**Candidate's Name.....Signature.....**

**553/1**
**BIOLOGY**
**(Theory)**
**Paper 1**
**2022**
2 $^{1}/_{2}$ hours

**MATIGO MOCK EXAMINATIONS 2022**
**Uganda Certificate of Education**
**BIOLOGY**
**(THEORY)**

**Paper 1**

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 & No.** |
| **A** | | | |
| **B** | **No. 31** | | |
| | **No. 32** | | |
| | **No. 33** | | |
| **C** | **No.** | | |
| | **No.** | | |
| **TOTAL** | | | |

**Turn Over**

*©2022 Matigo Mock Examinations +256780413120 or +256702048636*

## SECTION A (30 MARKS)

**1.** What is the process whereby small molecules, such as glucose and urea, pass from the blood into the nephron at the Bowman's capsule?

A. Active transport
B. Diffusion
C. Selective reabsorption
D. Ultrafiltration

**2.** Which of the following correctly describes the changes that take place when a person looks at a distant object?

| | Ciliary muscle | Suspensory ligament | Shape of lens |
|---|---|---|---|
| A. | Contracts | Becomes less taut | Becomes more convex |
| B. | Contracts | Becomes taut | Becomes less convex |
| C. | Relaxes | Becomes less taut | Becomes less convex |
| D. | Relaxes | Becomes taut | Becomes less convex |

**3.** The stomach is considered as an organ, because…

A. it consists of a group of cells working together to digest food
B. it consists of different tissues working together to digest food
C. it is a basic unit of life
D. it produces digestive enzymes to digest food

**4.** Meiosis occurs during the production of human gametes. The number of chromosomes present in each cell before and after meiosis is best represented by…

A. $n \rightarrow 2n$
B. $n \rightarrow n$
C. $2n \rightarrow n$
D. $2n \rightarrow 2n$

**5.** The Rhesus blood group system is a human blood group system. It is the most clinically important blood group system after ABO. In humans, the allele for the Rhesus-positive trait (H) is dominant to the allele for the Rhesus-negative trait (h). If a heterozygous Rhesus-positive woman and a homozygous Rhesus-negative man have children, what is the probability of their first child being Rhesus-negative?

A. 25%  B. 50%  C. 75%  D. 100%

**6.** Excess amino acids are toxic to the human body, and must be deaminated. Excess amino acids are deaminated in the…

A. Ileum
B. large intestine
C. liver
D. stomach

**7.** The first step in the test for starch in a leaf, is to place the leaf in boiling water for about 5 minutes. What is the rationale for this step?

A. To denature all enzymes in the leaf
B. To make the leaf softer so that it is easier to test for starch
C. To remove air in the leaf
D. To remove chlorophyll from the leaf

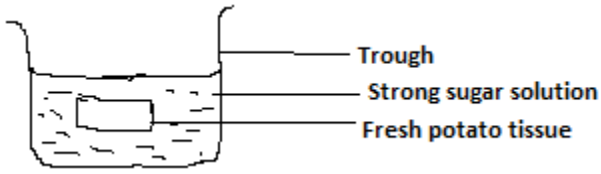
**8.** The following events occurs during inspiration in a man, except:

A. External intercostal muscles contracts
B. Internal intercostal muscles contracts
C. Diaphragm contracts
D. Internal intercostal muscles relaxes

**9.** In which order does light pass through these structures in the eye?

A. cornea → aqueous humour → lens → vitreous humour → retina
B. cornea → vitreous humour → lens → aqueous humour → retina
C. lens → aqueous humour → cornea → vitreous humour → retina
D. lens → vitreous humour → cornea → aqueous humour → retina

**10.** Study the investigation in the figure below.




Which of the followings describe what happens when the experiment is allowed to run for 1 hour?

A. Tissue loses water. The level of sugar solution in the trough rises.
B. Sugar diffuses into the tissue. The sugar level in the trough reduces.
C. Tissue decreases in size. Concentration of sugar solution reduces.
D. Both the size of the tissue and the level of solution remain the same.

**11.** Which sequence describes the flow of energy in an ecosystem?

A. carnivore → herbivore → plant → Sun
B. plant → herbivore → carnivore → Sun
C. Sun → carnivore → herbivore → plant
D. Sun → plant → herbivore → carnivore

**12.** After a volcanic eruption has covered an area with lava, which of the following is the mostlikely order of succession in the repopulation of the area?

A. lichens → grasses → shrubs → trees

B. mosses → grasses → lichens → trees

C. grasses → trees → mosses → lichens

D. shrubs → grasses → trees → lichens

**13.** Which organisms convert ammonium compounds to nitrates?

A. decomposing bacteria

B. nitrifying bacteria

C. decomposing fungi

D. nitrogen-fixing bacteria

**14.** The following constitute both blood and lymph except

A. Water

B. Lymphocytes

C. Dissolved food

D. Erythrocytes

**15.** Which blood vessel transports absorbed food substances to the liver?

A. Hepatic artery

B. Hepatic vein

C. Hepatic portal vein

D. Pulmonary artery

**16.** The process by which water enters the root hair cell is called

A. active transport

B. osmosis

C. diffusion

D. phagocytosis

**17.** Which conditions would cause a plant to wilt most rapidly?

A. High humidity, high temperature, high wind speed

B. High humidity, low temperature, high wind speed

C. Low humidity, high temperature, high wind speed

D. Low humidity, low temperature, high wind speed

**18.** Which of the following correctly describes the processes occurring in a person's skin when he takes a cold shower?

A. The arterioles constrict, and sweat glands are more active.

B. The arterioles constrict, and sweat glands are less active.

C. The arterioles dilate, and sweat glands are more active.

D. The arterioles dilate, and sweat glands are less active.

**19.** Sexual reproduction in spirogyra is described as

A. Fragmentation
B. conjugation
C. Budding
D. binary fission

**20.** To which phylum do liver flukes belong?

A. Mollusca
B. Platyhelminthes
C. Annelida
D. Arthropoda

**21.** What are the final products of anaerobic respiration in plants?

A. Carbon dioxide, water and energy
B. Carbon dioxide, water and alcohol
C. Carbon dioxide, alcohol and energy
D. Carbon dioxide and alcohol

**22.** What is the percentage of humus in soil if the following results were obtained in an experiment:

- Mass of empty crucible = 22g
- Mass of soil + crucible before drying = 50g
- Mass of soil + crucible after drying = 46g
- Mass of soil + crucible after heating to red hot = 44g

A. 25%
B. 7.14
C. 21.4%
D. 8.33%

**23.** Which one of the following parts of a seedling grows rapidly to bring about hypogeal germination?

A. Cotyledons
B. Epicotyl
C. Plumule
D. Hypocotyl

**24.** Which of the following is the most accurate method of measuring growth of an organism

A. Fresh mass
B. Dry mass
C. Linear dimension of length
D. Number of cells

**25.** The following are components of axial skeleton of mammals, except:

A. Sternum
B. Vertebrae
C. Ribs
D. Girdles

**26.** The following events occurs during the upstroke of flapping flight in birds except:

A. Pectoralis minor muscles contract
B. Pectoralis major muscles relax
C. Pectoralis minor muscles relax
D. Wings are pulled upward

**27.** Which one of these insects does not lay eggs in its lifecycle?

A. Bee
B. Grasshopper
C. Tsetse fly
D. Housefly

**28.** A woman gave birth to twins, a boy and a girl. Which one of the following statements is the only correct interpretation of this information?

A. Her uterus was large enough for two embryos to develop
B. Her ovaries produced two eggs which were both fertilized.
C. Her ovary produce on egg that was fertilized and divided to form two new zygotes
D. Twins were produced in past history

**29.** In a mammalian heart, the left ventricle is more muscular than the right because it

A. Pumps a lot of blood to the lungs.
B. Pumps blood to all parts of the body.
C. Receives blood from all parts of the body.
D. Receives more blood.

**30.** Which of the following are end products from digestion of cane sugar?

A. Sucrose and maltose.
B. Glucose and fructose.
C. Maltose and galactose.
D. Fructose and galactose

## SECTION B (40 MARKS)

**31.** The table below shows the results of an experiment on soil. Two glass tubes of equal diameter were filled with equal volumes of dry soil samples A and B, and one end of each tube was placed in water. The experiment was observed at intervals over a period of eight hours.

| Time | Height by water in cm | |
|---|---|---|
| | Soil sample A | Soil sample B |
| 0 | 0 | 0 |
| 0.5 | 15 | 5 |
| 1.0 | 25 | 15 |
| 2.0 | 28 | 32 |
| 4.0 | 30 | 41 |
| 6.0 | 30 | 46 |
| 8.0 | 30 | 48 |

(a) Plot a suitable graph of height reached by water in the two soil samples against time on the same axes *(7 marks)*

(b) What was the aim of the experiment? *(1 mark)*

……

(c) From the graph explain the difference in height reached by water in the two soil samples between;

(i) 0 and 2 hours *(4 marks)*

……

……

……

……

……

……

……

(ii) 2 and 8 hours *(4 marks)*

……

……

……

……

……

……

……

(d) State with a reason which soil sample has more plant nutrients *(2 marks)*

……

……

(e) Explain how the physical properties of soil sample B can be improved *(2 marks)*

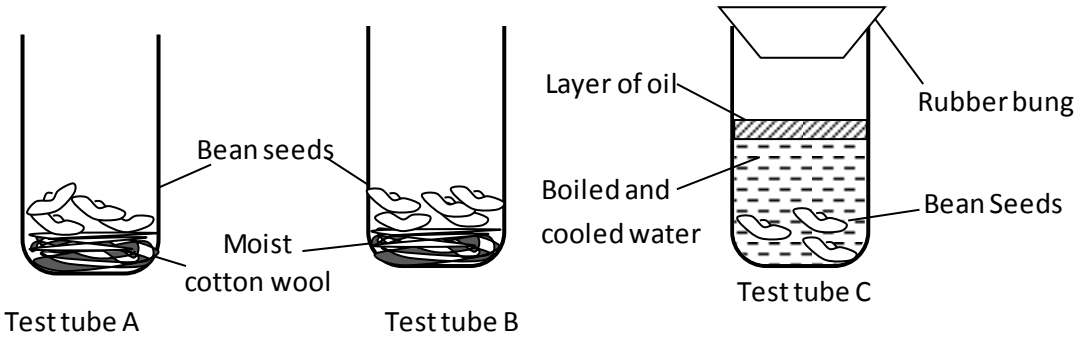
……

……

……

**32.** The experimental set up below is to investigate the environmental conditions affecting germination.

Test tube A and C are placed in the laboratory at $30^0$C, while test tube B in refrigerator at 4 $^0$C. Study the set up and answer questions that follow;




(a) What is the purpose of

(i) Boiling water in test tube C *( 1 mark)*

……

……

(ii) Keeping test tubes A and C at temperature $30\ ^0C$ *( 1 mark)*

……

……

(b) Explain what is observed after five days to seeds in

(i) Test tube A *(2 marks)*

……

……

……

(ii) Test tube B *(3 marks)*

……

……

……

……

(iii) Test tube C *(3 marks)*

……

……

……

……

**33.** In human: a gene that prevents blood to clot, a condition called haemophilia, is recessive to that of normal blood clotting. These genes are sex linked genes.

(a) What is meant by a sex – linked gene *(1 marks)*

……

……

……

(b) A man who is suffering from haemophilia married a woman who is normal but a carrier for the defective gene. Using suitable genetic symbols, work out the possible blood condition of their children *(6 marks)*

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

……

(c) Give **three** ways the study of genetics is useful to humans *(3 marks)*

(i)……

……

(ii)……

……

(iii)…….....,……

**.....**

## SECTION C (30 MARKS)

**34.** (a) What is **transpiration** *(1 marks)*

(b) Describe an experiment to show that the lower part of a leaf on a plant losses water faster than the upper part by transpiration . *(9 marks)*

(c) In what ways is transpiration,

(i) Advantageous to plants *(4 marks)*

(ii) Disadvantageous to plants *(1 marks)*

**35.** (a) Explain how a solid starchy food is broken down from the time it is taken Into the mouth to the time it is absorbed in the intestine. *(6 marks)*

(b) Describe how the products in (a) above are absorbed and assimilated in man. *(3 marks)*

(c) Describe the benefits of the mutualistic relationship between ruminants and their rumen microorganisms to:

(i) The ruminants *(2 marks)*

(ii) The microorganisms *(4 marks)*

**36.** (a) What is a **hormone**? *(1 mark)*

(b) How do ovarian and pituitary hormones interact to control the menstrual cycle in man *(9 marks)*

(c) Describe the formation of diploid zygote and triploid endosperm in angiosperms. *(5 marks)*

**37.** (a) Distinguish between the following:

i. Population and community *(1 marks)*

ii. Habitat and niche *(1 marks)*

(b) An avocado tree was found infested with 1000 caterpillars feeding on its leaves, 3 hawks feeding on the lizards, 10 lizards feeding on the caterpillars. Use the information to sketch the following:

i. A food chain for the organisms *(1 marks)*

ii. Pyramid of numbers *(2 marks)*

iii. Pyramid of energy *(2 marks)*

(c). Describe the effect of the different air pollutants. *(8 marks)*

**END**