

Candidate's Name:

Signature:

Stream:

553/1

BIOLOGY

(Theory)

Paper 1

Nov. 2020

2 ½ HOURS

UGANDA CERTIFICATE OF EDUCATION

BIOLOGY

(THEORY)

Paper 1

TIME: 2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

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

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

Write the answers to section **A** in the boxes provided, answers to section **B** in the spaces provided and answers to section **C** in the answer booklets provided.

| For examiners' use Only | | |
|---|-------|----------------------|
| Section | Marks | Examiner's Signature |
| A: | | |
| B: No. 31 No.32 No. 33 | | |
| C: No. No. | | |
| Total | | |

SECTION A (30 MARKS)

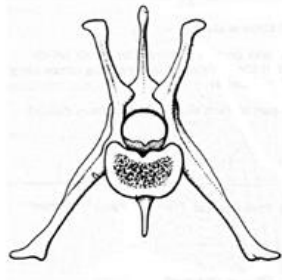
Answer **all** questions in this section. Write the letter representing the most correct answer to each question in the box provided.

1. When the triceps contract and the biceps relax, the

A. Hand is pulled
B. Arm is straightened
C. Hand is straightened
D. Arm is folded

☐

2. **Figure 1** below is an anterior view of a certain vertebra

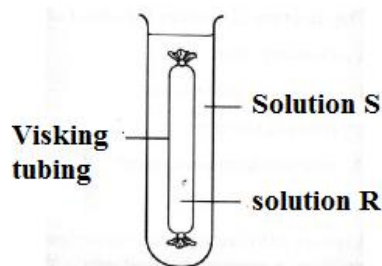


The type of vertebra shown in figure above is

A. Cervical vertebra
B. Lumbar vertebra
C. Thoracic vertebra
D. Sacral vertebra

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3. **Figure 2** 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 enclosed in a visking tubing as shown below.



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 precipitate
C. Yellow precipitate and brown solution
D. Brown solution and yellow precipitate

☐

4. What happens to ciliary muscles, Radial muscles and the Lens in the eye when it focuses on an approaching object?

| | Ciliary muscles | Radial muscles | Lens |
|----------|------------------------|-----------------------|-----------------|
| A | Contract | Relax | Becomes thicker |
| B | Contract | Relax | Becomes thinner |
| C | Relax | Contract | Becomes thicker |
| D | Relax | Contract | Becomes thinner |

☐

5. A potted plant was moved from a garden and placed in a box whose inside is painted black but with a small hole on it facing a window for a few days. After the few days, the observation made on the shoot growth was

- A. The illuminated side grew faster than the non-illuminated side
B. The non – illuminated side grew faster than the illuminated side
C. Both the illuminated and non – illuminated sides grew equally
D. No shoot growth occurred

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6. Plasmodium parasites reproduce a sexually by

- A. Budding
B. Binary fission
C. Fragmentation
D. Multiple fission

☐

7. In a human reproduction, the sequence of secretion of hormones controlling the menstrual cycle is?

- A. LH → Oestrogen → FSH → Progesterone
B. FSH → Oestrogen → LH → Progesterone
C. Progesterone → FSH → LH → Oestrogen
D. Oestrogen → LH → Progesterone → FSH

☐

8. Human Chorionic Gonadotrophine hormone (HCG) is produced by the placenta during pregnancy to

- A. Preserve the corpus luteum which continues to secrete progesterone which sustains pregnancy
B. Stimulates the anterior lobe of pituitary gland to release FSH into blood stream
C. Degenerate the corpus luteum in the ovaries
D. Stimulate secretion of oestrogen hormone by the ovaries.

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9. Which one of the following classes of organisms do not transport their respiratory gases in their blood?

- A. Aves
B. Insecta
C. Amphibia
D. Pisces

☐

10. The cotyledons come above the ground during hypogeal germination due to faster growth of;

- A. Hypogeal than epicotyl
- B. Epicotyl than hypocotyl
- C. Hypocotyl than epicotyl
- D. Epicotyl than cotyledon stalk

☐

11. Why does salivary amylase cause to function in the stomach?

- A. The pH of the gastric juice is unsuitable
- B. The temperature of stomach is inadequate
- C. Pepsin in the stomach stops its actions
- D. The stomach will absorb it.

☐

12. The following are factors that affect the rate of transpiration

- (i) Low temperature
- (ii) Low humidity
- (iii) High atmospheric pressure
- (iv) High light intensity

Which one of these would decrease the rate of transpiration?

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

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13. Which of the following events occurring during inhalation in man?

- A. Diaphragm flattens, ribs raised, intercostal muscles relax and pressure in the chest cavity decreases.
- B. Diaphragm becomes dome-shaped, ribs lowered, intercostal muscles contract and pressure in the chest cavity increases
- C. Diaphragm flattens, ribs lowered, intercostal muscles contract and pressure in the chest cavity increases.
- D. Diaphragm becomes dome-shaped, ribs raised, intercostal muscles relax and pressure in chest cavity decreases

☐

14. The biological control method involves;

- A. Application of pesticides to kill the pests
- B. Interruption of the pests' breeding cycles
- C. Destruction of pests' habitats and enemies
- D. Introduction of pests' predators

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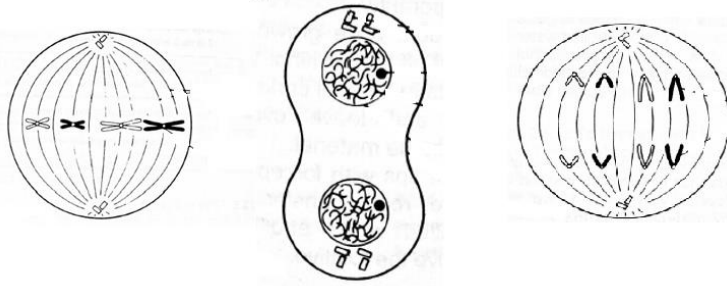
15. What relationship exists between a fungus and a plant root of spermatophytes in a mycorrhizae?

- A. Parasitism
- B. Commensalism
- C. Mutualism

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D. Symbiosis

16. What stage of cell division is not represented in **figure 3** below?



- A. Anaphase
- B. Prophase
- C. Metaphase
- D. Telophase

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17. The skin cell of an animal contain 12 chromosomes. How many chromosomes will be present in each of the gametes produced by this animal?

- A. 24
- B. 6
- C. 12
- D. 3

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18. A woman of blood group O, produced a baby of blood group O. which one of the following may not be the blood group of her Husband?

- A. A
- B. B
- C. AB
- D. O

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19. Below are characteristics of a certain type of soil.

- (i) Has large soli particles
- (ii) Has large air spaces
- (iii) Poor in dissolve minerals
- (iv) Low water retention capacity
- (v) High water drainage capacity

The above soil type can be improved to make it suitable for growth of crops by;

- A. Addition of Humus
- B. Removal of humus
- C. Irrigation to improve its water content
- D. Addition of pesticides

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20. Which one of the following vitamins is involved in the normal blood clotting of a damaged body part?

- A. Vitamin A
- B. Vitamin C

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- C. Vitamin D
- D. Vitamin K

21. Possession of a long loop of Henle is a characteristic of;

- A. Desert animals
- B. Amphibians
- C. Fresh water animals
- D. Mammals

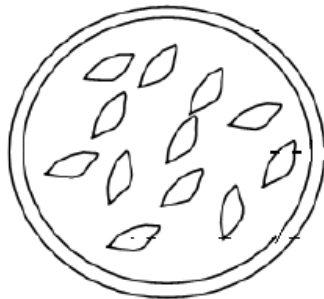
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22. In estimating the population of Nile perch in a fish pond, 200 fish were captured, marked and released back. After 4 days, 160 fish were captured and out of which 40 fish had a mark. The estimated population of Nile perch in the fish pond was?

- A. 400
- B. 800
- C. 900
- D. 750

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23. **Figure 4** below shows the cross section of part of a plant



Which part of the plant is shown above?

- A. Dicotyledonous stem
- B. Dicotyledonous root
- C. Monocotyledonous stem
- D. Dicotyledonous root

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24. Which one of the following parasites are transmitted by Tiger mosquito?

- A. Filarial worms
- B. Plasmodium
- C. Salmonella
- D. Virus

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25. The property enzymes related to substrates is?

- A. Enzymes speed up the rate of biochemical reactions
- B. An particular enzyme only acts on a particular substrate
- C. A particular enzyme can act on several substrates
- D. Enzymes are effective in small quantities

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26. A plant leaf was cut transversely and the internal structures were observed under a microscope. These cells were observed: Epidermal cells, Spongy cells, Palisade cells and Guard cells. Which one of the following features are commonly found in all these cells?

- A. Chloroplasts and cell wall
- B. Cell wall and Nucleus
- C. Nucleus and Large vacuole
- D. Large vacuole and chloroplasts

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27. Which type of leaf venation is represented by the **figure 5** below?



- A. Palmate parallel venation
- B. Pinnate network venation
- C. Pinnate parallel venation
- D. Palmate network venation

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28. The main value of sweating in man is that during the process

- A. Excess water is removed from the body
- B. Latent heat of vaporization of water helps to cool the body
- C. Excess mineral salts are removed from the body
- D. The body gets rid of excess nitrogenous wastes

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29. In which of the following are the largest amounts of nitrogen excreted from the mammalian body?

- A. Breath
- B. Sweat
- C. Urine
- D. Faeces

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30. Chemical digestion of lipids begins in which part of the alimentary canal?

- A. Stomach
- B. Mouth
- C. Duodenum
- D. Small intestines.

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SECTION B (40 MARKS)

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

31. Table 1 below shows the number of oxygen bubbles produced per minute at 15°C and 37°C from an aquatic plant when it was exposed to light from a 100W electric bulb at several distances from the setup of the plant in water. The bubbles produced per minute are taken as the rate of photosynthesis. Study the information carefully and answer the questions that follow.

| Distance of the bulb from the setup (cm) | Number of oxygen bubbles produced per minute | |
|--|--|---------|
| | At 15°C | At 37°C |
| 5 | 400 | 820 |
| 10 | 360 | 750 |
| 20 | 280 | 630 |
| 30 | 220 | 500 |
| 40 | 160 | 390 |
| 50 | 100 | 310 |
| 55 | 70 | 270 |
| 60 | 50 | 200 |
| 65 | 30 | 160 |

(a) What was the aim of the experiment? **(01 mark)**

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(b) What is the relationship between;

(i) Distance of Bulb from the set up and light intensity received by the plant. **(01 mark)**

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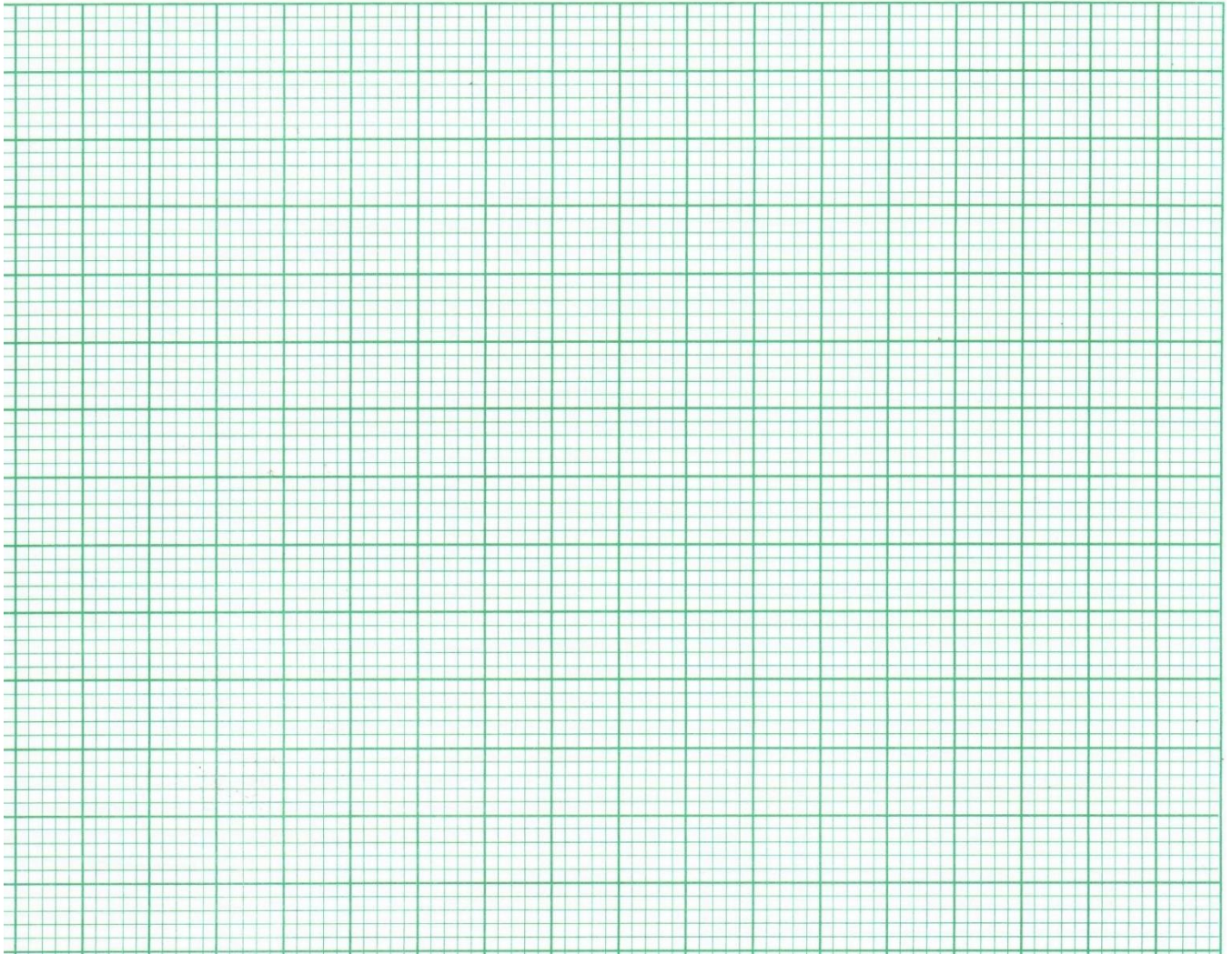
(ii) Distance of Bulb from the setup and number of oxygen bubbles evolved per minute. **(01 mark)**

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(iii) Number of oxygen bubbles evolved by the plant and rate of photosynthesis. **(01 mark)**

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(c) Using the same axes, represent the above information on a graph (08 marks)



(d) Describe the shape of the curve at 37°C (03 marks)

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

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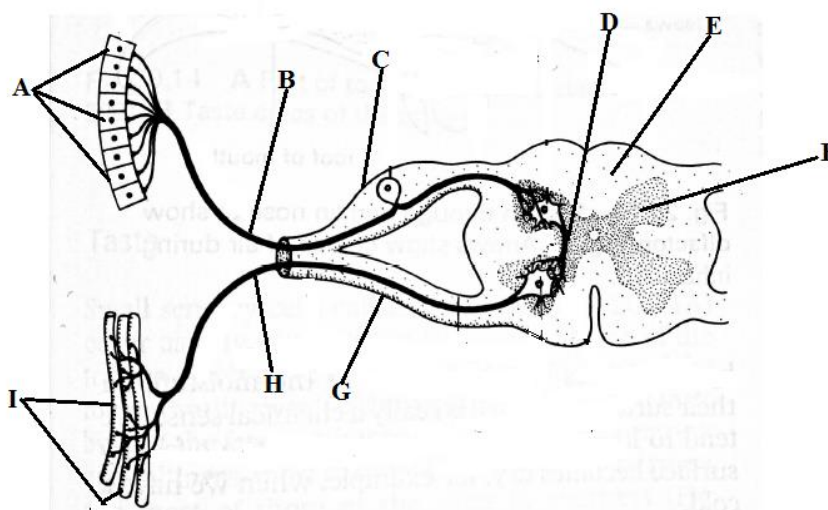
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(f) (i) Apart from the factors under the investigation, state two other factors that would affect the rate of photosynthesis in aquatic plant. (01 mark)

(ii) State the importance of photosynthesis. (02 marks)

32. Figure 6 below is a diagram of a reflex arc. Study it carefully and answer the questions that follow.



(a) What is a reflex arc (01 mark)

(b) Name the parts labelled A to I (04 1/2 marks)

| | |
|---------|---------|
| A | F |
| B | G |
| C | H |
| D | I |
| E | |

(c) (i) Describe the sequence of events that take place when an individual touches a hot object. (03 1/2 marks)

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- (ii). On the same diagram in figure 6 above, using 2 arrows show the direction of the impulses. **(01 mark)**
- 33. (a)** Table 2 shows blood group system in humans. Complete the table by;
- (i) Filling in the antigens and antibodies for each blood group.
 - (ii) Indicating whether agglutination occurs (by a cross X) or no agglutination occurs (by a tick ☐), when an individual of each group receives Blood of blood B.

Table 2

(06 marks)

| Blood group | Antigens | Antibodies | Agglutination/ No agglutination when an individual receives blood of blood group B |
|-------------|----------|------------|--|
| A | | | |
| B | | | |
| AB | | | |
| O | | | |

- (b)** Describe how the body responds when one's tissue is damaged. **(04 marks)**

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SECTION C (30 MARKS)

*Answer any **two** questions from this section. Additional questions answered will **not** be marked.
Answers to these questions must be written in the answer booklets provided.*

- 34.** (a) Describe any four adaptations of a good respiratory surface to suit its function. (08 marks)
- (b) Give two reasons why;
- (i) Unicellular organisms lack a specialized respiratory system. (02 marks)
- (ii) Multicellular organisms like man have a specialized respiratory system. (02 marks)
- (c). Describe the mechanism of gaseous exchange in an amoeba. (03 marks)
- 35.** (a) Distinguish between Excretion and Osmoregulation. (02 marks)
- (b) Give reasons why plants do not require special excretory organs as Man. (04 marks)
- (c) Describe how water balance is maintained in Man. (09 marks)
- 36.** (a) Define the term Biological Control method. (01 mark)
- (b) (i) Give any three examples of Biological control methods. (03 marks)
- (ii). State any two importances of the biological control method. (02 marks)
- (c). Describe how prey are adapted to escaping from predators. (09 marks)
- 37.** (a) Distinguish between menstruation and menstrual cycle. (02 marks)
- (b) Describe the hormonal control of the menstrual cycle in humans. (13 marks)

END

“Success is through repeated practice”.