



Dr. Blosa Science

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NAME:..... STREAM.....

SENIOR four

553/1

Biology

PAPER 1

Exam 2

**2 HOURS 30 MINUTES**

**INSTRUCTIONS**

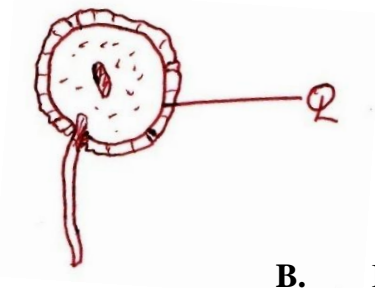
- Answer all questions in sections **A** and **B** in the spaces provided on the question paper and any two questions from section **C**.
- Answer section **A** by writing the correct alternative **A,B,C** or **D** in the box on the right hand side of each question.

FOR EXAMINER'S USE ONLY		
Section	Marks	Examiner's Initials
<b>A</b>		
<b>B</b>	31	
	32	
	33	
<b>C</b>	No:	
	No:	
<b>Total</b>		

## SECTION A

Write the correct answer in the box at the end of the question.

1. The diagram below shows the structure of a germinating pollen grain. Part Q represents the



- A. Exine  
B. Intine  
C. Tube nucleus  
D. Male nucleus

**B**

2. Leaves from a certain plant were found to have a thick waxy cuticle. The same plant is most likely to have had

- A. Very few stomata  
B. Very many leaves  
C. Broad leaves  
D. Stomata on the upper and lower surface of leaves

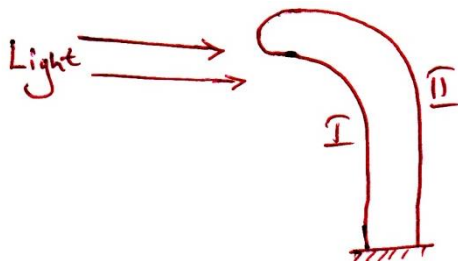
**A**

3. A deep keel in birds is intended to

- A. Reduce weight  
B. Increase surface area  
C. Insulate the body  
D. Streamline the body

**B**

4. The diagram below shows a shoot of plant growing near the window inside a laboratory. The reason for the direction of growth is



**A**

- A. A higher auxin concentration on side II  
B. A faster cell division on side II  
C. A faster cell elongation on side I  
D. A faster cell division on side I

5. The type of cells shown in figure II are found in the ;



A. Oviduct  
C. Artery

B. Ileum  
D. Retina

D

6. A diastema is commonly associated with animals that are

A. Herbivorous  
C. Omnivorous

B. Carnivorous  
D. Insectivorous

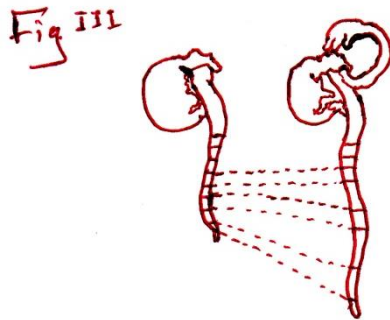
A

7. A student carried out an experiment using a variegated leaf. The aim of the experiment was to find out whether

A. The leaf contains starch  
B. Chlorophyll is necessary for photosynthesis to occur  
C. Light is necessary for photosynthesis to occur  
D. Oxygen is produced during photosynthesis

B

8.



The set up in fig III aimed at showing

A. That roots emerge before shoots  
B. That shoots grow faster than roots  
C. The region of cell elongation  
D. That oxygen is necessary in germination

C

9. The column of water held in the xylem vessels without breaking during transpiration is due to;

A. Transpiration pull  
B. Root pressure  
C. Osmosis  
D. Cohesion and adhesion

D

10. It is true all the arteries carry

- A. Oxygenated blood
- B. Deoxygenated blood
- C. Blood towards the heart
- D. Blood away from the heart

D

*Some arteries like pulmonary artery carry deoxygenated blood*

11. Ethanol and lactic acid are similar in that both are

- A. Bi-products of aerobic respiration
- B. Products of plant metabolism
- C. Products of animal metabolism
- D. Produced in the absence of oxygen

D

*Ethanol is produced by anaerobic respiration in plants while lactic acid is produced by anaerobic respiration in animals*

12. The aim of panting in dogs is to

- A. Pay the oxygen debt
- B. Cool the body
- C. Remove the excess carbon dioxide
- D. Increase metabolism

B

13. Increased solute concentration in the human blood would lead to increased production of

- A. Anti-diuretic hormone
- B. Insulin hormone
- C. Adrenaline hormone
- D. Thyroxine hormone

A

Anti-diuretic hormone reduce water loss in urine in order to dilute the blood

14. When organisms detect and adjust to the changing environment conditions, the process is known as

- A. Reproduction
- B. Locomotion
- C. Irritability
- D. Ecology

C

15. Which one of the following processes is not metabolism?

- A. Egestion
- B. De-amination
- C. Respiration
- D. Osmoregulation

A

16. The structure in the mammalian heart which prevents mixing of oxygenated and deoxygenated blood is the

- A. Pericardium
- B. Bicuspid valve
- C. Tricuspid valve
- D. Septum

D

17. Beetles which feed on the water hyacinth were bred and used to clear this aquatic weed. This is known as

- A. A food chain
- B. Mimicry
- C. Biological control
- D. Competition

C

18. Which one of the following contraceptive methods is the most effective?  
 A. Tubal ligation  
 B. Rhythm method  
 C. Withdraw method  
 D. Spermicides A
19. Which one of the following protects the foetus from mechanical injury?  
 A. Amnion sac  
 B. Placenta  
 C. Umbilical cord  
 D. Ovary C
- Amnion sac contains amnion fluid and both protect the foetus from injury
20. The type of joints found between the bones of cranium are known as  
 A. Hinge  
 B. Ball and socket joint  
 C. Gliding  
 D. Fixed D
21. A succulent fruit with many seeds is called  
 A. Pome  
 B. Legume  
 C. Berry  
 D. Drupe C
22. Which one of the following statements is correct?  
 A. During day only photosynthesis takes place  
 B. Both photosynthesis and respiration proceed at the same time in plants during day  
 C. During day only oxygen is released from green plants  
 D. Twice as much oxygen is released than carbon dioxide during photosynthesis. B
23. Ovulation in the human female is triggered off by the  
 A. Estrogen hormone  
 B. Progesterone hormone  
 C. Luteinizing hormone  
 D. Follicle stimulating hormone C
24. Natural selection is commonly associated with  
 A. Charles Darwin  
 B. Gregor Mendel  
 C. Thomas Hunt  
 D. Alfred Wallace A
25. While cellulose is made up of thousands of glucose molecules, proteins are made up of thousands of  
 A. Fatty acids  
 B. Amino acids

C. Fructose

D. Glycerol

B

26. The image formed by the human eye on the retina is

- A. Virtual, diminished and erect
- B. Virtual, diminished and inverted
- C. Real, diminished and inverted
- D. Real, magnified and erect

C

27. Which one of the following sets of events lead to exhalation in man?

- A. contraction of diaphragm, decrease in volume, increase in pressure
- B. relaxation of diaphragm, decrease in volume, increase in pressure
- C. relaxation of diaphragm, decrease in volume, decrease in pressure
- D. contraction of diaphragm, increase in volume, decrease in pressure

C

28. During down stroke in wings of a bird, the following occur

- A. pectoralis minor muscles contract and wings are lowered
- B. pectoralis minor muscles contract and wings are raised
- C. pectoralis major muscles contract and wings are lowered
- D. pectoralis major muscles relax and wings are lowered

C

29. A soil sample with high capillarity most likely has

- A. High aeration
- B. High water retention
- C. Low mineral content
- D. Coarse particles

B

30. Which one of the following features in man exhibits continuous variation?

- A. Albinism
- B. Height
- C. Blood groups
- D. Hemophilia

B

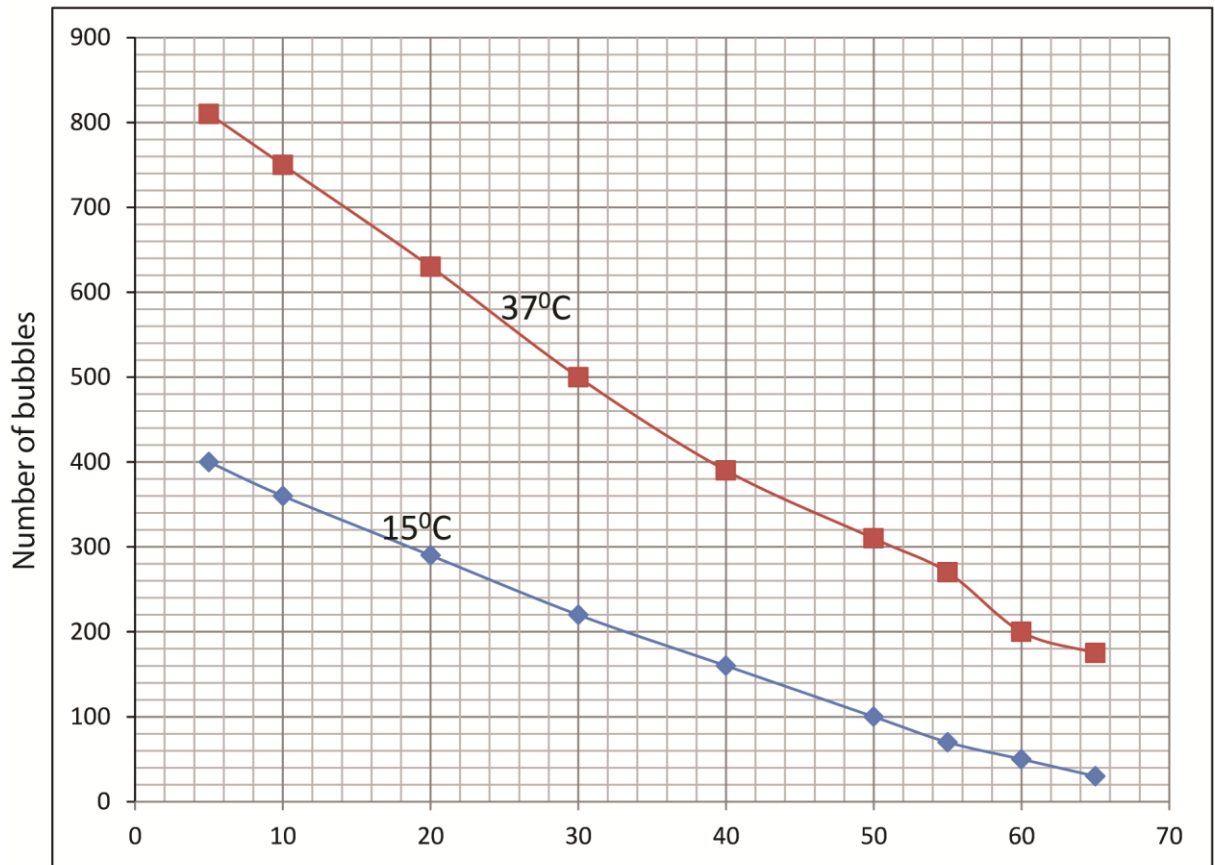
### SECTION B.

31. The data below shows the number of bubbles produced per minute at 15°C and 37°C from an aquatic plant when it was exposed to light from a 100 W electric bulb at several distances from the setup of the plant in water. The bubbles produced are taken as the rate of photosynthesis. Study it carefully and use it to answer questions that follow.

Distance of the bulb from the plant / cm	5	10	20	30	40	50	55	60	65
No. of bubbles produced at 15°C	400	360	290	220	160	100	70	50	30
No. of bubbles produced at 37°C	810	750	630	500	390	310	270	200	175

- (a) (i) Plot a graph of number of bubbles produced and the distance of bulb from the plant using the same axes. (10 marks)

A graph of number of bubbles produced against the distance of bulb from the plant



The distance of bulb from the plant

- (ii) What was the experiment intended to demonstrate? (01 mark)

*Rate of photosynthesis with light intensity*

- (iii) Describe the shape of the graph at 37°C from your results (2 marks)

Rate of photosynthesis (number of bubbles) decreases as light intensity decreases  
(increase with distance of the bulb from the plant)

- (b) Explain the difference in number of bubbles by the same plant at 15°C and 37°C (03marks)

*The rate of photosynthesis is higher at high temperature than at lower temperature*

- (c) Apart from the factors given state other factors that would affect the rate of photosynthesis in the aquatic plant. (02 marks)

- Amount of chlorophyll
- Amount of carbon dioxide

State two importance of photosynthesis.

(02marks)

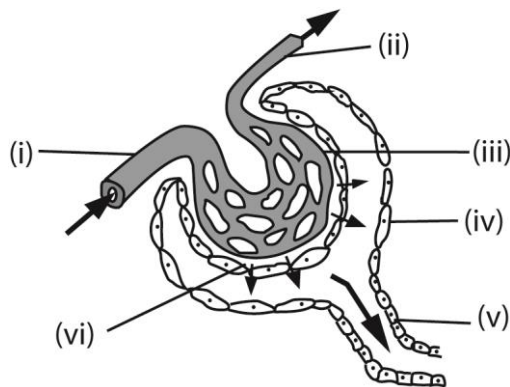
*Produced sugars for plant respiration*

*Recycle oxygen*

(d) Give two reasons why a leaf is put in boiling water while testing for starch. (01 marks)

*To kill protoplasm*

32. The diagram below shows part of the human nephron



a) Name the labeled parts;

(03 marks)

- |                          |                              |
|--------------------------|------------------------------|
| i. Afferent arteriole    | iv Bowman's capsule          |
| ii. Glomerulus           | v Proximal convoluted tubule |
| iii. efferent arteriole. | vi Basement membrane         |

b) Explain how part (vi) is adapted for its function.

(02 marks)

Has pores that allow passage of small molecules but retains big molecules like proteins

c) What is the importance of the diameter of vessels (i) and (ii)?

(01 mark)

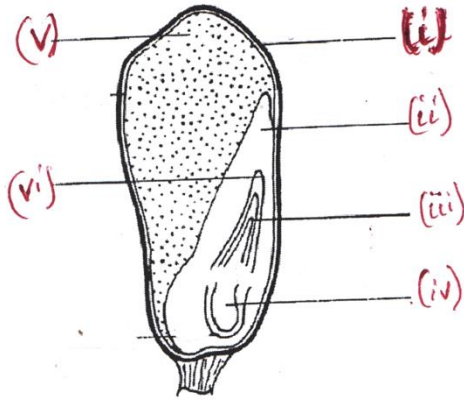
The diameter of vessel (i) is bigger than that of vessel (ii) to enable high pressure develop in the glomerulus to enable filtration

d) State the importance of the process which occurs in part (v).

(04 marks)

Reabsorption of essential molecules like glucose, amino acids and water and secretion into the tubule waste materials such as ammonia and urea

33. The figure below shows the structure of a maize grain:



(a) Name the labeled parts (03mark)

- |                 |                 |
|-----------------|-----------------|
| (i): Pericarp   | (iv) radicle    |
| (ii): cotyledon | (v) endosperm   |
| (iii) Plumule   | (vi) coleoptile |

(b) State the functions of parts (iii) and (v). (01 mark)

Part(iii)

Protects and nourishes the embryo

Part(v) stores food reserves

State the changes that occur in parts (i),(iv) and (v) during germination(03 marks)

Part(i) perishes

Part(iv) grows into root system

Part(v) shrinks and perishes

(c) State the conditions needed for the changes in c above to occur. (03 marks)

Water, oxygen, warmth for germination

## SECTION C

**Answer two questions only**

34. (a) What are gonads? (01 mk)

*Organs that produce and release gametes or reproductive cells that is; ovaries (produce eggs) in female and testis (produce sperms) in male*

(b) State the functions of human gonads. (07 mks)

The two major functions of the gonads in the adult are **steroid hormone production and gametogenesis**

The ovaries produce (eggs/ova) and secrete **estrogen and progesterone**. These hormones play an important role in reproductive development and menstruation

The testes produce sperms and also secrete **testosterone, an androgenic hormone**. These hormones play an important role in reproductive development and menstruation

(c) Describe the differences between reproduction in humans and amphibian. (07 mks)

*Differences between reproduction in human and amphibians*

<i>Reproduction in human</i>	<i>Reproduction in amphibians</i>
<i>Internal fertilization</i>	<i>External fertilization in toads and frogs but internal in the case of salamanders and caecilians.</i>
<i>Fetus grows in the womb</i>	<i>Eggs hatch externally</i>
<i>Have parental care</i>	<i>Have no parental care</i>
<i>Have no breeding seasons</i>	<i>Have breeding seasons</i>
<i>Few offspring</i>	<i>Many offspring</i>
<i>Show no metamorphosis</i>	<i>Develop through metamorphosis to change into adult form</i>
<i>Gaseous exchange occur in similar manner in the younger and adults</i>	<i>Gaseous exchange is by external gills in the young and by lungs and skin in adults</i>

35. During a Mendellian genetic experiment, 898 plants were obtained in the F<sub>2</sub> of which 225 had wrinkled seeds and the rest had round seeds.

(a) Work out the phenotypic ratio (02 mks)

Number of round seed = 898 – 225 = 673

Ratio of round to wrinkled seed = 673: 225 = 3:1

(b) Which plants above have the dominant character? Give reasons for your answer.

(02 mks)

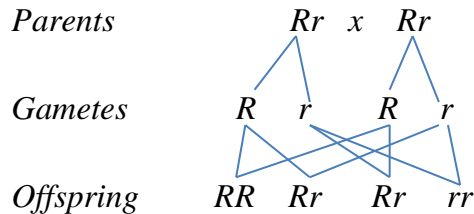
Round seed have a big ratio in  $F_2$  generation

(c) Use suitable symbols to show how the above results were obtained. (11 mks)

$R$  = round seed

$r$  = wrinkled seed

Parents



Offspring

Phenotypic ration 3 round seed: 1wrinkled seed

36. (a) Explain why digestion of food is very important (02 mks)

*Digestion is important for breaking down food into soluble absorbable nutrients, which the body uses for energy, growth, and cell repair.*

(b) What is the importance of human a stomach. (05 mks)

- breaks large particle of food into small particles
- produce hydrochloric acid that kills germs in the food
- Produces renin that curdles milk allowing a longer residence in the bowels and better absorption
- Produces pepsin that digests proteins
- absorbs vitamins such as ascorbic acid and water
- stores food temporarily

(c) What is the fate of the products of digestion of; (08 mks)

(i) Starch

*Digestion of starch produces glucose which is absorbed and used for respiration and production of energy. Some glucose is used to form amino acid, fats and structural molecules such collagen*

(ii) Protein.

*Digestion of proteins produce amino acid for synthesis of enzymes, hormones, structural proteins such as muscles and joints.*

37. (a) State the importance of plant shoot response to gravity. (03 mks)

- Negative geotropism in primary shoot allows shoot grow towards light

(b) In which ways does removal of a hand from a hot object differ from plant shoot

growth towards light?

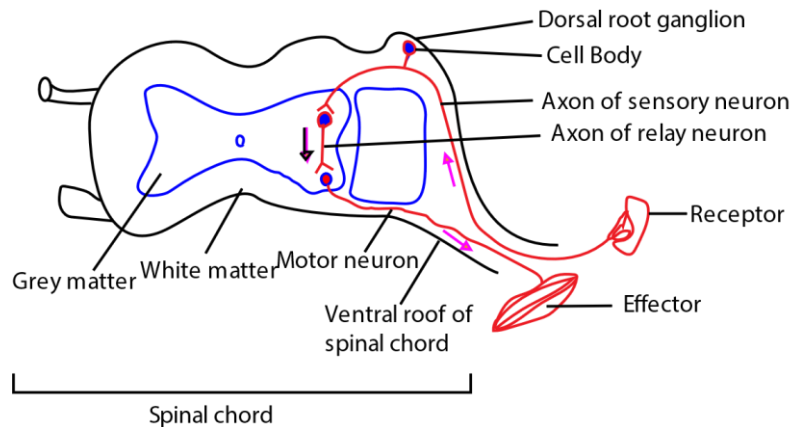
(05 mks)

<i>Removal of hand from hot object</i>	<i>Plant growth towards light</i>
<i>Fast</i>	<i>Slow</i>
<i>Electrical and chemical</i>	<i>Chemical</i>
<i>Response to heat</i>	<i>Response to light</i>
<i>It's effects are localized</i>	<i>It's effects are diffuse</i>

(c) Describe the path taken by an impulse to cause removal of hand from a hot object.

(07 mks)

### The reflex arc



*Hot object is detected by the receptor that sends the impulses to the spinal chord through the sensory neuron from the spinal chord impulses are sent to the effector via the motor neuron. Effector respond by contraction of muscles to remove the hand from hot object*

**END.**