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BIOLOGY
HIGHER LEVEL
PAPER 1

Wednesday 14 May 2008 (afternoon)

1 hour

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

1. What describes tissues?

A. Groups of cells that develop the same way with the same function

B. Groups of cells that develop the same way with different functions

C. Groups of cells that have combined to form a structure

D. Groups of cells that have combined to form one organ

2. Which pair of features is correct for both plant and prokaryotic cells?

	Plant cell	Prokaryotic cell
A.	Able to change shape	Fixed shape
B.	Contains DNA associated with protein	Contains naked DNA
C.	DNA enclosed by membrane	DNA associated with protein
D.	Chloroplasts may be present	Chloroplasts may be present

3. Which of the following are associated with mitosis?

I. Tissue repair
II. Chiasmata
III. Asexual reproduction

A. I and II only

B. I and III only

C. II and III only

D. I, II, and III

4. What role does iron play in living organisms?

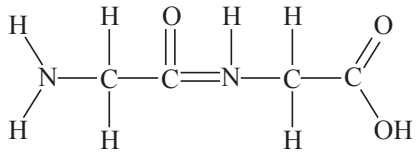
A. As a component in nucleic acids

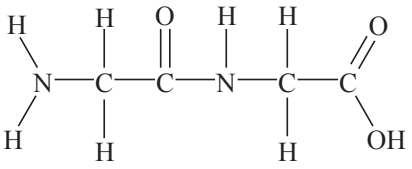
B. As a component of lipids

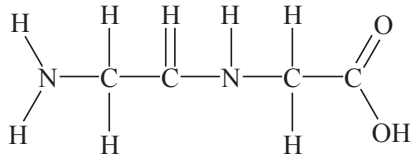
C. As a component of carbohydrates

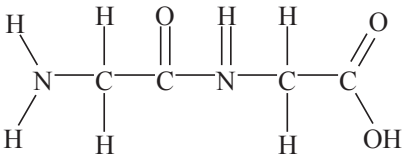
D. As a component of proteins

5. Which diagram correctly illustrates a dipeptide?

A. 

B. 

C. 

D. 

6. Which events take place in DNA replication?

I. Formation of messenger RNA
II. Unwinding of DNA double helix
III. Formation of complementary strands by DNA polymerase

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

7. What is the correct sequence of chemicals produced in the anaerobic respiration pathway?

A. lactate → pyruvate → ethanol

B. ethanol → pyruvate → glucose

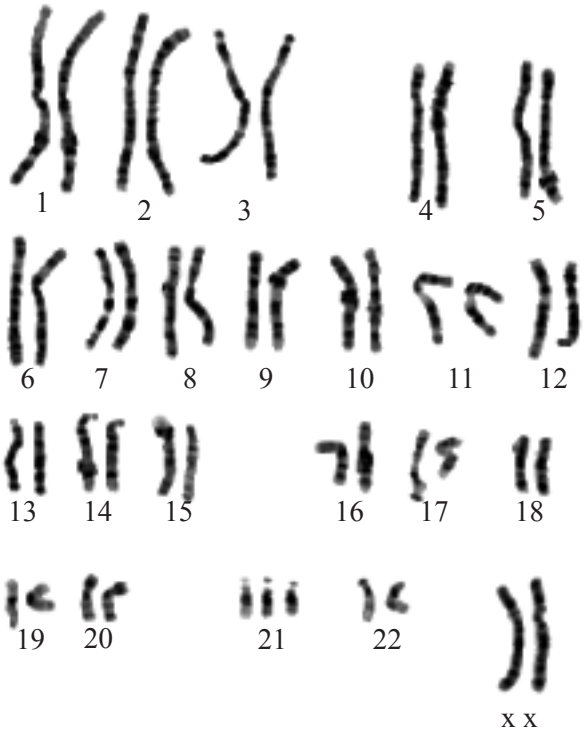
C. glucose → lactate → pyruvate

D. glucose → pyruvate → lactate

8. Which combination measures the rate of photosynthesis?

	Direct measurement	Indirect measurement
A.	Oxygen production	Biomass increase
B.	Carbon dioxide uptake	Biomass decrease
C.	Oxygen uptake	Biomass increase
D.	Carbon dioxide production	Biomass decrease

9. What can be concluded on the basis of the following karyotype?



A. Female with a normal set of chromosomes

B. Male with Down syndrome

C. Female with Down syndrome

D. Male with a normal set of chromosomes

10. What are homologous chromosomes?

A. Two chromosomes with differing sets of genes, in the same sequence, with the same alleles

B. Two chromosomes with the same set of genes, in a different sequence, with the same alleles

C. Two chromosomes with a different set of genes, in the same sequence, with different alleles

D. Two chromosomes with the same set of genes, in the same sequence, sometimes with different alleles

11. Which features of DNA fragments are used to separate them in the process of gel electrophoresis?

A. Their charge and their size

B. Their charge and base composition

C. The sequence of their bases and their charge

D. Their base composition and their size

12. Which feature of a genetic pedigree chart demonstrates that a characteristic is sex linked?

A. Numbers of offspring carrying the characteristic decreased over several generations.

B. One gender is more commonly affected than the other.

C. Equal numbers of males and females inherit the characteristic.

D. Boys and girls only inherit the characteristic from their mothers.

13. What is a *community*?

A. A group of producers and consumers living and interacting in an area.

B. A group of species living and interacting in an area.

C. A group of organisms living and interacting in an area.

D. A group of populations living and interacting in an area.

14. What are the main sources of carbon dioxide on earth?

A. cellular respiration of consumers, producers and combustion of fossil fuels

B. photosynthesis and cellular respiration of consumers

C. cellular respiration of producers and combustion of fossil fuels

D. photosynthesis and combustion of fossil fuels

15. Which factors can limit population growth?

I. Shortage of food
II. Increased genetic variation in the population
III. Increase in predators
IV. Increase in diseases and parasites

A I and II only

B I and III only

C I, III and IV only

D I, II, III and IV

16. What are *Allium sativa* and *Allium cepa*?

A. Two different species of the same genus

B. The same species of the same genus

C. The same species but of a different genus

D. Two different species of a different genus

17. In the digestive system, enzyme A has an optimum pH of 1.5 and enzyme B an optimum pH of 7. What are the possible substrates of these enzymes?

	Enzyme A	Enzyme B
A.	proteins	amino acids
B.	lipids	proteins
C.	carbohydrates	lipids
D.	proteins	lipids

18. Which vessels correspond with the descriptions of I, II and III below?

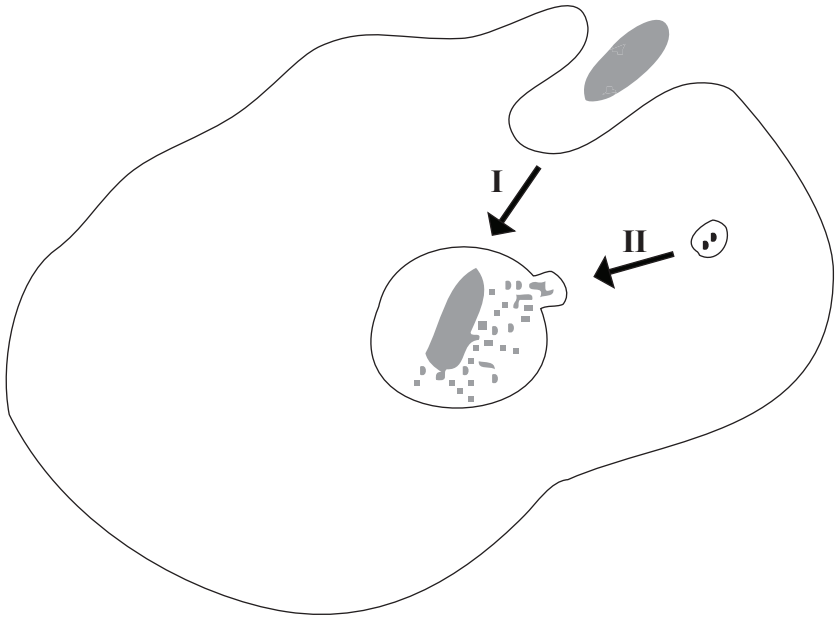
I. Thick outer layer of longitudinal collagen. Thick layers of circular elastic and muscle fibres. Narrow lumen.

II. Thin outer layer of longitudinal collagen. Thin layers with a few circular elastic and muscle fibres. Wide lumen.

III. Wall consists of single layer of cells. Pores between cells that form the wall. Very narrow lumen.

	I	II	III
A.	artery	vein	capillary
B.	vein	artery	capillary
C.	artery	capillary	vein
D.	vein	capillary	artery

19. Which processes are represented by the labels in the diagram below?

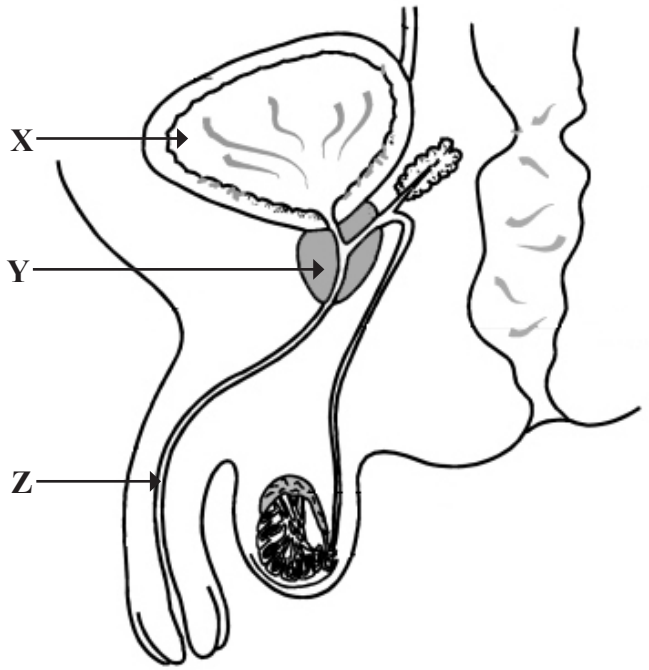


	I	II
A.	A phagocyte ingesting a microbe by exocytosis.	Digestion of the microbe with the help of the Golgi apparatus.
B.	A phagocyte ingesting a microbe by endocytosis.	Digestion of the microbe with the help of a lysosome.
C.	A phagocyte ingesting a microbe by exocytosis.	Digestion of the microbe with the help of a lysosome.
D.	A phagocyte ingesting a microbe by endocytosis.	Digestion of the microbe with the help of the Golgi apparatus.

20. Which type of urine would be produced in a human whose diet contains very small quantities of protein or fluid?

	Urea Concentration	Salt Concentration
A.	High	Low
B.	Low	High
C.	High	High
D.	Low	Low

21. The diagram below shows the human male reproductive system and associated organs.



Which of the labelled structures indicate the bladder, prostate and urethra?

	Bladder	Prostate	Urethra
A.	Y	X	Z
B.	X	Y	Z
C.	Z	X	Y
D.	X	Z	Y

22. What are the effect(s) of changing levels of FSH in the human menstrual cycle?

A. Peak levels cause ovulation.

B. Peak levels stimulate follicle development and estrogen secretion of the follicle.

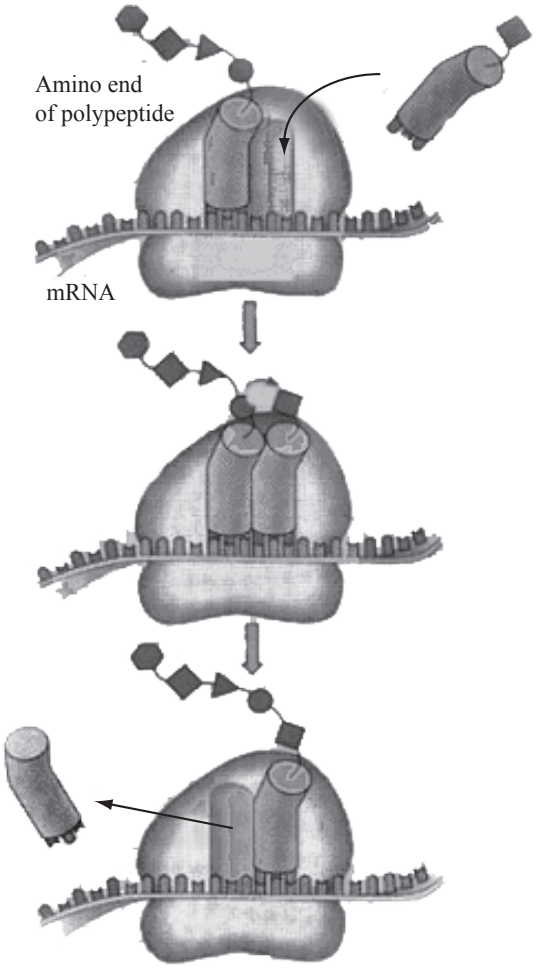
C. Peak levels stimulate follicle development and progesterone secretion of the follicle.

D. Peak levels cause repair of the lining of the uterus.

23. Which are the correct directions of the following processes?

	Replication	**Transcription**	**Translation**
A.	5’ to 3’	3’ to 5’	3’ to 5’
B.	3’ to 5’	5’ to 3’	5’ to 3’
C.	5’ to 3’	5’ to 3’	5’ to 3’
D.	3’ to 5’	3’ to 5’	3’ to 5’

24. Which stage of translation is illustrated by the diagram below?



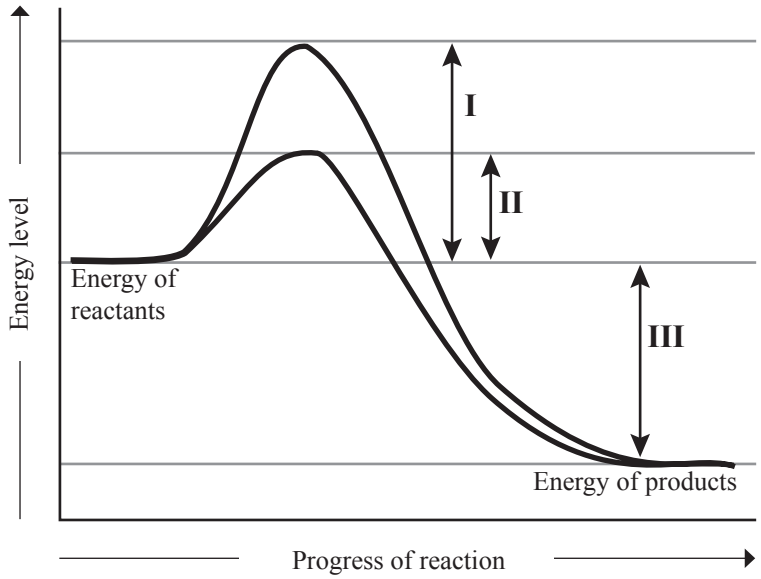
A. Termination

B. Initiation

C. Translocation

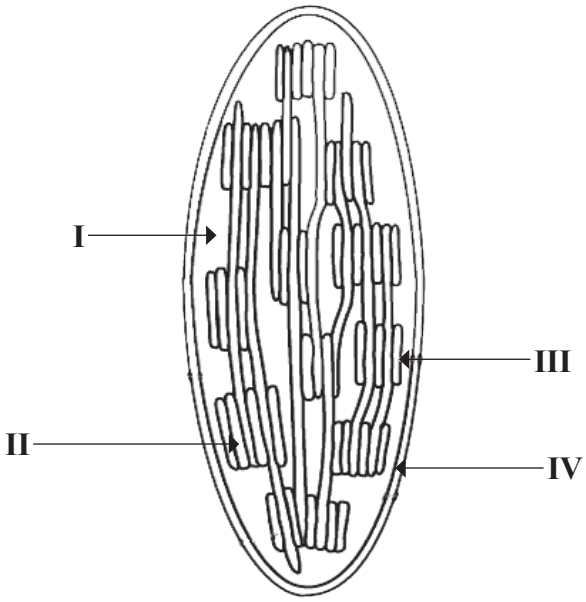
D. Elongation

25. The diagram below shows the energy levels of a reaction in the presence or absence of an enzyme. What is the best explanation of the different energy levels labelled I, II and III?



	I	II	III
A.	Absence of an enzyme	Presence of an enzyme	Endergonic reaction
B.	Presence of an enzyme	Absence of an enzyme	Exergonic reaction
C.	Absence of an enzyme	Presence of an enzyme	Exergonic reaction
D.	Presence of an enzyme	Absence of an enzyme	Endergonic reaction

26. In the diagram of a chloroplast below where will the Calvin cycle take place?



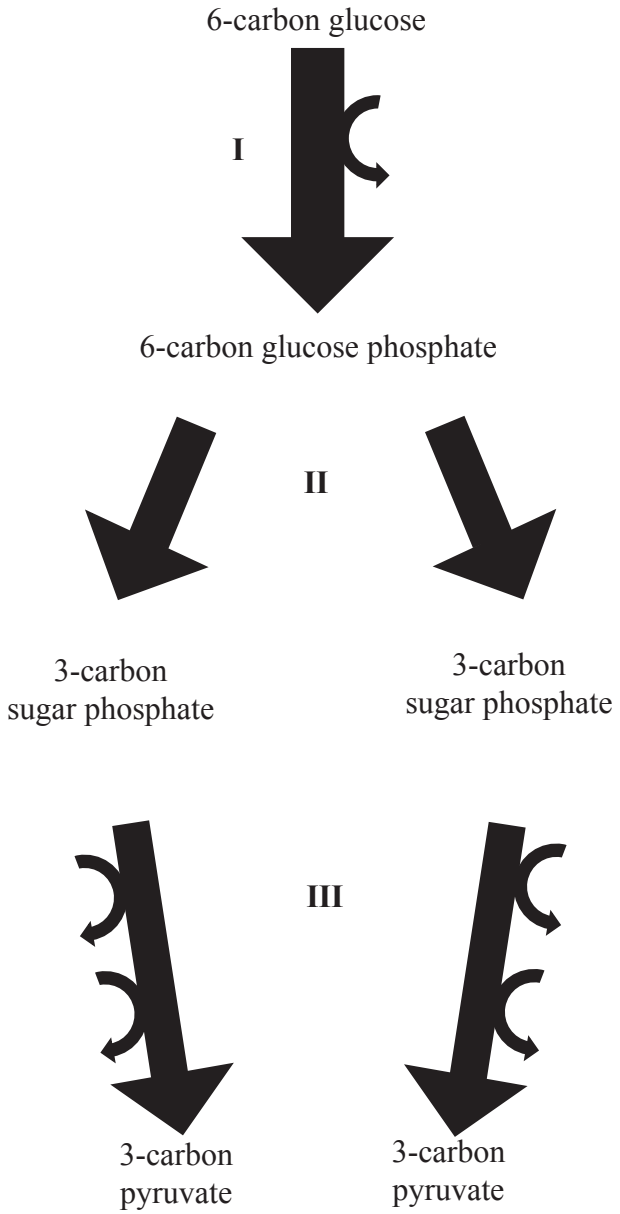
A. I

B. II

C. III

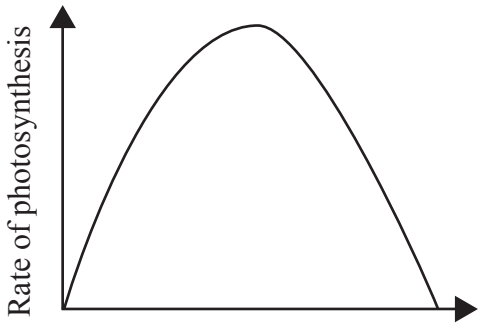
D. IV

27. The diagram below shows the three stages of glycolysis. Which processes are indicated by I, II and III?



	I	II	III
A.	Lysis	Phosphorylation	Oxidation and ATP formation
B.	Oxidation and ATP formation	Phosphorylation	Lysis
C.	Phosphorylation	Lysis	Oxidation and ATP formation
D.	Phosphorylation	Oxidation and ATP formation	Lysis

28. Which limiting factor of photosynthesis is shown below?



A. Increasing carbon dioxide concentration

B. Increasing temperature

C. Increasing light intensity

D. Increasing humidity

29. In *Drosophila* the allele for normal wings (W) is dominant over the allele for vestigal wings (w) and the allele for normal body (G) is dominant over the allele for ebony body (g). If two *Drosophila* with the genotypes Wwgg and wwGg are crossed together, what ratio of phenotypes is expected in the offspring?

A. 9 × normal wings, normal body : 3 × normal wings, ebony body : 3 × vestigal wings, normal body : 1 × vestigal wings, ebony body

B. 3 × normal wings, normal body : 3 × normal wings, ebony body : 3 × vestigal wings, normal body : 1 × vestigal wings, ebony body

C. 3 × normal wings, normal body : 1 × normal wings, ebony body : 3 × vestigal wings, normal body : 1 × vestigal wings, ebony body

D. 1 × normal wings, normal body : 1 × normal wings, ebony body : 1 × vestigal wings, normal body : 1 × vestigal wings, ebony body

30. What constitutes a linkage group?

A. Genes whose loci are on different chromosomes

B. Genes carried on the same chromosome

C. Genes controlling a polygenic characteristic

D. Genes for the inheritance of ABO blood groups

31. What are the possible outcomes of recombination?

I. A different combination of unlinked genes not seen in the parents
II. A different combination of linked genes not seen in the parents
III. The same combination of genes seen in the parents

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

32. Which correctly describes the role of the epididymis in semen production?

A. Produces fluid containing fructose to nurture sperm.

B. Finishes maturation of sperm so that they are capable of swimming.

C. Produces alkaline fluid with minerals to protect sperm.

D. Produces fluid containing fructose and store mature sperm.

33. After fertilization what is the correct order of events?

A. Embryo secretes HCG → implantation of embryo in uterine wall → stimulates corpus luteum to grow

B. Implantation of embryo in uterine wall → stimulates corpus luteum to grow → embryo secretes HCG

C. Implantation of embryo in uterine wall → embryo secretes HCG → stimulates corpus luteum to grow

D. Continued secretion of progesterone and estrogen → embryo secretes HCG → stimulates corpus luteum to grow→ implantation of embryo in uterine wall

34. Colostrum, the first milk produced by the mother after giving birth, also contains antibodies that can be absorbed into the baby's blood. What type of immunity is the baby acquiring from its mother?

A. Passive

B. Antigen

C. Active

D. Artificial

35. What is the correct order in the production of monoclonal antibodies?

A. Isolate B-cells producing specific antibody → inject antigens into animal → fuse B-cells with tumour cells → harvest monoclonal antibodies.

B. Inject antigens into animal → isolate B-cells producing specific antibody → fuse B-cells with tumour cells → harvest monoclonal antibodies.

C. Isolate B-cells producing specific antibody → fuse B-cells with tumour cells → inject antigens into animal → harvest monoclonal antibodies.

D. Inject antigens into animal → fuse cultured B-cells with tumour cells → isolate B-cells producing specific antibody → harvest monoclonal antibodies.

36. After depolorization what happens to restore the resting potential?

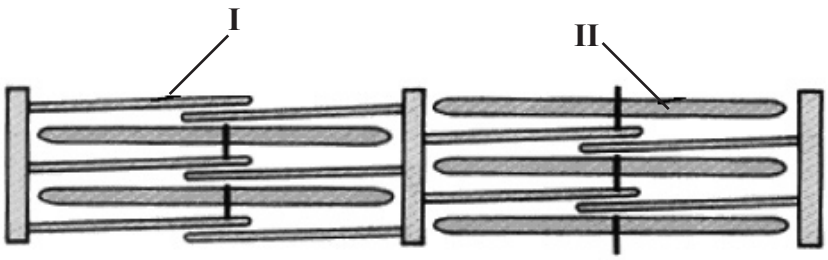
A. Sodium channels open and sodium ions diffuse out of the neuron

B. Potassium channels open and potassium ions diffuse into the neuron

C. Potassium channels open and potassium ions diffuse out of the neuron

D. Sodium channels open and sodium ions diffuse into the neuron

37. The diagram below shows part of a muscle fibre. What parts are labelled I and II?



	I	II
A.	Myosin filaments	Actin filaments
B.	Troponin filaments	Tropomyosin filaments
C.	Tropomyosin filaments	Troponin filaments
D.	Actin filaments	Myosin filaments

38. Which excretory product is associated with which group of organisms?

	Urea	Ammonia
A.	Fresh water fish	Birds
B.	Mammals	Fresh water fish
C.	Birds	Mammals
D.	Mammals	Plants

39. Which process starts the germination of a starchy seed.

A. Production of gibberellin

B. Absorption of water

C. Maltose is converted to glucose water

D. Production of amylase

40. A plant has a waxy cuticle, reduced leaves, reduced number of stomata, and CAM physiology. What type of plant could this be?

A. A hydrophyte

B. A filicinophyte

C. A bryophyte

D. A xerophyte