



GOVERNMENT OF SAMOA

STUDENT EDUCATION NUMBER

Samoa School Certificate

AGRICULTURAL SCIENCE 2023

QUESTION and ANSWER BOOKLET

Time allowed: 3 Hours & 10 minutes

INSTRUCTIONS

1. You have 10 minutes to read **before** you start the exam.
2. Write your **Student Education Number (SEN)** in the space provided on the top right hand corner of this page.
3. **Answer ALL QUESTIONS.** Write your answers in the spaces provided in this booklet.
4. If you need more paper to write your answers, ask the Supervisor for extra paper. Write your SEN on all extra sheets used and clearly number the questions. Attach the extra sheets to the appropriate places in this booklet.

STRANDS		Pages	Time (min)	Weighting
STRAND 1	AGRICULTURE IN SAMOA	2-4	15	8
STRAND 2	SOIL	5-6	18	10
STRAND 3	FARM MANAGEMENT, ECONOMICS AND MARKETING	7-11	36	20
STRAND 4	CROP PRODUCTION	12-17	43	24
STRAND 5	ANIMAL PRODUCTION	18-22	54	30
STRAND 6	TOOLS EQUIPMENT AND FACILITIES	23-24	14	8
TOTAL			180	100

Check that this booklet contains pages 2-25 in the correct order and that none of these pages are blank.

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

For Questions 1 to 3, choose and write the LETTER of the correct answer in the box provided.

1. Identify an **unmanaged ecosystem** in the list below.

- A. A banana plantation.
- B. A road through the bush.
- C. An area of natural forest.
- D. A village area.

SL 1

2. Select an option below that can reduce global warming.

- A. Cut down all the trees.
- B. Plant more trees between food crops.
- C. Use more chemical fertilizers.
- D. Burn all the weeds.

SL 1

3. Choose the most important managed ecosystem benefit needed for the daily survival of families in Samoa.

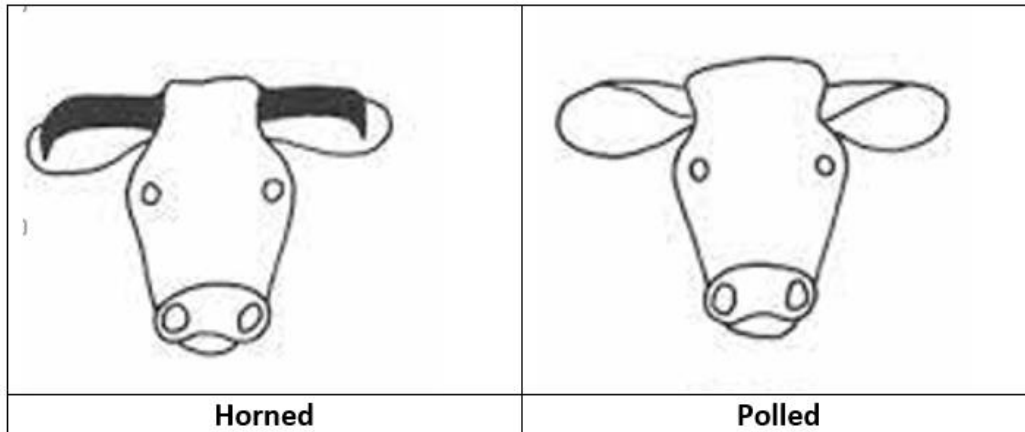
- A. Produce more oxygen gas for people to breathe.
- B. Make the land more beautiful to look at.
- C. Provide organic matter for biogas production.
- D. Produce food for people to eat.

SL 1

4. (i) Define cross-breeding.
(ii) Describe how it can boost agricultural animal productivity.

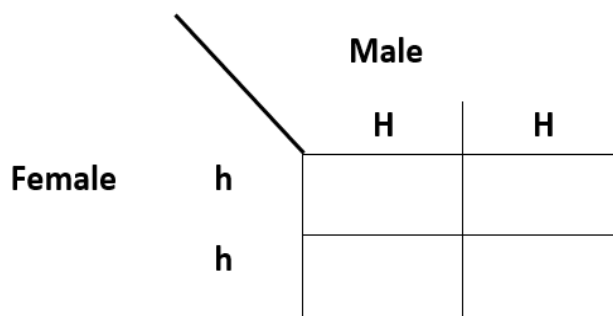
SL 2

5. A homozygous dominant polled bull and a homozygous recessive horned cow are crossed.



SL 3

- (i) Determine the genotypes and phenotypes of the first generation by completing the Punnet Square (F1) below;



Genotypes: _____

Phenotypes: _____

- (ii) Complete the Punnet Square below for the second-generation (F2) genotypes and phenotype probabilities. List these in the space provided.

		Male	
		H	h
Female	H		
	h		

Genotypes: _____

Phenotypes: _____

For Question 6, choose and write the LETTER of the correct answer in the box provided.

6. Soil conservation is best described as one of the following:

- A. It is another term for soil structure.
- B. It refers to the protection of soil from erosion.
- C. It is the weight of materials in a volume of soil.
- D. It is another term for soil texture.

SL 1

7. Organic matter in the soil is important for soil fertility in the production of crops. Explain **TWO** ways that can be used to increase the organic matter content of the soil on a farm.

SL 2

8. Explain the role of microorganisms in improving soil fertility.

SL 3

9. Soil water conservation is based on controlling runoff, percolation, and evaporation losses. Describe **FOUR METHODS** that farmers can apply to control soil erosion caused by water.

SL 4

For Questions 10 to 15, choose and write the LETTER of the correct answer in the box provided.

10. The main use of the **Gross Margin** analysis is to:

- A. work out the labour costs of a farm.
- B. calculate the total revenue of a farm's production.
- C. determine the profit or loss from a farm enterprise or activity.
- D. determine the fixed costs of production.

SL 1

11. In agricultural production, the term **Fixed Costs** refer to:

- A. those costs that increase as output increases e.g. electricity use.
- B. the costs of marketing.
- C. the costs of labour.
- D. those costs that remain the same regardless of the volume of output e.g. land.

SL 1

12. In agricultural production, the term **Variable Costs** refer to:

- A. those costs that increase as output increases e.g. electricity use.
- B. the costs of marketing.
- C. the costs of labour.
- D. those costs that remain the same regardless of the volume of output e.g. land.

SL 1

13. The term **Break-even Point** refers to the level of production where:

- A. the Variable Costs are equal to the Fixed Costs.
- B. the cost of production equals the revenue from sales.
- C. the level of production is at maximum.
- D. the level of production is at optimum.

SL 1

14. What does the term **Marketing Channel** refer to?

- A. It refers to the place where buses pick up passengers.
- B. It refers to the system in place to get a product from the farmer to the consumer.
- C. It refers to the shops and supermarkets.
- D. It refers to the television stations.

SL 1

15. The table below contains information about the effect of an incremental increase in the rate of fertilizer application (the input) on a crop of beans (the output).

Study the table carefully then select the correct answer to the question below.

Bean-Production-per-hectare				
1 Fertiliser Application Rate (kg/ha)	2 Total Physical Product of (or output) beans in kg/ha (TTP)	3 Marginal Physical Product of beans (MPP) in kg/ha	4 Marginal Value Product (MVP)	5 Price per Unit of Fertiliser
0	200	–	–	–
20	250	2.50	25.00	5.00
40	290	2.00	20.00	5.00
60	320	1.50	15.00	5.00
80	340	1.00	10.00	5.00
100	350	0.50	5.00	5.00
120	355	0.25	2.50	5.00

What is the **best point** of production?

- A. It is at the point of maximum Total Physical Product.
- B. It is at the point where the Marginal Physical Product (MPP) of beans is at the highest.
- C. It is at the point where the Marginal Value Product (MVP) equals the Price Per Unit of fertilizer.
- D. It is at the point that has the highest Application Rate of Fertilizer.

SL 1

16. Explain **TWO** benefits of keeping good farm **records**.

SL 2

17. List FOUR types of records that a farm should keep.

SL 2

18. Explain the purpose of a Marketing Channel and then prepare one for a product grown in a farm in Samoa.

SL 3

19. Differentiate between the costs of production.

SL 3

For Questions 21 to 25, choose and write the LETTER of the correct answer in the box provided.

21. What is the meaning of **Agroforestry**?

- A. It is the planting of tree crops with agricultural crops either in areas side-by-side or together.
- B. It is the planting of crops in the forest.
- C. It is the gathering of crops from the forest.
- D. It is planting of forests in the farm.

SL 1

22. The diagram below shows the location of a stoma on the underside of a plant leaf.



Identify the role of the **stomata** in the plant leaf.

- A. It is the vein that allows water to enter the leaf.
- B. It is part of the leaf where photosynthesis occurs.
- C. It is a pore or opening in the epidermis that allows CO_2 to enter.
- D. It is part of the leaf's food transport system.

SL 1

23. Identify a **vegetative propagation** method from the list below.

- A. Growing a tree from a mature coconut.
- B. Growing a new tree from a mango seed.
- C. Growing a taro plant from a taro shoot or *tiapula*.
- D. Growing tomatoes from a seed package.

SL 1

24. Identify a typical characteristic of a **monocotyledon** plant.

- A. It has a one seed leaf.
- B. It normally has many branches like the poumuli tree.
- C. It does not produce any food materials for people and animals.
- D. Plants are mostly all short.

SL 1

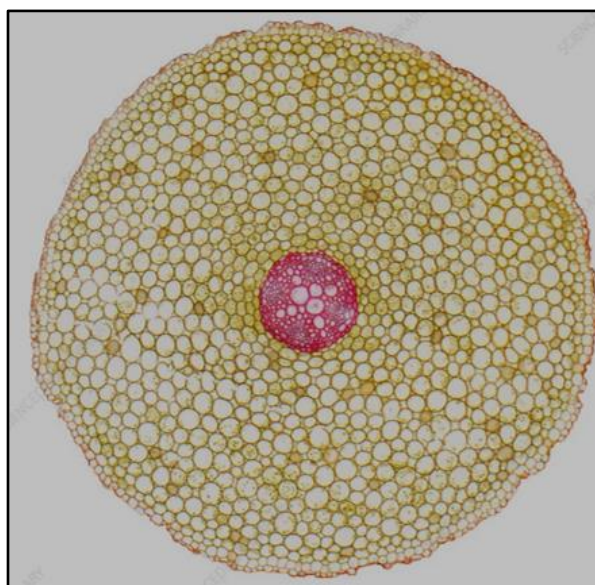
25. When seeds are removed from the fleshy fruit, they can be tested for viability by putting them into a glass of water. The following should be noted:

- A. good seeds will float while bad seeds will sink to the bottom.
- B. good seeds will change colour while bad seeds will sink to the bottom.
- C. good seeds will float while bad seeds will change colour.
- D. good seeds will sink to the bottom while bad seeds will float.

SL 1

26. The illustration below shows a magnified cross-section of a plant stem.

Draw a line or arrow in the diagram to clearly label the part of the stem known as the pith.



SL 1

27. Briefly explain at least **TWO** main functions of the root system of a plant.

SL 2

28. Explain how plant food, water and nutrients are **transported** within a growing plant.

SL 3

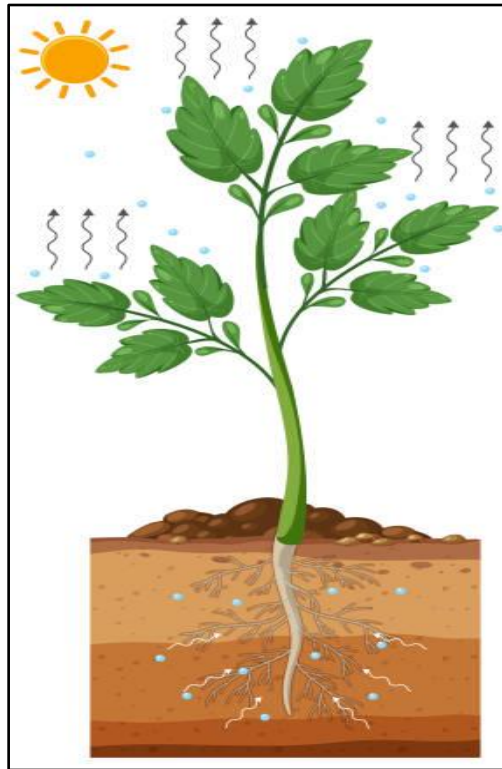
29. Explain at least **THREE** different ways in which a pathogen can enter a host plant in the process of **Penetration** during a disease cycle.

SL 3

30. Explain the difference between the major and minor nutrients or trace elements and give an example of each.

SL 3

Use the picture below to answer Questions 31 and 32.



31. Discuss how water moves upwards in plants through the process of transpiration.

SL 3

32. Outline how the leaves, stem and roots of the plant work together to maintain life and growth.

SL 4

For Questions 33 to 37, choose and write the LETTER of the correct answer in the box provided.

33. Identify an **improved pig breed** being used in commercial farming in Samoa.

- A. Dolly
- B. Friesian
- C. Landrace
- D. Hog

SL 1

34. Why are piglets **castrated**?

- A. To increase the rate of growth.
- B. To stop the production of boar taint.
- C. To control disease infections.
- D. To control insect infections.

SL 1

35. Identify the **main type** of pig production system used by farmers in Samoa.

- A. Intensive
- B. Commercial
- C. Fenced
- D. Free range

SL 1

36. What is a **parasite**?

- A. An organism that lives on another and obtains food from it.
- B. An organism that helps feed another.
- C. An organism that lives on another in a relationship that benefits both.
- D. An organism that makes its own food.

SL 1

37. Identify the bacteria that is a common cause of **abortion** in pregnant sows.

- A. Coccidiosis
- B. Brucellosis
- C. Streptococcus
- D. Pseudomonas

SL 1

38. Name **TWO** pig products that are locally produced commercially in Samoa.

SL 2

39. State **TWO** reasons why boar sow ratio is recommended to improve performances.

SL 2

40. Compare **THREE** main differences of pig production outbreeding and inbreeding.

SL 3

41. Management techniques which can help in piglet survival immediately after birth are **cross fostering**, **split suckling** and **supplementation** in the milk supply to the piglets.

Explain what is involved in each of these techniques.

SL 3

42. Effective mating management means introducing the boar to the sow during its period of peak fertility. This means knowing the **onset of oestrus** is important.

Explain **THREE** characteristic signs of oestrus.

SL3

43. (i) What is artificial insemination?
(ii) Outline **THREE** ways it can boost pig production in Samoa.

SL 4

44. (i) What is an ectoparasite?
(ii) Discuss **THREE** ectoparasites and how each one affects the health of pigs.

SL 4

45. The following factors are important in the management of a commercial pig farm.

Discuss what each factor means and how it is carried out.

- (i) Good hygiene;
- (ii) The control of heat stress in mature boars;
- (iii) Creep feeding;
- (iv) Sow weaning.

SL 4

For Questions 46 to 48, choose and write the LETTER of the correct answer in the box provided.

46. Identify the function of **knapsack sprayer**.

- A. Measure the land area.
- B. Spray farm chemicals.
- C. Dig the soil.
- D. Cut the weeds.

SL 1

47. Identify the function of **spade**.

- A. Measure the land area.
- B. Spray farm chemicals.
- C. Dig the soil.
- D. Cut the weeds.

SL 1

48. Identify the function of a **weed-eater**.

- A. Measure the land area.
- B. Spray farm chemicals.
- C. Dig the soil.
- D. Cut the weeds.

SL 1

49. Explain **TWO** ways on how to store tools after the cropping season or during the school break.

SL 2

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SSC AGRICULTURAL SCIENCE

2023

(For Scorers only)

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TOTAL		100			