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Samoa Secondary Leaving Certificate

BIOLOGY

2021

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	30	15
STRAND 2:	CELL BIOLOGY	5	10	20
STRAND 3:	GENETICS	10	20	15
STRAND 4:	PLANTS	13	55	15
STRAND 5:	ANIMALS	16	45	20
STRAND 6:	ENVIRONMENT	20	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. Most of the organisms in Kingdom _____ are photosynthetic.

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

SL 1

2. *cell, molecule, organ, tissue*

Which of the above levels of biological organization includes ALL of the others in the list below:

- A. Cell
- B. Molecule
- C. Organ
- D. Tissue

SL 1

3. Amoeba belongs to which Kingdom?

- A. Prokaryote
- B. Plantae
- C. Monera
- D. Protista

SL 1

4. Which of the following phyla do you classify octopus under?

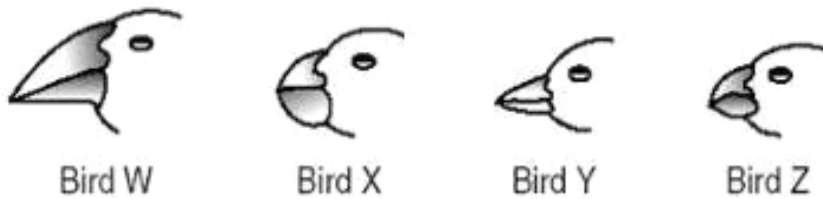
- A. Arthropoda
- B. Mollusca
- C. Annelida
- D. Cnidarian

SL 1

5. Describe TWO characteristics of Phylum Bryophyta.

SL 2

6. Study the dichotomous key and identify Bird W, Bird X and Bird Z.



SL 3

Dichotomous Key to Representative Birds	
1. a. The beak is relatively long and slender.....	<i>Certhidea</i>
b. The beak is relatively stout and heavy.....	go to 2
2. a. The bottom surface of the lower beak is flat and straight	<i>Geospiza</i>
b. The bottom surface of the lower beak is curved	go to 3
3. a. The lower edge of the upper beak has a distinct bend	<i>Camarhynchus</i>
b. The lower edge of the upper beak is mostly flat	<i>Platyspiza</i>

Bird W: _____

Bird X: _____

Bird Z: _____

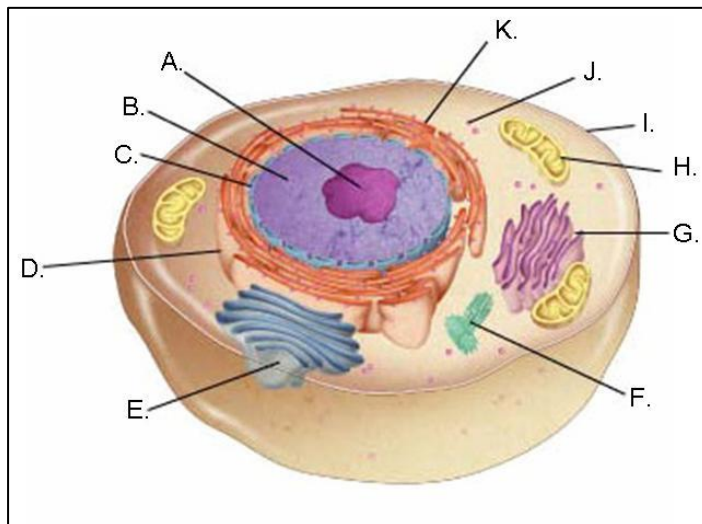
7. Explain the structure of cardiac muscle tissue and relate it to how it functions. Include in your answer the location of this muscle tissue in the human body.

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8. Deserts and rainforests are examples of two ecosystems. Explain the difference in biodiversity and the survival of organisms between the two ecosystems.

[illegible]

Use the diagram below to answer Question 9 and 10.



9. The name of the organelle labelled **H** is:

- A. Golgi apparatus.
- B. Smooth Endoplasmic Reticulum.
- C. Mitochondria.
- D. Nucleus.

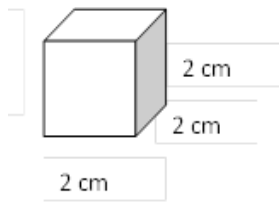
SL 1

10. The function of the organelle labelled **E** is:

- A. to process the products manufactured by the Endoplasmic Reticulum (ER), which will then be dispatched in vesicles that bud off and travel to other sites.
- B. to build proteins by using mRNA from the nucleus.
- C. to breakdown food particles, damaged organelles and foreign materials.
- D. to carry out cellular respiration.

SL 1

11. The dimensions of a cell is shown below as well as details of its surface area and the formula for calculating volume. Use the diagram and information below to calculate the Surface Area to Volume Ratio for this cell. Show your working out:



Formula: Volume = length x width x height
Surface area = 24 cm^2

SL 2

12. The nucleus in a photograph of a cell measures 3 mm across. If the magnification in the photograph is x 500, what is the actual size of the nucleus?

SL 2

13. In muscle cells, lactic acid fermentation results in pyruvate being reduced by NADH to form lactate, and NAD^+ is recycled. Describe how fermentation in yeast cells differs from how it happens in muscle cells.

SL 2

14. An experiment was set up to test whether temperature influences the rate of diffusion. The time (in seconds, s) for a purple dye to diffuse set distances in water at different temperatures was recorded.

Water Temperature (°C)	2 cm	4 cm	6 cm	8 cm	10 cm
10	60s	114s	210s	300s	450s
20	30s	66s	108s	282s	322s
30	12s	30s	55s	80s	125s

Discuss, using the results given in the table above, whether temperature affects the rate of diffusion. Your answer must include:

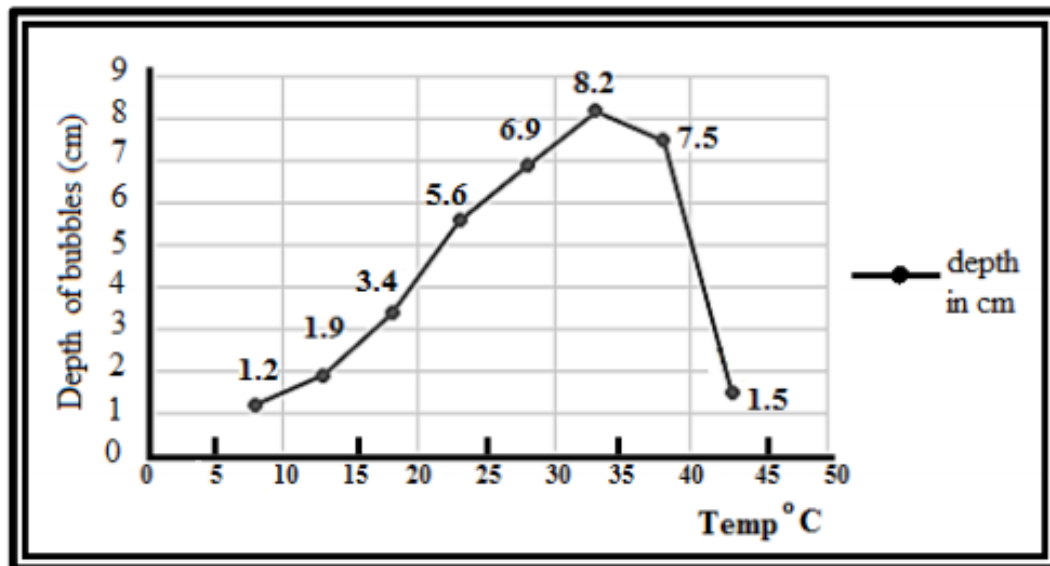
- (i) The definition of diffusion.
- (ii) The hypothesis of the experiment.
- (iii) An explanation on whether or not temperature affects the rate diffusion. If so, how does temperature affect the rate of diffusion?

SL 4

15. Contrast between the processes of active transport and passive transport. Include in your answer an example of each process.

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- Using the given information, and your knowledge, explain how peroxidase is affected by temperature. Include in your answer the optimum temperature for peroxidase, and suggest a reason for the depth of 1.5 cm at around 43°C.

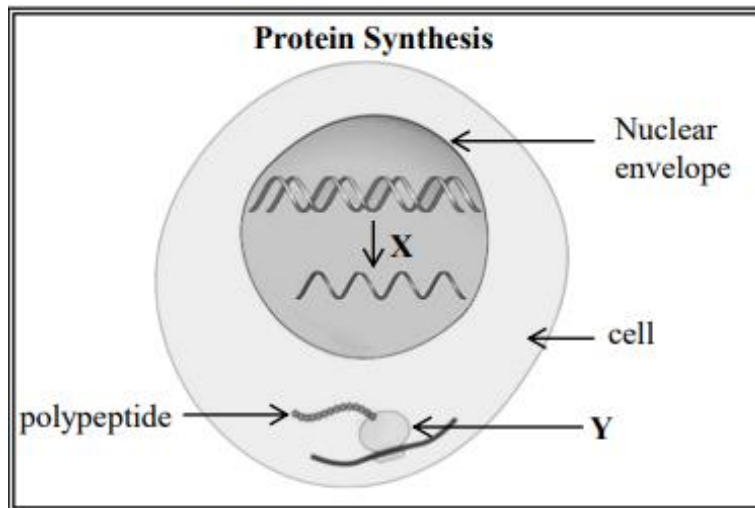


Using the given information, and your knowledge, explain how peroxidase is affected by temperature. Include in your answer the optimum temperature for peroxidase, and suggest a reason for the depth of 1.5 cm at around 43°C.

[illegible]

SL 4

Study the diagram of protein synthesis in a cell given below to answer the questions that follow:



17. Describe the function of organelle Y in protein synthesis.

SL 2

18. Explain the two main stages of protein synthesis. Include in your answer the location where they occur.

SL 3

19. Describe the structure of a single DNA nucleotide.

SL 2

20. Describe the difference between spontaneous mutations and induced mutations by giving examples of both.

SL 2

21. When a red-haired bull (RR) is crossed with a white-haired cow (rr), the resulting calf is roan (maroon) in colour. Explain the inheritance pattern exhibited by the calf.

[illegible]

SL 3

22. Steven is homozygous for type B blood, and Lucy is homozygous for type A blood. Carry out a cross between the two parents to see if Aaron, who is type O blood, is their biological son.

SL 3

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

23. The structures present on the underside of leaves of terrestrial plants that help reduce transpiration are:

- A. veins – xylem and phloem bundles.
- B. stomata – openings for exchange in leaves.
- C. lenticels openings for gas exchange in woody stems.
- D. epidermis – outer protective covering or bark.

SL 1

24. The light independent reactions of photosynthesis occur in the:

- A. thylakoid membranes.
- B. stroma and cytoplasm.
- C. inter membrane space.
- D. lumen of thylakoid membrane.

SL 1

25. On a windy day, certain plants tend to lose water easily and are often wilted by the afternoon. Briefly describe why wilting occurs faster on windy days.

SL 2

26. Describe the functions of the root.

SL 2

27. The rate of photosynthesis is affected by many factors. Explain how the rate of photosynthesis is affected by the following factors:

Decreased sunlight:

SL 3

Absence of chlorophyll:

Increase in carbon dioxide concentrations:

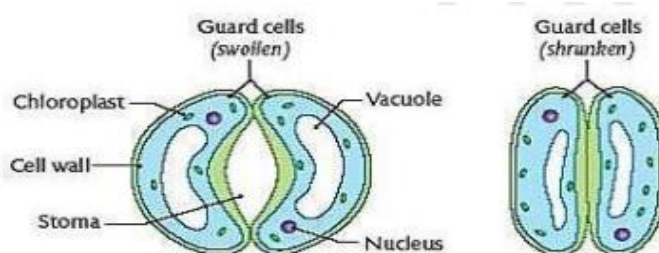
28. The photograph below shows a typical flower. Explain the process of pollination for this flower and how it is important in the survival of this species of plant.



Source: <http://typesofflower.com>

SL 3

29. Explain using the diagram below, how guard cells control the movement of gases.



SL 3

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

30. Animals need a viable skeletal system to support their body weight in relation to their lifestyle. A hydrostatic skeleton is employed by:

- A. turtles.
- B. starfish.
- C. jellyfish.
- D. mosquitoes.

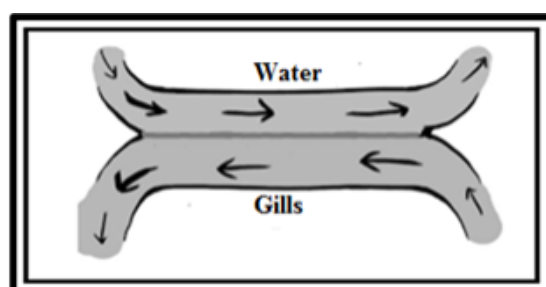
SL 1

31. _____ is an example of a female reproductive hormone.

- A. Insulin
- B. Glucagon
- C. Testosterone
- D. Progesterone

SL 1

The diagram given below shows the concept of the counter current system of gas exchange found in fish. Use the diagram to answer Question 32.



32. Describe how the gas exchange in fish works.

SL 2

33. Describe the response of the body when your body temperature exceeds 37°C .

SL 2

34. Describe TWO adaptations for herbivorous nutrition in cattle.

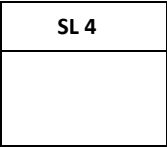
SL 2

35. Discuss how a human's circulatory system is different from that of a grasshopper.

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SL 4

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- This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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

38. Which of the following processes describes an *orderly progression of species composition in an area over a period of time*?

- A. Zonation
- B. Succession
- C. Colonisation
- D. Stratification

SL 1

39. A tapeworm living in a dog's gut is said to be a parasite since it:

- A. damages the intestine with its hook.
- B. is a benefit for both dog and tapeworm.
- C. harms the dog by eating some of its food.
- D. has a degenerate body form lacking eyes and legs.

SL 1

40. The measure of a number of organisms that make up a population in a defined area is said to be:

- A. population.
- B. population density.
- C. population distribution.
- D. population size.

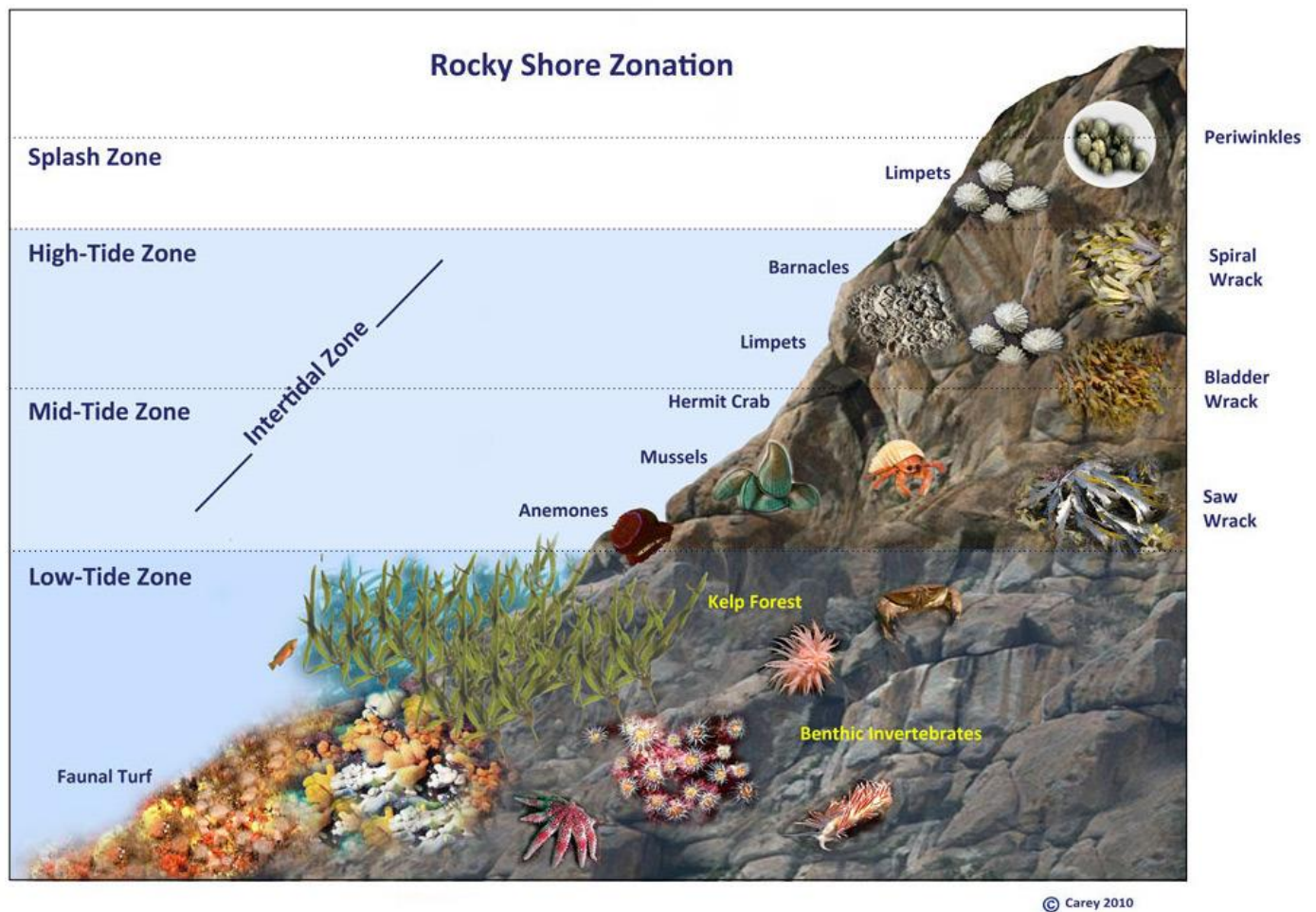
SL 1

41. What name is given to a feature of an organism that improves its chances of survival?

- A. An adaptation.
- B. A phenotype.
- C. Variation.
- D. None of the above.

SL 1

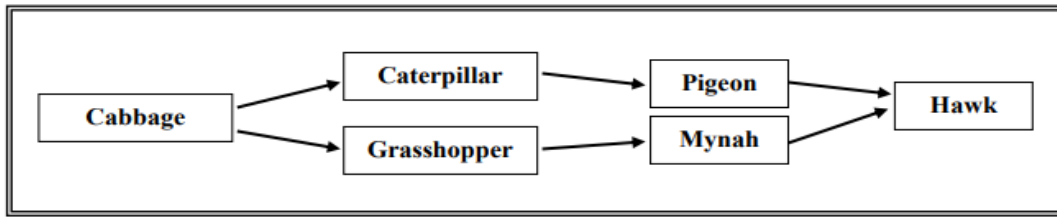
Study the diagram below to answer Question 42.



42. Describe the type of community pattern observed and the environmental condition observed at the high tide mark.

SL 2

Study the food web given and answer Question 43.



The cabbage plant shown in the diagram is from Phil's family garden. Phil's dad occasionally sprays weedicides in the gardens to control the weeds from over-growing.

43. Explain which organism would accumulate the greatest amount of weedicide.

SL 3

44. Explain why intraspecific competition is more intense than interspecific competition. Include in your answer the definition of intraspecific and interspecific competition. Also make reference to the living space, food and reproductive mates to explain why intraspecific competition is more intense that interspecific competition.

SL 3

45. Individuals make up a population in a community or ecosystem. Discuss THREE methods of sampling to determine population size.

SL 3

STUDENT EDUCATION NUMBER									

BIOLOGY

2021

(For Scorers only)

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