FUKIEN SECONDARY SCHOOL

S5 Final Examination (2020-2021)

Biology

Paper 1

(2 hours 30 minutes)

Date：8th June 2021 Name:_____

Time：8:30a.m. - 11:00a.m. Class: _____ No.: _____

GENERAL INSTRUCTIONS

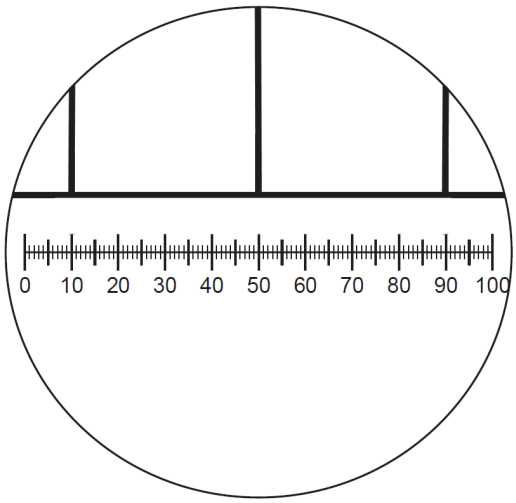
1. There are TWO sections, A and B, in this paper. You are advised to finish Section A in about 35 minutes.
2. Section A consists of multiple-choice questions in this question paper. Section B contains conventional questions printed separately in Question-Answer Book B.
3. Answers to Section A should 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 must be handed in separately at the end of examination.**

INSTRUCTIONS FOR SECTION A (MULTIPLE-CHOICE QUESTIONS)

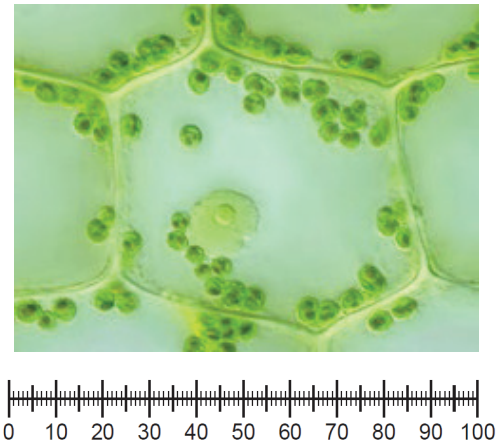
1. Read the instructions on the Answer Sheet carefully and insert the information required in the spaces provided.
2. When told to open this book, you should check that all the questions are there. Look for the words '**END OF SECTION A**' after the last question.
3. All questions carry equal marks.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

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

1. The diagram shows a section of a plastic ruler, with divisions 0.1 mm apart, viewed through an eyepiece containing a graticule.



Using the same magnification, a plant cell is observed.



What is the actual length of the nucleus of the plant cell?

A. 0.04 mm
B. 0.01 mm
C. 25 μm
D. 4 μm

2. Which of the following biomolecules can be found in the cell membrane of a prokaryotic cell?
   (1) phospholipid
   (2) protein
   (3) peptidoglycan
   A. (1) and (2) only
   B. (1) and (3) only
   C. (2) and (3) only
   D. (1), (2) and (3)

Directions: Questions 3 and 4 refer to the following experiment.

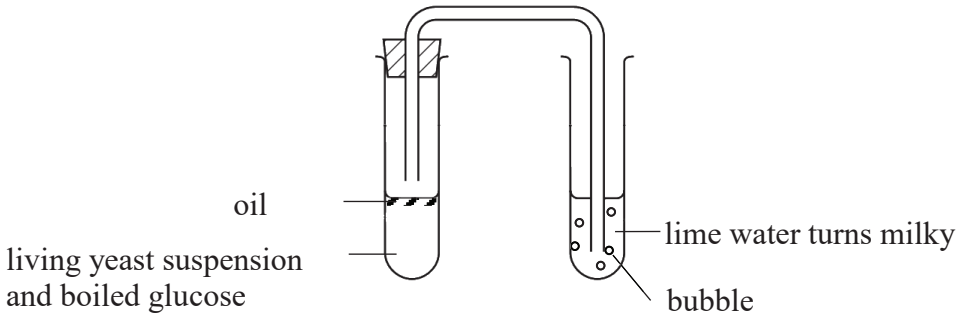
A student cut four strips from a fresh potato and weighed each of them. One strip was placed in distilled water and the others were each placed in sucrose solutions of different concentrations. After an hour, the strips were removed from the liquids, blotted dry and then reweighted. The results are shown in the table.

Liquid	Initial mass (g)	Final mass (g)
P	2.60	2.60
Q	2.65	3.02
R	2.58	3.00
S	2.61	2.48

3. Which of the liquids P, Q, R and S is distilled water?
   A. P
   B. Q
   C. R
   D. S

4. Which of the following conclusion(s) can be drawn from the results?
   (1) The water potential of the potato tissue is the same as that of liquid P.
   (2) Potato cells in liquids Q and R have burst.
   (3) Potato cells in liquid S have become plasmolysed.
   A. (2) only
   B. (1) and (2) only
   C. (1) and (3) only
   D. (1), (2) and (3)

Directions: Questions 5 and 6 refer to the diagram below, which shows a set-up used to study the action of yeast on glucose.



5. Which of the following would be formed by the yeast in the set-up?
   (1) carbon dioxide
   (2) ethanol
   (3) lactic acid
   A. (2) only
   B. (1) and (2) only
   C. (1) and (3) only
   D. (1), (2) and (3)

6. What modification should be made in the above set-up in order to prepare a control?
   A. removing the oil layer
   B. using boiled yeast suspension instead of living yeast suspension
   C. replacing the boiled glucose solution with distilled water
   D. replacing the lime water with distilled water

7. The following are events that occur in plant cells:
   (1) Oxygen acts as a hydrogen acceptor.
   (2) Carbon dioxide is fixed into organic compounds.
   (3) ATP is synthesized.
   (4) NADP acts as a hydrogen acceptor.

   Which of the following correctly matches each event with the set of reactions in which it occurs?

	Photosynthesis only	**Respiration only**	**Photosynthesis and respiration**
A.	(2)	(1)	(3) and (4)
B.	(2)	(3)	(1) and (4)
C.	(2) and (4)	(1)	(3)
D.	(2) and (4)	(3)	(1)

8. Which of the following cell types probably has the highest density of mitochondria?
   A. red blood cells
   B. cells of the capillary wall
   C. epithelial cells of air sacs of the lungs
   D. epithelial cells of kidney tubules

9. The table below shows the amounts of some nutrients present in 100 g of four different foods.

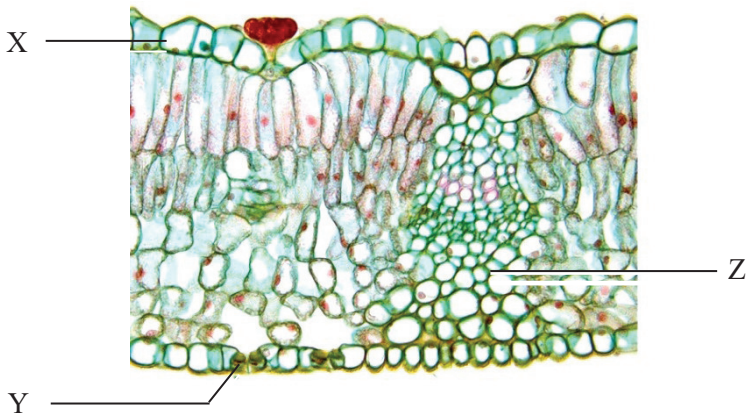
Food	Vitamin C (mg)	Vitamin D (IU*)	Calcium (mg)	Iron (mg)
1	53.2	0	40	0.1
2	0	87	50	1.2
3	3.7	0	15	0.3
4	1.5	0	19	3.3

* IU = Internal unit, 1μg of vitamin D is equal to 40 IU.

Which food would be best for a person suffering from bleeding gums?

A. 1
B. 2
C. 3
D. 4

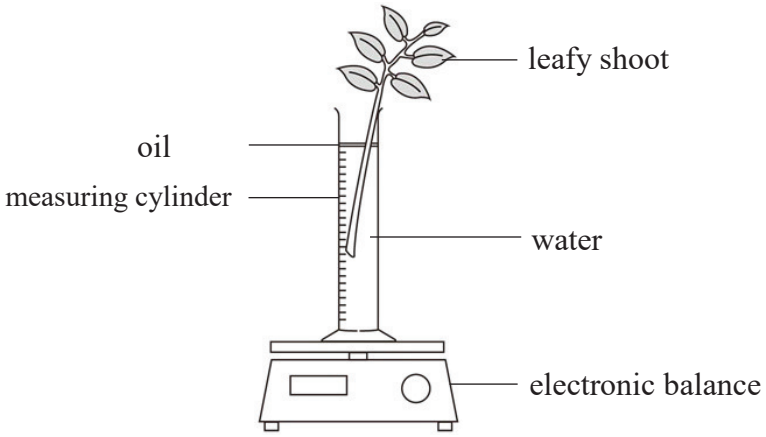
10. The photograph below shows the cross section of a leaf.



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

	X	Y	Z
A.	photosynthesis	protection	support
B.	protection	storage	support
C.	photosynthesis	storage	transport
D.	protection	photosynthesis	transport

Directions: Questions 11 and 12 refer to the experimental set-up below.



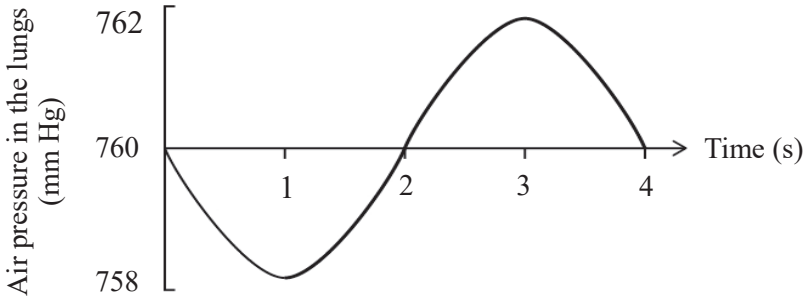
11. Which of the following data are needed to calculate the rate of transpiration of the leafy shoot?
    (1) the change in water level in the measuring cylinder
    (2) the change in the reading of the electronic balance
    (3) the duration of the experiment
    A. (1) and (2) only
    B. (1) and (3) only
    C. (2) and (3) only
    D. (1), (2) and (3)

12. Which of the following explains why the leaf shoot should be cut under water?
    A. to prevent the cut end of the leafy shoot from drying up
    B. to prevent air from entering the xylem of the leafy shoot
    C. to prevent the collapse of the xylem of the leafy shoot
    D. to allow the leafy shoot to adapt to the new environment

13. A long-sighted man is looking at a nearby object. Which of the following correctly states the condition of the suspensory ligaments and the position where the image seen is focused in his eyes?

	Suspensory ligaments	**Position of image focused**
A.	slackened	behind the retina
B.	tightened	behind the retina
C.	slackened	in front of the retina
D.	tightened	in front of the retina

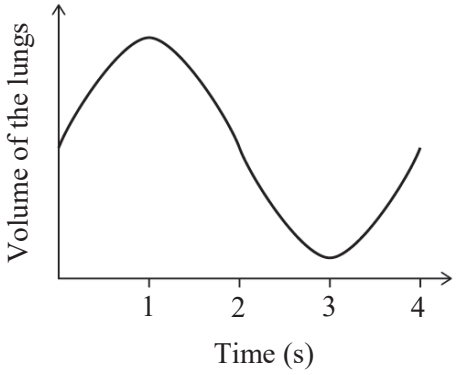
14. The graph below shows the changes in air pressure in the lungs of a person.



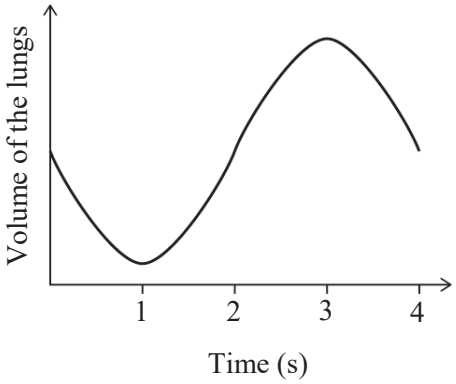
Atmospheric pressure = 760 mm Hg

Which of the following graphs shows the corresponding changes in the volume of the lungs?

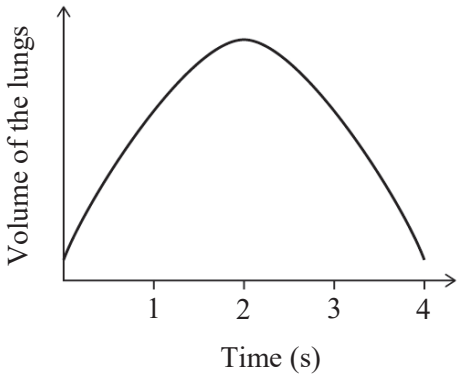
A.



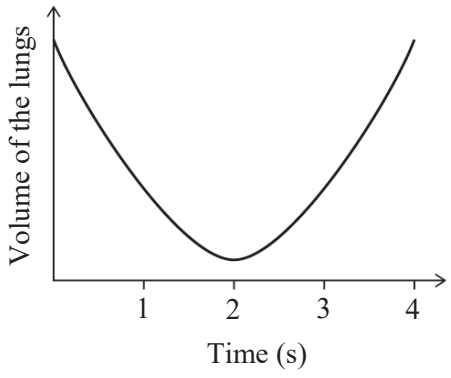
B.



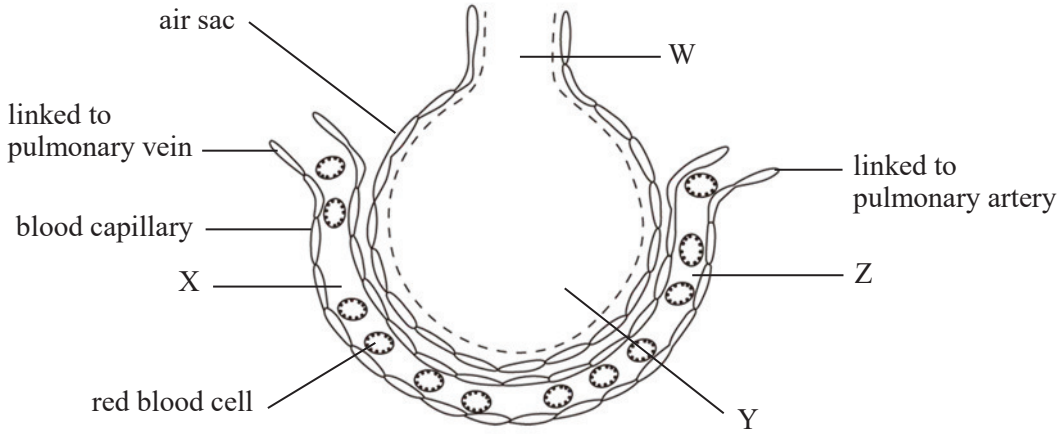
C.



D.



Directions: Questions 15 and 16 refer to the diagram below, which shows a section of an air sac and its associated blood capillary.



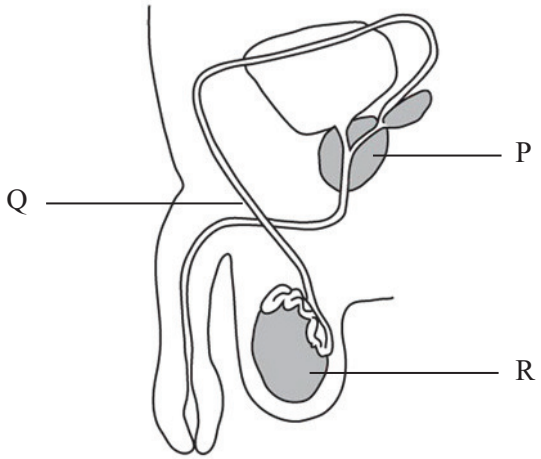
15. At which point is the carbon dioxide concentration the highest?
    A. W
    B. X
    C. Y
    D. Z

16. To which chamber of the heart will the red blood cells first return?
    A. left atrium
    B. right atrium
    C. left ventricle
    D. right ventricle

17. If a person has pneumonia (a serious lung infection), the air sacs may fill with excess mucus. What would be the effect of this on the person?
    A. The breathing rate would decrease.
    B. The exhaled air would contain a higher percentage of water vapour.
    C. The rate of gas diffusion through the mucus would increase.
    D. The oxygen content in the blood would decrease.

18. Which of the following statements about the circulatory system is correct?
    A. The left ventricle has a thick and muscular wall because it pumps blood to the whole body.
    B. The flow of blood in the aorta is assisted by the closing of the bicuspid valve.
    C. The blood in arteries is under high pressure due to the pumping action of the heart.
    D. Capillaries can change their lumen size to regulate blood flow.

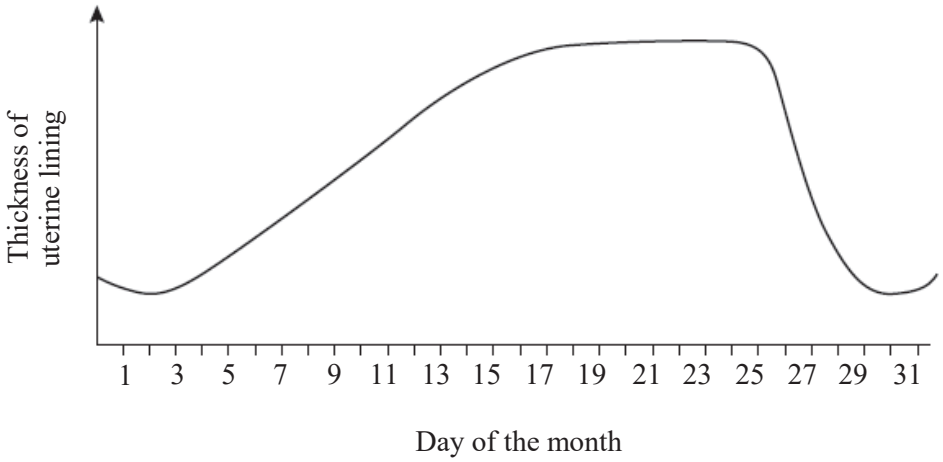
Directions: Questions 19 and 20 refer to the diagram below, which shows the reproductive system of a male.



19. In which of the labelled structure(s) do(es) mitosis take place?
    A. P only
    B. P and Q only
    C. Q and R only
    D. P, Q and R

20. Which of the following will occur if structure Q on both sides of the body are tied and cut?
    A. Structure R will stop producing sperm.
    B. The semen will contain no sperm.
    C. The man would fail to ejaculate during sexual intercourse.
    D. The breasts will enlarge.

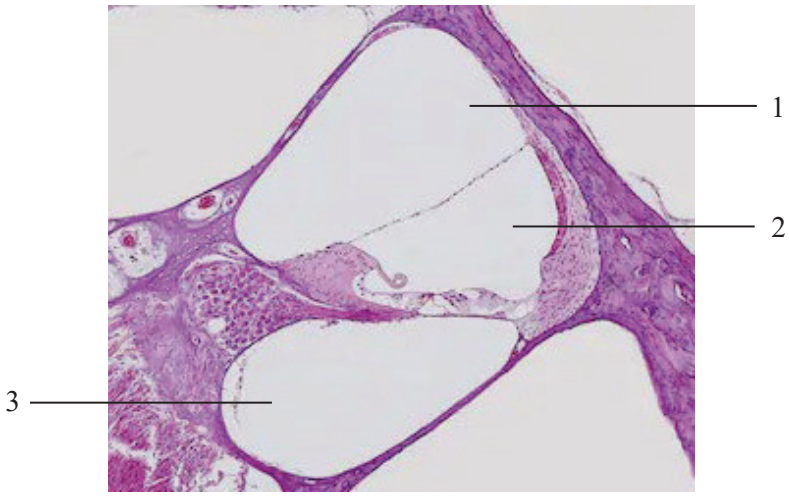
21. The graph below shows the changes in the thickness of the uterine lining of a woman over a certain month.



During which of the following periods would sexual intercourse most likely lead to pregnancy?

A. the 3rd - 6th day
B. the 9th - 14th day
C. the 19th - 24th day
D. the 25th - 28th day

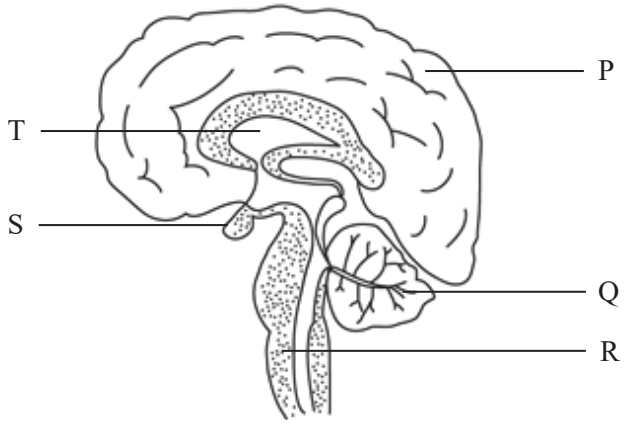
22. The photomicrograph below shows a cross section of the tube of the cochlea.



Which of the following statements about canals 1, 2, and 3 are ***incorrect***?

A. Canal 1 is connected to the oval window while canal 3 is connected to the round window.
B. Canals 1 and 3 are liquid-filled.
C. Canal 2 is air-filled.
D. Canal 2 contains receptors for hearing.

Directions: Questions 23 and 24 refer to the diagram below, which shows a section of the human brain.



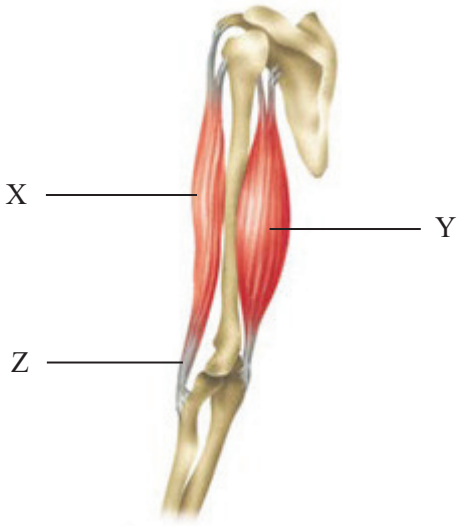
23. Which of the following combinations of the labelled structures and their functions is ***incorrect***?

	Structure	Function
A.	P	site of intelligence
B.	Q	controls muscle contraction
C.	R	reflex centre for swallowing
D.	S	secretes anti-diuretic hormone

24. The liquid in cavity T is derived from blood. Which of the following components of blood can be found in this liquid?
    (1) glucose
    (2) carbon dioxide
    (3) red blood cells
    A. (1) and (2) only
    B. (1) and (3) only
    C. (2) and (3) only
    D. (1), (2) and (3)

25. Lucy had been injured in a traffic accident. A doctor confirmed that her brain was still functioning normally. When her hand was pricked by a pin, Lucy withdrew her hand but she was unaware of the touch and the withdrawal of her hand. Which part of her nervous system was probably damaged?
    A. sensory neurone
    B. interneurone carrying signals to the brain
    C. interneurone carrying signals from the brain
    D. motor neurone

26. The diagram below shows some bones and muscles in a human arm.



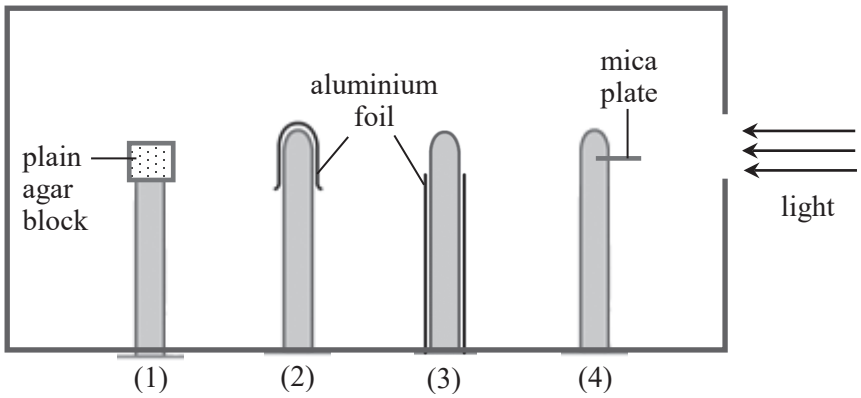
Which of the following combinations correctly describes the conditions of X, Y and Z while the forearm is being lifted?

	X	**Y**	**Z**
A.	contracting	relaxing	shortened
B.	relaxing	contracting	lengthened
C.	contracting	relaxing	under tension
D.	relaxing	contracting	slackened

27. Which of the following structures does ***not*** contain cartilage?
    A. rib cage
    B. bronchus
    C. pinna
    D. penis

28. Which of the following is ***not*** a major organic chemical constituent of organisms?
    A. lipid
    B. protein
    C. nucleotide
    D. magnesium

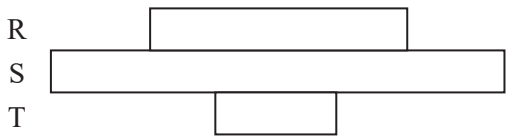
Directions: Questions 29 and 30 refer to the diagram below, which shows a set-up to study phototropism in oat coleoptiles.



29. Which coleoptiles will bend towards the light source?
    A. (1) and (3)
    B. (1) and (4)
    C. (3) and (4)
    D. (1), (3) and (4)

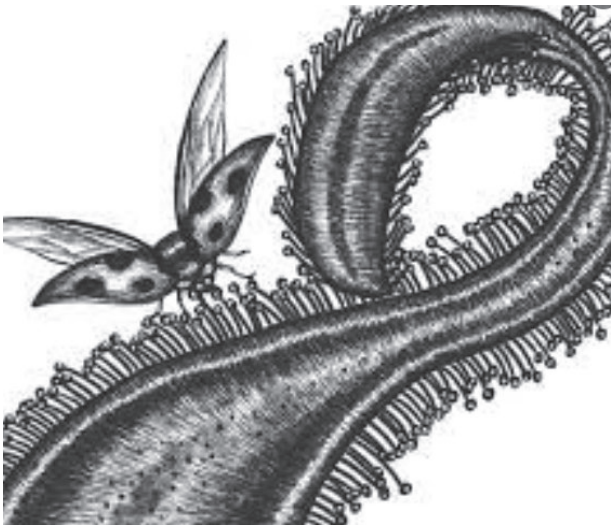
30. What hypothesis can be tested by comparing the growth of coleoptiles (2) and (3)?
    A. The tip of the coleoptile is responsible for detecting unilateral light.
    B. The substance controlling phototropism is produced at the tip of the coleoptile.
    C. The substance controlling phototropism promotes growth in the region behind the tip of the coleoptile.
    D. The substance controlling phototropism is destroyed by light.

31. The diagram below shows the pyramid of biomass for a food chain consisting of three types of organisms, R, S and T.



Which of the following statements about the food chain is correct?
    A. The size of T is larger than that of S.
    B. S does not feed solely on T.
    C. Some energy in S is not transferred to R.
    D. T can carry out photosynthesis.

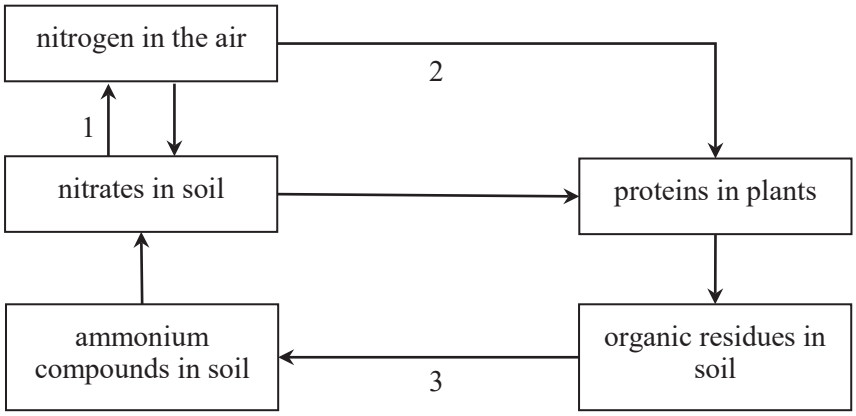
Directions: Questions 32 and 33 refer to the photograph below, which shows a Cape sundew (*Drosera capensis*) catching an insect with its sticky leaf. The plant will digest the insect to obtain nitrates.



32. What trophic level(s) does the Cape sundew occupy?
    (1) secondary consumer
    (2) primary consumer
    (3) producer
    A. (1) only
    B. (2) only
    C. (1) and (3) only
    D. (2) and (3) only

33. The Cape sundew requires nitrates for the synthesize of
    (1) amino acids.
    (2) cellulose.
    (3) chlorophyll.
    A. (1) only
    B. (1) and (3) only
    C. (2) and (3) only
    D. (1), (2) and (3)

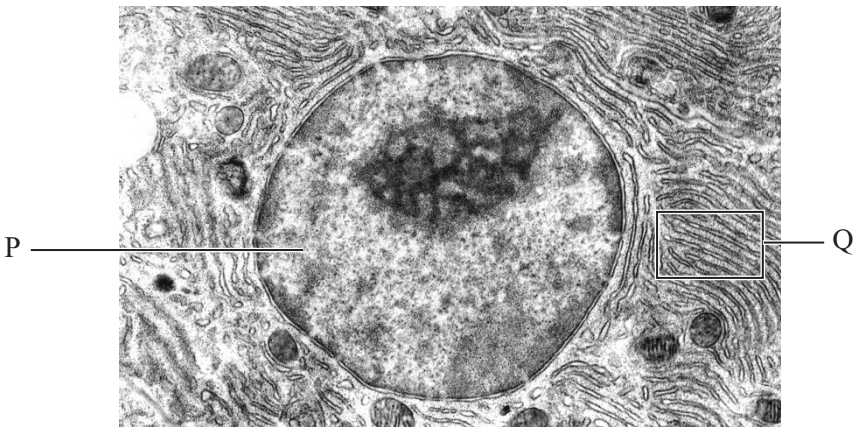
34. The diagram below shows some of the processes in the nitrogen cycle in nature.



Which of the following combinations correctly matches the microorganism involved in processes 1, 2 and 3?

	1	**2**	**3**
A.	nitrifying bacteria	denitrifying bacteria	nitrogen fixing bacteria
B.	denitrifying bacteria	nitrifying bacteria	nitrogen fixing bacteria
C.	nitrifying bacteria	nitrogen fixing bacteria	fungi
D.	denitrifying bacteria	nitrogen fixing bacteria	fungi

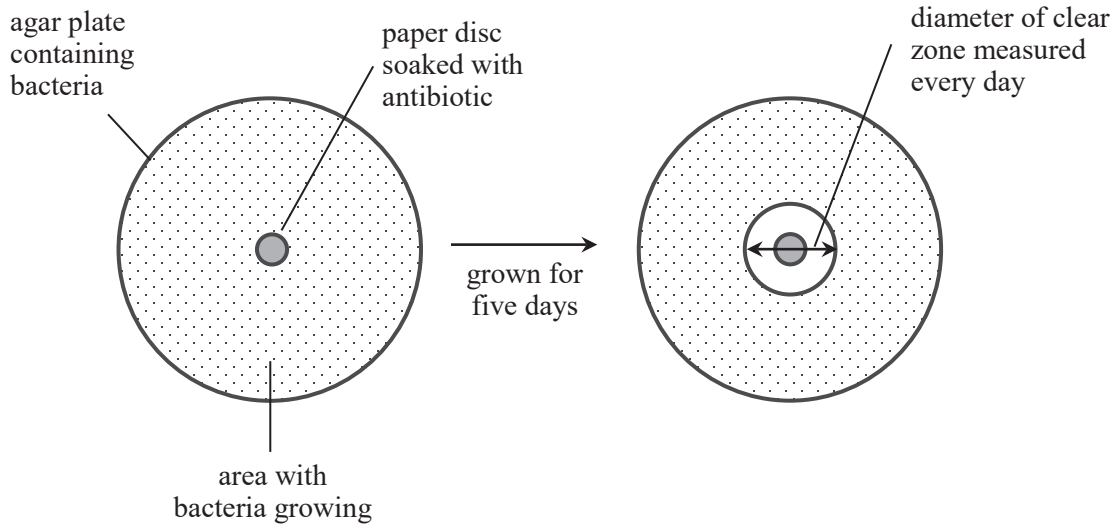
35. The electron micrograph below shows part of an active cell.



Which of the following is a possible example of this cell judging from the presence of P and Q?

A. Red blood cell
B. Xylem cell
C. Companion cell
D. Pancreatic cell

36. The diagram below shows a method to study the effect of an antibiotic on bacteria. The diameter of the clear zone is measured every day for five days.



The table below shows the results of the study on five different types of bacteria. Clear zones of less than 13 mm indicate the presence of resistant bacteria.

Type of bacteria	**Diameter of clear zone (mm)**				
	Day 1	Day 2	Day 3	Day 4	Day 5
1	18.9	13.7	13.2	12.4	11.5
2	23.8	21.9	19.5	17.2	14.8
3	19.2	15.1	13.2	8.3	0.0
4	17.9	15.2	12.0	8.8	0.0
5	21.4	20.8	20.4	20.2	20.2

Which of the following statements is supported by the results?

A. The antibiotic is not effective in killing any of the types of bacteria studied in the experiment.
B. Types 1, 3 and 4 of the bacteria have developed resistance to the antibiotic.
C. The antibiotic can be used to treat types 2 and 5 of the bacteria only.
D. Type 5 of the bacteria can never develop resistance to the antibiotic.

END OF SECTION A