GOVERNMENT OF SAMOA

STUDENT EDUCATION NUMBER									

Samoa Secondary Leaving Certificate

BIOLOGY

2024

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	6-12	10	35
STRAND 3	ANIMAL BIOLOGY	13-16	20	20
STRAND 4	PLANT BIOLOGY	17-20	55	15
STRAND 5	ENVIRONMENT	21-23	45	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, 5, 6, and 7, choose and write the LETTER of the correct answer in the box provided.

1. Which kingdom includes organisms that are multicellular, photosynthetic, and have cell walls primarily composed of cellulose?

   A. Kingdom Animalia.
   B. Kingdom Plantae.
   C. Kingdom Fungi.
   D. Kingdom Protista.

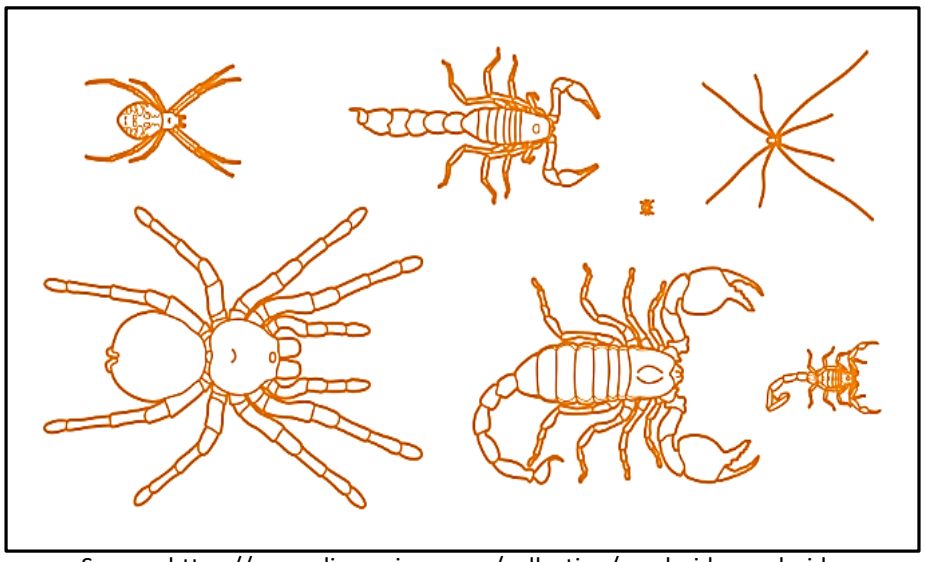
SL 1

2. The diagram below illustrates organisms that are under Kingdom Animalia. Use the diagram to describe **TWO** characteristics of Kingdom Animalia.

Source: https://www.mesc.gov.ws/wp-content/uploads/2020/03/Biology-Year-12.pdf

SL 2

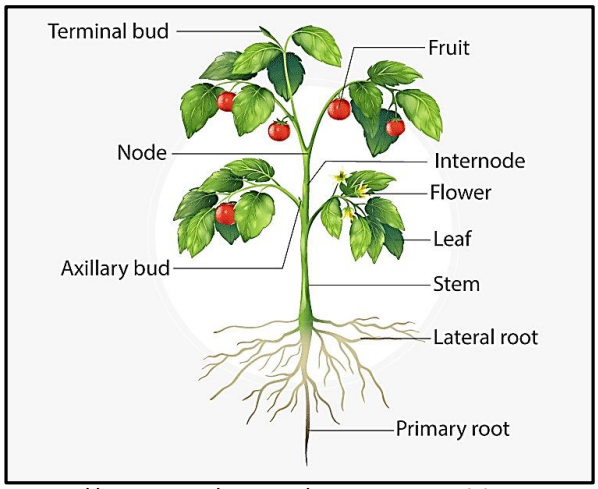
3. Classes in biological taxonomy are groups of related organisms that share common characteristics. Based on the picture provided, identify the Class in which the organisms belong and list **TWO** characteristics of organisms under this Class.



Source: https://www.dimensions.com/collection/arachnids-arachnida

SL 3

4. Use the diagram below to name the species' Phylum and list **TWO** characteristics unique to this Phylum compared to other Phyla in the Plant Kingdom.



Source: https://byjus.com/biology/morphology-of-flowering-plants/

SL 3

5. Which definition correctly defines ***"biosphere"***?

A. A part of a cell.
B. All the individuals of one species in an area.
C. One organism.
D. All the living things and the environment – sky, sea, soil.

SL 1

6. Which level of biological organization is defined by ***"All the living things in an area and their environment"***?

A. Cell
B. Organelle
C. Ecosystem
D. Population

SL 1

7. Which option is an example of an organelle?

A. Muscle.
B. A skin cell.
C. Heart.
D. Ribosome.

SL 1

8. Draw a flowchart that lists the levels of biological organization in order from the highest to the lowest. Use the following terms: ***organelle, population, biosphere, cell, ecosystem, organ system, individual, organ, community, tissue***.

SL 3

STRAND 2: **CELL BIOLOGY** **WEIGHTING 35**

For Questions 9 to 11, choose and write the LETTER of the correct answer in the box provided.

9. Which of the following **BEST** defines a light microscope?

A. A microscope that uses electrons to create magnified images of specimens.
B. A microscope that uses visible light and lenses to magnify small objects.
C. A microscope that utilizes lasers to visualize microscopic structure.
D. A microscope that employs X-rays to examine specimens at the atomic level.

SL 1

10. Arrange the following steps to prepare a wet mount in the correct order from first to last. (Write only the letters A, B, C, D, E and F in correct order).

A. Lower the coverslip onto the specimen at a 45-degree angle to minimize air bubbles.
B. Place a small drop of liquid (such as water or a specialized mounting medium) on the center of a clean glass slide.
C. Seal the edges of the coverslip with a suitable sealant to prevent drying and movement of the specimen.
D. Position the specimen carefully on the drop of liquid using fine-pointed forceps or a pipette.
E. Use a tissue or lens paper to carefully blot away excess liquid from the edges of the coverslip.
F. Gently press down on the coverslip to flatten the specimen and spread the liquid evenly.

SL 2

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11. Which of the following statements about anaerobic respiration is **CORRECT**?

A. It produces a large amount of ATP compared to aerobic respiration.
B. It requires oxygen as the final electron acceptor.
C. It occurs in the mitochondria of cells.
D. It produces lactic acid in humans and ethanol in yeast.

SL 1

12. Describe the difference between aerobic and anaerobic respiration in terms of the products formed and the location in which they occur.

SL 2

13. Explain the difference between aerobic and anaerobic respiration in terms of efficiency.

SL 3

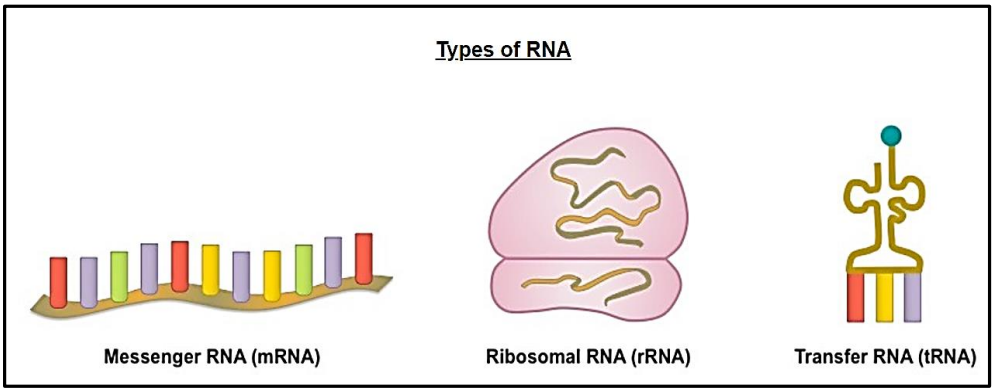
14. Describe **ONE** role that carbohydrates play in body cells and include an example of a source of carbohydrates.

SL 2

15. Nucleotides are the basic building blocks of DNA. List the elements that make up a nucleotide.

SL 2

The following image illustrates the three types of RNA. Use it to answer Questions 16 and 17.



Source: https://old-ib.bioninja.com.au/standard-level/topic-2-molecular-biology/26-structure-of-dna-and-rna/types-of-rna.html

16. Describe the role of tRNA in the process of protein synthesis.

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SL 2

17. Discuss how mRNA, tRNA, and rRNA work together in protein synthesis. Include in your answer the importance of protein synthesis.

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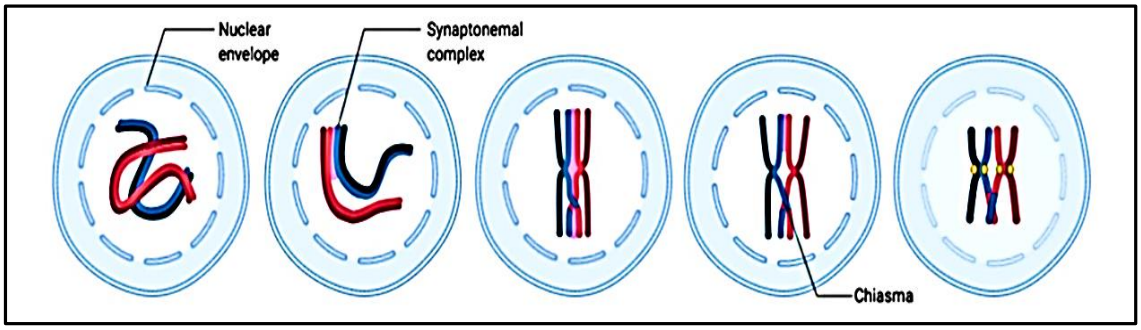
SL 4

18. Identify the cell division and stage that is shown in the image below:



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SL 2

19. In a certain species of flower, the gene for petal colour exhibits codominance. One allele (R) codes for red petals, another allele (W) codes for white petals, and when both alleles are present, the petals are pink. A homozygous red flower is crossed with a homozygous while flower. Fill in the Punnett square below to illustrate this cross and write the phenotypic ratio of the offspring produced.

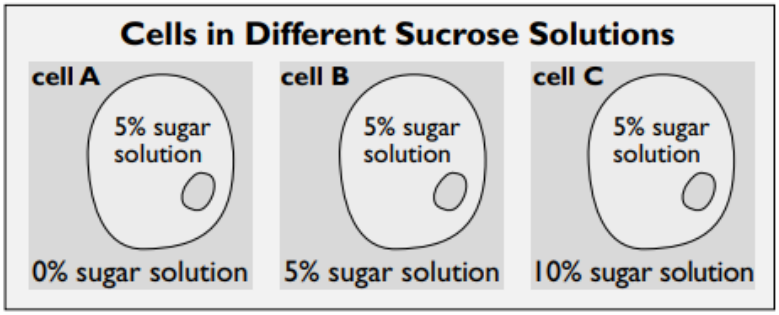
SL 3

Phenotypic ratio: _____

20. A plant breeder wants to determine the genotype of a pea plant with purple flowers. The plant breeder performs a testcross by crossing the purple-flowered plant with a homozygous recessive white-flowered plant. Explain how a testcross can determine the genotype of an unknown parent using the example given.

SL 3

21. The diagram shows three cells in different sucrose solutions. For each cell, predict using arrows (→) the overall direction water would move through the membrane in the diagram and label them in the space provided below the diagram.



SL 4

Source: https://www.mesc.gov.ws/wp-content/uploads/2020/03/Biology-Year-12.pdf

Cell A (in, out, or no net movement): _____

Cell B (in, out, or no net movement): _____

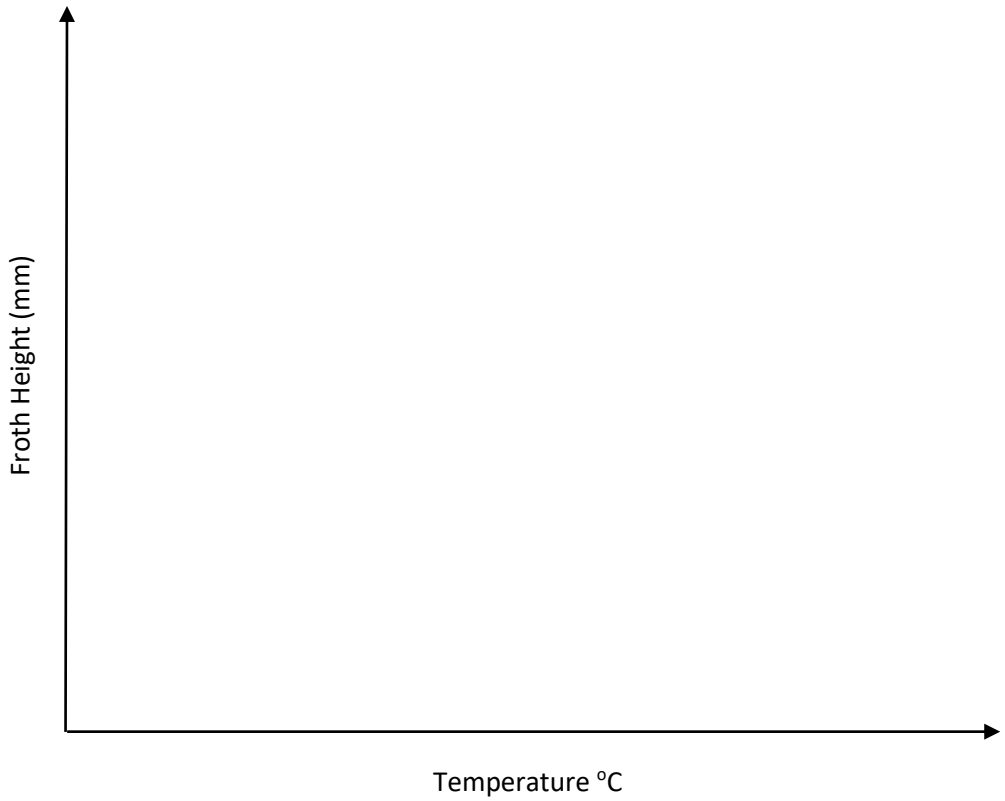
Cell C (in, out, or no net movement): _____

22. The data shows the results of an experiment on the effect of temperature on enzyme action. Plot the following data on a graph and explain the trend shown.

Temp.	Froth Height
20°C	12 mm
25°C	26 mm
30°C	54 mm
35°C	73 mm
40°C	82 mm
45°C	2 mm

Effect of Temperature on Enzyme Action

SL 4



For Questions 23 and 25, choose and write the LETTER of the correct answer in the box provided.

23. Which of the following **BEST** describes heterotrophic nutrition?

A. Organisms produce their own food using energy from sunlight.
B. Organisms obtain energy by consuming organic matter from other organisms.
C. Organisms obtain energy by breaking down inorganic compounds.
D. Organisms obtain nutrients from the atmosphere.

SL 1

24. Explain the role Vitamins A and D play in the human body. Include in your answer examples of food that contains Vitamin A and Vitamin D.

SL 3

25. The elimination of undigested food is the definition for which term?

A. Egestion
B. Digestion
C. Ingestion
D. Absorption

SL 1

26. Describe the function of the gall bladder and the large intestine in the digestive system of humans.

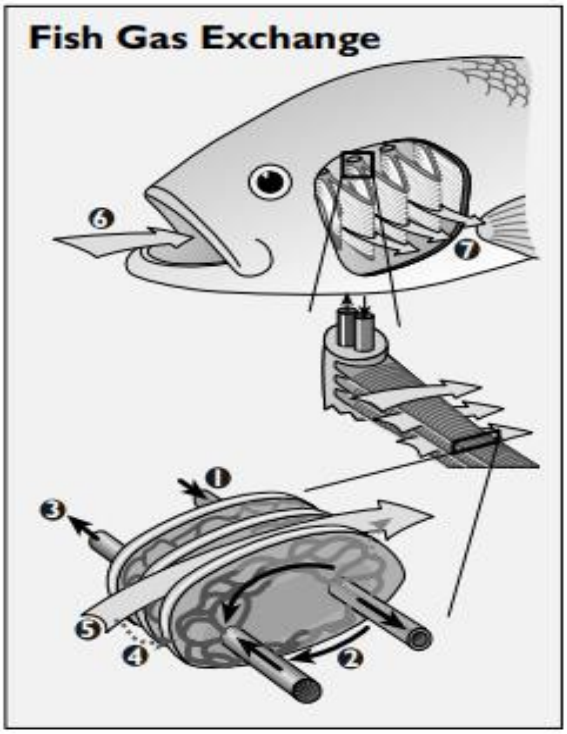
SL 2

27. Describe the difference between the left auricle and the right auricle of the heart.

SL 2

28. Fish have adapted the use of a counter-current gas exchange system as their method of getting the oxygen that they need.

Using the diagram of the gas exchange in fish below, analyze the numbered parts on the fish gas exchange by matching them with the correct descriptions on the right.



a) Water enters through the mouth of the fish.
b) Water flows between the folds on the gill arches.
c) Deoxygenated blood flows into the gills from the body.
d) Blood in the capillaries moves in the opposite direction to the water flow.
e) Dissolved oxygen moves from the water, through the gill membranes, into the blood capillaries.
f) Oxygen-rich blood flows out of the gills, off to the rest of the body.
g) Water passes out under the gill cover.

Descriptions	Numbered parts
a)	
b)	
c)	
d)	
e)	
f)	
g)	

SL 4

29. Explain **ONE advantage** and **ONE disadvantage** of producing uric acid as an excretory product. Include in your answer an organism that excretes uric acid.

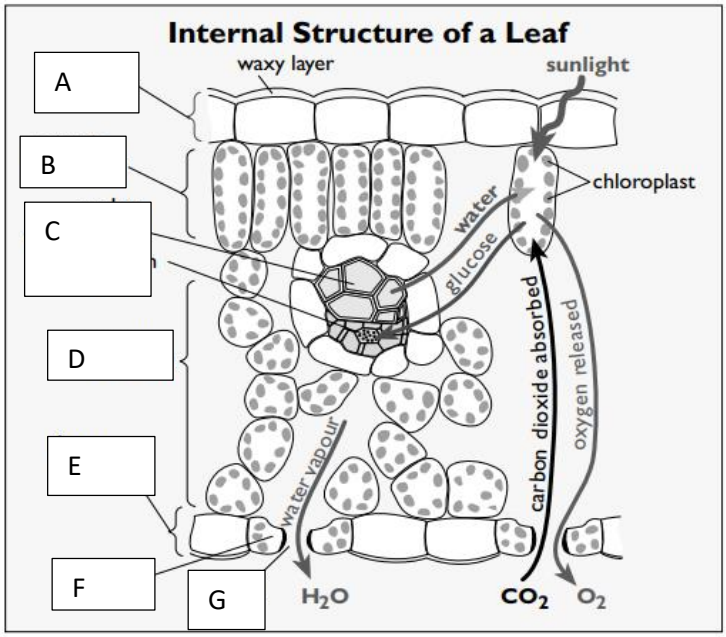
SL 3

30. Discuss **TWO** ways in which we (humans) control our temperature and maintain homeostasis and give examples.

SL 4

For Questions 31 and 34, choose and write the LETTER of the correct answer in the box provided.

Use the diagram below to answer Questions 31 to 33.



31. The layer that receives most of the sunlight and therefore contains many green chloroplasts represented by **Letter B** is called the:

A. Upper epidermis.
B. Palisade mesophyll layer.
C. Spongy mesophyll layer.
D. Lower epidermis.

SL 1

32. Describe the functions of structure **G** in the diagram above.

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SL 2

33. Explain how the functions of structures C and D help the plant.

SL 3

34. Which of the following statements accurately describes the sexual and asexual reproduction in plants?

A. Sexual reproduction involves the fusion of gametes from two different parent plants, while asexual reproduction involves the production of offspring from a single parent plant.

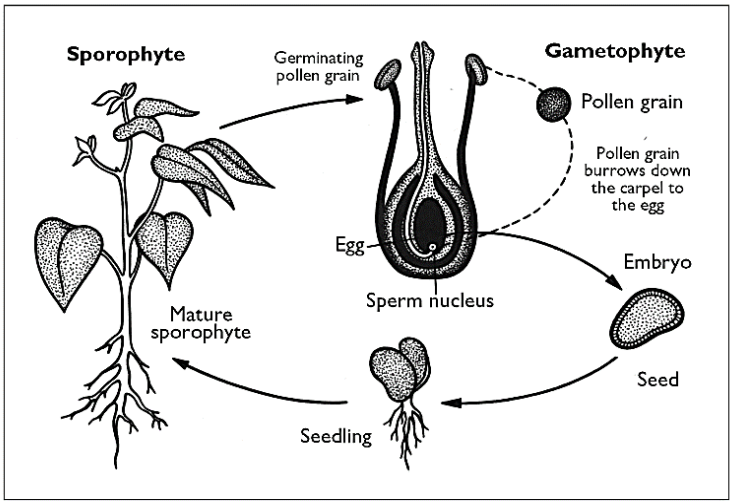
B. Sexual reproduction results in genetically identical offspring, while asexual reproduction results in genetically diverse offspring.

C. Asexual reproduction occurs through the formation of seeds, while sexual reproduction occurs through the formation of spores.

D. Sexual reproduction is more common in flowering plants, while asexual reproduction is more common in non-flowering plants.

SL 1

35. The diagram below illustrates the alternation of generation in angiosperms. Use the diagram to describe the differences between **sporophytes** and **gametophytes**.



SL 2

36. Explain the connection between the light-dependent (light phase) reaction and the light-independent (dark phase) reaction in photosynthesis.

SL 3

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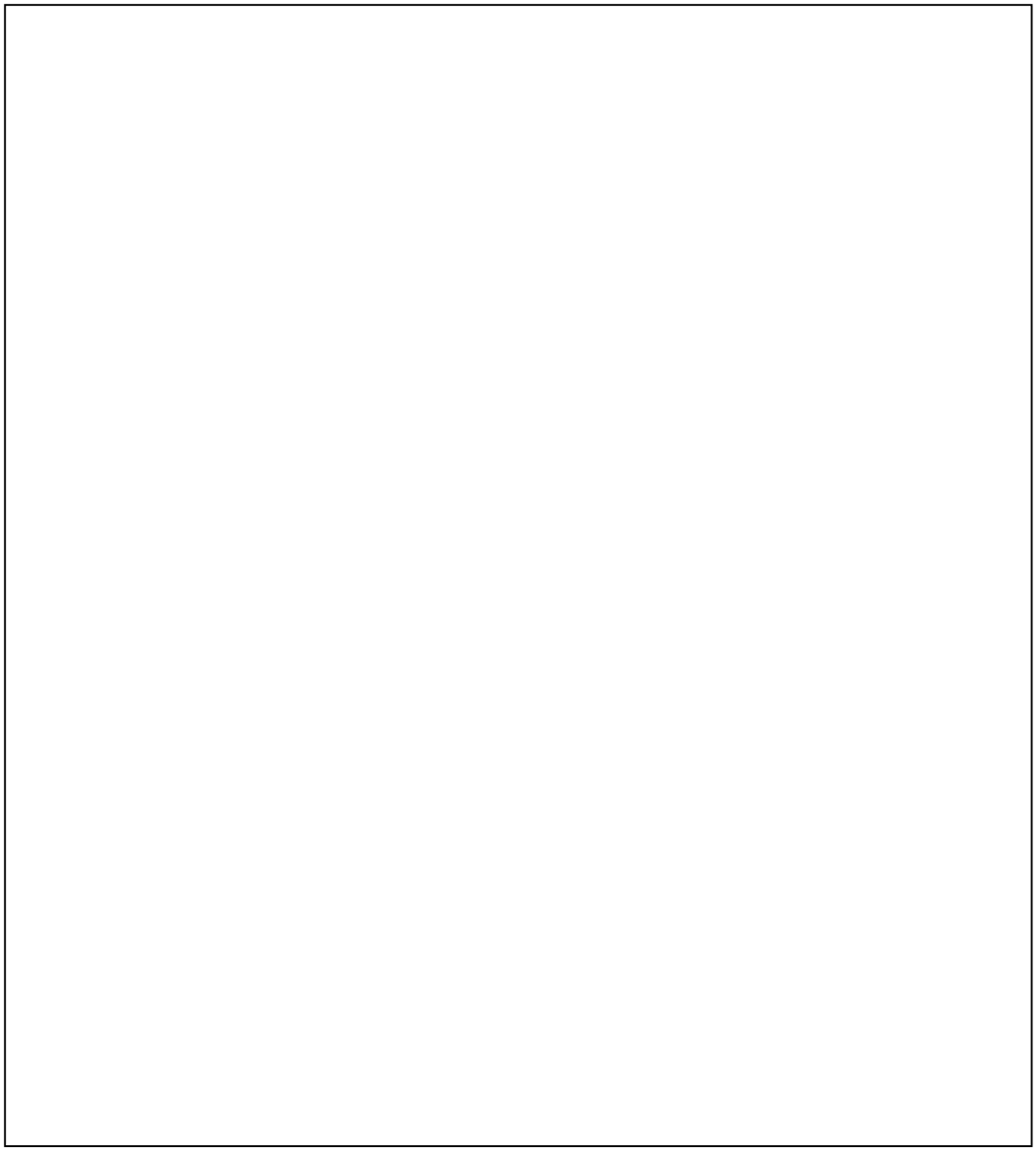
37. Draw and label the following structures in a flower – ***stamen, pistil, petals.***



SL 3

For Questions 41 and 42, choose and write the LETTER of the correct answer in the box provided.

38. Use the following food chains to draw a food web in the space given below.

Kelp → sea urchin → otter → bacteria

Kelp → fish → bacteria

Phytoplankton → zooplankton → fish → bacteria

SL 2

39. Explain the potential impact on the community that you illustrated in Question 38 if we removed kelp from the food web.

SL 3

40. Discuss in detail **TWO** ways in which sand mining impacts the environment.

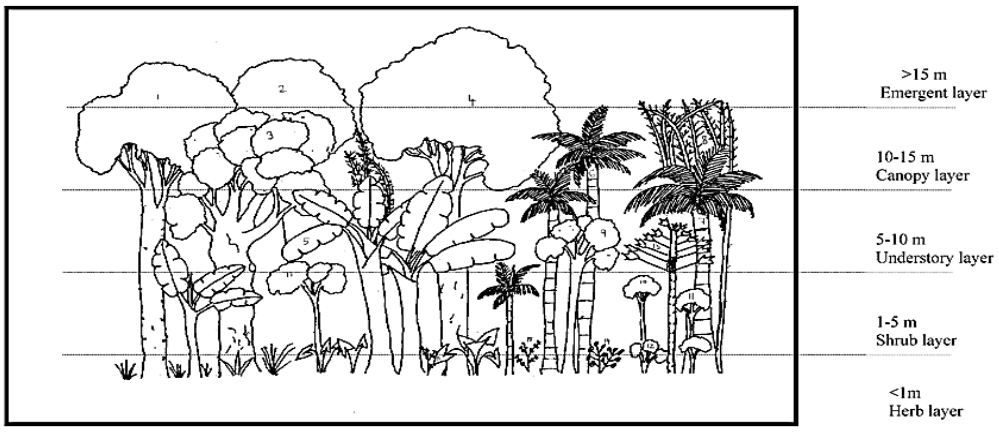
SL 4

41. *Clownfish* or *tufi* shelter among the tentacles of sea anemones. The fish give off a mucous substance to protect themselves from the anemone's stinging cells. The sea anemone gets scraps of food from the clown fish and the clown fish get protection from the sea anemone. This is an example of what type of relationship?

A. Predation.
B. Commensalism.
C. Mutualism.
D. Inter-specific competition.

SL 1

42. The community pattern which is shown by the diagram below is:



A. Zonation
B. Succession
C. Stratification
D. Competition

SL 1

43. Describe the community pattern you selected in Question 42.

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SL 2

44. Describe the difference between communities and populations and provide an example.

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SL 2

STUDENT EDUCATION NUMBER									

SSLC BIOLOGY

2024

(For Scorers only)

STRANDS		Weighting	Scores	Check Scorer	AED Check
STRAND 1	VARIETY OF LIFE	15			
STRAND 2	CELL BIOLOGY	35			
STRAND 3	ANIMAL BIOLOGY	20			
STRAND 4	PLANT BIOLOGY	15			
STRAND 5	ENVIRONMENT	15			
TOTAL		**100**			