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P530/1
BIOLOGY
PAPER 1
JULY/AUG 2022
2 ½ HOURS

ASSHU MBARARA JOINT MOCK EXAMINATIONS 2022
Uganda Advanced Certificate of Education
BIOLOGY
PAPER 1
2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES
This paper consists of sections A and B

Answer all questions in both sections

SECTION A. Write answers to this section in the boxes provided

SECTION B. Write answers to this section in the spaces provided

FOR EXAMINERS' USE ONLY		
SECTION	**MARKS**	**EXAMINER'S SIGNATURE AND NO.**
A: 1-40		
B 41		
42		
43		
44		
45		
46		
Total		

SECTION A (40 MARKS)

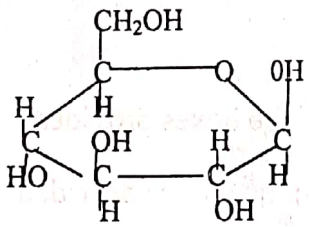
1. In a non endospermous seed with epigeal germination, the region of maximum elongation in a germinating seedling is the

   A. Shoot apex
   B. Root apex
   C. Hypocotyl
   D. Epicotyl

2. What is the first identifiable product of carbondioxide fixation in photosynthesis ?

   A. Triose phosphate (T.P)
   B. Malale
   C. Glycarate-3- phosphate (GP)
   D. Ribulose bisphosphate (RuBP)

3. The diagram shows the structure of monosaccharide (x)



   Which of the following substances can be formed from the condensation of Monosaccharide (x) molecules

   (i) Maltose (ii) Sucrose (iii) Starch (iv) Cellulose

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

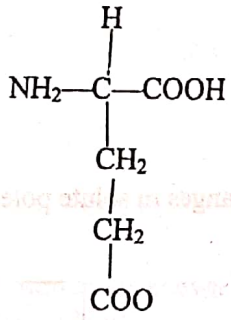
4. The first mitotic division of the zygote in a fertilized ovule produces

   A. The root apex
   B. Abasal cell and a terminal cell
   C. The suspensor and embryo
   D. The plumule and radicle

5. In a population where 7 percent of the babies are born with sickle cell anemia, what is the frequency of babies born having the heterozygous genotype?
   A. 0.005
   B. 0.389
   C. 0.541
   D. 0.930

6. Which process doe **not** occur during the opening of stomata?
   A. Potassium ions diffuse into the guard cells.
   B. Starch is converted into malic acid.
   C. Water enters osmotically into guard cells
   D. Sugar is converted into starch.

7. The following is the formula of an amino acid



This amino acid is

(i)	Hydrophilic	(iii)	Negatively charged
(ii)	Acidic	(iv)	Insoluble in water

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

8. Which statement about the deoxyribonucleic acid molecule is not true?
   A. It contains the bases adenine, guanine, thymine, and cytosine.
   B. It contains genetic information in its nucleotides.
   C. It consist of two strands which are antiparallel to one another
   D. Its sugar unit is doexyribose which has a hydroxyl group on the second carbon

9. The delay in development of an insect pupa due to decrease in light intensity is known as
   A. Hibernation
   B. Aestivation
   C. Diapause
   D. Metamorphosis

10. The entire range of factors on organism is able to exploit in its environment is its
    A. Community
    B. Realized niche
    C. Habitat
    D. Fundamental niche

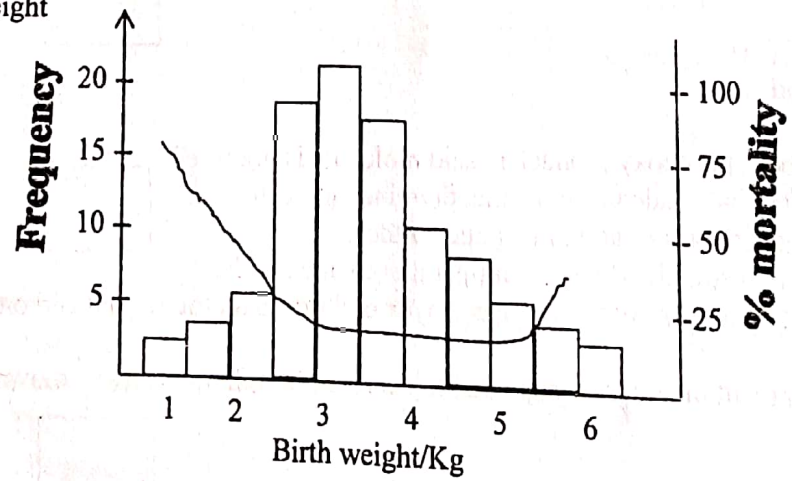
11. Which of the following factors below when increased would cause the greatest increase in blood flow?
    A. Blood viscosity
    B. Vessel radius
    C. The pressure gradient
    D. Vessel length

12. The diagram shows two adjacent cells and their values φs and φp are given in $k\rho a$.

Cell A	Cell B
φs = -1600 φp = 800	φs = - 2200 φp= 1000

What is the pressure potential φp of cell A when equilibrium is reached between the two cells (assume that changes in solute potential are negligible)
    A. 800 Kρa
    B. 600 Kρa
    C. 1000 Kρa
    D. 1200 Kρa

13. The chart below represents the proportion newly born babies in a number of birth weight Intervals. The curve represent % mortality f the new- born babies in relation to birth weight



Which of the following correctly describes the information in the diagram?

A. Birth weight is subject to stabilizing selection.
B. Birth weight is an example of discontinuous variation
C. Infant mortality is inversely proportional to birth weight.
D. Birth weight is genetically linked to infant mortality.

14. Which of the following represents the correct sequence of the stages in the development of spermatozoa?

A. Primordial germ cell – primary spermatocyte – secondary spermatocyte.
B. Primordial germ cell- spermatids – secondary spermatocyte.
C. Primary spermatocyte – spermatids – secondary spermatocyte
D. Primary spermatocyte – secondary spermatocyte – spermatid

15. Two heterozygous brown – eyed parents already have two brown – eyed children and one blue –eyed child. What is the probability that the fourth child will have brown eyes?

A. $\frac{1}{8}$

B. $\frac{1}{4}$

C. $\frac{1}{2}$

D. $\frac{3}{4}$

16. Which hormone is known to have similar effect as red light and can stimulate flowering in long day plants?

A. Auxin
B. Cytokinin
C. Abascisic acid
D. Gibberellins

17. An accidental discharge of a vey acidic waste occurred near a small lake, which of the following is most likely to happen?

A. Eutrophication
B. Increased water turbidity
C. Gill damage in fish
D. An algal bloom

18. The following occurs in the cori-cycle in mammals except;

A. Lactic acid is oxidized to pyruvate forming reduced NAD in the muscle.
B. Lactic acid is produced during strenuous muscle activity
C. Lactic acid diffuses into blood carried in solution in blood plasma to the liver
D. Lactic acid is converted to pyruvate in the liver in presence of oxygen

19. The fluid filled spaces in which bone secreting cells are enclosed are called?
    A. Canaliculi
    B. Haversian canals
    C. Lacunae
    D. Volkmann canal

20. The following factors are explained by Fick's law of diffusion except
    A. Temperature
    B. Thickness of the membrane
    C. Surface area
    D. Concentration gradient

21. The final acceptor of hydrogen in an aerobic cell respiration in plants is .....
    A. Lactic acid
    B. Pyruvate
    C. NAD^+
    D. Ethanol

22. Different species of the mosquito ***Anopheles*** inhabit different habitats such as stagnant water or running water. What type of reproductive barrier is possibly separating the species?
    A. Ecological isolation
    B. Seasonal isolation
    C. Behavioural isolation
    D. Post-zygotic barriers

23. Which one of the following best describes Hardy-Weinberg equation?
    A. $p^2 + 2pq + q^2 = 0$
    B. $p^2 + pq = 1$
    C. $p^2 + 2pq + q^2 = 1$
    D. $1 - p^2\ 2pq + q^2$

24. The life cycle of pteridophytes involves a dominant sporophyte stage that produces spores. Which of the following statements is true?
    A. Haploid spores are produced through mitosis
    B. Haploid spores are produced through meiosis
    C. Diploid spores are produced through meiosis
    D. Diploid spores are produced through mitosis

25. If sucrose is actively loaded into a sieve tube, which combination of changes takes place in the sieve tube?

	Solute potential	Hydrogen in concentration
A	Becomes more negative	Decreases
B	Becomes more negative	Increases
C	Becomes less negative	Decreases
D	Becomes less negative	Increases

26 A single base substitution in the genetic code is less harmful than a single base deletion since the substituted base usually results into new codon specifying the same amino acid as an original codon. This property of genetic code attributed to this is .....

A. Non overlapping
B. Punctuated
C. Triplet code
D. Degenerate

27. During sprinting, the breathing rate of an individual was 20 breaths per minute while the tidal volume was $0.5dm^3$. What was the minute ventilation of the individual?

A. 40
B. 20.5
C. 10
D. 19.5

28. A person has anti – A or ant-B in the red blood cells. What is her blood type?

A. O
B. AB
C. A
D. B

29. Which one of the following is the correct arrangement of microtubules in a cross section at the base of flagellum

A. 9 + 2

B. 9 + 3

C. 9 + 0

D. 9 + 1

30. Which of the following statements correctly describe the mobilization of nutrients during germination of a maize seed?

A. The aleurone releases gibberellic acid which stimulates embryo to synthesize amylase

B. The aleurone releases amylase which stimulates the embryo to synthesize gibberellic acid.

C. Gibberellic acid inhibits amylase synthesis in the aleurone

D. The embryo produces gibberellic acid which causes aleurone to secrete amylase

31. The maintenance of the allele for sickle cell anaemia in human populations in malaria – endemic regions is an example of

A. genetic drift

B. gene flow

C. founder effect

D. genetic load

32. The tendency of one species to limit access to resources regardless of abundance is commonly known as

A. Exploitation competition

B. Competitive exclusion principle

C. Interference competition

D. Resource partitioning

33. Which of the following are characteristics of a continuous variation?

(i) Controlled by different alleles of a single gene

(ii) The groups show a normal frequency distribution curve.

(iii) Phenotypic expressions can be affected by environment.

(iv) Characteristics are qualitative

A. (i) and (ii)

B. (i) and (iv)

C. (ii) and (iii)

D. (ii) and (iv)

34. Which of the following constitutes the highest percentage of total granulocytes?

A. Eosinophils

B. Neutrophils

C. Basophils

D. Lymphocytes

35. The gene that causes albinism in human is associated with loss of melanin pigment in the skin, grey hair and pink eyes. This gene is therefore said to be

A. Polygenic

B. Epistatic

C. Pleiotropic

D. Codominant

36. Which of the following is likely to occur, if a photosynthesing plant was suddenly removed from light?

A. Reduction in PGA

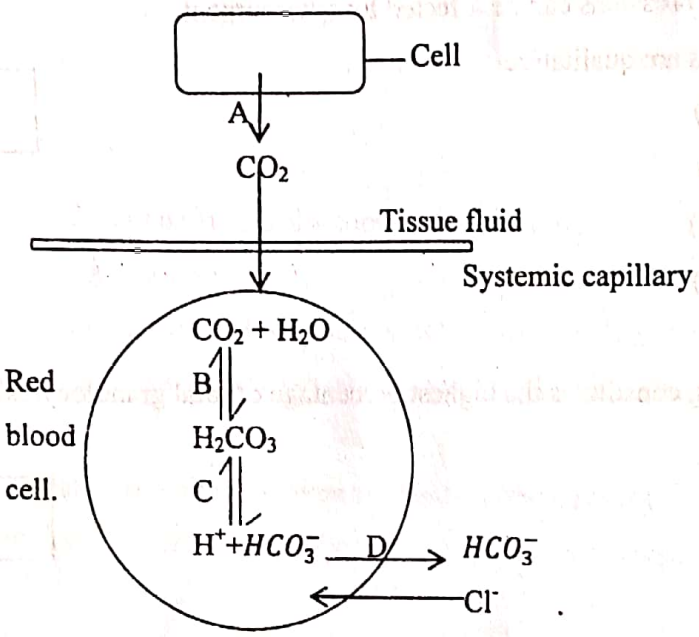
B. Accumulation of PGAL

C. Accumulation of PGA

D. No change in amount of PGAL

37. The diagram represents the transport of carbondioxide between tissue cells and systemic capillaries.

In which labeled part does enzyme carbonic anhydrase act?



A.

B

C.

D.

38. X is an inherited genetic disorder caused by defective genes CFTR, a trans membrane protein needed for transport of Cl^- ions. Thick mucus is secreted that plugs the airways and reduces airflow and gas exchange . X is

A. Asthma

B. Emphysema

C. Cystic fibrosis

D. Lung cancer

39. In which part of the brain are the cardiac acceleratory and inhibitory centres located?

A. Cerebrum

B. Medulla oblongata

C. Hypothalamus

D. Cerebellum

40. Very small mammals cannot live at altitudes over 4000 metres high on mountains because

A. They would lack suitable foods at such altitudes.

B. Their surface are to volume ratio is too high to support breathing

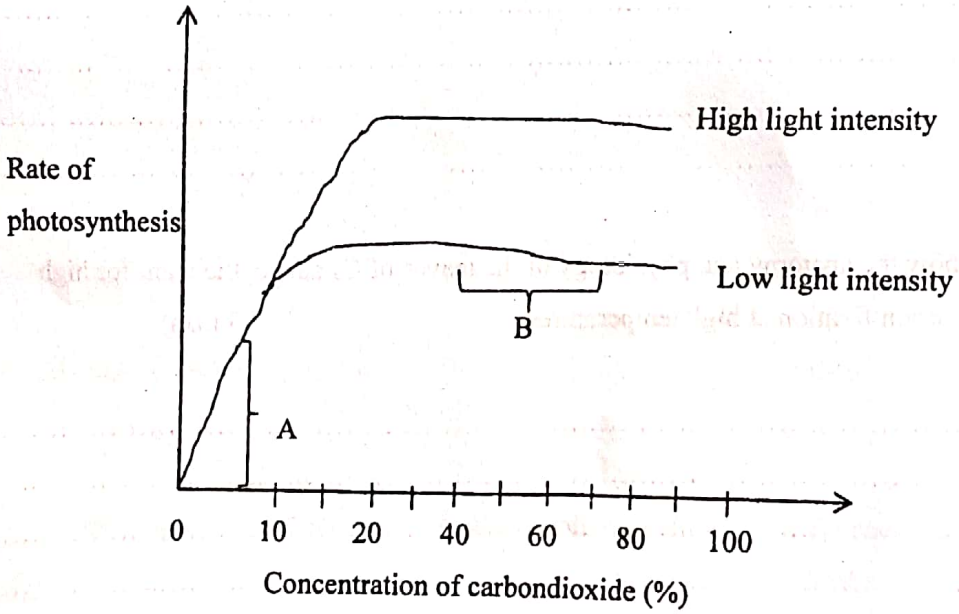
C. They lack sufficient fur to keep them warm

D. At such altitudes, the oxygen partial pressures are too low

SECTION B (60 MARKS)

Write answers in the spaces provided

41. The graph shows the effect of carbondioxide concentration on the rate of photosynthesis of an aquatic plant measured at two different light intensities.



(a) (i) Describe the effects of increasing light intensity on the rate of photosynthesis.

(3 mks)

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(ii) State precisely the rate limiting factor at

A.....

B.....

(b) Explain why increasing the concentration of carbondioxide may increase the rate of production of carbohydrates at high light intensity. (3 mks)

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(c) Explain how the anatomy and physiology of the leaves of C_4 adapts the plant for high rates of carbon fixation at high temperatures. (3 mks)

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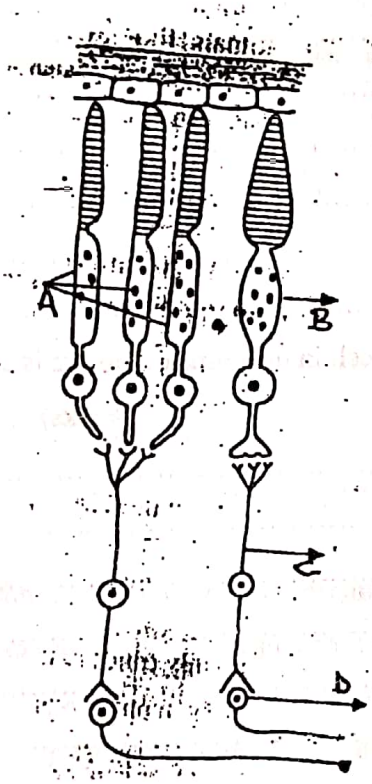
42. The figure shows microscopic structure of the retina



(a) (i) Name cell structures C and D (1 mk)

C.....

D.....

(ii) Indicate by an arrow on the diagram the direction in which light rays enter the eyes. (1 mk)

(b) What is the significance of the fact that

(i) Several cells of type labeled A connect to one cell C (2 mks)

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(ii) One cell of type labeled B connects to one cell C. (2 mks)

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(c) Explain how light energy falling on the rod cell in the retina of the eye is converted to electrical energy. (4 mks)

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43. The plant genus spartina contains a number of species. Hybridization between spartina alterniflora (2n = 62) and spartina maritima (2n=60) has produced a F_1 sterile hybrid spartina townsedii

(a) What is mean by hybridization? (1 mk)

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(b) Explain why the F_1 hybrid plant cannot reproduce sexually. (2 mks)

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(c) A chromosomal change has occurred naturally in the sterile hybrid and a fertile F_2 tetraploid plant spartina anglica is produced.

(i) Describe with the aid of a genetic diagram, the chromosomal changes that may have occurred to produce the fertile grass (4 mks)

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(ii) State the importance of polyploidy in agriculture. (3 mks)

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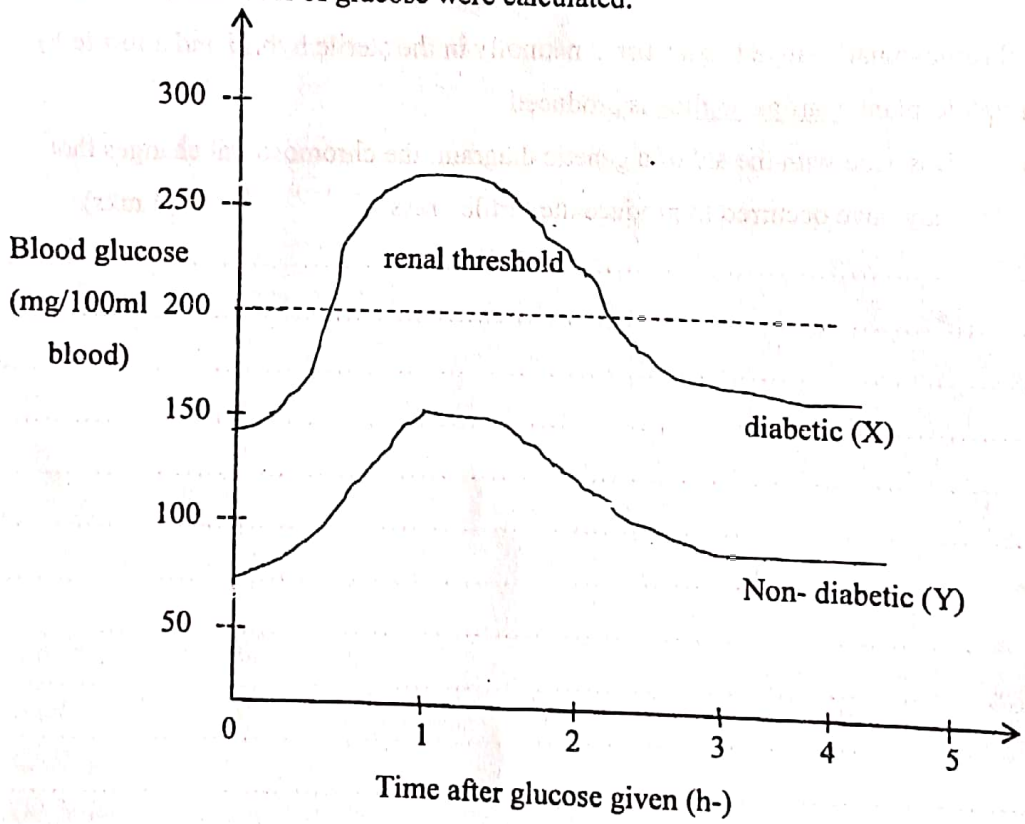
44. An experiment on glucose tolerance test was carried on two people. Person X had type 1 diabetes while Y did not. At every 15 minutes blood samples were taken from the members and the level of glucose were calculated.



(a) (i) Using the information from the graph, explain the changes in blood glucose concentration in person Y after glucose is drunk. (3 mks)

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(ii) Explain the difference in blood glucose concentration in person X compared to person Y (3 mks)

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(b) Suggest a reason why the glucose concentration fall in both persons after the first hour. (1 mk

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(c) Explain why patients of type 1 diabetes mellitus require frequent injections of insulin.

(3mks)

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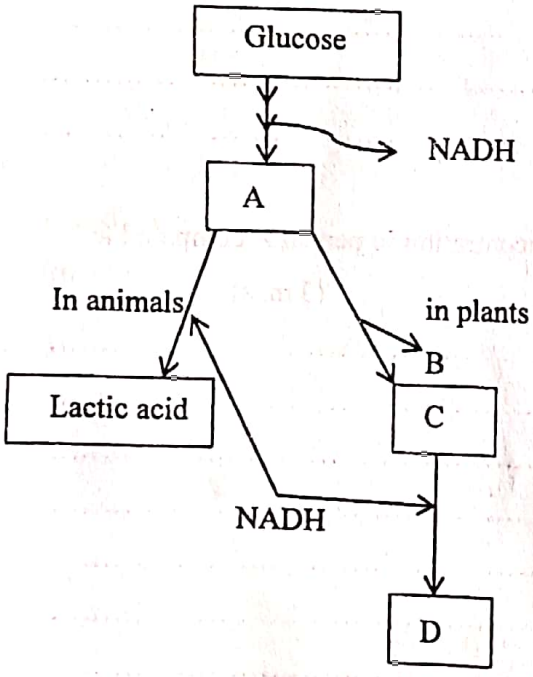
45. The figure below shows the scheme for anaerobic respiration



(a) (i) Name substances labeled B, and C (1 mk)

B.....

C.....

(ii) State the role of NAD^+ in respiration

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(b) Describe the fate of

(i) Compound A in the roots of plants living in water logged soils (3 mks)

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(ii) Lactic acid from anaerobic respiration (3 mks)

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(c) Explain why many plants or parts of plants indulge in anaerobiosis for a short period of time. (2 mks)

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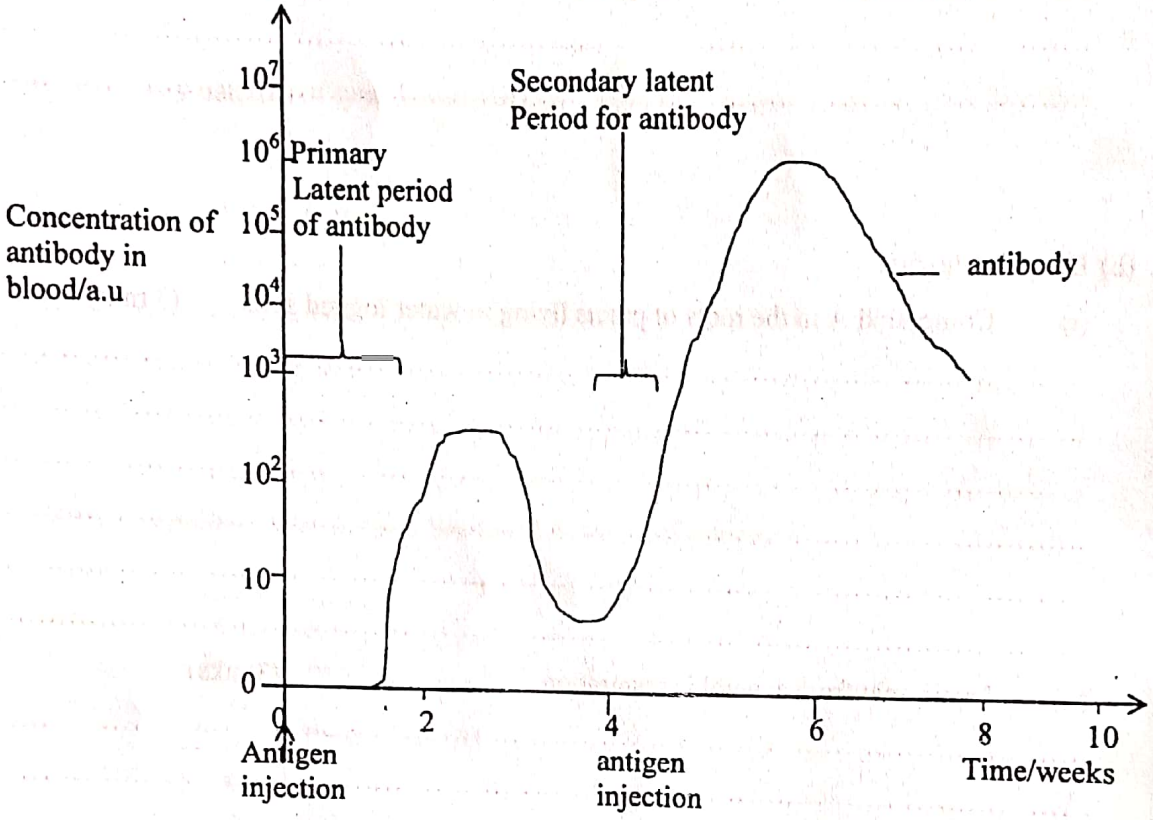
46. The graph shows the primary and second immune responses when a child is vaccinated



(a) What is meant by the primary and secondary responses of antibody production (2 mks)

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(b) Compare the length of latent period for antibody production in primary and secondary responses. (1 mk)

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(c) Describe the differences between the results of the first and second antigen injections.

(4 mks)

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(d) Explain the differences in the rate of response in (c). (3 mks)

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END