

STUDENT EDUCATION NUMBER

GOVERNMENT OF SAMOA  
MINISTRY OF EDUCATION, SPORTS AND CULTURE

# Samoa School Certificate

# BIOLOGY

## 2018

## 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
<b>STRAND 1:</b> VARIETY OF LIFE	2	28	16
<b>STRAND 2:</b> CELL BIOLOGY	5	10	6
<b>STRAND 3:</b> GENETICS	6	22	12
<b>STRAND 4:</b> PLANTS	8	54	30
<b>STRAND 5:</b> ANIMALS	13	44	24
<b>STRAND 6:</b> ENVIRONMENT	17	22	12
<b>TOTAL</b>		<b>180</b>	<b>100</b>

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. *Euglena* species are characterized by an elongated cell with one nucleus, numerous chlorophyll-containing chloroplasts, a contractile vacuole, an eyespot and one or two flagella.

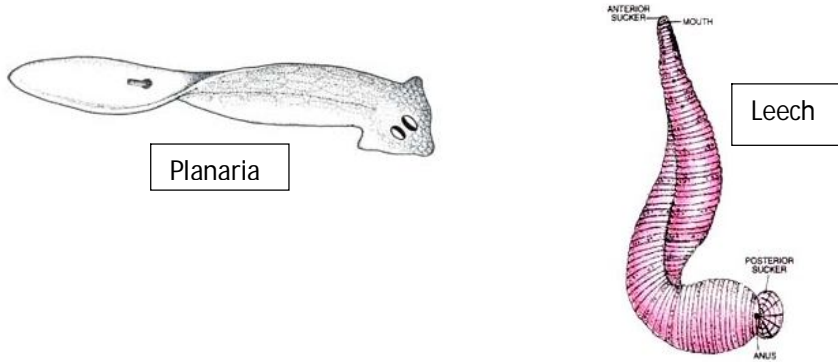


Does a *Euglena* species belong to the Kingdom Monera or Protista?

\_\_\_\_\_

SL 1

- 2. What are the features used to separate the Phylum Annelida from the Phylum Platyhelminthes? Refer to the diagrams below.



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SL 2

- 3. Considering the evolutionary scale, which of the two is more advanced, the seed, or the spore?

\_\_\_\_\_

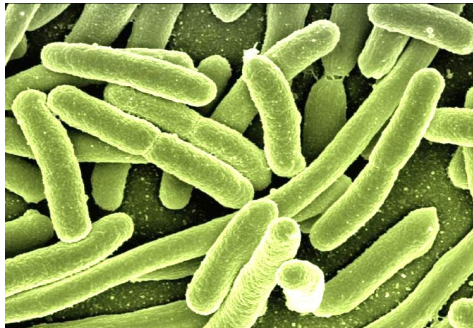
SL 1

4. By means of diagrams illustrate why a virus needs a host to replicate whereas a bacterium does not.

--

SL 2

5. *Rhizobium leguminosarum*, as the scientific name suggests, is a legumen endosymbiotic microbe. Explain its role in plant nutrition.



---

---

---

---

---

SL 3

6. Myna birds (*Acridotheres spp.*) were introduced from India into Samoa between the 1960s and the 1980s, in an attempt to control livestock insect pests, e.g. ticks and fleas. Mynas are known to eat a wide variety of insects and to prey on native birds. Explain the consequent disadvantages that a biological control may represent.

---

---

---

---

---

---

---

---

---

---

SL 3

7. Discuss Koch's Postulates in terms of ethics: "Is it ethical to use animals other than humans?"

---

---

---

---

---

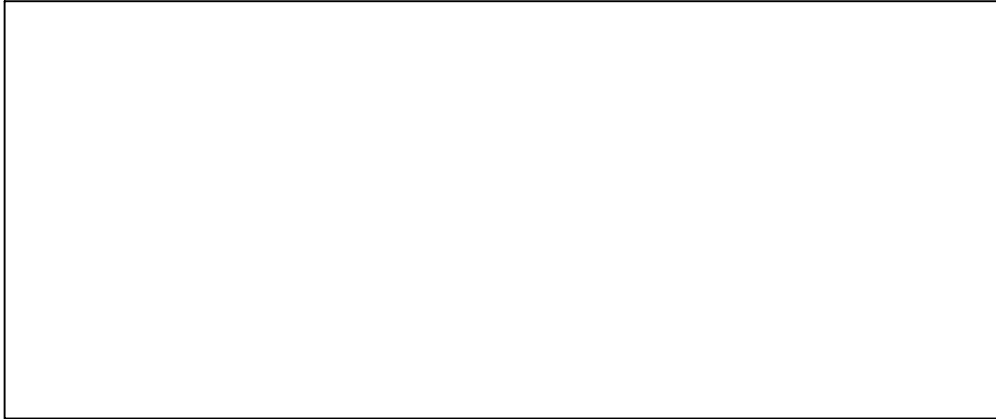
---

---

---

SL 4

8. Draw the structure of the rough endoplasmic reticulum, and describe its role in the metabolism of cells.



\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SL 2

9. Discuss the differences between cellular respiration and photosynthesis. Include the fully balanced chemical reaction for each process and the role of enzymes participating in the reactions.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SL 4

10. Define "Genome".

---

---

---

SL 1

11. What is the outcome of mitotic division?

---

---

---

SL 1

12. Define homologous chromosomes.

---

---

---

SL 1

13. By means of a Punnet square, determine the phenotypic and genotypic ratio of a cross between a heterozygote male and a recessive homozygote female for the height trait.

Phenotype \_\_\_\_\_ Ratio \_\_\_\_\_

Genotype \_\_\_\_\_ Ratio \_\_\_\_\_

SL 2

14. Red-green colour blindness (alleles: R=normal; r=colour blind), is due to a mutation on the X-chromosome. Use a Punnet square to explain this pattern of inheritance if a woman carrier mates with a normal male.

---

---

---

---

---

---

---

---

---

---

SL 3

15. Discuss the relation between the DNA, the protein coded, the gene and the alleles present in a chromosome, and how this relation can be a source of variation.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

SL 4

16. The leaf is an organ. List the internal tissues involved in photosynthesis.

---

---

---

SL 1

17. What is the function of stomata?

---

---

---

SL 1

18. What type of transport occurs in the guard cell acting in the opening and closing of stomata?

---

---

---

SL 1

19. Define transpiration.

---

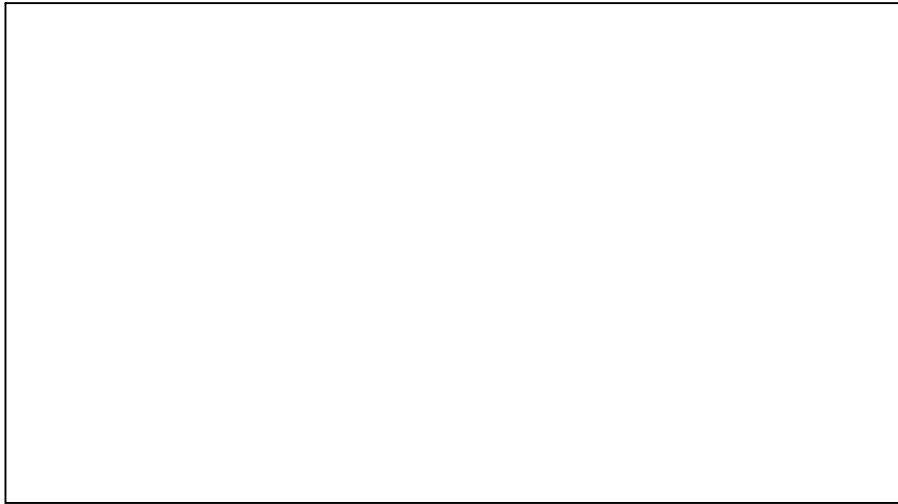
---

---

SL 1



20. By means of diagrams, describe at least TWO different types of plant root.



SL 2

21. Describe the function of pneumatophores in the mangrove ecosystem.

---

---

---

---

SL 2

22. Environmental abiotic factors affect plant transpiration. List those that may affect transpiration in a rainforest plant growing under the tall trees (understory).

---

---

---

---

SL 2

23. Explain how different plant species have adapted in order to reduce loss of water during transpiration.

---



---



---



---



---

SL 3

24. The growth of plants in greenhouses can be increased by manipulating a biotic factors. This can be useful to maximise crop yields for economic benefit. One such factor is the availability of Nitrogen.

Study the table below, and answer the question that follows:

Nitrogen fertiliser concentration (g L <sup>-1</sup> )	Number of leaves					Mean
	Sample (n)					
	1	2	3	4	5	
0	9	9	10	8	7	
0.06	15	16	15	16	16	
0.12	16	17	17	17	16	
0.18	18	18	19	18	-	
0.24	6	19	19	18	18	
0.30	18	17	18	19	19	

- (a) Complete the table by calculating the mean for each of the concentration of Nitrogen added to the plants, identifying the smallest and the largest value.
- (b) Discuss the results, stating also the dependent and independent variables and the control for this experiment. Include a reference to the possible aim in your discussion.

---



---



---



---



---

SL 4

---

---

---

25. Give examples of at least TWO plants hormones stating their specific function in plant growth.

---

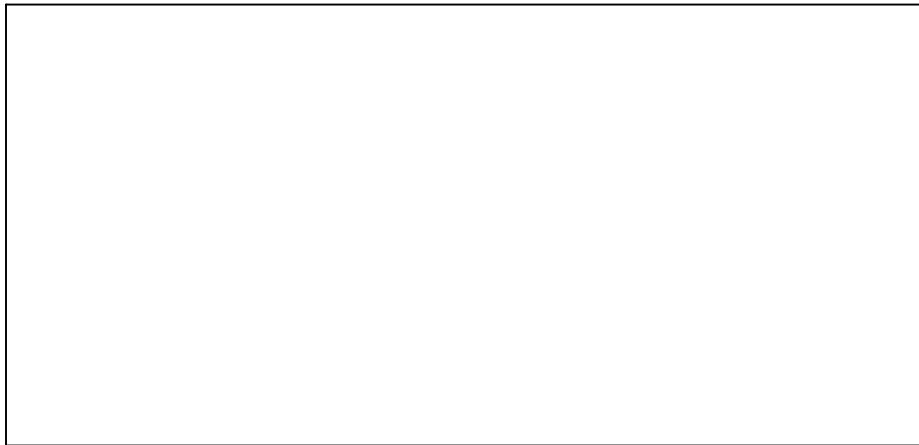
---

---

---

SL 2

26. Design an experiment to demonstrate phototropism. You may do this by drawing it.



---

---

---

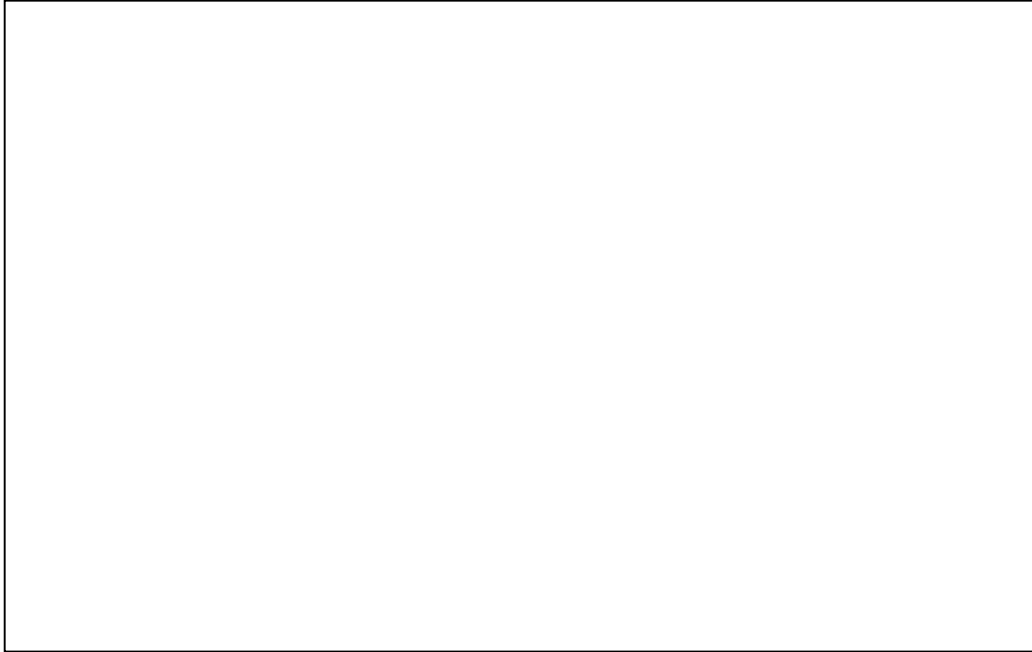
---

---

---

SL 4

27. Draw and label the reproductive organs in a hermaphrodite flower.



SL 3

28. Discuss the processes and outcomes of pollination and fertilization in an insect pollinated flower.

---

---

---

---

---

---

---

SL 4

29. Which group of food molecules is broken down in the mouth?

\_\_\_\_\_

SL 1

30. What are the main molecules broken down in the stomach?

\_\_\_\_\_

\_\_\_\_\_

SL 1

31. Name the enzyme and inorganic chemical acting in the stomach digestion.

\_\_\_\_\_

SL 1

32. What is the function of the gall bladder?

\_\_\_\_\_

\_\_\_\_\_

SL 1

33. List THREE different types of blood vessels describing their functions.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SL 2

34. What is the function of the lymph nodes?

---

---

---

---

SL 2

35. Why is movement important in animal survival?

---

---

---

---

SL 2

36. Compare the vertebrate skeleton to the exoskeleton of an arthropod.

---

---

---

---

---

---

---

---

SL 3

37. Explain how alcohol affects the body.

---

---

---

---

---

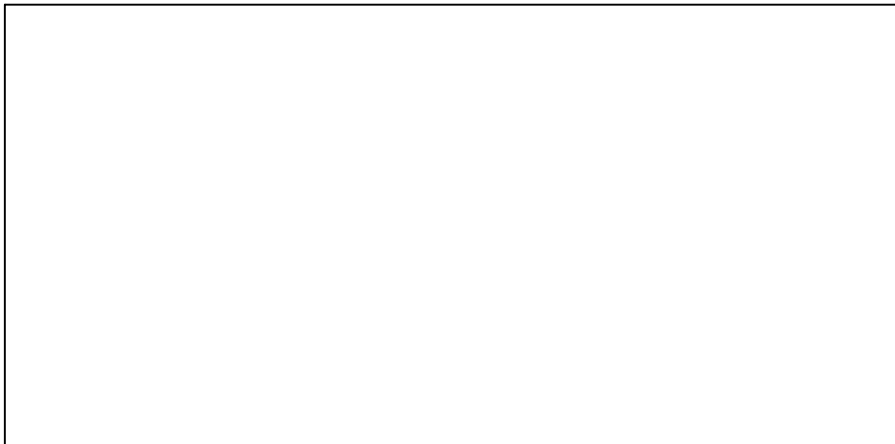
---

---

---

SL 3

38. Draw a diagram of the reflex action and discuss its advantage over the central nervous system response.



---

---

---

---

---

---

---

---

SL 4





**40.** Give a comprehensive definition of “environment”.

\_\_\_\_\_  
\_\_\_\_\_

SL 1

**41.** Define adaptation and give an example.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SL 1

**42.** Using your knowledge of the Samoan Flora or Fauna, give an example of symbiosis.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SL 1

**43.** Draw a flow diagram of a coral reef food chain indicating clearly the energy transfer.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SL 2



STUDENT EDUCATION NUMBER									

## BIOLOGY

2018

(For Scorers only)

STRANDS	Weighting	Scores	Chief Scorer
<b>STRAND 1: VARIETY OF LIFE</b>	16		
<b>STRAND 2: CELL BIOLOGY</b>	6		
<b>STRAND 3: GENETICS</b>	12		
<b>STRAND 4: PLANTS</b>	30		
<b>STRAND 5: ANIMALS</b>	24		
<b>STRAND 6: ENVIRONMENT</b>	12		
<b>TOTAL</b>	<b>100</b>		