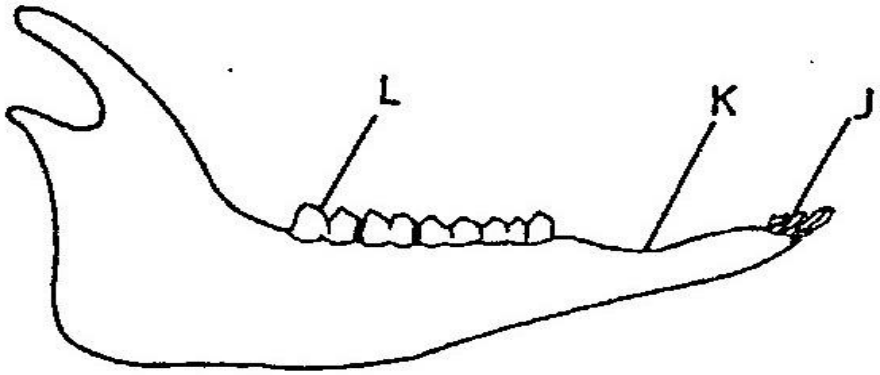
BUKAKA CLUSTER EXAMINATIONS
BIOLOGY PAPER 2
MARKING SCHEME
END OF TERM 1, 2025
FORM 4

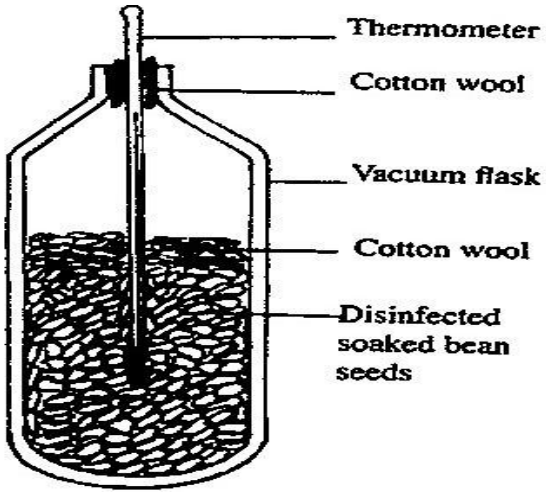
SECTION 1

1. ***The diagram below represents the lower jaw of a mammal***



a. Herbivorous rej herbivore
b. Structural – Tooth J is narrow/sharp/chisel like while tooth L is broad/ridged.
   Functional –Tooth J is used for cutting and biting while tooth L is used for grinding and crushing food.
c. i. Diastema
   ii. To allow manipulation of food by tongue, separating chewed and newly cut vegetation.
d. Calcium phosphate.
e. $i\ ^{2}/_{2}\quad c^{1}/_{1}\ pm\ ^{2}/_{2}\ m\ ^{3}/_{3}$ **OR** $2(i\ ^{2}/_{2}\ c\ ^{1}/_{1}\ pm\ ^{2}/_{2}\ m\ ^{3}/_{3}) = 32$

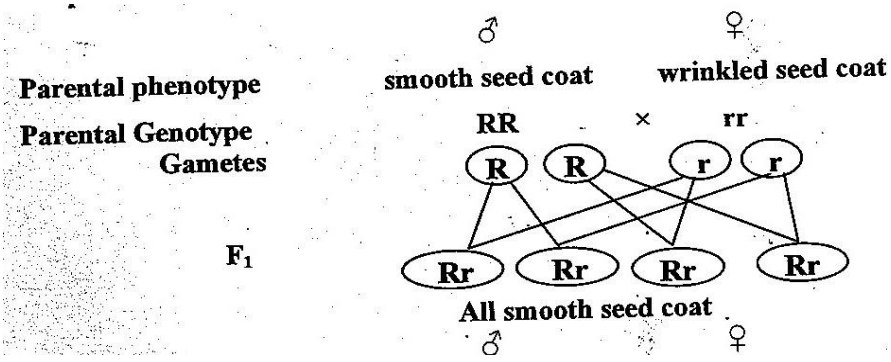
2. ***In an experiment, disinfected soaked bean seeds were put in a vacuum flask which was then fitted with a thermometer as shown in the diagram below.***



a. aerobic respiration. acc respiration
b. i. An increase in temperature on the thermometer reading.
   ii. Stored starch/carbohydrates in germinating seeds are broken down/hydrolysed then oxidized to release energy; Some of the energy is released as heat;
c. To kill bacteria/fungi/micro-organisms that would cause decay/decomposition or respiration of the micro-organisms; which could raise heat.
d. To conserve heat/prevent loss to surrounding.
e. Use a similar set up with dead disinfected boiled seeds or use dry bean seeds.

3. In an investigation a variety of pea plants grown from seeds with smooth coats were crossed with plants grown from seeds with wrinkled coats. All the seeds obtained in the first filial (F_1) generation had smooth seed coats.

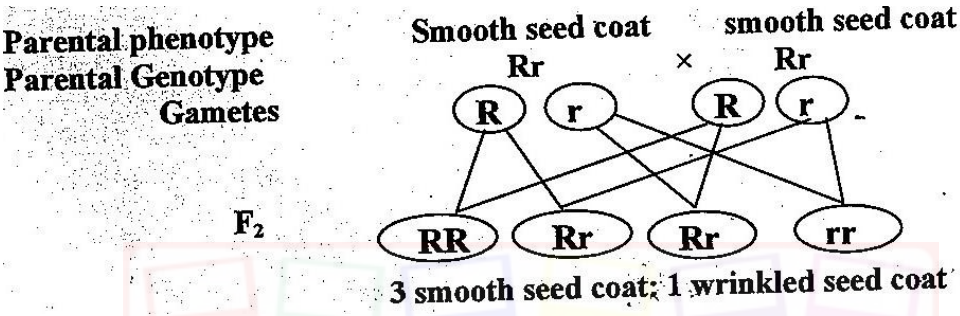
a. ***Using the letter R to represent the gene for smooth seed coat, wok out the genotype of the F_1 generation. Show your working.***



Parental genotype 1mk
Gametes 1mk
Fusion lines 1mk
F1 genotypes 1mk

NB//Narration on the left is not a must but if written must be correctly placed

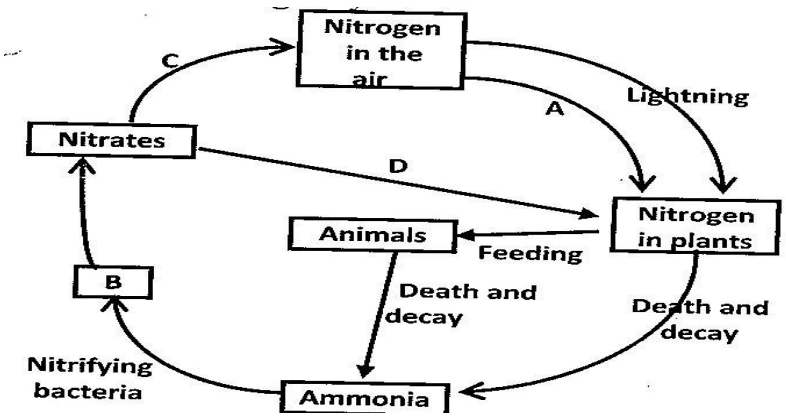
b. ***If the F_1 generation was selfed, determine the phenotypic ratio of the filial (F_2) generation. Show your working***



Parental genotype 1mk
Gametes 1mk
F2 genotypes 1mk
F2 phenotypical ratio 1mk

NB//rej ratio if its narration is omitted i.e. if 3:1

4. The diagram below represents the nitrogen cycle



a. A- Nitrogen fixation by symbiotic bacteria e.g. Rhizobium, D- absorption.
b. Nitrites (NO)

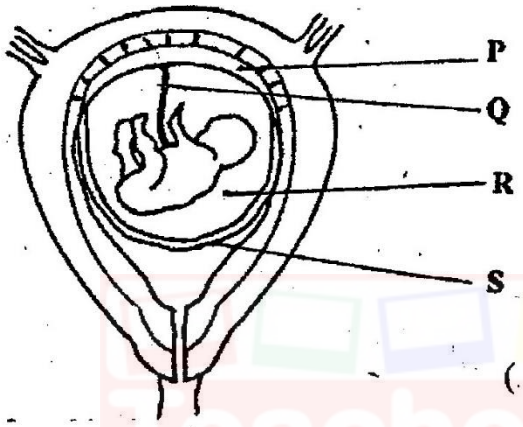
c. Denitrifying bacteria/Denitrificans.
d. i. Leguminous plants (or legumes)

ii. Root nodules

e. By -Killing/reduction of nitrogen fixing bacteria/nitrogen fixing microorganisms e.g. Rhizobium.

-Destruction of leguminous plants.

5. The diagram below represents human foetus in a uterus



a. Chorion
b. i. Umbilical arteries,
Umbilical veins.
ii. umbilical vein-More food nutrients; more oxygen;
umbilical artery-less food nutrients; more excretory products.
c. – Highly vascularized; large surface area;
-Presence of secretory cells;
d. Cushion foetus / acts as a shock absorber of the foetus.

SECTION B

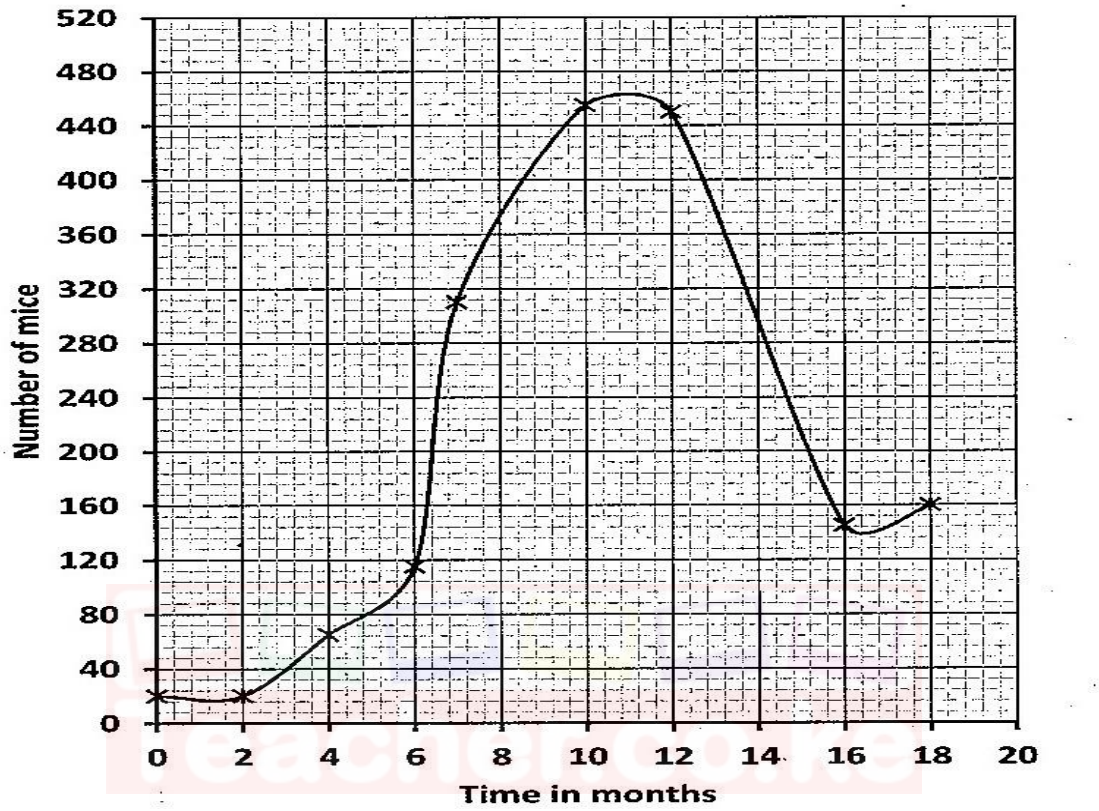
6. ***A scientist carried out an investigation to find out the population growth of mice under laboratory conditions. Twenty young mice were placed in a cage. The results obtained from the investigation were as shown in the table below.***

Time in months	0	2	4	6	7	10	12	16	18
Number of mice	20	20	65	115	310	455	450	145	160

a. On the grid provided, draw a graph of the number of mice against time.

Scale: x-axis: 1cm rep 2 months, y-axis: 1cm rep 40 mice

A graph showing number of mice against time in months



x axis scale 1mk
y axis scale 1mk rej if origin is missing
labelling axis 1mk each
plotting 1mk
curve 1mk

b. i. population of mice is constant due to:-

- the reproducing mice are still immature.
- mice are still adjusting to their environment.

ii. Population of mice rose steadily due to: -

- An increase in the number of reproducing females.
- Mice are already adapted to their new environment.

iii. Population of mice rose rapidly due to: -

- There are many reproducing females.
- Plenty of food to the mice / environmental factors not limiting.

iv. Population of mice almost constant but declining slowly due to:

- Stiff competition for food hence food is not adequate.
- Stress due to limited space.
- Accumulation of wastes which can be toxic.

c. i. ***Between which two months was population change greatest?***

Between the 6th and 7th months

ii. ***Calculate the rate of population change over the period in (c) (i) above***

rate of population change = change in mice population; / time

$\frac{310 - 115}{2} = \frac{195}{2} = 97.5 = 98$ mice/month.;

=***What change in population would be expected if the investigation was continued to the 19th month?***

the population of mice would increase by 20 to stand at 180.

d. ***To obtain the observed results state two variables that were kept constant during the investigation***.

- Amount of food given to the mice each day was kept constant.
- Space was kept constant.
- Sex ratio was kept constant.

7. ***a. State four characteristics of gaseous exchange surfaces***

- moist; to dissolve gases hence diffuse in solution form.
- Thin walled/epithelium; which is one cell thick to reduce the distance of diffusing molecules.
- Have large surface area; for maximum exchange of gases.
- Highly vascularized; to maintain a step concentration gradient hence maximum gaseous exchange.

b. ***Describe the mechanism of gaseous exchange in a mammal***

Breathing in or inhalation

External intercostals muscles contract; while internal intercostals muscles relax; ribcage moves upwards and outwards; Muscles of diaphragm contract; hence flattens; the volume of the thoracic cavity increases; and pressure decrease than the atmospheric pressure; The higher atmospheric

pressure forces air rich in oxygen; into the nostrils, trachea, bronchi, bronchioles, alveoli; inflating the lungs;

Breathing out or exhalation

External intercostals muscles relax; while internal intercostals muscles contract; This causes the ribcage to move downwards and inwards; The muscles of the diaphragm assumes a dome shape; This makes the volume of thoracic cavity to decrease; while the pressure increases than atmospheric pressure; Higher pressure in the thoracic cavity forces air rich in carbon (IV) oxide; out of the lungs via bronchioles, bronchi, up the trachea and out through nostrils; and the lungs deflate;

8a. Describe how urea is formed in humans

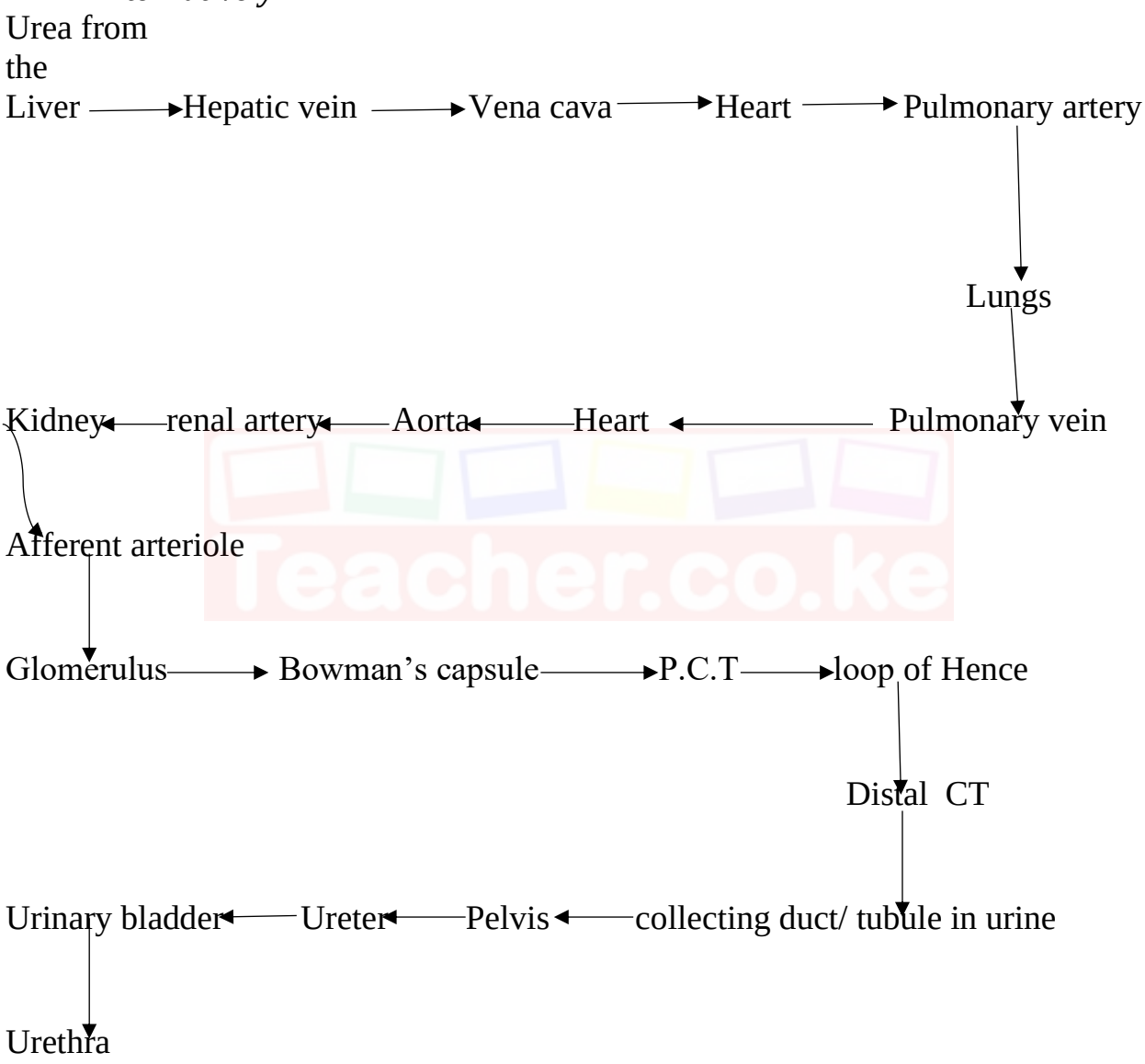
Urea is formed in the liver; where excess amino acids are deaminated /amino group is removed; the amino group react with hydrogen; to form ammonia; which is toxic; ammonia combines with CO_2 (in the cycle); to form urea (which is less toxic);

Max 5

b. Describe the path followed by urea from the site of formation until it is eliminated from the body.

Urea is carried in blood; thorough the hepatic vein; into venacava; blood containing urea then enters the heart/ right auricle/ right auricle and right ventricle; leaves the heart through pulmonary artery into the lungs; (out of lungs through pulmonary vein; to the heart/left auricle/left auricles and left ventricle; through aorta (into) kidney; via renal artery; to afferent arteriole; to the glomerulus; where ultrafiltration occurs; resulting in formation of (glomerular) filtrate; which enters the Bowman's capsule; into the proximal convoluted tubule ; loop of Henle /descending and ascending loops of Henle; to Distal convoluted tubule; urea enters the collecting ducts/tubules in urine; into the pelvis; ureter; then into urinary bladder; from where it exits the body through the urethra;

Alternatively



22 max 15