2020-2021
S6 Biology
Paper 1A

Munsang College (Hong Kong Island)
Academic Year 2020-2021
Secondary 6 Examination
BIOLOGY PAPER 1

Class: _____( )

Name: _____

Date: 18th January, 2021

Total Marks: 120

No. of Pages in Section A: 13

No. of Pages in Section B: 18

Time Allowed: 2 hr 30 min

GENERAL INSTRUCTIONS

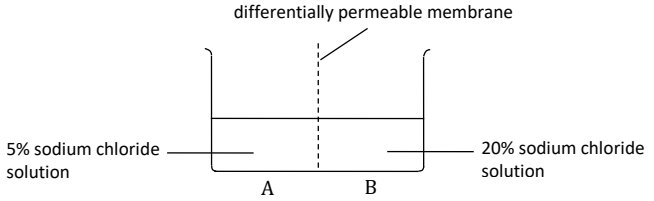
1. There are TWO sections, A and B, in this Paper. You are advised to finish Section A in about 35 minutes.
2. Section A consists of multiple-choice questions in this question paper. Section B contains conventional questions printed separately in Question-Answer Book B.
3. Answers to Section A should 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 B 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. After the announcement of the start of the examination, you should write down your **NAME**, **CLASS** and **CLASS NUMBER** on the multiple-choice answer sheet. **Blacken** the corresponding circles of your **CLASS** and **CLASS NUMBER**. No extra time will be given for writing anything after the 'Time is up' announcement.
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 are advised to use an HB pencil to mark all the answer on the multiple-choice 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 the wrong answers.

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

1. The following diagram shows an experimental set-up used to study movement of substances.

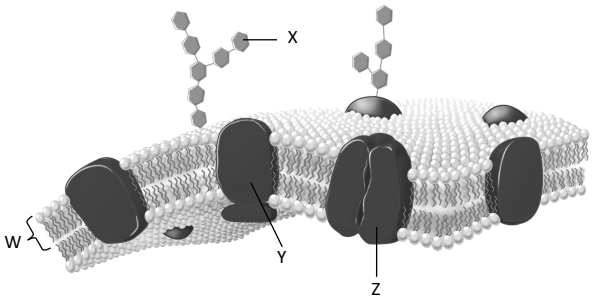


Which of the following statements about the set-up is/ are correct?

(1) Water molecules move from A to B only.
(2) sodium chloride solution diffuses from B to A.
(3) The concentration of solutions in A and B will finally become the same.

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

Directions: Questions 2 and 3 refer to the diagram below, which shows the cell membrane of an epithelial cell in the ileum.



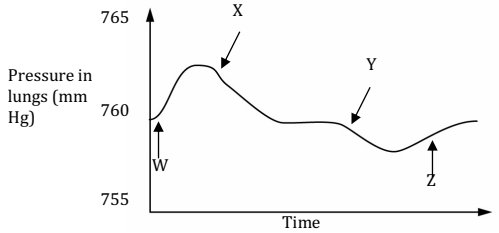
2. Which part(s) contribute(s) the differential permeability of the cell membrane?

A W, Y and Z only
B W, X and Z only
C X, Y and Z only
D W, X, Y and Z only

3. Which of the following combinations correctly show the absorption pathway of water and vitamin A in the epithelial cells of the ileum?

	water	**vitamin A**
A	W	Y
B	Z	W
C	X	Z
D	Y	X

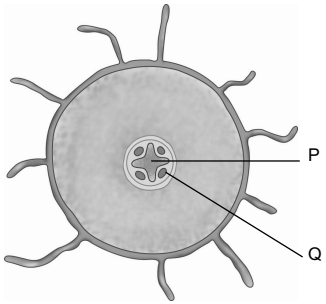
4. The graph below shows the changes of the air pressure in the lungs during breathing. The atmospheric pressure is 760 mmHg.



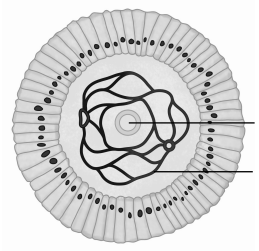
Which of the following positions on the graph corresponds to the point at which the ribs begin to raise?

A W B X
C Y D Z

5. The following figures show the cross sections of a root and a villus of the small intestine:



Root



Villus of small intestine

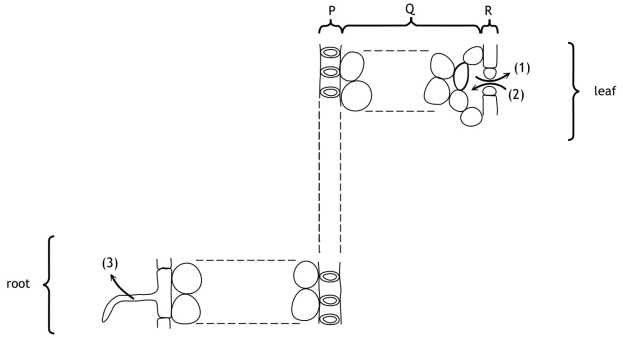
Which of the following combinations correctly states the structures that are responsible for the uptake of minerals in plants and humans?

	Plants	**Humans**
A	Q	R
B	Q	S
C	P	R
D	P	S

6. Which of the following statements about the structures of phloem is ***incorrect***?

A Sieve plates have pores to allow organic nutrients to pass through.
B Sieve tubes have lignified cell walls.
C Each companion cell contains a nucleus.
D Sieve tubes have no nuclei.

Directions: Question 7 and 8 refer to the diagram below which is a diagrammatic representation of the root and the leaf of a plant:



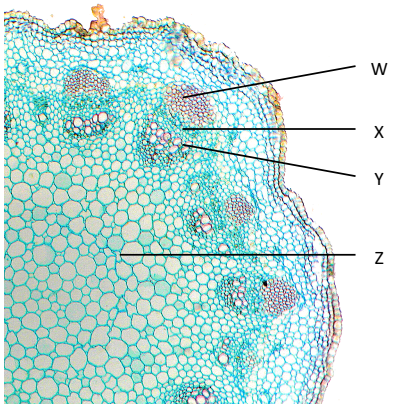
7. Which of the following is the correct combination of diffusion of gases under bright daylight?

	(1)	**(2)**	**(3)**
A	oxygen	water vapour	carbon dioxide
B	carbon dioxide	oxygen	oxygen
C	oxygen	carbon dioxide	water vapour
D	water vapour	carbon dioxide	carbon dioxide

8. Which types(s) of cells is/ are important to provide support to the plant regardless of water supply?

A P only B Q only
C P and Q only D P, Q and R

9. The photomicrograph below shows a section of dicot stem:



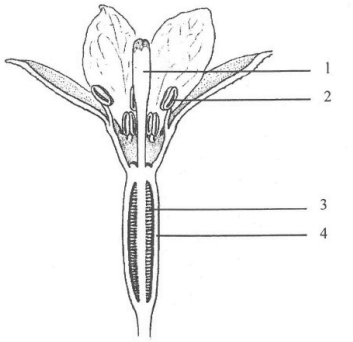
Which of the following correctly states the functions of W, X, Y and Z?

	W	X	Y	Z
A	support	transport of food	transport of water	support
B	transport of food	support	support	storage
C	transport of water	transport of food	support	support
D	support	transport of water	transport of food	storage

10. The amount of DNA in cell A immediately before first meiotic cell division is x. After second meiotic cell division, there are 4 chromosomes in each daughter cell. Which of the following description is correct?

A The amount of DNA in the daughter cell is 0.25x.
B The amount of DNA in each chromosome is 0.125x.
C There are 8 chromosomes after the first meiotic division.
D There are 16 chromosomes in cell A immediately before division.

Directions: Question 11 and 12 refer to the diagram below, which shows the structure of a flower:



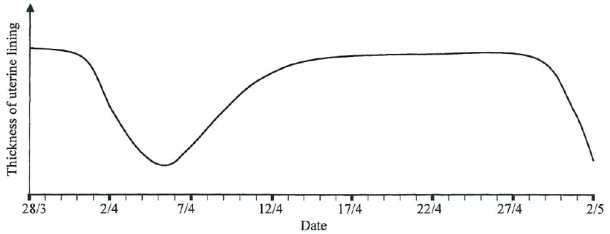
11. Which of the following combinations correctly shows the development of the floral parts after fertilization?

	1	3	4
A	fall off	cotyledons	seed coat
B	scar	seed	fruit wall
C	fruit wall	embryos	fruit wall
D	scar	seed	seed coat

12. Which of the following parts of the human reproductive system serves a function similar to that of structure 2?

A ovary
B epididymis
C testis
D penis

13. The diagram below shows the changes in the uterine lining of a woman:



Ovulation properly occurs on

A 2/4
B 7/4
C 16/4
D 22/4

14. During foetal development, the placenta has the functional roles as:

(1) the excretory system
(2) the immune system
(3) the endocrine system

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

Directions: Questions 15 and 16 refer to the following investigation.
Oscar wants to study competition between two types of seedlings X and Y. He prepared four pots of soil with the same mass. He planted different numbers of seeds in each pot, as shown in the **table 1** below.

Pot	Number of seeds planted	
	X	Y
1	5	5
2	10	0
3	0	10
4	10	10

Oscar put the pots on a window sill for four weeks. Each morning, he gave each pot 20 cm^3 of water. After four weeks, he removed the seedlings from the pots and weighed the seedlings.

Table 2 below shows the results of Oscar's experiment:

Pot	Total mass of seedlings after four weeks (g)	
	X	Y
1	9	12
2	29	0
3	0	33
4	22	28

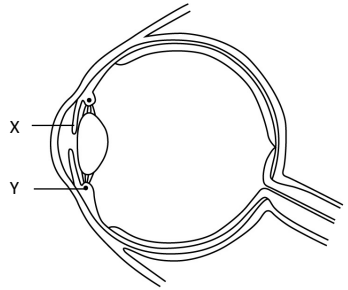
15. Which of the following is an independent variable in the above investigation?

A the mass of soil in each pot
B the number of seeds planted
C the weight of the seedlings after four weeks
D the amount of water received by the seedlings

16. Which of the following conclusions can be drawn based on the results?

A The higher the density of seeds planted, the lighter the weight of seedlings.
B Seedlings X and Y compete for water and nutrients in the soil.
C Competition adversely affects the growth of seedlings X and Y.
D Competition favours the growth of seedling Y.

17. The diagram below shows a section through the human eye.



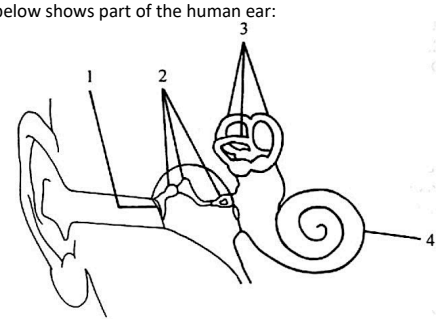
Which of the following combinations about the muscles in X and Y is correct when the eye focuses on a distant object in bright light?

	Circular muscles in X	**Radial muscles in X**	**Muscles in Y**
A	Contract	Relax	Contract
B	Contract	Relax	Relax
C	Relax	Contract	Contract
D	Relax	Contract	Relax

18. Peter noticed that there was a cockroach in a dim room. He found that he could see the cockroach more clearly when he tried to focus on the rubbish bin right next to it. Which of the following ***best*** explains this?

A The image of the cockroach was formed on the yellow spot where there are cone cells only.
B The image of the cockroach was formed on the yellow spot where there are rod cells only.
C The image of the cockroach was formed on the periphery of the retina where there are more cone cells than rod cells.
D The image of the cockroach was formed on the periphery of the retina where there are more rod cells than cone cells.

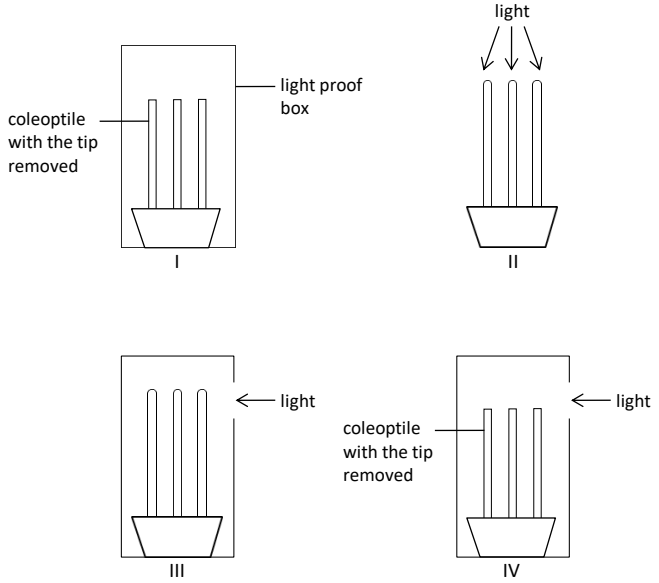
19. The diagrams below shows part of the human ear:



Which of the following statements is correct?

A Structure 1 bulges outwards and cannot vibrate freely when an aircraft takes off.
B structures 2 amplify and detect sound vibrations.
C structure 3 converts sound waves into electrical impulse.
D structure 4 contains sensory neurones.

20. The diagram below shows an investigation studying phototropic responses in oat coleoptiles.



Which two set-ups can be used to show that the shoots of the coleoptiles are positively phototropic?

A I and II
B I and III
C II and III
D II and IV

21. Which of the following combinations is ***not*** correct?

	endocrine gland	**exocrine gland**
A	thyroid gland	salivary gland
B	pancreas	sweat gland
C	mammary gland	sebaceous gland
D	ovary	prostate gland

22. The diagram below shows the cross section of a human spinal cord (diagram I) and three types of neurons (diagram II):

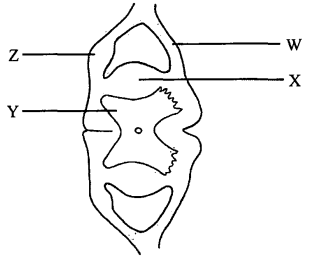


Diagram I

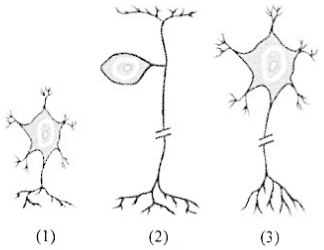
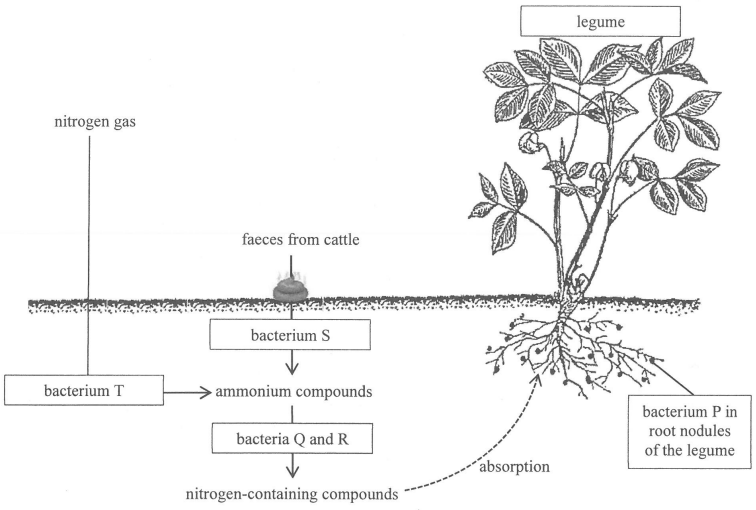


Diagram II

Which of the following combinations correctly shows the locations of the neurons in the spinal cord?

	Neurone (1)	**Neurone (2)**	**Neurone (3)**
A	X	W	Y
B	Y	Z	W
C	Z	Y	X
D	W	X	Z

Directions: Questions 23 and 24 refer to the diagram below, which shows some processes of the nitrogen cycle:



23. Which of the following combinations correctly shows the types of organisms indicated by labels Q, S and T?

	Q	**S**	**T**
A	nitrogen fixing bacteria	nitrifying bacteria	decomposer
B	nitrifying bacteria	nitrogen fixing bacteria	decomposer
C	nitrogen fixing bacteria	decomposer	nitrifying bacteria
D	nitrifying bacteria	decomposer	nitrogen fixing bacteria

24. What is the relationship between bacterium P and the legume plant?

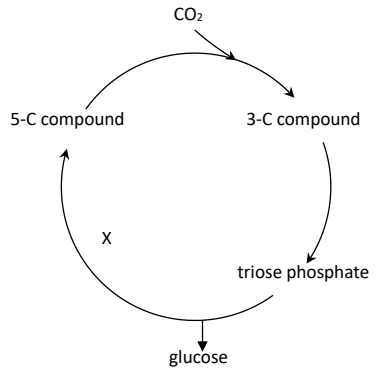
A commensalism B mutualism
C parasitism D competition

25. The photo below shows a section of a wood,

which of the following substances contributes most to the increase in biomass of the wood?

A water B minerals
C carbon dioxide D oxygen

26. The diagram below summarizes the major steps of the Calvin cycle.

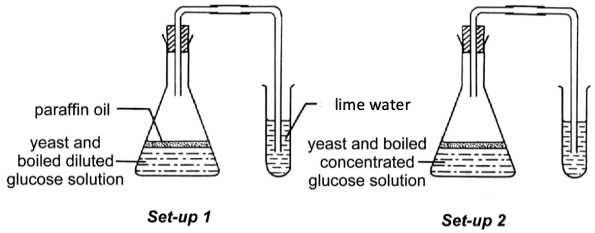


What of the following is/ are needed to regenerate 5-C compound in stage X?

(1) ATP (2) NADPH (3) NADP

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

Directions: Questions 27 and 28 refer to the diagram below which shows two set-ups used to study the anaerobic respiration of yeast:



The table below shows the results obtained:

Set-up	Result
1	Alcohol produced
2	No alcohol produced

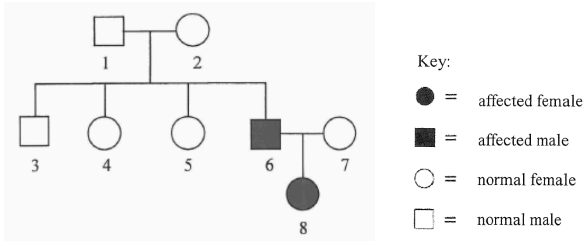
27. Which of the following can be concluded from the results?
A Yeast carried out aerobic respiration at low glucose concentration.
B Yeast carried out aerobic respiration at high glucose concentration.
C Yeast lost water by osmosis when they are placed in high glucose concentration.
D Yeast cannot carry out anaerobic respiration at high glucose concentration.

28. Which of the following are necessary to provide anerobic condition for the respiration of the yeast?
(1) stopper the flask
(2) add paraffin oil
(3) boil the glucose solution
A (1) and (2) only B (1) and (3) only
C (2) and (3) only D (1), (2) and (3)

29. After injury, the wound usually becomes swollen due to
A more tissue fluid formation at the wound.
B increased blood supply at the wound.
C more phagocytotic activities at the wound.
D the cell content released by damaged cells.

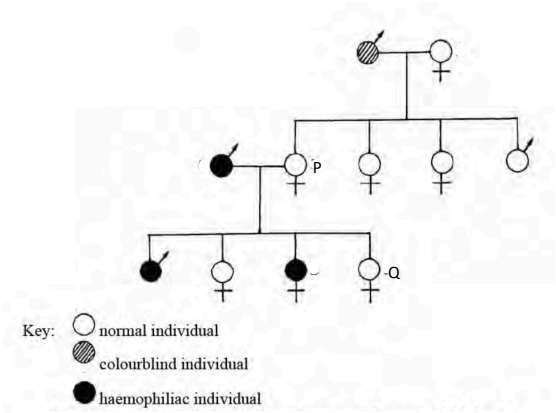
30. Which of the following descriptions about non-specific defence mechanism is ***incorrect***?
A The sebum released from the skin enhance the growth of bacteria.
B The closely packed epithelial cells in the trachea prevent the entry of pathogens.
C Lysozyme in saliva can kill certain bacteria.
D Blood clotting can prevent entry of pathogens.

31. The pedigree below shows the inheritance of a genetic disorder.



Which of the following descriptions about the inheritance of this disorder is/ are possible?
(1) The disorder is a recessive disorder.
(2) The disorder is an autosomal disorder.
(3) The disorder is x-linked.
A (1) and (2) only B (1) and (3) only
C (2) and (3) only D (1), (2) and (3)

Directions: Questions 32 and 33 refer to the diagram below, which shows the pedigree of the occurance of colour blindness and haemophilia in a family:



32. What is the genotype of P?
A Heterozygous for haemophilia and colourblindness.
B Homozygous dominant for haemophilia and colourblindness.
C Heterozygous for colourblindness and homozygous dominant for haemophilia.
D Heterozygous for haemophilia and homozygous dominant for colourblindness.

33. If Q marries a normal man, what is the probability of her son being haemophilic?
A 0% B 25%
C 50% D 75%

34. Which of the following are reasons why bacteria can evolve rapidly in response to environment changes?

(1) They give rise to many generations in a short period of time.
(2) They produce a large number of offspring in each generation.
(3) They are relatively vulnerable to mutagens.

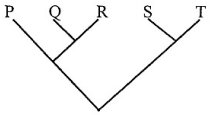
A (1) and (2) only
B (1) and (3) only
C (2) and (3) only
D (1), (2) and (3)

35. The table below shows the presence (+) or absence (-) of some traits in five species:

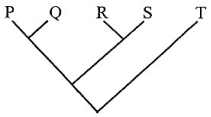
	Trait				
Species	1	2	3	4	5
P	-	+	-	-	-
Q	+	+	-	+	-
R	+	+	-	-	-
S	+	-	-	-	+
T	+	-	+	-	+

Which of the following evolutionary trees best illustrates the phylogenetic relationship of the five species?

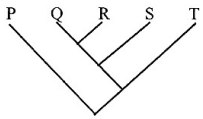
A



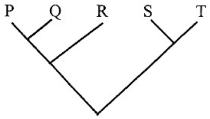
B



C



D



36. Which of the following is the ***least*** accurate for deducing the evolutionary relationship between different species?

A Studying fossils of organisms.
B Comparing the anatomical features of common body structures in different organisms.
C Comparing the DNA sequences of common proteins present in different organisms.
D Comparing the functions of the common body features present in different organisms.

END OF SECTION A
Go on to Question-Answer Book B for questions on Section B