

KCSE Biology Practical Examination

Areas tested in Biology practical

1. Botany

i) Flowers

- Description of Whorls – Calyx, corolla, androecium and gynoecium
- Classification (of plants into classes; Monocotyledonae and Dicotyledonae) based on number of floral parts and whether they are free or fused
- Shape and colour
- Agents of pollination based on shape, colour of floral parts. How the flower structures are adapted to the various pollination agents.

ii) Fruits

- Classification: whether the fruit is dry or succulent, type of dry/succulent fruit.
- Fruit structure- location of epicarp, mesocarp and endocarp (in succulent fruits), pericarp,
- Placentation: axile, free-central, parietal, marginal and basal
- Drawing of cross section of fruits
- Fruit dispersal: Agents of dispersal: Wind, water, and adaptations of fruits and seeds to the agents of dispersal.

iii) Seeds

- External features of dicot and monocot seeds.
- Internal features of seeds – endosperm, plumule, radicle, embryo, testa,

iv) Leaves

- External features of leaves: veins, presence/absence of hairs,
- Comparison of monocotyledonous and dicotyledonous leaf
- Type of leaf: simple vs. compound, pinnate vs. bipinnate leaf..
- Dichotomous key based on external features only

v) Roots and stems

- root system type: fibrous or tap
- Internal fine structure of root and stem (cross section)
- Comparison of cross section of dicot and monocot root and stems
- Techniques of sectioning: significance of making thin sections, watering, staining...

vi) Entire plant

- Characteristics of normally grown plant vs. an etiolated plant (Thick vs. thin stem, long vs. short internodes/stem, narrow vs. wide leaves, yellow vs. green leaves)

2. Zoology

i) Dentition

- Adaptation of animals to mode of feeding (carnivore vs. herbivore)

ii) Gas exchange surfaces:

- Gills in fish, tracheoles in insects,
- Breathing apparatus in mammals: ribcage, intercostal muscles, diaphragm.

iii) Heart and associated blood vessels

- Direction of Blood flow through the heart
- Anatomical modifications: thickness of left ventricle, valves, tendons,
- Identification of vein and artery,

iv) Mammalian skeleton

Axial vs. Appendicular skeleton – features and adaptations of different bones in the skeleton.

v) Classification and dichotomous key:

- classification by observing the external features of organisms up to Class.

- using a constructed key in identification,
- constructing a key using the observable features.

3. Physiological processes

- i) Enzyme activity – factors affecting enzyme action: temperature, pH. Practical may involve:
 - Digestive enzymes- of proteins(e.g. egg albumen) carbohydrates (e.g. starch)
 - Respiratory enzymes- e.g. using yeast extract and glucose solution, where aspects like frothing/fizzing is observed.
 - Hydrolytic enzymes e.g. using saliva and starch solution followed by test for the products of hydrolysis.
- ii) Cell physiology
 - may be on osmosis and diffusion – e.g. use of visking tubing,
 - Use of appropriate terms in to describe the processes taking place (e.g. A stem cannot become flaccid/turgid but hard/flexible/soft/stiff/curved) – turgidity or flaccidity are used to describe a cells only.
 - Accounting for observations in experiments involving osmosis and diffusion.
- iii) Tropisms and effects of auxins on plant growth (e.g. photos of a germinating seed, or tendril twining on another stem/hard object.)
- iv) Germination
 - type of germination, identification of the structures in germinating seedling-epicotyl, hypocotyl, coleorhiza, coleoptile etc. and their roles during germination.
- v) Food tests
 - can be done alone or incorporated in other questions (e.g. the one involving the enzymes or cell physiology).
 - all columns must be correctly filled to score.

- marking stops where a candidate commits a mistake along a row, e.g. if a procedure is wrong, the observation and conclusion becomes wrong too.
- if the heading of a column is 'test', use name of reagent e.g.: iodine test, Benedict's test, DCPIP test and Biuret's test.
- in the column of procedure, use correct units of measurement: ml/cm³ etc., and exact number of drops of reagents used (avoid use of 'about two drops', '3-4 drops' etc.)
- correct spellings of reagents (and use of Capital letter where necessary e.g. Benedict's instead of benedict), if their chemical formulae are used, they must be correct e.g.: HCl, 1% CuSO₄, 10% NaOH, NaHCO₃ etc.
- in observation column, avoid use of -ish as the colour e.g. bluish, yellowish...
- where a sequence of colours is expected, the candidate must show the order of the colours correctly or show the initial and final colour only.

4. Practical skills

- Observation using ear/eye/skin/nose. Most questions of observations are tied to the next question.
- Deductive reasoning- drawing conclusions from the observations.
- measurement
- manipulative
- recording
- drawing skills. Marks for drawing are awarded on the basis of:
 - P- Proportionality
 - A-Accuracy
 - L- Labelling
 - M- magnification.

Proportionality:

- the structures drawn must have their relative sizes shown.
- the position of the structures must be correctly shown

Accuracy

-diagram must be drawn free hand. Do not use a pair of compass/coin for instance to draw the cross section of a lemon.

-no shading is allowed

-the outline must be smooth, continuous (not broken)

-correct section/view must be drawn e.g. cross section or longitudinal section.

Types of view

-dorsal view=view from the back

-ventral view=front view

-lateral view=side view

-anterior view=top/head wise view

-posterior view= bottom view

Labelling:

-the labelling line must touch the structure being labelled

-the labelling line must not start/end in an arrow or dotted line.

Summarized as:-

C-correct

S-spelling

O-only

Magnification

-this tests the measurement skills.

Magnification = length of drawing (cm)/object length (cm) , express magnification as x3, x2, x5 etc. when units of measurement are omitted, the magnification is not valid.

-Compiled from content of Biology teachers' Worskshop held on 4th July, 2019 at Onjiko High School by Wycliffe Otieno.

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