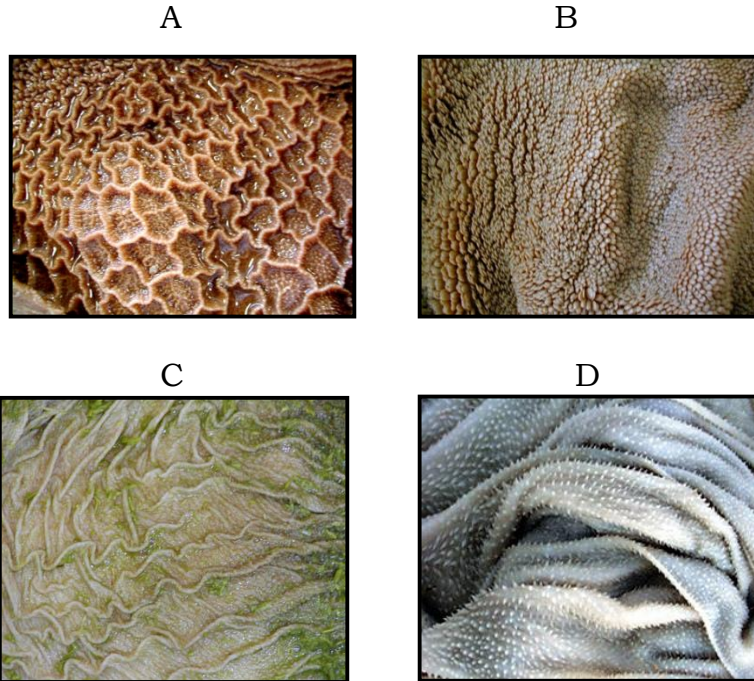
- iv) Describe the trend shown on the graph in page 15.

2 Marks	
2	
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0	
NR	

QUESTION THREE: ANIMAL PRODUCTION (35 Marks)

A) NUTRITION (10 Marks)

- 1) The photograph below indicate the **FOUR** compartment in the stomach of a ruminant animal.



- i) Identify the **FOUR** compartments in the stomach of a ruminant animal.

Compartment A: _____

Compartment B: _____

Compartment C: _____

Compartment D: _____

4 Marks	
4	
3	
2	
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0	
NR	

- ii) Explain the differences between Compartment **A** and **B** in term of their functions.

2 Marks	
2	
1	
0	
NR	

- iii) Prove with evidence that **compartment C** is the true stomach of ruminant animal.

4 Marks	
4	
3	
2	
1	
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NR	

B) BREEDS & BREEDING**(10 Marks)**

- 1) Use the picture below to answer the questions that follow.

A**B****C****D**

- i) Identify the breed of cattle in pictures **A** and **B** above.

A. _____

B. _____

2 Marks	
2	
1	
0	
NR	

- ii) Give an advice to suggest to local farmers the best beef breed which is suitable for the climatic condition of Tonga.

3 Marks	
3	
2	
1	
0	
NR	

- iii) Discuss what will happen if you cross-breed **Breed A** and **D**.

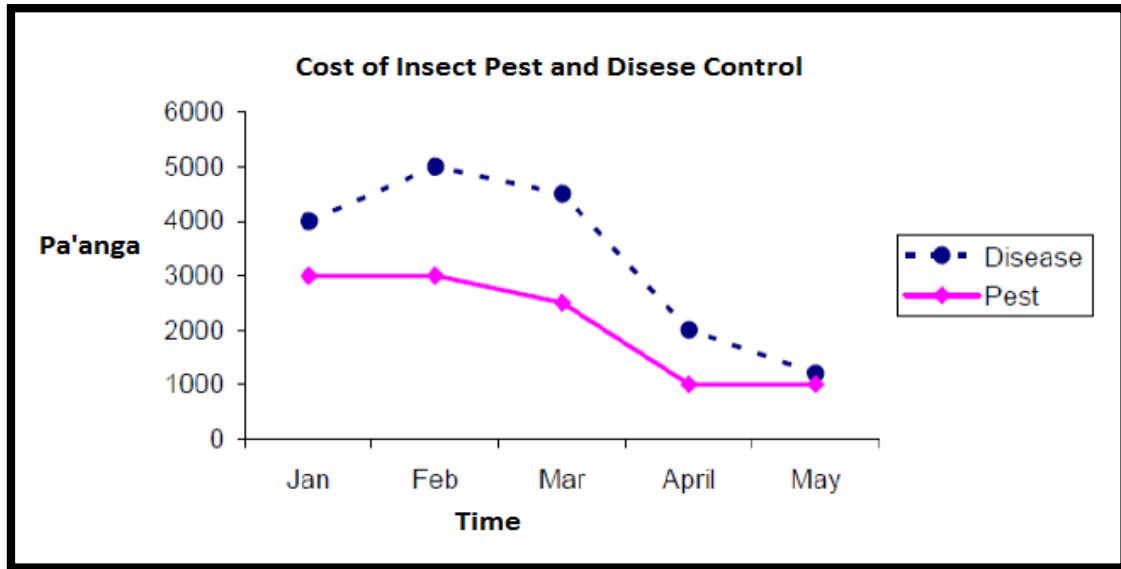
3 Marks	
3	
2	
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- iv) You were advised by the Ministry of Agriculture that the best time for mating is when the cows show the sign of heat. Briefly describe how you would know that the cow is on heat.

2 Marks	
2	
1	
0	
NR	

C) ANIMAL HEALTH**(10 Marks)**

- 1) Below is a graph of the cost of controlling insects and diseases on a poultry farm during the first five months of 2014. Study the graph and answer the questions that follow.



- i) Describe the trend shown when controlling pests and diseases from January to May. Give a reason to explain this trend.

3 Marks	
3	
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- ii) Predict the likely trend of pests and diseases for the rest of 2014. Give reasons for your answer.

Prediction:

Reasons:

4 Marks	
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2) Study the diagram and then answer the following questions.



i) Name the **external parasite** shown in the picture above.

1 Mark	
1	
0	
NR	

ii) Describe the **harmful effect** caused by the external parasite shown in the picture above.

2 Marks	
2	
1	
0	
NR	

D) ANIMAL MANAGEMENT**(5 Marks)**

- 1) Study the photograph below very carefully and use it to answer the questions that follow.



- i) What is the management practice shown on the photograph above?

1 Mark	
1	
0	
NR	

- ii) What is the main purpose of the management practice shown in the photograph above?

1 Mark	
1	
0	
NR	

- iii) Discuss the advantage of this method compared to other management practices.

3 Marks	
3	
2	
1	
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QUESTION FOUR: AGRICULTURAL INDUSTRY (10 Marks)

A) POST-HARVESTING & MARKETING (7 Marks)

Select one Primary product from the list below and use it to answer the questions that follow.

- ☐ Squash pumpkin
 - ☐ Coconut
 - ☐ Vanilla
 - ☐ Kava

Name of chosen Primary product: _____

- i) Identify **TWO** market requirements for your selected primary product.

a. _____

b. _____

2 Marks	
2	
1	
0	
NR	

- ii) Describe **ONE** way of reducing mechanical damage to your selected product during storing process.

2 Marks	
2	
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NR	

- iii) There are **FOUR** important factors that are important in marketing of any agricultural product. It is known as the **4 Ps**, briefly discuss the importance of **Promotion**, **Product** and **Place** in making your product more competitive at the market.

3 Marks	
3	
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B) FINANCIAL MANAGEMENT

(3 Marks)

- 1) There are **TWO** types of record that are important in a farm management, the **physical** and the **financial** records. Compare the differences between **physical** and **financial** records. Support your comparison with appropriate examples.

3 Marks	
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TONGA SCHOOL CERTIFICATE

2015

AGRICULTURAL SCIENCE

(FOR MARKERS USE ONLY)

SECTIONS	MARK	CHECK MARKER	TOTAL
ONE			25
TWO			30
THREE			35
FOUR			10
TOTAL			100