

THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
ADVANCED CERTIFICATE OF SECONDARY EDUCATION
EXAMINATION

133/1

BIOLOGY 1

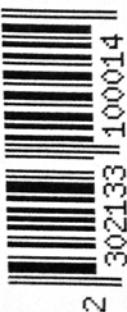
(For Both School and Private Candidates)

Time: 3 Hours

Year: 2023

Instructions

1. This paper consists of sections A and B with a total of **ten (10)** questions.
2. Answer **all** questions in section A and **two (2)** questions from section B.
3. Section A carries **seventy (70)** marks and section B carries **thirty (30)** marks.
4. All writing must be in **blue** or **black** ink, **except** for diagrams which must be in pencil.
5. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).



2

SECTION A (70 Marks)

Answer **all** questions in this section. Each question carries **ten (10)** marks.

1. (a) A Form Five student studied the features of various organelles within an animal cell. After the study the student said, 'A mitochondrion can be regarded as a cell within the cell.' Justify this statement by giving four points.
(b) Draw the diagram of a mitochondrion and label six parts.
2. (a) What will happen if a pleural membrane is severely damaged? Give three points.
(b) The mammalian lungs are made up of sac like structures called alveoli which are very efficient in gaseous exchange. Why are the alveoli very efficient? Briefly explain by giving seven points.
3. (a) A young scientist wrote the scientific name of human being as homo sapiens. Identify two mistakes which were made by the scientist.
(b) Figure 1 consists of organisms labeled **A**, **B**, **C**, **D**, **E**, **F**, **G** and **H**. Use the provided key to identify the organisms by writing down the number of the true statement for the organism until you arrive at the correct name.

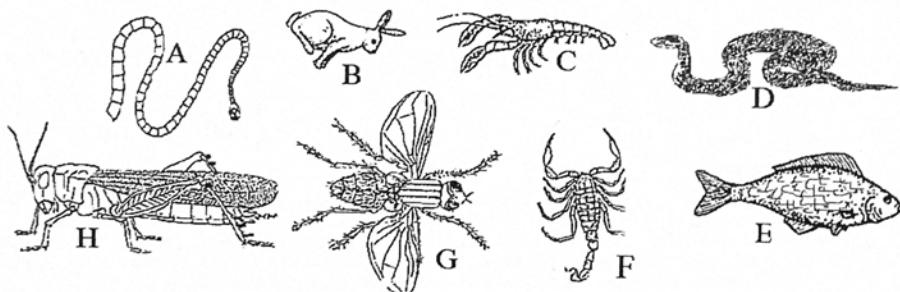


Figure 1

Key

1a. Antennae present.....	2
1b. Antennae absent.....	4
2a. Wings absent.....	4
2b. Wings present.....	Anostraca
3a. Wings stretched/open.....	3
3b. Wings not stretched/closed.....	Diptera
4a. Body with legs	Orthoptera
4b. Body without legs	5
5a. Legs two pair.....	6
5b. Legs four pair.....	7
6a. Body with segments.....	Scorpiones
	Cestoda

- 6b. Body without segmented.....8
- 7a. Tail present..... Primate
- 7b. Tail absent.....9
- 8a. Dorsal fin present..... Teleostei
- 8b. Dorsal fin absent..... Squamata
- 9a. Body elongated.....10
- 9b. Body not elongated.....11
4. (a) Calculate the magnification of the specimen if its linear dimension is 2 cm and the linear dimension of its drawing is 6 cm.
- (b) A Form Two student drew a diagram of a fish as seen in Figure 2. Observe the diagram carefully and identify four principles of biological drawing which were violated by the student.

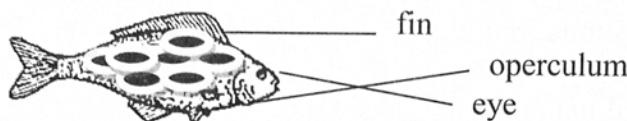


Figure 2

- (c) State two purposes of recording by biological drawing.
5. Figure 3 is a section through a mammalian ovary. Study it carefully and answer the questions that follow:

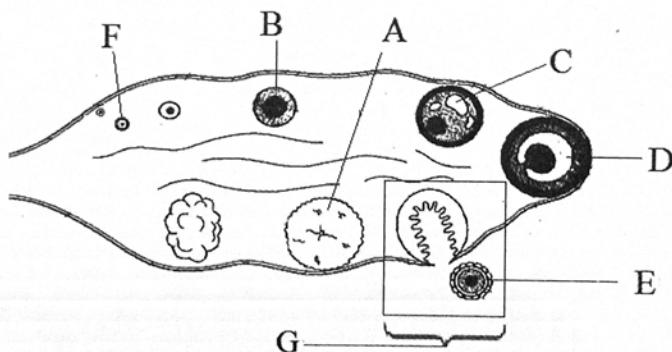


Figure 3

- (a) Arrange the labeled **A**, **B**, **C**, **D**, **E** and **F** in a correct sequence starting from the first to the last stage of oogenesis.
- (b) Why is it not advisable to undergo surgical operation which involves removal of the structure represented by Figure 3 for the first three weeks of pregnancy? Give four points.
6. (a) Carbon dioxide and water are the raw materials of photosynthesis while sunlight energy, chlorophyll and optimum temperature are the important conditions for effective

photosynthesis. Under which condition does each of the following factors limit the process of photosynthesis?

- (i) Temperature
- (ii) Carbon dioxide concentration.

- (b) A certain person encountered a motor cycle accident which severely damaged his Brunner's gland. State six digestive processes which will be impaired in that person.
7. (a) Coordination in human being involves endocrine and nervous systems. How do endocrine and nervous coordination differ? Give five points.
- (b) How are the nervous tissues adapted for their roles? Give five points.

SECTION B (30 Marks)

Answer **two (2)** questions from this section. Each question carries **fifteen (15)** marks.

8. Describe the structure of mammalian lungs. Use nine points.
9. The transport of materials in an organism may be passive or active. How do active and passive transportation of materials differ? Give seven points.
10. Describe the process which leads to the formation of embryo and endosperm in flowering plants.

THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
ADVANCED CERTIFICATE OF SECONDARY EDUCATION
EXAMINATION

133/2

BIOLOGY 2

(For Both School and Private Candidates)

Time: 3 Hours

Year: 2023

Instructions

1. This paper consists of **six (6)** questions.
2. Answer **five (5)** questions.
3. Each question carries **twenty (20)** marks.
4. All writing must be in **blue or black ink except** drawing which must be in pencil.
5. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).



1. Describe lytic and lysogenic life cycles of a bacteriophage (diagram is **not** required).
2. In five points, describe ways in which mammals are adapted to cold and hot environments.
3. With the help of diagrams, describe growth patterns of fish, human being and arthropods.
4. Using genetic crosses, describe the mode of inheritance of haemophilia and sickle celled anaemia.
5. (a) Explain six essential features of natural selection.
(b) Describe how geographical, reproductive and genetic isolations bring about speciation.
6. (a) With the help of diagram, describe a typical marine food chain.
(b) In six points, justify the fact that, food chains in the ecosystem are limited to a certain number of trophic levels.

**THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
ADVANCED CERTIFICATE OF SECONDARY EDUCATION
EXAMINATION**

133/3A

**BIOLOGY 3A
(ACTUAL PRACTICAL A)**
(For Both School and Private Candidates)

Time: 3:20 Hours

Year: 2023

Instructions

1. This paper consists of **three (3)** questions.
2. Answer **all** the questions.
3. Question one (1) carries **twenty (20)** marks and the other two (2), carry **fifteen (15)** marks each.
4. All writing must be in **blue or black ink except** diagrams which must be in pencil.
5. Cellular phones and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).



1. You have been provided with specimen **B**. Dissect the specimen in a usual way to fully display the digestive system.
 - (a) Draw a large diagram of your dissection and label ten parts.

Leave your dissection properly displayed for assessment.

 - (b) Explain five adaptations of the digestive system to its role in specimen **B**.
 - (c)
 - (i) Identify two structures of digestive system which are more developed in specimen **B** than in human being.
 - (ii) What effects will specimen **B** face if the structures you mentioned at 1(c)(i) will fail to function normally?
2. You are provided with solution **Q**. Carry out the experiments in item (i) – (v), then answer the questions that follow:
 - (i) Take three test tubes and label them as test tube **A**, **B** and **C**.
 - (ii) Put 2 ml of the solution **Q** to each of the test tubes **A**, **B** and **C**.
 - (iii) Add 2 ¹ ml of dilute hydrochloric acid to test tube **A** and warm the mixture. Then add 4 ml of Benedict's solution and observe the changes.
 - (iv) Add 2 ¹ ml of dilute hydrochloric acid to test tube **B** and warm the mixture. Then add 3 ¹ ml of sodium hydroxide solution followed by 4 ml of Benedict's solution and observe the changes.
 - (v) Warm the solution contained in test tube **C**, then add 2 ml of Benedict's solution and observe the changes.

Questions

- (a) Present your observations in experiments (iii) – (v) as shown in Table 1.

Table 1

Experiment	Observation
(iii)	
(iv)	
(v)	

- (b) Name the type of food substance contained in solution **Q**.
- (c) Why the experiments (iii) – (v) provided different results on Benedict's test? Give two reasons for each.
- (d) Briefly explain how the following factors affect enzyme activity in experiment (iv):
 - (i) Temperature
 - (ii) pH.

3. You have been provided with specimens **P₁**, **P₂**, **P₃**, **P₄** and **P₅**. Observe the specimens carefully then, answer the following questions:

(a) Why were specimens **P₁**, **P₂**, **P₃**, **P₄** and **P₅** formally placed in the same Phylum? Give two reasons.

(b) Use the following classification key to identify the specimens **P₁**, **P₂**, **P₃**, **P₄** and **P₅**:

1a	Wings present.....	2
1b	Wing absent.....	3
2a	Outer wings are soft.....	_____
2b	Outer wings are harder	_____
3a	Have numerous similar limb	_____
3b	Similar limbs absent	4
4a	The first appendage bear prehensile chelicerae	_____
4b	The first appendage serves as jaw.....	_____
(c)	Identify the structures concerned with gaseous exchange in each of the specimens P₁ , P₂ , P₃ , P₄ and P₅ .	
(d)	Outline two common adaptation features for the structures you named in 3(c).	
(e)	Draw a large, neat and well labeled diagram of specimen P₁ .	

THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
ADVANCED CERTIFICATE OF SECONDARY EDUCATION

EXAMINATION

BIOLOGY 3B

(ACTUAL PRACTICAL B)

(For Both School and Private candidates)

Time: 3:20 Hours

Year: 2023

Instructions

1. This paper consists of **three (3)** questions.
 2. Answer **all** questions.
 3. Question **one (1)** carries **20** marks, and the other **two (2)**, carry **15** marks each.
 4. Mathematical tables and non-programmable calculators may be used.
 5. All writing must be in **blue** or **black** ink **except** drawing which must be in pencil
 6. Cellular phones and any unauthorized materials are **not** allowed in the examination room.
 7. Write your **Examination Number** on every page of your answer booklet (s).



1. You are provided with the specimen **S₁**. Dissect it to display its digestive system and pin the ileum to their right hand side.

Questions

- (a) Draw a large diagram of the specimen **S₁** and label nine parts,
 - (b) Explain the adaptations of a structure used for mechanical digestion in specimen **S₁**
 - (c) (i) State the enzymes found in the structure used for mechanical digestion.
(ii) Give the digestive role played by each of the enzymes named in (c)(i).
 - (d) State two locations in specimen **S₁** where absorption takes place in its body.
2. You are provided with a sample labeled **M**, boiled and unboiled potatoes, water trough, knife/scalpel, scooper and water. Perform the following procedure:
- (i) Cut the cross section to obtain two equal halves for each Irish potato by using a knife/scalpel.
 - (ii) Label the 2 halves of the unboiled Irish potato as **A** and **B** respectively, and one half of the boiled potato as **C**.
 - (iii) Use a scooper to make the holes of about 2.5 cm deep from the cut surface for the three halves of Irish potatoes **A**, **B** and **C** while making sure that the wall of the holes must be thin (about 5 - 8 mm thick) to create a semi-permeable membrane and not damaged.
 - (iv) Put 3 g of sample **M** in each hole of **B** and **C** while keeping hole **A** empty.
 - (v) Place all the three Irish potatoes in a trough.
 - (vi) Put water in a trough until the Irish potatoes are half immersed. Carefully observe the experiment and note the set up and the level of water at the beginning.
 - (vii) Leave the experiment for 30 minutes thereafter observe the experiment again and note the changes.

Questions

- (a) State the changes observed after 30 minutes of the experiment,
 - (b) Explain how the solute potential in hole **A**, **B** and **C** acted to bring about the observed results of the experiment,
 - (c) Explain the necessity of potato **A** for this experiment.
 - (d) Explain the six ways in which the investigated process is important in nature.
3. You are provided with specimens **S₂** , **S₃** and **S₄**, study them carefully and answer the following questions:
- (a) Name the phylum in which the specimen **S₃** and **S₄** belong,
 - (b) Classify the specimen **S₂**, **S₃** and **S₄** to class level,
 - (c) Identify features in both specimen **S₃** and **S₄** which justify their representation of their respective classes,
 - (d) State where specimen **S₃** is found naturally,
 - (e) Give ways in which specimen **S₂** is useful for economic development.
 - (f) Explain to how specimen **S₄** adapted to its environment.

CONFIDENTIAL

THE UNITED REPUBLIC OF TANZANIA NATIONAL EXAMINATIONS COUNCIL OF TANZANIA ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION 2023

133/3A

BIOLOGY 3A (ACTUAL PRACTICAL 3A)

03 HOURS PRACTICAL ADVANCE INSTRUCTIONS

1.0 IMPORTANT

- 1.1** GREAT CARE MUST BE TAKEN **NOT** TO DIVULGE THESE INSTRUCTIONS TO BOTH CANDIDATES AND UNAUTHORIZED PERSONS EITHER DIRECTLY OR INDIRECTLY.
- 1.2** MAKE SURE THAT THE CANDIDATES ARE PROVIDED WITH SPECIMENS, CHEMICALS AND APPARATUSES INDICATED IN THESE PRACTICAL ADVANCE INSTRUCTIONS ONLY AND **NOT** OTHERWISE.

2.0 PREPARATION OF THE SPECIMENS AND SOLUTIONS

2.1 Specimen

Use chloroform to anaesthetize the fresh guinea pig/rat/mouse about 10 minutes before the commencement of the examination. Provide 1 specimen to each candidate.

2.2 Solution

Prepare sucrose solution by mixing 20 g of sucrose crystals with 1 litre of distilled/rain water. Provide each candidate with 30 ml.

3.0 LABELLING OF THE SPECIMENS AND SOLUTION

- | | | |
|-----|---|----------------------|
| (a) | Fresh killed guinea pig/rat/mouse (1 per candidate) ----- | B |
| (b) | Crab (1 for 4 candidates) ----- | P₁ |
| (c) | Grasshopper (1 per candidate) ----- | P₂ |
| (d) | Bee (1 per candidate) ----- | P₃ |
| (e) | Spider (1 per candidate) ----- | P₄ |
| (f) | Millipede (1 for 4 candidates) ----- | P₅ |
| (g) | Sucrose solution (30 ml per candidate) ----- | Q |

CONFIDENTIAL

4.0 LABELLING OF THE CHEMICALS

Prepare the fresh solutions, label them by their name, and then arrange in such a way that can be shared by 4 candidates.

- (a) Dilute hydrochloric acid solution
- (b) Benedict's solution
- (c) Sodium hydroxide solution
- (d) 1000 ml of tap/rain water

5.0 APPARATI

Provide each candidate with the following apparatus:

- (a) 4 test tubes
- (b) 1 test tube rack
- (c) 1 test tube holder
- (d) 1 measuring cylinder
- (e) 1 test tube brush
- (f) Bunsen burner (can be shared by 4 candidates)
- (g) 1 measuring cylinder (10 ml) or dropper with measurements
- (h) 4 watch glasses
- (i) 2 beakers (200-300 ml)
- (j) 1 hand lens
- (k) 1 dissecting kit/instruments
- (l) 1 dissecting board/tray
- (m) 1 scalpel

6.0 OTHER REQUIREMENT PER CANDIDATE

- (a) 1 pair of gloves
- (b) 1 piece of cotton wool
- (c) 3 stickers
- (d) 30 cm cotton thread
- (e) 10 office pins

7.0 ASSESSMENT OF THE DISSECTION AND DRAWING (5 Marks)

A biology teacher appointed will be required to make an on-the spot assessment of each candidate's dissection and drawing at least 45 minutes after the beginning of the Biology Practical examination. The candidates' scores of the assessment should be recorded on a separate form provided. The form **must be attached to each candidate's script** and sent to NECTA.

8.0 NOTE TO EXAMINATIONS SUPERVISORS AND LABORATORY TECHNICIAN/ BIOLOGY TEACHER APPOINTED

After the arrangement of the laboratory for examination, the Laboratory Technician/ Biology teacher assigned the responsibility to arrange the laboratory must fill in the attached declaration form in page 3. The form indicates the quantity provided and the labels used for the specimens, chemicals and apparatus as indicated in the **03 Hours Practical Advance Instructions**. The form must be filled at the beginning of each session of the examination and submitted to the Council enclosed together with the candidates' scripts in the last envelope of the final session.