553/1

BIOLOGY

(Theory)

Jul/Aug 2019

2 ½ Hours

MUKONO EXAMINATION COUNCIL

Uganda Certificate of Education

BIOLOGY

(Theory)

Paper 1

2 Hours 30 Minutes

INSTRUCTIONS

*This paper consists of sections **A**, **B** and **C**.*

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

*Answers to questions in section **A** must be written in the boxes provided*

*Answers to questions in section **B** must be written in the spaces provided.*

*Answer to questions in section **C** must be written in the answer sheets provided.*

SECTION	QUESTION	MARKS	SIGN & EXAMINER'S No.
A	(1 – 30)		
B	31		
	32		
	33		
C			
	TOTAL		

SECTION A

1. Which one of the elements is found in proteins but NOT carbohydrates?

   A. carbon
   B. hydrogen
   C. nitrogen
   D. oxygen

2. The diagram in figure 1 below shows how a seed changes after it is planted in soil and watered.

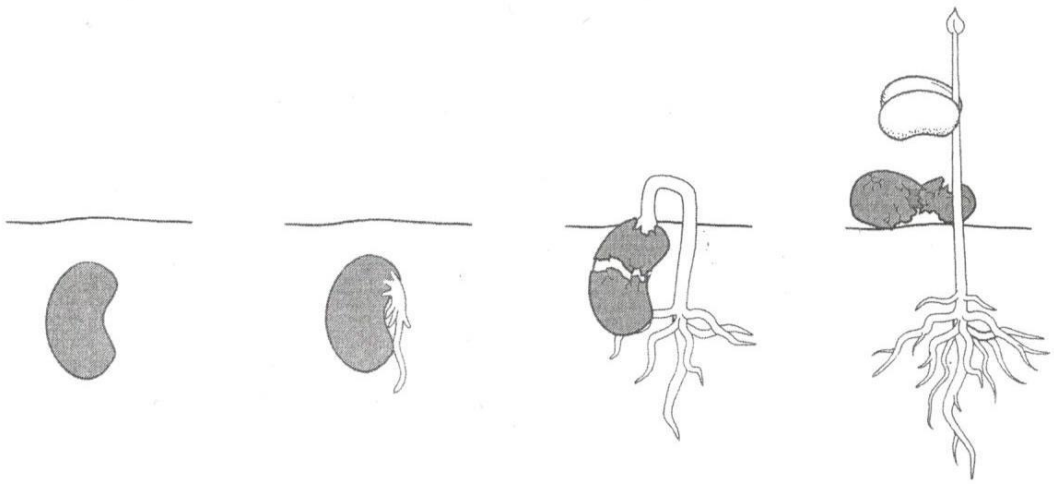


Fig. 1

Which characteristics of living things are demonstrated by this sequence?

A. excretion and growth
B. growth and sensitivity
C. nutrition and reproduction
D. nutrition and sensitivity

3. The diagram in Figure 2 shows a section through a leaf.

   Which arrow shows the direction of diffusion of carbon dioxide on a sunny day?

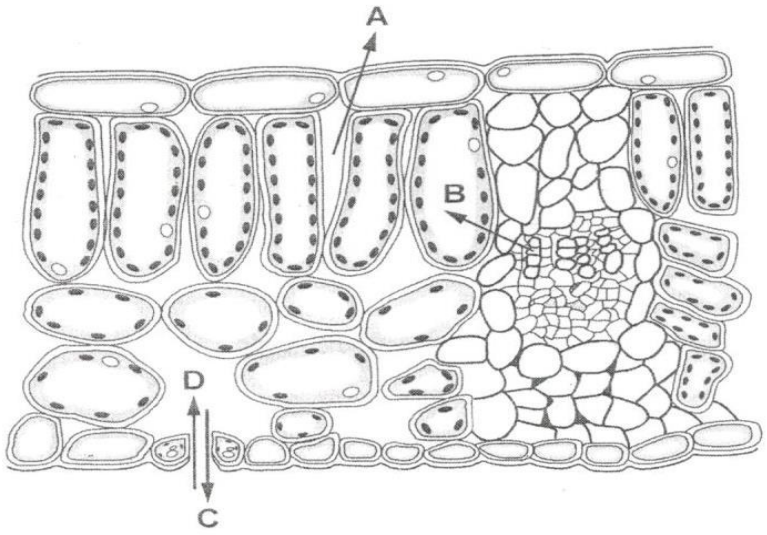


Fig. 2

4. Many enzymes do not work at a temperature above 60°C.

   Which of the following statements explains this?

   A. Substrate molecules are moving too fast.

   B. Substrate molecules are moving too slowly.

   C. Product molecules change shape so do not fit to the active site.

   D. Product molecular are not made because the active site has changed shape.

5. Which of the following pairs of substances are used for photosynthesis?

   A. Carbon dioxide and glucose

   B. Carbon dioxide and water

   C. Glucose and oxygen

   D. Glucose and water

6. Which term describes the taking of substances into the body through the mouth?

   A. absorption B. assimilation

   C. digestion D. ingestion

7. Which one of the following nutrients is deficient in the diet of a child with kwashiorkor?

   A. calcium B. iron

   C. protein D. vitamin D

8. The diagram in figure 3 below shows a tooth with signs of decay.

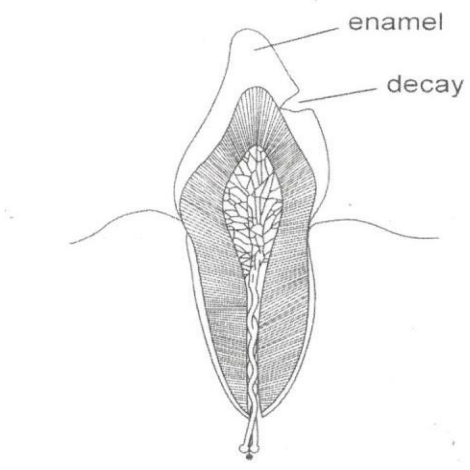


Fig. 3

What has made the hole in the enamel of the tooth?

A. acid B. saliva

C. sugar D. toothpaste

9. Which of the following is a description of translocation?

A. movement of amino acids and sucrose in the phloem sieve tubes.

B. movement of amino acids and sucrose in the xylem vessels of the stem.

C. movement of water and mineral salts from the roots to leaves in xylem vessels.

D. movement of water from the leaves to the roots of a plant.

10. Which one of the following is a common feature of both active and passive immunity?

A. They are acquired by vaccination

B. They are always short term.

C. They are always long term.

D. they involve antibodies

11. A red blood cell and a palisade cell are placed in a solution which has a lower solute concentration than the cells.

What will happen to each cell?

	Red blood cell	**Palisade cell**
A	Bursts	Bursts
B	Bursts	Gains mass
C	Loses mass	Gains mass
D	Loses mass	Loses mass

12. Which one of the following characteristics is common to fish, reptiles and birds?

A. They are cold- blooded.

B. They use their nostrils for breathing.

C. They have scales

D. Their fertilization is external

13. The following are some characteristics of insects

(i) undergo complete metamorphosis

(ii) posses wings

(iii) bear jointed legs

(iv) have three pairs of legs

(v) have bodies divided into head, thorax and abdomen.

Which of the following combinations of characteristics is true for all insects?

A. (i), (ii) , (iii)

B. (iii), (iv), (v)

C. (i), (ii), (v)

D. (ii), (iii), (v)

14. Which one of the following is the main growth stage of a housefly?

A. Puparium B. Pupa

C. Newly hatched adult D. Larva

15. Which of the following confirms that maize is a fruit?

A. it contains a plumule and radicle. B. It has two scars

C. It has a cotyledon D. The food is stored in the endosperm.

16. Which of the following comparisons between insect and wind pollinated flowers is not true?

	Wind pollinated	**Insect pollinated**
A	Flowers not brightly coloured	Flowers brightly coloured
B	Pollen light and small	Pollen heavy and often sticky
C	Flowers odourless	Flowers scented
D	Stigma usually small and simple	Stigma large and feathery

17. Which of the following activities can take place together in the skin?

A. Vasodilation, increase in sweating, contraction of erector pili muscle.

B. vasodilation, increase in sweating, shivering.

C. Increase in sweating, vasodilation, relaxation of erector pili muscles.

D. Vasoconstriction, increase in sweating, shivering.

18. A traffic policeman stretched out his arm to the right. To cause this motion of the arm his;

A. biceps contracted while the triceps relaxed.

B. triceps contracted while biceps relaxed.

C. biceps and triceps both relaxed

D. triceps and biceps both contracted.

19. The regions of most active growth in plants are found mainly in the;

A. stem and root apices

B. axillary buds and flowers.

C. stems and root hairs

D. stems and leaves

20. Which part of the ear is responsible for the detection of the positions of the body when the body is rotating?

A. Perilymph B. Semi-circular canals

C. Cochlea D. Ossicles

21. Which one of the following conditions would cause the adrenal glands of a man to produce a hormone?

A. Hearing a song
B. seeing a monster snake
C. smelling a flower
D. eating a carrot

22. Binary fission describes the type of reproduction where the organism divides to form;

A. Two daughters
B. Many spores
C. Many buds
D. Numerous rhizomes

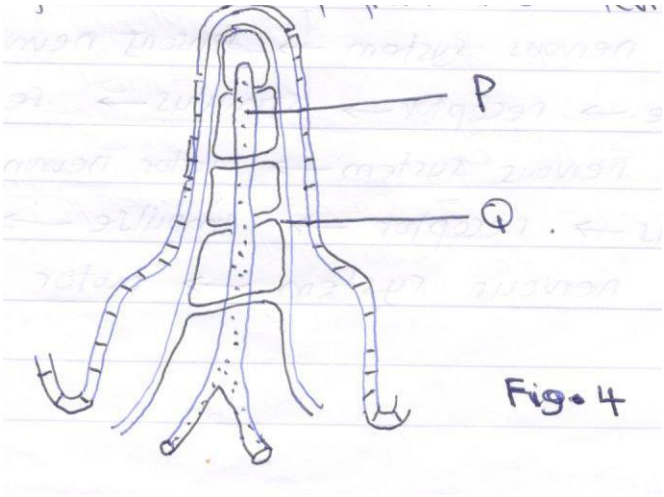
23. Which one of the following best describes the function of the umbilical cord?

A. feeds the embryo with digested food substances.
B. conveys nutrients and wastes to and from the embryo respectively.
C. removes waste matter from the embryo to the mother's blood.
D. Supplies oxygenated blood from the mother to the embryo.

24. The use by man of one species to limit the population growth of another is termed;

A. natural selection
B. biological control
C. cross breeding
D. species interaction

25. The diagram in figure 4 below is the longitudinal section of the villus, from the ileum of a mammal.



What food substances are absorbed at structures labeled P and Q respectively?

	P	Q
A	fatty acids and glycerol	amino acids
B	glucose	fatty acids and glycerol
C	fatty acids and glycerol	proteins
D	proteins	glucose

26. The diagram in figure 5 below is a pyramid of numbers in an aquatic ecosystem.

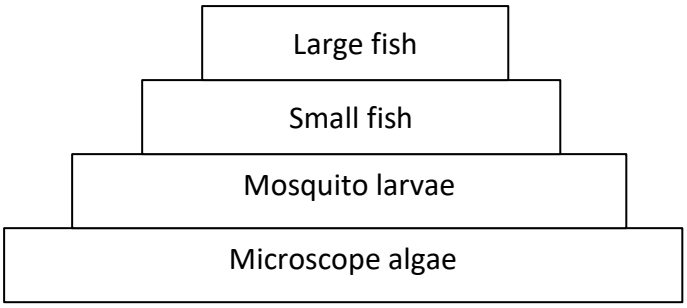


Fig. 5

Which one of the following charges would increase the number of mosquito larvae?

A. increase in number of large fish

B. increase in number of small fish

C. decrease in number of large fish

D. decrease in number of microscopic algae.

27. Which of the following is the correct sequence for the successful completion of a reflex action?

A. stimulus ⟶ receptor ⟶ impulse ⟶ motor nuerone ⟶ Central nervous system ⟶ sensory nerve ⟶ effector

B. impulse ⟶ receptor ⟶ stimulus ⟶ motor nuerone ⟶ Central nervous system ⟶ sensory nuerone ⟶ effector

C. Impulse ⟶ receptor ⟶ stimulus ⟶ sensory neurone ⟶ Central nervous system ⟶ motor neurone ⟶ effector

D. Stimulus ⟶ receptor ⟶ impulse ⟶ sensory nuerone ⟶ Central nervous system ⟶ motor neurone ⟶ effector

28. Which one of the following changes occurs when you walk out of a bright sun shine into a poorly lit room?

A. The pupils become larger

B. The ciliary becomes thicker

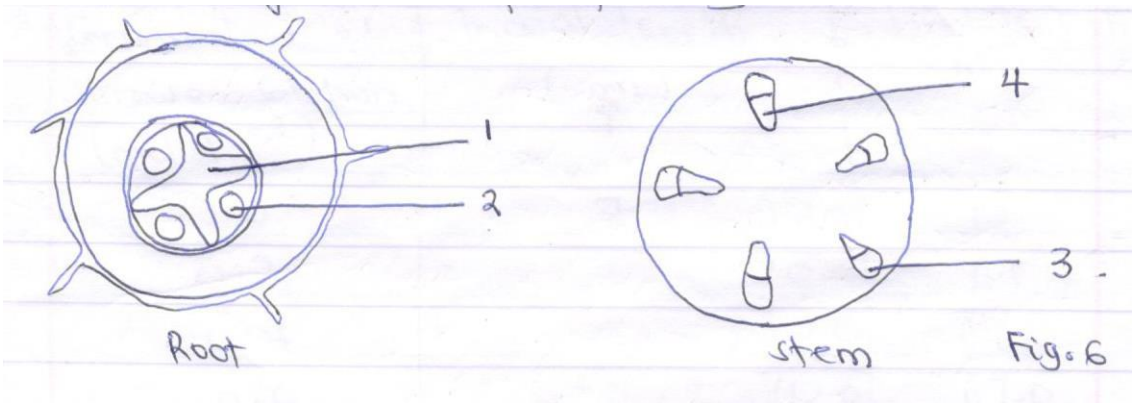
C. The ciliary muscle relaxes

D. The eyes become blind

29. The gene for normal skin colour is completely dominant over the one for albino condition. What is the probability that a father and a mother who are both heterozygous for the trait produce a carrier for albino condition?

A. $\frac{1}{4}$ B. $\frac{3}{4}$ C. $\frac{2}{3}$ D. $\frac{1}{2}$

30. The diagram in figure 6 below represents sections of two plant organs



Which one of the following is the correct label of phloem in the root and stem.

	Root	Stem
A	1	2
B	2	4
C	2	3
D	1	3

SECTION B

31. An experiment was carried out to investigate the effect of different concentrations of sucrose on the length of potato strips.

Five test tubes were set up, each containing a diffrent concentration of sucrose solution. Another test tube was set up containing same volume of distilled water.

A strip of potato tissue was placed in each tube. The strips were of equal size as shown in figure 7 below.

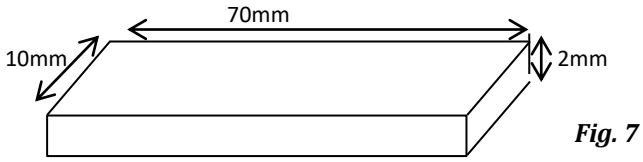


Fig. 7

These strips were completely covered by the solutions and were left in the tubes for 30 minutes. The potato strips were removed and measured. The results are shown in table 1 below.

Concentration of sucrose solution (mold m^{-3})	**Initial length (mm)**	**Final length (mm)**	**Change in length (mm)**
0.0	70.0	73	
0.2	70.0	71.5	
0.4	70.0	69.0	
0.6	70.0	67.0	
0.8	70.0	66.0	
1.0	70.0	64.5	

Table 1

a) Complete the table to show the change in length of each strip. ***(03 marks)***

b) Plot a graph of change in length varying with concentration of sucrose solution. ***(06 marks)***

c) From the graph, determine the sucrose concentration equal to that of the potato tissue. Explain your answer. ***(02 marks)***

d) Explain the results obtained at the following sucrose concentrations;

(i) 0.0 $moldm^{-3}$ ***(03 marks)***

.....

.....

.....

.....

.....

.....

.....

.....

(ii) 1.0 $moldm^{-3}$ ***(03 marks)***

.....

.....

.....

.....

.....

.....

.....

.....

e) State three factors that can increase the rate of the process being investigated in the experiment above. ***(03 marks)***

.....

.....

.....

.....

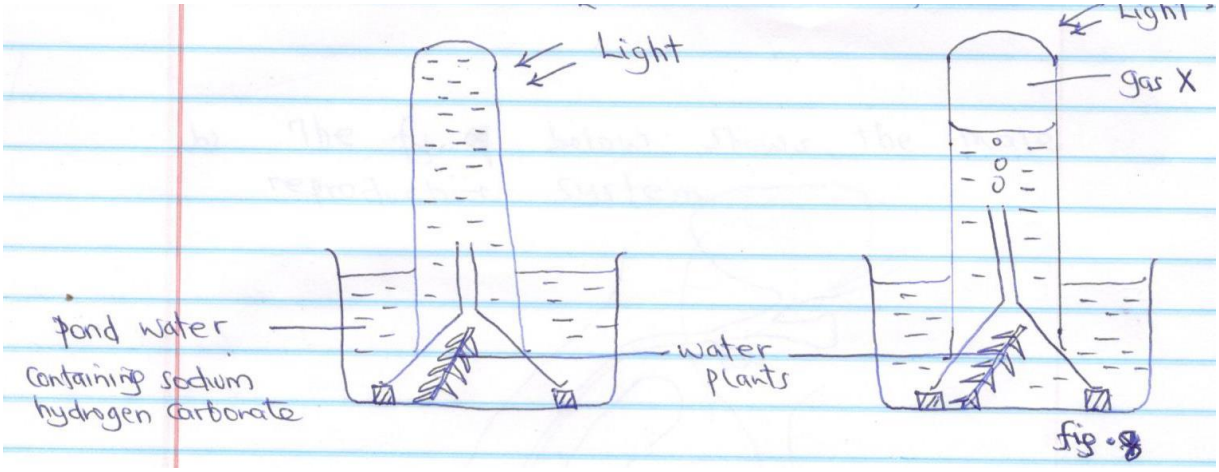
.....

.....

.....

.....

32. The **figure 8** below shows an experimental set up on photosynthesis in green plants. Study it and answer the questions that follows.



a) State the aim of the set up above? ***(01 mark)***

.....

.....

.....

b) Give one example of a water plant which can be used in the experiment above ***(01 mark)***

.....

.....

c) Name gas x ***(01 mark)***

.....

d) Describe how gas x can be identified in the lab. ***(01 mark)***

.....

.....

.....

.....

e) Explain the importance of sodium hydrogen carbonate in the experiment. ***(02 marks)***

.....

.....

.....

.....

f) Explain how the rate of production of gas x can be increased. ***(04 marks)***

.....

.....

.....

.....

.....

.....

.....

33. a) What is meant by the term sexual reproduction? ***(02 marks)***

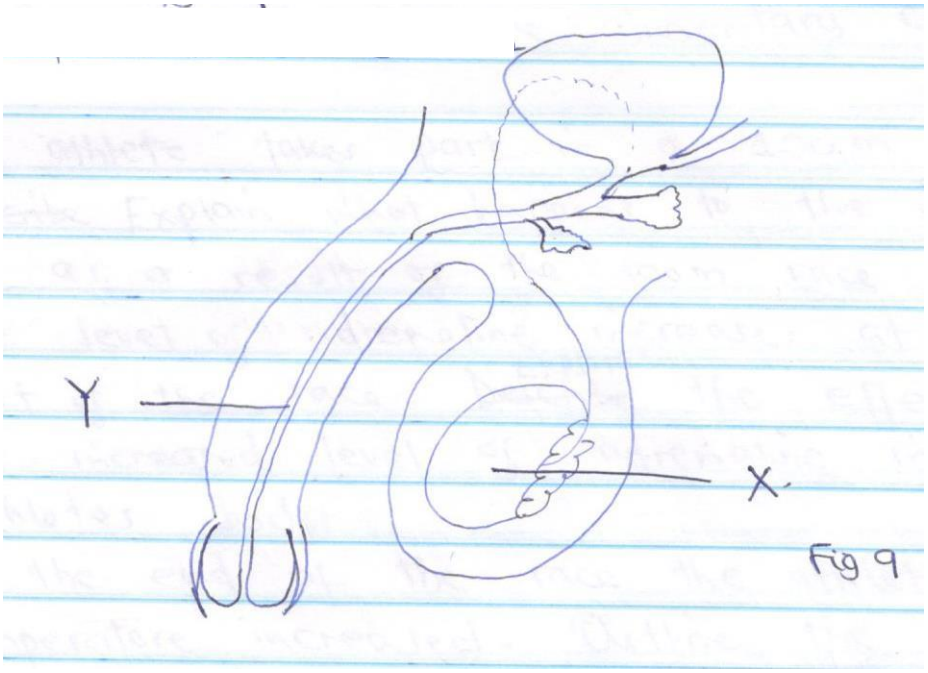
.....

.....

.....

.....

b) The figure 9 below shows the male reproductive system.



(i) Name the part labeled **X** and **Y** ***(02 marks)***

X

.....

.....

.....

Y

.....

.....

.....

(ii) Name the sex hormone secreted by part labeled X. ***(01 mark)***

……

……

(iii) State the changes caused by the hormone in (ii) above in the body during puberty. ***(03 marks)***

……

……

……

c) State two advantages of sexual reproduction over asexual reproduction. ***(02 marks)***

……

……

SECTION C

34. a) What is an enzyme? ***(03 marks)***
    b) State the conditions in which enzymes work best. ***(03 marks)***
    c) Explain the role played by named enzymes in each of the following processes;
    (i) germination of seeds ***(05 marks)***
    (ii) fat digestion in the alimentary canal. ***(04 marks)***
35. An athlete takes part in a 100m race.
    a) Explain what happens to the breathing rate as a result of the 100m race. ***(05 marks)***
    b) The level of adrenaline increases at the start of the race. Explain the effect of this increased level of adrenaline in the athletes body. ***(04 marks)***
    c) At the end of the race the athletes body temperature increased. Outline the body processes which cause the body temperature to return to normal after the race. ***(06 marks)***
36. a) What is meant by the following terms?
    (i) water pollution ***(02 marks)***
    (ii) hydrophytes ***(02 marks)***
    b) Describe how untreated sewage can cause water pollution. ***(05 marks)***
    c) How are hydrophytes adapted to survive in their habitats? ***(06 marks)***

37. In humans the blood circulatory and lymphatic systems transports body fluids.
    a) Outline the defensive functions of the circulatory system. ***04 marks)***
    b) Explain the changes that occur in the composition of blood as it passes through the capillaries of the following parts of the body.
    (i) lungs ***(03 marks)***
    (ii) kidneys ***(03 marks)***
    (iii) liver ***(05 marks)***

- ***End*** -