

MARKER CODE				



STUDENT ENROLMENT NUMBER (SEN)									

TONGA FORM SIX CERTIFICATE 2023

BIOLOGY

QUESTION AND ANSWER BOOKLET

Time allowed: 3 Hours

INSTRUCTIONS:

- Write your **Student Enrolment Number (SEN)** on the top right-hand corner of this page.
- This paper consists of **FOUR SECTIONS** and is out of 70 weighted scores.

SECTION	STRANDS	TOTAL SKILL LEVEL
ONE	CELLULAR BIOLOGY	16
TWO	GENETICS	11
THREE	ORGANISM LEVEL BIOLOGY	27
FOUR	ENVIRONMENTAL BIOLOGY	16
TOTAL		70

- Answer **ALL QUESTIONS**. Write your answers in the spaces provided in this booklet.
- Use a **BLUE** or **BLACK** ball point pen only for writing. Use a pencil for drawing if required.
- If you need more space for answers, ask the supervisor for extra paper. Write your **Student Enrolment Number (SEN)** on each additional sheet, number the questions clearly and insert them in the appropriate places in this booklet.
- Check that this booklet contain pages **2-15** in the correct order and that none of the pages is blank.

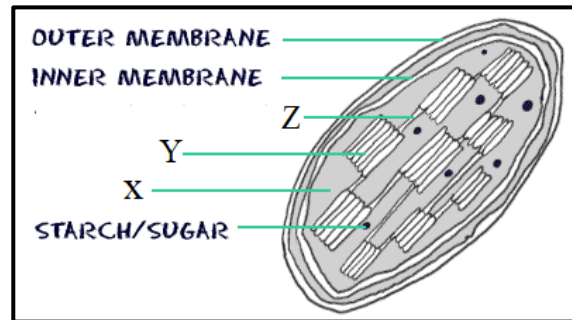
YOU MUST HAND IN THIS BOOKLET TO THE SUPERVISOR BEFORE YOU LEAVE THE EXAMINATION ROOM.

SECTION ONE:

CELLULAR BIOLOGY

- Plant cells have organelles known as chloroplasts shown in **Figure 1.1**

Figure 1.1 Chloroplast



Source: (adapted from www.biology4kids.com)

- Define photosynthesis.

Skill level 1	
1	
0	
NR	

- Identify the specific site of the dark reaction that is labelled **X** in **Figure 1.1**.

X: _____

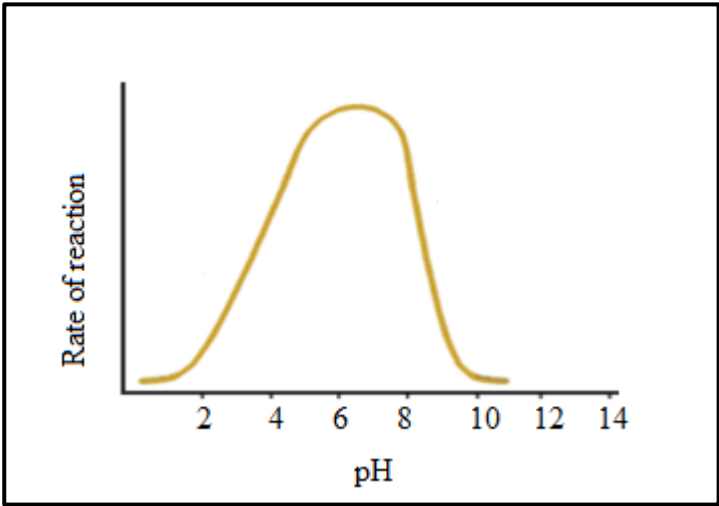
Skill level 1	
1	
0	
NR	

- Relate the structures of parts **X** and **Y** of the chloroplast shown in **Figure 1.1** to the overall function of the chloroplast.

Skill level 3	
3	
2	
1	
0	
NR	

2. The graph below shows the activity of enzyme Y at different pH levels.

Figure 1.2: Rate of Reaction of enzyme Y



Explain the effect that being at optimum conditions has on the activity of enzyme Y as shown in **Figure 1.2**.

Skill level 3	
3	
2	
1	
0	
NR	

3. Within a cell, substances can be transported around by facilitated diffusion and active transport.

a. Define facilitated diffusion.

Skill level 1	
1	
0	
NR	

b. Define active transport.

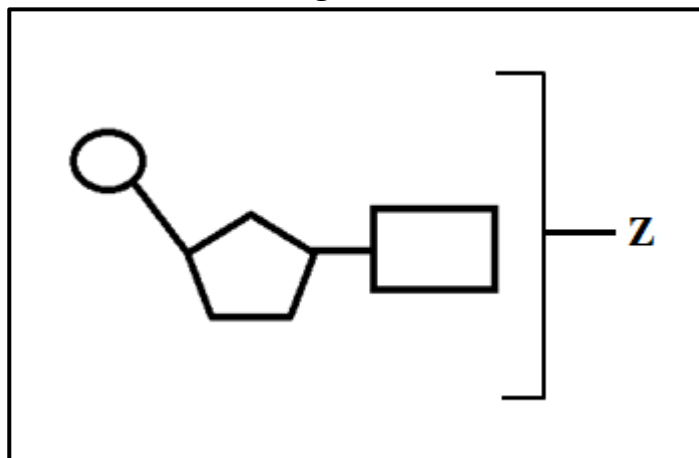
Skill level 1	
1	
0	
NR	

SECTION TWO:

GENETICS

1. Name the building block (monomer) of nucleic acids represented by the letter **Z** in **Figure 2.1** below.

Figure 2.1



Z: _____

Skill level 1	
1	
0	
NR	

2. In dog species **X**, golden fur colour is recessive to black fur colour. If the dog has black fur, its genotype (whether it is homozygous or heterozygous) can be determined by a test cross.

- a. Define **test cross**.

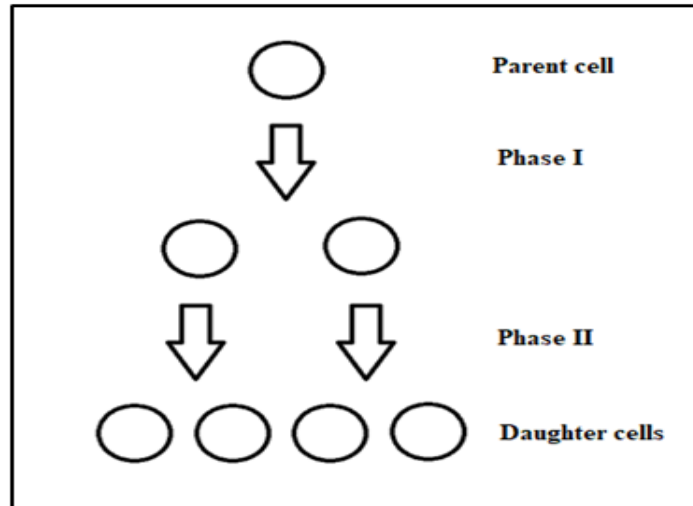
Skill level 1	
1	
0	
NR	

- b. Define **heterozygous**.

Skill level 1	
1	
0	
NR	

3. Study the diagram in **Figure 2.2** and answer the questions that follow.

Figure 2.2



Describe what happens to the number of chromosomes in the daughter cells compared to that of the parent cells in the type of cell division shown in **Figure 2.2**.

Skill level 2	
2	
1	
0	
NR	

4. Mele was born with Blood Type **AB**. However, neither of her parents or any of her brothers have the same Blood Type as her. Her mother has Blood Type **A**.

Explain why Mele's inheritance of the Blood Type is an example of multiple alleles.

[illegible]

Skill level 3	
3	
2	
1	
0	
NR	

5. Tomatoes have been genetically modified to last longer after they are picked. However, some people are concerned and do not want to buy tomatoes that have been genetically modified.

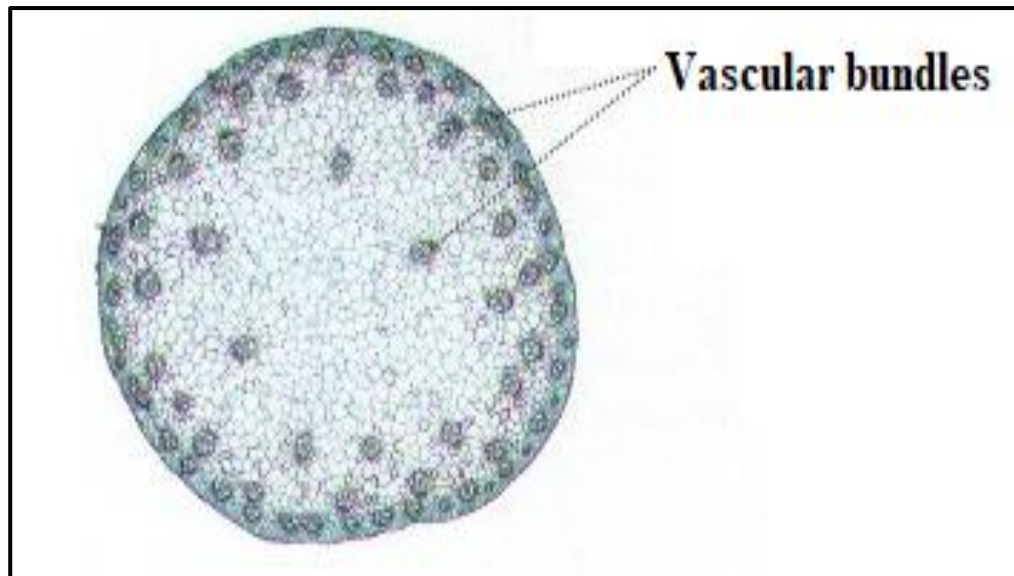
Explain the disadvantages of using genetic modification on food crops such as tomatoes.

Skill level 3	
3	
2	
1	
0	
NR	

SECTION THREE:**ORGANISM LEVEL BIOLOGY**

1. A cross section of a plant stem showed *scattered* vascular bundles. The vascular bundles were NOT arranged in a ring. These vascular bundles contain xylem and phloem.

Figure 3. 1 Cross section of a stem



(Adapted from: <https://soil.evs.buffalo.edu/>)

- a. Identify whether the cross section described above was taken from a monocotyledon or a dicotyledon plant.

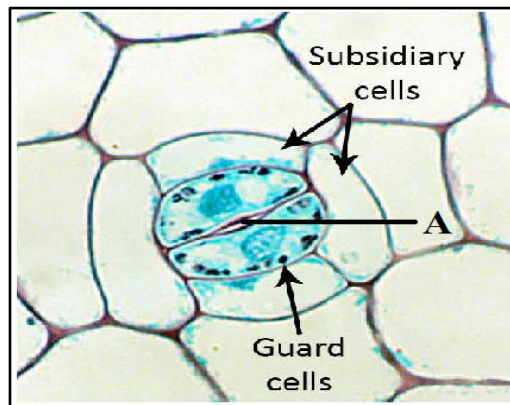
Skill level 1	
1	
0	
NR	

- b. Describe the role of the phloem in a plant.

Skill level 2	
2	
1	
0	
NR	

2. **Figure 3.2** shows the underside of a leaf under a microscope.

Figure 3.2: Diagram showing guard cells in leaf structure



(Source: <https://propg.ifas.ufl.edu/>)

Identify structure A.

A: _____

Skill level 1	
1	
0	
NR	

3. Plants reproduce and grow in different ways based on their adaptations and surroundings. Ferns can often be found growing only in damp and moist areas whereas angiosperms can be found in many different habitats.

- a. State the **TWO** (2) modes of reproduction in plants.

Skill level 1	
1	
0	
NR	

- b. Compare ferns and angiosperms in terms of their dependence on water for fertilization.

Skill level 3	
3	
2	
1	
0	
NR	

- a. Name **ONE** (1) example of a *processed* food.

Skill level 1	
1	
0	
NR	

Skill level 1	
1	
0	
NR	

- [illegible]

Skill level 3	
3	
2	
1	
0	
NR	

-

Skill level 1	
1	
0	
NR	

- a. Explain how the structure of the circulatory system of mammals is related to their way of life.

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.

Skill level 3	
3	
2	
1	
0	
NR	

- [illegible]

Skill level 3	
3	
2	
1	
0	
NR	

SECTION FOUR:

ENVIRONMENTAL BIOLOGY

1. In the marine environment, we can find larger animals in deeper water such as whales, fish such as tuna fish and octopus. We can also find giant clams (*vasuva*), and different types of lobster and crabs. Closer to the shore we can find sea cucumber, star fish and sea urchins (*tukumisi*).

- a. From the underlined marine animals named above, give **ONE** (1) example of an echinoderm.

- b. Choose **ONE** (1) underlined marine animal mentioned above and explain how its adaptations are related to its ecological niche.

Skill level 1	
1	
0	
NR	

Skill level 3	
3	
2	
1	
0	
NR	

2. On island **X**, there were two populations of birds. **Bird Population A** was isolated from the other populations of birds. When a new disease was introduced to the island, the mortality rate of the birds in population **A** increased.

- a. Define mortality.

Skill level 1	
1	
0	
NR	

-
- 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.

- A flea living on a dog's fur.

-
-
-
-
-

