STUDENT EDUCATION NUMBER									

GOVERNMENT OF SAMOA
MINISTRY OF EDUCATION, SPORTS AND CULTURE

Samoa Secondary Leaving Certificate

BIOLOGY

2020

QUESTION and ANSWER BOOKLET

Time allowed: 3 Hours & 10 minutes

INSTRUCTIONS

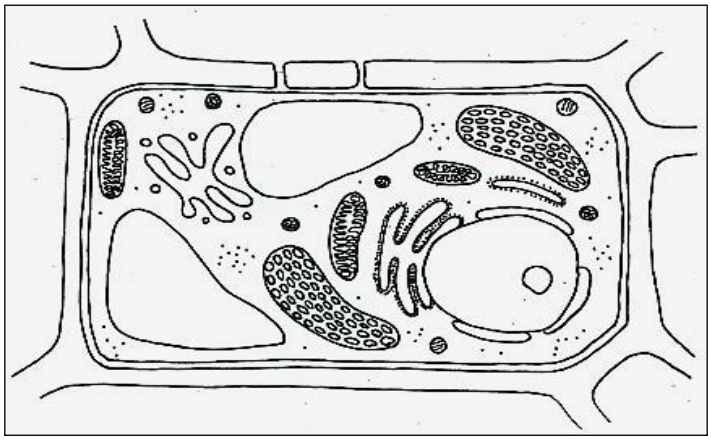
1. You have 10 minutes to read **before** you start the exam.
2. Write your **Student Education Number (SEN)** in the space provided on the top right hand corner of this page.
3. **Answer ALL QUESTIONS.** Write your answers in the spaces provided in this booklet.
4. If you need more space, ask the Supervisor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

Check that this booklet contains pages 2-21 in the correct order and that none of these pages are blank.

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

STRAND 1: **VARIETY OF LIFE** **Weighting 15**

1. A student uses a microscope to look at some cells from an organ found in a plant. The diagram below shows what the student drew after observing through the microscope.



Name the ***organ*** that the student observed.

SL 1

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2. Describe the features of organization at organelle level.

SL 2

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3. The scientific name for human beings is *Homo sapiens*. What does the term *"Homo"* represent in the divisions of the classification system of living things?

SL 1

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4. Identify the Phylum that earthworms and leeches are grouped under.

SL 1

_____

5. List TWO characteristics of the Phylum grouping for earthworms and leeches.

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SL 2

6. List TWO examples of local animals that are grouped under the Phylum Mollusca.

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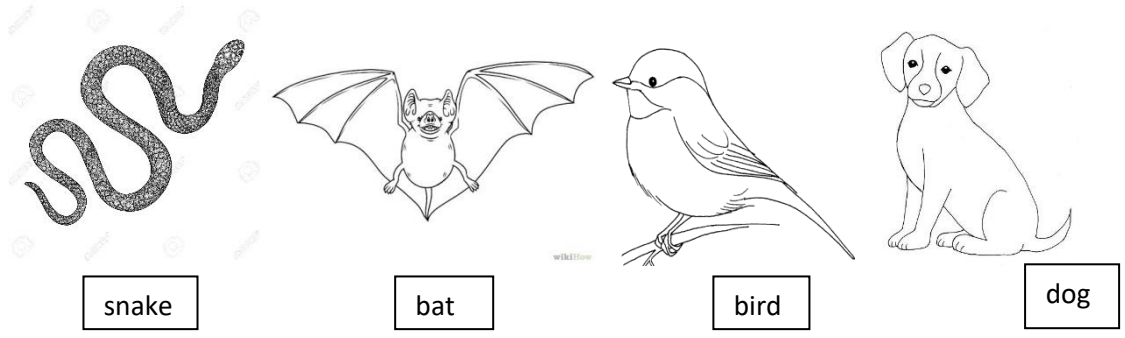
SL 2

7. You have learnt in class that all living things can be classified according to their anatomical and physiological characteristics. Use the diagrams and your knowledge of the four organisms shown below to CREATE a dichotomous key to identify these organisms.



snake | bat | bird | dog

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SL 3

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

SL 3

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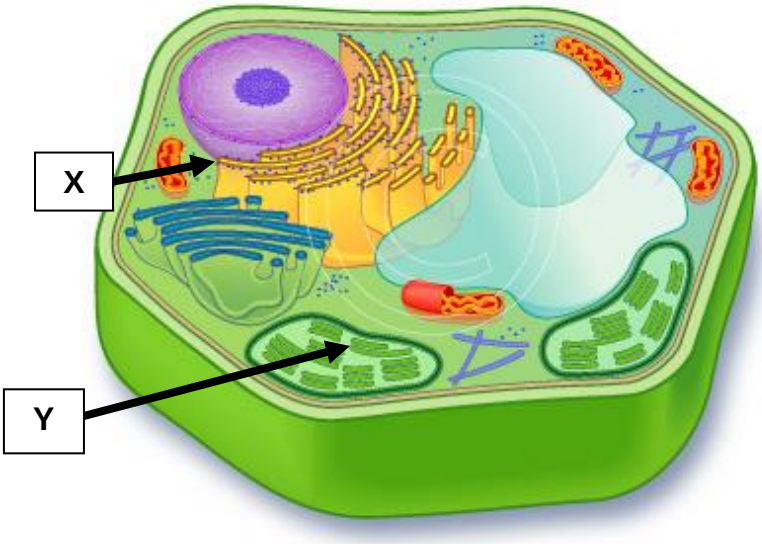
Use the diagram given below to answer Questions 9 – 11.



9. Identify the type of cell in the diagram.

_____ SL 1

10. State ONE evidence to support the cell type identified.

_____ SL 1

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11. Identify the structures labeled **X** and **Y**.

X:_____ SL 2

Y:_____

12. State the function of lysosomes.

SL 1

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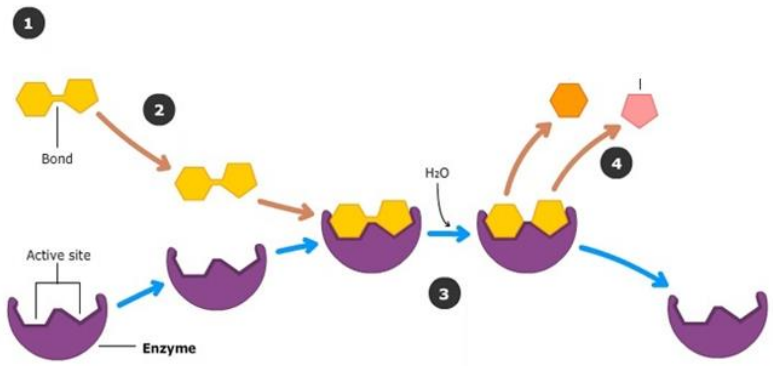
Use the diagram below to answer Question 13.

13. In FOUR steps, discuss how the enzyme sucrase catalyzes the breakdown of sucrose into simple sugars. Your answer must include the name of the simple sugars formed.



SL 4

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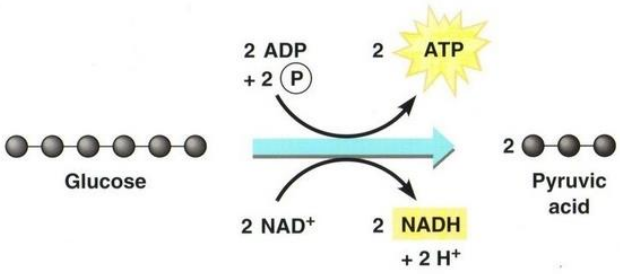
14. Using the diagram below, explain how glucose is converted into pyruvic acid during the process of Glycolysis.



SL 3

15. Food rots when microbes break down food molecules. Food preservation methods interfere with enzyme activity of microbes and prevent them from surviving. Explain how each of the following would interfere with enzyme activity:

canning (heating); freezing; pickling (soaking in acetic acid)

SL 3

16. A biologist isolated a sample of an enzyme called lactase from the intestinal lining of a calf. The substrate of lactase is the disaccharide lactose. The enzyme breaks a lactose molecule in two, producing a molecule of glucose and a molecule of galactose. The biologist performed two series of experiments. First, she made up 10% lactose solutions with different concentrations of enzyme and measured the rate at which galactose was produced (in terms of grams of galactose produced per minute; a bigger number means a faster breakdown of lactose). The results of these experiments are shown in Table A below. In the second series of experiments, as shown in Table B, she prepared a 2% enzyme solutions with different concentrations of lactose and again measured the rate of galactose production.

Table A: Rate and Enzyme Concentration					
Lactose concentration	10%	10%	10%	10%	10%
Enzyme concentration	0%	1%	2%	4%	8%
Reaction rate	0	25	50	100	200

Table B: Rate and Enzyme Concentration					
Lactose concentration	0%	5%	10%	20%	30%
Enzyme concentration	2%	2%	2%	2%	82%
Reaction rate	0	25	50	65	65

Discuss the results of the experiment above. Include in your answer:

(i) the relationship of the reaction rate and the enzyme concentration,
(ii) the reaction rate and the substrate concentration,
(iii) what might be happening between individual enzyme and substrate molecules and;
(iv) how and why the results of the two experiments differ.

SL 4

17. Define catalysts.

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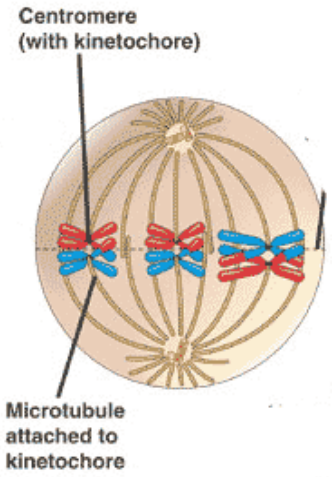
SL 1

STRAND 3: **GENETICS** **Weighting 15**

Use the diagram below to answer Question 18.



18. The diagram represents Metaphase 1 in Meiosis 1. Describe the evidence that proves this is Metaphase 1 and NOT Metaphase 2.

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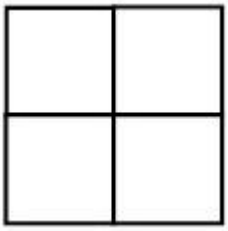
SL 2

19. Fill in the table below to distinguish between Mitosis and Meiosis.

Mitosis	Meiosis
(a)	Produces haploid daughter cells unlike the parent cell
Individual chromosomes line up at metaphase plate	(b)
(c)	Produces cells for sexual reproduction

SL 3

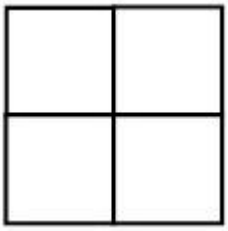
20. A rooster with gray feathers is mated with a hen of the same phenotype. Among their offspring, 15 chicks are gray, 6 are black and 8 are white. This follows a pattern of incomplete dominance. Use a punnett square to predict the phenotypes of the offspring when you mate a gray rooster and a black hen. (Black – BB).



Phenotypes of offspring:_____

SL 3

21. If half the offspring from a testcross are of the dominant phenotype and half are of the recessive phenotype, is the parent of the dominant phenotype (but unknown genotype) homozygous or heterozygous? Explain your answer.



SL 3

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22. Discuss how DNA, messenger RNA (mRNA), transfer RNA (tRNA), and ribosomes all work and function together in the process of protein synthesis.

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SL 4

23. Describe the function of the palisade mesophyll in a leaf.

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SL 2

24. List ONE factor that affects the rate of transpiration.

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SL 1

25. Describe the effect of your listed factor in Question 24 on the process of transpiration.

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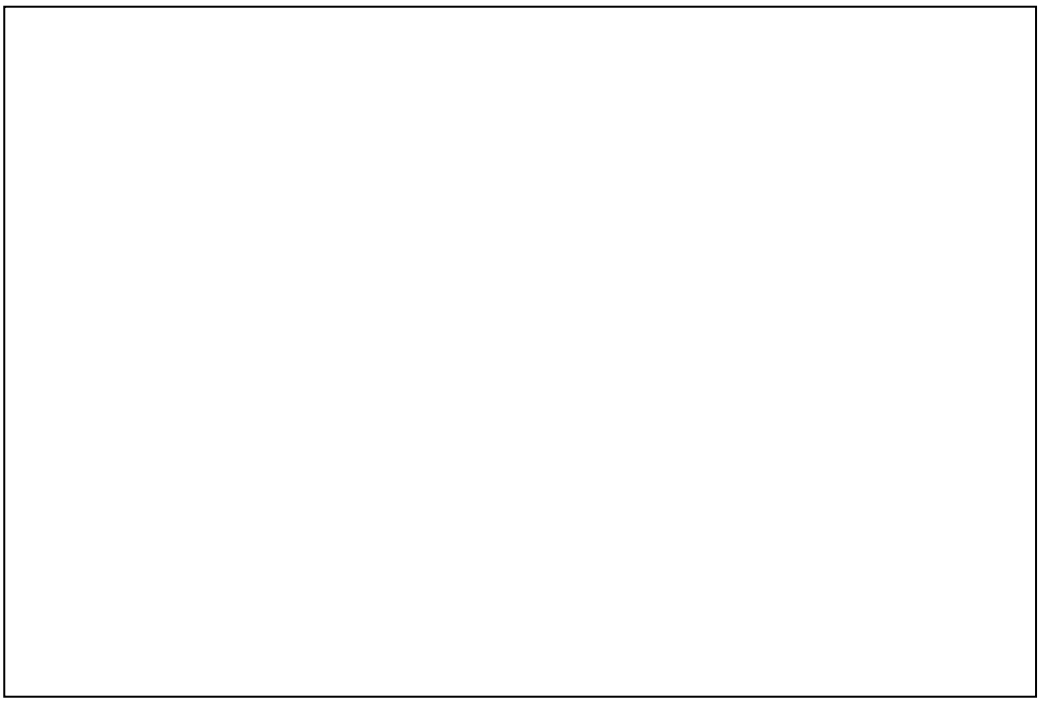
SL 2

26. Draw and label the structure of a flower.

SL 3



27. Describe TWO advantages of asexual reproduction.

SL 2

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28. Describe the process of translocation.

SL 2

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29. Use the diagram below to explain the alternation of sporophyte and gametophyte generations in ferns. Make sure you include in your answer which generation is dominant in the life cycle of ferns.

SL 3

30. Discuss TWO advantages and TWO disadvantages of having an exoskeleton.

SL 4

The diagram below shows the single circulation of blood in fish and double circulation of blood in mammals.

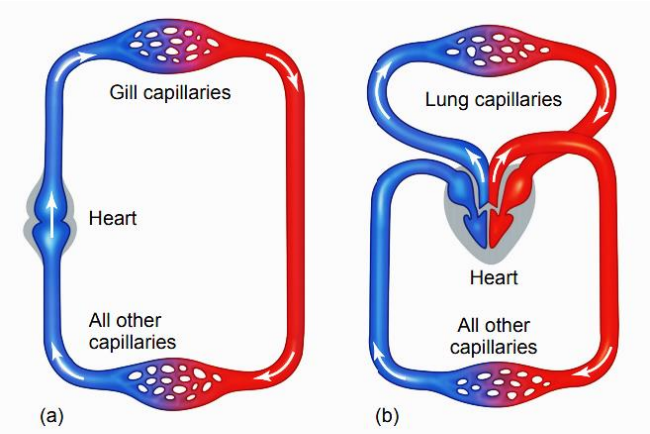


Figure 7.11 Diagrammatic representation of (a) single circulation (b) double circulation

31. Compare the efficiency of the single circulatory system of a fish to the double circulatory system of a mammal.

SL 3

32. Carbohydrates, lipids and proteins are three of the four biological macromolecules, which are formed by many monomers linking together, forming a polymer. Using your knowledge of carbohydrates, lipids and proteins, explain their importance in the human diet. (Include in your answer some examples of food that fall into these three classes of biological macromolecules).

SL 3

33. Compare the health effects of a person whose diet consists mainly of root crops (e.g. taro, yams, bananas), seafood (e.g. fish, sea urchins, octopus) and luau (green leaves and coconut) to that of a person whose diet is mainly processed and imported foods.

SL 4

34. Describe TWO differences between autotrophic and heterotrophic nutrition.

SL 2

35. Discuss how the human body maintains homeostasis in terms of sugar levels in blood. Use the term ‘insulin’ and ‘glucagon’ in your answer.

SL 4

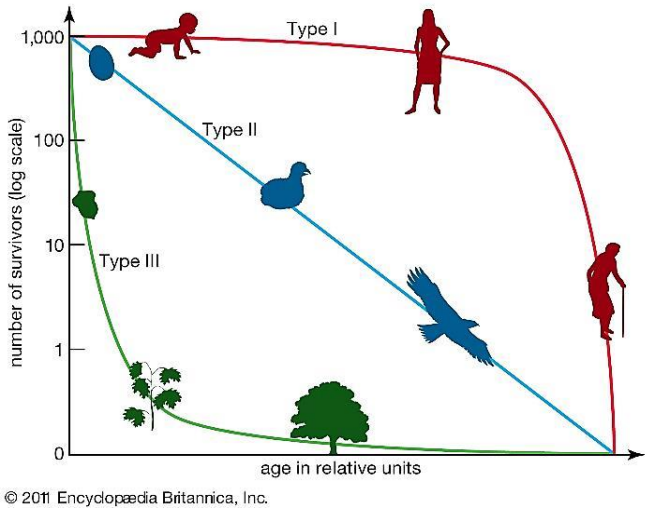
36. Define the term ecological niche.

SL 1

37. Define the term population density.

SL 1

Use the following survivorship curves to answer Question 38.



38. Choose **ONE** of the three types of survivorship curves: (Type I (Humans) OR Type II (Birds) OR Type III (Trees) and describe the characteristics of growth for that particular population.

SL 2

39. Explain the effects of **natality** and **mortality** on population growth.

SL 3

Define the following terms in Questions 40 – 42.

40. Predation.

SL 1

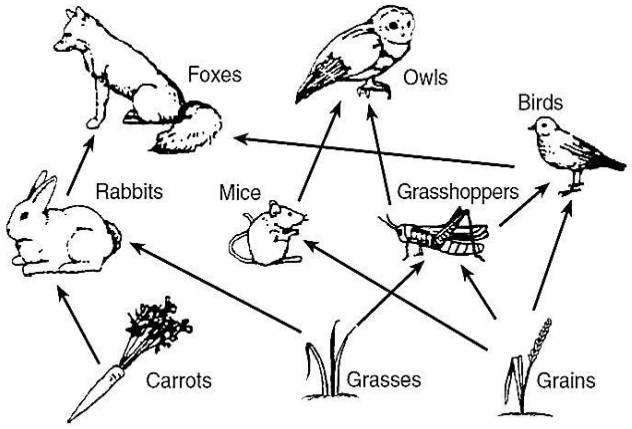
41. Commensalism.

SL 1

42. Mutualism.

SL 1

Use the following food chain to answer Question 43.



(Not drawn to scale)

43. Name ONE organism that is a second order carnivore.

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SL 1

44. Describe the difference between communities and populations.

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SL 2

45. Describe the importance of recycling nutrients. Use carbon and nitrogen as examples.

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SL 2

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BIOLOGY

2020

(For Scorers only)

CURRICULUM STRANDS	Weighting	Scores	Chief Scorer	Double Entry (AED)
STRAND 1: VARIETY OF LIFE	15			
STRAND 2: CELL BIOLOGY	20			
STRAND 3: GENETICS	15			
STRAND 4: PLANTS	15			
STRAND 5: ANIMALS	20			
STRAND 6: ENVIRONMENT	15			
TOTAL	**100**			