

DUNMAN SECONDARY SCHOOL

CANDIDATE
NAME

CLASS

INDEX
NUMBER

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PRELIMINARY EXAMINATION 2026 SECONDARY 4 EXPRESS

BIOLOGY

Paper 1

6093/01

1 September 2026

1 hour

Additional Materials: Multiple Choice Answer Sheet

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, class and index number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each questions there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

The use of an approved scientific calculator is expected, where appropriate.

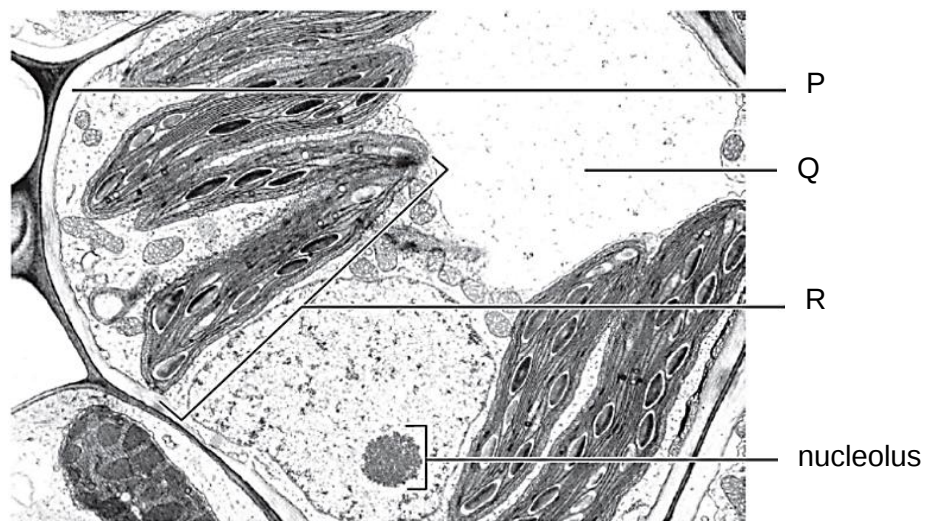
1 Some cell structures are listed in a particular order.

- 1 nucleus
- 2 ribosome
- 3 Golgi body
- 4 vesicle

What does the order represent?

- A sequence used in the synthesis of a lipid
- B sequence used in the synthesis of an antibody
- C size from largest to smallest
- D size from smallest to largest

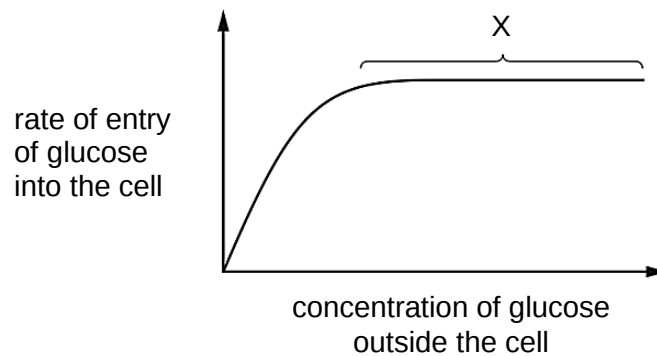
2 The electron micrograph shows part of a plant cell.



Which row correctly identifies the cell organelles?

	P	Q	R
A	cell membrane	cytoplasm	mitochondrion
B	cell membrane	vacuole	chloroplast
C	cell wall	cytoplasm	mitochondrion
D	cell wall	vacuole	chloroplast

- 3 The graph shows how the rate of entry of glucose into a cell changes as the concentration of glucose outside the cell changes.



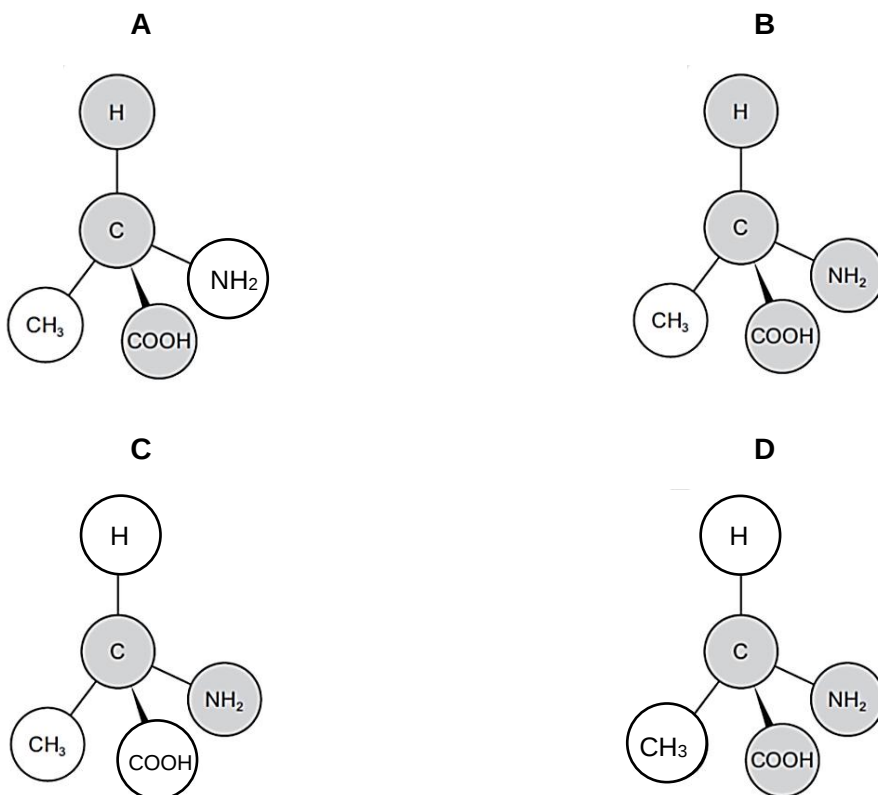
Which statement is correct to describe the plateau at point X?

- A Glucose is transported via diffusion only.
 - B Glucose is transported via active transport only.
 - C The cell has used up its supply of energy.
 - D The concentration of glucose in and outside of the cell are equal.
- 4 Some processes which occur in flowering plants are listed.
- 1 ion uptake by roots hair cells
 - 2 movement of mineral ions up the xylem in the stem
 - 3 water uptake by root hairs cells
 - 4 water vapour loss by the mesophyll cells of the leaves

Which process(es) is/ are controlled by cell surface membranes?

- A 1 only
- B 1 and 3
- C 2 only
- D 2, 3 and 4

- 5 The diagrams show the structure of an amino acid with some parts of the molecule shaded. Which diagram shows the shaded part of the molecule that is common to all amino acids?

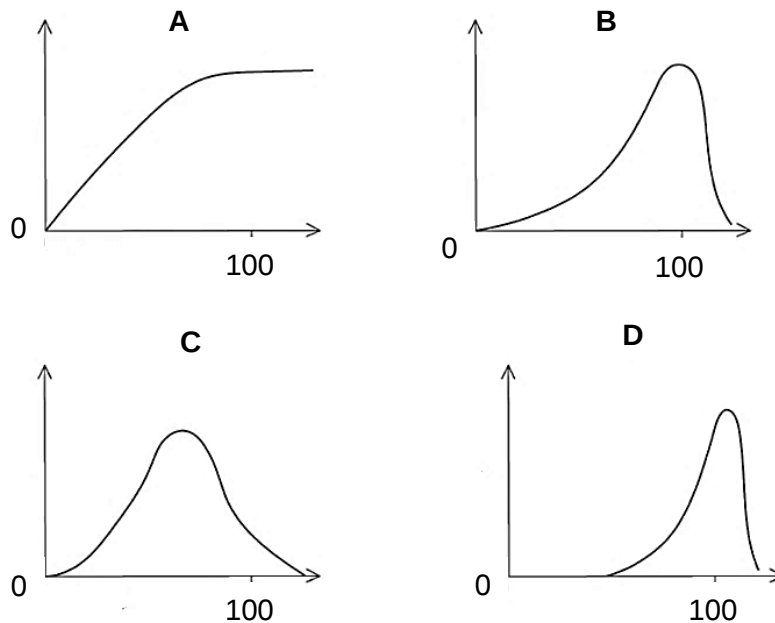


- 6 A solution of amylase was added to a suspension of starch. After 30 seconds, three samples of the mixture were tested with iodine solution, Benedict's solution and biuret reagent.

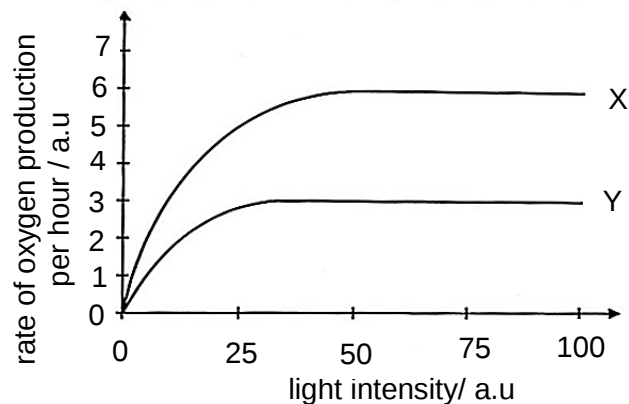
Which row correctly identifies the resulting colours when tested with each reagent?

	colour with test reagent		
	iodine	Benedict's	biuret
A	black	blue	purple
B	black	red	blue
C	brown	green	blue
D	brown	orange	purple

- 7 Which graph represents the relationship between temperature and the rate of enzyme activity in bacteria which grows optimally at temperatures between 80 °C and 110 °C?



- 8 A plant was exposed to two different concentrations of carbon dioxide. The rate of oxygen production at increasing light intensities was measured. The results were plotted on the graph shown.



Which statement **cannot** be concluded from the graph?

- A At light intensity of 25 a.u, the amount of starch present in curve X is higher than in curve Y.
- B Curve X was obtained from the plant being placed in a higher concentration of carbon dioxide than in curve Y.
- C Light intensity is a limiting factor after 50 a.u in both curves.
- D When the light intensity increases from 0 to 25 a.u, the rate of photosynthesis increases in both curves.

9 Which of the following statements describe(s) the use of lipids?

- 1 It acts as a heat insulating layer for organs.
- 2 It has shock-absorbing properties in blood vessels.
- 3 It is storage for food reserves

- A** 1 only
- B** 1 and 2 only
- C** 1 and 3 only
- D** 2 and 3 only

10 When 1 cm³ of human bile was added to 5 cm³ of milk in a test tube which also contained a few drops of universal indicator solution, the colour change indicated an increase in pH.

Which of the following accounts for the change in pH?

- A** Bile contains alkaline salts.
- B** Bile emulsifies fats giving them a larger surface area for digestion to occur.
- C** Bile has a high optimum pH.
- D** Bile hydrolyses fats and releases fatty acids.

11 The pressure of blood flowing through the heart changes during the cardiac cycle.

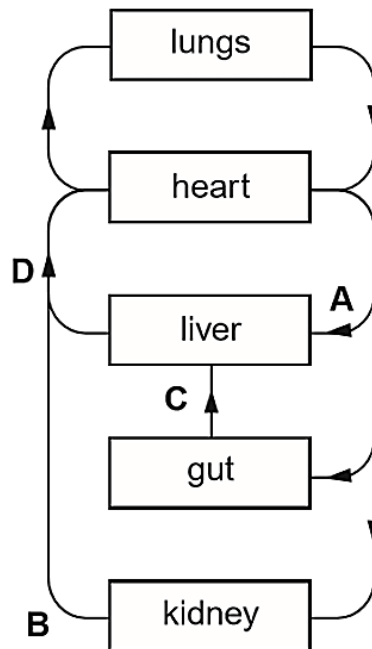
The table shows some values for the pressure in the chambers of the right side of the heart and the pulmonary artery.

Which row shows the correct values when the atrioventricular valves are opened and the semilunar valves are closed?

	pressure in right atrium / mmHg	pressure in right ventricle / mmHg	pressure in pulmonary artery / mmHg
A	2	25	25
B	8	5	25
C	2	25	5
D	8	5	5

12 The diagram shows a part of the human circulatory system.

In which vessel is the breakdown products of alcohol first found?



13 The table shows features of the blood of four people.

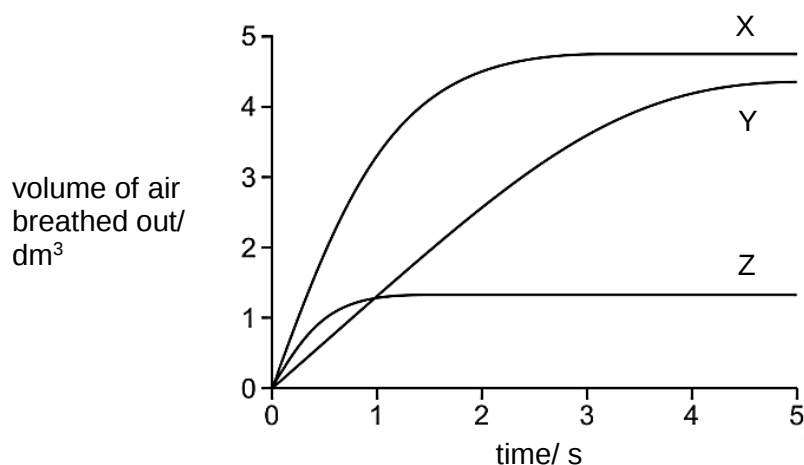
Whose blood will fail to form a clot when there is a cut?

person	platelet count / per mm ³	fibrinogen in plasma	red blood cell count
A	250 000	present	normal
B	250 000	absent	normal
C	250 000	present	low
D	60 000	present	normal

14 What happens during the process of breathing in?

	diaphragm muscle	external intercostal muscles	pressure in the lungs	volume of thorax
A	flattens	contract	decrease	decrease
B	move upwards	relax	increase	decrease
C	relaxes	relax	decrease	decrease
D	contracts	contract	decrease	increase

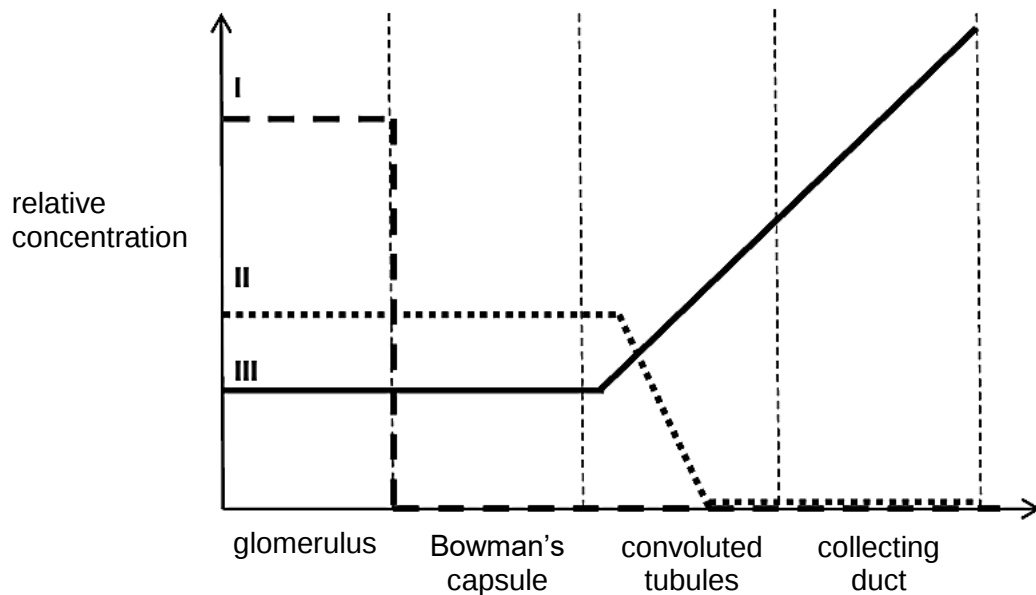
15 The graph shows the volume of air breathed out quickly and with force, following a deep breath in, for three different people, X, Y and Z.



What row shows a possible explanation for the differences in the volume of air breathed out by X, Y and Z?

	chronic bronchitis	emphysema	normal lung function
A	X	Z	Y
B	Y	X	Z
C	Y	Z	X
D	Z	Y	X

- 16** Which feature maintains a steep concentration gradient of oxygen between the air in the alveoli and the blood in the surrounding capillaries?
- A** the flow of blood through the lungs
 - B** the presence of haemoglobin in the blood cells
 - C** the single-celled wall of the alveoli
 - D** the epithelium of capillaries
- 17** The line graphs show the relative concentration of glucose, protein and urea in the fluids obtained from various parts of the mammalian kidney.



Which of the following correctly matches the three graphs?

	I	II	III
A	protein	urea	glucose
B	glucose	urea	protein
C	glucose	protein	urea
D	protein	glucose	urea

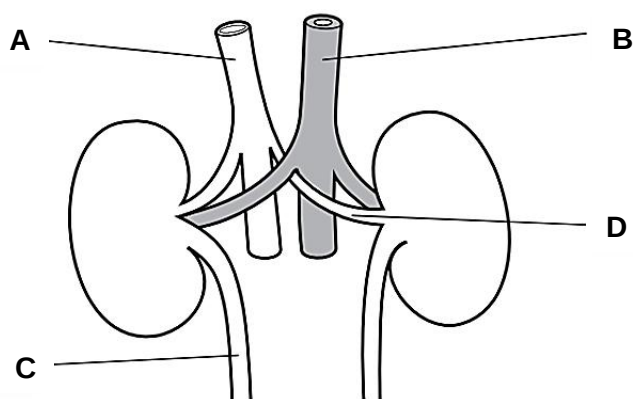
18 Where is the waste product of amino acid metabolism produced and which organ excretes it?

	produced by	excreted by
A	kidney	liver
B	kidney	skin
C	liver	kidney
D	liver	large intestine

19 The table shows the composition of a liquid found in the human body.

component	concentration/ arbitrary units
amino acids	0.0
glucose	0.0
protein	0.0
salts	1.5
urea	2.0

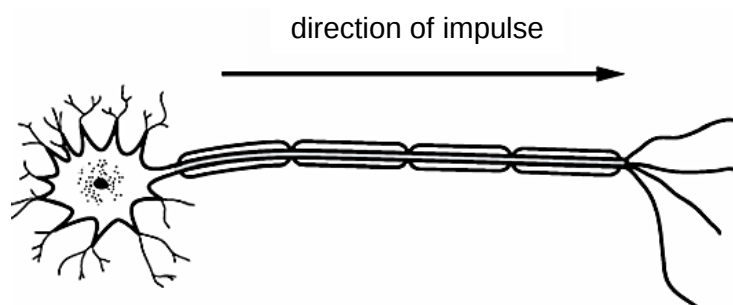
In a healthy person, which structure contains this liquid?



20 Which process does not involve the spinal cord?

- A knee jerk reflex
- B salivation when smelling food
- C scratching an itch on one's arm
- D withdrawal of hand when accidentally touching a hot object

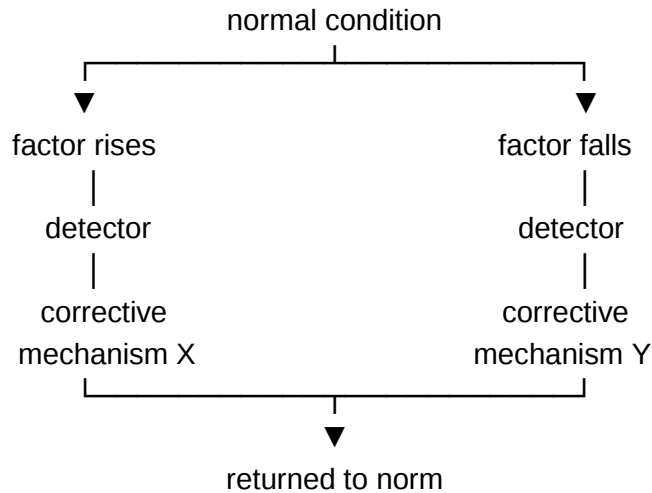
21 The diagram shows a neurone carrying an impulse.



Which row identifies the type of neurone and the direction of impulse?

	type of neurone	direction of impulse
A	motor	towards the spinal cord
B	motor	away from the spinal cord
C	sensory	towards the spinal cord
D	sensory	away from the spinal cord

- 22 The diagram below shows a homeostatic mechanism in a mammal.



What is the principle shown in this mechanism, and what does corrective mechanism X do?

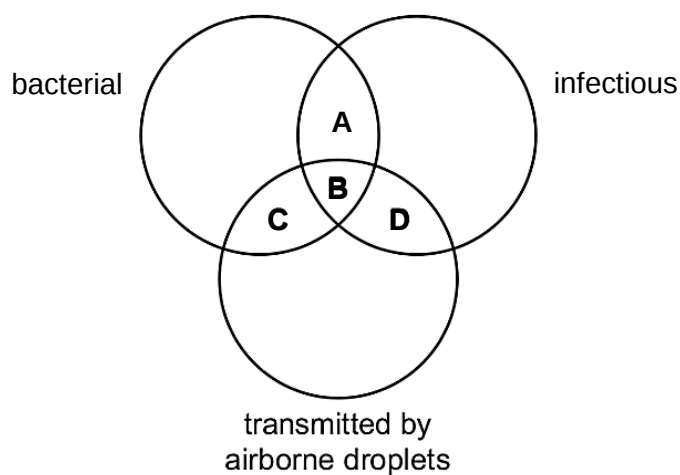
	principle	action of corrective mechanism X
A	positive feedback	increases the factor further
B	positive feedback	decreases the factor further
C	negative feedback	increases the factor further
D	negative feedback	decreases the factor back to the norm

- 23 Which condition is a disruption to normal body function caused by a pathogen?

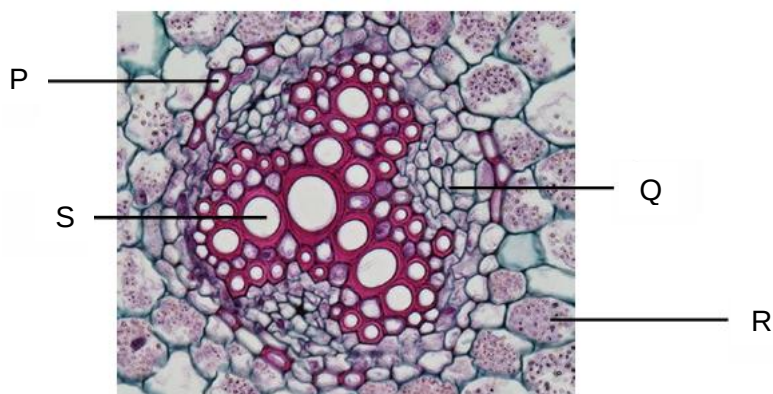
- A** a coronary artery becomes narrowed by fatty deposits, reducing blood flow to the heart muscle
- B** the air sacs of the lungs become inflamed and fill with fluid, causing fever and difficulty in breathing
- C** the pancreas fails to produce enough insulin, so blood glucose remains high after a meal
- D** the walls of the alveoli break down, reducing the surface area for gaseous exchange

24 The diagram shows properties of diseases.

Which shows the properties that are common to both influenza and pneumococcus disease?



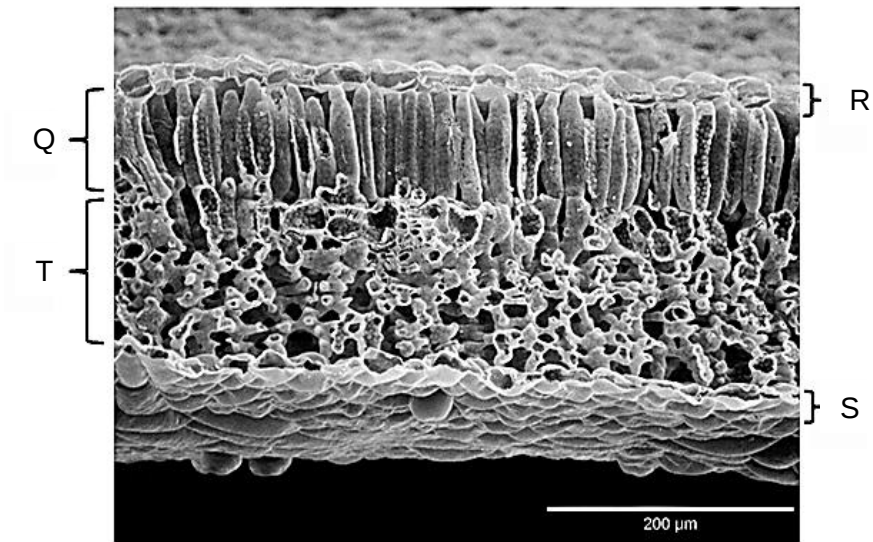
25 The diagram shows the cross section of part of a root.



Which structure transports water with dissolved ions and which part contains companion cells?

	contains companion cells	transports water with dissolved ions
A	Q	P
B	R	P
C	Q	S
D	R	S

26 The diagram is an electron micrograph of a cross-section of a leaf.



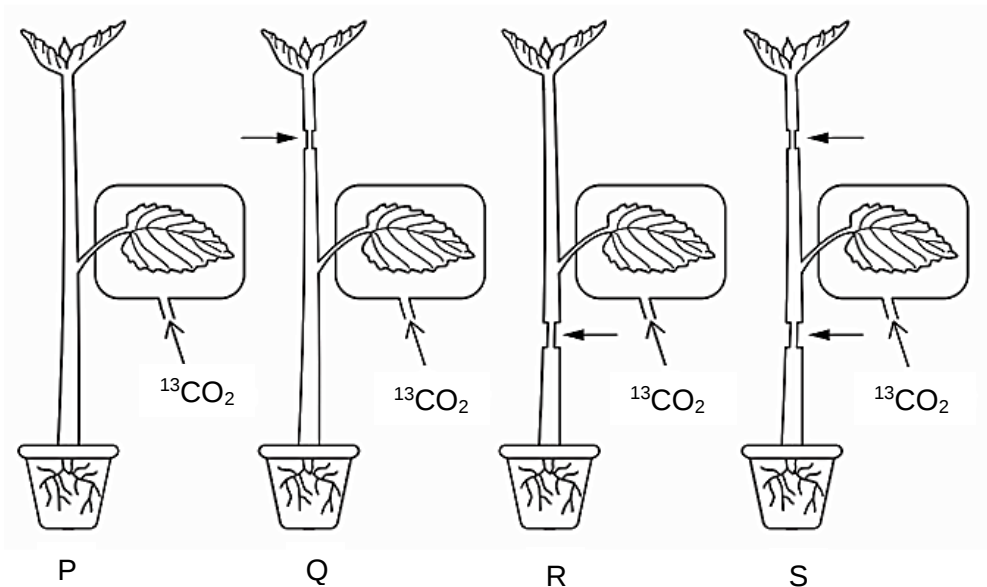
Which row shows the correct order of chloroplast density from lowest to highest?

	lowest → highest			
A	T	S	R	Q
B	R	S	T	Q
C	S	R	Q	T
D	S	T	Q	R

- 27 The translocation of sucrose from the leaves of plants can be investigated using carbon dioxide containing a traceable source of carbon (^{13}C).

Four plants, P, Q, R, S, that had leaves of similar size, were supplied with $^{13}\text{CO}_2$. After the leaves have started making sucrose, a ring of tissues, including the phloem, from different places were removed as indicated by the arrows.

The quantities of sucrose containing ^{13}C / arbitrary units, in the shoot tips and in the roots were determined.

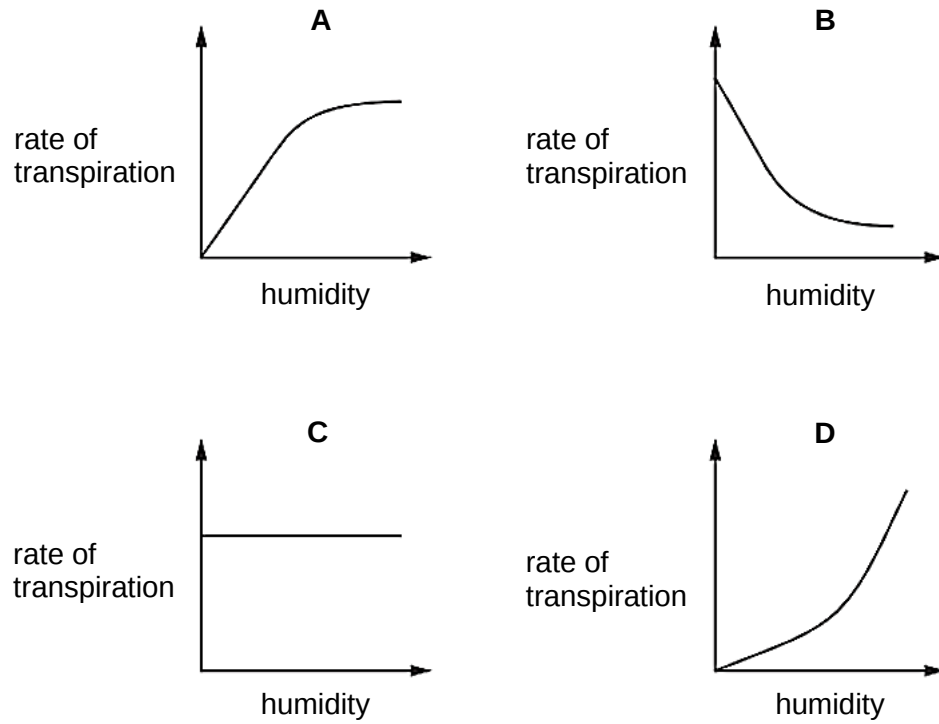


Key : → the positions on the stems where rings of tissue were removed.

Which row shows the likely quantities of sucrose containing ^{13}C in the different plants?

	P		Q		R		S	
	shoot tips	roots	shoot tips	roots	shoot tips	roots	shoot tips	roots
A	3.2	0.9	0	0.4	4.1	0	0	0
B	3.2	3.2	0.1	0.4	4.1	0	0	0
C	0.9	3.2	0	0.4	0	4.1	0.1	0.1
D	0.9	3.2	0.1	0.4	0	4.1	0.1	0.1

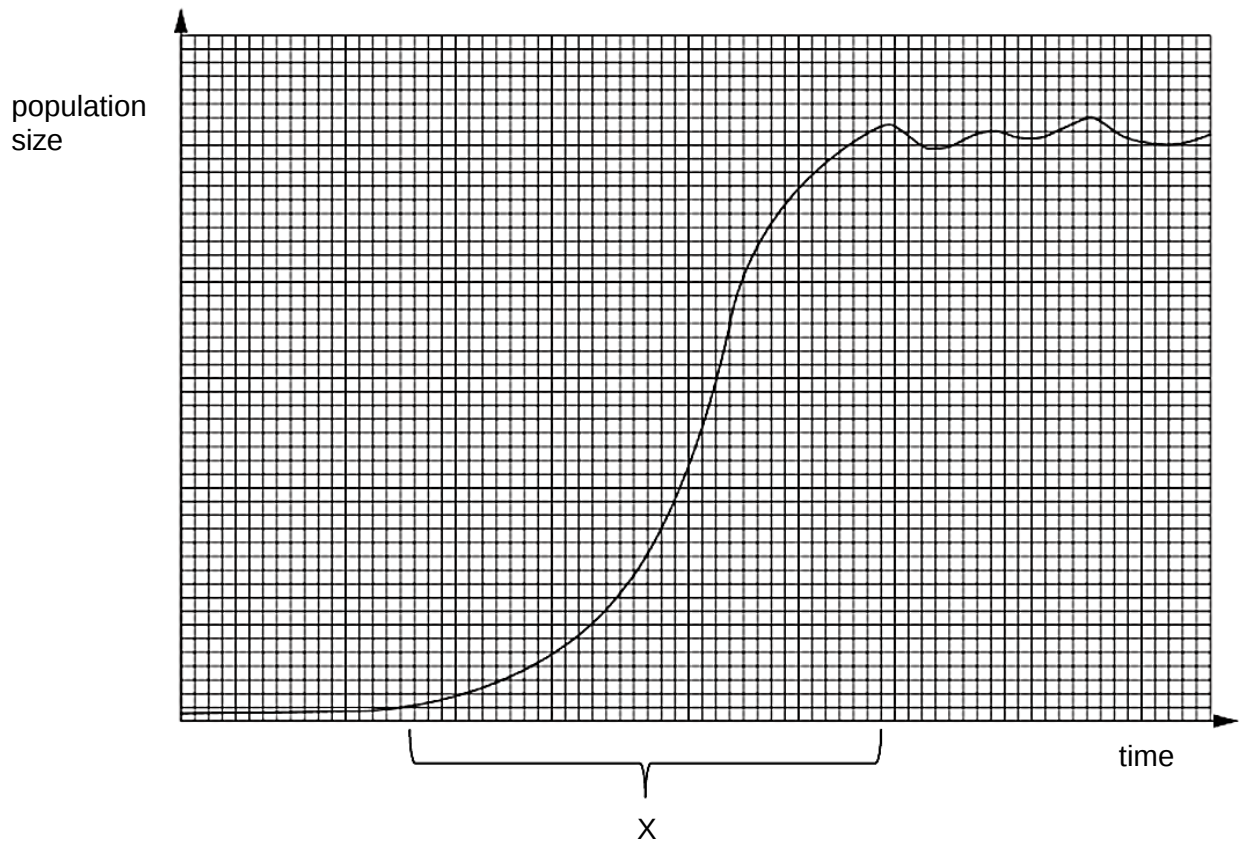
28 Which graph shows the changes in the rate of transpiration as humidity increases?



29 In an ecosystem, between which stages is most energy lost?

- A sunlight → trophic level 1
- B trophic level 1 → trophic level 2
- C trophic level 2 → trophic level 3
- D trophic level 3 → trophic level 4

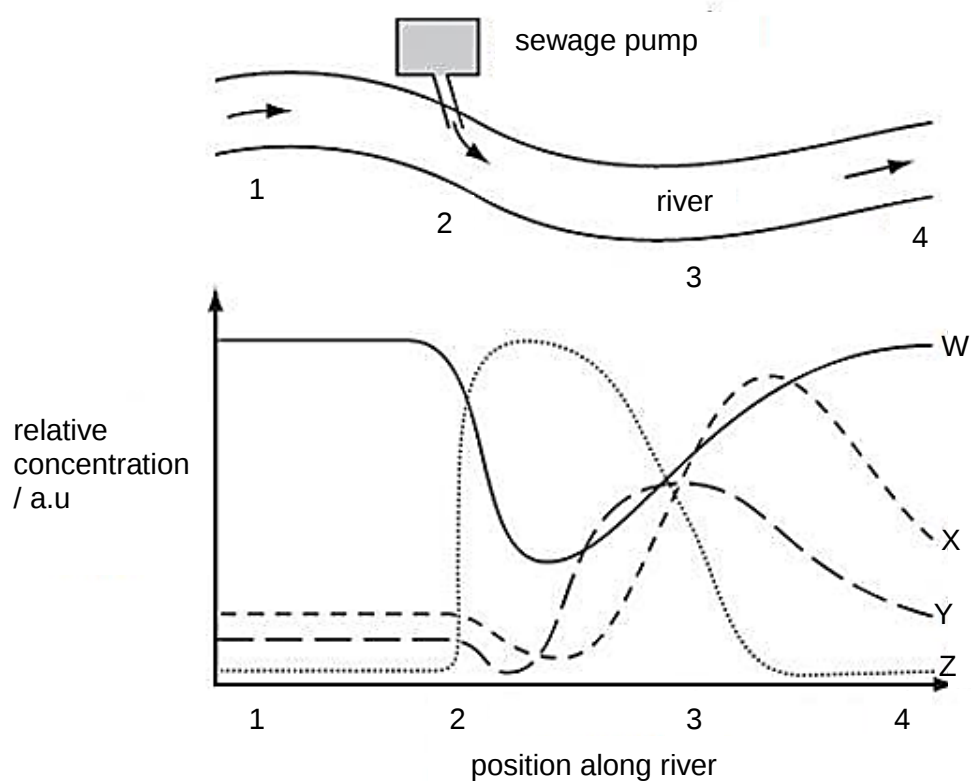
- 30** Some hares colonized an island for the first time. The graph shows how their population size changed over the next few years.



Which is a possible explanation for the change in the hare population during time X?

- A** birth rate and death rate in equilibrium
- B** increasing number of hares able to reproduce
- C** increase in the number of predators
- D** limiting factors begin to take effect

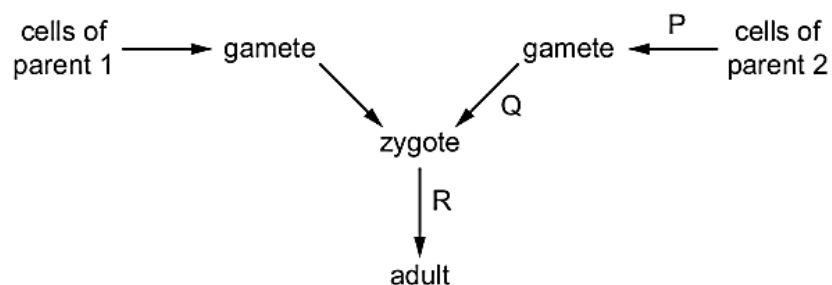
- 31 The diagram shows part of a river into which sewage is being pumped. Some of the effects of adding sewage to the river are plotted in the graph.



Which graph represents the bacteria and the oxygen content of the water?

	bacteria	oxygen
A	W	Y
B	X	Z
C	Y	X
D	Z	W

- 32 The diagram represents stages in the life cycle of an organism.



Which arrow represents a process that results in a haploid cell and which represents mitosis?

	results in a haploid cells	mitosis
A	P	Q
B	Q	R
C	R	Q
D	P	R

- 33 A double-stranded DNA molecule contains a total of 800 base pairs. A biochemist analyzes a single, isolated strand of this DNA molecule (Strand 1) and determines its base composition.

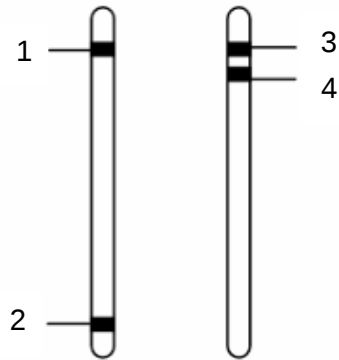
The results for Strand 1 are shown in the table below, with one value missing.

base	percentage in Strand 1
adenine	35%
cytosine	20%
guanine	?
thymine	15%

Using the data provided, how many guanine bases are present in the complementary strand (Strand 2)?

- A** 120
- B** 160
- C** 240
- D** 280

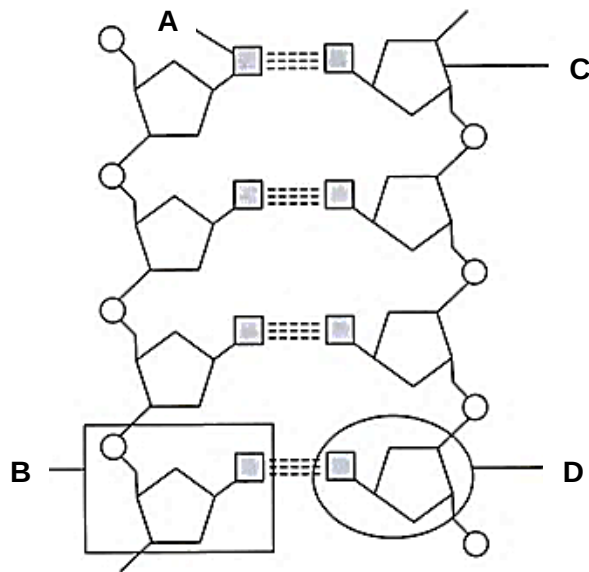
- 34** The diagram below represents a pair of homologous chromosomes showing four regions where genes are found.



Which pairs are alleles?

- A** 1 and 2
 - B** 1 and 3
 - C** 2 and 4
 - D** 3 and 4
- 35** The diagram shows the structure of part of a DNA molecule.

Which option shows a nucleotide?



36 Bacteria can be genetically modified to produce human insulin.

Which statement about this procedure is true?

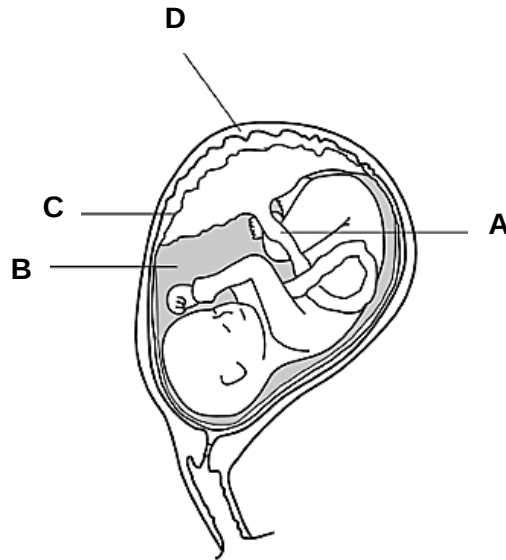
- A** Bacterial insulin is less effective in treating diabetes as bacterial insulin is different from human insulin.
- B** The genetically modified bacteria may become insulin resistant.
- C** The genetically modified bacteria may cause mutations to human genes.
- D** This is possible because the genetic code is universal; a specific codon codes for the same amino acid in almost all living organisms.

37 Which of the following could cause a person to be born with Down's syndrome?

- 1 mutation in the embryo
 - 2 more than one sperm fused with the ovum
 - 3 change in gene structure in sperm due to radiation exposure
- A** 1 and 2 only
 - B** 2 only
 - C** 2 and 3 only
 - D** none of the above

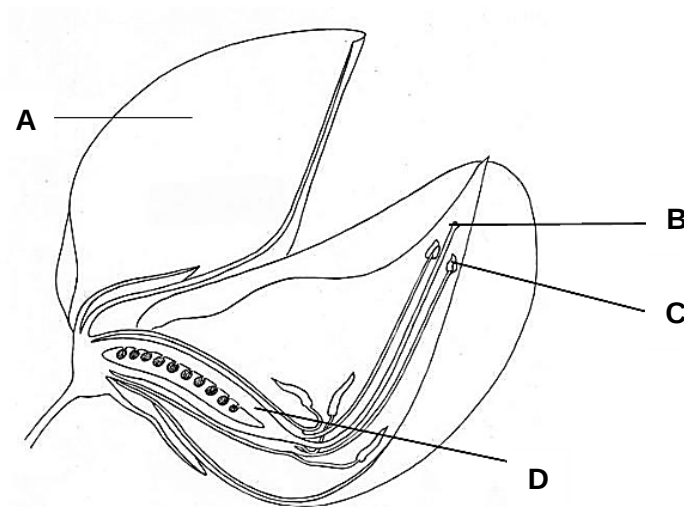
38 The diagram shows a developing fetus.

Which is the site where gaseous exchange occurs?



39 The diagram below shows the longitudinal section of a flower.

Which part of the flower must be removed so that any fruit formed results from cross-pollination?



- 40** In some boys the testes fail to descend and remain inside the abdomen throughout life.

Which row shows the likely effects in an adult man with this condition?

	number of sperm produced	temperature of the testes	fluid added to sperm by the prostate gland
A	low	higher than in the scrotum	normal
B	low	lower than in the scrotum	none
C	normal	higher than in the scrotum	none
D	normal	lower than in the scrotum	normal

End of paper