BIOLOGY PAPER ONE

THE TEACHERS

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Ocan is also an author and has been a biology senior examiner for 24 years.

Deogracious Ojok is an experienced biology teacher. Since 2014, he has facilitated the teaching and learning of biology at St Michael International School, Wakiso, Seat of Wisdom, Kasawo, St Mary's College, Kisubi and Trinity Senior Academy.

He has authored a number of biology teaching and learning resource materials. He has facilitated in biology seminars for both students and teachers.

Ojok is also a senior member of biology assessment with numerous mock bodies.

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SECTION A

Multiple choice questions

1. The source of the blood discharged during menstruation is
   A. Implantation of the foetus.
   B. Breakdown of the outer layer of cells of the inner lining uterus wall
   C. Degeneration of the unfertilised egg.
   D. Breakdown of the cells lining the vaginal wall

2. When the biceps contract, the
   A. hand is pulled.
   B. arm is straightened.
   C. hand is straightened.
   D. arm is folded.

3. What fluid is released from the collecting ducts into the pelvis of the kidney?
   A Urine.
   B. Glomerular filtrate.
   C. Plasma.
   D. Tissue fluid.

4. Which of the following glands secretes the bile, the part of the alimentary canal where it is secreted and its function?

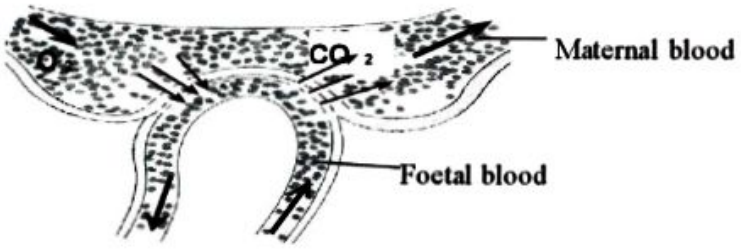
	Gland	Part	Function
A.	Liver	Duodenum	Breaks down large lipids to small lipid droplets
B.	Pancreas	Duodenum	Breaks down lipids to glycerol and fatty acids
C.	Gall bladder	Ileum	Breaks down large lipid to small lipid droplets
D.	Pancreas	Ileum	Breaks down lipids to glycerol and fatty acids

5. Which meristem causes the type of growth shown?

	Meristem	Type of growth
A.	Lateral	Increase in length of the plant.
B.	Apical	Increase in girth of the plant.
C.	Axillary	Increase in girth of the plant
D.	Apical	Increase in length of the plant

6. An ecosystem consists of elephants, lions, zebras and giraffes. In which one of the following pairs is competition most likely to occur?
   A. Zebra and Lion.
   B. Lion and giraffe.
   C. Lion and elephant.
   D. Elephant and giraffe.

7. **Figure 1** below shows the exchange of substances between foetal and maternal blood in the placenta.



Why does oxygen move from maternal blood to foetal blood? Because of

A. less blood pressure in foetal blood than in maternal blood.
B. less blood pressure in maternal blood than in foetal blood.
C. more carbon dioxide in foetal blood than in maternal blood.
D. more oxygen in maternal blood than in foetal blood

8. The dental formula of a child with milk teeth is $I\frac{2}{2}C\frac{1}{1}P\frac{2}{2}M\frac{0}{0}$. How many incisors are found in the lower jaw?

A. 2.
B. 4.
C. 8.
D. 6.

9. The part of the Irish potato that is peeled off during the earlier preparation stage of cooking is.

A. Epidermis.
B. Bark.
C. Cortex.
D. Piliferous layer.

10. The following structures form a possible route for movement of amino acids from the ileum to the lungs:
(i) Liver
(ii) Posterior vena cava
(iii) Pulmonary artery
(iv) Heart
(v) Hepatic portal vein
Which is the correct sequence?

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

11. Plant macronutrients are nutrients required by the plants

A. of large sizes.
B. in small quantities.
C. in large quantities.
D. in the fertiliser.

12. Humans keep chicken home for food consumption, but feeding the chicken on maize bran. Which one below represents the trophic level of each of the organisms in this feeding relationship?

	Humans	Maize bran	Chicken
A.	Primary consumer	Secondary consumer	Producer
B.	Secondary consumer	Producer	Primary consumer
C.	Tertiary consumer	Primary consumer	Tertiary consumer
D.	Producer	Tertiary consumer	Secondary consumer

13. A student carried out an investigation to estimate the population size of rats within the school environment. She caught 30 rats and marked all of them before releasing them back into the environment. After three days, 20 rats were caught from the same area, out of which, 6 had a mark. What is the estimated population of rats in the school environment?

A. 30
B. 180
C. 100
D. 600

14. The correct sequence for the successful completion of a reflex action is.

A.	Stimulus	Receptor	Impulse	Motor neurone	CNS	Sensory neurone	Effector
B.	Impulse	Receptor	Stimulus	Motor neurone	CNS	Sensory neurone	Effector
C.	Impulse	Receptor	Stimulus	Sensory neurone	CNS	Motor neurone	Effector
D.	Stimulus	Receptor	Impulse	Sensory neurone	CNS	Motor neurone	Effector

15. **Figure 2** below shows part of the skin and scales on a fish. The most probable position of the head to the fish is in direction:

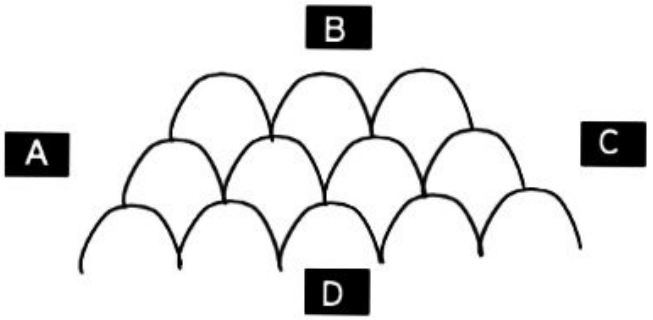


Figure 2

A. D.
B. A.
C. B.
D. C.

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Continued from p17

16. Cotyledons remain in the ground during epigeal germination due to faster growth of
    A. Epicotyl than hypocotyl.
    B. Hypogeal than epicotyl.
    C. Hypocotyl than epicotyl.
    D. Cotyledon stalk than epicotyl.

17. Which one of following categories of fruits has sutures?
    A. Caryopsis, legume, schizocarp and nut.
    B. Nut, berry, achene, and follicle.
    C. Capsule, legume, follicle and schizocarp.
    D. Pome, drupe, follicle, and caryopsis.

18. In a genetic cross between a pea plant with green pod wand with a plant with red pods, all the offspring had green pods. Selfing the offspring resulted in 400 plants with some having green pods and others red pods. How many plants were homozygous for the colour of the pods?
    A. 200
    B. 100
    C. 250
    D. 300

19. The rate of diffusion will increase in the cubes in figure 3 below in the order of

Figure 3.

    A. X⟶Y⟶Z
    B. X⟶Z⟶Y
    C. Y⟶X⟶Z
    D. Y⟶Z⟶X

19. The rate of diffusion will increase in the cubes in figure 3 below in the order of

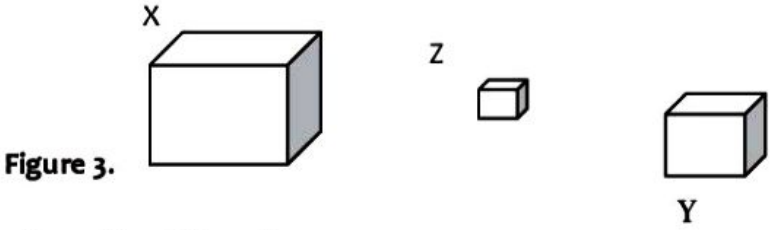


Figure 3.

A. X⟶Y⟶Z
B. X⟶Z⟶Y
C. Y⟶X⟶Z
D. Y⟶Z⟶X

20. Which of the following characters show the form of relationship shown in figure 4.

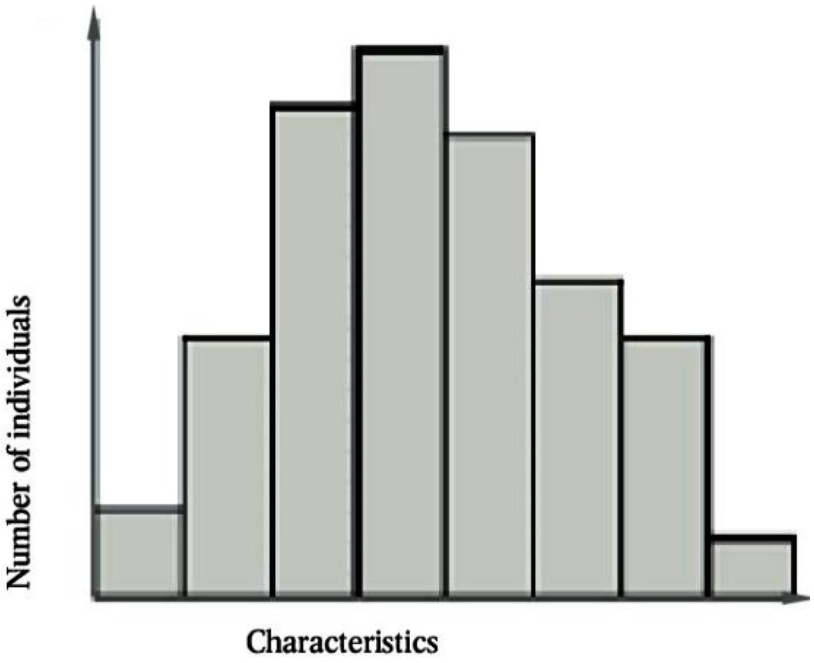


Figure 4.

A. Blood groups in humans
B. Height in humans
C. Weight in cattle
D. Skin colour in humans

21. Below is a set of events following fertilisation in humans. Which one is the correct order of events?
(i) The embryo is embedded in the uterine wall.
(ii) A zygote is formed in the fallopian tube.
(iii) Cell division occurs to form a ball of several hundreds of cells.
(iv) The ball remains free for several days in the uterus.

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

22. The figure 5 below shows an experimental setup to investigate the selective permeability of visking tubing to starch and glucose. Solution R which is a mixture of starch and glucose were enclosed in a visking tubing as shown below.

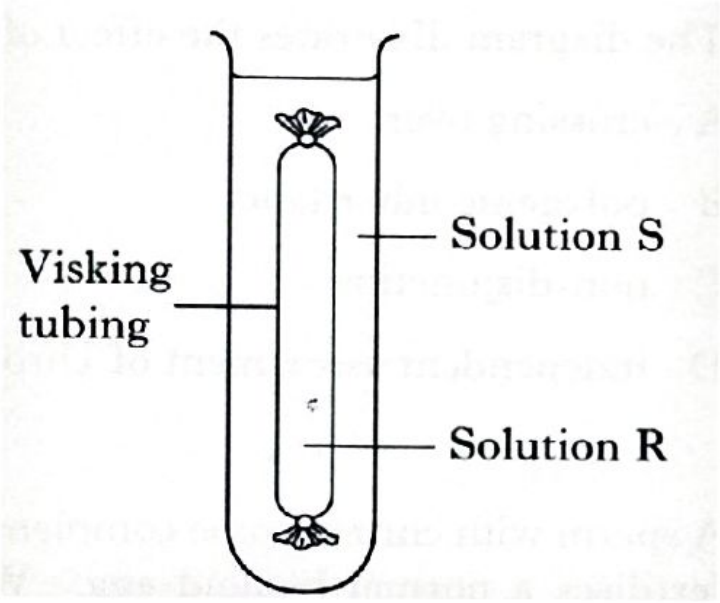


Figure 5.
The observation made when iodine and Benedict's test were carried out on solution S after 30 minutes was

A. Black and blue solutions.
B. Black solutions and yellow precipitates.
C. Yellow precipitates and brown solution.
D. Brown solution and yellow precipitates.

23. The results below were for an experiment where 250cm³ of dry soil was used: -
Volume of water added to soil = 150cm³
Volume of soil + water mixture = 380cm³
What was the percentage of air content in the soil?

A. 8
B. 25
C. 5.3
D. 7.9

24. Which one of the following is not a characteristic of the form of heterotrophic nutrition in man?

A. Excretion
B. Digestion
C. Ingestion
D. Assimilation

25. The nutritional group of a mammal whose types and arrangement of teeth are represented in **figure 6** below is

Figure 6.

A. Omnivore.
B. Carnivore.
C. Herbivore.
D. Holozoic.

26. A bird and a cow belong to the phylum chordata because both:
    A. are endotherms.
    B. are terrestrial.
    C. have vertebral column.
    D. carry out heterotrophism.

27. The stage in cell division where chromatids are formed is
    A. Prophase.
    B. Interphase.
    C. Metaphase.
    D. Telophase.

28. The increase in lactic acid concentration in blood of athletes after a physical exercise is due to
    A. Transportation of lactic acid from muscles to the liver.
    B. Payment of oxygen debt.
    C. Little supply of oxygen to blood.
    D. Breakdown of lactic acid in blood

29. What is the type of leaf represented in **figure 7**?

Figure 7.

A. Compound palmate.
B. Compound pinnate.
C. Compound trifoliate.
D. Simple palmate.

30. Which of the following substances are not found in tissue fluid?
    A. Red blood cells.
    B. Urea.
    C. Water.
    D. Carbondioxide.

SECTION B

Structured questions

31. A student set up an experiment to investigate the effect of unidirectional light on the growth of a shoot of a potted plant. The student enclosed a potted plant in a box with a hole on the side to allow light in and with the inner surface of the box painted black. The experimental set up was as in **figure 8** below.

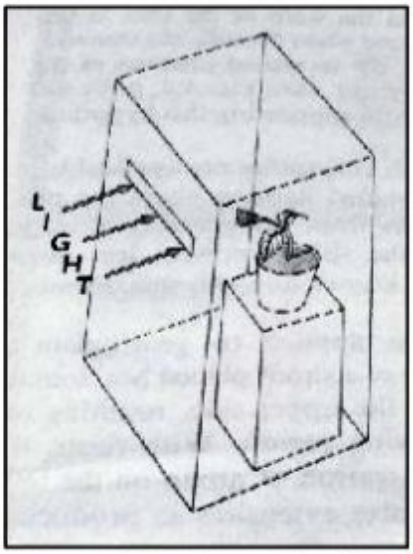
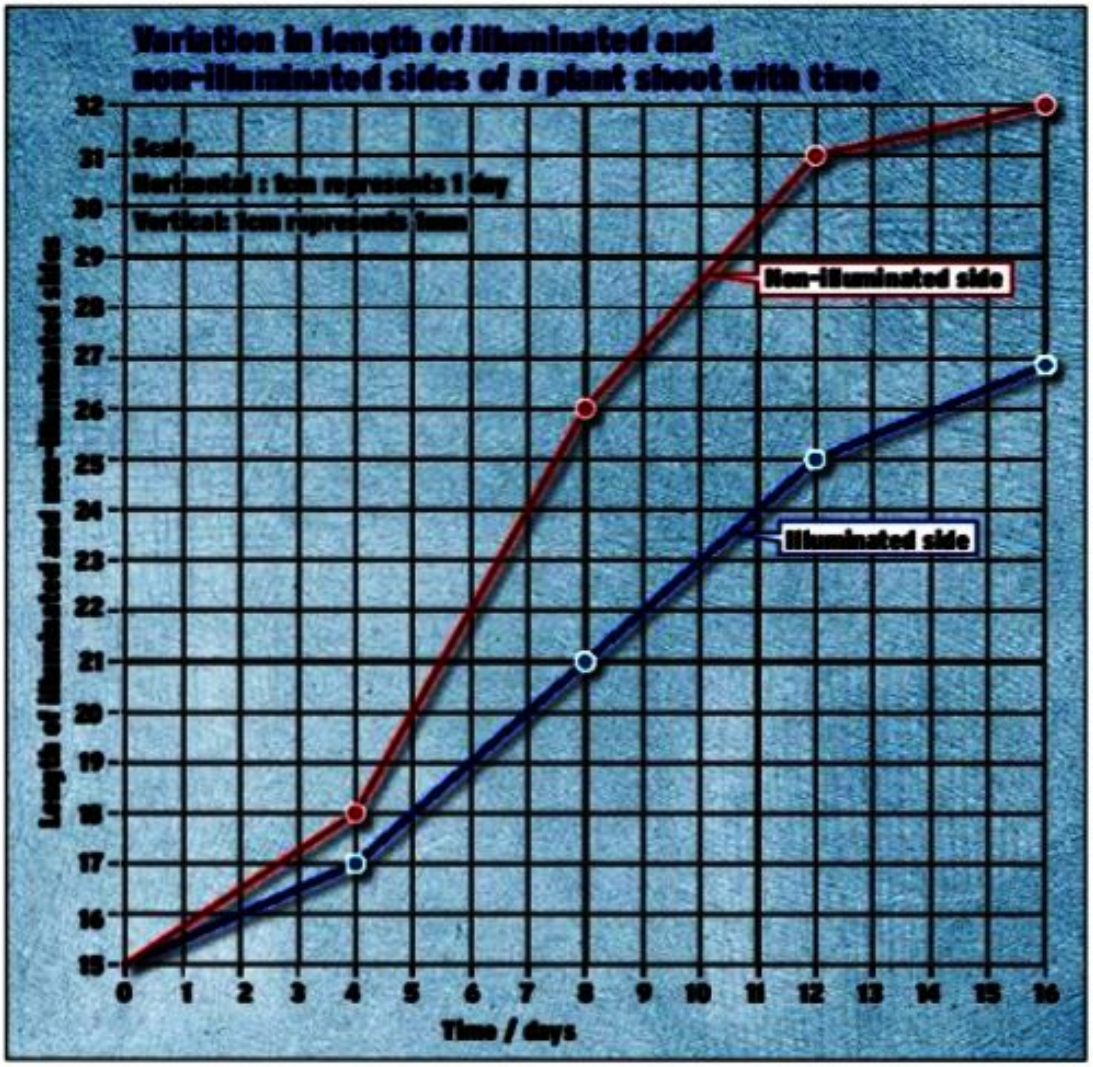


Figure 8.

The student measured the length of both illuminated and non-illuminated parts of the shoot and the results are shown in the graph below.

The student measured the length of both illuminated and non-illuminated parts of the shoot and the results are shown in the graph below.



(a) Describe the variation in the length of non-illuminated side with time. (03 marks)

(b) Suggest the observation that would be made from the setup in figure 8 after 10 days. (01 mark)

(c) Explain the reason for painting the inner surface of the box black. (02 marks)

(d) State the difference between the response of the illuminated and non-illuminated side of shoot. (01 mark)

(e) Explain the difference in response of the illuminated and non-illuminated side of the shoot. (04 marks)

(f) Suggest what would happen if

(i) The plant was exposed to light from all directions. (01 mark)

(ii) The root of the plant was exposed to unidirectional light. (01 mark)

(iii) The tip of the shoot was cut off. (01 mark)

(g) Suggest an explanation for your responses in.

(i)(d)(i)..... (01 mark)

(ii)(d)(ii) ..... (03 marks)

(h) Suggest the type of response being investigated in the experiment. (01 mark)

(i) Suggest the significance of the response suggested in (f) above to a plant. (01 mark)

32. Study **figure 9** below of the life cycles of insect A and insect B.

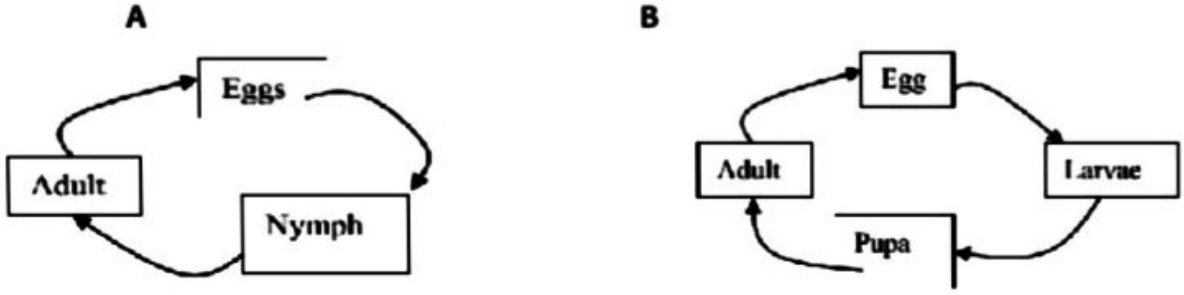


Figure 9

(a) With evidence from the illustration, identify the type of metamorphosis represented by illustrations A and B. Give two examples of insects that undergo each type of metamorphosis. (04 marks)

	A	B
Type		
Evidence		
Examples		

(b) Explain why metamorphosis makes insects among the most successful. (02 marks)

(c) Suggest some mechanisms that can be used to overcome swarms of insects that destroy crops. (02 marks)

.....

d) How are female anopheles mosquitoes adapted to parasitic mode of life? (02 marks)

.....

33. **Figure 10** below shows a section through a plant root and shoot systems.

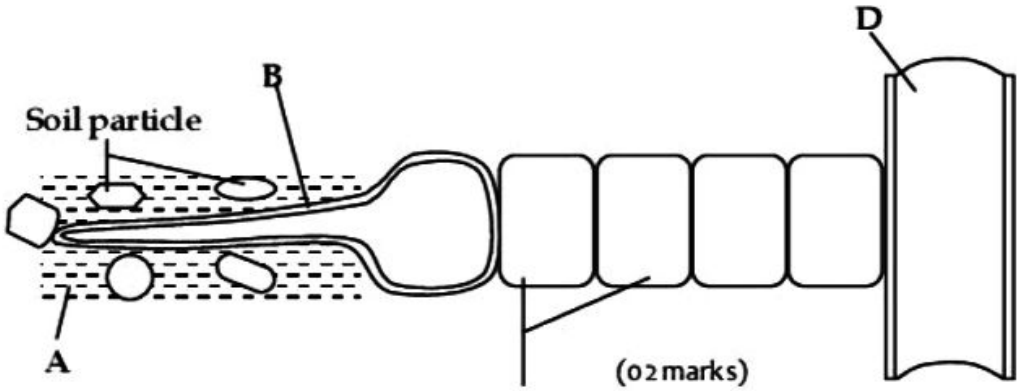


Figure 10.

(a) Label parts indicated from A to D. (02 marks)

A. ..... B.....

C. ..... D..... .....

(b) Describe how one named material found in region A moves into part D. (04 marks)

(c) (i) Using an arrow, show the direction of flow of fluid in part D. (01 mark)

(ii) Give two causes of fluid movement in the direction shown in part D above. (02 marks)

(d) Suggest why the amount of fluid absorbed by part B is not equal to that lost in the leaves. (01 mark)

SECTION C

Answer any two questions in this section.

34. a) What is food test? (01 mark)

(b) Describe an experiment you would carry out to confirm the presence of non-reducing sugars in a fresh Irish potato. (14 marks)

35. (a) Differentiate between a virus and a microbe and give an example of each. (02 marks)

(b) State;

(i) Two effects of microbial growth on plants and animals. (02 marks)

(ii) Methods of controlling highly contagious and infectious diseases spread by viruses and microbes. (05 marks)

(c) (i) Explain what makes certain organisms compete better than others. (02 marks)

(iii) Discuss, giving examples, the various types of competition. (04 marks)

36. (a) Suggest the importance of reproduction as a life process to living things. (01 mark)

(b) Describe the various forms of vegetative propagation used by farmers in Uganda. (10 marks)

(c) Suggest some of the advantages of vegetative propagation. (04 marks)

37. (a) Describe the homeostatic responses of the body to decrease of blood sugar below the normal level.

(b) What is the challenge faced by organisms that live in;

(i) Cold environment. (01 mark)

(ii) Hot environment. (01 mark)

(c) Describe how different modifications enable mammals that live in cold environment to overcome the challenge stated in (b)(ii) above. (06 marks)