



Dr. Blosa Science

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+256 778 633 682, 753 802709
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SENIOR FOUR

553 / 1

BIOLOGY

PAPER 1

EXAM 6

FOR CONSULTATION CALL 0778 633682

2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

- Answer ALL questions in Section A and B and any TWO from Section C.
- For Section A write your correct corresponding answer in the box.
- For Section B write the answers in the space provided.
- For Section C write your answers on the attached answer sheets.

For Examiner's Use Only	
A	
B	
C	
Total	

SECTION A

1. Which one of the following parts of a microscope regulates the amount of light entering the lens system
- A. Turret
 - B. Diaphragm
 - C. Mirror
 - D. Stage

B

2. Living organisms are capable of reacting to the changing conditions in the environment. This process is referred to as
- A. Growth
 - B. Movement
 - C. Sensitivity
 - D. Death

B

3. A vertebra has the following characteristics
- (i) Short neural spine
 - (ii) Short transverse process
 - (iii) Vertebralarterial canal
- A. Lumbar vertebra
 - B. Thoracic vertebra
 - C. Cervical vertebra
 - D. Tail vertebra

C

4. Which one of the following is the relative size limit in millimeters for silt
- A. 2.0 – 0.20mm
 - B. 0.02 – 0.002mm
 - C. 0.20 – 0.02mm
 - D. Below 0.002mm

B

5. A researcher captured an animal and noted its dental formula as follows

$$i \frac{2}{1} \quad c \frac{0}{0} \quad pm \frac{3}{2} \quad m \frac{3}{3}$$

Which animal was captured?

- A. A hog
- B. A fox
- C. An antelope
- D. A rabbit

B

Dental formula for antelope **0/3, 0/1, 3/3, 3/3 = 32**

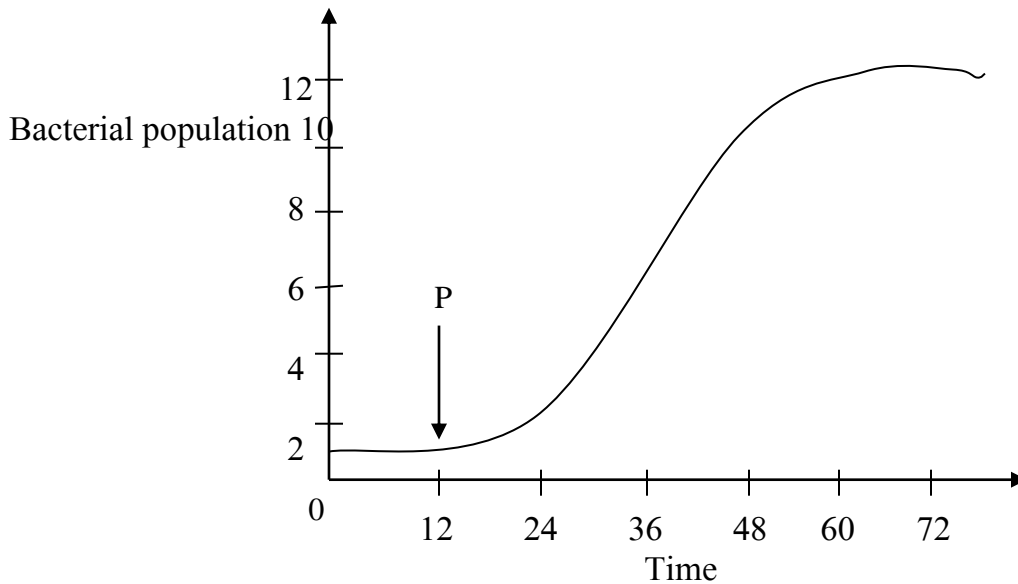
Dental formula for fox incisors 3/3, canine 1/1, premolars 4/4, molars 2/3.

6. Antibodies defend the body against infections caused by bacteria in the following ways except by

- A. Production of opsonins to adhere on the surface of bacteria for easy destruction.
B. neutralizing bacteria poisons through production of anti toxins.
C. Inhibiting production of agglutinins thus scattering bacteria
D. Production of lysins to dissolve bacterial coats.
7. Which one of the following parts of the eye gives the most accurate interpretation of an image
A. Blind spot
B. Retina
C. Fovea
D. Lens
8. The hormone that controls the amount of water re – absorbed into the blood stream by the kidney is known as
A. Adrenaline
B. Vasopressin
C. Insulin
D. Thyroxin
9. Which of the following lacks locomotory structures
A. Amoeba
B. Euglena
C. Paramecium
D. Plasmodium
10. Plant roots in association with symbiotic bacteria is an indication that;
A. The plant is un healthy
B. The soil around lacks Nitrogen
C. The soil around the roots lacks water
D. The roots have a viral infection
11. The significance of vascularization of endometrium before implantation in mammals is to;
A. ensure firm attachment of the fetus on to the uterine wall.
B. Prevent menstruation
C. Assist in producing hormones which maintain pregnancy
D. Facilitates food and oxygen supply to the fetus and removal of excretory products
12. The main function of the epididymis of the mammalian testis is to
A. Store spermatozoa
B. Produce spermatozoa

- C. Secrete seminal fluids
D. Secrete hormones
13. Two organisms A and B live together in the same locality A provide shelter to B where as B feeds on some secretions produced by A. What type of relationship are two exhibiting
- A. Parasitism
B. Saprophytism
C. Commensalism
D. Mutualism
- D
14. The correct route taken by a molecule of carbon dioxide exhaled from the body is
- A. Alveolus → Bronchus → Bronchiole → Trachea → Nostril
B. Nostril → Trachea → Bronchus → Bronchiole → Alveolus
C. Alveolus → Bronchiole → Bronchus → Trachea → Nostril
D. Trachea → Bronchus → Bronchiole → Nostril → Alveolus
- C
15. Asexual reproduction in spirogyra takes place by
- A. Fragmentation
B. Sporulation
C. Conjugation
D. Binary fission
- A
16. Sickle cell is a disease that affects the red blood cells of human beings. What would be the percentage number of off springs with sickle cells if two other carrier parents get married?
- A. 100%
B. 75%
C. 50%
D. 25%
- D
17. Which one of the following vitamins and mineral elements are essential for clot formation
- A. Vitamin A and iron
B. Vitamin C and potassium
C. Vitamin K and calcium
D. Vitamin E and nitrogen
- C

18. Curve 1 below shows the population growth of bacterial cells over a given time: What is taking place in region P?



- A. Exponential grow due lack of food
- B. Slow growth due to plenty of food
- C. Slow growth due to lack of reproductive individuals
- D. Slow movement

C

19. Which one of the following measures can be applied to reduce on the rate of air pollution by carbon dioxide in Uganda?

- A. By reducing on the quantity of fuel consumption and by industries and automobiles
- B. By constructing long chimney to direct industrial gases far into the atmosphere.
- C. By planting many trees to consume high levels of carbon dioxide from the atmosphere.
- D. By directing the gas into water bodies

C

20. Which one of the following Arthropods possesses poisonous claws on their limbs?

- A. centipedes
- B. Millipedes
- C. Cockroaches
- D. Mosquitoes

A

21. In which one of the following regions of the leaf is the highest concentration of chloroplast cells

- A. Palisade mesophyll region
B. Spongy mesophyll region
C. Lower epidermal region
D. Intercellular air space regions
22. In which part of the nephron does reabsorption of glucose take place?
A. Bowman's capsule
B. Loop of Henle
C. Glomerulus
D. Proximal convoluted tubule
23. Which one of the following adjustments occurs in the body in the response to over heating?
A. Skeletal muscle contraction
B. Reduction in metabolic rate
C. Closure of sweat pores
D. Vasoconstriction of arteries
24. Which one of the following is the correct order of arrangement of ossicles in the middle ear?
A. Malleus, incus, stapes
B. Incus, stapes, Malleus
C. Malleus, stapes, incus
D. Incus, Malleus, stapes
25. During what phase of mitosis do the chromosomes align themselves at the equator of the spindle.
A. Inter phase
B. Prophase
C. Metaphase
D. Anaphase
26. Large trees are capable of losing liquid water via their leaves by the process of
A. translocation
B. Transpiration
C. Photosynthesis
D. Guttation
27. Which one of the fins is responsible for controlling pitching during locomotion in fish?
A. Caudal and anal fins
B. Pectoral and anal fins
C. Dorsal and pelvic fins

D

D. Pelvic and pectoral fins

28. The following are characteristics of the coordination processes in a mammal.

- (i) Messages travel very fast
- (ii) Effects of messages usually last longer
- (iii) Messages are transmitted through the blood stream
- (iv) Made of secretory cells
- (v) Messages are transmitted in form of electrical impulse.

Which one represents hormonal coordination ?

- A. (i), (ii), (iii), and (iv)
- B. (i), (ii), (iii), (iv) and (v)
- C. (ii), (iii) and (iv)
- D. (ii), (iv) and (v)

C

29. A student took a blood sample from the cut tail of a rat and placed it in a dilute salt solution. He later observed that majority of the red blood cells had lost their bi concave disk shape and had burst. He described the bursting as

- A. Flaccidity
- B. Plasmolysis
- C. Haemolysis
- D. Turgidity

C

30. The three areas of gaseous exchange in frogs are.

- A. Lungs, bucal cavity and stomach
- B. Skin, lungs and nostril
- C. Skin, lungs and bucal cavity
- D. Lungs, nostrils and wind pipe

C

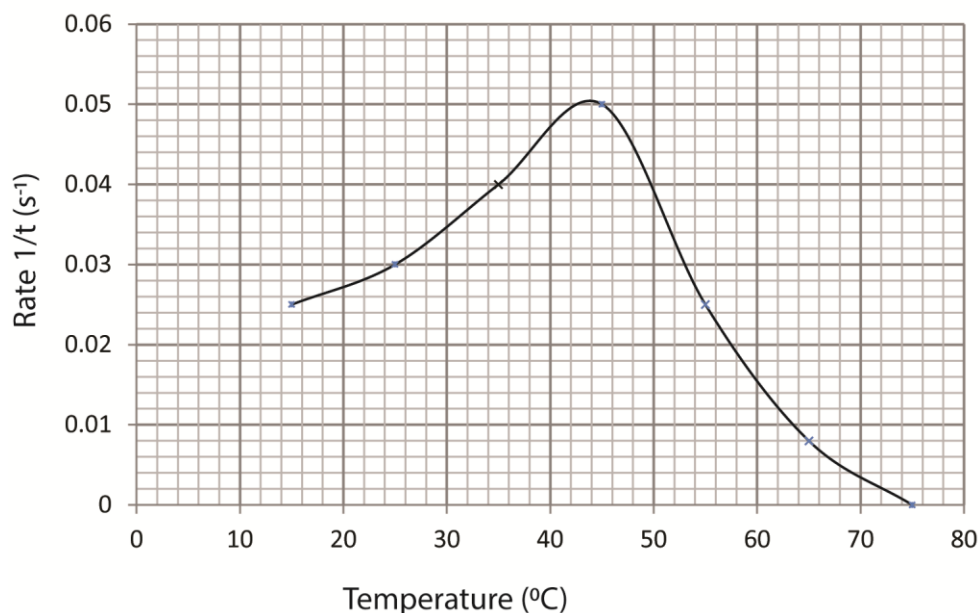
SECTION B (40MARKS)

- 31 In an experiment, the time taken for enzyme catalase to produce 10cm^3 of oxygen in seconds was recorded at various temperatures in $^{\circ}\text{C}$. The results were as follows.

Temperature ($^{\circ}\text{C}$)	Time(t) taken to evolve 10cm^3 of oxygen (seconds)	Rate $1/t$
15	40	0.025
25	33	0.030
35	25	0.040
45	20	0.050
55	40	0.025
65	125	0.008
75	No gas evolved.	0

- a) Complete the table by calculating the rate of oxygen released at each temperature. *(3 1/2 marks)*
- b) Plot an appropriate graph for the data in the table above *(7 1/2 marks)*

A graph of rate against temperature



- c) i) Describe the shape of the graph *(2 1/2 marks)*

The rate increased from 0.025s^{-1} at 15°C to 0.050s^{-1} at 42°C and then decreases to 0 at 75°C

ii) Explain the shape of the graph (3½marks)

The rate increased up to 42°C because enzymes were activated and then decreased to zero at 75°C because enzymes were denatured by heat. 42°C is the optimum temperature for the enzyme

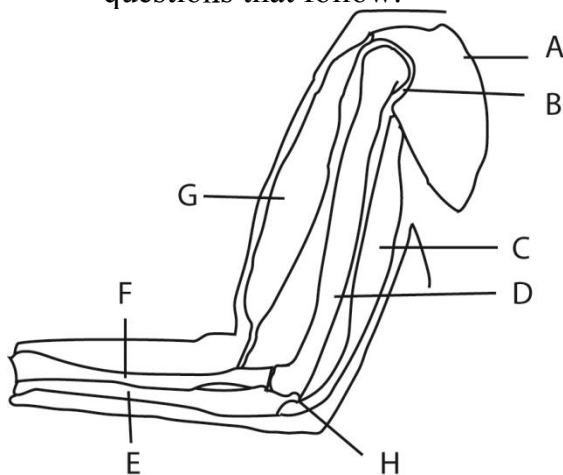
d) Explain why enzymes pepsin cannot function outside the stomach in the alimentary canal. (2marks)

Pepsin works in acid medium provided by HCl, only found in the stomach

e) Apart from the factors seen above, name three other factors which affect enzyme activity. (1½marks)

- pH
- concentration of the enzyme
- concentration of the substrate

32 Study the diagram of the part of the fore arm below and answer the questions that follow.



a) Label the parts labeled A-H on the diagram above (4marks)

A- Scapular

B- Ball and socket joint

C- Triceps muscle

D- Humerus

E- ulna

F- radius

G- Biceps

H- Elbow joint

b) i) How does the structures B and H differ in the way they bring about movement? (2 marks)

Joint at B moves in many direction while the joint at H moves in one direction

c) Explain how bending and straightening of the arm occurs at point H (3marks)

Muscles G (biceps) and C (triceps) are antagonistic; when muscle G contract and muscle C relax, the arm bends. When muscle G relaxes and muscle C contract the arm straightens.

(d) Give two functions of part labeled D (02marks)

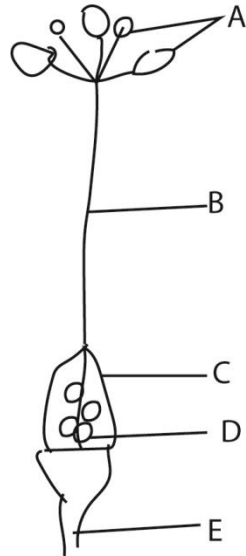
- provides support

- makes red blood cell

- stores calcium

33 The drawing is part of a common plants flower

(a) Name parts



(b) i) Identify the structure drawn above (1mark)
Pistil

ii) Name one **essential** part of the flower not shown in the diagram. (1mark)

A- Stigma

B- Style

C- Ovary

D- ovule

(c) What is the importance of part C and D? (2marks)

- ovary (C) protects the ovules
- Ovule (D) develop into seed after fertilization

(d) In what ways do the following adaptations promote flight in birds? (5marks)

(i) Rigid skeleton.

To make the skeleton tough for attachment of flight muscles so that the thrust (forward force) generated by the wings can lead to maximal lift, and the bird can be propelled through the air with minimal compression to the body cavity.

(ii) Hollow bones

Make the bird light

(iii) Large keel

To provide large surface area for attachment of flight muscles

(iv) High metabolic rate

To provide energy for flight

(v) Stream lined body.

Reduce resistance to motion

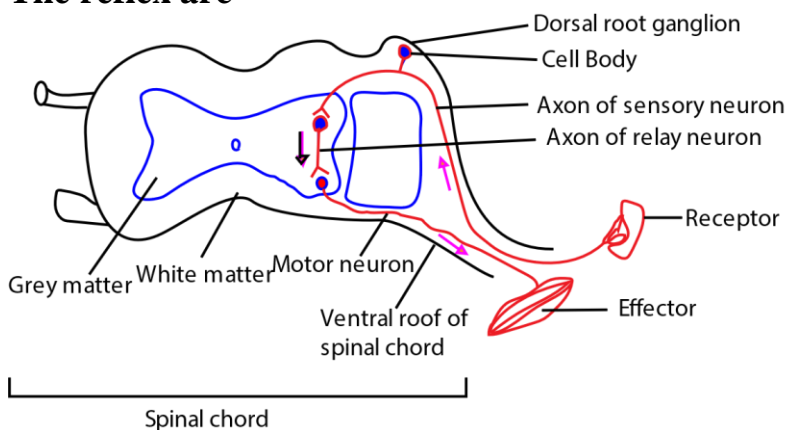
SECTION C (30marks)

34. (a) A bare footed man suddenly steps on a drawing pin and quickly jumps up.

With the aid of a diagram describe the response. (10marks)

The impulse is generated by receptors in the foot are conducted to spinal cord by sensory nerves and then to the effector muscle through the motor neuron as shown in the reflex arc below

The reflex arc



b) Distinguish between the nervous and hormonal control. (5marks)

Difference between nervous and endocrine system

	Nervous system	Endocrine system
1.	Fast acting	slow acting
2.	It's effects are localized	It's effects are diffuse
3.	Transmission are electrical and Chemical theory cell fibre	Relies on chemical transmission through circulatory system
4.	Transmission occur in nerve	It occurs in blood

35 Explain how;

a) Deforestation may harm the environment (7marks)

- May cause climate change, desertification, soil erosion, fewer crops, flooding, increased greenhouse gases in the atmosphere, and a host of problems for indigenous people
- It **causes habitat destruction, increased risk of predation, reduced food availability, and much more.** As a result, some animals lose their homes, others lose food sources – and finally, many lose their lives. In fact, deforestation is one of the main causes of extinction
- Lowers water level

b) Trees may conserve soil. (08marks)

- *reduce soil erosion*
- *fallen leaves mulch the soil and keep it moist*
- *decomposing leaves add humus to the soil*
- *Some trees contain symbiotic organism that add nitrogen to the soil*

36. a) Distinguish clearly between complete dominance and co dominance.

(03marks)

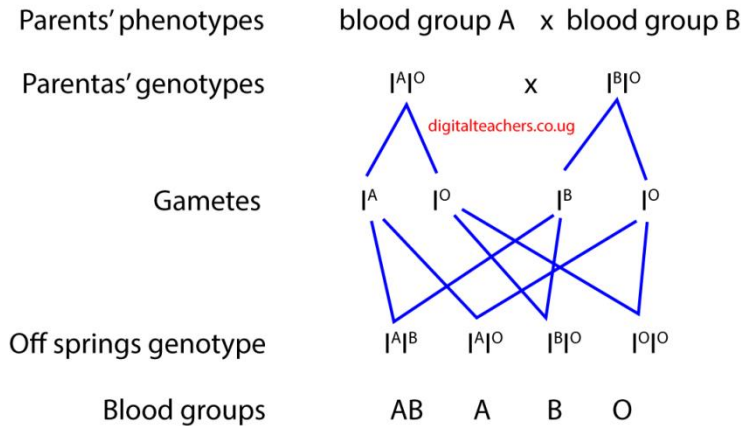
In complete dominance, the dominant gene/allele completely masks the effect of the recessive gene/allele whereas, in co-dominance neither gene/allele in the pair is dominant

Or

In complete dominance, only one allele in the heterozygous state is expressed in the phenotype. In codominance, both alleles in the genotype are expressed in the phenotype.

b) Explain how a man with blood group A and a woman with blood group B, can have a child with blood group O. Show your working.

(6½marks)



c) The presence of hair on the stems of a certain species of plant is controlled by a single pair of alleles. When a pure breeding plant with a smooth stem, all the off springs have hairy stems. Using a genetic cross, show how parental plants can produce off springs with hairy and smooth stems in the ratio of 1:1

(4½marks)

37 a) Define the following terms.

i) Ultra filtration

(1½marks)

Ultrafiltration is the process of filtration of blood in the glomerulus **under great pressure** during which the liquid part of the blood i.e. plasma along with small molecules (urea, glucose, amino acids and others) enter the renal tubule

ii) Selective reabsorption

(1½marks)

Selective reabsorption is the process whereby useful molecules (e.g. ions, glucose and amino acids), after being filtered out of the capillaries along with nitrogenous waste products (i.e. urea) and water in the glomerulus, are reabsorbed from the filtrate as they pass through the nephron.

b) Describe what happens along the following areas of nephron during the urine formation in man.

i) Proximal convoluted tubule. (4marks)

there reabsorption of glucose, amino acid, ions and water

ii) Distal convoluted tubule (3marks)

There reabsorption of water depending on body's needs when the body fluid are concentrated, much water is reabsorbed in the presence of ADH

iii) Collecting duct. (3marks)

reabsorption of water

c) State two ways by which plants excrete their metabolic wastes products. (2marks)

- Gaseous waste (oxygen and carbon dioxide) by diffusion through the stomata and lenticel
- Stored solid and liquid waste by shedding leaves, peeling of bark and falling of fruits.
- By secreting waste in the form of gum and resins

END