Candidate's Name: ….……

Signature: ……...……..……..

MOCK SET I EXAMINATIONS 2019

Uganda Advanced Certificate of Education
BIOLOGY (THEORY)
P530/1
HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

- This paper consists of sections A and B.
- Answer all questions in both sections.

SECTION A:

- Answers to this section must be written in boxes provided.

SECTION B.

- Answers to this section should be written in the spaces provided and not anywhere else. No additional sheets of paper should be inserted in this booklet.

For Examiner's use only	
Section	Marks
A: 1-40	
B: 41	
42	
43	
44	
45	
46	
Total	

SECTION A (40 MARKS)

1. Which one of the following cell structures can be seen with a light microscope?

   A. Mitochondria
   B. Rough endoplasmic reticulum
   C. Ribosome
   D. Smooth endoplasmic reticulum

2. The use of electrons as a source of radiation in which electron microscope allows high resolution to be achieved because electrons:

   A. Are negatively charged
   B. Can be focused using electron magnet
   C. Have a very short wavelength
   D. Travel at the speed of light.

3. Which one of the following structures is found in animal cells, but not in plant cells?

   A. Cell surface membrane
   B. Centriole
   C. Chloroplast
   D. Golgi body

4. What type of chemical reaction is involved in the formation of disulphide bonds?

   A. Condensation
   B. Hydrolysis
   C. Oxidation
   D. Reduction

5. Figure 1 below shows an enzyme and two inhibitors of the enzyme, X and Y. which of the following describes the two inhibitors?

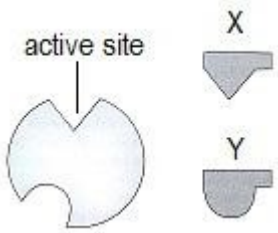


fig.1

   A. X and Y are competitive inhibitors
   B. X and Y are non-competitive inhibitors
   C. X is a competitive inhibitor and Y is a non-competitive inhibitor
   D. X is a non-competitive inhibitor and Y is a competitive inhibitor

6. If methylene blue dye is added to a suspension of yeast cells, living cells do not take up the stain, and they remain colourless. However, dead cells are stained blue. This fact was used to carry out an investigation into the rate at which yeast cells were killed at two different temperatures. The results are shown below in figure 2.

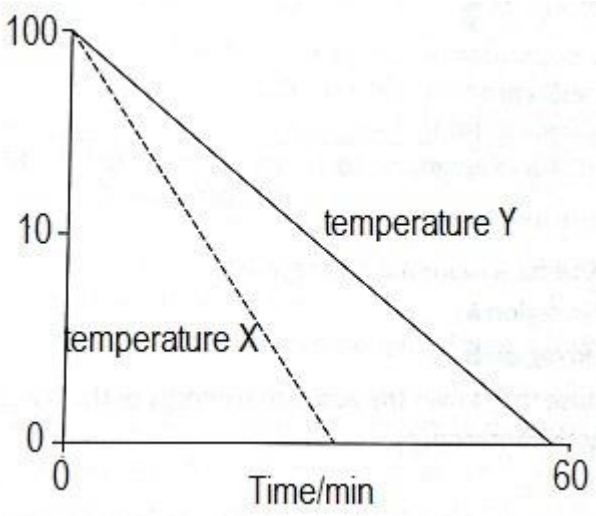


fig. 2

Which of the following is correct?

	The higher temperature is	The vertical axis should be labelled
A.	X	% coloured cells
B.	Y	% colourless cells
C.	X	% colourless cells
D.	Y	% coloured cells

7. Which statement about base pairing in nucleic acids is not correct?
   A. Adenine can pair with either Thymine and uracil
   B. Guanine only pairs with cytosine
   C. Thymine can pair with either thymine or uracil adenine or uracil
   D. Uracil only pairs with adenine.

8. Figure 3 below shows the changes in blood pressure as blood flows through the blood vessels in the human systemic circulatory system.

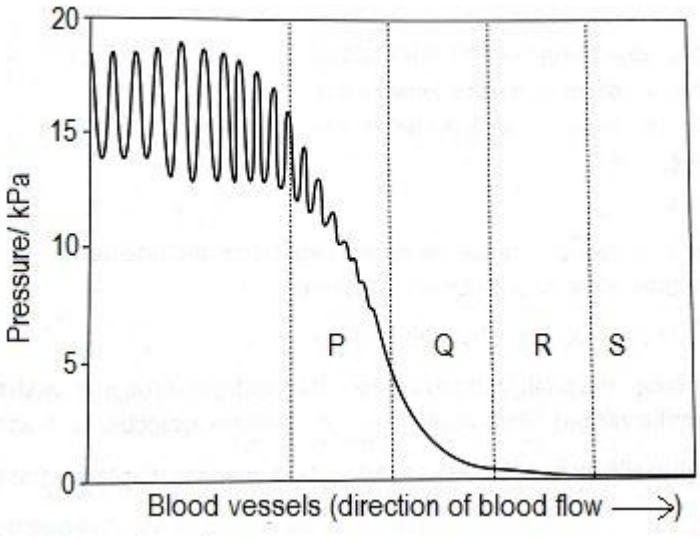


fig.3

Which correctly identifies the vessels labelled P to S?

	P	Q	R	S
A.	Artery	Capillary	Arteriole	Venule
B.	Arteriole	Artery	Venule	Capillary
C.	Artery	Arteriole	Capillary	Venule
D.	Venule	Capillary	Arteriole	Artery

9. What causes the bicuspid valve to close during ventricular systole?

A. A greater blood pressure in the left atrium than in the left ventricle.
B. A greater blood pressure in the left ventricle than in the left ventricle.
C. Contraction of muscles in the septum
D. Contraction of muscles in the valve

10. Which substance in tobacco smoke decreases the oxygen-carrying capacity of haemoglobin

A. Carbon dioxide
B. Carbon monoxide
C. Nicotine
D. Tar.

11. Which of the following best describes the process of gaseous exchange in the lungs?

A. Air moves in and out of the alveoli during breathing.
B. Carbon dioxide diffuses from deoxygenated blood in capillaries into the alveolar.
C. Oxygen and carbon dioxide diffuses down their concentration gradients between blood and alveolar air.
D. Oxygen diffuses from alveolar air into deoxygenated blood.

12. The following occur during the response to infection.

1) Attachment of bacteria to cell surface membrane of phagocyte
2) Movement of a phagocyte to site of infection by bacteria
3) Formation of a phagocytic vacuole
4) Fusion of lysosomes to the phagocytic vacuole.
5) Infolding of cell surface membrane
6) Release of enzymes into the phagocytic vacuole

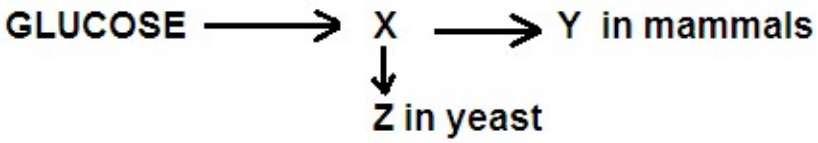
In which order do these events occur?

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

13. Which type of immunity is provided by vaccination?

A. Artificial active B. Artificial passive
C. Natural active D. Natural passive.

14. The diagram summarizes how glucose can be used to produce ATP, without the use of oxygen.



Which compounds are represented by the letters X, Y and Z?

	X	Y	Z
A.	Ethanol	Pyruvate	Lactate
B.	Lactose	Ethanol	Pyruvate
C.	Pyruvate	Ethanol	Lactate
D.	Pyruvate	Lactate	Ethanol

15. What are the products of the light dependent reactions of photosynthesis?

A. ATP, RuBP and reduced NAD C. GP, oxygen and reduced NAD
B. ATP, oxygen and reduced NADP D. GP, reduced NADP and RuBP

16. An actively photosynthesizing plant was supplied with water containing the ^{18}O isotope of oxygen. In which products of photosynthesis would this isotope be found?

A. Oxygen produced by chloroplast grana
B. Oxygen produced by the chloroplast stroma
C. Carbohydrate produced by chloroplast grana
D. Carbohydrate produced by the chloroplast stroma

17. In response to dehydration, ADH is released by the posterior pituitary gland. One of its effects is to stimulate:

A. A reduction in the glomerular filtrate rate

B. An increase in the number of aquaporins in the cell membranes of collecting duct cells.

C. An increase in the uptake of water by cells in the proximal convoluted tubules of nephrons.

D. An increase in the volume of urine produced by the kidneys.

18. Which of the following statements is **not true**.

A. Small mammals in temperate regions have a large appetite enabling them to maintain a high metabolic rate.

B. Species living in colder climates have smaller extremities to reduce heat loss.

C. Large mammals like elephants have extremely large ears to reduce heat gain.

D. Volume increases more rapidly than surface area as the size of an animal increases.

19. Which of the following is responsible for saltatory conduction in myelinated neurones?

A. Axon membranes

B. Nodes of Ranvier

C. Schwann cells

D. Voltage-gated channel proteins

20. The arrival of an impulse at the presynaptic membrane causes calcium ions to diffuse thorough the presynaptic membrane. What is the role of the calcium ions?

A. Stimulation of the vesicles containing acetyl choline to move to the presynaptic membrane and fuse with it.

B. Causes diffusion of the of acetyl choline across the synaptic cleft and bind with temporarily to receptors on the post synaptic membrane.

C. Causes opening of the sodium ion voltage-gated channels and so propagating the action potential.

D. Causes a very steep electrochemical gradient of calcium ions so that sodium ions can move in the opposite direction to propagate an impulse.

21. All the offsprings of a cross between pure-bred red flowered and pure-bred white flowered snapdragons were pink. Two of these pink-flowered plants were interbred. What proportion of the offspring were pink?

A. 25%

B. 33%

C. 50%

D. 100%

22. A man has hemophilia. Which statement correctly describes the inheritance of the gene causing his condition?

A. He inherited the recessive allele from his mother
B. He inherited the dominant allele from his father
C. He can pass the recessive allele to a son
D. He can pass the dominant allele to a daughter.

23. A species of finch living on an isolated island shows variation in beak size. Birds with larger beaks can eat larger seeds. After a period of drought on the island, large seeds were more plentiful than small seeds and the average size of the finches' beaks increased.
What explains this increase in size of beak?

A. Artificial selection acting against finches with small beaks
B. Directional selection acting against finches with small beaks
C. Increased rate of mutation resulting in finches with larger beaks
D. Stabilizing selection acting against finches with the smallest and largest beaks.

24. Which of the following is the definition of the term niche?

A. All the environmental factors that determine where an organism lives.
B. All the food webs in an ecosystem
C. The place where an organism lives
D. The role that a species fulfils in a community

25. Which of the statements about Protoctista are correct?

1. A eukaryote that is not a fungus, plant or animal is a protoctist.
2. An organism with cellulose cell walls and chloroplasts may be a protoctist.
3. An organism existing as a group of similar cells may be a protoctist.
4. A single celled heterotrophic eukaryote is a protoctist.

A. 1, 2, 3 and 4 B. 1, 2 and 4 C. 2 and 3 D. 3 and 4 only

26. A cell in the process of meiosis was seen to have a spindle with sister chromatids being drawn towards opposite poles of the cell. In what stage of meiosis was the cell?

A. Anaphase I C. Metaphase I
B. Anaphase II D. Metaphase II

27. Which of the following is a response which involves movement of the whole organism in response to an external directional stimulus.

A. Kinetic response C. Taxic response
B. Tropic response D. Trophic response

28. A simple and specialized form of learning occurring during receptive periods in an animal's life is

A. Imprinting
C. Lateral learning
B. Insight learning
D. Habituation

29. For some seeds under certain environmental conditions fail to germinate. They must undergo a period of after-ripening before they will germinate. The significance of this period is

A. To make that the seeds store enough food
B. To make sure that all growth inhibitors like Abscisic acid is lost
C. To increase the permeability of the seed coat as well as changes in levels of growth substances.
D. To ensure that premature germination does not occur.

30. During secondary growth, the ray initials divide by mitosis to form

A. Vascular cambium which gives rise to new vascular tissue
B. Cork cambium which arises later to replace the ruptured epidermis of the expanding plant body.
C. Parenchyma cells between the neighboring xylem and phloem
D. Secondary phloem to the outside or secondary xylem to the inside.

31. The relative change in dry mass of endosperm and embryo during germination is shown below in figure 4 the decrease in dry mass of endosperm from 6-8 days is due to;

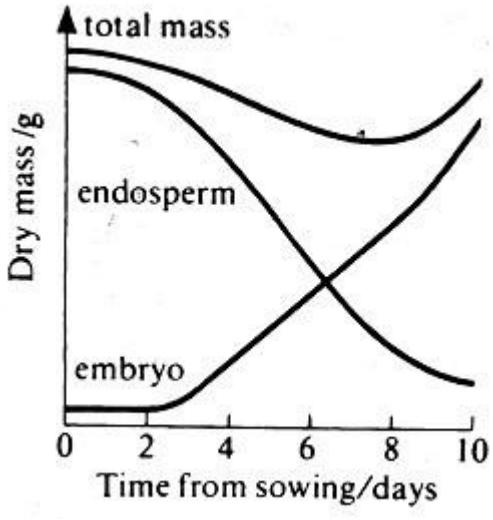


fig.4

A. Utilization of its contents by the developing embryo.
B. The embryo is out competing the endosperm for the food available.
C. Changes in the internal factors like hormones.
D. Lack of photosynthesizing leaves to replenish the endosperm.

32. Which of the statement is not true about adaptations of flowering plants to sexual reproduction?

A. Production of seeds and fruits to nourish and protect the embryo
B. Absence of swimming male gametes.
C. The extreme prolonged gametophyte generation which is adapted to life on land.
D. Production of gametes carried inside pollen grains to the female parts of the flower.

33. The importance of capacitation during fertilization is

A. Activates the secondary oocyte
B. Activates the sperm
C. Reduces chances of multiple fertilization
D. Prepares the oocyte for implantation.

34. The main difference between the ulna and the radius bones of the limbs is..

A. The radius is longer than the ulna
B. The radius is shorter than the ulna
C. The radius is thicker than the ulna
D. The radius is thinner than the ulna

35. What happens to the length of the A band as the sarcomere contracts? A. A band remains the same length C. A band elongates
B. A band shortens D. A band thickens

36. The reason why sprinters generally run on their toes is

A. To gain more stability in air
B. To gain more stability on land
C. To increase the effective length of their limbs
D. To increase speed.

37. Which of these is **not** consistent with evolutionary theory?

A. All living organisms share a common ancestor
B. The environment affects which organisms survive to reproduce
C. Natural selection always favors the same traits regardless of the environment
D. Species change overtime.

38. Carbon dioxide functions as a greenhouse gas by

A. Interfering with water's ability to absorb heat

B. Increasing the random molecular motion of oxygen

C. Allowing radiation from the sun to reach the earth and absorbing the reradiated heat

D. Splitting into carbon and oxygen and increasing the rate of cellular respiration

39. When individuals are evenly placed throughout the habitat their dispersion is termed as

A. Clumped B. Uniform C. Random D. excessive

40. Which of the following does **not** occur during the light reactions of photosynthesis

A. Oxygen is split releasing water

B. Electrons from chlorophyll are added to the electron transport chain

C. An electron transport chain drives the synthesis of ATP for use by the Calvin cycle

D. Oxygen is produced when water is split

Section B (60 marks)

41. (a) Define the term neurosecretion? (01 mark)

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b) i) state any four characteristics of hormones. (02 marks)

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ii) Explain how hormones exert their effects to target cells. (07 marks)

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42 a) What is meant by the term allele frequency? (02 marks)

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List three forces which may alter the allele frequency in a small population. (03 marks)

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b) The algebraic expression of the Hardy – Weinberg principle is $p^2 + 2pq + q^2$ Where ***p*** and ***q*** are the frequencies of two alleles.

i) State, in words, the ***Hardy – Weinberg*** principle. (01 mark)

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ii) The allele for woolly hair (H) is dominant over that for normal hair (h). The alleles for **H** and **h** have the frequencies **p** and **q** respectively. In a certain population of 1200 people, 1092 individuals have woolly hair. Assuming the Hardy -Weinberg principle applied, calculate the frequency of occurrence of each of the genotypes **HH**, **Hh** and **hh**.

(04 marks)

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43 (a) (i) Distinguish between physical and chemical digestion. (02 marks)

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(ii) State three ways in which physical digestion occurs in humans. (1½ marks)

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(b) Explain the nervous and chemical (hormonal) control of secretion of digestive juices during digestion in human.

(i) In the stomach: (04 marks)

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(ii) In the duodenum: (03 marks)

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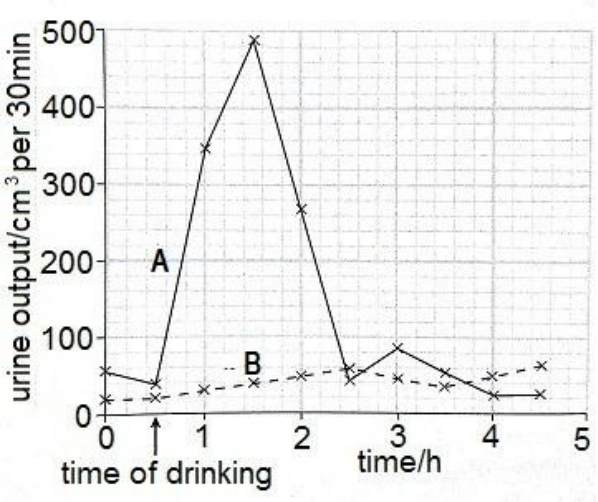
43 (a) A person drank one litre of water and his urine collected at half-hourly intervals for four hours after drinking. The results are represented on the figure below as line ***A***. On the following day, the same person drank one litre of a dilute salt solution with the same water potential as blood plasma and the urine was collected in the same way as shown by line ***B***.



a) Calculate how much urine was produced in the two hours after drinking water. (01 mark)

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b) Explain why the person produced much urine after drinking the liter of water on the first day but less on the second day. (05 marks)

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c) Explain why negative feedback, and not positive feedback, is involved in homeostatic mechanisms. (04 marks)

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45. Measles is a common viral infection. Babies gain passive immunity to measles.

a) Explain:

i) the term passive immunity (02 marks)

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ii) how babies gain passive immunity (02 marks)

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b) Explain why the vaccine for measles should not be given too early. (03 marks)

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c) State how the response of B-lymphocytes during an immune response is different to the response of T-lymphocytes. (03 marks)

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46. The composition of alveolar air remains fairly constant even though gases are exchanged with the blood in the capillaries that surround the alveoli.

a) Describe the process of gas exchange between alveolar air and blood. (04 marks)

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b) Explain why the composition of alveolar air remains fairly constant. (03 marks)

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c) Suggest three ways in which the gas exchange system responds to the demands of exercise. (03 marks)

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END

(Successful people win first before they go for war)