N08/4/BIOLO/HPM/ENG/TZ0/XX+

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BIOLOGY
HIGHER LEVEL
PAPER 1

Monday 17 November 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. Which of the following characterizes tissues?

A. A group of cells that develop independently.

B. A group of organs that have the same function.

C. A group of cells that have the same function.

D. A group of organs that have the same structure.

2. What is necessary for osmosis to occur?

A. A membrane protein

B. A partially permeable membrane

C. A source of energy

D. A cell wall

3. Which of the following is(are) associated with mitosis?

I. Asexual reproduction
II. Tumours
III. Fertilization

A. II only

B. I and II only

C. I and III only

D. I, II and III

4. Which of the following contain the element phosphorus?

A. Amino acids

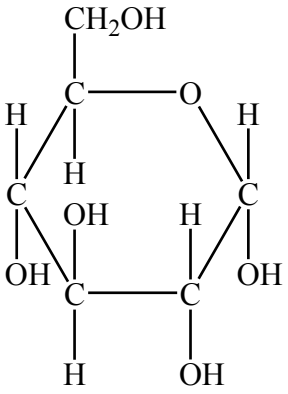
B. Viruses

C. Ribose

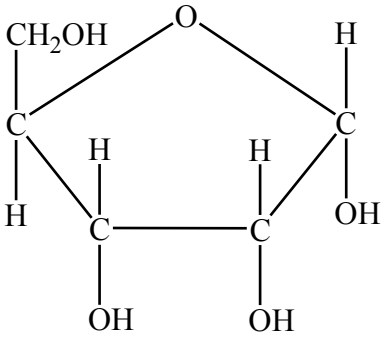
D. Deoxyribose

5. Which diagram correctly illustrates a glucose molecule?

A.



B.



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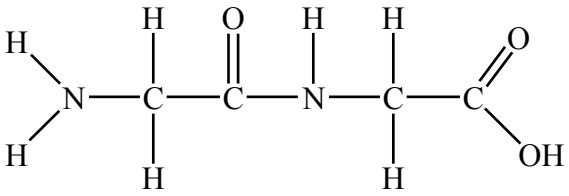

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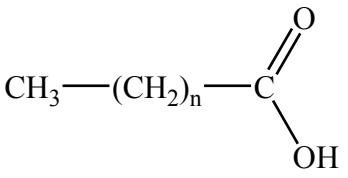


6. What is the function of DNA polymerase in DNA replication?

A. Unwinding of DNA double helix

B. Formation of messenger RNA

C. Separation of DNA strands

D. Formation of the complementary strand

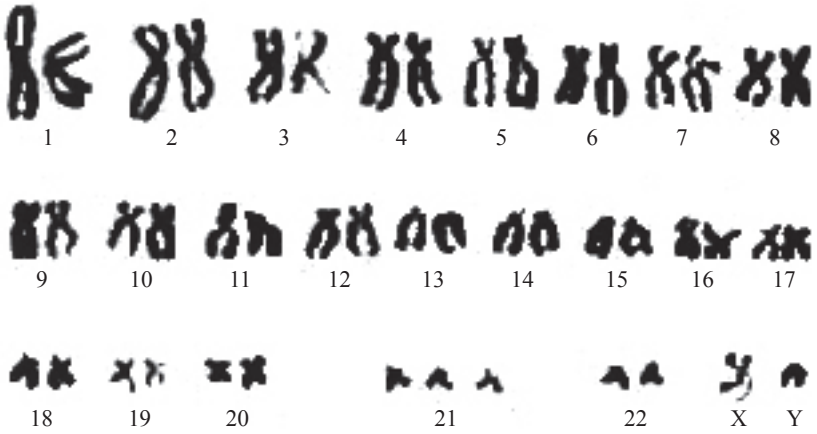
7. Which of the following correctly show the process and location for pyruvate formation?

	Process	Location
A.	aerobic cell respiration	cytoplasm
B.	respiration	chloroplast
C.	photosynthesis	cytoplasm
D.	photosynthesis	chloroplast

8. Which colours of light are mainly absorbed or reflected by chlorophyll?

	Absorbed	Reflected
A.	blue and red	green and yellow
B.	green and yellow	blue and red
C.	yellow only	blue only
D.	blue only	green only

9. What can be concluded from the following data?



A. Karyotype of a male with a normal set of chromosomes

B. DNA profiling of a male with Down syndrome

C. DNA profiling of a male with a normal set of chromosomes

D. Karyotype of a male with Down syndrome

10. The genotypes of two parents are Hb^A Hb^A and Hb^A Hb^S. What are the likely phenotypes of their children?

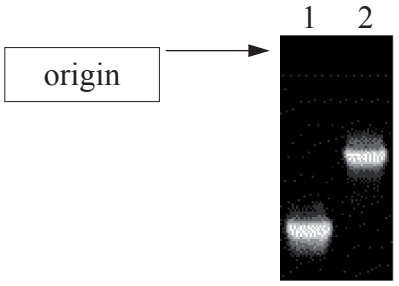
A. 75 % healthy

B. 50 % may develop sickle-cell anemia

C. 25 % may develop sickle-cell anemia

D. 100 % healthy

11. The gel image shown below has two lanes. The DNA is loaded onto the gel at the origin. To separate the DNA fragments a negative charge is applied to the origin of the gel. What conclusion could be made about the DNA fragments?



A. The size of the DNA fragment in Lane 1 is greater than in Lane 2.

B. The charge of the DNA fragment in Lane 2 is positive.

C. The size of the DNA fragment in Lane 2 is greater than in Lane 1.

D. The charge of the DNA fragment in Lane 1 is positive.

12. Which of the following best describes sex linkage?

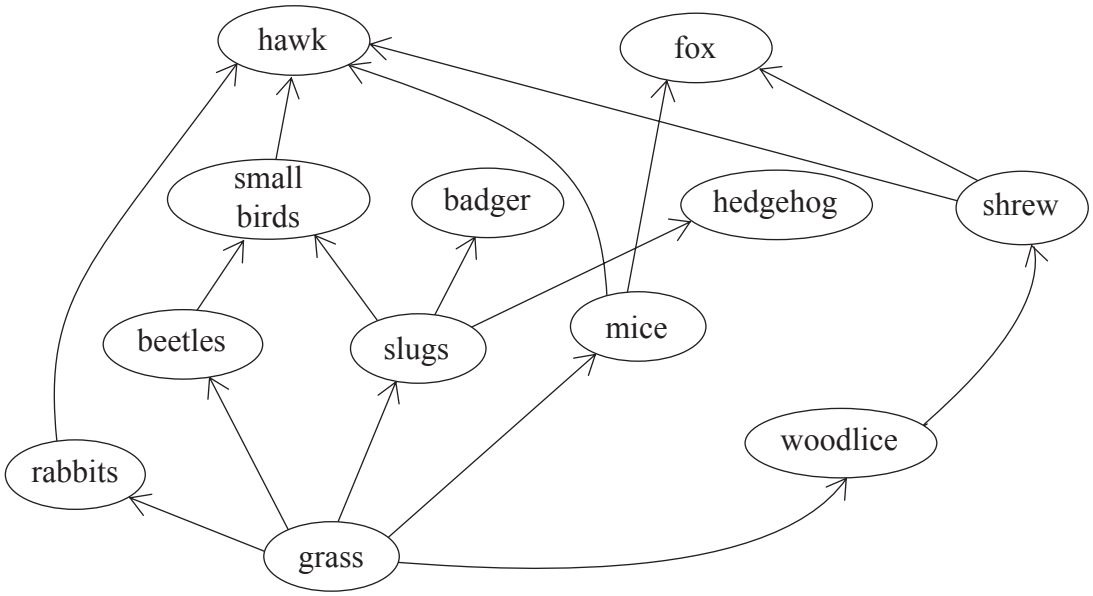
A. The condition will be inherited only by sons.

B. The condition will be inherited only by daughters.

C. The condition may be inherited by sons and daughters.

D. The condition will be inherited by more daughters than sons.

The following diagram of a food web refers to questions 13 and 14.



13. Which organism(s) in the food web above is(are) both secondary consumer(s) and tertiary consumer(s)?

A. Hawk and fox

B. Hawk and hedgehog

C. Fox and badger

D. Hawk only

14. If 1 000 000 $J\,m^{-2}\,yr^{-1}$ of sunlight is assimilated by the grass in the food web, how much energy would be available to the badger?

A. 10 to 25 $J\,m^{-2}\,yr^{-1}$

B. 100 to 200 $J\,m^{-2}\,yr^{-1}$

C. 500 to 1000 $J\,m^{-2}\,yr^{-1}$

D. 2500 to 10 000 $J\,m^{-2}\,yr^{-1}$

15. Which of the following factors influence carrying capacity?

I. Size of habitat

II. Increase in predators

III. Increase in diseases and parasites

A. I only

B. II only

C. II and III only

D. I, II and III

16. Which of the following gases contribute to the greenhouse effect?

I. Methane

II. Water vapour

III. Nitrogen

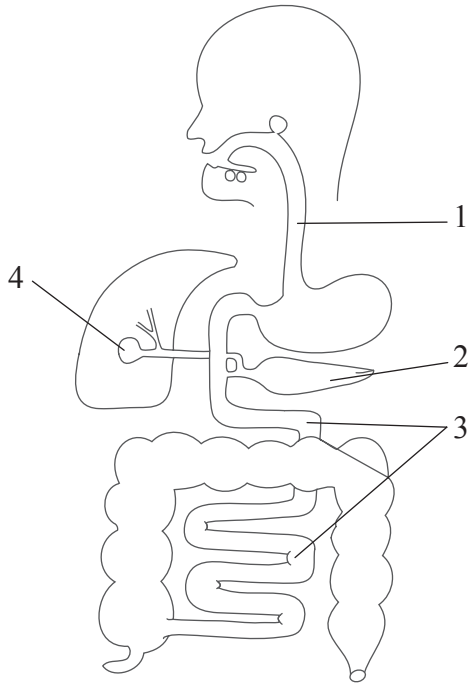
A. I only

B. I and II only

C. II and III only

D. I, II and III

17. The diagram below represents the human digestive system.



Which of the following correctly represents the labels?

	Esophagus	Gall bladder	Small intestine	Pancreas
A.	1	4	2	3
B.	1	4	3	2
C.	4	3	1	2
D.	2	1	3	4

18. What are the characteristics of blood flowing through most arteries and veins?

	Arteries	Veins
A.	slow velocity	fast velocity
B.	high pressure	low pressure
C.	deoxygenated	oxygenated
D.	greater than 37 °C	less than 37 °C

19. What will be an effect of HIV infection on the immune system?

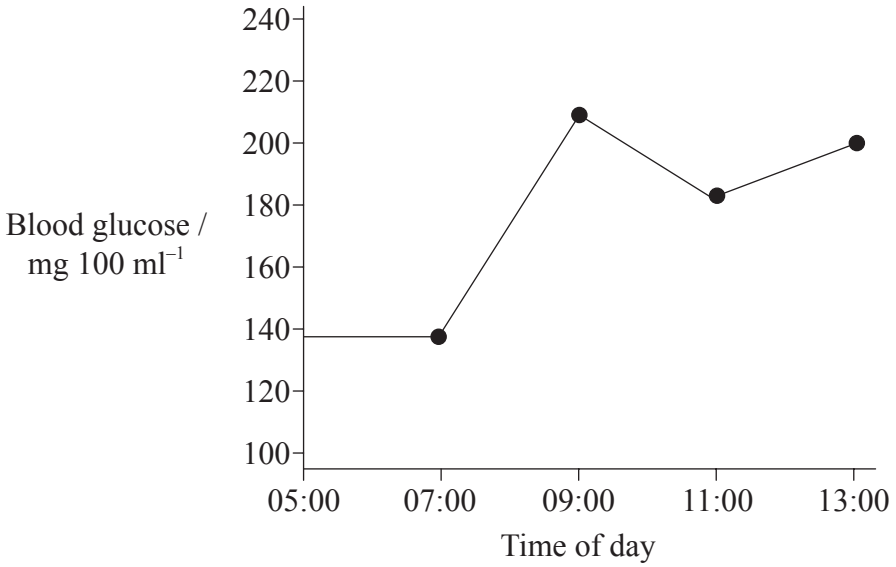
A. Antigens no longer bind to antibodies.

B. Number of active lymphocytes is increased.

C. Antibody production is limited.

D. HIV patient will fall ill more frequently.

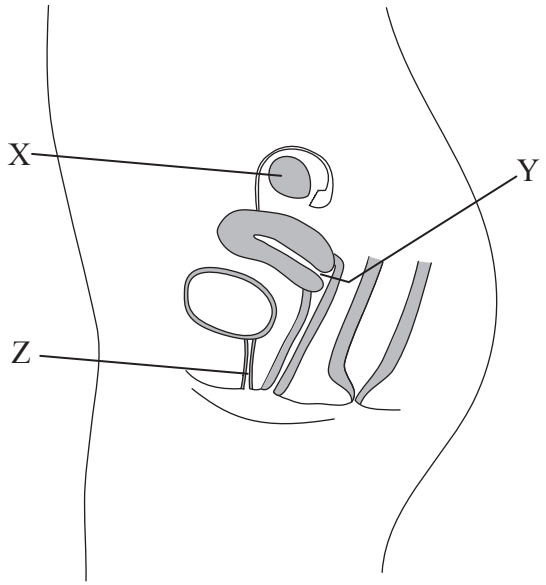
20. The graph below shows the blood glucose concentration of a patient after feeding at 07:00.



What describes the events between 07:00 and 09:00 and between 09:00 and 11:00?

	Between 07:00 and 09:00	**Between 09:00 and 11:00**
A.	α islet cells produce and secrete insulin	β islet cells produce glucagon
B.	β islet cells produce and secrete glucagon	α islet cells produce and secrete insulin
C.	α islet cells produce and secrete glucagon	β islet cells produce and secrete insulin
D.	β islet cells produce and secrete insulin	α islet cells produce and secrete glucagon

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



Which of the labelled structures correctly identify the cervix, urethra and ovary?

	Cervix	Urethra	Ovary
A.	Z	X	Y
B.	Y	Z	X
C.	Y	X	Z
D.	Z	Y	X

22. Which sequence of events precedes birth?

A. Progesterone levels increase, oxytocin decreases, uterine contractions increase, oxytocin decreases further.

B. Progesterone levels decrease, oxytocin increases, uterine contractions increase, oxytocin increases further.

C. Progesterone levels increase, oxytocin increases, uterine contractions decrease, oxytocin decreases.

D. Progesterone levels decrease, oxytocin decreases, uterine contractions decrease, oxytocin decreases further.

23. In the gene regulation of the lac operon, which of the following events take place in the absence of lactose?

A. Regulator protein prevents binding of RNA polymerase so no mRNA is produced.

B. Regulator protein binds to lactose.

C. Regulator protein binds to DNA polymerase.

D. Regulator protein binds to mRNA.

24. During translation, which of the following codons would bind to a 3′ AUC 5′ anti codon of a tRNA?

A. 5′ UAG 3′

B. 3′ UAG 5′

C. 5′ AUC 3′

D. 3′ AUC 5′

25. The active site of an enzyme can bind to both glucose and fructose. What does this exemplify?

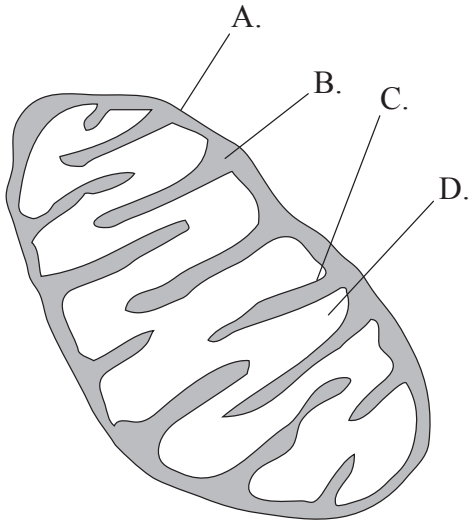
A. Allosteric inhibition

B. Lock and key model

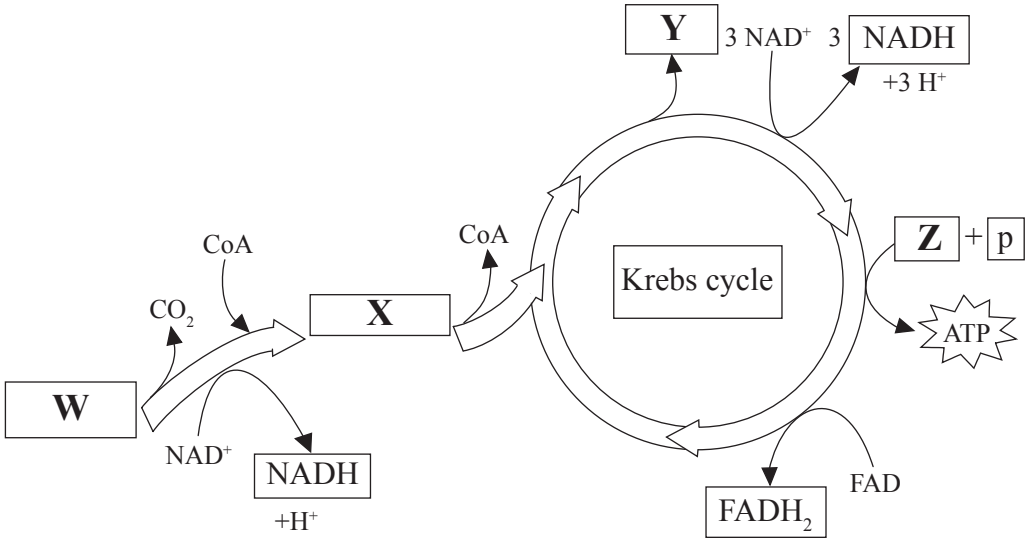
C. Non-competitive inhibition

D. Induced fit model

26. In the diagram of a mitochondrion below where is the electron transport chain located?

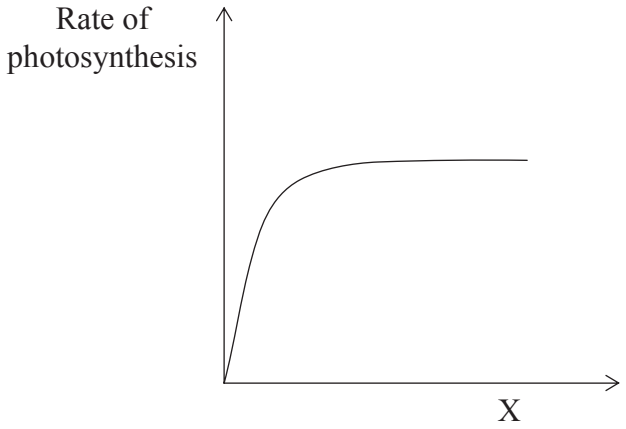


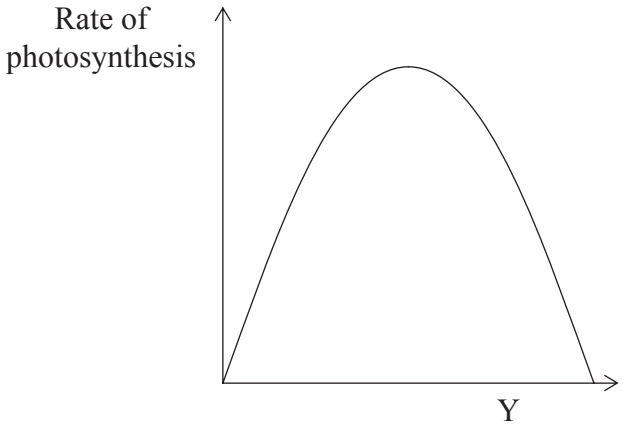
27. The diagram below shows the link reaction and stages of the Krebs cycle. Which molecules are represented by the letters W, X, Y and Z?



	W	X	Y	Z
A.	acetyl CoA	carbon dioxide	ADP	pyruvate
B.	pyruvate	acetyl CoA	carbon dioxide	ADP
C.	ADP	carbon dioxide	acetyl CoA	pyruvate
D.	acetyl CoA	pyruvate	carbon dioxide	ADP

28. Which limiting factors of photosynthesis are represented by X and Y?





	X	Y
A.	carbon dioxide concentration	temperature
B.	temperature	carbon dioxide concentration
C.	light intensity	carbon dioxide concentration
D.	temperature	light intensity

29. In rabbits the allele for long ears (*L*) is dominant over the allele for short ears (*l*). The allele for black fur (*B*) is dominant over the allele for brown fur (*b*).

If two rabbits with the genotypes *Llbb* and *llBb* are crossed together, which phenotypic ratio is expected in the offspring?

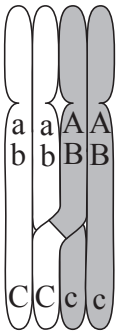
A. 9 long-eared black : 3 long-eared brown : 3 short-eared black : 1 short-eared brown

B. 1 long-eared black : 3 long-eared brown : 3 short-eared black : 9 short-eared brown

C. 6 long-eared black : 3 long-eared brown : 3 short-eared black : 3 short-eared brown

D. 1 long-eared black : 1 long-eared brown : 1 short-eared black : 1 short-eared brown

30. The diagram below shows an event during prophase I.



What event does it represent?

A. Crossing over of non sister chromatids of a homologous pair

B. Crossing over of sister chromatids of a homologous pair

C. Crossing over of non sister chromatids of a non-homologous pair

D. Crossing over of sister chromatids of a non-homologous pair

31. What causes genetic variation?

I. Random orientation of pairs of chromosomes in meiosis

II. Base substitution

III. Crossing over

A. II only

B. III only

C. I and II only

D. I, II and III

32. Which of the following correctly describes features of spermatogenesis and oogenesis?

	Spermatogenesis	Oogenesis
A.	mitosis	meiosis
B.	completed during fertilization	completed during fertilization
C.	four sperm produced per meiosis	one egg produced per meiosis
D.	sperm production starts during fetal development	early stages happen during fetal development

33. Which materials are passed across the placenta from the fetus back to the mother?

A. Carbon dioxide, urea, hormones and water

B. Oxygen, minerals, urea and hormones

C. Carbon dioxide, proteins, uric acid and water

D. Oxygen, carbon dioxide, urea and hormones

34. Which of the following represent an example of both artificial immunity and passive immunity?

A. Antibodies passed across in colostrum

B. Injection of antivenom used to treat snake bites

C. Exposure to somebody who is ill with Chickenpox

D. Immunization with a weakened form of a virus

35. What is(are) the use(s) of monoclonal antibodies in treatment and diagnosis?

I. Targeting viral proteins

II. Purification of interferon

III. Tissue typing for transplants

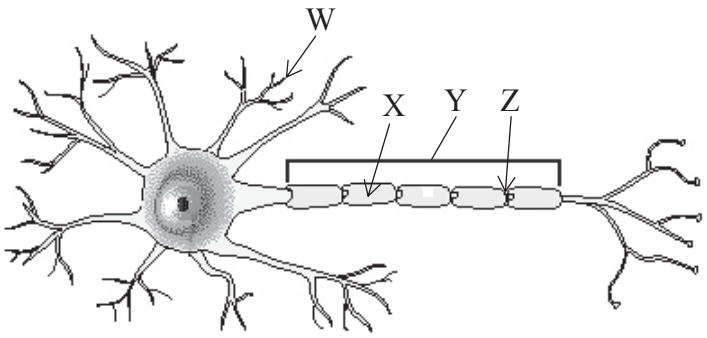
A. I only

B. I and II only

C. I and III only

D. I, II and III

36. In the diagram of the motor neuron below what is indicated by the labels W, X, Y and Z?



	W	X	Y	Z
A.	myelin sheath	dendrite	node of Ranvier	elongated axon
B.	myelin sheath	dendrite	elongated axon	node of Ranvier
C.	dendrite	myelin sheath	elongated axon	node of Ranvier
D.	dendrite	node of Ranvier	myelin sheath	elongated axon

37. In the human elbow joint, what are the functions of synovial fluid, cartilage and ligaments?

	Synovial fluid	Cartilage	Ligaments
A.	reduces friction	lubricates the joint	links bone to bone
B.	lubricates the joint	reduces friction	links bone to bone
C.	reduces friction	links bone to bone	lubricates the joint
D.	lubricates the joint	links bone to bone	reduces friction

38. Which excretory product occurs in which group of organisms?

	Carbon dioxide	Uric acid	Oxygen
A.	mammals	birds	plants
B.	mammals	plants	birds
C.	plants	mammals	birds
D.	birds	plants	mammals

39. A plant has roots, leaves and short woody stems. The leaves are usually curled up during growth and divided into leaflets. They produce spores, usually on the underside of the leaves.

What type of plant could this be?

A. Hydrophyte

B. Filicinophyte

C. Bryophyte

D. Xerophyte

40. Which factors are essential for seed germination?

A. Oxygen and soil

B. Carbon dioxide and water

C. Oxygen and light

D. Oxygen and water