Name: *Mr. Nyanzi Stephen* Stream:..... Signature: *Marking Guide*

553/1
BIOLOGY(THEORY)
Paper one
FEB 2020
2 hours

D†S

UGANDA MARTYRS' HIGH SCHOOL-LUBAGA

S.4 Mid-Term Topical Test I, TERM I 2020

(Excretion, Osmoregulation & Thermoregulation; Support, Movement and Locomotion)

INSTRUCTIONS: **TIME: 1½ HRS** **Date: 05/03/2020**

All questions in section A and B are compulsory.

SECTION A: 30 Marks

Answers to this section should be filled in the answer box below

	A	B	C	D			A	B	C	D
1					MARKS:	16				
2					SECTION	17				
3					A:.....	18				
4					SECTION	19				
5					B:.....	20				
6					SECTION C:	21				
7					.....	22				
8					TOTAL:.....	23				
9						24				
10						25				
11						26				
12						27				
13						28				
14						29				

15						30				

SECTION A: 20 Marks

1. Uric acid is the main nitrogenous waste in
   A: fishes **B: birds** C: amphibians D: mammals
2. Which pair of bones belong to human forearm?
   A: Femur and Radius B: Fibula and tibias
   C: Ulna and tibia D: humerus and Radius

Radius & Ulna: Free

3. Which of the following would contain the largest amount of protein?
   A: Blood plasma B: Glomerular filtrate
   C: urine D: serum
4. The main value of sweating in man is that during the process
   A: Excess water is removed from the body
   B: latent heat of vaporisation of water helps to cool
   C: Excess mineral salts are removed from the body
   D: the body gets rid of excess nitrogenous wastes
5. Steering in fish is achieved by the action of
   A: Caudal and dorsal fins.
   B: Caudal fins only.
   C: Caudal, Pelvic and pectoral fins.
   D: Caudal and anal fins.

Ventral fin and Anal fin; Free

6. The tail feathers in birds serve the functions of:
   A: Steering and increasing speed.
   B: Steering and balancing.
   C: Steering and reducing air resistance.
   D: Steering and increasing air resistance.

7. Which part of the brain is the temperature regulating center?
   A: Hypothalamus B: cerebrum
   C: cerebellum D: Pituitary body
8. Which of the following provides buoyancy in fish?
   A: Caudal fin B: Streamlined body
   C: Swim bladder D: Lateral line.
9. Where in the kidney nephron does re-absorption of sugar occur?
   A: first coiled part B: second coiled region
   C: Ascending limb of Henle's loop D: Descending limb of Henle's loop
10. Which of the following fins are paired?
    A: Pectoral and anal fins B: Caudal and dorsal fins.
    C: Pelvic and pectoral fins. D: Anal and pelvic fins.
11. Which of the following is not an excretory product?

A: carbon dioxide B: water

C: Feaces D: Nitrogenous wastes

12. The muscle responsible for the elevation of the wing of a bird is:

A: Pectoralis major **B: Pectoralis minor**

C: Biceps muscle D: Triceps muscle.

13. What happens to a person after consuming food with high salt content?

A: Osmotic pressure of his blood decreases

B: a lot of ADH will be produced by his pituitary glands

C: much urine will be produced

D: less ADH will be produced.

14. The skeletal and cardiac muscles are:

A: Striated muscles B: Myogenic muscles

C: Voluntary muscles D: Involuntary muscles.

15. Pitching in fish is prevented by the action of:

(i) Pectoral fins.

(ii) Pelvic fins.

(iii) Anal fins.

(iv) Dorsal fins.

A: i, ii & iii **B: i & ii** C: ii & iv D: I & iii.

16. Which one of the following requires a largest amount of water for excretion?

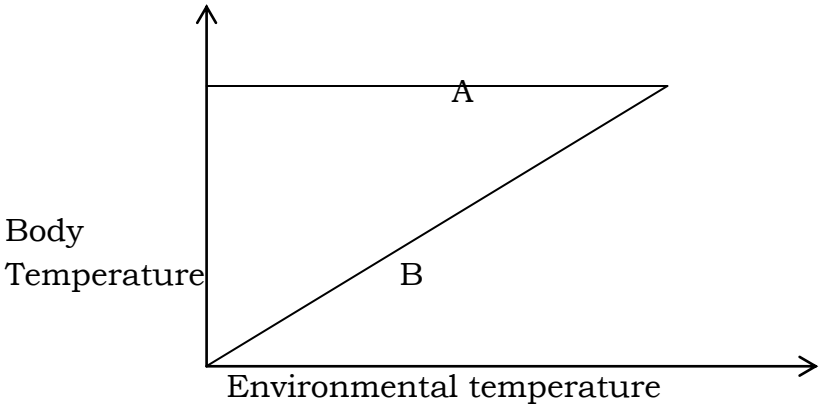
A: urea **B: ammonia** C: uric acid D: salts

17. The rate of glomerular filtration is highest in

A: man B: amphibians

C: Fresh water fishes D: marine fishes

18. Figure 2 shows how the body temperature of animals A and B vary with environmental temperature.



Which one of the following is demonstrated in the figure?

A: Body temperature of A is dependent on environmental temperature

B: Body temperature of B is dependent on environmental temperature

C: A has a higher body temperature than B
D: B loses more heat than A

19. What effect will the removal of the dorsal fin has on the locomotion of a fish?
    A: It's speed will be affected seriously.
    B:It will be unable to swim to the surface.
    C: It will tend to roll during forward movement.
    D: It will not be able to turn efficiently.

20. Urine contains no glucose since
A: the nephron is impermeable to glucose
B: Glucose passes back into the blood stream
C: the kidney converts glucose to urea
D: Glucose is used for respiration before reaching the collecting ducts.

21. The glomerulus of nephrons is located in the
    A: cortex B: pelvis C: medulla D: pyramid

22. The skeletal and cardiac muscles are:
    A: Striated muscles B: Myogenic muscles
    C: Voluntary muscles D: Involuntary muscles.

23. A fresh water bony fish produces
    A: isotonic urine **B: hypotonic urine**
    C: hypertonic urine D: concentrated urine
24. The main value of panting in a dog is that
    A: excess water is removed from the body
    B: latent heat of vaporization of water cools the body
    C: excess mineral salts are removed from body
    D: the dog relaxes from exhaustion
25. The element that is essential for the formation of both plant cells and bones in animals is:
    A: Iron B: Calcium **C: Phosphorous** D: Plasmodium
26. The skeletal and cardiac muscles are:
    A: Striated muscles B: Myogenic muscles
    C: Voluntary muscles D: Involuntary muscles.

27. Which of the following is true about the ball and socket joint?
    A: It allows movement in one plane.
    B: It allows movement in two planes.

C: It allows movement in many planes.
D: It allows rotation of certain parts on others.

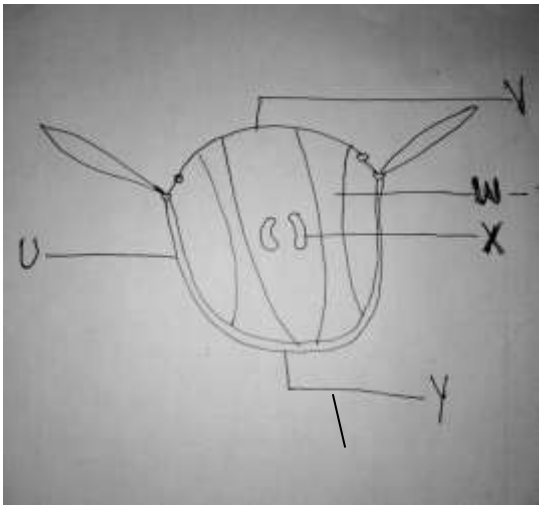
28. The skeletal and cardiac muscles are:
A: Striated muscles B: Myogenic muscles
C: Voluntary muscles D: Involuntary muscles.

29. Which of the following types of feathers is most widespread?
A: covert feather **B: filoplumes**
C: Quill feathers D: down feathers.

30. Which one of the following layers of the human skin insulates the body against heat loss?
A: Granular layer B: malphigian layer
C: sub-cutaneous layer D: conified layer

SECTION B: 20 Marks

31. The following is a diagram of an insect. Use them to answer questions that follow:



(a) With a reason, name the type of muscles shown in the diagram above (02 Marks).
Type of muscle: *Indirect muscles; 01 Marks;*
Reason: *They are not directly attached on the wings; but on the exoskeleton; 0½ Marks@; Total 01 Marks;*

(b) Name the muscles labeled W and X, and the exoskeleton segments labeled U, V and Y ($02\frac{1}{2}$ Marks).
U: *Pleuron;*
V: *Tergum;*
W: *Dorso-ventral muscle;*

X: *Longitudinal muscle;*
Y: *Ventral;* ***0½ Marks@; Total 2½ Marks***

(c) Explain the changes in the above parts that result into upward and downward movement of the wings: (04 Marks).

Upward stroke:

- *Dorso-ventral muscle (Muscle W) contracts;*
- *Longitudinal muscle (X) relaxes;*
- *The tergum (V) is pulled downwards;*
- *The wings are raised/elevated;*

01 Mark@; Total 04 Marks;

Downward stroke:

- *Dorso-ventral muscle (Muscle W) relaxes;*
- *Longitudinal muscle (X) contracts;*
- *The tergum (V) is pulled upwards/raised;*
- *The wings are depressed/lowered;*

01 Mark@; Total 04 Marks;

(d) State any three ways by which insects are adapted to flight ($01\frac{1}{2}$ Marks).

- *Strong exoskeleton; to offer strong attachment for flight muscles;*
- *Light body; to be easily carried in the air;*
- *Strong hind legs; to offer strong propulsive/forward force;*

0½ Marks@ structural feature;

32. (a) Explain how the mammalian body restores it's osmotic pressure following a meal of porridge (06 marks).

- *This type of meal lowers the osmotic pressure (solute concentration) of blood; below the normal level; (Or It dilutes the blood; below the normal solute concentration ;)*
- *The high osmotic pressure of the blood is detected; by the osmotic receptor cells; of the hypothalamus; when blood passes there.*
- *The hypothalamus suppresses/prevents ADH production; by the pituitary;*
- *This lowers the permeability of the kidney tubules to water; lowering water re-absorption into the blood stream;*
- *This results into production of large quantities; of dilute urine; (Or hypotonic urine;*
- *The osmotic pressure of blood is raised back to the normal level; (Or The solute concentration of blood is raised back to the normal level).*

$0\frac{1}{2}$ *Mark@*

SECTION C: 15

Answer only one question (In the space left below)

33. (a) Explain how the mammalian body responds to cold weather (11 marks).

- *The fall in body temperature below the normal is detected by thermo-receptors in the hypothalamus;*
- *In response, the thermo-receptors send nerve impulses to the skin; which produce the following physiological responses which raises the body temperature back to the normal;*
- *Vasoconstriction(narrowing of the body vessels near the skin); the volume of blood flowing near the skin surface is reduced; which reduces the amount of heat lost from the body to the surrounding environment;*
- *Reduction of sweat production; to conserve the heat that would have been lost by the evaporation of the sweat;*
- *Contraction of Hair Erector pili muscles; this makes the hairs to stand almost upright on the skin surface; trapping a layer of air close to the skin; which insulates the body against heat loss;*
- *Increase in Metabolic rate; to generate a lot of metabolic heat in the body;*
- *Shivering: due to involuntary rapid contraction of the skeletal muscles; which produces much heat;* ***$0^1/_2$ Marks@ for any 12 points***

(b) How are animals in temperate areas adapted to that type of weather (04 marks)

- *Hibernation; (when an animal falls asleep in a burrow or nest) all its metabolic body activities slowed down; reducing amount of energy used;*
- *Thick sub-cutaneous fat beneath their skin; which insulates the body from heat loss; (which helps to keep the animals warm)*
- *Have thick fur; which traps a layer of air close to the skin surface; The air, being a poor conductor of heat, it insulates the body against heat loss;*
- *Have reduced exposed body extremities/extensions/projections; (These animals have very small nose, ears, tail and eyes) this reduces the total surface area of exposed parts; reducing heat loss from the body;*

$0^1/_2$ Marks@ for any 08 points; Maximum 04 Marks;

34. (a) Describe how movement occurs at a named hinge joint (09 Marks)

- ***Hinge Joint**: Elbow Joint;*
  ***Movement**:*
  ***Flexing/Bending/Folding**;*
- *Biceps muscle contracts;*
- *Triceps muscle relaxes;*
- *Radius is pulled upwards; (**Accepted:** Fore hand is pulled upwards)*
- *Arm is folded/bent at the elbow;*
  ***Straightening**;*
- *Biceps relaxes;*
- *Triceps contracts;*
- *Ulna pulled downwards; (**Accepted**: Fore arm pulled downwards)*
- *Arm straightens; **01 Mark@; Maximum 09 Marks;***
  Alternative:
- ***Hinge Joint**: Knee Joint;*
  ***Movement**:*
  ***Flexing/Bending/Folding**;*
- *Flexor muscle contracts;*
- *Extensor muscle relaxes;*
- *The femur and tibia bones are pulled towards each other (Or tibia is pulled towards femur);*
- *Leg is folded/bent;*
  ***Straightening**;*
- *Flexor muscle relaxes;*
- *Extensor muscle contracts;*
- *Femur and tibia bones are pulled away from each other (Or tibia pulled away from femur);*
- *Leg straightens;*
  01 Mark@; Maximum 09 Marks;

(b) Explain the importance of the human skeleton. (06 Marks)

- *Offers support to the body;*
- *Aids process of movement and locomotion of the body;*
- *Protects inner delicate organs from mechanical damage;*
- *Manufacture of red blood cells;*
- *Aiding the process of hearing by the ossicles (ear bones) in the ear;*
- *Aids the process of breathing/ventilation; **01 Mark@; Total 06 Marks***