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Samoa School 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		Pages	Time (min)	Weighting
STRAND 1:	VARIETY OF LIFE	2	30	16
STRAND 2:	CELL BIOLOGY	6	10	6
STRAND 3:	GENETICS	7	20	12
STRAND 4:	PLANTS	10	55	30
STRAND 5:	ANIMALS	18	45	24
STRAND 6:	ENVIRONMENT	23	20	12
TOTAL			180	100

Check that this booklet contains pages 2-26 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 and 2, choose and write the LETTER of the correct answer in the box provided.

1. Identify ONE **main difference** between living things listed in the Kingdom Monera and those that belong to the Kingdom Protista.

- A. Organisms in Kingdom Monera are unicellular while those of Protista are both unicellular and multicellular.
- B. Organisms in Kingdom Monera have a nucleus while those of Protista have no nucleus.
- C. Organisms in Kingdom Monera have a chloroplast while those of Protista have no chloroplast.
- D. Organisms in Kingdom Monera have a mitochondria while those of Protista have no mitochondria.

SL 1

2. Identify ONE **economic use** of the fungus called yeast.

- A. Used as a fertilizer.
- B. Used as a fuel.
- C. Used to produce alcohol.
- D. Used as a paint.

SL 1

3. List TWO **features** that are common to all living things which make them different from non-living things.

SL 2

4.



By Teinesavaii - Own work, CC BY-SA 3.0

<https://commons.wikimedia.org/w/index.php?curid=10789585>



<https://www.nps.gov/npsa/learn/nature/animals.htm>

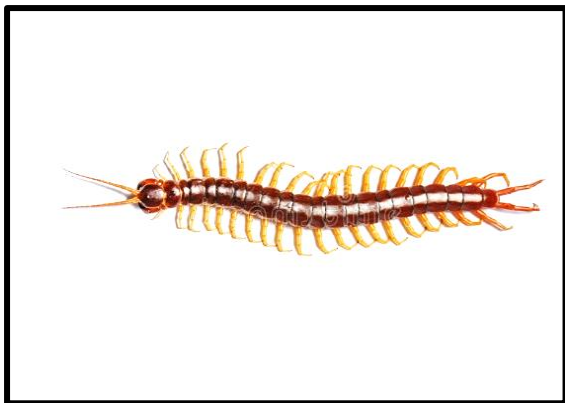
Typical scenes of some living things in Samoa

Biology is the scientific study of life such as the living things seen in the photos above from Samoa. Evaluate TWO reasons why this understanding of living things is **important to us humans** in the world we live in today.

This image shows a single 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.

SL 4

5.



<https://www.dreamstime.com/photos-images/centipede.html>



<https://www.prevention.com/health/g29022991/common-house-spiders/>

The pictures above are those of a centipede from the Class Chilopoda (left) and spider from Class Arachnida (right). Both classes belong to the phylum Arthropoda of the Kingdom Animalia. Describe TWO features that these two living things have that are common to the phylum **Arthropoda**.

SL 2

6. Explain how the process of **reproduction used by viruses cause disease** in the living organism whose cells they use for reproduction.

SL 3

7. Making compost is a method that uses soil micro-organisms to break down dead organic matter to become humus which can then be re-used as nutrients by plants and help lessen pollution caused by dead organic matter. Summarize at least THREE conditions in which the decomposing micro-organisms **operate best** in order to speed up the breakdown of organic matter in compost.

8. Describe the process of **osmosis** in a cell.

SL 2

9. The data in the table below shows the results of an experiment into the effect of **temperature on enzyme** action.

Temperature	Froth Height
20°C	10 mm
25°C	30 mm
30°C	60 mm
35°C	70 mm
40°C	80 mm
45°C	5 mm

Assess the data given, then discuss the following:

- (a) Effect of increasing temperature on enzyme action;
- (b) Optimum temperature for enzyme action;
- (c) What happens to the enzymes when the temperature exceeds the optimum temperature? (Use proper scientific terms to explain your answer).

SL 4

For Questions 10 to 12, choose and write the LETTER of the correct answer in the box provided.

10. DNA stands for:

- A. Deoxyribonatural Acid.
- B. Deoxynucleic Acid.
- C. Deoxynatednucleic Acid.
- D. Deoxyribonucleic Acid.

SL 1

11. Jill the calf was successfully **cloned** in New Zealand in 1998. What is the meaning of this?

- A. It means that Jill the calf had no father and no mother.
- B. It means that Jill the calf had a father but no mother.
- C. It means that Jill the calf was produced through meiosis.
- D. It means that Jill the calf was produced from just one parent.

SL 1

12. What is the meaning of the word **gamete**?

- A. It is a cell with no nucleus.
- B. It is a cell that contains all the chromosomes.
- C. It is a sex cell with only half the number of chromosomes.
- D. It is another name for a zygote.

SL 1

13. Plants and animals reproduce by cell division through mitosis and meiosis. Describe the **main difference** between the two in terms of **genetic inheritance**.

SL 2

14. Explain how chromosomes, DNA, genes and alleles are **related** or **connected** to each other.

SL 3

15. In rabbits there is a gene which controls whether fur is brown or white. The allele coding for brown fur (B) is dominant over the allele coding for white fur (b). A pure breeding white female rabbit is to be crossed (mated) with a heterozygous brown male rabbit.

- (a) Construct a **punnet square** to show the offspring produced;
- (b) Determine the **genotypes** and their **ratios** (of the expected baby rabbits);
- (c) Identify which genotypes are **homologous** and which are **heterozygous** (of the expected baby rabbits);
- (d) State the **phenotypes** and their **ratios** (of the expected baby rabbits).

SL 4

For Questions 16 to 19, choose and write the LETTER of the correct answer in the box provided.

16. Name the transport system that transports glucose from the leaves to the different parts of the plants.

- A. Xylem vessels.
- B. Spongy mesophyll.
- C. Phloem tubes.
- D. Stoma.

SL 1

17. Define what a **seed** is.

- A. A seed is a sex cell for reproduction.
- B. A seed is a gamete.
- C. A seed contains a small embryo.
- D. A seed contains an ovum.

SL 1

18. The plant hormone that causes **cell division** is:

- A. auxin.
- B. cytokinin.
- C. gibberellin.
- D. abscisic acid.

SL 1



19. Identify the special method that the **pawpaw or papaya (esi)** plant shown in the photos above uses to help **spread its seeds** in the wild in Samoa.

- A. Hooks that attach onto moving animals;
- B. Parachutes that allow them to be carried by wind;
- C. Seeds that allow them to float on water;
- D. Seeds that can be spread by animals that eat its fruits.

☐

SL 1

20. Roots support the plant by holding it firmly in the soil. Identify the TWO main types of plant root systems and describe ONE advantage related to the structure of each type of plant root system that helps it to survive.

SL 2

21. Describe TWO plants grown in Samoa for food that **reproduce asexually**. Include in your answer the **part of the plant** used for this type of reproduction.

SL 2



<https://pixabay.com/photos/banana-shrub-plant-green-1912064/>

Leaves of a banana plant

22. The leaf of a typical plant like the one shown above is:
- (a) thin.
 - (b) flat.
 - (c) has a large surface.
 - (d) which is covered by a waxy cuticle (or outside skin) that is transparent to light.
 - (e) and often arranged with others in a pattern to make sure that all get as much light as possible.

Evaluate how each of these features will help the leaf carry out its important function of **photosynthesis**.

SL 4

24. Write down the **chemical equation** for photosynthesis.

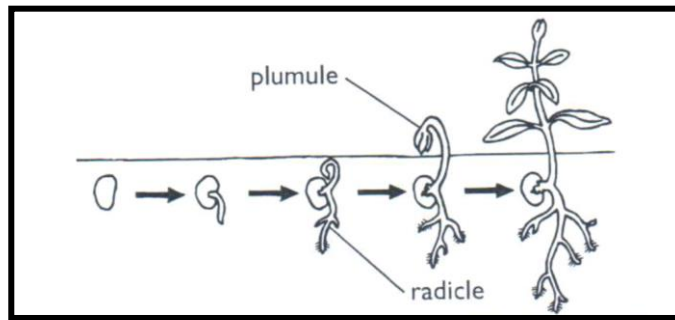
SL 2

25. Plants need to open the stomata to take in carbon dioxide and as a result lose water in the process called transpiration. However, the plant needs this water for support so it is important that it reduces water loss as much as possible by reducing transpiration.

Summarize THREE **adaptations** that plants use to help them **reduce transpiration** and save or conserve water for its own use.

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

SL 3



Germination of a dicotyledon seed

26. Describe how **water** and **oxygen** are used in the **germination** of a plant seed as illustrated in the diagram above.

SL 2



A big tree that is still growing

https://www.123rf.com/photo_76371151_tree-forest-camphor-tree-ecology-fresh-green-.html?vti=nemu2xlzcsoeon74x6-1-25

27. One way plants are different from animals is that many can continue to grow **taller** and **thicker** throughout their lives so that many, like trees, become very big like the one in the photo. Discuss **how** these plants are able to do this.

SL 4

28 The data below was obtained when a scientist measured the sugar concentration in grass in a field every 4 hours.

Time of day	Sugar Concentration (% dry mass)
4 a.m.	0.55
8 a.m.	0.65
12 p.m.	1.85
4 p.m.	2.05
8 p.m.	1.45
12 a.m.	0.60
4 a.m.	0.50

Study the data then answer the following:

- At what time of the day is the greatest concentration of sugar present?
- Explain why the sugar concentration is higher in the afternoon rather than in the morning.
- The oxygen level was also higher within the grass leaves during the day than at night. Explain why.
- When would the carbon dioxide concentration be highest within the grass leaves? Explain why.

SL 4

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 29 to 32, choose and write the letter of the correct answer in the box provided.

29. Vitamins are important nutrients for the growth and good health of humans and other animals. What is the most important use of **Vitamin A**?

- A. It is for good eyes and good night vision.
- B. It is needed for respiration.
- C. It is needed for healthy teeth and gums.
- D. It is needed to develop strong bones.

SL 1

30. In human reproduction, **fertilization** occurs when:

- A. male and female gametes are formed.
- B. when the female egg and male sperm come together and fuse.
- C. when the zygote starts to divide.
- D. when the egg is formed.

SL 1

31. An important feature of a **vertebrate** animal is:

- A. an animal with an exoskeleton.
- B. an animal with no skeleton.
- C. an animal with an endoskeleton.
- D. an animal with no endoskeleton.

SL 1

32. Identify the **hormone** of the endocrine system that controls the **metabolic** and **growth rates** of a range of different cells.

- A. Adrenaline.
- B. Insulin.
- C. Thyroxin.
- D. Oestrogen.

SL 1

35. Explain the **differences** between respiration, gas exchange and breathing.

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.

SL 3

36. Humans and other similar animals have a Central Nervous System which controls the body's responses to the information it receives from **sense organs** such as the eyes and ears. Describe what makes up the **Central Nervous System of a human**.

SL 2

38. Describe the **purpose** of the Human Excretory System and state **an example**.

SL 2

39. Many animals produce a large number of offspring or babies but only a small number survive because they are eaten by predators for example, turtles and fish. When this happens, the animal is in 'population balance'. In contrast, humans usually produce only one offspring at a time and then look after it for many years to make sure that it lives to reproductive age, the age when humans are able to reproduce. In addition, humans also improve the success of the reproduction of the one offspring through other ways. Discuss TWO of these ways and reflect on **one advantage** and **one disadvantage** of this success in human reproduction from a biological viewpoint.

SL 4

For Questions 40 to 42, choose and write the letter of the correct answer in the box provided.

40. **Adaptations** of an organism in relation to its **habitat** refers to:

- A. the changes in biotic factors in an organism's habitat.
- B. the changes in abiotic factors in an organism's habitat.
- C. changes to an organism's habitat due to climate change.
- D. the special inherited features which help it to survive and reproduce in its habitat.

SL 1

41. A **relationship** where **one species benefit** by obtaining food, shelter, or some other advantage but the other species is **not affected** by the relationship is called:

- A. mutualism.
- B. parasitism.
- C. commensalism.
- D. symbiotic.

SL 1

42. A **relationship** where one species lives on or in a host organism **obtaining food and shelter** but **does not benefit** its host although it can often irritate or harm its host but does not kill it, is called:

- A. mutualism.
- B. parasitism.
- C. commensalism.
- D. symbiotic.

SL 1

43. Describe how the **absence of rainforests, vegetation** or **plant cover** on the soil affect:

- (a) *rainfall;*
- (b) *global warming.*

SL 2

44. Discuss:

- why **carbon** is considered to be the **most important element** for life on earth;
- how carbon can also **cause problems** to life on earth;
- the **best way to manage carbon** so that it is always useful and does not cause problems.

SL 3

STUDENT EDUCATION NUMBER									

BIOLOGY

2021

(For Scorers only)

STRANDS		Weighting	Scores	Check Scorer	Answer Sheet (scorer)	AED Check
STRAND 1	VARIETY OF LIFE	25				
STRAND 2	CELL BIOLOGY	15				
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TOTAL		100				