Names:……**Index No:** ……...……

School Exam Number: ……..…**Signature**:…….……

*Candidates should **NOT** write their Centre Name or Centre Number anywhere on this booklet*

P530/1
BIOLOGY
THEORY
Paper 1
23 July 2018
2 ½ hours

ENTEBBE JOINT EXAMINATION BUREAU

Uganda Advanced Certificate of Education

BIOLOGY THEORY

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

*This paper consists of **two*** Sections **A** *and* **B**.

*Answer **all** questions in both* Sections.

For Section ***A,*** *fill the letter of the right answer in the **answer grid** on Page 8.*

For Section ***B****, write answers in the spaces provided and not anywhere else.*

No additional sheets of paper should be inserted in the booklet.

FOR EXAMINER'S USE ONLY		
SECTION	**MARKS**	**NO & SIGNATURE**
A: 1 – 40		
B: 41		
42		
43		
44		
45		
46		
TOTAL		

SECTION A (40 MARKS)

1. Which one of the following has a sole function of offering support to the plant?

A. Sclerenchyma and vessel elements
B. Vessel elements and tracheids
C. Sclerenchyma and collenchyma
D. Parenchyma and collenchyma

2. Which of the following is true about sex-linked characters in humans?

A. Females never suffer from the trait
B. Fathers do not pass on character to their sons.
C. Females are either normal or carriers
D. Males are either carriers or sufferers

3. The similarities of the skeletal structures of moles, monkeys and whales lead to the conclusion that they

A. belong to the same class
B. originate from the same environment
C. descend from a common ancestor
D. evolved convergingly.

4. Which of the following sets of characteristics is an adaptation in mammals to desert conditions?

A. Uric acid production and short loop of Henle.
B. Long loop of Henle and urea production.
C. Ammonia production and long loop of Henle.
D. Short loop of Henle and urea production.

5. Which of the following parts of a muscle fibre remains the same length in both a contracted and relaxed muscle?

A. Sarcomeres
B. H – zones
C. Light bands
D. Dark bands

6. The following processes occur in a seedling during germination.

(i) Rapid cell division and cell enlargement
(ii) Production of hydrolytic enzymes
(iii) Secretion of gibberelic acid
(iv) Reduction in dry mass of the endosperm

The correct order of the sequence of occurrence is

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

7. The ability of a police dog to trace accurately the route taken by a suspect is an example of

A. habituation
B. latent learning
C. imprinting
D. insight learning

8. In poultry, feather colour is controlled by two sets of alleles, ***W*** *(white)* dominant over ***w***, coloured and ***B*** *(black)* dominant over ***b*** *(brown).* A fowl heterozygous for both alleles *(W or Bb)* is white. This is an example of

A. gene complementarity.
B. epistasis.
C. pleiotropy.
D. incomplete dominance

9. A person's blood group is type *A* if his/her

A. red blood cells carry only *B*-antigen.
B. blood plasma contains an antibody *b*.
C. blood plasma contains only antigen *A*.
D. blood plasma contains neither antibody *a* nor *b*.

10. The following occur during senescence except:

A. hardening of arteries.
B. shrinking body size.
C. increased sensitivity.
D. mental sterility.

11. During the heat of the day, control of stomata movements to reduce excessive water loss is due to

A. active accumulation of mineral ions in the guard cells.
B. Synthesis of abscisic acid.
C. inter conversion of glucose and starch in guard cells.
D. synthesis of glucose during photosynthesis.

12. Which of the following physiological roles of phytochrome *Pr* and *Pfr* is **not** correctly matched?

	Physiological process	*Pr*	*Pfr*
A.	Flowering in long day plants	Inhibits	Promotes
B.	Flowering in short day plants	Promotes	Inhibits
C.	Leaf expansion	Inhibits	Promotes
D.	Elongation of internodes	Promotes	Inhibits

13. Which of the following is not true about both blood circulatory system and lymphatic system in mammals? The fluid in both systems contains

A. excretory products.
B. leucocytes.
C. dissolved food.
D. plasma proteins.

14. Which one of the following may not always form part of a bacterium cell?

A. Cell wall.
B. Ribosomes.
C. Mesosomes.
D. Cytoplasm.

15. Predators in trophic levels of a food chain are most severely affected by non biodegradable pesticides because

A. they have rapid reproductive systems.
B. their systems are highly sensitive to chemicals.
C. they cannot store pesticides in their tissues.
D. such pesticides accumulate along the food chain.

16. When the shoot apex of the growing plant is removed, lateral growth is encouraged because

A. auxins are activated in buds.
B. growth of lateral buds is stimulated by gibberellins.
C. more abscisic acid is produced to promote lateral growth.
D. cytokinins are activated in absence of auxins from the apex.

17. Net primary productivity in C_4 plants is higher than that in C_3 plants because

A. C_4 plants have a higher turnover rate.
B. photorespiration occurs in C_3 plants.
C. the rate of respiration is high in C_3 plants.
D. energy accumulates at higher rate in C_4 plants.

18. In a population that is in Hardy – Weinberg equilibrium, 16% of the individuals show the recessive trait. What is the frequency of the dominant alleles in the population?

A. 0.6
B. 0.84
C. 0.4
D. 16

19. During photosynthesis, the major advantage of the C4 pathway is to

A. fix carbon dioxide in the Calvin cycle.
B. concentrate carbon dioxide in the cells of leaves.
C. fix carbon dioxide from the atmosphere into the leaves.
D. store carbon dioxide in from of organic acids.

20. Which of the following would contribute to greenhouse effect?

A. Use of nuclear power.
B. Use of fossil fuels.
C. Excessive use of fertilisers.
D. Accumulation of sewage in water bodies.

21. Which one of the following processes would continue to take place in a living plant whose Golgi apparatus has been destroyed?

A. Formation of polypeptides.
B. Autolysis of redundant organelles.
C. Formation of primary cell walls.
D. Production of extra-cellular enzymes.

22. How many times must a molecule of oxygen diffuse across a cell surface membrane in passing from alveolar air space to haemoglobin?

A. 2
B. 4
C. 5
D. 8

23. The lack of a nucleus in a red blood cell enables it to

A. have a high affinity for oxygen.
B. be more permeable to oxygen.
C. contain enough oxygen.
D. contain more haemoglobin.

24. A desert mammal's lower lethal temperature is higher than that of a mammal living in cold regions because a desert mammal has

A. Small extremities
B. Poor insulation mechanism
C. Thick fur
D. small surface area : volume ratio

25. In the HIV virus, the role of enzyme 'reverse transcriptase' is to

A. make DNA from RNA.
B. unite viral DNA with host's DNA.
C. release viral DNA to make proteins.
D. transfer DNA from host into the virus.

26. In ferns, gametes are produced by the

A. gametophytes through mitosis.
B. sporophytes through meiosis.
C. sporophytes through mitosis.
D. gametophytes through meiosis.

27. Which one of the following would decrease the cardiac rate in a mammal?

A. Increase in carbon dioxide content in blood.
B. Increase in partial pressure of oxygen in blood.
C. Accumulation of lactic acid in tissues.
D. Secretion of adrenaline into blood.

28. Leaf fall in deciduous plants is initiated by a hormone called

A. Auxins
B. Cytokinin
C. Gibberellins
D. Abscisic acid

29. Which of the following does not involve a cascade of reactions in the body?

A. Blood clotting
B. Conversion of glycogen to glucose by adrenaline.
C. Regulation of blood sugar by cortisol hormone.
D. Conduction of an impulse along the nerve fibre.

30. A plant cell is magnified x2000 and the length of one chloroplast is 16 mm. what is the actual length of the chloroplast in micrometers?

A. 0.16.
B. 8.
C. 1600.
D. 3200.

31. One of the roles of the glycoprotein and glycolipids on the surface of the cell membrane is to

A. increase the absorbing surface area
B. provide receptor site for recognition of stimuli
C. provide sites for various reaction pathways.
D. separate the contents of the cell from the surrounding environment.

32. A primary meristematic tissue in plants that gives rise to the cortex is the

A. ground meristem.
B. protocambium.
C. protoderm.
D. protoxylem

33. A close relationship between the action spectrum for photosynthesis and absorption spectrum of the chlorophylls indicates that

A. All the light absorbed by the chlorophylls is used in photosynthesis.
B. Chlorophylls are responsible for absorption of light in photosynthesis.
C. Photosynthesis proceeds after light absorption.
D. Light energy is trapped in chlorophylls.

34. A muscle cell of an animal was found to contain 24 chromosomes. How many chromosomes would a germinal epithelium cell within the ovary of the animal contain?

A. 24
B. 12
C. 48
D. 36

35. Which one of the following cells is most vulnerable to HIV?

A. Memory cells.
B. T – killer cells.
C. T – helper cells.
D. B – cells.

36. After an action potential, re-polarisation of the membrane begins by

A. entry of sodium ions into the cell.
B. sodium ions diffusing out of the cell.
C. potassium ions diffusing out of the cell.
D. potassium ions actively moving out of the cell.

37. A shark *(fish)* and porpoise *(mammal)* are both adapted for swimming. This is an example of

A. adaptive radiation.
B. convergent evolution.
C. divergent evolution.
D. speciation.

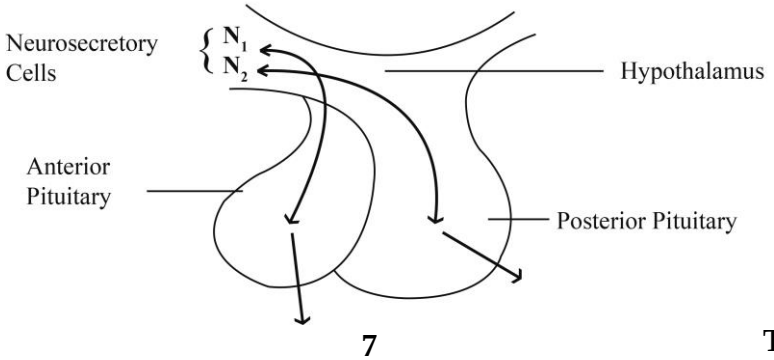
38. The transport of photosynthetic products in a plant from the photosynthetic cell to adjacent transfer cells occurs by

A. active transport.
B. mass flow.
C. osmotic movement.
D. cytoplasmic streaming.

39. The internal solute concentration of a plant cell is about 0.8 M. to demonstrate plasmolysis, it would be necessary to suspend the cells of the plant in external solution with solute concentration of

A. 0.4 M
B. 0.8 M
C. 0.0 M
D. 1.0 M

40. Figure 1 below shows the structure of the pituitary gland and its relationship to the hypothalamus.



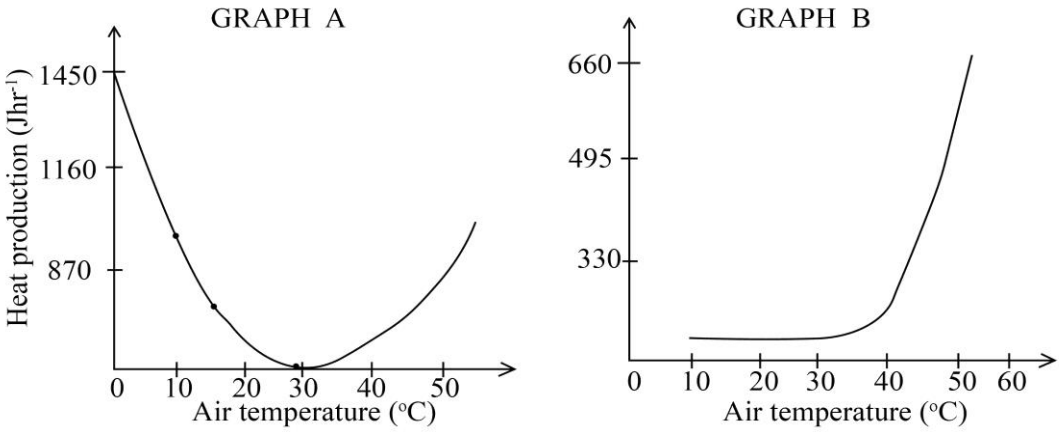
Turn Over

By what means is N_1 connected to anterior pituitary gland from hypothalamus?

A. Nerve impulses
B. Synaptic impulses
C. Portal blood vessels
D. Hormonal communication

SECTION B: (60 MARKS)

41. Figure 2 below shows the relationship between air temperature and heat production *(Graph A)* and heat loss *(Graph B)* in humans.



(a) Describe the relationship between the changes in air temperature and the

(i) rate of heat production in humans. *(02 marks)*

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(ii) rate of heat loss in humans. *(02 marks)*

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(b) Explain the form of Graph A. *(03 marks)*

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(c) Explain the observed rate of health loss in graph B below 30^0 C of the air temperature. *(02 marks)*

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(d) State how the hypothalamus acts as a thermostat. *(01 mark)*

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42. (a) Explain the following observations:

(i) The volume of air exchanged in the alveolus is less than that inhaled. *(02 marks)*

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(ii) Parallel flow system is an efficient mechanism of gaseous exchange. *(02 marks)*

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(b) Explain how the carbon dioxide in blood is expelled as gaseous carbon dioxide by the lungs. *(2 ½ marks)*

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43. The table below shows the number of invertebrates that were collected from the litter of adjacent grassland and woodland areas.

Invertebrates	**Grassland**	**Woodland**
Spiders	5	12
Beetles	13	3
Worms	0	15
Mollusks	0	6
Millipedes	0	5

(a) Suggest any **three** reasons why more invertebrates were found amongst the litter of woodland than the grassland area. *(03 marks)*

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(b) Give **three** structural adaptations that enable the beetles to exist in the grassland area. *(03 marks)*

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(c) State **four** characteristics of millipedes that enable them to survive in the woodland. *(04 marks)*

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44. (a) Explain how fatty acids are modified in order to reach the blood stream in mammals? *(03 marks)*

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(b) State **three** properties of fats that make them suitable for storage. *(03 marks)*

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(c) Amino acids are not stored in the body. State what happens to excess amino acids in the body of a human. *(04 marks)*

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45. (a) Distinguish between **the endocrine system** and **the nervous system.** *(02 marks)*

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(b) Describe the role of the thyroid stimulating hormone in the increase of metabolic rate in the body. *(02 marks)*

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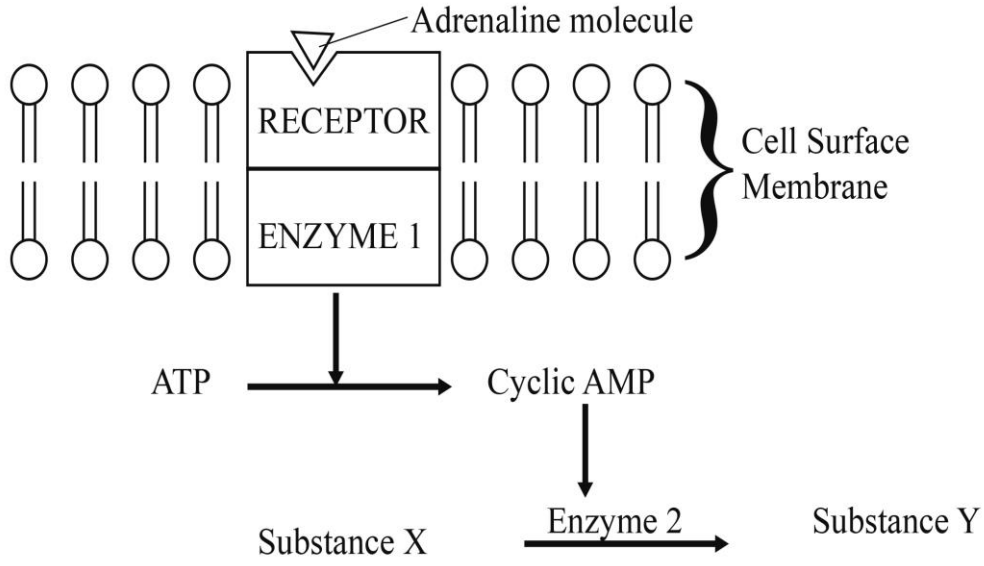
(c) The diagram below summarises the way in which adrenaline can control a chemical reaction in a liver cell.



(i) Name the enzymes ***1*** and ***2***. *(01 mark)*

Enzyme ***1*** ……

Enzyme ***2*** ……..

(ii) Name substances ***X*** and ***Y***. *(01 mark)*

Substance ***X***……

Substance ***Y*** ……..

(iii) Using the diagram above, briefly describe how a single molecule of adrenaline may cause the liver cell to produce large amounts of substance ***Y***. *(04 marks)*

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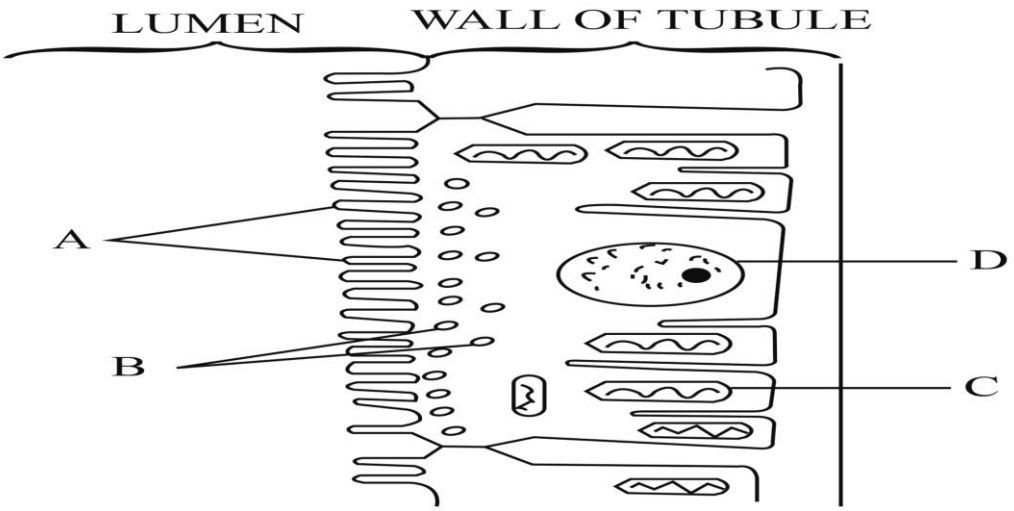
46. The figure below shows the epithelial cells taken from the proximal convoluted tubule.



(a) Label parts ***A*** – ***D***. *(02 marks)*

A. ……..

B. ……..

C. ……..

D. ……..

(b) With evidence from the diagram, give the process by which materials are mainly moved across the wall of the tubule. *(02 marks)*

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(c) Give **three** ways in which the structure above is adapted to its functions. *(03 marks)*

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(d) (i) Why are amphibians the least adapted vertebrates for terrestrial life? *(01 mark)*

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(ii) An Australian desert frog *chiroloptes*, is one of the four amphibians able to survive in extremely dry conditions.

Give **two** ways in which they are able to achieve this.

(02 marks)

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END