



STUDENT EDUCATION NUMBER									

Samoa Secondary Leaving Certificate

BIOLOGY

2022

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.

STRANDS		Page	Time (min)	Weighting
STRAND 1:	VARIETY OF LIFE	2-5	30	15
STRAND 2:	CELL BIOLOGY	6-10	10	20
STRAND 3:	GENETICS	11-13	20	15
STRAND 4:	PLANTS	14-16	55	15
STRAND 5:	ANIMALS	17-20	45	20
STRAND 6:	ENVIRONMENT	21-24	20	15
TOTAL			180	100

Check that this booklet contains pages 2-25 in the correct order and that none of these pages are blank.

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

For Questions 1 to 4, choose and write the LETTER of the correct answer in the box provided.

1. A localized group of organisms that belong to the same species is called a:

- A. biosphere.
- B. community.
- C. population.
- D. ecosystem.
- E. family.

SL 1

2. Which of these is reflective of the hierarchical organization of life from most to least inclusive?

- A. Kingdom, order, family, phylum, class, genus, species.
- B. Phylum, class, order, kingdom, family, genus, species.
- C. Kingdom, phylum, class, order, family, genus, species.
- D. Genus, species, kingdom, phylum, class, order, family.
- E. Class, order, kingdom, phylum, family, genus, species.

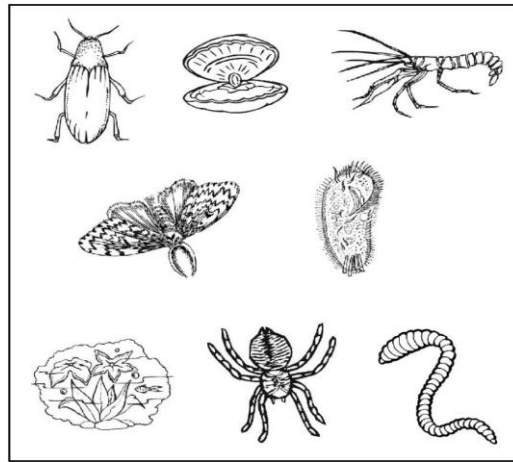
SL 1

3. A filamentous organism has been isolated from decomposing organic matter. This organism has a cell wall but no chloroplasts. Which Kingdom would you classify this organism under?

- A. Kingdom Prokaryota.
- B. Kingdom Bacteria.
- C. Kingdom Plantae.
- D. Kingdom Protista.
- E. Kingdom Fungi.

SL 1

4. Exoskeleton, bilateral symmetry, segmented bodies and jointed appendages are some of the characteristics for the animals shown in the illustration below. Which Phylum do they belong to?



Source: <https://skeletalphylum.weebly.com/index.html>

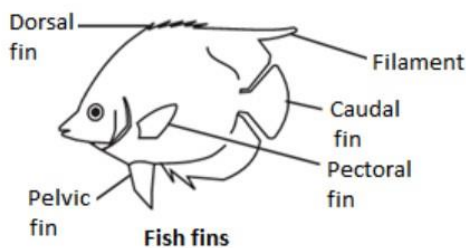
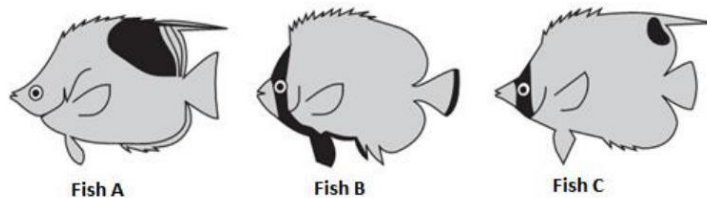
- A. Helminthes
- B. Annelida
- C. Mollusca
- D. Arthropoda
- E. None of the above

SL 1

5. Identify and describe the lowest level of biological organization that can perform all the activities required for life.

SL 2

6. There are over 40 different species of butterfly fish found in tropical reefs throughout the world. Three different species of Chaetodon butterfly fish are shown below. The fish fin diagram and dichotomous key shown below can be used to determine the species of each of these fish.



Dichotomous Key to Butterfly Fish	
1. a. Pelvic fin dark	2
b. Pelvic fin light	4
2. a. Two large white spots below dorsal fin	<i>C. quadrimacul</i>
b. Lacks two large white spots below dorsal fin	3
3. a. Caudal fin with two dark bars at tip	<i>C. reticulatus</i>
b. Caudal fin with one dark bar at tip	<i>C. kleinii</i>
4. a. Dorsal fin has long filament extension	5
b. Filament extension lacking from dorsal fin	6
5. a. Large dark spot on body near filament	<i>C. ephippium</i>
b. Small dark spot on body near filament	<i>C. auriga</i>
6. a.	

Source: <https://www.bartleby.com>

Use the dichotomous key and fish fin diagram to identify Fish A, B and C.

Fish A: _____

Fish B: _____

Fish C: _____

SL 3

7. Using the circulatory system as an example, explain how cells, tissues, organs, and systems work together and why it is important for them to work together.

SL 3

8. Explain why biodiversity and the interdependence among organisms of the different Kingdoms with the environment are important for the survival of life on earth. You must include in your answer why biodiversity and interdependency are important and the link between the two which enables a high chance of survival.

SL 3

For Questions 9 and 10, choose and write the LETTER of the correct answer in the box provided.

9. When a cell structure is worn out or defective, which organelle is responsible for breaking down the material?

- A. Lysosome
- B. Cytoplasm
- C. Ribosome
- D. Nucleus
- E. Endoplasmic reticulum

SL 1

10. The movement of molecules from an area of higher concentration to an area of lower concentration is called:

- A. Diffusion.
- B. Endocytosis.
- C. Catalysis.
- D. Active transport.
- E. Osmosis.

SL 1

11. Describe TWO functions of the features of a cell that are found in plant and NOT animal cells.

SL 2

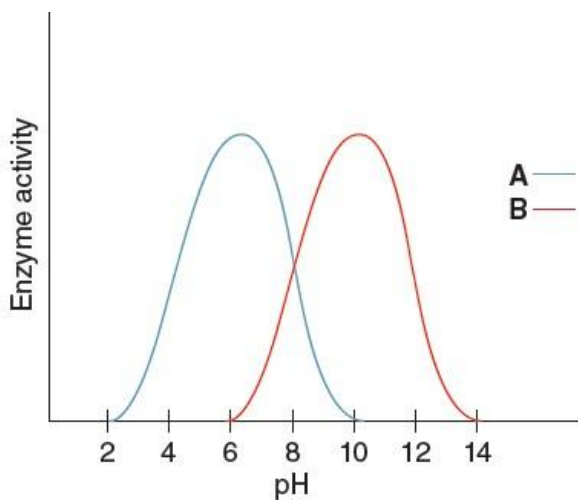
12. Describe ONE advantage of using an electron microscope over a light microscope.

SL 2

13. On a cool and brisk day, if you take a deep breath in and then exhale, you will see a “fog” that forms as a result of your exhaled breath. Which of the following products of cellular respiration does that “fog” contain?

SL 2

14. A group of biology students want to study the effects of pH on enzyme activity. They measure the activity of enzymes A and B at various pHs and record their data in the graph below.

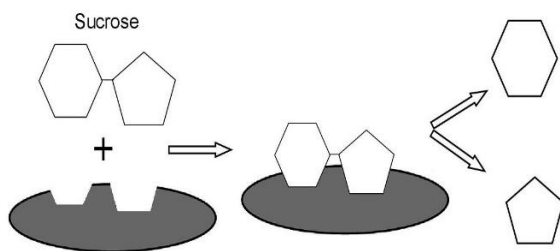


Source: <https://brainstudy.info/images/what-determines-the-optimum-ph-of-enzymes-cheeg>

Discuss the effect that pH had on the two different enzymes, A and B. You must include in your answer an explanation on the slopes in the graph and the optimal pH for which both enzymes were most active.

SL 4

15. Discuss in FOUR steps how the enzyme sucrase catalyzes the breakdown of sucrose using the induced fit model. Include in your answer the products formed at the end.

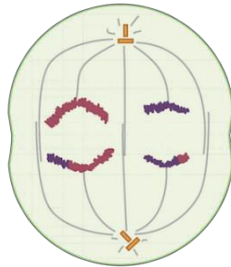


SL 4

16. Compare the direction in which materials move and the energy requirements between passive and active transport. Include in your answer, ONE example of each type of transport.

SL 4

17. Describe the stage of Meiosis the cell is in.



Source: <https://www.khanacademy.org/science/biology/cellular-molecular-biology/meiosis/e/meiosis>

SL 2

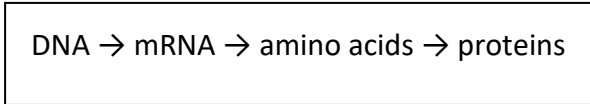
18. State the long form or full name of tRNA and describe the function of tRNA in protein synthesis.

SL 2

19. Draw a flow diagram of the correct order in which mitosis occurs.

SL 2

20. Explain the process of protein synthesis using the diagram below. Include in your answer the following terms: *mRNA*, *tRNA*, *ribosomes*, *transcription*, *translation*.



SL 3

21. Mitosis and meiosis are cell divisions that have several differences. Distinguish between meiosis and mitosis by filling in the table below.

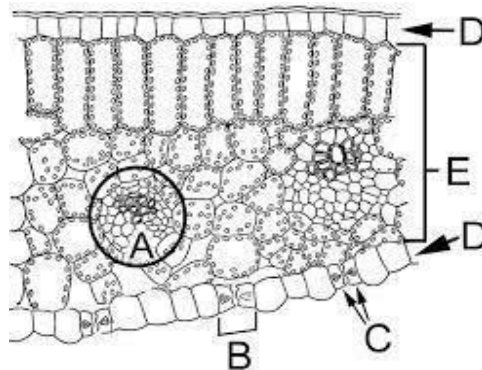
Comparison	Meiosis	Mitosis
<i>Function</i>		
<i>Type and number of daughter cells produced</i>		
<i>Number of cell divisions</i>		

SL 3

22. Explain how natural selection helps individuals to adapt and therefore enable them to survive and reproduce. Include an example of natural selection.

SL 3

The diagram below shows the internal structure of a leaf. Use this diagram to answer Questions 23 – 25.



23. Which letter is NOT correctly matched to its corresponding structure?

- A. A – vascular bundle
- B. B – stomata
- C. C – guard cells
- D. D – upper and lower epidermis
- E. E – palisade parenchyma

	SL 1

24. Which organelle is responsible for the exchange of oxygen and carbon dioxide?

- A. D
- B. E
- C. B
- D. A and E
- E. D and B

	SL 1

25. Describe the structure and function of the organelles labeled C in the diagram.

SL 2

26. Describe TWO factors of transpiration and how they affect the rate of transpiration.

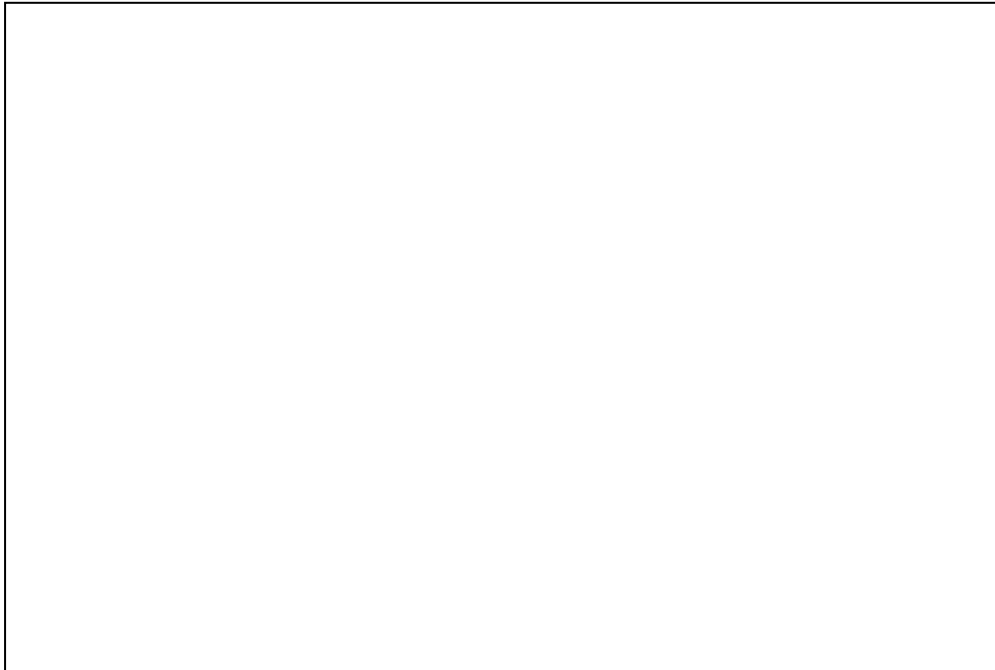
SL 2

27. Several factors influence the rate of photosynthesis in plants. Explain how and why temperature, light intensity and carbon dioxide concentration affects the rate of photosynthesis.

SL 3

28. Draw and label the following structure of a flower.

Stamen – anther and filament, **Pistil/Carpel** – stigma, style and ovary, **Petals**



SL 3

29. Transpiration is very important in maintaining plant water balance. This has many benefits of plants including *uptake of nutrients*, *evaporative cooling* and *turgor pressure*. Explain in detail the three benefits of transpiration mentioned.

SL 3

For Questions 30 and 31, choose and write the letter of the correct answer in the box provided.

30. The type of nutrition in which the organism produces its food from inorganic raw materials like carbon dioxide and water is:

- A. Heterotrophic.
- B. Autotrophic.
- C. Parasitic.
- D. Saprophytic.
- E. Omnivore.

	SL 1

31. The swelling of the thyroid gland (goiter) is caused due to the lack in which mineral?

- A. Magnesium
- B. Chloride
- C. Sodium
- D. Copper
- E. Iodine

	SL 1

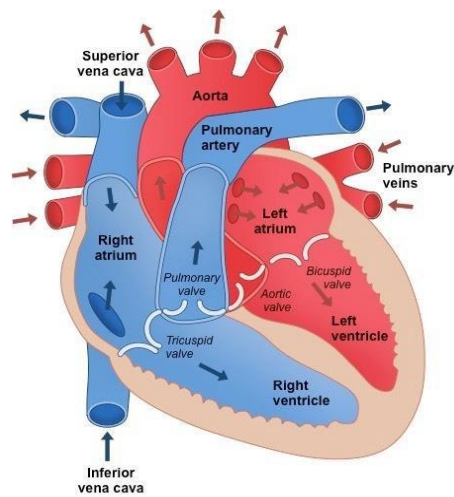
32. Describe the action of the salivary enzyme on starch. You MUST include the name of the enzyme and product that is formed.

SL 2

33. Describe TWO disadvantages of having a hydrostatic skeleton.

SL 2

34. Describe the function of the bicuspid valve and the aorta.



Source: <https://ibstudy.weebly.com/topic-2-exercise-physiology.html>

SL 2

35. Compare the digestive systems of cows and lions by filling in the table below.

	Cow	Lion
Type of diet	Herbivore	Carnivore
<i>Teeth</i>		
<i>Number of Stomachs</i>		
<i>Length of the digestive system</i>		

SL 4

36. Discuss the structure of arteries, veins and capillaries and how it aids in their function.

SL 4

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

SL 4

For Questions 38 to 41, choose and write the LETTER of the correct answer in the box provided.

38. The niche of an animal is:

- A. the number of individuals of the species the environment will support.
- B. the same as its habitat.
- C. the way the animal fits into its environment.
- D. the specific place in the habitat where the animal lives.
- E. its position in the food chain.

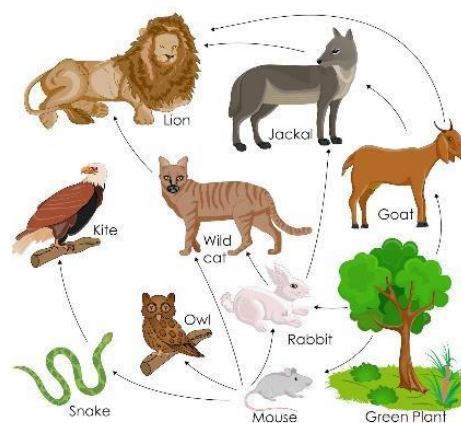
SL 1

39. A lichen is actually composed of two organisms – a fungus and an alga. They depend on each other for survival. The most specific term that describes their relationship is:

- A. Parasitism.
- B. Predation.
- C. Commensalism.
- D. Symbiosis.
- E. Mutualism.

SL 1

Use the diagram below to answer Question 40.



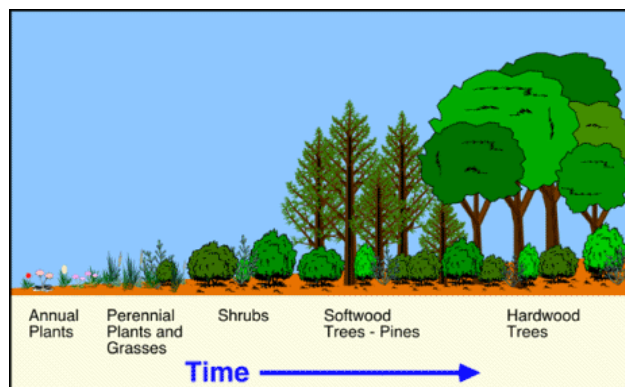
Source: <https://www.toppr.com/ask/content/concept/basic-of-food-chain-and-food-web-247826/>

40. Which organisms are carnivores?

- A. Green plant and mouse.
- B. Owl and green plant.
- C. Mouse and owl.
- D. Wild cat and jackal.
- E. Goat and jackal.

	SL 1

Use the following diagram to answer Questions 41 and 42.



Source: <https://www.slideshare.net/egfred/forest-2739325>

41. What type of community pattern is illustrated in the diagram above?

- A. Zonation.
- B. Succession.
- C. Stratification.
- D. Elimination.
- E. Biotic and abiotic.

	SL 1

42. The community pattern you selected in Question 41 can be defined as:

SL 2

43. Explain the effects natality and mortality have on population growth.

SL 3

44. Finish off the food chain below using any THREE animals you are familiar with. Be sure to label which organism is the primary consumer, secondary consumer, and tertiary consumer.

Grass (producer) →

SL 3

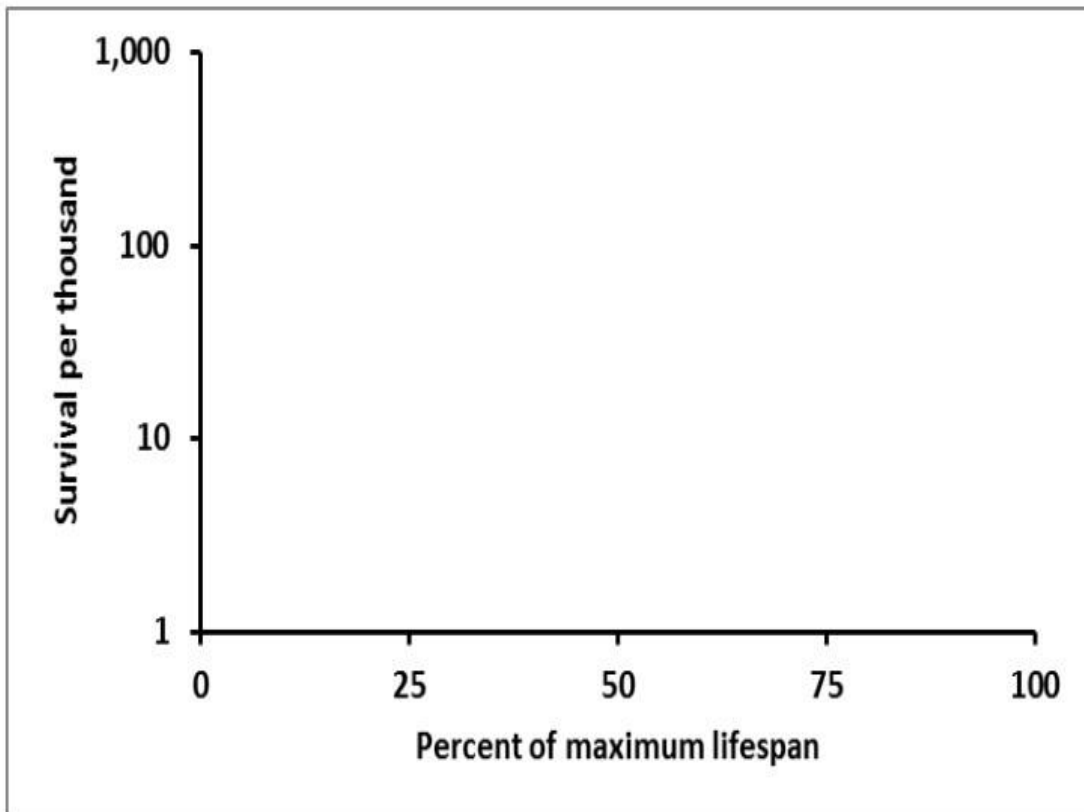
45. Use the set of axes shown below to draw survivorship curves for the species populations described underneath. Label the curves.

Species A – Experience high early mortality and few individuals live to old age.

Species B – High chance of surviving through early and middle life but the number of individuals surviving into old age rapidly decrease.

Species C – Constant mortality rate throughout its entire life.

SL 3



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BIOLOGY

2022

(For Scorers only)

STRANDS		Weighting	Scores	Check Scorer	AED Check
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			