



GOVERNMENT OF SAMOA

STUDENT EDUCATION NUMBER

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Samoa Secondary Leaving Certificate

BIOLOGY

2023

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 to 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	21-23	20	15
TOTAL			180	100

Check that this booklet contains pages 2-24 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. Which of the following represents the correct order of biological classification, from most general to most specific?

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

SL 1

2. Living things and ecosystems are highly organized and structured in different levels of organization. Which level is best defined as – “**A group of interbreeding organisms of one species**”?

- A. Ecosystem
- B. Community
- C. Population
- D. Organism

SL 1

3. Which of the following characteristics is used to identify an organism in the plant kingdom as a member of the Phylum Bryophyta?

- A. Presence of seeds.
- B. Presence of flowers.
- C. Presence of vascular tissue.
- D. Absence of vascular tissue.

SL 1

4. Which of the following phyla includes organisms with a segmented body and jointed appendages?

- A. Annelida
- B. Platyhelminthes
- C. Nematoda
- D. Arthropoda

SL 1

5. Mollusca is one of the phyla classified under the Animal Kingdom and is the second largest animal phylum. Examples of animals in this phylum are pictured below.



Source: <https://en.wikipedia.org/wiki/Mollusca>

Give **TWO** detailed characteristics of the Phylum Mollusca.

SL 2

6. The Manumea, Samoan Flying Fox, and Teuila are examples of local organisms found in Samoa’s wildlife. Information on the order of biological organization of these three local organisms is given below and next page.



Manumea	
Kingdom	Animalia
Order	Columbiformes
Family	Columbidae
Genus	<i>Didunculus</i>
Species	<i>strigirostis</i>

Source: https://en.wikipedia.org/wiki/Tooth-billed_pigeon



Samoa Flying fox	
Kingdom	Animalia
Order	Chiroptera
Family	Pteropodidae
Genus	<i>Pteropus</i>
Species	<i>samoensis</i>

Source: https://en.wikipedia.org/wiki/Samoa_flying_fox



Teuila	
Kingdom	Plantae
Order	Zingiberales
Family	Zingiberaceae
Genus	<i>Alpinia</i>
Species	<i>purpurata</i>

Source: https://en.wikipedia.org/wiki/Alpinia_purpurata

What is the binomial system used to name the Manumea, the Samoan Flying Fox, and the Teuila?

SL 3

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

9. Which of the following objective lenses should be used to locate a specimen on a slide?

- A. Low-power objective lens.
- B. High-power objective lens.
- C. Oil immersion objective lens.
- D. None of the above.

SL 1

10. Which of the following is a function of centrioles in animal cells?

- A. Synthesizing proteins.
- B. Producing ATP.
- C. Transporting materials within the cell.
- D. Assisting in cell division.

SL 1

11. A student observed a microscopic image of a cell and measured its size as 5 mm on the slide. The total magnification is $400\times$. What is the actual size of the cell in micrometers?

Hint: $1\text{ mm} = 1,000\mu\text{m}$.

SL 2

12. Describe how yeast cells produce energy in the absence of oxygen, and what the products of this process are.

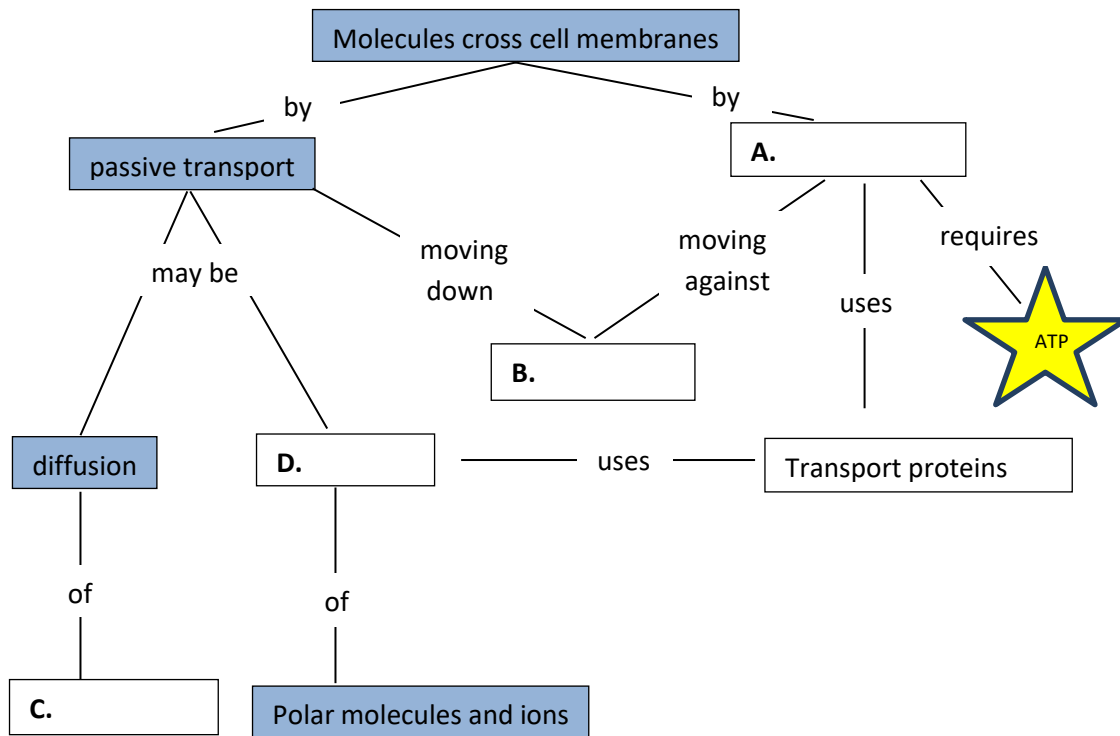
SL 2

13. Describe how carbohydrates contribute to the structure and function of cells. Provide **TWO** specific examples of their roles in cellular processes.

SL 2

15. Fill in the following concept map to review the processes by which molecules move across membranes. Use the following terms below to help you:

concentration gradient, transport proteins, active transport, facilitated diffusion, small nonpolar molecules.



- A. _____
- B. _____
- C. _____
- D. _____

SL 4

20. In a population of flowers, red flowers (RR) are completely dominant over white flowers (rr). However, when a red flower is crossed with a white flower, the resulting offspring are pink (Rr) which exhibits incomplete dominance. If two pink flowers are crossed, what is the expected phenotypic ratio of their offspring?

Punnett square		

SL 3

21. A plant with purple flowers is crossed with another plant with white flowers. The resulting offspring all have purple flowers. What is the genotype of the purple-flowered parent plant and how can you test your hypothesis?

Punnett square		

SL 3

22. Explain how mutations contribute to the genetic diversity of a population. Include in your answer the definition of mutations and factors that cause mutations.

SL 3

For Questions 23 and 24, choose and write the LETTER of the correct answer in the box provided.

23. Which of the following characteristics is unique to angiosperms and not found in gymnosperms?

- A. Vascular tissue
- B. Seeds
- C. Flowers
- D. Cones

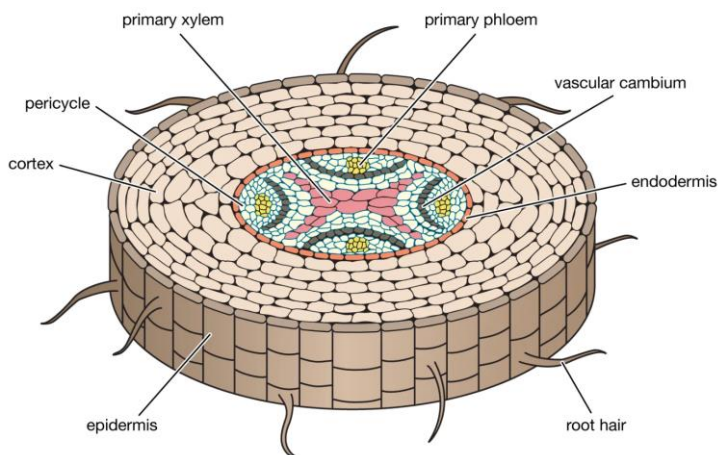
SL 1

24. Which of the following is a function of the root cap in a plant root?

- A. Photosynthesis.
- B. Absorption of water and nutrients.
- C. Protection of the growing tip.
- D. Gas exchange.

SL 1

25. The epidermis and cortex are found in root cells as seen in the diagram below. Describe the functions of these two root cells.

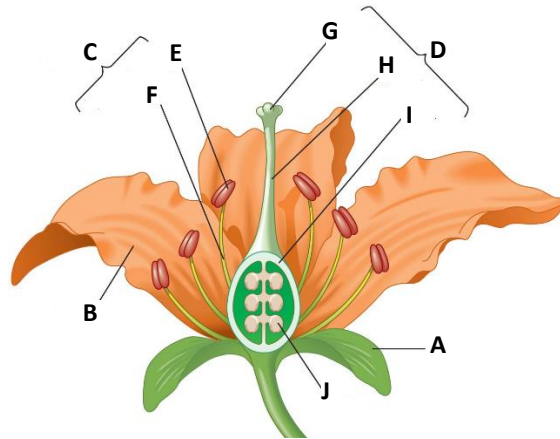


SL 2

Source: <https://cdn.britannica.com/05/5605-050-591AB62E/Cross-section-root-xylem-cylinder-phloem.jpg>

Use the diagram below to answer Questions 26 and 27.

Structure of a Flower



Source: <https://www.quizbiology.com/2016/04/diagram-quiz-on-flower-parts.html>

26. Describe the functions of structures B and A.

SL 2

27. Label structures D, E, and J.

D _____
E _____
J _____

SL 3

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

30. Which of the following best defines the process of egestion in animals?

- A. The breakdown of food into small molecules.
- B. The absorption of nutrients into the bloodstream.
- C. The elimination of undigested food as feces.
- D. The movement of food through the digestive system.

SL 1

31. Which of the following hormones is responsible for the development of male secondary sexual characteristics?

- A. Estrogen
- B. Progesterone
- C. Testosterone
- D. Follicle-stimulating hormone

SL 1

32. Name **TWO** hormones related to the development of female characteristics and in the menstrual cycle and discuss their functions.

SL 4

33. Describe how the process of breathing facilitates gas exchange in the human body.

SL 2

34. Discuss how adaptive structures aid in gas exchange by using the specific structures and functions involved in insects and mammals.

SL 4

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

38. Which of the following is an example of an abiotic factor?

- A. Predation
- B. Competition
- C. Temperature
- D. Parasitism

SL 1

39. Which of the following best describes the difference between intra-specific and inter-specific competition?

- A. Intra-specific competition occurs within a single species, while inter-specific competition occurs between different species.
- B. Intra-specific competition occurs between different species, while inter-specific competition occurs within a single species.
- C. Intra-specific competition and inter-specific competition are the same things.
- D. Intra-specific competition and inter-specific competition are both forms of cooperation.

SL 1

40. Which of the following best describes adaptation?

- A. The process by which organisms change their environment.
- B. The process by which organisms evolve to better suit their environment.
- C. The process by which organisms reproduce and pass on their genes.
- D. The process by which organisms interact with their environment.

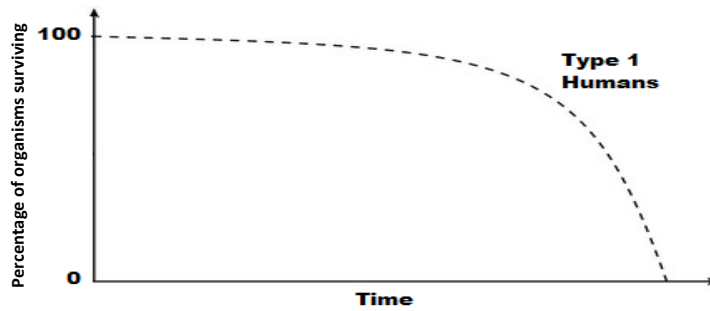
SL 1

41. Which of the following best describes the three types of population distribution?

- A. Clumped, random and even.
- B. Predation, competition and parasitism.
- C. Abiotic, biotic and symbiotic.
- D. Intra-specific, inter-specific and co-evolutionary.

SL 1

42. What does the survivorship curve for humans below suggest about their population growth characteristics?



SL 2

43. Given a dataset of age-specific mortality rates for a population of rabbits, draw a survivorship curve for the population and label the axes appropriately.

Age (years)	Mortality Rate	Rate of Survival
0	0.15	0.85
1	0.30	0.7
2	0.55	0.45
3	0.75	0.25
4	0.85	0.15
5	0.90	0.1

SL 3

44. Explain three different types of adaptations that help land animals in Samoa survive in their environment. Provide one example for each type of adaptation and explain how it helps the organism survive.

SL 3

45. Explain using an example how intra-specific competition for food and light affects the population dynamics of trees.

SL 3

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SSLC BIOLOGY

2023

(For Scorers only)

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