UGANDA LOWER SECONDARY CURRICULUM

ELEMENTS OF CONTRUCTS FOR BIOLOGY

The Uganda National Lower Secondary Curriculum assesses 07 elements of construct in Biology during the end of cycle assessment. There are two papers of Biology at this level; Paper 1 and Paper 2. Out of the 7 elements of construct, 5 elements are assessed in Paper 1 and the 2 elements are assessed in Paper 2.

These elements of construct are as follows.

S/N	ELEMENT OF CONSTRUCT (The learner;….)	AREAS ASSESSED
PAPER 1 ELEMENTS OF CONSTRUCT		
01	**Diversity of organisms & Sustainability of natural resources** Appreciates diversity of living things and sustainability of natural resources [*Diversify of organisms, soil, pollution & conservation]*	**i**. Introduction to Biology
		ii. Classification
		iii. Cell Biology
		iv. Insects
		v. Flowering plants
		vi. Ecology; ✓ Concepts of ecology ✓ Food webs & food chains ✓ Community interactions ✓ Human & natural environment
		vii. Soil
02	**Plant Biology (Botany)** Understands how plants obtain and use nutrients to meet their energy requirements during which raw materials and products are carried to and from various organs involved.	**i**. Nutrition in plants
		ii. Transport in plants
		iii. Gaseous exchange & Respiration in plants
03	**Animal Biology (Zoology)**	**i**. Nutrition in animals
		ii. Transport in animals

	Understands how mammals obtain and use nutrients to meet their energy requirements during which raw materials and products are carried to and from various organs involved.	**iii.** Gaseous exchange in animals
		iv. Excretion in animals
04	**Human Physiology** Appreciates how the human body coordinates various activities and adjust to ensure normal functioning of the body systems.	**i.** Coordination in animals
		ii. Homeostasis
		iii. Osmoregulation
		iv. Locomotion in animals
05	**Inheritance of characteristics & Variation** Appreciates how characteristics/ traits are inherited in living organisms and passed to generations through reproduction and manifested as the organism grows	**i.** Genetics [inheritance & variation]
		ii. Cell division
		iii. Reproduction
		iv. Growth and development in plants and Animals
PAPER 2 ELEMENTS OF CONSTRUCT		
06	Appreciates Science inquiry skills	Food tests
		Soil experiments
		Osmosis
		Enzyme activities
07	Appreciates structures and functions of living organisms	Lower plants
		Flowers
		Fruits
		Leaves
		Arthropods
		Bones and teeth

STRUCTURE OF BIO/P1 553/1

This paper takes a duration of 2 hours and 30 minutes and has a total of 7 items in two sections; A and B.

Section A has three compulsory structured examination items, these items are set from elements of construct 2, 4 and 5

Section B has two sub-section i.e part I and part II with each part having two examination items. A learner is supposed to attempt one item from each part from this section

Examination items for section B are set from elements of construct 1 and 3

[N.B Each item has a maximum of 15 scores] IGNORE

Additional information about elements of construct [E.C]

1. E.C.1 – Diversity of living things & sustainability of Natural resources

N.B Natural resources are substances/ living organisms found in the environment that can be used for economic benefits, sustainability and human well-being.

E.g's

1. **Renewable resources**; these can be replenished/restored/replaced naturally/ i.e without human intervention; solar energy, wind energy, Hydro energy, Geothermal energy, water, Fisheries, forests

2. **Non-renewable resources**: Cannot be replenished naturally; Fossil fuels (coal,oil,gas), Minerals(iron, copper,gold), Nuclear energy, Metals (aluminium, steel)

3. **Biotic Resources** [living organisms] i.e Plants, Animals, Microorganisms

4. **Abiotic Resources**; Non- living substances i.e Water , soil, minerals, Rocks

Basis of Assessment

I. Understands the state / condition of natural Resources in context
II. Applies Biology for sustainable use of Natural resources & life forms

How do we assess the learner?

Learners should be able to;

I. Explain or describe the challenges / problems associated with a named Natural resource including life forms.
II. Detailed solutions to the challenges / problems identified . OR/AND Explain the benefits of the Natural Resources conserved most of which should be living things.

2. E.C .2- Plant Biology

Undestands how plants obtain and use nutrients to meet their energy requirements during which raw materials are carried to and from various organs involved;

Topics involved;Nutrition, Transport, Gaseous exchange & Respiration

Basis of Assessment (U, A)

I. Undestands (U) the role / roles/ functions of structures/ processes/ organs involved
II. Explains / describes roles of plant processes involved to demonstrate how to overcome the challenge

3. E.C .3- Animal Biology

Understands how animals obtain and use nutrients to meet their requirements during which raw-materials and products are transported to and from various organs /strusctures involved;

Topics involved; Gaseous exchange/ Respiration, excretion, nutrition, respiration in animals

Basis of Evaluation (U, A)

I. Understands the whole/ functions of different organs/ structures/ processes involved
II. Applies Biology of diseases/ disorders/ deficiciencies/ challenges in the context and appreciate how organisms / organs overcome the challenges.

General success Criterion

I. Explain /describe roles of structures/ organs/ processes involved
II. Explain /describe how the products of life processes OR human practices are utilized to overcome the challenges /disorders/ diseases/ deficiencies.

4. E.C- Human Physiology

Appreciates how the human body coordinates various activities and adjust to ensure normal functioning of body systems.

Basis of evaluation

I. Understands the concept of process/ disorders / challenges in one context

II. Understands the causes/ the effects/ symptoms of imbalances/ disorders and appreciates strategies to manage/ avoid them

III. Applies biology concepts in managing diseases/ disorders associated with coordination and sensory aspects and balance / adjustments

Success Criterion (U, A)

I. Describes and explains roles of structures/ processes involved or diseases /explains causes/effects/symptoms of the disorders or problems

II. Applications
Explains/ describes the strategies to manage/avoid the disorders / problems/ challenges.

5. **E.C- 5 Inheritance of characteristics & Variation**

Appreciates how characteristics are inherited in living organisms, passed to generations through Reproduction & are manifested as organisms grow.

Basis of Evaluation

I. Understands the process/ concept of variation, Reproduction & growth and development

II. Applies genetics, Variation & Reproduction to explain and manage disorders/ diseases and how to avoid the disorders or problems or challenges

Success Criterion

I. Describes/explains roles of structures /processes/concepts involved and or explains/describes the symptoms/ causes/ effects of the disorders /problems.

II. Explain/ describe the strategies to manage / avoid the disorders / problems.

NOTE:

Codes; UL, Ue, AL, Ae; are used by scorers to indicate different abilities of the learners;

UL= Undestanding of knowledge by listing / **Correct responses listed at understanding level** (Always scores one Mark, ONLY)

Ue= Understanding of knowledge by explanation/ **Correct responses explained**

AL= Application of knowledge by listing (Always scores one mark, ONLY)

Ae= Application of knowledge by explanation/ Correct responses explained

UL & AL only take level one/ score one mark, and are only scored when an item taker completely fails Ue OR Ae.

SCORING LEVELS

- ✓ **Level .1 = Given to a learner who expresses their ability through listing points**
- **Levels; 2, 3, & 4 = Given to learners who express both abilities ; listing and explanation.**

Highest level ; I,e level 4 is given to learners who maximize both listing & explanation abilities. HOWEVER; at level 4, the listing ability is recessive; and explanation ability dominates ; thus it's awarded with level 4

Zero (0) is awarded to learners who leave spaces/ questions/ items not attempted, OR to learners who answer wrongly an item;

Scorer ONLY put 0 and not 00; of X

- ➢ **Generally when writing scores in the NLSC, write one figure ; e.g 4 and not 04;**
- ➢ **04 means that the learner is either at level 0 or 4.**

SCORING RUBRIC/ SUCCESS CRITERION

- The scoring rubric is not standard, but item specific; each item has it's own rubric.
- When to give level .4.; scorer uses the 2/3 rule, i.e 2/3 of the maximum points for an item.

OR

USE THE half rule (½) rule;

- **Level.4; awarded when an item taker scores above ½ the expected points**
- **Level 3; awarded when an item taker scores ½ the expected points**
- **Level 2 ; awarded when an item taker scores below ½ the expected points**
- **Level 1; awarded when an item taker ONLY lists points (UL, or Ae)**

NB

For a Genetics Scenario/ Item

- ✓ For a learner to score level.4
- Correct crosses with all it's details; then an interpretation and conclusion for the genetic cross done
- Level.3= Correct genetic cross with no conclusion added
- Level. 2=
- Level. 1=

- Level zero = learner has completely showm no competence / didn't attempt the item / wrong interpretation.

STRUCTURE OF BIO/P2 [553/2]

This is a practical paper for the NLSC Biology and it focuses on two elements of construct. These are elements:

E.C-6 (The learners Appreciates ***Scientific inquiry skills***)

E.C- 7 (The learners appreciates ***structures and functions of living organisms***).

The paper has two examination items.

Item I ; Is assessed basing on element of construct 6 and it aims at scientific investigations.

The learner is required to ***design, perform an investigation, write a report and make conclusions*** basing on what he/she has performed.

Item I assesses the followings;

- Food tests
- Soil experiments
- Osmosis
- Enzyme activities

Item II is assessed basing on element of construct 7 and the followings are the areas assessed;

- Lower plants
- Flowers
- Fruits
- Leaves
- Arthropods
- Bones and teeth

There are mainly three questions from this item and they always follow the order below

I. Identification of the specimen using observable features

II. Suitability of the parts to the survival of the specimen
III. Drawing skills

NB

The maximum number of specimens set for item II is always 4

NOTE:

ADDITIONAL NOTES FOR BIO.2 553/2

Two E.C are considered;

E.C-1 Appreciates scientific investigative processes in Biology

Basis of Assessment (looks at how to design/ score learners)

A. **Planning to carry out scientific investigation**

Attributes /things scorers look at to score/grade

- ✓ Aim
- ✓ Variables
- ✓ Hypothesis (***this is the prediction of the expected outcome***)
- ✓ Apparatus/ solutions/ Reagents/ materials

All these are scored to a maximum of ***level.4 ; e.g***

- ➢ if a learner passes all the attributes, she/he is given level=4;
- ➢ If a learner passes only one attribute; score is level=1

  NOTE
  - ✓ **For materials to be scored ; No irrelevant materials should be included**
  - ✓ Award level one if a learner fails ; aim, variables, hypothesis, but has some irrelevant apparatus/material
  - ✓ Deny apparatus /materials, if there's irrelevant material stated.
  - ✓ Deny apparatus/materials if a student passes ; Aim,variables, Hypthesis.
- ***Hypothesis should be stated always before the procedure***

B. **Procedure**

The procedure should be; (C^2 A R)

I. **C**orrect
II. **R**elevant
III. **C**oherent

IV. Accurancy/ ***Quantify the materials used.***

N.B

The procedure should be Correct, Relevant, Coherent/ systematically flowing and the materials used should be quantified.

- ***The procedure should be related to the scenario given in the task***
- ***In the procedure;***

  1. Correct procedure *=Reagents MUST be correct*

  2. Relevancy= *Correct steps used as by the scenario's demands*

  3. Coherency= *Logical / systematic flow in the procedure*

  4. Accurancy= *Quantification of materials to be used; e,g To 1cc of test solution; add 2 drops of iodine solution. AVOID ranges i.e 2-3 drops of iodine*

NB

Scoring;

- ✓ Level 4 is given to learners who give all the four items in the procedure; I.E **C^2 A R**
- ✓ Never score a learner Zero, i.e the lowest score should be Level.1

NOTE

- **The procedure should be addressing a certain problem as stated in the scenario.**
- **Scorers should always read through the entire procedure before awarding any score. (We don't score each step written)**

C. Presentation of Data, Observation / Results

Data is presented depending on the question;

e.g

- ✓ table of results; for food tests
- ✓ Calculations
- ✓ Tables e.g in soil experiments

Attributes

- Presented data should be from a relevant procedure
- Data pattern i.e accurate data pattern is expected

  e.g
  - ✓ In soil expts; soil types and drainage; i.e sand soil drains faster, followed by loam and finally clay.

- ✓ Food tests; scorer looks at the colour changes

Observation and it's scoring

- ✓ If NO observation completely is written; score= 0
- ✓ If some basic observation is given; score = 1
- ✓ If there are some few gaps in the observation; score= 3
- ✓ Perfect observation written; score=4

D. **Analysis ; interpretation of data & Recommendations**

Attributes

- ✓ Data processing ; i.e a deduction written/given
- ✓ Making meaning of processed data/ Explanation
- ✓ Recommendations

Success Criterion

- ✓ *Processes data*
- ✓ *Makes complete meaning of data / makes conclusion based on interpreted data*
- ✓ *Makes recommendations based on the Task given; E.g-* **For bleeding gum; take vitamin C ; to boast immunity**

BIO.2 [553/2]

E.C-2 Appreciates the structure & function of living organisms

Bases of Assessment

There are two ;

- ✓ Identification & adaptations of organisms for survival or function

Attributes

It has two attributes;

I. Relevant feature of identification
II. Suitability of parts for survival

Overall score is Level=4

E.g

For specimens; Cockroach, Termite, Honey bee

- ✓ Identify specimens with reasons

Answer

Specimens ; are Insects

Reasons;

- ✓ Identify specimens using relevant features of identification
  Answer= Use a dichotomous key;

NOTE

- ✓ Learners have to interpret concepts
- ✓ Learners should be always attach explanations WHERE need be
- ✓ **Identification of specimens using a relevant feature of identification**; in this case a learner can construct a dichotomous key

DRAWING SKILLS

Drawing skills include; (**Major skills scored in drawing**) [M T N D L A]; D & L are taken to be the same

i. Title (*is obtained from the task*)
ii. Outline of the drawing (*Should be a correct outline of the correct drawing & it the outline has to be continuous in order to bring out the shape*)
iii. Magnification
iv. Accurancy
v. Neatness

N.B

- ✓ For labelling ; No skill is being potrayed; HOWEVER; good students can go ahead and label OR a learner can go ahead and label if the item /qn requires a labelled drawing.
- ✓ Framing the drawing or without framing; NO mark is awarded

NOTE

Details on the Drawing skills

- ✓ **Accurancy;**
  - ➢ Should bring out all the features of the diagram required
  - ➢ Proportionalty of parts is a factor considered in accurancy while making drawings
- ✓ **Neatness**
  - ➢ No sign of any rubbing should be seen
  - ➢ A sharp pencil should be used

- ✓ **Magnification**
  - ➢ Can be written
- In words ; e.g the drawing is three times bigger than the object OR as
- X sign e.g X3

Mg for Magnification is not used in Biology

<u>Attributes</u>

- ✓ Four & above points from (MTNDLA) ; level=4
- ✓ Three points e.g MTN; level= 3
- ✓ Two points e.g MT; level = 2
- ✓ Give full tick all through; No half tick should be scored.