THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

133/3A **BIOLOGY 3A**

(ACTUAL PRACTICAL A)

(For Both School and Private Candidates)

Time: 2:30 Hours **ANSWERS** **Year: 2000**

Instructions

1. This paper consists of three questions.

2. Answer all questions.

1.Dissect specimen S_1 provided in the usual way. Displace the gut to the left-hand side of the specimen and display fully both the digestive and reproductive systems.

(a) Draw a large diagram of your dissection and label only the required structures.
The diagram should include:
- Digestive tract (oesophagus, stomach, intestines)
- Reproductive organs (testes/ovaries, vas deferens/oviduct)

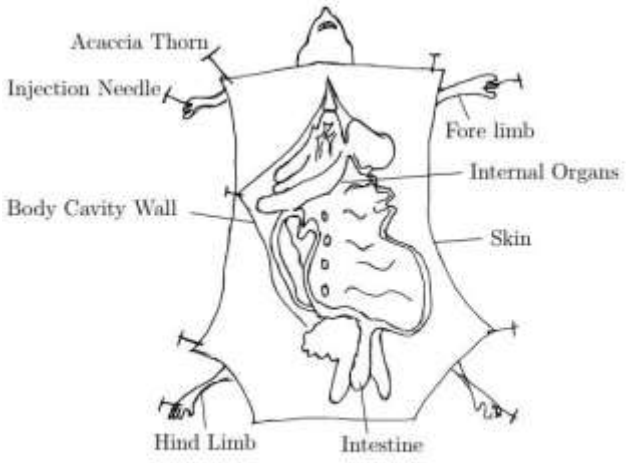


Figure 5.7: A labeled diagram of a rat dissection

(b) State the sex of your specimen and give one external feature you used to determine the sex of specimen S_1.
Sex: Male or Female
Example:
Male -----> Presence of testes, absence of ovaries
External feature -----> Presence of scrotal sacs or penis
Female -----> Presence of vagina or uterine horns

(c) Mention the structure in specimen S_1 which performs the same function as rumen in mammals, for example cow.
Crop or caecum (in birds) -----> Site of microbial fermentation

(d) LEAVE YOUR DISSECTION PROPERLY DISPLAYED FOR ASSESSMENT.

2. You have been provided with a 2% hydrogen peroxide solution, some fresh liver and soaked peas. Carry out the following activities to investigate the interactions of substance X present in the liver and peas, with hydrogen peroxide.

Test-tube No.	Observations
1	Bubbling/effervescence
2	Bubbling/effervescence
3	No reaction
4	Bubbling (moderate)
5	No reaction
6	No reaction
7	Bubbling (increased)

(b) (i) Suggest the name of substance X.
X = Catalase

(ii) Mention the cellular organelles in which substance X is found.
Peroxisomes

(iii) Name the biochemical process catalysed by X which takes place in liver cells.
Breakdown of hydrogen peroxide -----> water + oxygen

(c)(i) Purpose of grinding the liver?
To release more catalase by breaking cell membranes

(ii) Purpose of boiling liver and peas?
To denature catalase enzyme and show heat-labile nature

(d)(i) Balanced equation of the reaction between substance X and hydrogen peroxide:
$2H_2O_2$ -----> $2H_2O + O_2$

(ii) Biological significance:
Detoxifies harmful hydrogen peroxide from metabolic activities

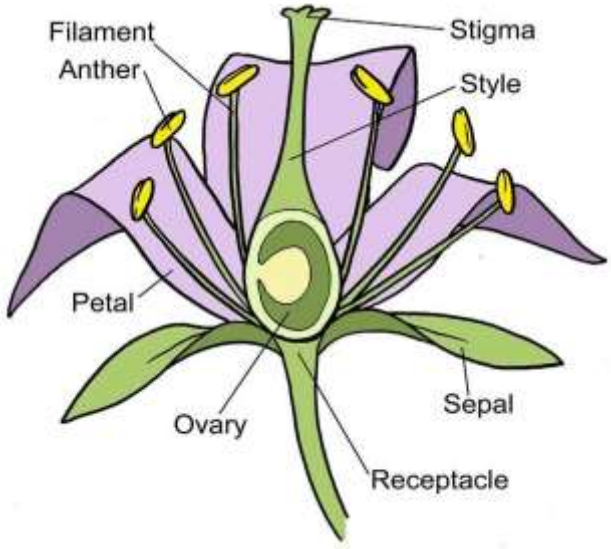
(e) In which part of the pea is X most abundant?
Seed coat or embryo axis (actively respiring tissues)

3. (a) Observe specimens S_2, S_3 and S_4 carefully and complete table 2:

Specimen	Common name	Phylum	Two adaptations to its mode of life
S_2	Spider	Arthropoda	Eight legs for walking; fangs for capturing prey
S_3	Millipede	Arthropoda	Many legs for burrowing; hard exoskeleton for protection
S_4	Earthworm	Annelida	Setae for anchorage; segmented body for movement

(b) Carefully study specimen S_5.

(i) Write its floral formula
Br, actinomorphic, bisexual
K(5) C(5) A(∞) G(1) superior
(ii) Draw a floral diagram



(iii) Class of specimen S_5
Dicotyledonae

(iv) Observable features placing it in this class
- Network of leaf veins
- Floral parts in 4s or 5s
- Two cotyledons

(v) Mode of pollination:
Insect pollination (entomophily)
- Showy petals and scent attract insects
- Sticky pollen grains

(c)
(i) You are provided with specimens S_6, S_7, S_8, S_9, S_{10}, S_{11} and S_{12}. Construct a simple numbered dichotomous key using body parts, legs, and wings characteristics only.

1a. Wings present -----> go to 2
1b. Wings absent -----> go to 5
2a. Wings covered with scales -----> Lepidoptera
2b. Wings not scaly -----> go to 3
3a. Two pairs of wings -----> go to 4

3b. One pair of wings -----> Diptera
4a. Hardened outer wings -----> Coleoptera
4b. Soft wings -----> Hymenoptera
5a. Many legs -----> Myriapoda
5b. Eight legs -----> Arachnida
5c. No legs -----> Annelida

(ii) Give the common names and classes:

Specimen	Common name	Class
S_6	Butterfly	Insecta
S_7	Beetle	Insecta
S_8	Fly	Insecta
S_9	Millipede	Myriapoda
S_{10}	Spider	Arachnida
S_{11}	Bee	Insecta
S_{12}	Earthworm	Oligochaeta