Name:.....Centre/Index No:...../.....

553/1
BIOLOGY
THEORY
Paper 1
JULY/AUGUST, 2022
*2½ hours*

JINJA JOINT EXAMINATIONS BOARD

*Uganda Certificate of Education*

MOCK EXAMINATIONS JULY/AUGUST, 2022

BIOLOGY

THEORY

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

*Answer* ALL *questions in section* A *and* B, *plus any* TWO *questions in section* C.

*Answers to section* A *and B* should be written in the spaces provided strictly.

*For Examiner's Use Only*

| SECTION | MARKS |
|---|---|
| A: 1-30: | |
| B No. 31: | |
| No. 32: | |
| No. 33: | |
| C No. : | |
| No: | |
| TOTAL | |

SECTION A (30 MARKS)

# ANSWER SHEET

| | | | | | |
|---|---|---|---|---|---|
| 1 | | 11 | | 21 | |
| 2 | | 12 | | 22 | |
| 3 | | 13 | | 23 | |
| 4 | | 14 | | 24 | |
| 5 | | 15 | | 25 | |
| 6 | | 16 | | 26 | |
| 7 | | 17 | | 27 | |
| 8 | | 18 | | 28 | |
| 9 | | 19 | | 29 | |
| 10 | | 20 | | 30 | |

1 What is the significance of the biconcave shape of the red blood cells? To……

A: reduce the weight of cells
B: enable cells carry more energy
C: enable cells pass through the capillary walls
D: allow cells fit into the narrow lumen of the capillaries

2 Why is it that enzyme maltase will not only hydrolyse maltose? Because enzymes…..

A: are specific in nature

B: are protein in nature

C: work best at specific $P^H$

D: control reactions that are reversible

3 Which one of the following is not a variant of coronavirus?

A: Alpha

B: Delta

C: Covidex

D: Omicron

4 Which one of the following provides active acquired immunity to the very young child?

A: Receiving antibodies from mother's milk

B: Developing antibodies as a result of inherited genes

C: Receiving antibodies from mother via the placenta

D: Receiving injections of antigens which cause the body to make antibodies

5 Which one of the following best describes the effect of one-sided illumination on the distribution of auxins in a shoot tip?

A: The auxins are evenly distributed around the tip

B: The light inhibits movement of auxins down the tip

C: The auxins increase on the illuminated side of the tip

D: There is a reduction of auxins on the illuminated side of the tip

6 Which one of the following structures of a flower develops into a seed coat after fertilization?

A: Ovary

B: Receptacle

C: Integument

D: Embryo sac

7 Which one of the following is part of the appendicular skeleton?

A: Skull

B: Atlas

C: Scapulae

D: Lumbar vertebra

8 Which one of the following is the least important function of humus in the soil?

A: Water retention

B: Improving soil aeration

C: Increasing soil fertility

D: Prevention of soil erosion

9 At which of the following levels of classification can organisms interbreed and produce fertile off-springs?

A: Class

B: Species

C: Phylum

D: kingdom

10 By which one of the following processes does carbon dioxide leave the blood capillaries into the alveoli?

A: Osmosis

B: Diffusion

C: Capillarity

D: Active transport

11 Which one of the following methods would be the best for estimating the population density of rats in a bush?

A: Line transect

B: Direct counting

C: Quadrat method

D: Capture - recapture method

12 Which one of the following would be a correct sequence of plant succession on an abandoned tarmac compound?

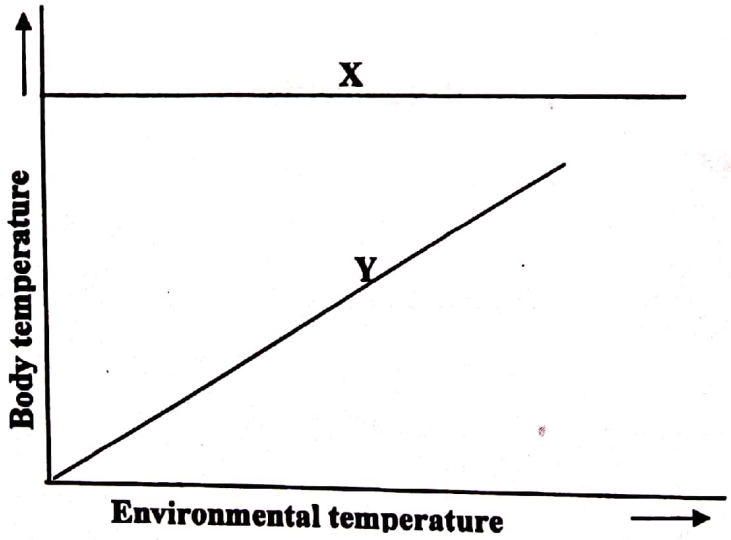
A: Mosses → herbs → shrubs → trees

B: Herbs→ mosses→ shrubs → trees

C: Shrubs → herbs → trees → mosses

D: Mosses → herbs → trees → shrubs

13 The graph below shows how the body temperature of animals X and Y vary with environmental temperature.



Which one of the following is demonstrated in the graph above?
A: Y losses more heat than X
B: X has a higher body temperature than Y
C: Body temperature of Y is dependent on environmental temperature
D: Body temperature of X is dependent on environmental temperature

14 Which of the following features show continuous variation?
A: Weight
B: Haemophilia
C: Sickle cell trait
D: A, B and O blood group

15 Which of the following bones are connected by a pivot joint?
A: Atlas and axis
B: Femur and tibia
C: Carpals of the wrist
D: Humerus and scapula

16 By which of the following are impulses transmitted across synapses?
A: Thermal means
B: Chemical means
C: Electrical means
D: Mechanical means

17 Which one of the following is the best definition of a gene? A……
A: part of a single chromosome in the nucleus
B: factor responsible for producing a characteristic
C: portion of a chromosome responsible for several characteristics
D: part of a chromosome responsible for producing one characteristic

18 Which one of the following pairs are components of viruses?
A: Protein and lipid
B: Lipid and carbohydrate
C: Protein and carbohydrate
D: Protein and nucleic acid

19 Which one of the following excretory products are removed from the body by the kidney?
A: Excess water, excess salts and urea
B: Excess water, urea and carbon dioxide
C: Excess salts, urea and carbon dioxide
D: Excess water, excess salts and carbon dioxide

20 Which one of the following substances accumulates in muscles during vigorous exercise?
A: Water
B: Oxygen
C: Lactic acid
D: Carbon dioxide

21 Which one of the following is the likely cause of short sightedness
A: Lens becoming thicker
B: Expansion of iris muscles
C: Contraction of the ciliary muscles
D: Suspensory ligament becoming shorter

22 Which one of the following parts of the mammalian ear is concerned with balance?
A: Cochlea
B: Oval window
C: Eustachian tube
D: Semi- circular canal

23 Which one of the following controls salt levels in the body of humans?
A: Liver
B: Rectum
C: Kidney
D: Bladder

24 Which of the following is produced in the lymph nodes?
A: Fibrinogen
B: Blood platelets
C: Some white blood cells
D: Red blood cells and white blood cells

25 When the environmental temperature is at 18°c, which one of the following represents the temperature of the air breathed out?
A: 37.0°C
B: 24.0°C
C. 30.0°C
D.98.4°C

26 Which of the parental crosses below would produce 25% albino offspring if A stands for normal skin colour and a the recessive character?
A: aa x aa
B: Aa x Aa
C: AA x aa
D: AA x Aa

27 Which one of the following does not cause an increase in human body temperature?
A: Shivering of muscles
B: Increased metabolic rate
C: Dilation of deep lying blood vessels
D: Constriction of peripheral blood vessels

28 What is the significance of secondary growth in plants? It causes an increase in....
A: height
B: length
C: thickness
D: number of branches

29 A population in equilibrium would be characteristic of a natural community in which
A: immigration is occurring rapidly
B: succession has reached a climax
C: the pyramid of energy has been reversed
D: pioneer organisms are increasing rapidly

30 Red flowered peas were crossed with white flowered peas. The $F_1$ generation were all pink flowered. What would be the result of selfing these pink flowered peas?
A: All the flowers would be pink
B: Half the flowers would be red and half pink
C: Half the flowers would be pink and half white
D: A quarter of the flowers would be red, half pink and a quarter white

## SECTION B (40 MARKS)
**Answer all questions in this section.**

31 The table below shows the percentage composition of inhaled and exhaled air, in a human being at rest and also the composition of exhaled air during exercise.
Use the information in the table to answer the question that follow:

| | Oxygen | Carbon dioxide | nitrogen | Water vapour |
|---|---|---|---|---|
| Inhaled air at rest | 20.96% | 0.03% | 79% | Variable |
| Exhaled air at rest | 16.2% | 4.1% | 79% | 0.8% |
| Exhaled air during exercise | 15.58% | 4.5% | 79% | 0.92% |

a. Give a reason for each difference stated in the table above (6 marks)

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b. State the changes that occur in the composition of exhaled air in a human being who is previously at rest, then takes an exercise. (3 marks

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c. Give a reason why each change stated in (b) above occurs. (3 ma

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d. During exercise, the breathing rate increases. From the information provided suggest v this happens. (3 m

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e. Why is the percentage of nitrogen constant in inhaled and exhaled air? (2 marks)

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32. A mouse 20gms, an elephant 2000kg and a whale 20000kg are mammals with a normal body temperature of approximately 37°c.

i. Which of the three mammals has the smallest volume? (1/2 marks)

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ii. Which one contains the least amount of heat? (1/2 marks)

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iii. Give reasons for your response in(ii) above. (2 marks

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iv. Which of the three animals has the smallest surface area in proportion to its volume?

(1 mark)

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v. The elephant normally lives in hot climates where endothermic animals usually need to lose heat to maintain a constant body temperature. Give two special features of the elephant that enable it to lose heat. (2 marks)

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vi. State two special features of the whale that enable it to retain heat. (2 marks)

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vii. What features enable the mouse to retain heat in a cold climate? (2 marks)

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33 a Give four characteristics of gaseous exchange surfaces in plants. (4 marks

i. .....

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ii. .....

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iii. .....

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iv. .....

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b. Fill in the spaces in the table below:

| ANIMAL | RESPIRATORY SURFACE |
|---|---|
| FISH | |
| INSECT | |
| FROG | |
| AMOEBA | |
| RAT | |
| PARAMECIUM | |

c. Explain why diffusion alone meets the gaseous exchange requirements of protozoans. (3 marks)

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## SECTION C (30 MARKS.)

**Answer any two questions in this section:**

34. a. How does passive immunity differ from active immunity? (4 marks)
    b. In what other ways does the body protect itself against infection? (11 marks)

35. a. Distinguish between osmosis and diffusion. (2 marks)
    b. Describe an experiment to demonstrate osmosis using a named plant material. (9 marks)
    c. Outline the importance of osmosis to plants. (4 marks)

36. a. Outline the role of hydrochloric acid in the stomach. (5 marks)
    b. Describe how the small intestine is adapted to its function. (10 marks)

37. a. Describe the term pollution. (2 marks)
    b. Describe four causes of air pollution and their effects. (8 marks)
    c. State five ways of controlling air pollution. (5 marks)



End