



*Dr. Blossa Science*

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

**SENIOR four**

553/1

**Biology**

**PAPER 1**

**Exam 18**

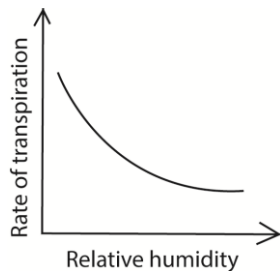
2 hours

Instructions

Answer all questions in section A and B and two questions from section C

Section A (30 marks)

- Which of the following processes is catalyzed by salivary amylase?
  - A. Maltose to glucose
  - B. Sucrose to glucose and fructose **C**
  - C. Starch to maltose
  - D. Lactose to galactose and glucose
- The figure below shows the effect of relative humidity on transpiration rate

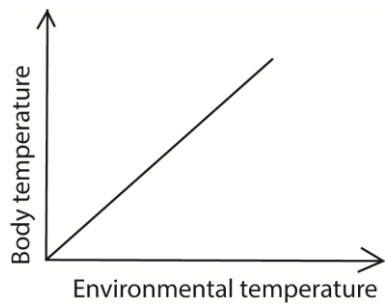


**A**

From the figure, transpiration rate

- A. Increase with decreased relative humidity
- B. Increase with increased relative humidity
- C. Is not affected by changes in relative humidity

- D. All the above
3. Which one of the following classes has the highest number of species
- A. Crustacea
  - B. Insecta
  - C. Arachnida
  - D. Myriapoda
- B**
4. Which of the following substances is not contained in glomerular filtrate in mammalian kidney?
- A. Urea
  - B. Plasma proteins
  - C. Glucose
  - D. Mineral salts
- B**
5. Which one of the following is an adaptation of the leaf for transportation of manufactured food?
- A. Numerous chloroplasts
  - B. Numerous stomata
  - C. Branching network of veins
  - D. Large air space in spongy mesophyll
- C**
6. Clay soil has a high water retention capacity because it
- A. Has small air spaces
  - B. Contains little amounts of humus
  - C. It is sticky when wet
  - D. Has good capillary attraction
- A**
7. Which of the following is the correct order of cell organization
- A. Cell → organ → tissue → system
  - B. Tissue → cell → organ → system
  - C. Organ → cell → tissue → system
  - D. Cell → tissue → organ → system
- D**
8. The figure below shows the changes in body temperature with environmental temperature in an animal



Which one of the following could be the animal represented?

- A. Bird
- B. Human
- C. Dog
- D. frog

**D**

9. Which one of the following relationship is example of mutualism?

- A. Tapeworm living in a human gut
- B. Bacteria living in the gut of a cow
- C. Tick living on skin of a dog
- D. Plasmodium living in human blood

**B**

10. The following are responses to cold conditions in mammal?

- (i) vasoconstriction    (ii) hair standing up    (iii) shivering    (iv) increase in metabolic rate

Which of these both reduce heat loss

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

**A**

11. Which of the following is not a respiratory surface?

- A. Spiracle
- B. Tracheoles
- C. Gill filament
- D. Alveoli

**A**

12. Which one of the following types of fruits is a pineapple?

- A. Drupe
- B. Multiple fruit
- C. Indehiscent fruit
- D. berry

**B**

13. the following are all a result of deficiency of vitamin B group except
- A. Night blindness ( is due to lack of vitamin A)
  - B. Beriberi
  - C. Pellagra A
  - D. Perniciuos anemima
14. In plants , large surface area to volume ratio for gaseous exchange is achieved by
- A. Presence of numerous stomata on th leaves
  - B. Platness of air spaces in the mesophyll A
  - C. Presence of air spaces in the mesophyll
  - D. Presence of lenticels
15. In the mammalian heart, the thick muscular walls of left ventricles are vital for
- A. Resisting pressure of the blood coming into the ventricles
  - B. Maintaining the shape of the heart C
  - C. Producing enough pressure to pump blood to all parts of the body
  - D. Resisting back flow of blood from the aorta
16. Which one of the following sets of events occurs in a person when feeling cold?
- A. Blood capillaries constrict, hair rises and metabolic rate increase
  - B. Hair lowers, blood capillaries dilate and metabolic rate decreases A
  - C. Metabolic rate increases, blood capillaries dilate and hair lowers
  - D. Metabolic rate decreases, blood capillaries constrict and hair rires
17. Which one of the following equations summarises the process of fermentation?
- A. Glucose  $\rightarrow$  ethanol + carbon dioxide + water
  - B. Glucose  $\rightarrow$  lactic acid + energy + water C
  - C. Glucose  $\rightarrow$  ethanol + carbon dioxide + energy
  - D. Glucose  $\rightarrow$  lactic acid + water + carbon dioxide
18. Which of the following is the mode of feeding of a mould?
- A. Holozoic
  - B. Autotrophic
  - C. Saprophytic C
  - D. parasitice
19. Which of the following is a correct rout taken by carbon dioxide from cells of an insect to the atmosphere?
- A. Trachea  $\rightarrow$  Tracheoles  $\rightarrow$  spiracle

- B. Spiracle → trachea → tracheoles
- C. Tracheoles → trachea → spiracles
- D. Spiracles → tracheoles → trachea

**C**

20. In an experiment to find the proportion of air in the soil, the following results were obtained

Volume of soil =  $x \text{ cm}^3$

Volume of water added to the soil  $200 \text{ cm}^3$

Volume of water + soil after stirring =  $y \text{ cm}^3$

Which of the following expressions gives the volume of air in the soil sample

- A.  $(y - x) \text{ cm}^3$
- B.  $(x + 200) - y \text{ cm}^3$
- C.  $y - 200 \text{ cm}^3$
- D.  $y - (x + 200) \text{ cm}^3$

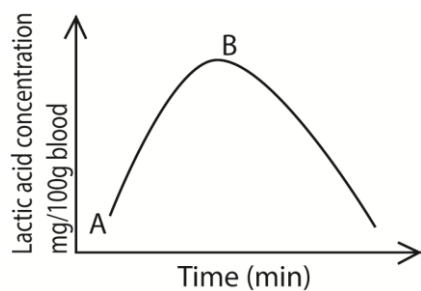
**B**

21. Which one of the following enzymes acts at low pH?

- A. Pepsin
- B. Trypsin
- C. Peptidase
- D. Lipase

**A**

22. The figure below shows the changes in the lactic acid concentration in blood during and after the exercise



The correct explanation for what is occurring between A and B is that

- A. Breathing rate increase
- B. Blood flow to the muscle has increased
- C. Oxygen supply to the muscle is less than the demand
- D. Oxygen supply to the muscle is in excess

**C**

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

- A. Objective lens
- B. Eye piece

- C. Coarse adjustment **D**  
D. Fine adjustment
24. Which one of the following correctly describe population density?  
The number of organisms
- A. In specified area  
B. Of a particular species in a specified area **B**  
C. Which can interbreed and produce viable offspring
25. The bacteria which convert ammonia into nitrates are called
- A. Putrefying bacteria  
B. Nitrifying bacteria **B**  
C. Denitrifying bacteria  
D. Nitrogen fixing bacteria
26. Which one of the following parts of the kidney carries out excretory function?
- A. Cortex  
B. Medulla **D**  
C. Pelvis  
D. Nephron
27. Which one of the following diseases is not prevented by washing of hands
- A. Cholera  
B. Typhoid  
C. Tapeworms infections **C**  
D. Dysentery
28. Which one of the following blood vessels has highest levels of nutrients?
- A. Mesenteric artery  
B. Hepatic portal vein **B**  
C. Renal artery  
D. Hepatic vein
29. Which one of the following organs excretes urea?
- A. Bladder  
B. Skin **C**  
C. Liver  
D. lungs
30. Which one of the following pairs of organs is important in digestion of fats

- A. Stomach and liver
- B. Pancreas and stomach
- C. Liver and pancreas
- D. Stomach and mouth

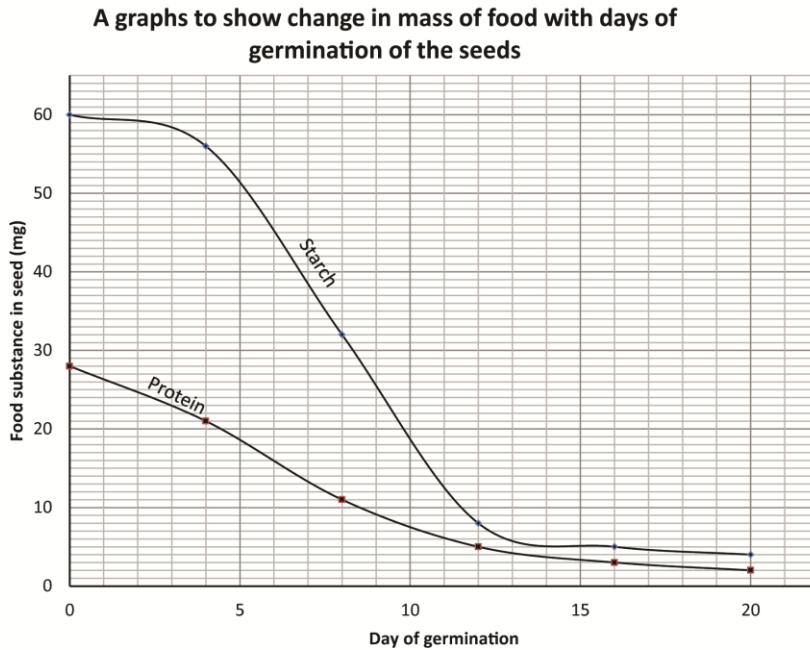
C

**SECTION B (40 MARKS)**

31. The table below shows the changes in mass of starch and proteins in a typical pea seed during germination in the first 20 days of germination

Food substance in seed	Day of germination					
	0	4	8	12	16	20
Starch (mg)	60	56	32	8	5	4
Protein (mg)	28	21	11	5	3	2

(a) Using the same axes, draw two graphs to show change in mass of starch and proteins during the first 20 days of germination of the seeds on the graph paper provided (08 marks)



(b) How are the changes in mass of starch and protein

- (i) Similar (02marks)
- They both decrease with the number of days of germination
  - Both remain almost constant between 16<sup>th</sup> and 20<sup>th</sup> day

- (ii) Different (02marks)

- The mass of starch is always higher than that of proteins
- The decrease in mass of starch decreases slowly initially while that of protein decreases fast initially

(c) Explain why the mass of starch and proteins in the germinating seed as described in (b). In each case state the reactions that results into the changes (04marks)

Starch decreases because it is hydrolysed to glucose to provide energy to growing embryo

Proteins decrease due to hydrolysis to amino acids

(d) Suggest two ways in which the products from each starch and proteins may be used in the germinating seeds

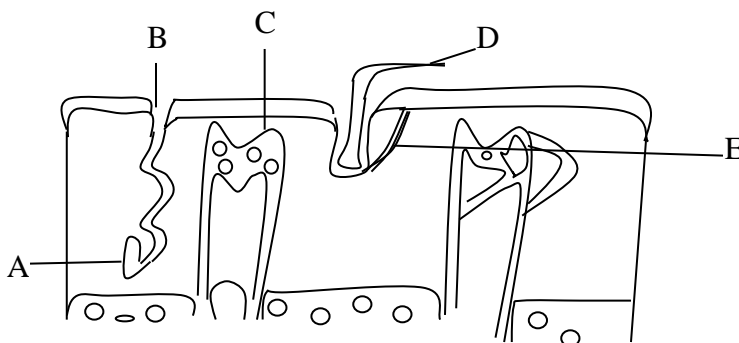
(i) Starch

Glucose provide enrgy during respiration and in synthesis of amino acid and fats

(ii) Proteins

*provide a source of amino acids and reduced N necessary for synthesis of enzymes and for formation of structures in developing embryo*

32. Figure below shows a longitudinal section of human skin



(a) (i) Name the parts A to E

A sweat gland

B sweat pores

C blood capillaries

D hair

E erector pili muscle

(b) State the function of each of the parts labelled A, B, D and E

A produces sweat

B lets sweat out

C their dilation when the body is hot leads the blood to the surface promoting heat loss

D when the hairs stand up they trap air around the skin and insulate it

E Contraction of the muscle cause the hair to stand up

(c) Using any one observable feature on the diagram, suggest the type of temperature condition the skin is responding to. State the observable feature as a reason for your answer

Temperature condition hot

Observable features:

- Superficial blood capillaries dilated to increase heat loss
- Hair lowered to remove air insulation

33. What do you understand by the following terms

(a) Habitat

Is a place where an organism lives

(b) Ecosystem

An ecosystem is a self-sustaining unit consisting interacting organisms in area together with the non-living constituents of their environment.

(c) There are four possible trophic levels that can exist in a food chain state them below

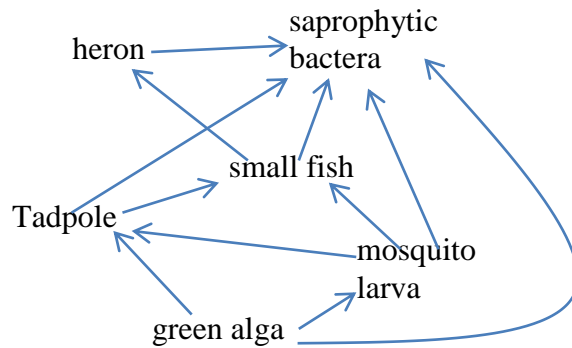
- (i) producers
- (ii) Primary consumers
- (iii) Secondary consumers
- (iv) Tertiary consumers

(d) Give an example of a food chain consisting of four levels of organisms found in a grassland

Grass → grasshopper → chameleon → kite

(e) Construct a diagram of a food web which may exist in a fresh water lake in Uganda comprising of the following organisms

Tadpole, green alga, heron, saprophytic bacteria, small fish and mosquito larva



### SECTION C (30marks)

34. (a) Why do flowering plants possess simpler excretory organs than those found in mammals (03marks)

Plants do not possess special excretory organs like the animals because:

- Most of plant wastes are gaseous (oxygen from photosynthesis and carbon dioxide from respiration) and are lost by diffusion through stomata.
- There is very little accumulation of toxic wastes e.g. nitrogenous wastes because plants are inactive
- Excess water passes to the exterior via similar routes and is eliminated by processes of guttation (droplet exudation) and transpiration (evaporation of water from plant surfaces).
- Plants use waste plants (oxygen for respiration and carbon dioxide for photosynthesis)
- The plant wastes are stored in cellular vacuoles, and lost in leaves that fall off. Some other waste products are stored in the xylem, like resins and gums.

(b) Describe how the mammalian kidney forms urine (10marks)

Urine production involves three processes

#### **Filtration:**

This occurs in glomerulus into the Bowman's capsule. The filtration pressure is due to the fact that **afferent** blood vessel is bigger than the efferent blood vessel.

Small molecules like glucose, amino acids, ammonia are filtered through the pores of capillary vessels.

Big molecules like proteins and blood cells are not filtered because they cannot pass through the pores of the glomerular membrane

#### **Reabsorption**

Useful molecules like glucose, amino acids and water are reabsorbed from the filtrate in proximal convoluted tubules while unwanted molecules like urea are not reabsorbed. More water is reabsorbed from the loop of Henle.

#### **Secretion**

Urea and ammonia which remained in blood is removed by active transport and secreted into the filtrate.

The remaining material including urea and ammonia pass through the collecting duct to the bladder as urine

(c) What part is played by the mammalian skin in excretion? (02marks)

Sweating eliminates urea, a by-product of protein catabolism, excess water and salts.

35. Explain how a dicotyledonous leaf is adapted for the process of photosynthesis (15 marks)

**Adaptation of leaves to photosynthesis**

- The leaf is only a few cells thick for easy penetration of light and gases.
- Wax cuticle prevent excessive water loss
- The palisade cells that contain numerous chloroplasts are well positioned to receive light.
- Presence of xylem that supply the leaf with water for photosynthesis
- The spongy mesophyll has many air space. Gases can readily diffuse to all photosynthetic cells
- They are broad and flat to offer a large surface area exposed to light and air
- Stomata control passage of gases
- The arrangement of leaves to the plant is such way that each leaf receives light.

36. (a) Explain the advantages of ectothermy and endothermy (09 marks)

Endothermy animals maintain constant body temperature irrespective of that of the surrounding while ectothermy animals don't.

**Advantages of being endothermic animals**

- Survives in a wide range of environmental temperatures
- Metabolic reactions in the body are always carried out effectively no matter variations in surrounding temperature.
- The response of the organism to stimuli are always quick
- High metabolic activities

**Advantage of ectotherms**

- Low food consumption since it is not used to maintain body temperature.
- Bodies are less affected by wide environmental temperature variation

(b) A shrew is the smallest mammal in Africa. It eats a lot of food which is mainly insects rich in fats

Explain why the shrew eats

(i) A lot of food (03 marks)

To provide energy to replace heat loss due to large surface area to volume ratio

(ii) Mainly insects rich in fats (03 marks)

Fat have very high calorific value

**END**