

STUDENT EDUCATION NUMBER

GOVERNMENT OF SAMOA
MINISTRY OF EDUCATION, SPORTS AND CULTURE

Samoa School Certificate

BIOLOGY

2019

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 left hand corner of this page.
3. **Answer ALL QUESTIONS.** Write your answers in the spaces provided in this booklet.
4. If you need more space, ask the Supervisor for extra paper. Write your SEN on all extra sheets used and clearly number the questions. Attach the extra sheets at the appropriate places in this booklet.

	STRANDS	Page	Time (min)	Weighting
STRAND 1:	VARIETY OF LIFE	2	15	10
STRAND 2:	CELL BIOLOGY	4	20	16
STRAND 3:	GENETICS	7	15	10
STRAND 4:	PLANTS	8	40	20
STRAND 5:	ANIMALS	12	60	30
STRAND 6:	ENVIRONMENT	17	30	14
	TOTAL		180	100

Check that this booklet contains pages 2-18 in the correct order and that none of these pages are blank.

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

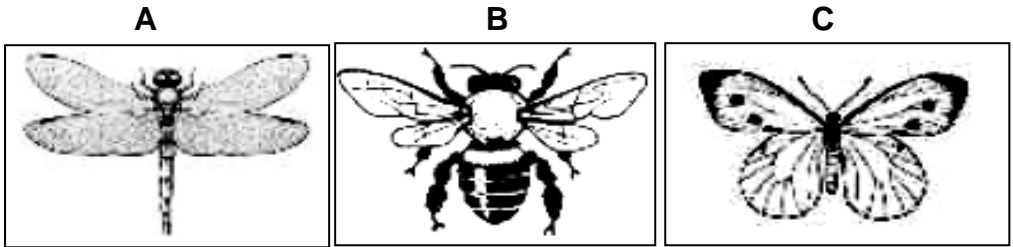
A dichotomous key is used as a biological tool for the identification of organisms.

Insect Dichotomous Key

- (i) Does the insect have wings?
(a) Yes.....go to step 2
(b) No.....Order Hemiptera
- (ii) Does the insect have parallel wings? (Hint: Parallel wings don't stick out to the side).
(a) Yes.....go to step 3
(b) No.....go to step 4
- (iii) Does the insect have a parallel line down the back that divides the wings?
(a) Yes.....Order Coleoptera
(b) No.....Order Orthoptera
- (iv) Does the insect have 4 total wings?
(a) Yes.....go to step 5
(b) No.....Order Diptera
- (v) Does the insect have long antennae?
(a) Yes.....go to step 6
(b) No.....Order Odonata
- (vi) Does the insect have a small body with large fan – shaped wings?
(a) Yes.....Order Lepidoptera
(b) No.....Order Hymenoptera

Use the Insect Dichotomous Key (page 2) to identify the Order for the following three (3) insects (Insect A, B and C).

1. Write your answer in the spaces provided.



Insect A: Order _____

Insect B: Order: _____

Insect C: Order: _____

SL 3

2. Name the microscopic pathogens that lack the capacity to thrive and reproduce outside of a host body.

SL 1

3. Describe the process of binary fission.

SL 2

4. Describe how microorganisms have played a major role in controlling diseases caused by harmful bacteria.

SL 2

5. Describe ONE common disease caused by fungi.

SL 2

STRAND 2:

CELL BIOLOGY

Weighting 16

6. Define cellular respiration.

SL 1

7. The reactants for cellular respiration include glucose and oxygen.
Identify the end products for cellular respiration.

SL 1

The diagram below is that of an organelle found in both plant and animal cells.



8. Identify the organelle.

SL 1

9. Describe how the structure of the organelle (page 4) helps with its function.

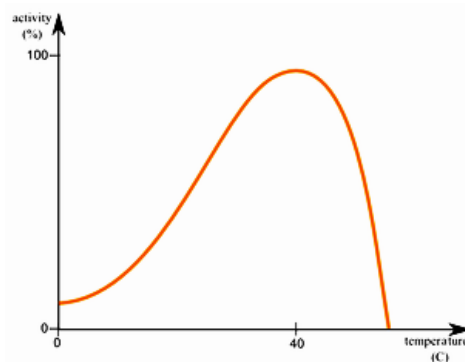
SL 2

10. Explain THREE differences between chloroplasts and mitochondria.

SL 3

In the following experiment the activity of catalase is measured and graphed over a range of temperatures. The substrate for catalase is hydrogen peroxide and the products of its decomposition are water and oxygen.

The following graph is the result of this experiment.



11. What is the function of enzymes?

SL 2

12. Using the graph (page 5), interpret the results shown. Include the optimum temperature for enzyme activity and account for the increase and decline of the slope.

SL 4

13. Describe the process of osmosis.

SL 2

14. Define "meiosis".

SL 1

15. What is the difference between meiosis 1 and meiosis 2?

SL 2

The following diagram illustrates the first stage of mitosis, which is prophase. In this stage, the chromosomes condense and become visible, spindle fibers emerge from the centrosomes and the nuclear envelope breaks down.

16. In the box below, draw and label the remaining 3 stages of mitosis.



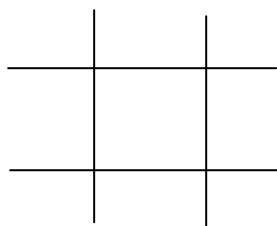
Prophase

SL 3

Read to answer Number 17 and 18.

In dogs, the gene for fur colour has two alleles. The dominant allele (F) codes for grey fur and the recessive allele (f) codes for black fur.

17. Using this information, use a punnet square to determine the possible genotypes of the offspring if we cross a heterozygous female dog and a homozygous recessive male dog.



SL 3

18. What will be the phenotypic ratio of the offspring in Number 17 above?

SL 1

STRAND 4:

PLANTS

Weighting 20

19. Name the gas that enters the stomata during photosynthesis **and** the gas that passes out of the stomata during photosynthesis.

SL 1

20. If carbon dioxide concentration keeps on increasing in the atmosphere, what will that mean for the rate of photosynthesis?

SL 1

21. Give a balanced chemical equation to represent the process of photosynthesis.

SL 2

Use the following information to answer Number 22 – 25.

In an experiment set up, a well-watered healthy potted plant with variegated leaves was kept in darkness for about 24 hours (*Variegated leaves have green parts that contain chlorophyll and white parts where there is no chlorophyll*). After that, it was placed in sunlight for a few hours. One of the leaves was then plucked and tested for starch. Using the above information to answer the following questions:

22. State the aim of the above experiment.

SL 1

23. Name the chemical used for testing the presence of starch.

SL 1

24. Why do we heat a plant leaf in boiling water for 30 seconds and then heat it in boiling ethanol for a few minutes?

SL 2

25. After adding the iodine to the leaf, what would we expect to see in the variegated leaf?

SL 2

26. Compare the THREE different methods of seed dispersal.

SL 3

27. Define geotropism.

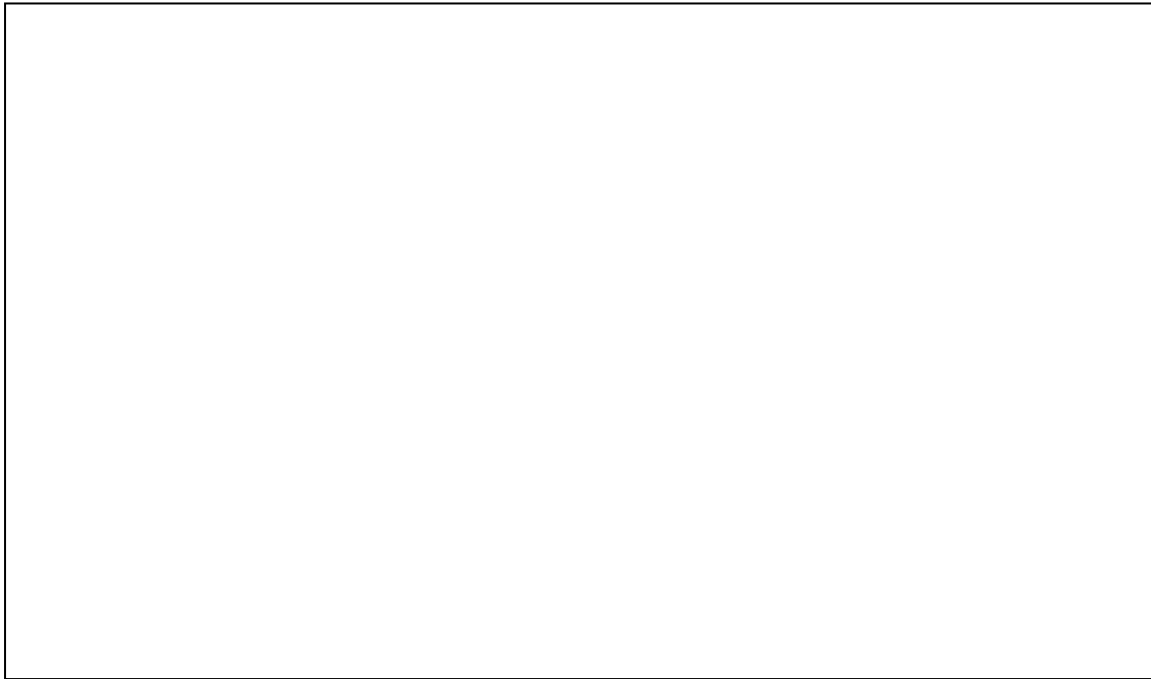
SL 1

28. Explain how carbon dioxide, water and warmth are important in plant growth.

SL 3

29. Draw a diagram of an experiment to demonstrate phototropism. You may do this by drawing it in the space provided below.

SL 3



30. What is the use of fibre in our diets?

SL 1

31. Explain the importance of calcium and iron in our diet.

SL 3

32. Discuss a test for simple carbohydrates and proteins in the lab. Include in your discussion the solutions/reagents used as well as the results of the test.

SL 4

33. Using the following terms, describe the correct sequence in which food passes through the human digestive system: stomach, pharynx, large intestine, oesophagus, small intestine.

SL 2

34. Explain the difference between breathing, respiration and gas exchange.

SL 3

35. Describe what happens to our diaphragm when we inhale and exhale air.

SL 2

36. How do arteries differ from veins?

SL 2

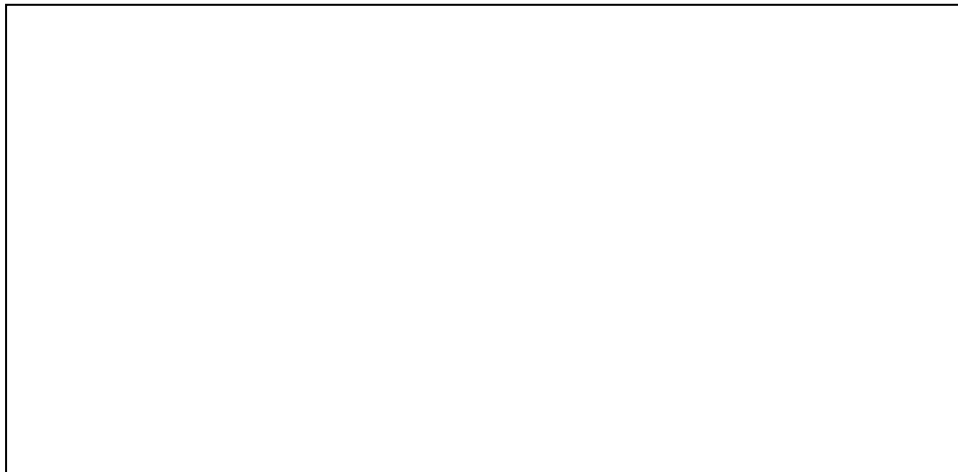
37. Explain THREE functions which highlight the importance of the skeleton in vertebrates.

SL 3

38. Adrenaline, insulin, oestrogen, progesterone, testosterone and thyroxine are examples of hormones found in humans and animals. Pick THREE and explain their function/role in humans and animals.

SL 3

39. A neuron consists of THREE major parts. In the space below, draw a neuron and label your diagram.



SL 3

40. Discuss the combined harmful effects that drugs and alcohol have on human health and societal structures. Include examples in your answer.

SL 4

STRAND 6:

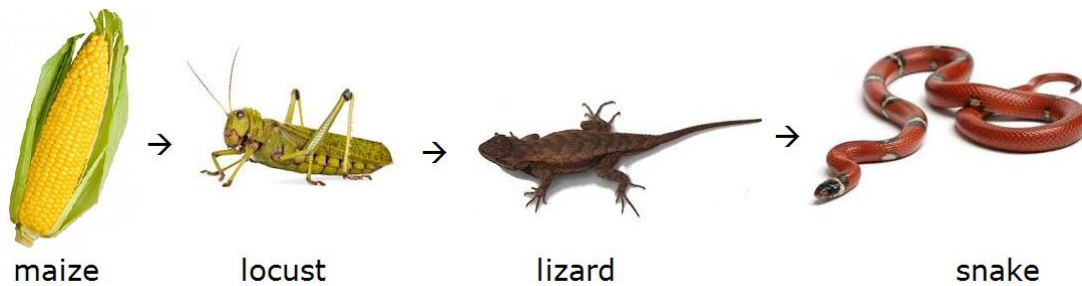
ENVIRONMENT

Weighting 14

41. Define food web.

SL 1

Use the food chain below to answer Number 42.



42. Name the producer AND the secondary consumer.

SL 2

Environmental issues are global problems and over the last few decades, the exploitation of our planet and the destruction of our environment have increased at an alarming rate. Deforestation is one environmental issue faced here in Samoa.

- 47.** Discuss the disadvantages deforestation has on humans, other species and ecosystems.

SL 4

STUDENT EDUCATION NUMBER									

BIOLOGY

2019

(For Scorers only)

STRANDS	Weighting	Scores	Chief Scorer
STRAND 1: VARIETY OF LIFE	10		
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TOTAL	100		