Candidate's Name:……

Signature:……Index Number……/……/……

553/1

BIOLOGY

(THEORY)

Paper 1

2019

UGANDA CERTIFICATE OF EDUCATION

BEGINNING OF TERM TWO EXAMINATIONS 2019

BIOLOGY PAPER ONE (THEORY)

TIME 2HOURS 30MINUTES

INSTRUCTION TO CANDIDATES

- **The paper consists of section A, B and C**
- **Answer all questions in section A and B , plus any two questions from section C**
- **Write the answers to section A in the boxes provided, and answers to section C in the answer booklet provided.**

For examiners' Use Only		
Section	**Marks**	**Examiners' signature and number**
A:		
B: No.31 **No.32** **No.33**		
C: No. **No.**		
Total		

SECTION A (30 MARKS)

1. In which one of the following association do both organism benefit?

A. Round worms in human gut B. Fungi and algae living together

C. Liver fluke in a liver of fish D. Plasmodium in human blood.

2. A soil with poor water retention ability has;

A. Low capillarity B. Small particles

C. Poor aeration D. Poor drainage

3. Which one of the following factors favours cross pollination?

A. Stamens and carpels maturing at the same time.

B. Flowers remaining closed after maturing at the same time.

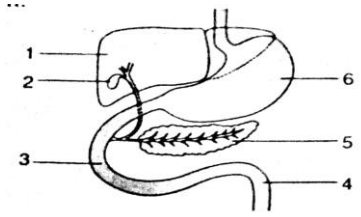
C. Stamens being situated below the stigma

D. Style being shorter than the filament.

4. In vertebrates the joint between an axis and atlas vertebrae is known as

A. Ball and socket joint B. Hinge joint C. Pivot joint D. Gliding joint

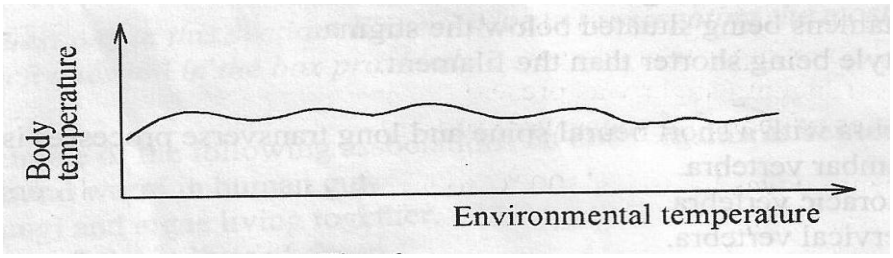
5. The figure below is part of the human digestive system.



The parts that secrete enzymes which digest proteins are

A. 2, 3, 5 B. 4, 5, 6 C. 1, 2, 4, 5 D. 3, 4,5, 6

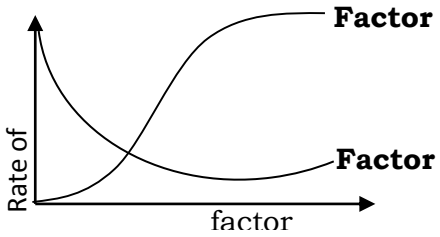
6. Figure below shows the variation of body temperature of an animal with environmental temperature.



Which of the following animals would have its temperature varying as shown in the figure?

A. Snake B. bird C. Toad D. Snail.

7. The graph below shows the rate of transpiration under tow different external conditions.



What are factors **X** and **Y**?

	X	**Y**
A.	Temperature	Air movement
B.	Air movement	Atmospheric pressure
C.	Atmospheric pressure	Humidity
D.	Humidity	Temperature

8. A dry soil sample was heated to a constant weight, which component of soil was being investigated?

A. Organic matter B. Air C. Micro-organisms D. Water

9. Which of the following sets consists of only dry indehiscent fruits

A. Achene, cypsela, nut
B. Cryopsis, legume, capsule
C. Achene, follicle, legume
D. Schizocarp, capsule, caryopsis

10. Which of the following structures of a bony fish enables it to vary its density while swimming?

A. Lateral line B. Dorsal fin C. Pectoral fin D. Swim bladder

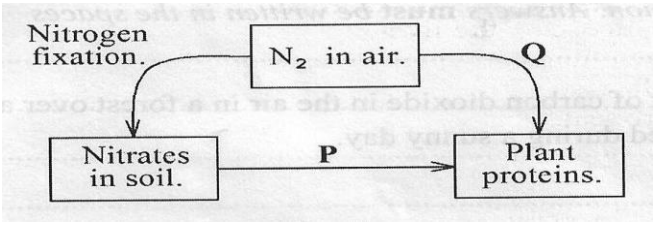
11. An embryo from the mating of two red haired foxes is transplanted into the uterus of a brown haired fox. The allele for brown hair is dominant. The resulting offspring will have

A. Red hair
B. Red hair with brown spots
C. Brown hair with red spots
D. Brown hair

12. Which of the following is a vector for yellow fever?

A. Aedes mosquito
B. Culex mosquito
C. Anopheles mosquito
D. Black fly

13. The figure below represents part of nitrogen cycle. The processes P and Q are..... respectively.



A. absorption and nitrification
B. Absorption and nitrogen fixation
C. Decomposition and denitrification
D. death and putrefication

14. Which type of roots are found on a rhizome?

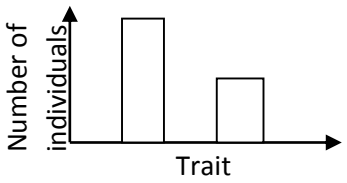
A. Adventitious roots
B. Fibrous roots
C. Tap roots
D. Lateral roots

15. Which vessel carries blood rich in end products of digestion?

A. Hepatic vein
B. Hepatic artery

C. Hepatic portal vein D. Renal artery

16. The figure bellow shows the distribution of a trait amongest individuals.

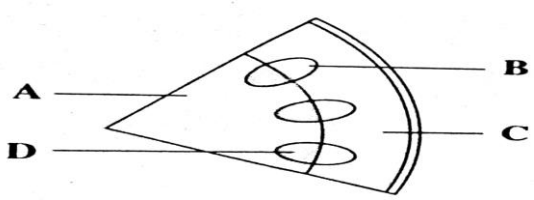


Which of the following traits will have the type of graph shown?

A. Body weight C. Blood group

B. Height of individual D. Tongue rolling

17. The figure below shows a cross section of a dicotyledonous stem. Which labeled part is the site for transportation of mineral salts and water?



18. Presence of wax in the ears may result into poor perception of sound because the;

A. Ossicals cannot move freely

B. Ear drum is unable to vibrate properly

C. Eustachian tube is unable to balance the air pressure in the ear

D. Oval window becomes rigid

19. In which region of the mammalian vertebral column does the vertebra with verterbraterial canals found?

A. tail region B. Abdominal C. chest region D. Neck region

20. An individual who secretes insufficient amounts of Antidiuretic hormone is likely to pass out….

A. low quantities of dilute urine C. low quantities of concentrated urine

B. large quantities of concentrated urine D. Large quantities of dilute urine

21. Which of the following is not a characteristic adaptation of insects to flight?

A. Light B. Strong flight muscle

C. Hollow bones D. Streamline body

22. Which of the following methods would best determine the rate of growth of a seedling?

A. Length of radicle and fresh weight B. Diameter of radicle and dry weight

C. Length of radicle and dry weight D. Diameter of radicle and dry weight

23. The following are products of tissue respiration in living organisms

(i) Energy, **(ii)** water, **(iii)** carbon dioxide, **(v)** ethanol, **(vi)** lactic acid

Which of them are common to both aerobic and anaerobic respiration in plants?

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

24. Which one of the following enzymes works best at low pH?

A. Pepsin B. putyline C. Trypsin D. Lipase

25. Which one of the following is the reason why finger prints were chosen for use on national identity cards?

A. Finger prints are easy to get
B. Finger prints show continuous variation
C. Finger prints show discontinuous variation
D. Finger prints are common

26. Which of the following changes is catalysed by salivary amylase?

A. Maltose to glucose
B. Sucrose to glucose and fructose
C. Starch to maltose
D. Lactose to glucose and galactose

27. Which of the following substances is not contained in the glomerular filtrate?

A. Urea B. Plasma proteins C. Glucose D. Mineral salts

28. Which of the following control measures against mosquitoes is least harmful to the environment?

A. Draining swamps
B. Spraying with insecticides
C. Covering surfaces of stagnant water with oil
D. Introducing fish in ponds to feed on mosquito larva

29. A tip of bean root was marked with black ink at uniform intervals. After 3 days, it was noted that some intervals were longer than others. The conclusion from this is that

A. The ink accelerated growth in some parts of the root tip
B. There was no growth in some parts of the root tip
C. The rate of cell elongation in part of the root tip is not uniform
D. Cells in the longer region differentiated more than those in short intervals

30. A cell which has 12 chromosomes and it divides by mitosis. What is the result?

A. four nuclei with 6 chromosomes each
B. Two nuclei with 6 chromosomes each
C. Two nuclei with 12 chromosomes each
D. Four nuclei with 24 chromosomes each

SECTION B (40MARKS)

31. The table 1 below shows the body surface area and volume of two land animals A and B.

Table 2 shows the rate of metabolism of the two animals at varying environmental temperatures.

Study them and answer the questions that follow.

TABLE 1

Mammal	**Surface area (m^2)**	**Volume (m^2)**
A	1.2	0.92
B	0.6	0.18

TABLE 2

Environmental temperature (^0C)	**Metabolic rate of mammals (arbitrary units)**	
	A	**B**
16	10.5	12.9
18	8.9	10.9
20	7.5	9.2
22	6.4	7.8
24	5.6	6.7
26	5.0	5.8

a) From table 1:

i) Work out the surface area to volume ratio for each mammal. [02 marks]

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ii) State the structural differences between mammal **A** and mammal **B**. [02 marks]

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b) Plot on the same graph, the metabolic rate of the mammals **A** and **B** against environmental temperature. [07 marks]

c) From your graph, determine the metabolic rate of each mammal at 25 ^{0}C. [02 marks]

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d) (i) How does the environmental temperature affect the metabolic rate of mammals? [02marks]

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(ii).Explain why variation of temperature affects the metabolic rate of the mammals as stated in (c) (i) above [02marks]

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e) From the information provided, explain why at any temperature the metabolic rate of mammal **B** is higher than that of mammal **A**. [03marks]

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32. a) State what happens in each of the following types of flight in birds. [03marks]

i) Hovering

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ii) Gliding

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iii) Soaring

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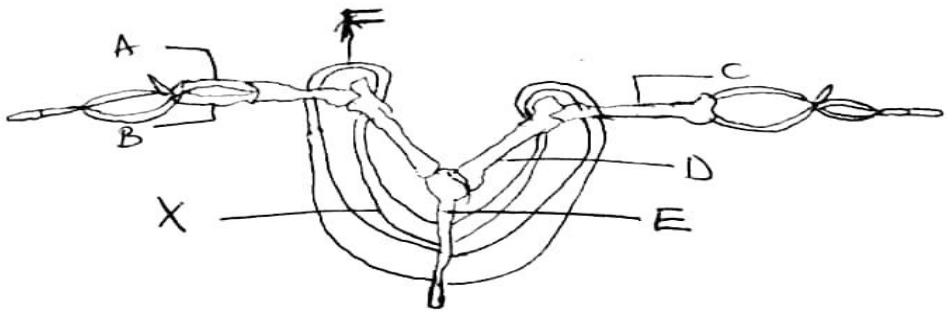
b) The figure below shows part of a skeleton of a bird. Study it and use it to answer the questions that follow.



i) Name parts labelled **A**, **B**, **C**, **D**, **E** and **F**. [03 marks]

A .....**B**.....

C .....**D**.....

E .....**F**.....

c) Outline the sequence of events that would result during active flight when muscle labelled **X** relaxes. [04 marks]

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33. a) Differentiate between **dominant** and **recessive allele.** [01mark]

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b) Some students in biology class mated fruit fries with red eyes. They looked at the eye colour of 1568 off springs and found that 1176 had red eyes. Let **R** represent the allele for red colour and **r** represent allele for brown colour in fruit flies.

i) What was likely genotype of the parents? [01mark]

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ii) Red eyed flies used (b) were mated with brown eyed flies, if 1354 fruit flies were produced, **calculate** the number of red eyed offspring produced. Show your working. [06marks]

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c) Give four practical applications of the knowledge of human genetics. [02 marks]

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SECTION C (30 MARKS)

34. a) Describe the process of

i) Exhalation

ii) Inhalation in man [08 marks]

b) Explain how are the human lungs suited for their function as respiratory organs? [07 marks]

35. a) Define the term homeostasis [01 mark]

b) Describe the role of the pancreas in regulation of blood sugar. [08 mark]

c) Explain the biological significance of maintaining a constant blood sugar level.[02 marks]

d) Explain the how mammalian skin responds to cold temperatures. [04 marks]

36. a) What is meant by **astigmatism**? [01mark]

b) How does the human eye adjust its self for; [09 marks]

i) seeing in dim light

ii) focusing near object

c) State the differences between **short sightedness** and **long sightedness** [05marks]

37. a) State the **roles of the lymph** in the human body. [05marks]

b) In what ways;

i) does the **lymphatic system differ** from the **blood circulatory** system? [06marks]

ii) are red blood cells different from white blood cells? [04marks]

END