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Name: MARKING GUIDE Centre/Index No: 1

P530/3
BIOLOGY
PRACTICAL
Paper 3
AUGUST, 2023
3¼ hours



JINJA JOINT EXAMINATIONS BOARD

Uganda Advanced Certificate of Education

MOCK EXAMINATIONS – AUGUST, 2023

BIOLOGY

PRACTICAL

Paper 3

3¼ hours

INSTRUCTIONS TO CANDIDATES

Answer **ALL** questions.

Answers must be written in the spaces provided.

Additional papers must not be inserted

For Examiner's Use Only

QUESTION	MARKS
1	39
2	38
3	23
TOTAL	100%

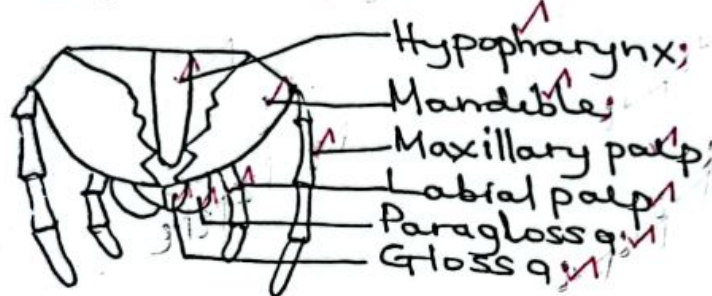
1. You are provided with specimen K and L which are freshly killed.

(a) Using a hand lens, examine the foot of hind limb of specimen K. How is it adapted for locomotion? (3 marks)

- Has claws which are curved and pointed for grip during locomotion on rough surface;
- Has acrolum/plantulae which are swellings that secrete sticky fluid for grip during locomotion on smooth surface;
- Segmented for flexibility during locomotion;

(b) (i) Cut out the head from specimen K and continue to extract the labrum and clypeus to be discarded. Using a hand lens, examine the front view. Draw and label observable mouth parts without displacement. (8 marks)

A drawing of observable mouth parts after labrum and clypeus have been extracted from front view of specimen K;



N - Same pencil intensity
light pencil
no broken lines

Added marks for drawing only
when the left structure exactly
matches those on right

N/A - Any other head
structure drawn
and labelled

NAD - Any other head
structure drawn
but not labelled but award L marks

* palp should be narrow at base broad at apex

* First maxillary palp shorter than the rest.

X10-40;
REL = below X5

TR-IF 'best' view
Structure labelled

T-0 1/2
M-0 1/2
O-0 1/2
N-0 1/2
D-03
L-03
08

(ii) How are the lateral named mouth parts in (b)(i) above adapted for the organism's survival?

Deny without edges (3 marks)

- Mandibles with serrated/toothed edges for cutting/chewing food;
- Maxillary palps which are long and segmented for flexibility to manipulate and push food into the mouth;
- Labial palps are segmented for flexibility to push food into mouth;

(c) Dissect specimen L in the normal way. Proceed to carefully cut out the parts of alimentary canal posterior to the duodenum with associated mesenteries. Continue to expose:

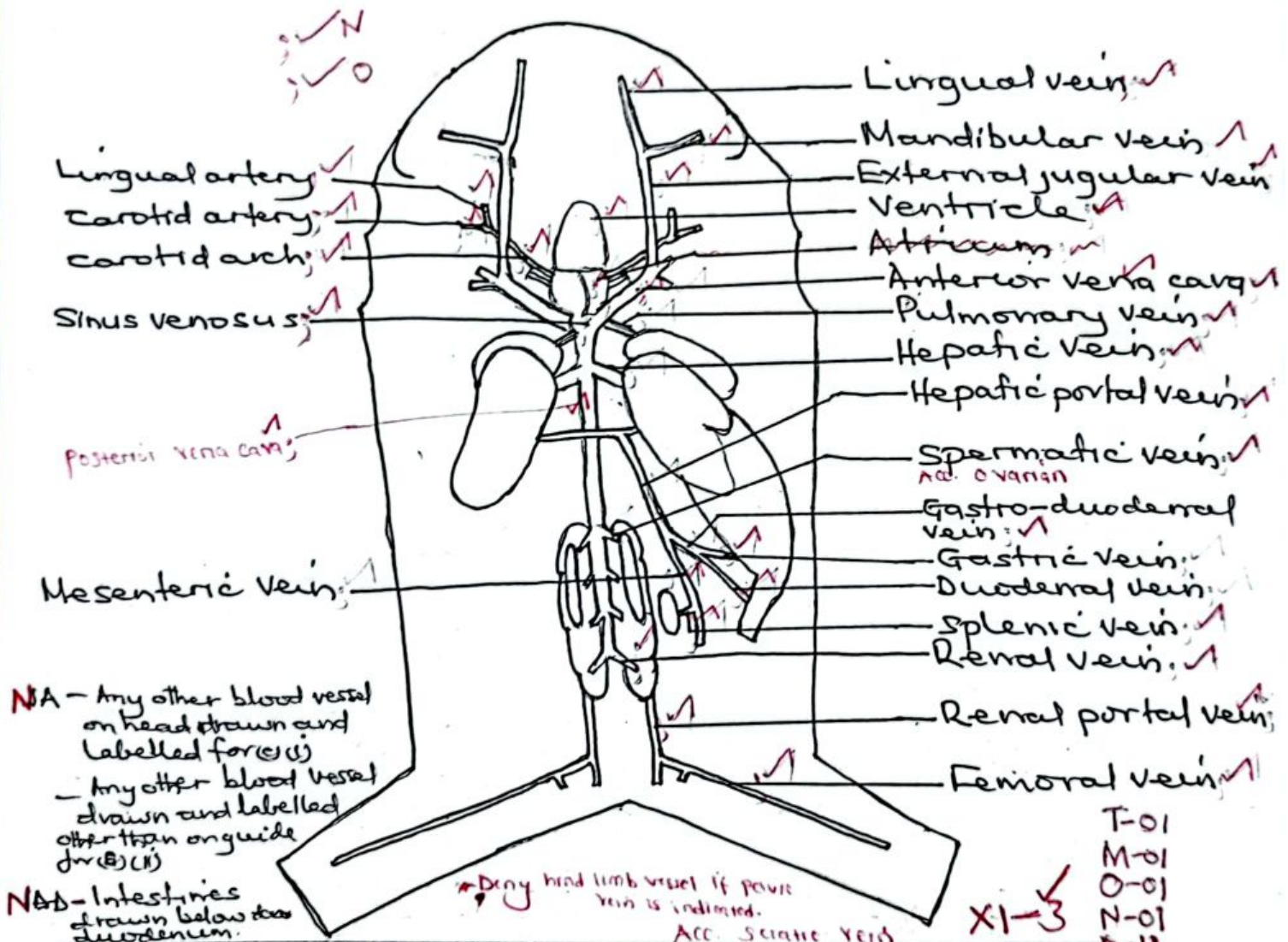
(i) Blood vessels on the floor of head region.

(ii) Vessels draining blood from remaining abdominal cavity structures, thoracic viscera and upper side of hind limb thigh region.

With heart turned upwards, draw and label your dissection.

(26 marks)

A drawing of blood vessels on the floor of head region and vessels draining blood from abdominal cavity structures, thoracic viscera and upper side of hind limb thigh region of specimen L with parts of alimentary canal posterior to duodenum cut out with heart turned upwards; ✓



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Turn over

If - If arteries drawn for (ii)

Deny drawing marks if no structures drawn to terminal blood vessels
- drawing marks if only one side blood vessels of head region drawn.

X1-3

T-01
M-01
O-01
N-01
D-11
L-11

25

(39)

C - 10% amylase enzyme.
 D - 10% Trypsin enzyme.
 S - dilute HCl
 T - 2M NaHCO_3

20% extract from a fresh egg plant
 20% extract from fresh white striped bean
 Egg white from 2 eggs in 2 litres

2. You are provided with extracts A and B which were obtained from different plant organs, solutions C, D, S and T.

- (a) (i) Carry out tests in Table 1 on extracts A and B. Record your tests and observations in the table.

(14 marks)

Tests	Observations	
Iodine test To 1cm ³ of solution add 1/2/3 drops of Iodine solution	A	Turbid solution turns to black
	B	Turbid solution turns to pale black
Benedict's test To 1cm ³ of solution add 1cm ³ of Benedict's solution and boil	A	Turbid solution turns pale blue to green to yellow precipitate
	B	Turbid solution turns to pale blue
Biuret test To 1cm ³ of solution add 1cm ³ of NaOH add 1/2/3 drops of $\text{CuSO}_4(\text{aq})$	A	Turbid solution turns to pale blue
	B	Turbid solution turns to deep purple
DCPIP Test To 1cm ³ of DCPIP solution add solution dropwise	A	Deep blue solution turns to pale blue in excess of solution
	B	Deep blue solution turns to pale blue in excess of solution

res. purple alone without deep

15

- (ii) A mother feeds her child on organs A and B. Comment on the nutrient components, likely implications and give your advice to her.

(4 marks)

OWTTE
 organs have high carbohydrates which give energy and high proteins necessary for proper growth, but lack vitamins necessary for immunity development, hence child is likely to be sickly. The diet should therefore include fruits which are rich in vitamins to boost immunity of the child's body.

03

- (b) (i) Label four test tubes (i)-(iv) and carry out procedures summarized in table 2.

Table 2.

Test tube	Contents
(i)	2cm ³ of solution B+1cm ³ of solution C+1 cm ³ of solution S
(ii)	2cm ³ of solution B+1cm ³ of solution C+1 cm ³ of solution T
(iii)	2cm ³ of solution B+1cm ³ of solution D+1 cm ³ of solution S
(iv)	2cm ³ of solution B+1cm ³ of solution D+1 cm ³ of solution T

- (ii) Record the appearance of the contents in the test tubes. (1 mark)

Turbid solution; ✓ 01

- (iii) Incubate all the four test tubes (i) – (iv) at 35°C – 40°C for 30 minutes (Meanwhile you may continue with other work)

After 30 minutes of incubation, shake, observe and describe the appearance of the mixture in each test tube in comparison before incubation in Table 3.

Table 3

(2 marks)

Test Tube	Appearance
(i)	Turbid solution; ✓
(ii)	Turbid solution; ✓
(iii)	Turbid solution; ✓
(iv)	Turbid solution; ✓ 02

- (iv) Carry out tests on the mixture / content of the incubated test tubes as indicated in Table 4 and 5. Record your observations and deductions.

Table 4

(4 marks)

Iodine test		
Test tube	Observations	Deductions
(i)	Turbid solution turns to <u>pale black</u> ; ✓	Little starch present; ✓

(ii)	Turbid solution turns to pale brown yellow	Starch absent
(iii)	Turbid solution turns to pale black	Little starch present
(iv)	Turbid solution turns to pale black	Little starch present

max 05

Table 5

(4 marks)

Biuret test		
Test tube	Observations	Deduction
(i)	Turbid solution turns to deep purple	Much proteins present
(ii)	Turbid solution turns to deep purple	Much proteins present
(iii)	Turbid solution turns to deep purple	Much proteins present
(iv)	Turbid solution turns to pale purple	Little proteins present

max 05

(c) From your results, explain the effect of the following solutions on extract B

(i) Solution C

(2 marks)

Has an enzyme which catalyses breakdown of starch to ~~reducing sugars~~ but not proteins.

1

(ii) Solution D

(2 marks)

Has an enzyme/active substance which catalyses breakdown of proteins; but not starch.

02

(d) From your results, explain the effect of the following solutions on the activity of substance in solution C and D

(i) Solution S

(2 marks)

Provides unfavourable/unsuitable medium, which denatures the enzymes resulting into no activity/which stops activity.

(ii) Solution T

(2 marks)

Provides favourable/suitable medium, which activates the enzymes resulting into increased/high activity.

38

3. You are provided with specimens W, X, Y and Z which are plant organs.

- (a) Give three differences in the description of floret arrangement between specimen W and X in Table 6. (3 marks)

Table 6

W - <i>Tridax</i> / <i>Sidens</i>	X - <i>Lantana</i>
Florets surrounded by bracts	Each floret has its own bract attached at base ✓
Has two types of florets	Has only one type of floret ✓
Florets arranged in rings / circular pattern	Florets randomly arranged ✓
Florets vary in height	- Florets of same height ✓

- (b) Describe the features of named parts of the androecium of

(i) Specimen Y - *Moringa* / *glory*

(2 marks)

Five free stamens attached at corolla tube; ✓
filaments long, hairy at base, tapering towards apex; ✓
anthers bilobed; tapers towards tip; ✓
filaments of variable length / height; ✓ 02 max

(ii) Specimen Z - *Crotalaria* / *bean flower*

(2 marks)

Ten stamens with nine fused filaments; ✓
form long, curved, staminal tube; ✓
one free stamen; ✓
anthers bilobed with five rounded and five elongated anther heads; ✓ 02 max

- (c) With the aid of hand lens, observe and state two differences between the following parts of specimen W and X florets, by filling Table 7

Table 7

(6 marks)

Part	W - <i>Tridax</i>	X - <i>Lantana</i>
Sepals	- Free - Longer	- Fused ✓ - shorter ✓

Ref. If not comparative

Ovary	- Inferior - Elongated	- superior ✓ - Rounded ✓
Stigma	- Forked / divided ✓ - Tapers towards apex	- Not forked / Not divided ✓ - Rounded / oval shaped ✓

(d) What benefits does specimen W derive from pattern of floret arrangement? (3 marks)

- Florets are closely packed which increases chances of pollination ✓
- Outer florets have large brightly coloured petals which attracts pollinating agents ✓
- Florets are closely packed for support ✓

(e) Using only primary features of florets / flowers, construct a dichotomous key for the identification of specimen W, X, Y and Z. (3 marks)

- 1 (a) Inferior ovary ----- W ✓
- 1 (b) Superior ovary ----- go to 2 ✓
- 2 (a) Fused stamen ----- Z ✓
- 2 (b) Free stamen ----- go to 3 ✓
- 3 (a) Stigma forked / divided ----- X ✓
- 3 (b) Stigma not forked / not divided ----- Y ✓

(f) Remove whole mature inner floret from specimen W. Observe under low power of microscope. Draw (5 marks)

Drawing of whole mature inner floret from Specimen W viewed under low power of microscope

Stigma - divided & hairy ✓
Anther - point upward & hairy ✓
Sepals - Hairy hair point upwards ✓
Ignore label.
ovary - Hairy ✓



T-0 1/2
M-0 1/2
D-04
05

X10-40
ACC.

23