GOVERNMENT OF SAMOA

| STUDENT EDUCATION NUMBER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |

# Samoa School Certificate

# BIOLOGY

# 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 space, 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** | VARIETY OF LIFE | 2 – 4 | 30 | 16 |
| **STRAND 2** | CELL BIOLOGY | 5 | 10 | 6 |
| **STRAND 3** | GENETICS | 6 – 7 | 20 | 12 |
| **STRAND 4** | PLANTS | 8 – 12 | 55 | 30 |
| **STRAND 5** | ANIMALS | 13 – 15 | 45 | 24 |
| **STRAND 6** | ENVIRONMENT | 16 – 18 | 20 | 12 |
| | **TOTAL** | | **180** | **100** |

Check that this booklet contains pages 2 - 19 in the correct order and that none of these pages are blank.

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

1. The table below shows some features of different species of living things collected on a class field trip.

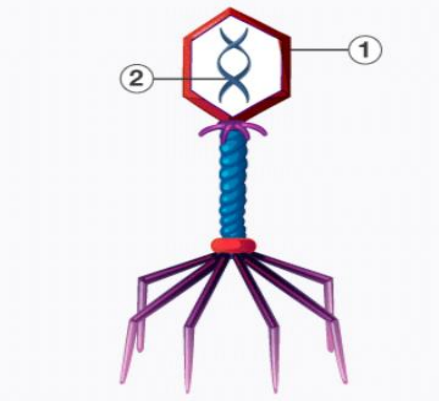
| **Features** | **Species A** | **Species B** |
|---|---|---|
| **Nutrition** | Autotrophic | Saprotrophic |
| **Cell Wall** | Present | Present |
| **Chloroplast** | Present | Absent |
| **Cellularity** | Multicellular | Multicellular |

Identify which **<u>Kingdom</u>** species B listed above belong to.

| SL 1 |
|---|
| |

Species B _____

2. Name the part (number 2) of the micro-organism structure.




Name:_____

| SL 1 |
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3. Explain why we get sick with chicken pox once in a lifetime but suffer from the flu numerous times.

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| SL 2 |
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4. Briefly explain preventative measures that Samoa used to control measle diseases currently and in the past.

| SL 2 |
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5. ***Fungi use different adaptations based on their method of feeding.***
Explain **THREE** (3) of these adaptative features and how fungi use them to obtain nutrients for their growth.

| SL 3 |
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6. Explain the process of microbial fermentation and describe its various applications in the food and beverage industry.

| SL 3 |
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7. Create a simple dichotomous key for identifying common insects found in your area, using observable characteristics such as the number of legs, the presence of wings, and body shape.

| SL 4 |
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| |

8. Explain how the process of osmosis affects the movement of water in and out of a cell.

| SL 2 |
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| |

9. Discuss how factors of pH, temperature, and substrate concentration can impact the structure of the enzyme and its rate of enzyme-catalyzed reactions.

| SL 4 |
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| |

10. Define Discrete variation.

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_____

| SL 1 |
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11. What is the expected genotype ratio of offspring resulting from a cross between a homozygous dominant parent (BB) and a heterozygous parent (Bb) for the trait of brown eyes?

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_____

| SL 1 |
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12. Assume that one of Mickey Mouse sons, who is heterozygous for the light blue body color, married a girl that was also heterozygous. What are the chances of a child with light blue skin and a child with light green skin.

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| SL 1 |
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13. Describe the behaviour of chromosomes during the metaphase stage of mitosis. (You can use labeled diagrams to help your explanation if needed).

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| SL 2 |
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14. Explain how the presence or absence of the Y chromosome determines the sex of the individual in humans.

| SL 3 |
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15. Discuss in a short paragraph how the principle of segregation and the principle of independent assortment contribute to the diversity of traits in offspring resulting from sexual reproduction.

| SL 4 |
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16. Define the following terms:

(a) Transpiration

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_____

| SL 1 |
|---|
| |

(b) Tropism

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| SL 1 |
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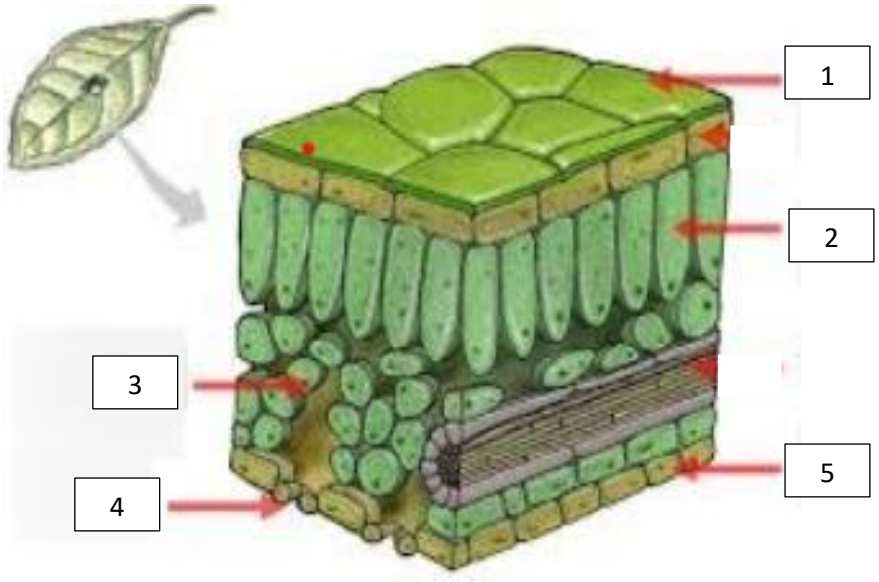
Use the diagram of a leaf-cross section below to answer the Questions 17 to 19.




17. Select and name any **TWO** from the above diagram.

| No. | Name of Structure |
|---|---|
| | |
| | |

| SL 1 |
|---|
| |

| SL 1 |
|---|
| |

18. Explain how the internal structure of leaves contributes to the processes of gas exchange and materials transport in and out of the plant.

| SL 3 |
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| |

19. Discuss in a short/mini paragraph how features of the leaf (thin, flat, surface area, leaf arrangement) help to carry out the important function of photosynthesis.

| SL 4 |
| --- |
| |

20. Plants can reproduce both sexually and asexually. Given an advantage and disadvantage of either Sexual Reproduction OR Asexual Reproduction in plants.

**Sexual Reproduction**

Advantage _____

Disadvantage_____

| SL 2 |
| --- |
| |

OR

**Asexual Reproduction**

Advantage _____

Disadvantage_____

21. List **TWO** raw materials of the process of photosynthesis.

_____

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| SL 2 |
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22. Describe how environmental factors such as soil pH and temperature affect the availability and uptake of essential nutrients by plants.

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| SL 3 |
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23. Explain how a root system achieves a large surface area for the absorption of water and minerals.

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| SL 2 |
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24. State a function of plant hormones Abscisic acid and Auxin.

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| SL 2 |
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**Mrs. Rosie, a biology teacher, is conducting a transpiration experiment with her students in the laboratory. She has set up four identical potted plants and one she covered with a plastic bag to prevent transpiration. After a few hours, the students observed and recorded their findings.**

25. Discuss what are the factors that affect the rate of transpiration in plants, and how they impact the experiment conducted by Mrs. Rosie and her students.

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| SL 4 |
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26. Discuss the role of meristematic tissues in plant growth.

| SL 4 |
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27. State what nutrient deficiencies in animal nutrition lead to.

| SL 1 |
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28. Discuss the conditions that can affect the human digestive system, such as ulcers or irritable bowel syndrome.

| SL 4 |
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| |

29. Explain the role of the circulatory system in maintaining body temperature and the effects of inefficient circulation on this process.

| SL 3 |
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| |

30. Briefly discuss how kidneys work in regulating water balance and electrolyte levels in the body.

| SL 3 |
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| |

31. Define the term **gametogenesis.**

| SL 1 |
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32. Discuss the impact of environmental factors, such as nutrition and stress, on embryonic development.

| SL 2 |
| --- |
| |

33. Which gland produces the hormone **Insulin**?

| SL 1 |
| --- |
| |

34. Explain what happens to your pulse rate during moderate exercise and why does this change occur in your body.

| SL 2 |
| --- |
| |

35. Discuss the effects of drug and alcohol use on the social structures of communities, such as increases in crime and family dysfunction.

| SL 4 |
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| |

36. Describe the mechanisms by which invertebrates sense and respond to external stimuli, including sensory receptors and neural pathways.

| SL 2 |
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| |

37. Give **ONE** exercise or activity that is particularly beneficial for improving respiratory health and increasing lung capacity.

| SL 1 |
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38. Define the following terms:

(a) Symbiosis

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| SL 1 |
|---|
| |

(b) Predation

_____

_____

| SL 1 |
|---|
| |

39. The cockroach is an insect found almost anywhere. It has excellent adaptations for survival. Give a 'Behavioral Adaptation' and explain how it helps the cockroach to survive.

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| SL 2 |
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40. State how energy flows through a food chain, including the roles of producers, consumers, and decomposers.

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| SL 1 |
|---|
| |

**Around Samoa many new developments are taking place, such as new buildings being built, and new roads being constructed to help improve our standard of living.**

41. Explain **THREE** ways in which these developments negatively damage our environment.

| SL 3 |
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42. Discuss in a short/mini paragraph the impact of chemical controls on soil health and the long-term consequence of pesticide uses on soil fertility and structure.

| SL 4 |
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| |

| STUDENT EDUCATION NUMBER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
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# SSC BIOLOGY

## 2023

***(For Scorers only)***

| STRANDS | | Weighting | Scores | Check Scorer | AED Check |
|---|---|---|---|---|---|
| **STRAND 1** | VARIETY OF LIFE | 16 | | | |
| **STRAND 2** | CELL BIOLOGY | 6 | | | |
| **STRAND 3** | GENETICS | 12 | | | |
| **STRAND 4** | PLANTS | 30 | | | |
| **STRAND 5** | ANIMALS | 24 | | | |
| **STRAND 6** | ENVIRONMENT | 12 | | | |
| | **TOTAL** | **100** | | | |