2020-DSE
BIO (Mock)
PAPER 1A

Form Six Mock Examination 2019-2020

DSE BIOLOGY PAPER 1

Date: 24th Feb. 2020
8:25 am – 10:55 am (2 hours 30 minutes)
This paper must be answered in English

Candidate number: _____

GENERAL INSTRUCTIONS

1. There are **TWO** sections, A and B, in this paper. You are advised to finish Section A in about 35 minutes.

2. Section A consists of multiple-choice questions in this question book. Section B contains conventional questions printed separately in Question-Answer Book B.

3. Answers to Section A should be marked on the Multiple-choice Answer Sheet while answers to Section B should be written in the spaces provided in Question-Answer Book B. **The Answer Sheet for Section A and the Question-Answer Book for Section B must be handed in separately at the end of the examination.**

INSTRUCTIONS FOR SECTION A (MULTIPLE-CHOICE QUESTIONS)

1. Read carefully the instructions on the Answer Sheet. Insert the information required in the spaces provided.

2. When told to open this book, you should check that all the questions are there. Look for the words "**END OF SECTION A**" after the last question.

3. All questions carry equal marks.

4. **ANSWER ALL QUESTIONS.** You should use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured.

5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.

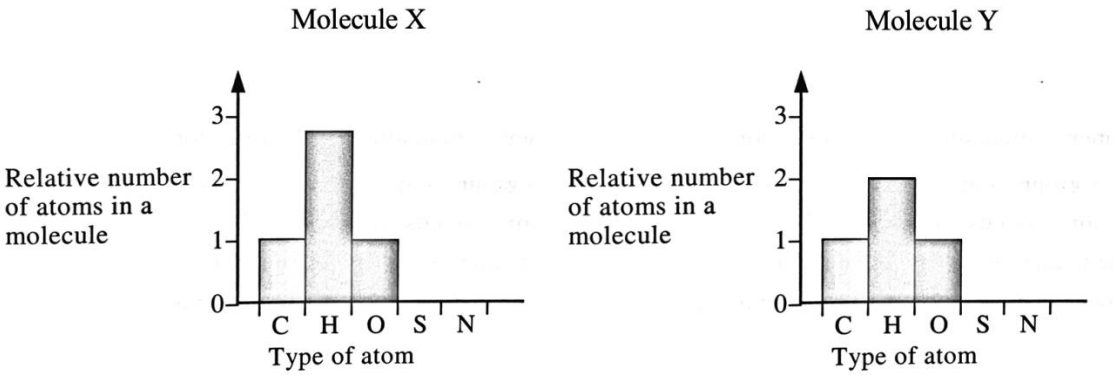
6. No marks will be deducted for wrong answers.

7. The diagrams in this section are **NOT** necessarily drawn to scale.

Not to be taken away before the end of the examination

There are 36 questions in this section.
The diagrams in this section are not necessarily drawn to scale.

1. The bar charts below show the relative numbers of atoms in two different molecules:



Which of the following conclusions can be made regarding the two molecules?

(1) Molecule X is larger than molecule Y.
(2) Molecule Y is soluble in water.
(3) Neither molecule X nor molecule Y is a polypeptide.

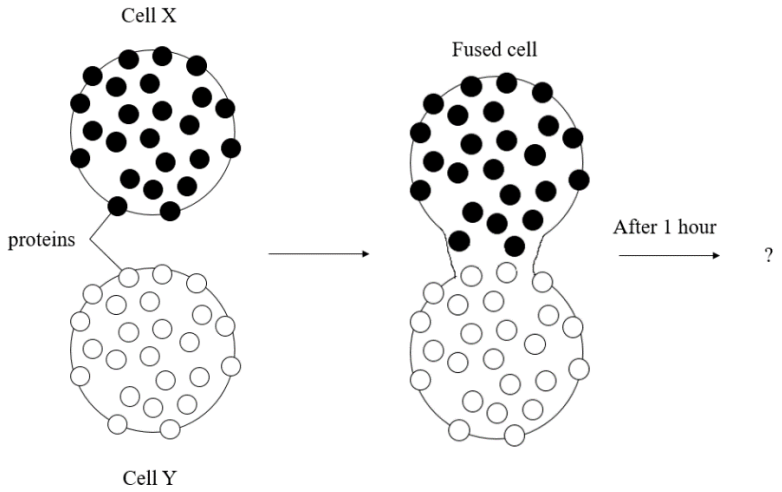
A. (2) only
B. (3) only
C. (1) and (3) only
D. (2) and (3) only

2. Which of the following reactions involve water as a reactant?

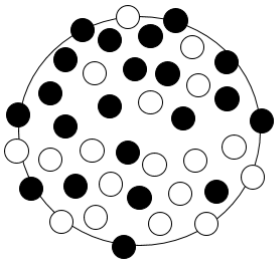
(1) ATP → ADP
(2) Maltose → Glucose
(3) Photochemical reactions of photosynthesis

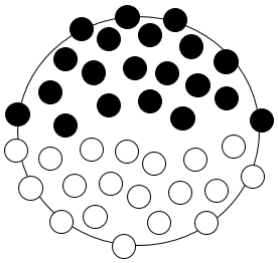
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2), and (3)

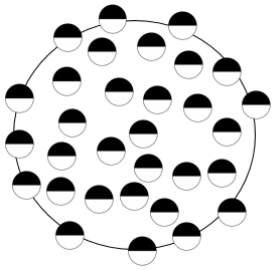
3. The diagram below shows an experiment regarding the fluid mosaic model. Cell X and cell Y were first fused together. The protein patterns on the fused cell were then observed after an hour.

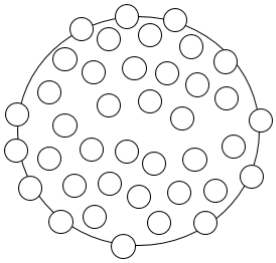


Which of the following results provides evidence for the fluid mosaic model?

A. 

B. 

C. 

D. 

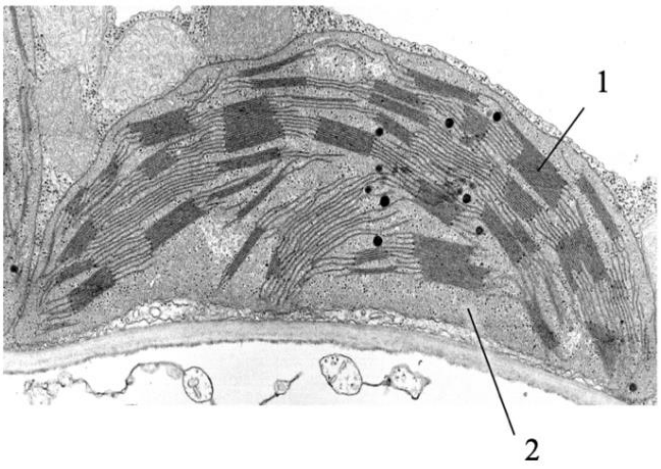
4. Which of the following processes involve diffusion?

(1) Transport of glucose from blood to tissue fluid
(2) Transport of carbon dioxide across the capillary and alveoli walls
(3) Transport of neurotransmitters across a synaptic cleft

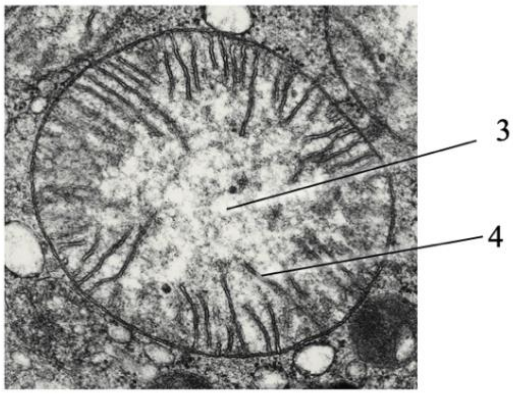
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2), and (3)

Directions: Questions 5 and 6 refer to the electron micrographs below, which show two different organelles:

Organelle X



Organelle Y



5. Which of the following statements are true for both organelles?

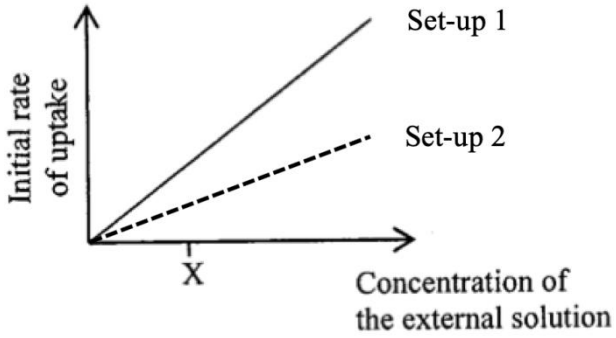
(1) Their membranes are made of phospholipids.
(2) They contain nucleic acids.
(3) Their inner membranes are fully permeable.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2), and (3)

6. Which of the following statements regarding the structures in organelles X and Y is ***incorrect***?

A. Electron transport chains are located in structures 1 and 4.
B. The Calvin cycle occurs at structure 2, while the Krebs cycle occurs at structure 3.
C. Oxygen is produced at structure 1, while carbon dioxide is produced at structure 4.
D. ATP is produced by enzymes in structures 1 and 4.

7. Some plant cells were placed in solutions of different concentrations and the initial rate of uptake of solute into the cells was measured. It is known that X is the concentration of the solute inside the plant cells.



Which of the following conclusions can be made regarding the experiment?

(1) The uptake of solute will be inhibited if cyanide was added to the plant cells.
(2) After a fixed amount of time, more solute was taken up by the plant cells in set-up 1 than in set-up 2.
(3) The concentration gradient between the plant cells and the external solution was steeper in set-up 1 than in set-up 2.

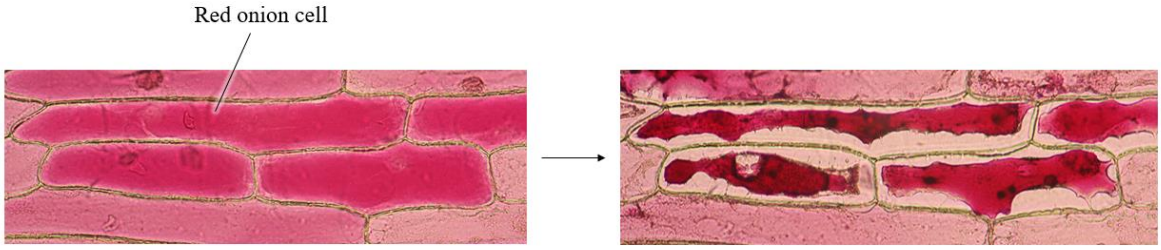
A. (1) only
B. (2) only
C. (1) and (3) only
D. (1), (2), and (3)

8. Which of the following are anabolic reactions?

(1) Conversion of triose phosphate to glucose in plants
(2) Conversion of glucose to pyruvate in respiration
(3) Conversion of glucose to glycogen in the liver

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2), and (3)

9. The photomicrographs below show some red onion cells placed in a solution and observed under a light microscope for five minutes:

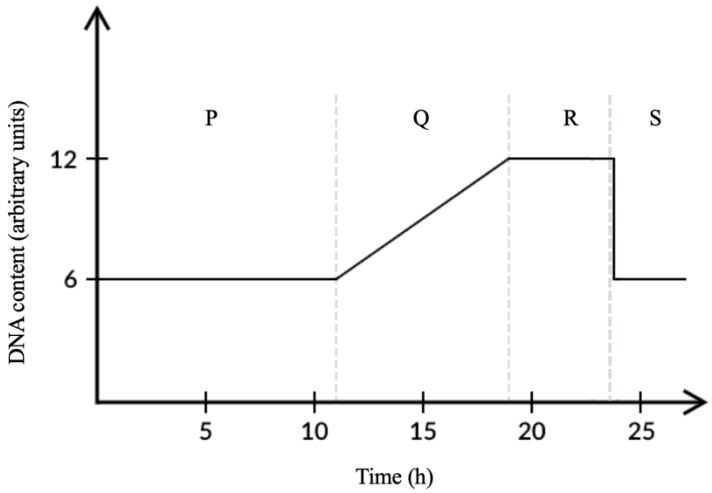


Which of the following is/are required for the above change in the appearance of the cells to occur?

(1) Concentration gradient between the cytoplasm of the cells and the solution
(2) Selectively permeable membrane
(3) Energy released from respiration

A. (2) only
B. (1) and (2) only
C. (1) and (3) only
D. (1), (2), and (3)

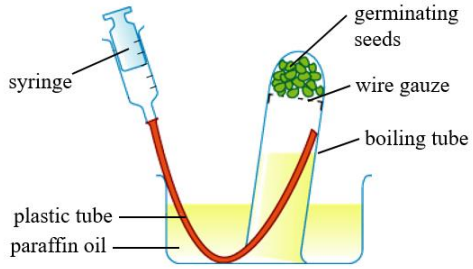
10. The following graph shows how cellular DNA content changes over the course of a typical cell cycle in a human cell:



Which of the following descriptions about the cell is correct?

A. Translation of mRNAs occur during time period P.
B. Chromosomes are coiled and visible under the microscope during time period Q.
C. The cell is tetraploid during time period R.
D. Four haploid daughter cells are produced during time period S.

Directions: Questions 11 and 12 refer to the diagram below, which shows an experimental set-up for studying respiration in germinating seeds. Gas was collected using a syringe after a few hours.



11. Which of the following modifications can improve the accuracy of the experiment?

(1) Use a test tube instead of a boiling tube
(2) Use a syringe with smaller scale divisions
(3) Sterilize the surface of the seeds

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2), and (3)

12. Which of the following statements regarding the gas collected is correct?

A. The gas is reabsorbed by the seeds for photosynthesis.
B. The gas is produced from the decarboxylation of pyruvate in the seeds.
C. The gas turns sodium hydrogencarbonate solution yellow.
D. The gas is produced in lactic acid fermentation in humans.

13. Under starvation, the body weight of a man decreases because

A. no food is available for synthesis of new body tissues.
B. his energy intake decreases.
C. his muscles are broken down to provide energy.
D. his bone mass decreases due to a loss of calcium.

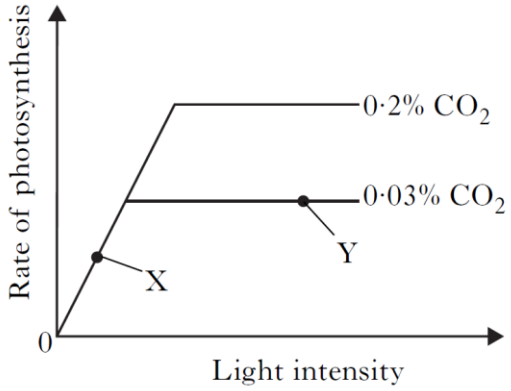
14. If the pancreatic duct of a person is blocked, which of the following would occur to him?

A. Blood glucose level increases.
B. Bile content in blood decreases.
C. Protein digestion decreases.
D. Emulsification of lipid decreases.

15. Celiac disease causes the destruction of the villi cells. Which of the following is most likely to happen to people with celiac disease?

A. Incomplete digestion of fats
B. Poor absorption of calcium
C. Increased levels of glucose in blood
D. Decreased water content in faeces

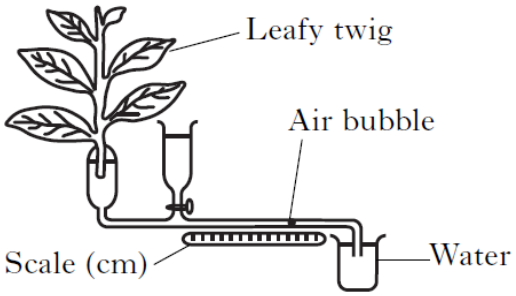
16. The graph below shows the rate of photosynthesis at two different levels of carbon dioxide concentration at 20°C:



Which of the following correctly shows the limiting factor at points X and Y?

	Point X	***Point Y***
A.	Light intensity	Carbon dioxide concentration
B.	Temperature	Light intensity
C.	Carbon dioxide concentration	Temperature
D.	Light intensity	Temperature

17. The diagram below shows the set-up used to measure the transpiration rate of a leafy twig:

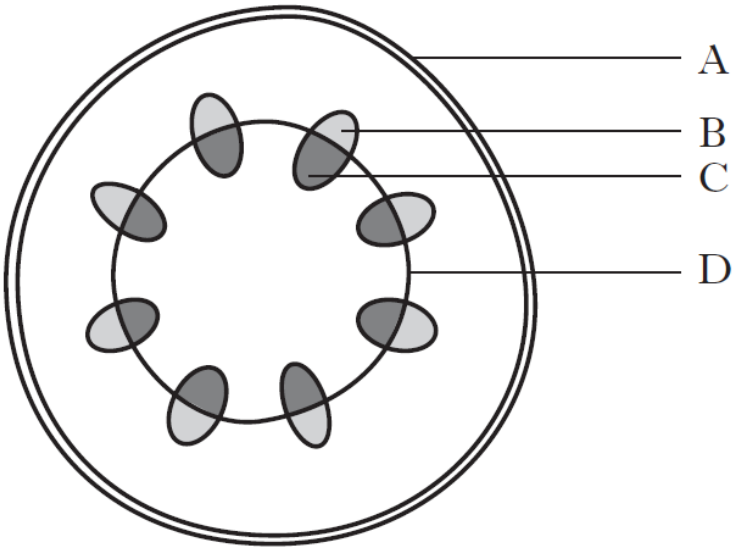


Which of the following is a necessary precaution when preparing the set-up?

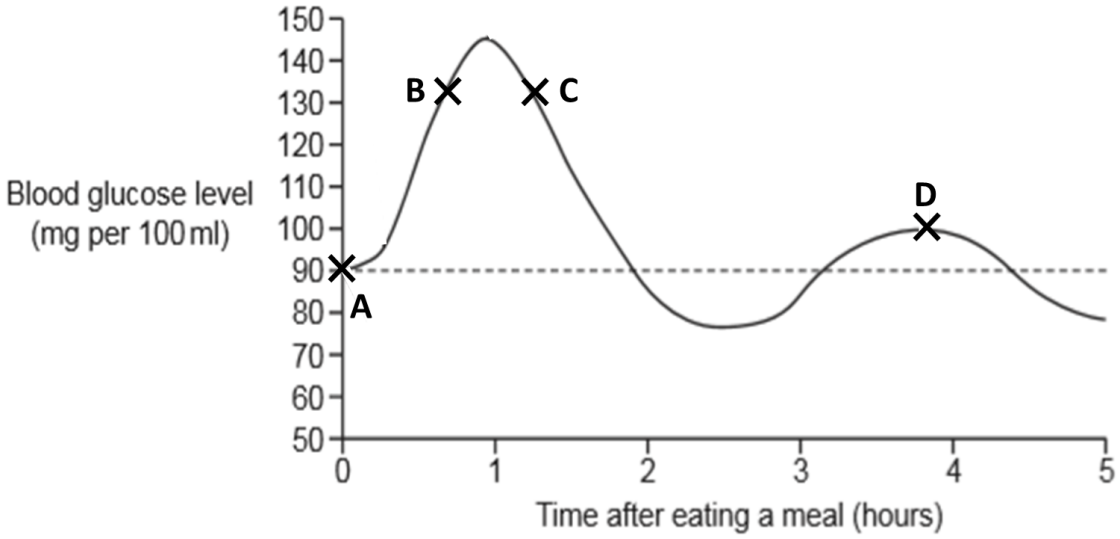
(1) Cut the leafy twig under water.
(2) Cover the water in the beaker with oil.
(3) Blot dry the leaves.

A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

18. The diagram below shows a cross section of a young dicot stem. In which region would meristem be found?



19. The graph shows blood glucose levels after eating a meal. Which point A, B, C or D on the graph would the insulin level in the blood be at its highest level?



20. Which of the following are main components of pus?

(1) Tissue fluid
(2) Dead white blood cells
(3) Dead pathogens

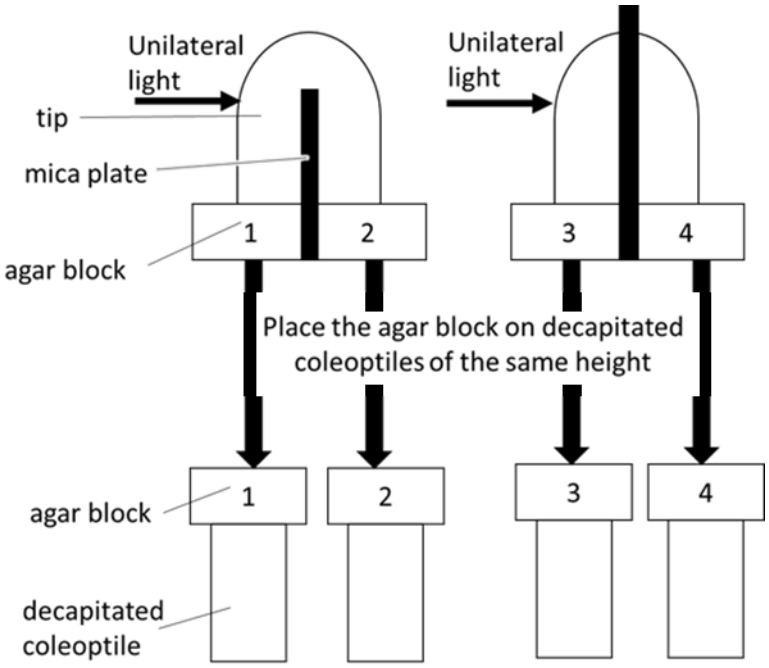
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

21. Which of the following is the significance of blood clotting?

(1) to stop further bleeding
(2) to stimulate the production of antibodies
(3) to prevent the entry of pathogens

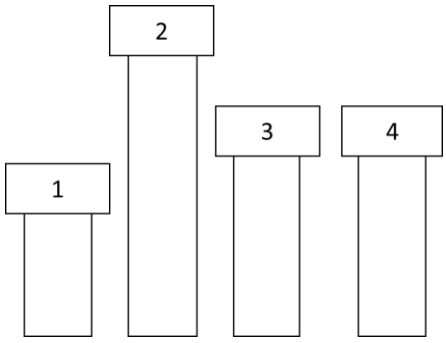
A. (1) and (2) only
B. (1) and (3) only
C. (2) and (3) only
D. (1), (2) and (3)

22. The diagram below shows how auxins are collected from the tip of coleoptiles under different conditions. The agar blocks are then placed on decapitated coleoptiles of the same height.

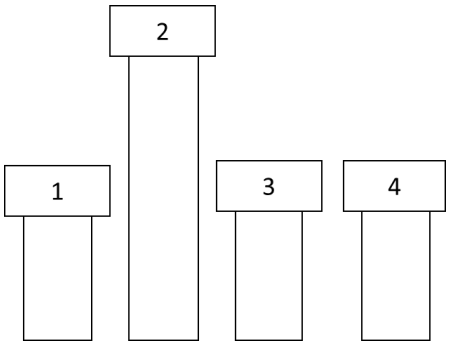


Which of the following correctly shows the growth response of the decapitated coleoptiles?

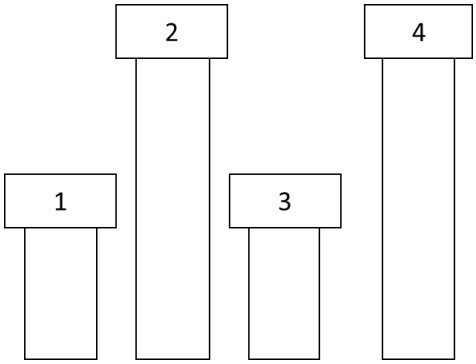
A.



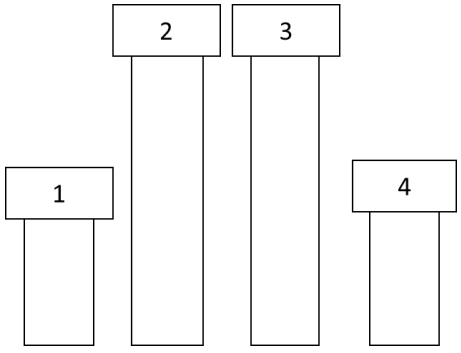
B.



C.

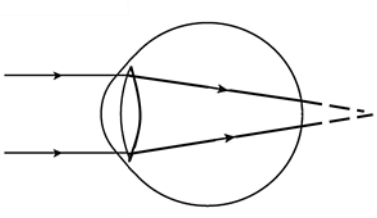


D.

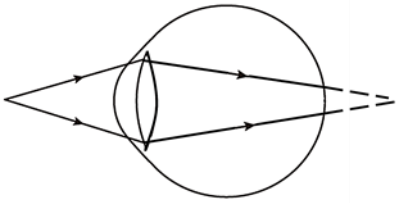


23. Keratoconus is a condition in which the cornea is not strong enough to hold its shape and becomes bulged out (more convex). Which diagram shows the correct ray diagram when the patient observes far way object?

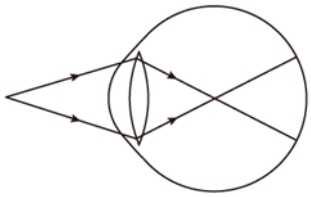
A.



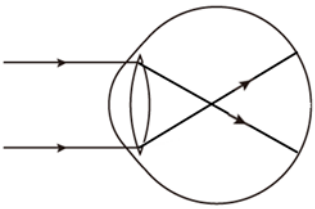
B.



C.



D.



24. Which of the following best describes different components of musculoskeletal system?

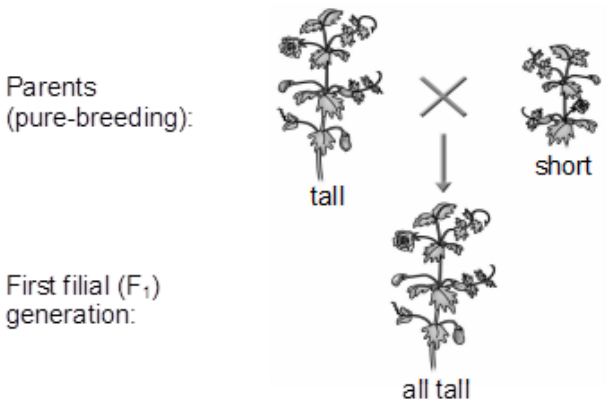
	Component	***Description***
A.	Synovial membrane	Inelastic tissue that binds bones together
B.	Tendon	Elastic tissue found at the two ends of a long bone
C.	Cartilage	Inelastic tissues found at the two ends of a long bone
D.	Ligament	Elastic tissue that binds bones together

25. In a family, the father has normal vision while the mother is red-green colour blind (a recessive X-linked trait). Which of the following phenotypes must not be present in their biological child?

(1) Son with red-green colour blindness
(2) Daughter with red-green colour blindness
(3) Son with normal vision
(4) Daughter with normal vision

A. (1) and (2) only
B. (2) and (3) only
C. (1) and (4) only
D. (3) and (4) only

26. The following diagram shows the cross performed by Gregor Mendel between a pure-breeding tall pea plant and a pure-breeding short pea plant:



What can Mendel deduce from the above cross?

A. Each inherited characteristics is determined by a pair of hereditary factors.
B. During gamete formation, separation of each pair of hereditary factors occurs so that each gamete receives only one factor from each pair.
C. Each pure-breeding parent has two identical hereditary factors.
D. The tall character is dominant to the short character in the F1 generation.

27. Which of the following is an example of geographical isolation?

A. During mating season, females from different songbird species are only attracted by mating calls of a particular frequency.
B. More black peppered moth living on polluted tree trunks while more white peppered moth living on unpolluted tree trunks.
C. Two pandas were sent from China to Germany, separating from their original family.
D. Due to continental drift, the common ancestor of marsupials in Australia was separated from the rest of the mammal population.

28. Which taxa do *Aptenodytes patagonicus* and *Aptenodytes forsteri* share?

A. They share the same class but not the same family.
B. They share the same class but not the same genus.
C. They share the same family but not the same species.
D. They share the same species but not the same class.

29. Which of the following best describes the DNA region where RNA polymerase moves along during transcription?

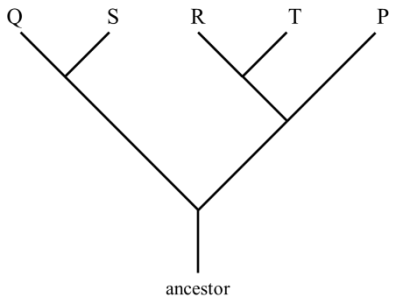
A. coding strand in coding DNA
B. template strand in coding DNA
C. either one of the strands in coding DNA
D. either one of the strands in non-coding DNA

30. This question refers to the nucleotide sequence of a certain function gene segment found in four different species of organisms P, Q, R, S and T.

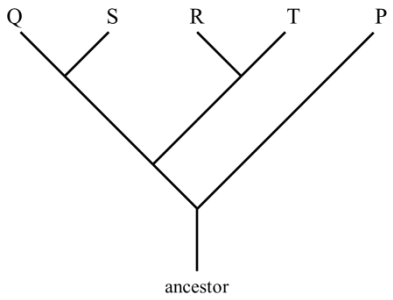
GTT AGC TAG CAG TA (organism P)
CCA TGT AAG TGG TT (organism Q)
TCA TGT CAG CAA CT (organism R)
CCG TGT AAG CAG TT (organism S)
TCA TGT CAG CAA CC (organism T)

Based on the above information, which of the following diagrams best represents the evolutionary tree of these organisms?

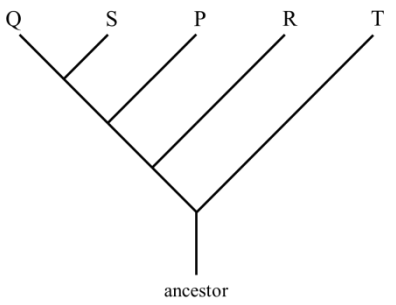
A.



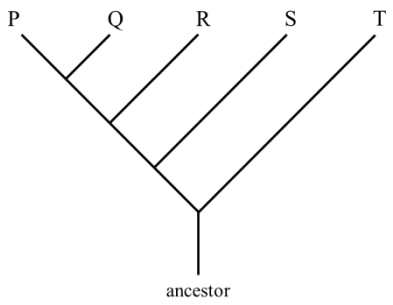
B.



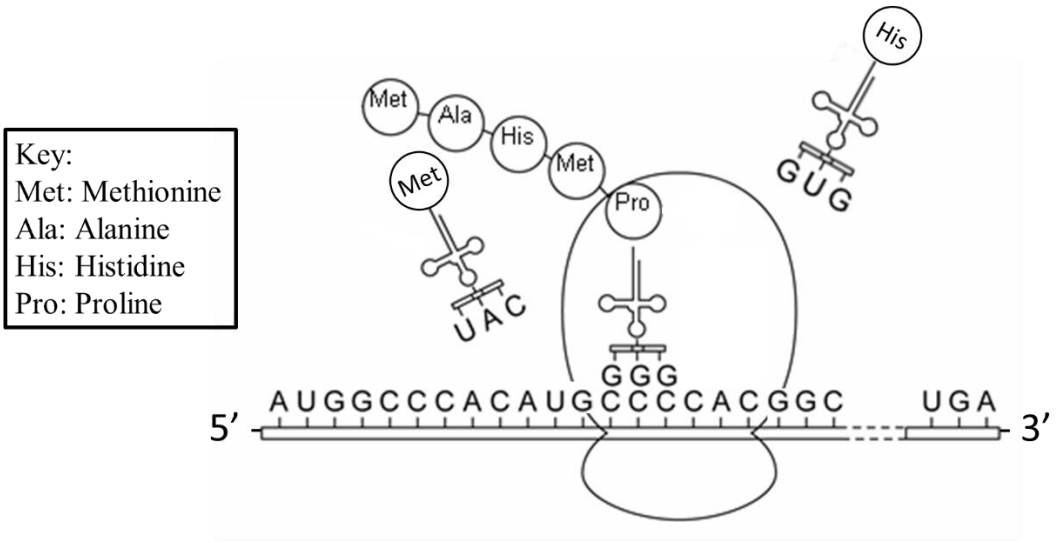
C.



D.



31. The following diagram shows the process of translation.



Which of the following statements about this translation process is correct?

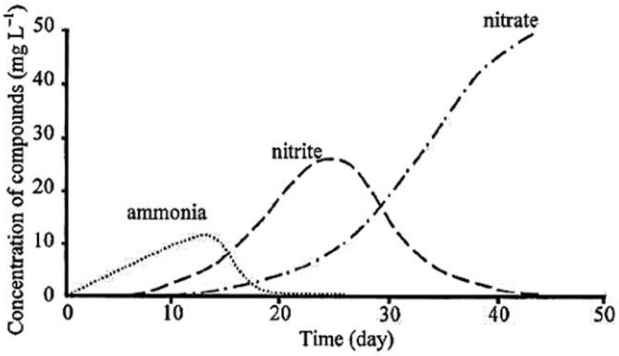
A. The stop codon is ACU.
B. The ribosome moves along the mRNA from 3' to 5'.
C. The next peptide bond will be formed between proline and methionine.
D. It is the first time for a tRNA molecule with anticodon GGG to bind on the mRNA strand.

32. A zoo obtained a Nile crocodile (*C. niloticus*) and a West African crocodile (*C. suchus*) which are evolved from a common ancestor. Which of the following descriptions about them must be true?

(1) They must be coming from two populations.
(2) They must be coming from two communities.
(3) They must be coming from two ecosystems.

A. (1) only
B. (3) only
C. (2) and (3) only
D. (1), (2) and (3)

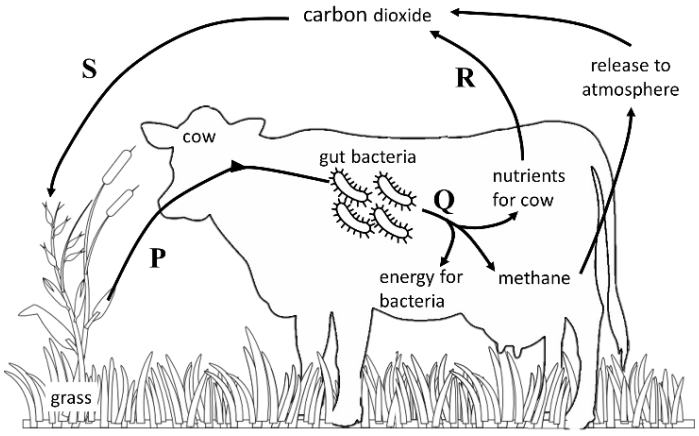
33. Kitty purchased a testing kit to monitor the levels of ammonia, nitrite and nitrate in her aquarium. The graphs below shows the changes in the concentration of the three compounds over 45 days:



Which of the following statements can be deduced from the graph?

A. Nitrifying bacteria became more active over time.
B. Nitrogen-fixing bacteria became more active over time.
C. The aquarium provided insufficient amount of oxygen for nitrifying bacteria.
D. Denitrifying bacteria became less active over time.

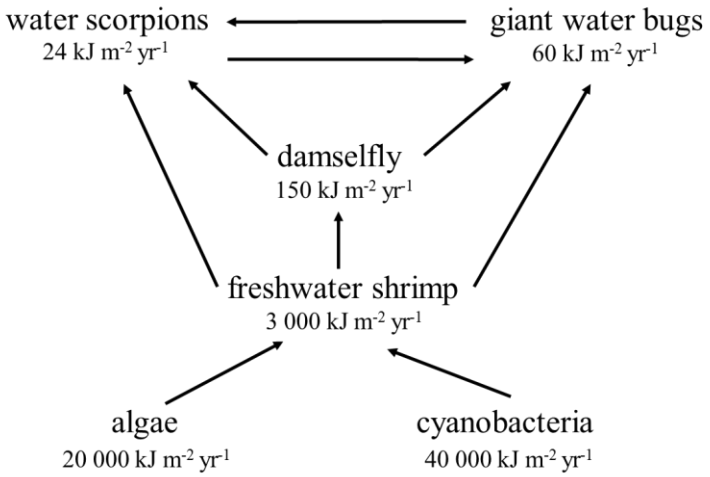
34. The diagram below shows part of a carbon cycle in a grassland:



Which of the following combinations correctly describes the processes P, Q, R and S?

	P	***Q***	***R***	***S***
A.	grazing	fermentation	decomposition	photosynthesis
B.	grazing	respiration	breathing	diffusion
C.	feeding	fermentation	respiration	photosynthesis
D.	feeding	respiration	decomposition	diffusion

Directions: Questions 35 and 36 refer to the diagram below which shows a food web. The energy values represent the amount of energy stored in biomass in the population.



35. Which of the following organisms are competitors?

A. algae and cyanobacteria
B. freshwater shrimp and algae
C. damselfly and freshwater shrimp
D. water scorpions and giant water bugs

36. What is the percentage of energy lost between the first and second trophic levels?

A. 85%
B. 90%
C. 92.5%
D. 95%

END OF SECTION A

Go on to Question-Answer Book B for questions on Section B