STUDENT EDUCATION NUMBER									

GOVERNMENT OF SAMOA
MINISTRY OF EDUCATION, SPORTS AND CULTURE

Samoa Secondary Leaving Certificate

BIOLOGY

2017

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
STRAND 1:	VARIETY OF LIFE	2	18	15
STRAND 2:	CELL BIOLOGY	5	32	20
STRAND 3:	GENETICS	9	44	15
STRAND 4:	PLANTS	12	50	15
STRAND 5:	ANIMALS	15	18	20
STRAND 6:	ENVIRONMENT	19	18	15
	TOTAL		**180**	**100**

Check that this booklet contains pages 2-22 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. Six biological levels of organization are listed below:

organs, atoms, tissues, populations, cells, organisms

Use them to answer the questions that follow:

(a) Identify which one represents the smallest or lowest level.

_____ SL 1

(b) Identify the highest level.

_____ SL 1

(c) Identify the lowest level to have the characteristics of life.

_____ SL 1

(d) Describe the basis of your answer in (c) above.

_____ SL 2

_____

2. Which level of biological organization is represented by the human stomach?

_____ SL 1

3. A student investigated the species diversity of plants in a community. The table below shows her results.

Plant species	**Number of plants per m^2**
Ferns	5
Mosses	4
Teuila	8
Coconuts	3
Wild berry	11

The demand for housing development had led to areas of the community being cleared and used to build new houses. Explain the effect of this on the organism diversity.

SL 3

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Read the passage below to answer the question that follows.

The Taro Leaf Blight (TLB) or Lega in Samoan is caused by a fungus *Phytophthora colocasiae*. In 1993, Samoa's taro crops were completely destroyed by the TLB. The taro growers' common practice at the time, was to grow just one kind of taro plant or the popular type that everyone likes to buy and eat. So when the TLB entered Samoa, it wiped out all the taro plantations on island.

4. Discuss the importance of organism diversity for survival using the taro example above.

SL 4

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5. Use the Dichotomous Key below to identify Bird Z.
In other words, write the correct genus name for Bird Z).

SL 2

_____

I. a. The beak is relatively long and slender.....*Certhidea*

b. The beak is relatively stout and heavy.....go to 2

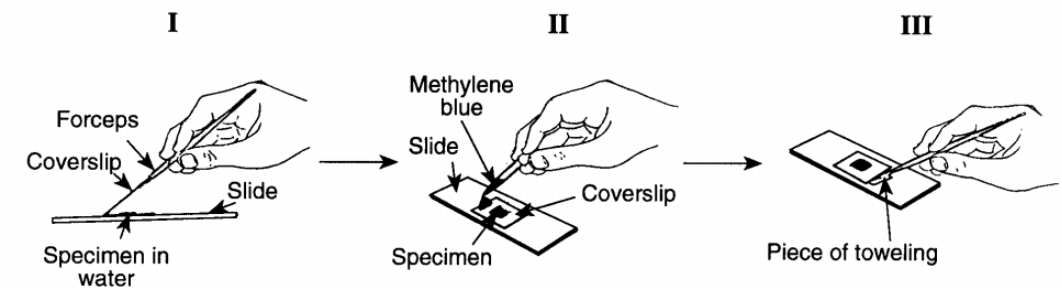
II. a. The bottom surface of the lower beak is flat and straight.....*Geospiza*

b. The bottom surface of the lower beak is curved.....go to 3

III. a. The lower edge of the upper beak has a distinct bend.....*Camarhynchus*

b. The lower edge of the upper beak is mostly flat.....*Platyspiza*

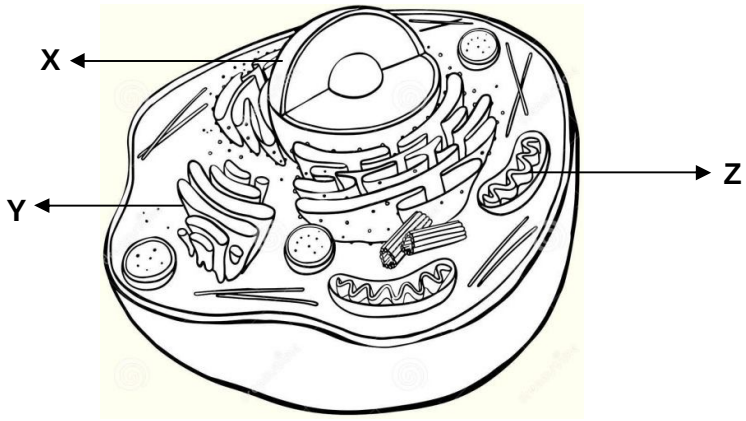
The following diagram shows parts of the procedure to prepare a wet mount of a specimen on a microscope slide.



6. Step I is important. Explain the procedure illustrated in **Step I** and why it is important.

SL 3

7. Use the diagram below to answer the questions that follow:



(a) Name organelle **X**.

_____

SL 1

(b) Name organelle **Y**.

_____

SL 1

(c) Name organelle **Z**.

_____

SL 1

(d) State the function of organelle Z.

_____

_____

SL 2

(e) Write a balanced equation for the process that takes place in organelle Z.

_____

_____

SL 2

8. Define enzymes.

_____

SL 1

9. You have learned in class that particles move across membranes by diffusion, osmosis, active transport and passive transport mechanisms. Define the term diffusion.

_____

SL 1

10. List TWO factors, which influence the rate at which the diffusion and osmosis processes occur.

_____

_____

SL 1

11. If the concentration of sodium ions is greater outside a cell than inside the cell, explain the process or mechanism that could move sodium out of the cell. *(You may draw diagram/s to illustrate your answer).*

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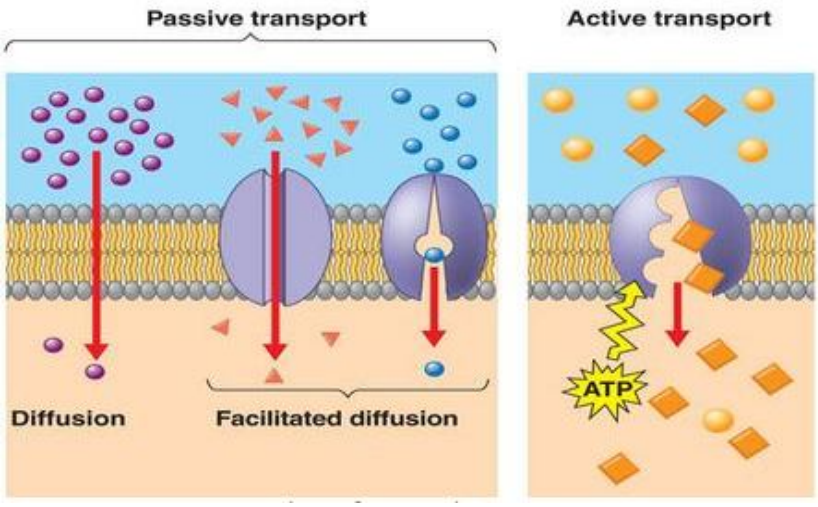
SL 3

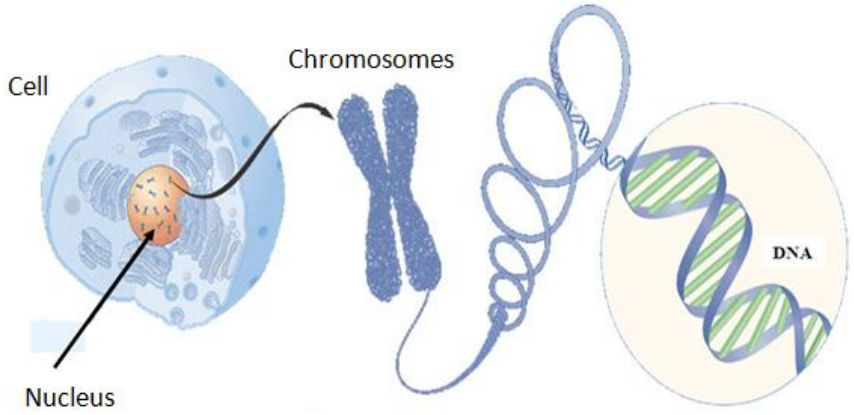
Use the diagram below to answer question 12.



12. Compare the processes of active transport and passive transport in terms of energy requirements using the example shown in the diagram above.

SL 4

13. Use the diagram below to answer the questions that follow:



(a) State the function of DNA.

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_____

SL 1

(b) State the function of chromosomes.

_____

_____

SL 1

(c) Describe the relationship between chromosomes and DNA in terms of their structure.

_____

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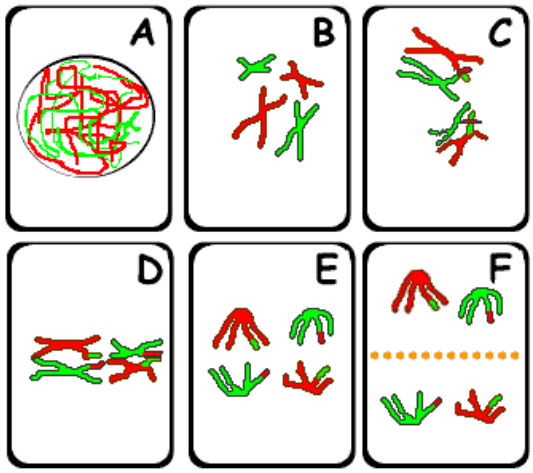
SL 2

Use the diagram below to answer the questions that follow:



14. (a) Name the type of cell division shown in the diagram above (that is, is the cell division mitosis or meiosis?)

_____

SL 1

(b) Name the stage of cell division in **D**.

_____

SL 1

(c) Name the process illustrated in stage **F**.

_____

SL 1

15. Discuss the role of crossing over, recombination and independent assortment in producing variation in species.

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SL 4

16. In humans, being a tongue roller (R) is dominant over non-roller (r). A man who is a non-roller marries a woman who is heterozygous for tongue rolling.

Write the Parents' phenotype and genotype:

Father's phenotype_____ Mother's phenotype_____

Father's genotype_____ Mother's genotype_____

SL 3

What is the probability of this couple having a child who is a tongue roller?

_____

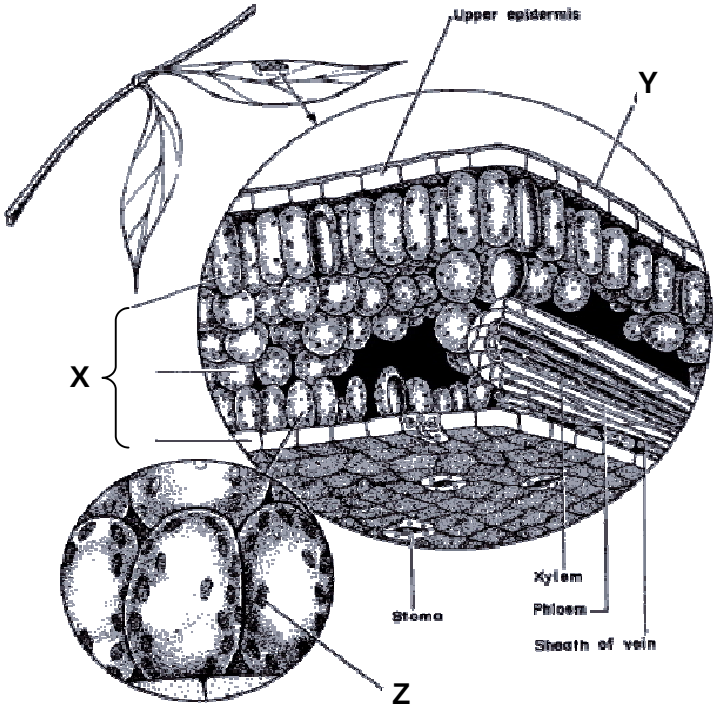
17. Define the term speciation.

_____

_____

SL 1

18. Use the diagram below of the cross-section of a typical leaf blade to answer the questions that follow.



(a) Name part **Y**.

_____

SL 1

(b) Cells **X** contain a lot of structures labeled **Z**. Name structure **Z**.

_____

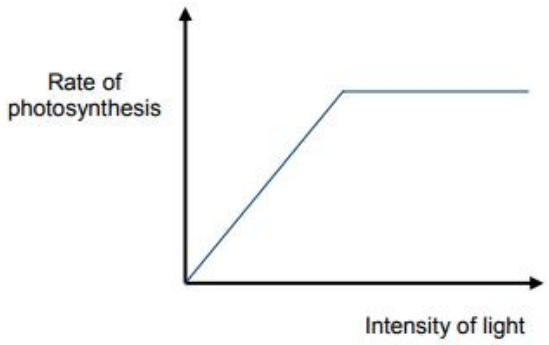
SL 1

(c) Write a balance chemical equation for the process that occurs in **Z**.

_____

SL 2

19. The graph below refers to an investigation on photosynthesis rate affected by light intensity.



Discuss the relationship between light intensity and the rate of photosynthesis. (Include in your answer: the effect of the number of chlorophyll molecules present and the effect of other limiting factors (name those factors).

SL 4

20. Define sexual reproduction in plants.

SL 1

21. Explain the importance of seed and fruit development for the survival of the plant kingdom.

SL 3

22. Differentiate between the **sporophyte** and **gametophyte** generations in plants. You may use drawings to illustrate your answer.

SL 3

23. Define heterotrophic nutrition.

SL 1

24. Describe the differences between **autotrophic** and **heterotrophic** nutrition.

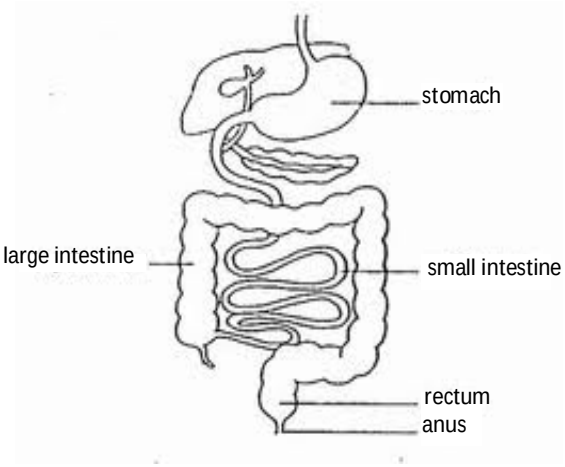
SL 2

25. A 32-year-old body builder decided to go on a diet consisting of egg whites to ensure only proteins for muscle growth. After a few weeks he experienced decreased energy, weakness and paleness. His medical doctor found that he was hypoglycemic (low blood glucose levels).

Explain the importance of the presence of glucose in food.

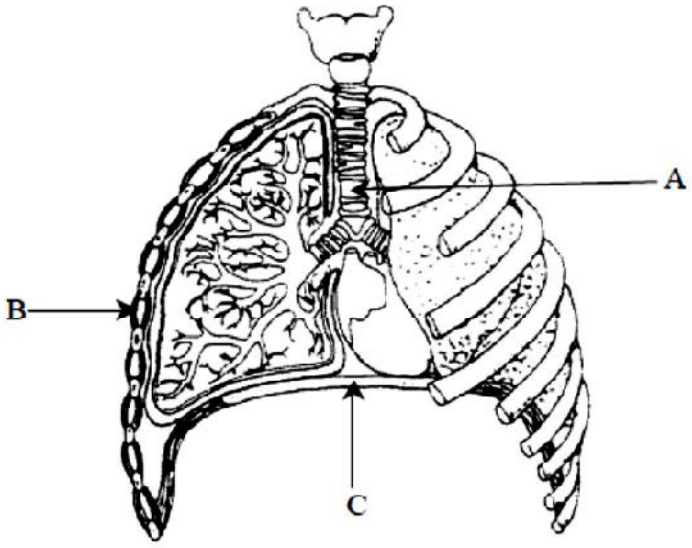
SL 3

26. The diagram below shows the gut structure of humans. Use this diagram to help you **compare** the gut structures of humans with herbivores and carnivores. (You may draw diagram/s to illustrate your answer).



SL 4

27. The diagram below shows the respiratory organs inside the human chest.



(a) Name the structures labelled **A** and **B**.

A:_____ SL 1

B:_____ SL 1

(b) Describe the process of breathing (ventilation). SL 2

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(c) Explain how the structures **A**, **B** and **C** bring about inhalation and exhalation.

SL 3

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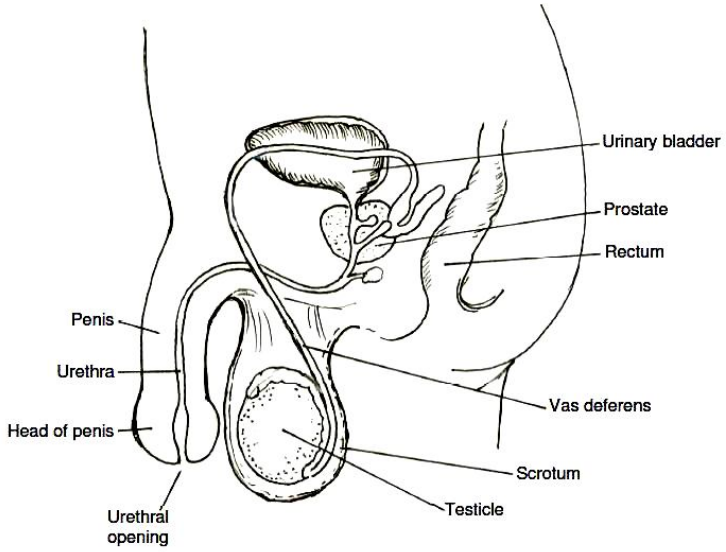
28. Use the diagram below of the Human Male Reproductive organ to answer the Questions that follow.



(a) State the function of the scrotum.

SL 1

_____

(b) State the function of the vas deferens.

_____

SL 1

(c) Name the reproductive hormone that is secreted by the testicle.

_____

SL 1

STRAND 6: ENVIRONMENT Weighting 15

29. Define the following terms:

(a) habitat

_____

_____

SL 1

(b) ecological niche

_____

_____

SL 1

(c) adaptation

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_____

SL 1

(d) population density

_____

_____

SL 1

(e) predation

_____

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SL 1

30. Give TWO local examples of habitat in Samoa.

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SL 2

31. Explain how behavioural adaptations help organisms to survive.

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SL 3

32. Explain why biodiversity is essential for the perpetuation of communities.

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SL 3

33. Describe the importance of recycling of nutrients, using carbon and nitrogen as examples.

SL 2

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STUDENT EDUCATION NUMBER									

BIOLOGY

2017

(For Scorers only)

CURRICULUM STRANDS	Weighting	Scores	Chief Scorer
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**		