



*Dr. Blosa Science*

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NAME:.....

STREAM:.....

**SENIOR FOUR**

553/1

**BIOLOGY**

**PAPER 1**

**EXAM 8**

**2 hour 30 Minutes**

### Instructions to candidates

Answer all questions in section A and B, plus two questions in section C.

Write the answers to section A on the answer sheet provided at the end of that section, answers to section B in the spaces provided, and answers to section C in the answer booklets provided.

### FOR EXAMINERS USE ONLY

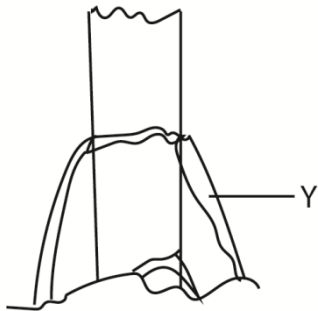
Section	Marks
<b>A</b>	
<b>B:</b> No 31	
No 32	
No 33	
<b>C:</b> No	
No	
<b>Total</b>	

**TURN OVER**

### **SECTION.A (30 MARKS)**

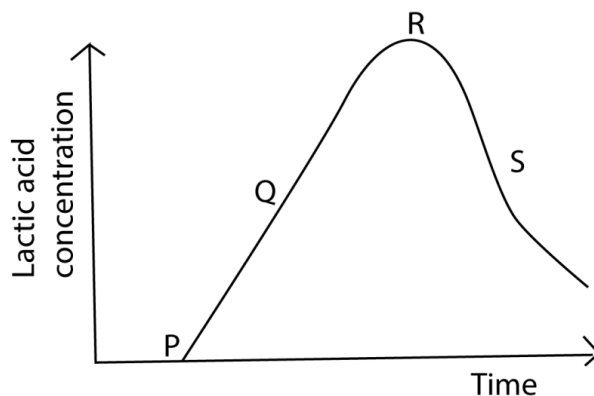
**Answer all questions in the section. Write the answer (Letter) representing the most correct answer to each question on the answer sheet provided at the end of the section.**

1. Which one of the following sets of events occurs in a person when feeling cold?  
**A.** Blood capillaries constrict, hair rises and metabolic rate increases  
B. Hair lowers, blood capillaries dilate and metabolic rate decreases.  
C. Metabolic rate increases, blood capillaries dilate and hair lowers.  
D. Metabolic rate decreases, blood capillaries construct and hair rises
  
2. Which one of the following word equations summarizes the process of formation?  
A. Glucose  $\longrightarrow$  ethanol + carbondioxide + water  
B. Glucose  $\longrightarrow$  lactic acid + energy + water  
**C.** Glucose  $\longrightarrow$  ethanol + carbondioxide + energy  
D. Glucose  $\longrightarrow$  lactic acid + water + carbondioxide
  
3. The type of roots labeled Y in figure below are called



- A.** prop roots      B. lateral roots      C. clasping roots      D. adventitious roots
4. What are the chances of parents who are carriers of a gene for albinism producing an albino child?  
**A.** 25%      B. 50%      C. 75%      D. 100%
  
  5. Which one of the following is the mode of feeding of a mould.  
A. Holozoic      **B.** saprophytic      C. autotrophic      D. Parasitic
  
  6. Which one of the following is a characteristics of Sunday soils?  
A. high retention      B. high capillarity      C. low drainage      **D.** high porosity

7. Which one of the following plant organs has a scattered arrangement of vascular bundles?  
 A. root of a monocotyledonous plant  
 B. stem of a monocotyledonous plant  
 C. stem of a dicotyledonous plant  
 D. root of a dicotyledonous plant
- B**
8. In the colonization of a bare rock, the next most likely group of plants after the lichens are the  
 A. grasses      **B. mosses**      C. Shrubs      D. trees
9. Which one of the following includes all the possible blood groups that can be possessed by the children from a marriage between a mother heterozygous for blood group A and a father heterozygous for blood group B?  
 A. A and B      B. AB and O      C. A, B and O      **D. A, B, AB and O**
10. Which one of the following is a correct route taken by carbondioxide from the body cells of an insect to the atmosphere  
 A. Trachea → Tracheoles → Spiracles  
 B. Spiracles → Trachea → Tracheoles  
**C. Tracheoles → Trachea → Spiracles**  
 D. Spiracles → Tracheoles → Trachea
11. In an experiment to find the proportion of air in soil, the following results were obtained.
- |  |                    |
|--|--------------------|
| Volume of soil                           | $= X\text{cm}^3$   |
| Volume of water added to soil            | $= 200\text{cm}^3$ |
| Volume of soil plus water after stirring | $= Y\text{cm}^3$   |
- Which one of the following expressions gives the volume of air in the soil samples  
 A.  $Y - X\text{ cm}^3$       **B.  $(X + 200) - Y\text{cm}^3$**       C.  $(Y - 200)\text{cm}^3$       D.  $Y - (X + 200)\text{cm}^3$
12. Which one of the following enzymes acts best at low PH?  
**A. Pepsin**      B. Peptides      C. Trypsin      D. Lipase
13. The figure below shows the concentration of lactic acid in blood of an athlete during and after a race. During which period on the graph does the athlete not experience both aerobic and anaerobic respiration?



- A. P – Q
- B. Q – R
- C. R – S
- D. P – R

**C**

14. Which of the following are characteristics of insect pollinated flowers?

- A. feathery stigmas, light pollen grains
- B. sticky stigmas, light pollen grains**
- C. light pollen grains, dull coloured
- D. long filaments, much pollen

15. The part of the microscope used to make the image clear is the

- A. objective lens
- B. eye piece
- C. coarse adjustment
- D. fine adjustment**

16. Which one of the following correctly describes population density?

The number of organism

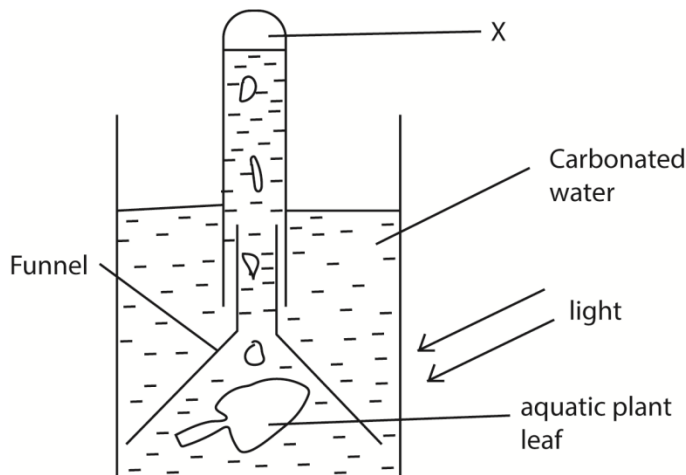
- A. In a specified area
- B. Of a particular species in a specified area
- C. Living either on land or water
- D. Which can interbreed and produce viable offspring

**A**

17. Which one of the following is a form of sexual reproduction?

- A. binary fission
- B. fragmentation
- C. conjugation**
- D. spore formation

18. Figure below is an experimental set up to demonstrate photosynthesis



Gas X produced in the experiment is tested by use of

- A. Glowing splint
- B. lime water
- C. litmus paper
- D. sodium bi bicarbonate

**A**

the gas is oxygen released during photosynthesis

19. The main function of buttress roots is to

- A.** provide additional support
- B. store food for the plant
- C. enable the plant clasp firmly onto others
- D. store water for the plant

20. The bacteria which convert ammonia into nitrates are called

- A. purifying bacteria
- B.** nitrifying bacteria
- C. denitrifying bacteria
- D. nitrogen fixing bacteria

21. Which one of the following is likely to occur if the osmotic pressure of the cell sap of the root hair is lower than that of the surrounding?

- A.** plant wilts
- B. cells of root hairs become turgid
- C. rate of transpiration increases
- D. more water is absorbed

Because there will be no absorption of water

22. Which one of the following features of arthropods would be least important when constructing an identification key?

- A. presence or absence of antennae
- B. Number of body divisions
- C. Number of jointed appendages
- D.** Body colour

Body color is variable

23. The following is the reason for classifying a house fly as an insect.

- A. has a pair of wings
- B. Jointed body parts
- C.** three pairs of legs
- D. two main body parts

24. Which one of the following conditions would lead to the highest transpiration rate?

- A. high light intensity and low temperatures
- B. low light intensity and high temperatures
- C.** Low humidity and high temperatures
- D. High humidity and low temperatures

25. Which one of the following parts of the kidney carries out the excretory function.

- A. cortex
- B. pelvis
- C. Medulla
- D.** nephron

26. Which of the following events result into the formation of identical twins?

- A.** One egg released, fertilized and splits into two

- B. Two eggs released and each fertilized by a separate sperm
- C. One egg is released and fertilized by two sperms
- D. One egg released, splits and fertilized by separate sperms

27. Which one of the following diseases is not prevented by washing of hands and covering of food?

- A. cholera
- B. typhoid
- C. tape worm infection**
- D. dysentery

Cholera, typhoid, dysentery are transmitted by housefly, Tape worms are transmitted by eating half cooked beef or pork.

28. Which one of the following responses in plants is dependant on the intensity of a stimulus and not the direction?

- A. Nastic response**
- B. geotropism
- C. hydrotropism
- D. phototropism

29. Which of the following soil types has the highest water holding capacity?

- A. sand
- B. loam
- C. clay**
- D. silt

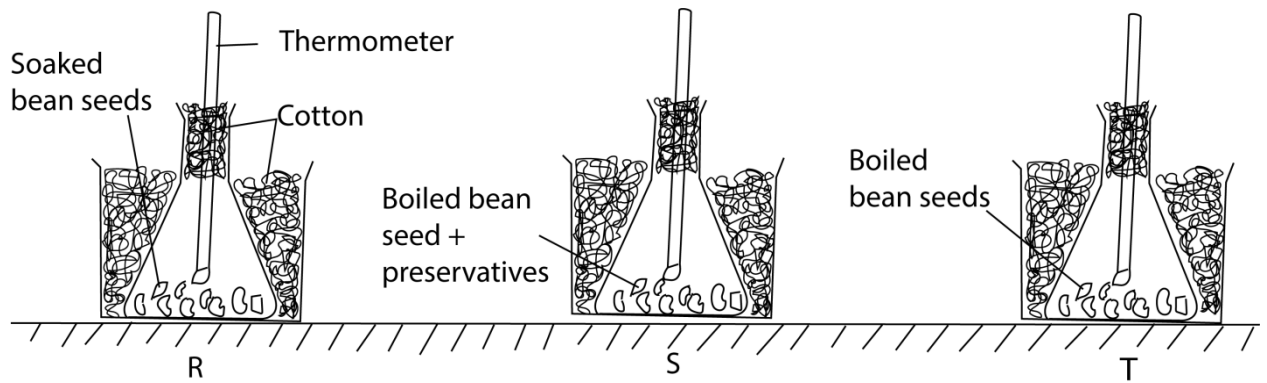
30. The following are types of plant hormones except

- A. Gibberellins
- B. adrenalin**
- C. cytokinins
- D. ethene

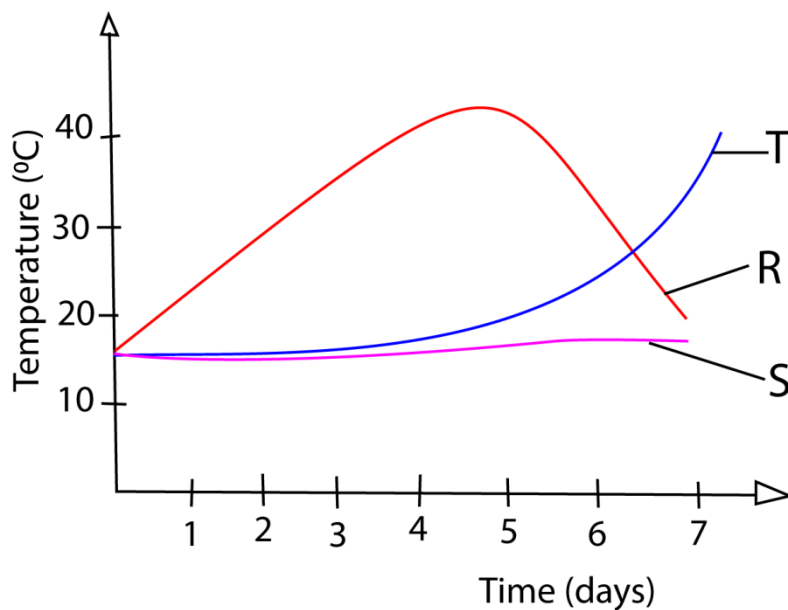
### **SECTION. B (40 MARKS)**

**Answer all questions in this section, answer must be written in the spaces provided.**

31. A student carried out an experiment using the set of apparatus below. In R, beans seed soaked in water were used. In S, boiled bean seeds sprinkled with a preservative were used while in T; boiled seeds without the preservative were used.



The temperature in each was recorded for a week. The results obtained are shown in the graph below



a) State the aim of the experiment.

(02 marks)

To show respiration in germinating seeds produce heat

b) Using the information provided, explain the changes in temperature un set R and T

i) From day 0 to day 5

(06 marks)

In R

Temperature rose rapidly because respiring seeds produced heat

In T

Temperature rose slowly because boiled seed do not respire however, they were invaded by respiring microorganisms that produced heat.

ii) After day 5

(4 marks)

In R

Temperature dropped because food reserves got used up and the rate of respiration dropped

In T

Temperature rose rapidly due to accumulation of respiring microorganisms

c) Explain why there was no significant change in temperature in **S** for the whole week. (02 marks)

Preservative prevented invasion of respiring microorganisms.

d) Suggest one way the above set up could be improved for better results.

Give a reason for the suggested improvement.

(02 marks)

Should be carried out in the dark to prevent photosynthesis after germination

e) What other changes would occur in the composition of air in set up R and T during the experiment?

(04 marks)

In R

Concentration of carbon dioxide increase while that of oxygen decrease

In T

Composition of the air almost remained unchanged in first 5days, the concentration of carbon dioxide rose while that of oxygen decreased

32. In a breeding experiment; when plants with red flowers were crossed, a total of 898 plants were produced out of which 325 had white flowers.

a) What was the recessive character? Give two reasons.

(03 marks)

white flower because the flowers were produced in small proportions

b) What was the genotype of the parents.

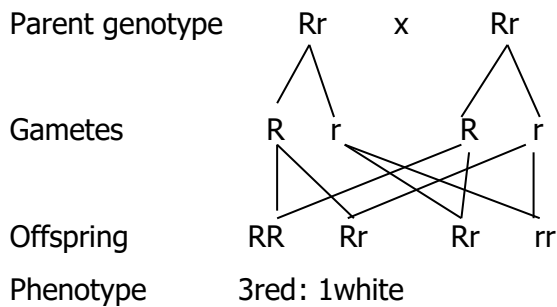
(01 marks)

Rr (R – red allele, r- white allele)

c) Using suitable symbols show the expected phenotypic and genotypic ratios in the experiment.

(04 marks)





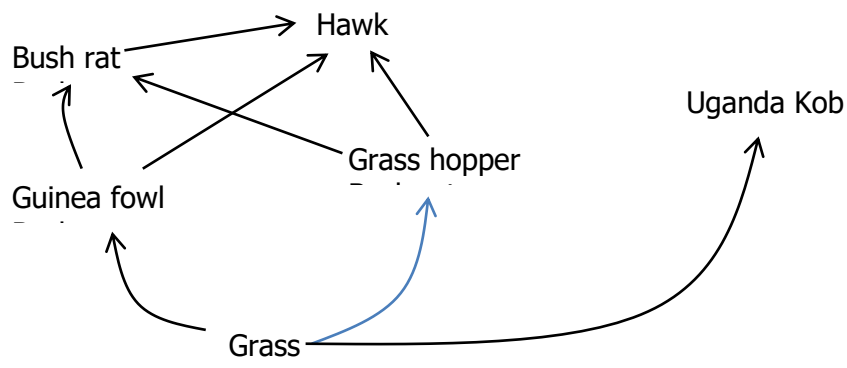
d) Were the observed results in agreement with the laws of monohybrid inheritance? Show your working.

(02 marks)

No because the ratio of red to white (573: 325 or 2:1) not 3:1

33. The following organisms live in a national park in Uganda. Bush rat, guinea fowl, hawk, grass hopper, Uganda Kob and grass.

a) Show the feeding relationship that exists between these organisms. (03 marks)



b) What name is given to the feeding relationship in a). (01 mark)

Food web

c) Which organisms in the relationship are

i) Primary producers?

(01 mark)

Grass

ii) Secondary consumers?

(01 mark)

Hawk

d) Suggest what would happen in the relationship if Uganda kobs were removed from the park.

(03 marks)

Grass would increase

**SECTION.C (30 MARKS)**

***Answer any two questions***

34.a) What is a balanced diet

(01 marks)

It is a diet consisting of a variety of different types of food and providing adequate amounts of the nutrients necessary for good health.

b) In which way is the ileum adapted for its function?

(08 marks)

Adaptation of small intestine for absorption of food

1. Long to allow food enough time for absorption
2. Villi and microvilli increase surface area for absorption
3. Well supplied by blood to carry away absorbed food so as to maintain diffusion gradient
4. The villi have thin membrane to reduce diffusion gradient
5. Villi have high concentration of mitochondria to provide energy for active transport.
6. **circular fold** increase surface area for absorption
7. Villi contain lacteal for absorption of fats

c) Outline the fate of food after absorption.

(06 marks)

Glucose, galactose and fructose are oxidized to release energy in the body and formation of cellular structures

Lipids are oxidized to produce energy, insulate the body against heat loss, make cellular structures like cell membrane

Amino acids are used to produce cellular structures, enzymes, hormones, antibodies

35.a) In what ways is nitrogen added and removed from the soil.

(10 marks)

**Nitrogen fixation process in order of magnitude.**

1. industrial fixation e.g., Haber process
2. mutualistic blue- green bacteria e.g., Rhizobium e.g. legume
3. free- living blue- green bacteria e.g. Azobacter, clostridium
4. Action of lightning etc. on oxygen and nitrogen.
5. Manure addition

Ways nitrogen is removed from soil

1. Denitrification. Bacteria change nitrate in the soil to atmospheric nitrogen, which joins the atmosphere in low-aerated, water-logged soils.

2. Volatilization. Turns urea fertilizers and manures on the soil surface into gases that also join the atmosphere.
3. Leaching
4. Erosion

b) Give the importance of organic matter in the soil.

(05 marks)

A soil with an adequate level of organic matter will be **less erodible, have increased nutrient retention, and also be easier to work and plow**. Other advantages include resistance to soil crusting and compaction, greater fertility, better root growth of crops, and improved crop yields.

36.a) Describe how light, humidity and air movement affect the rate of transpiration in plants.

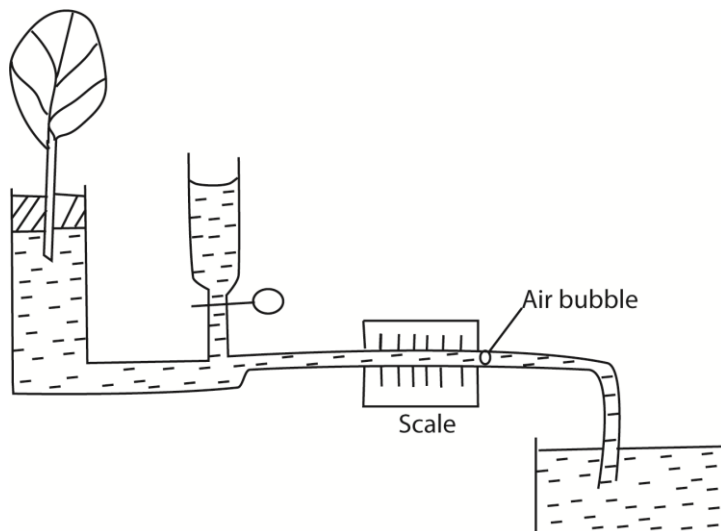
(09 marks)

- Light: light increases the rate of evaporation because it causes the stomata to open.
- Humidity: this is the amount of water vapour in air. High humidity lowers the rate of evaporation and thus transpiration.
- Wind: - gentle wind increases the rate of evaporation because it blows away water vapour around the stomata which promotes water loss  
- Strong wind reduces the rate of transpiration because it causes the stomata to close.

b) Describe an experiment to show that more transpiration occurs in the lower epidermis than the upper epidermis of a plant leaf.

(06 marks)

Two identical photometers setup are each containing a single leaf from the same potted plant but one smeared with grease on the upper epidermis and another with grease on the lower epidermis to prevent transpiration



## Observation

The air bubble in the photometer where the leaf is smeared with grease on upper epidermis moves faster than that in which the lower epidermis is smeared with grease

## Conclusion

When the upper epidermis is smeared with grease, transpiration occurs through the lower epidermis. Thus transpiration is higher through the lower epidermis.

37.a) Describe how the human body controls temperature.

(12 marks)

Response to cold

1. Erector pili muscle contract raising the hair. Air gets trapped in the spaces between the hairs and insulates the body
2. The arterioles leading to the superficial capillaries contract. As a result, the blood flow is diverted from the surface cutting down the heat loss.
3. Metabolic rate increases, heating up the body.

Behavioral response to cold

- Engaging in exercises (making a lot of noise in some organism)
- Taking hot drink or bath
- Wearing heavy clothes
- Burrowing
- Hibernation

Responses to hot conditions

1. The hair is lowered by relaxation of the erector pili muscle and removing air insulation
2. The arterioles leading to superficial capillaries dilate and as a result of blood flow to the surface is increased leading to increased heat loss
3. Sweating (panting in dogs) occurs and evaporation of water cools the body
4. Metabolic rate decreases reducing heat production.

Behavioral response to hot conditions

- Moving to cold places
- bathing

b) What is the importance of having a constant body temperature?

(03 marks)

The body temperature must be kept constant because enzymes work best within narrow temperature range. At very low temperature enzymes are inactive whereas at very high temperature enzymes are denatured both conditions are harmful to life.

**END**