



福建中學

FUKIEN SECONDARY SCHOOL

S6 Mock Examination (2020-2021)

Biology Paper 1

(2 hours 30 minutes)

Date: 21st January 2021

Time: 8:30a.m. - 11:00a.m.

Name: _____

Class: _____ No.: _____

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 will be collected separately at the end of the examination.

INSTRUCTIONS FOR SECTION A (MULTIPLE-CHOICE QUESTIONS)

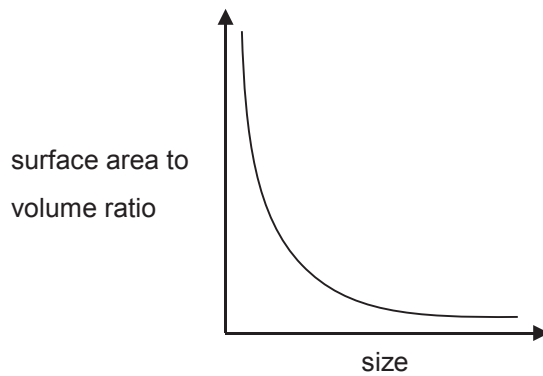
- 1 Read carefully the instructions on the Answer Sheet. Insert the information required in the spaces provided.
- 2 When told to open this book, you should check that all the questions are there. Look for the words 'END OF SECTION A' after the last question.
- 3 All questions carry equal marks.
- 4 ANSWER ALL QUESTIONS. You should use an HB pencil to mark all the answers on the Answer Sheet. Wrong marks must be completely erased.
- 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.

There are 36 questions in this section.

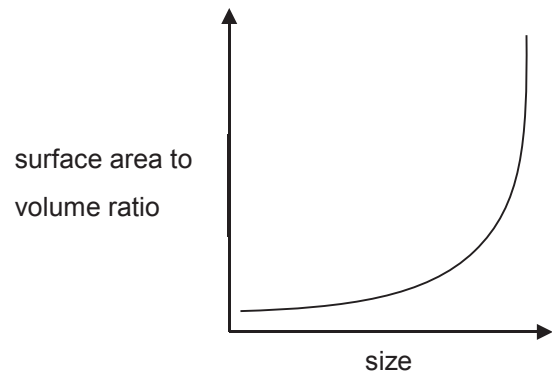
The diagrams in this section are NOT necessarily drawn to scale.

- 1 Which of the following graphs correctly shows the relationship between the size and the surface area to volume ratio of a cell?

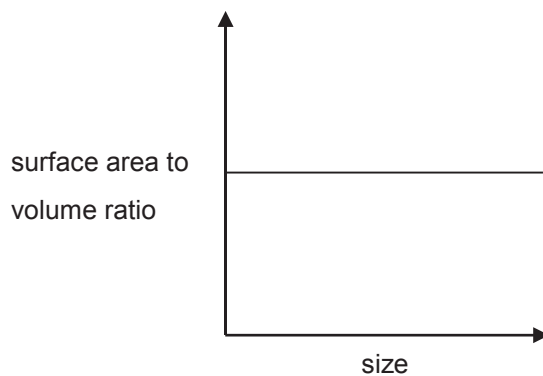
A



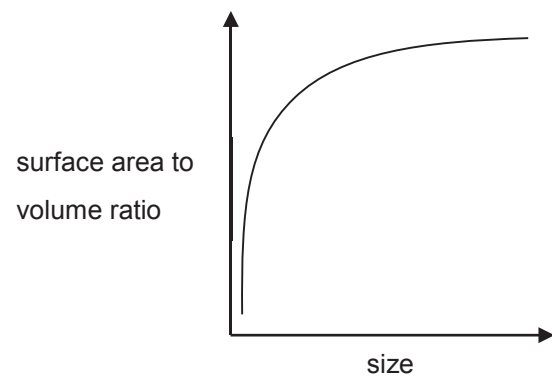
B



C



D



- 2 Which of the following statements correctly describe(s) both starch and polypeptide?

- (1) Both are made up of identical subunits.
- (2) Both can act as an energy source in the human body.
- (3) Both serve as structural components in the human body.

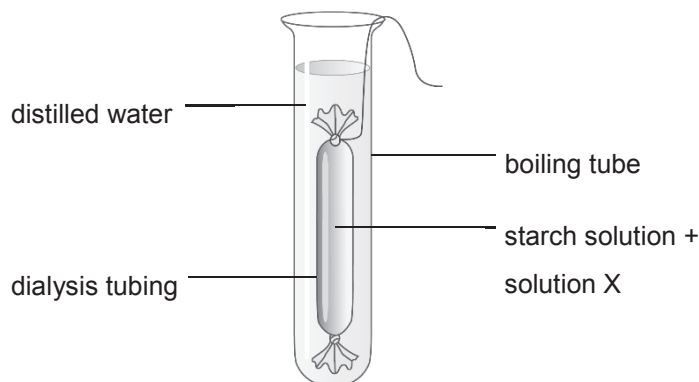
A (2) only

B (1) and (2) only

C (1) and (3) only

D (2) and (3) only

Directions: Questions 3 and 4 refer to the set-up below, which was used by a student to demonstrate the importance of digestion in the absorption of carbohydrates. The student tested the distilled water and the mixture in the dialysis tubing with Benedict's test at the beginning of the experiment and after 30 minutes.



The table below shows the results of the experiment.

	Results of Benedict's test		Results of iodine test	
	At the beginning	After 30 minutes	At the beginning	After 30 minutes
Distilled water	No observable change	Brick-red precipitate is formed	Remains brown	Remains brown
Mixture in the dialysis tubing	No observable change	Brick-red precipitate is formed	Turns blue-black	Turns blue-black

3 Which of the following conclusion(s) could be drawn from the results?

- (1) Solution X contains amylase.
- (2) Starch was broken down into glucose.
- (3) The dialysis tubing is permeable to a kind of reducing sugar.

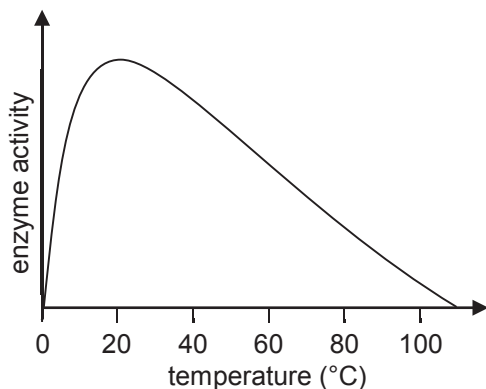
- A (3) only B (1) and (2) only
C (1) and (3) only D (2) and (3) only

4 Which of the following should be carried out as a precaution in this experiment to avoid experimental errors?

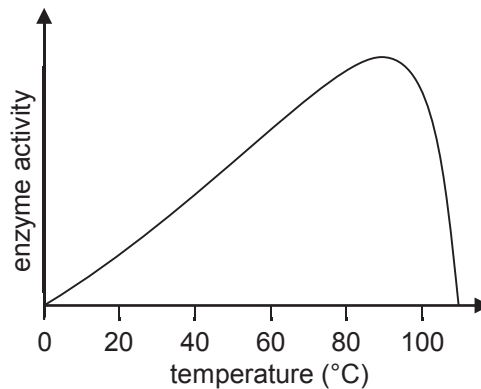
- A Fill the dialysis tubing fully with the solution mixture.
- B Put the set-up into a water bath at 37 °C.
- C Shake the dialysis tubing regularly to mix the solution mixture.
- D Wash the outside of the dialysis tubing with distilled water before placing the tubing into the boiling tube.

- 5 Hydrogenobacter is a group of bacteria which lives in hot springs with temperatures up to 90°C. X is an enzyme extracted from Hydrogenobacter. Which of the following graphs most probably shows the effect of temperature on the activity of enzyme X?

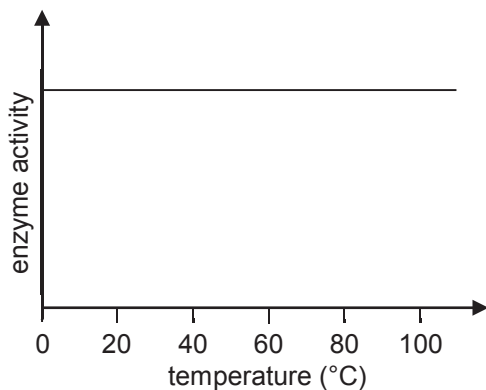
A



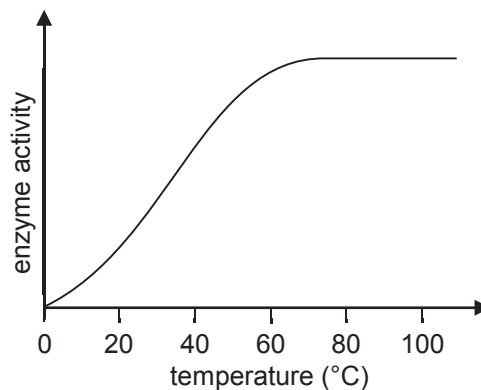
B



C



D



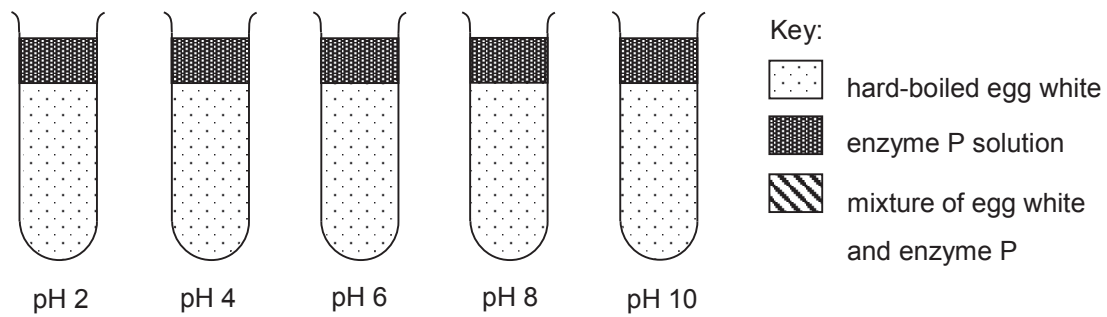
- 6 A student accidentally mixed up five tubes of carbohydrates of known identity. The table below shows the results of several food tests the student carried out previously on the five carbohydrates.

Carbohydrate	Food test		
	Glucose test paper	Benedict's test	Iodine test
glucose	positive	forms brick-red precipitate	remains brown
fructose	negative	forms brick-red precipitate	remains brown
sucrose	negative	remains blue	remains brown
lactose	negative	forms brick-red precipitate	remains brown
starch	negative	remains blue	turns blue-black

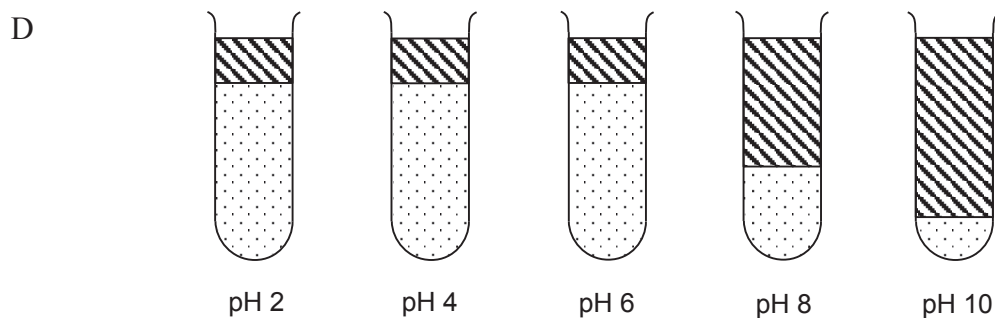
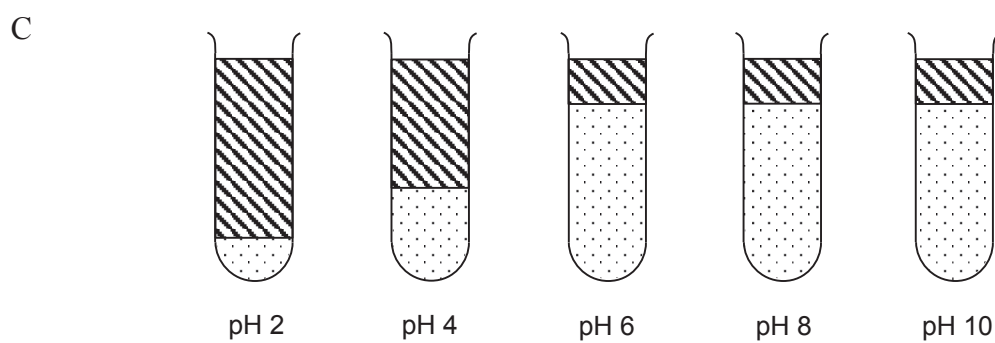
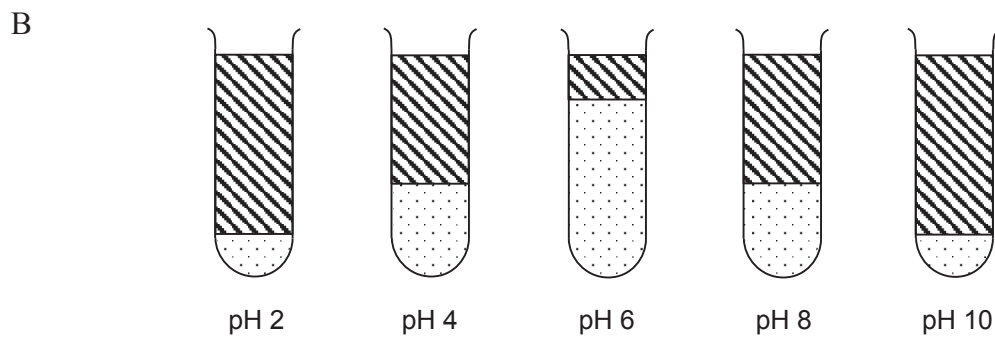
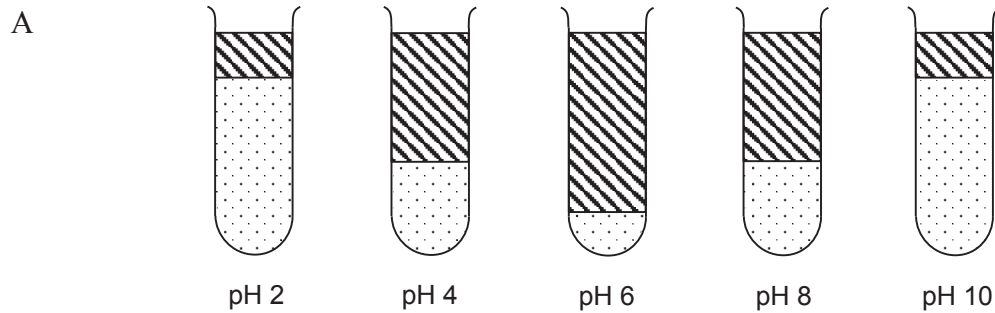
What is the minimum number of food test(s) that the student needs to carry out in order to identify sucrose from the four other carbohydrates?

- A one
B two
C three
D cannot be determined

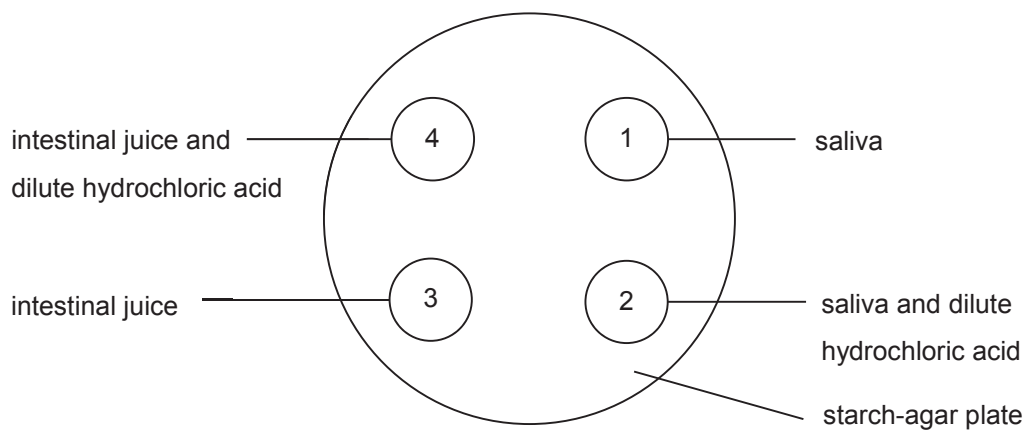
- 7 The experimental set-up below was used to investigate the effect of pH on the activity of enzyme P, a protease obtained from the stomach.



Which of the following shows the expected results of the investigation?



- 8 A scientist used a starch-agar plate to study the actions of human digestive juices. He made four wells on the plate and filled the wells with different mixtures, as shown in the diagram below.



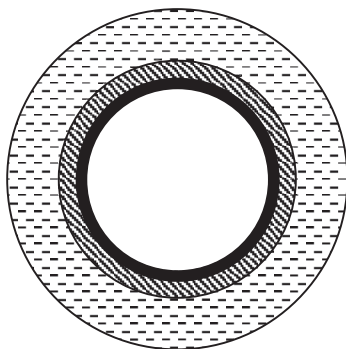
After a one-hour incubation at 35 °C, a clear zone could be observed around

- A well 1 only. B well 4 only.
 C wells 1 and 3 only. D wells 2 and 4 only.
- 9 Which of the following simplified diagrams best represents the cross section of an artery?

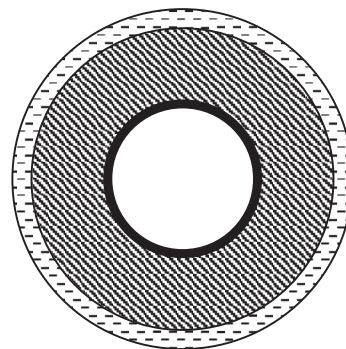
Key:

-  fibrous tissue
-  muscle and elastic tissues
-  endothelium

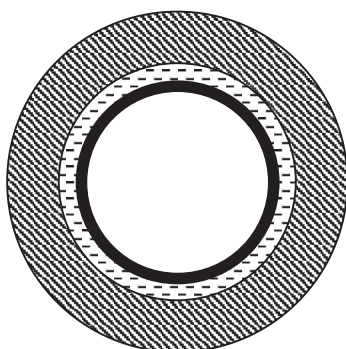
A



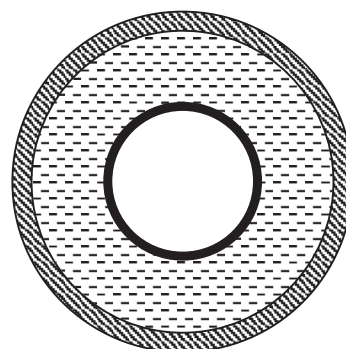
B



C



D

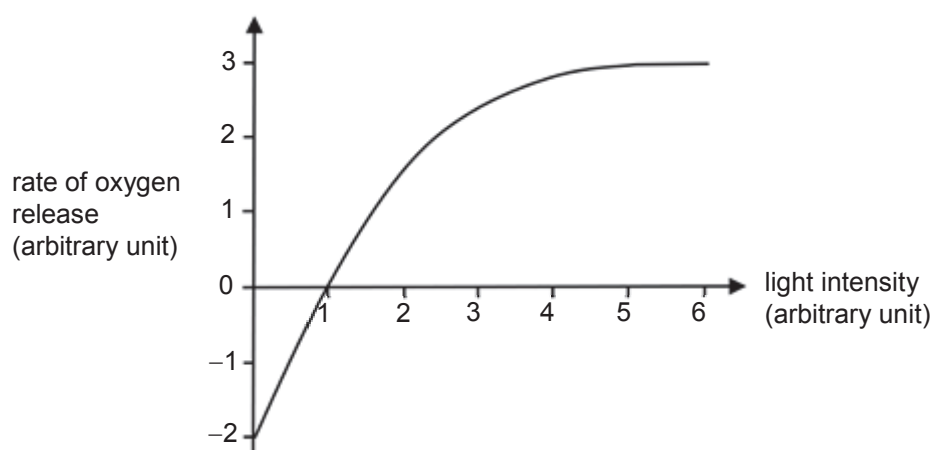


- 10 The table below shows the distribution of stomata in the leaves of three types of plants, X, Y and Z.

Plant	Average stomatal density (number per cm ²)	
	Upper epidermis	Lower epidermis
X	10 500	0
Y	4300	4500
Z	1250	14 000

Which of the following combinations correctly identifies plants X, Y and Z?

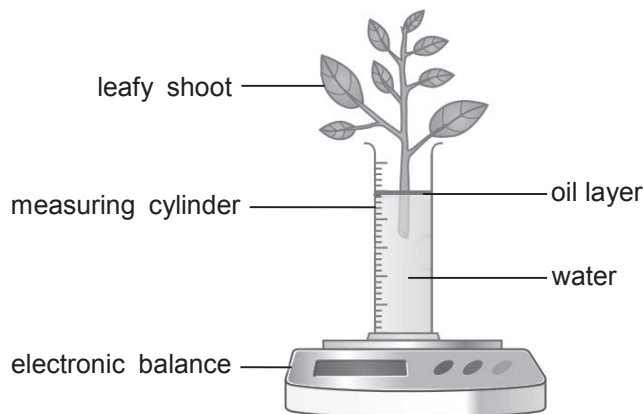
- | | Plant X | Plant Y | Plant Z |
|---|---------------------|---------------------|-------------------|
| A | terrestrial dicot | terrestrial monocot | floating plant |
| B | terrestrial monocot | terrestrial dicot | floating plant |
| C | floating plant | terrestrial dicot | submerged plant |
| D | floating plant | terrestrial monocot | terrestrial dicot |
- 11 The graph below shows the rate of oxygen release of a plant under different light intensities.



Which of the following can be deduced from the graph?

- (1) The plant does not carry out photosynthesis at 1 unit of light intensity.
 - (2) The rate of respiration of the plant is lower than the rate of photosynthesis at 3 units of light intensity.
 - (3) The maximum rate of photosynthesis of the plant is 5 units in terms of the rate of oxygen release.
- A (1) and (2) only
 B (1) and (3) only
 C (2) and (3) only
 D (1), (2) and (3)

Directions: Questions 12 and 13 refer to the diagram below, which shows an experimental set-up used to study the water balance of a leafy shoot of a terrestrial plant. The set-up is put under light for 30 minutes.



The table below shows the initial and final readings in the measuring cylinder and the electronic balance.

	Initial reading	Final reading
Reading in measuring cylinder (cm^3)	50	46.5
Reading in electronic balance (g)	80.5	77.5

12 What is the amount of water retained by the leafy shoot in 30 minutes? (Given that 1 cm^3 of water weighs 1 g.)

- A 0.1 g
- B 0.5 g
- C 3 g
- D 3.5 g

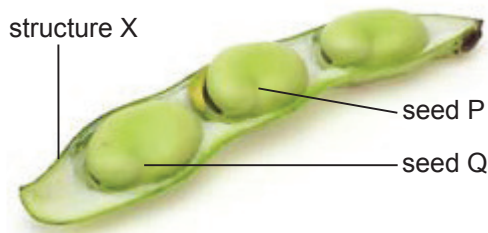
13 Which of the following will lead to a smaller change in the reading in the electronic balance after 30 minutes?

- (1) Put the set-up in a dark place
- (2) Smear the lower surface of the leaves with vaseline
- (3) Remove the oil layer in the measuring cylinder

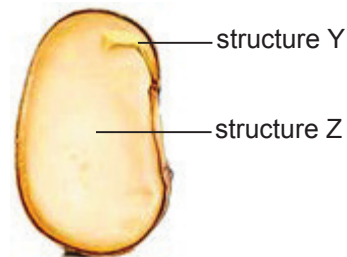
- A (1) and (2) only
- B (1) and (3) only
- C (2) and (3) only
- D (1), (2) and (3)

Directions: Questions 14 and 15 refer to Photograph I and Photograph II below. Photograph I shows an opened broad bean pod and Photograph II shows the vertical section of a broad bean.

Photograph I



Photograph II

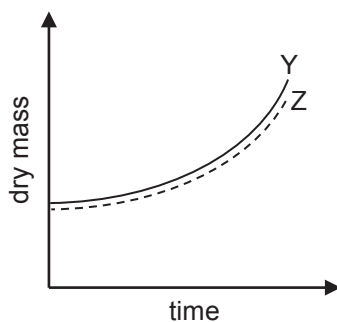


14 Which of the following statements about the labelled structures in Photograph I is correct?

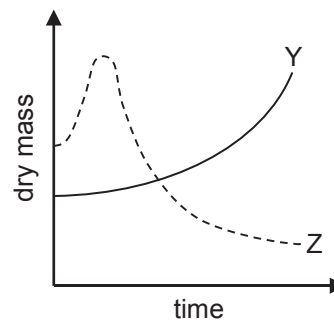
- A Structure X is developed from the carpel of the flower.
- B Structure X is diploid while seeds P and Q are haploid.
- C Structure X helps disperse seeds P and Q.
- D Seeds P and Q have the same genetic make-up.

15 Which of the following graphs correctly shows the changes in dry mass of structures Y and Z shown in Photograph II during germination?

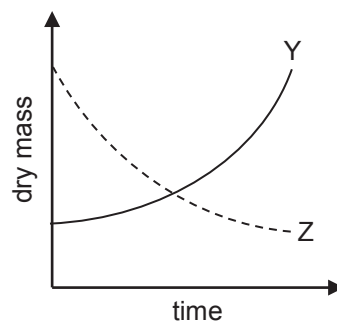
A



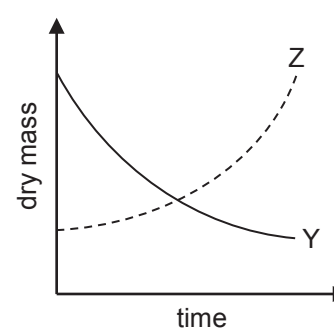
B



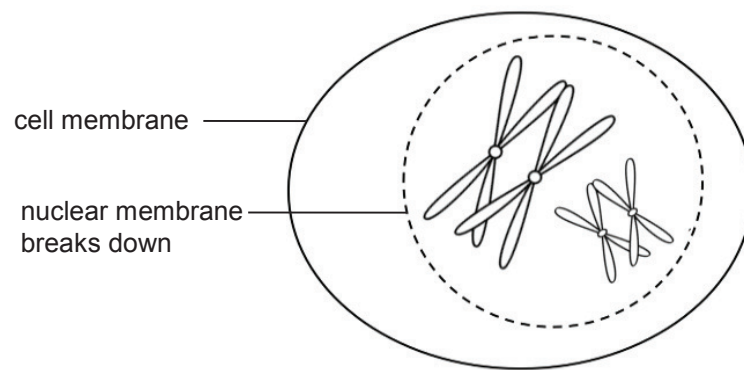
C



D



16 The diagram below shows a certain stage of cell division.



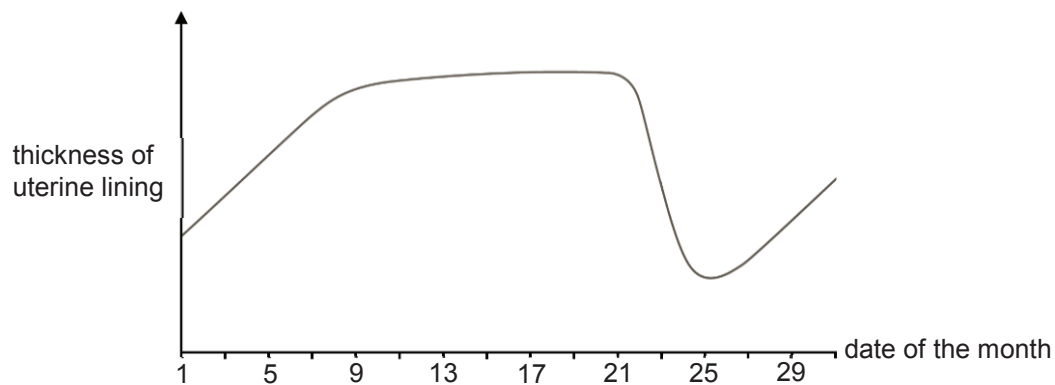
Which of the following statements about this stage are correct?

- (1) It is a stage of meiotic cell division.
 - (2) DNA replication occurs immediately after this stage.
 - (3) It gives rise to new genetic combinations in the daughter cells.
- A (1) and (2) only
 B (1) and (3) only
 C (2) and (3) only
 D (1), (2) and (3)

17 Which of the following comparisons between self-pollination and cross-pollination of flowering plants is correct?

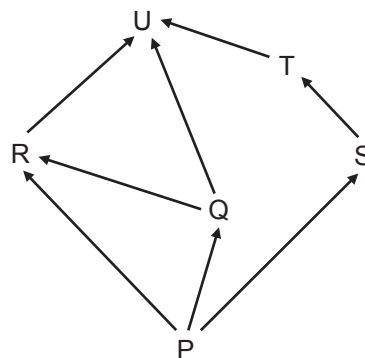
	Self-pollination	Cross-pollination
A	produces offspring that show no genetic variations	produces offspring that show genetic variations
B	does not requires external agents	requires external agents
C	produces fewer seeds	produces more seeds
D	less favourable in terms of natural selection	more favourable in terms of natural selection

- 18 The graph below shows the changes in the thickness of the uterine lining of a woman in a certain month.



Which of the following can be deduced from the graph?

- (1) Menstruation is likely to have occurred during the 21st–25th day.
 - (2) The woman would have a higher chance of becoming pregnant if she has sexual intercourse during the 13th–21st day.
 - (3) A large corpus luteum is likely to be found in the ovary of the woman during the 9th–15th day.
- A (1) and (2) only
 B (1) and (3) only
 C (2) and (3) only
 D (1), (2) and (3)
- 19 The food web below shows the feeding relationships among six organisms in an ecosystem.



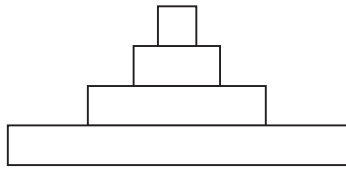
Which of the following statements about this food web are correct?

- (1) R and S compete for food.
 - (2) The amount of energy transferred from R to U is larger than that transferred from T to U.
 - (3) The longest food chain in this food web consists of four trophic levels.
- A (1) and (2) only
 B (1) and (3) only
 C (2) and (3) only
 D (1), (2) and (3)

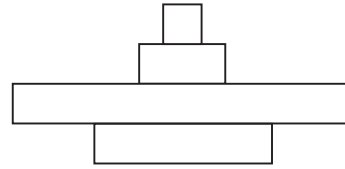
- 20 Which of the following diagrams correctly shows the pyramid of number for the food chain below?

grass → rabbit → wolf → parasite in wolf

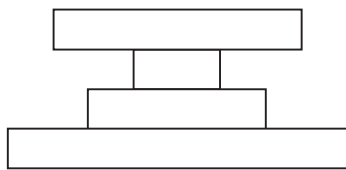
A



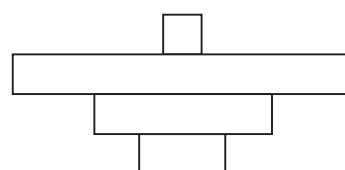
B



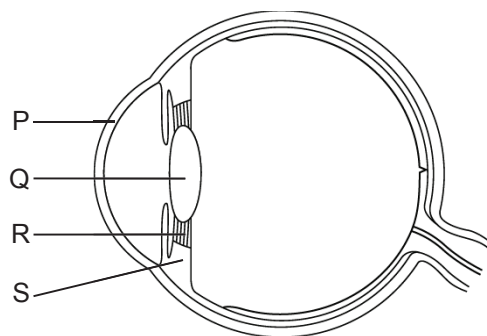
C



D



Directions: Questions 21 and 22 refer to the diagram below, which shows the section of a human eye.



- 21 Which of the following statements about structures P and Q are correct?
- (1) Both P and Q do not have capillaries.
 - (2) Both P and Q obtain nutrients from the aqueous humour.
 - (3) More refraction of light occurs in P than in Q.
- A (1) and (2) only
 B (1) and (3) only
 C (2) and (3) only
 D (1), (2) and (3)
- 22 Which of the following combinations correctly states the changes in structures R and S when a person is looking at a car approaching him?

	R	S
A	becomes slackened	relaxes
B	becomes slackened	contracts
C	becomes tightened	relaxes
D	becomes tightened	contracts

Directions: Questions 23 and 24 refer to Diagram I and Diagram II below. Diagram I shows an athlete practising high diving. Diagram II shows some structures in a human leg.

Diagram I

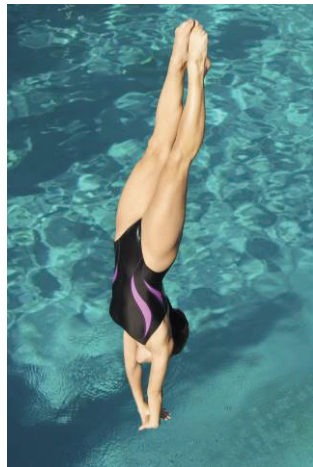
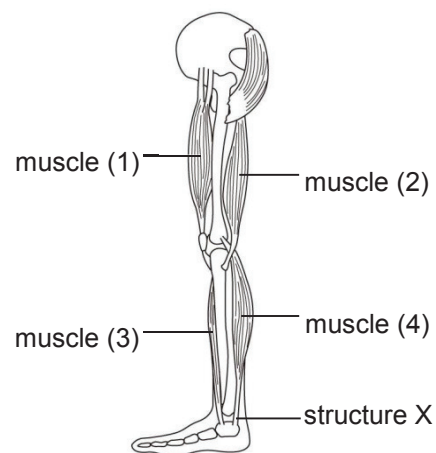
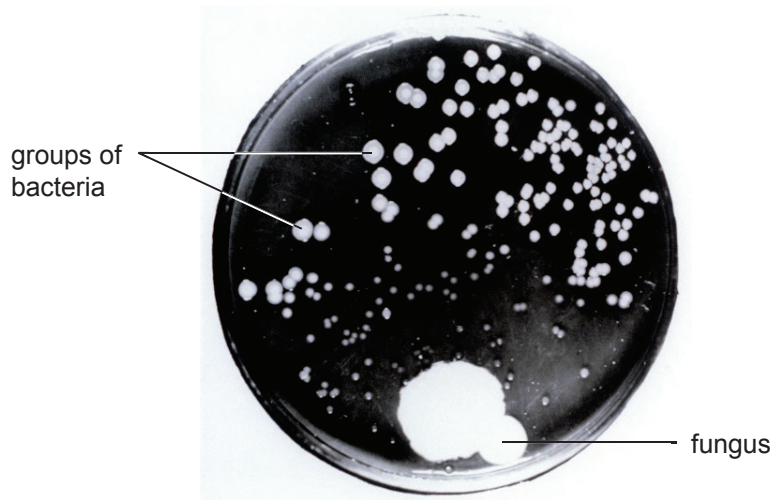


Diagram II



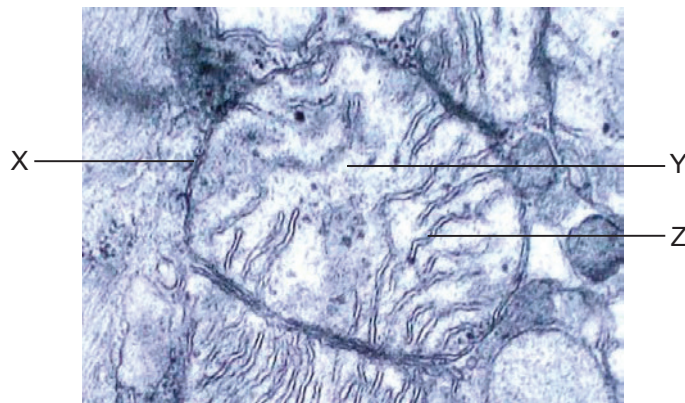
- 23 In maintaining the posture shown in Diagram I, which of the labelled muscles in Diagram II are contracting?
- A Muscles (1) and (3)
 - B Muscles (1) and (4)
 - C Muscles (2) and (3)
 - D Muscles (2) and (4)
- 24 Which of the following statements about structure X shown in Diagram II is correct?
- A It consists of living cells.
 - B It becomes shorter when muscle (4) contracts.
 - C It prevents dislocation of the ankle joint during movement.
 - D It absorbs shock during movement.
- 25 Antibiotics are ineffective against
- (1) cholera.
 - (2) hepatitis B.
 - (3) coronavirus disease 2019 (COVID-19).
- A (1) only
 - B (1) and (2) only
 - C (1) and (3) only
 - D (2) and (3) only

- 26 In 1928, Scottish microbiologist Alexander Fleming grew bacteria on agar plates. One of the plates was contaminated with a fungus. The photograph below shows Fleming's contaminated plate.



- Which of the following statements correctly explains the absence of bacterial growth around the fungus?
- A The fungus preyed on the bacteria.
 - B There was intraspecific competition among the bacteria.
 - C The fungus itself stopped the bacteria from growing.
 - D The fungus had released a substance that stopped the bacteria from growing.
- 27 A plant is supplied with water containing radioactive oxygen atoms. After putting the plant under bright light for three hours, which of the following substances in the plant will contain the radioactive oxygen atoms?
- (1) oxygen
 - (2) glucose
 - (3) carbon dioxide
- A (1) only
 - B (1) and (2) only
 - C (2) and (3) only
 - D (1), (2) and (3)
- 28 Which of the following biochemical pathways use energy from ATP?
- (1) conversion of glucose to triose phosphate in glycolysis of respiration
 - (2) regeneration of 4-C compound in the Krebs cycle of aerobic respiration
 - (3) regeneration of carbon dioxide acceptor in the Calvin cycle of photosynthesis
- A (1) and (2) only
 - B (1) and (3) only
 - C (2) and (3) only
 - D (1), (2) and (3)

29 The electron micrograph below shows a mitochondrion in an animal cell.



Which of the following statements about the labelled structures is correct?

- A Structure X is fully permeable.
 - B Glycolysis takes place at structure Y.
 - C Synthesis of ATP mainly occurs at structure Z.
 - D Carbon dioxide is produced at structure Z.
- 30 According to the World Health Organization (WHO), doing moderate- to high-intensity exercise for at least 150 minutes throughout the week may reduce the risk of type 2 diabetes. The table below shows the percentage of males and females of different ages doing moderate- to high-intensity exercise for at least 150 minutes per week in Country X.

Percentage of people doing moderate- to high-intensity exercise for at least 150 minutes per week (%)		
Age	Male	Female
18–27	78	65
28–37	75	61
38–47	72	59
48–57	63	56
58–67	58	45
≥68	41	32

Which of the following conclusions can be drawn based on the data shown in the table?

- (1) Males aged 18–27 have the lowest risk of type 2 diabetes.
 - (2) Females aged above 68 have the highest risk of type 2 diabetes.
 - (3) The percentage of males doing moderate- to high-intensity exercise for at least 150 minutes per week decreases as the age increases.
- A (1) only
 - B (3) only
 - C (1) and (2) only
 - D (1), (2) and (3)

Directions: Questions 31 and 32 refer to the table below, which shows the compatibility for blood transfusion among three members of a family, X, Y and Z.

		Donor		
		Individual X	Individual Y	Individual Z
Recipient	Individual X		incompatible	incompatible
	Individual Y	compatible		incompatible
	Individual Z	compatible	compatible	

31 Which of the following can be deduced from the above table?

- (1) The blood group of individual X is O.
- (2) The blood group of individual Y is A.
- (3) The blood group of individual Z is AB.

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

32 Which of the following is a possible combination of the relationships among individuals X, Y and Z?

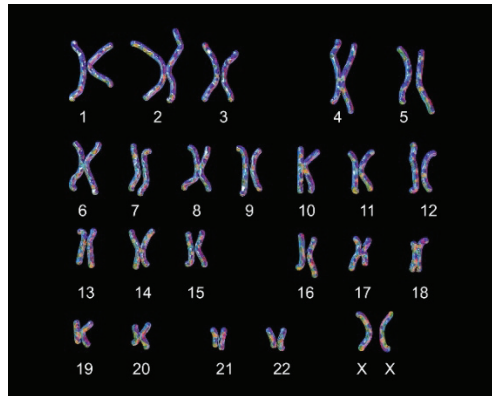
- | | Individual X | Individual Y | Individual Z |
|---|-------------------|--------------|--------------|
| A | parent | parent | child |
| B | child | parent | parent |
| C | parent | child | parent |
| D | cannot be deduced | | |

33 Which of the following statements about codons is/are correct?

- (1) Codons consist of the bases A, C, G and T.
- (2) Each codon specifies an amino acid.
- (3) Some codons specify the same amino acid.

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

- 34 The photomicrograph below shows the karyotype of person P.



Which of the following can be deduced from the karyotype?

- (1) The cell used for karyotyping is a somatic cell.
 (2) Person P is a female.
 (3) Person P does not have any genetic diseases.
- A (1) and (2) only
 B (1) and (3) only
 C (2) and (3) only
 D (1), (2) and (3)
- 35 Which of the following combinations correctly shows the classification of the organisms under the three-domain and six-kingdom system?

	Organism	Kingdom	Domain
A	mushroom	Plantae	Eukarya
B	Paramecium	Protista	Eukarya
C	E. coli	Archaeobacteria	Bacteria
D	slime mould	Fungi	Archaea

- 36 Which of the following shows the correct sequence of events in the development of pesticide resistance in insect pests?
- (1) natural selection
 (2) use of pesticide
 (3) mutation of insect pests
 (4) predomination of pesticide-resistant insect pests
- A (1) → (3) → (2) → (4)
 B (2) → (3) → (1) → (4)
 C (3) → (2) → (1) → (4)
 D (3) → (2) → (4) → (1)

– END OF SECTION A –

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