



# Samoa Secondary Leaving 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.

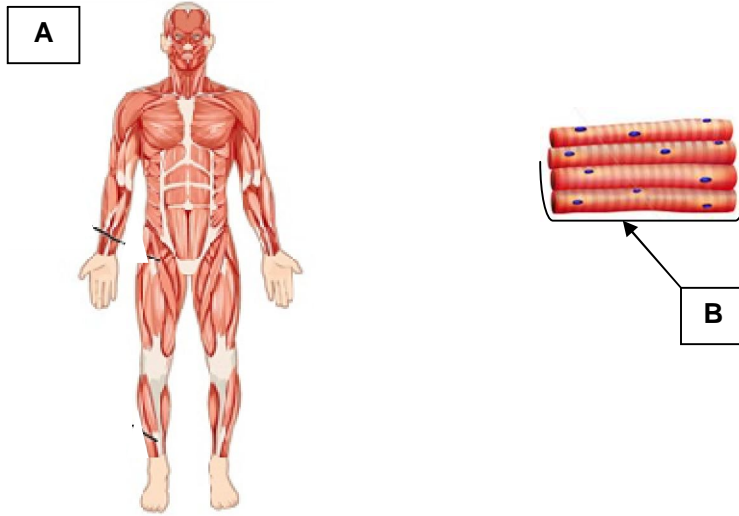
CURRICULUM STRANDS		Page	Time (min)	Weighting
<b>STRAND 1:</b>	VARIETY OF LIFE	2	18	15
<b>STRAND 2:</b>	CELL BIOLOGY	5	32	20
<b>STRAND 3:</b>	GENETICS	9	44	15
<b>STRAND 4:</b>	PLANTS	12	50	15
<b>STRAND 5:</b>	ANIMALS	14	18	20
<b>STRAND 6:</b>	ENVIRONMENT	17	18	15
<b>TOTAL</b>			<b>180</b>	<b>100</b>

Check that this booklet contains pages 2-20 in the correct order and that none of these pages are blank.

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

The diagrams below show different levels of organization in a multi cellular organism.

Study Diagram A and B to answer Number 1 to 4.



1. Name the level represented by **A**.

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SL 1

2. Name the level represented by **B**.

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SL 1

3. Give an example of a level lower than **B**.

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SL 1

4. Explain why there can be more than one tissue per organ.

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SL 3

Taxonomy orders plants and animals in ranks of superior and subordinate groups.

5. List the THREE major characteristics of the organisms grouped in the Kingdom Plantae.

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SL 1

6. The Ve'a is found in Samoa as well as many other Pacific Islands.

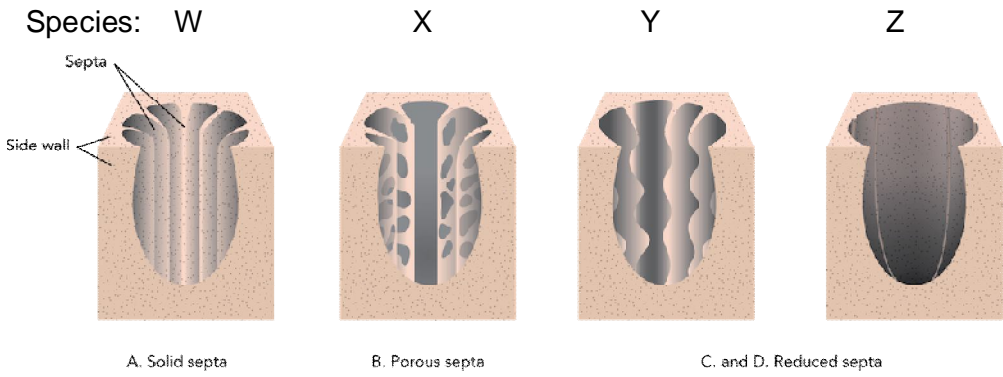


Match the following ranks to the corresponding Ve'a classification and transfer your classification by writing it in decreasing order from superior to subordinate groups.

<u>RANK</u>	<u>CLASSIFICATION</u>	<u>VE'A CLASSIFICATION</u> (Superior to subordinate)
Genus	<i>Gallirallus</i>	1. _____
Phylum	Vertebrata	2. _____
Class	<i>Gallirallus philippensis</i>	3. _____
Subphylum	Aves	4. _____
Family	Animalia	5. _____
Species	Rallidae	6. _____
Kingdom	Chordata	7. _____

SL 2

7. Use the diagram below to prepare a dichotomous key of corals.



SL 3

8. What difference would it make, to the survival of organisms and their biodiversity, if a Land or Marine Park, is cut down from 100 hectares to 10 hectares? Explain your answer.

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SL 3

9. Describe the steps you would take to observe a plant cell under light microscope.

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SL 2

10. State the function of the rough endoplasmic reticulum.

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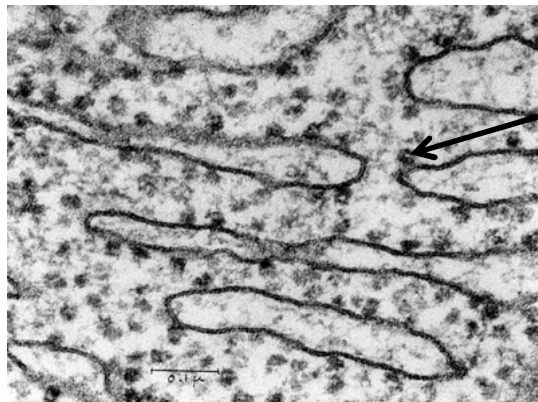
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SL 1

Observe the electron micrograph below, which shows a part of a cell.

11. Name the organelle indicated by the arrow.



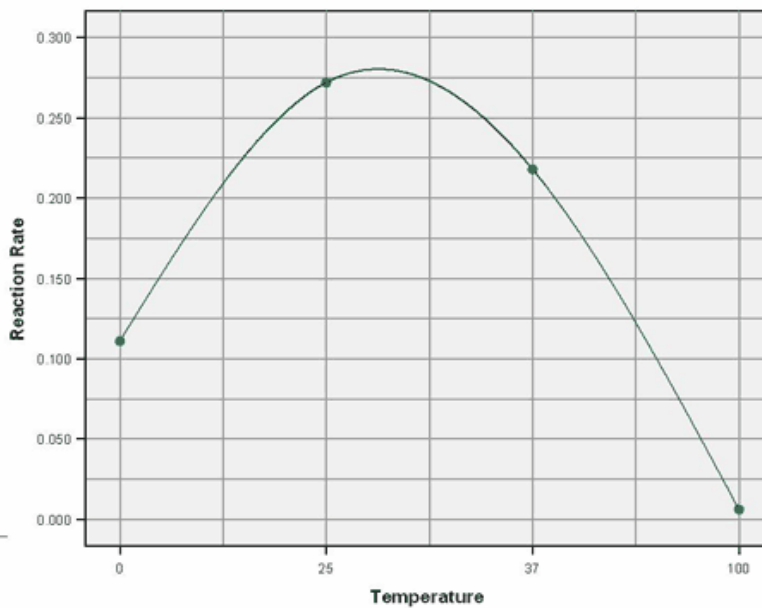
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SL 1

12. Describe the relationship between the Rough Endoplasmic Reticulum and the organelle identified in Number 11.

SL 2

Hydrogen peroxide ( $H_2O_2$ ) is a by-product of respiration and is made in all living cells. Hydrogen peroxide is harmful and must be removed as soon as it is produced in the cell. Cells make the enzyme catalase to remove hydrogen peroxide. The graph below represents the catalytic action on the substrate at different temperatures. Use this graph to answer Number 13 to 15 that follow.



13. Referring to the above graph, identify the dependent and independent variables. Give a reason for your choice.

SL 2

14. Discuss the above reaction system in terms of enzyme-substrate formation, activation energy levels and rate of reaction.

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SL 4

15. The same reaction requires the presence of a coenzyme in order to occur. Discuss in detail the effects that a temperature of 100°C has on the formation of the coenzyme-enzyme-substrate complex.

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SL 4

16. Cellular respiration and Adenosine Triphosphate (ATP) production occurs in the mitochondria of both animals and plants.

Discuss in detail the THREE steps involved in the production of ATP, indicating:

- Sites of ATP production
- Relation between structure of mitochondrial cristae and ATP production
- Amount of energy produced in each site
- Examples of cell metabolic processes where ATP is used

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SL 4



17. By means of a diagram, summarise the processes of DNA duplication, transcription and translation in Eukaryotes.



SL 3

18. Describe the role of metaphase I in the production of allele recombination.

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SL 2

19. Reproduction may occur by mitosis (asexual) and/or by meiosis (sexual). Explain THREE advantages of asexual reproduction?

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SL 3

20. Sex of an individual is usually determined by sex chromosomes. In humans, males are the heterogametic sex whereas females are homogametic.

Describe how sex is determined in mammals.

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SL 2

21. The ultimate source of all genetic variation is mutations as they produce new alleles. What are the possible causes of mutation?

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SL 2

In a dihybrid cross, when a homozygous dominant tall plant (TT) with round peas (RR) is mated with a recessive homozygous short plant (tt) with wrinkled peas (rr) an F<sub>1</sub> generation is produced.

If the F<sub>1</sub> plants (TtRr) self-pollinate determine the following: (Space is left for you to draw Punnett squares)

22. How many **genotypes** are produced in the F<sub>2</sub>?

SL 3

How many **phenotypes** are produced in the F<sub>2</sub>?

23. The leaf is a plant's organ and as such has different types of tissue. Name the ONE tissue involved in protecting the internal structures.

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SL 1

24. Leaf structures comprise the palisade mesophyll and the spongy mesophyll. What function do these tissues have in common?

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SL 2

25. Explain the role of light and dark phases and their connection in photosynthesis.

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SL 3

26. What is the major factor affecting plant turgidity?

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SL 1

27. Describe the water transport in plants.

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SL 2

28. Translocation is the transport of solutes such as sucrose and other molecules via the phloem.

Explain this process in terms of active transport and osmosis.

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SL 3

29. Draw and label the reproductive structures of a hermaphrodite flower.



SL 3

**30.** Define autotrophic and heterotrophic organisms.

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SL 1

**31.** If an organism is heterotrophic, what are its possible types of nutrition?

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SL 2

**32.** Reflect on the traditional and modern Samoan diet to discuss them in terms of intake of simple and complex carbohydrates, proteins and lipids.

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SL 4

33. State the function of the THREE main blood vessels.

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SL 1

The internal transport can be divided into two basic types depending on the animal species.

34. Give ONE example of an animal with an open circulatory system and ONE example of an animal with a closed circulatory system.

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SL 2

35. Discuss THREE advantages of the closed circulatory system.

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SL 4

36. State TWO disadvantages of the endoskeleton.

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SL 2

37. Discuss THREE advantages of the skeleton of a crab and how this feature aids its survival in its environment.

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SL 4



**38.** Define the term adaptation.

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SL 1

Consider a Samoan fruit bat (pe'a), and a Samoan marine turtle (laumei) to answer Number 39 and 40.

**39.** Describe the types of structural and behavioural adaptations relative to each of these animals.

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SL 2

**40.** Explain how the adaptations described in Number 39, help with the survival of the laumei and pe'a.

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SL 3



44. Construct a food chain that may be represented in a Samoan ecosystem, showing clearly the flow of energy transfer.



SL 3

45. Name ONE abiotic factor in the ecosystem represented in your food chain.

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SL 1

STUDENT EDUCATION NUMBER									

## BIOLOGY

2018

(For Scorers only)

CURRICULUM STRANDS	Weighting	Scores	Chief Scorer
<b>STRAND 1: VARIETY OF LIFE</b>	15		
<b>STRAND 2: CELL BIOLOGY</b>	20		
<b>STRAND 3: GENETICS</b>	15		
<b>STRAND 4: PLANTS</b>	15		
<b>STRAND 5: ANIMALS</b>	20		
<b>STRAND 6: ENVIRONMENT</b>	15		
<b>TOTAL</b>	<b>100</b>		