Cambridge Assessment International Education

Cambridge IGCSE™ (9–1)

BIOLOGY **0970/02**

Paper 2 Multiple Choice (Extended) **For examination from 2023**

SPECIMEN PAPER **45 minutes**

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

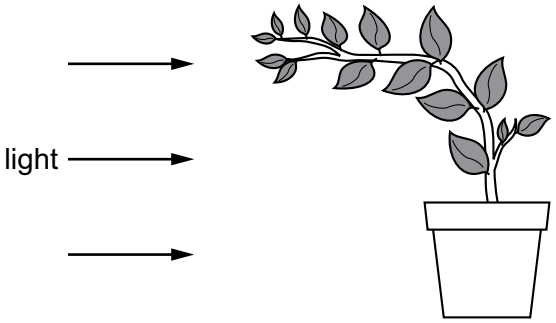
- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **18** pages. Any blank pages are indicated.

1 The diagram shows a plant.



Which characteristic of living organisms is shown by the plant in the diagram?

A excretion

B reproduction

C respiration

D sensitivity

2 Lichens are formed from two different organisms living together.

Organism X and organism Y are found in most lichens.

The table shows some of the characteristics of organism X and organism Y.

X	Y
made of strands called hyphae	single-celled
hyphae have cell walls and many nuclei	cell contains a nucleus and chloroplasts

Which kingdoms do X and Y belong to?

	X	Y
A	fungus	prokaryote
B	fungus	protoctist
C	protoctist	fungus
D	protoctist	plant

3 Which part of a plant cell controls the movement of substances into and out of the cell?

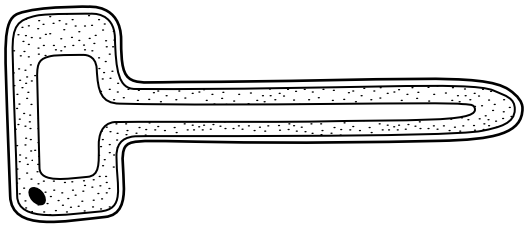
A cell membrane

B cell wall

C cytoplasm

D vacuole

4 The diagram shows the structure of a plant cell.



What is a function of this specialised plant cell?

A It absorbs carbon dioxide from the air.

B It absorbs ions from the soil.

C It transports sucrose from leaves.

D It transports water in stems.

5 How do carbon dioxide and oxygen move into and out of a mesophyll cell?

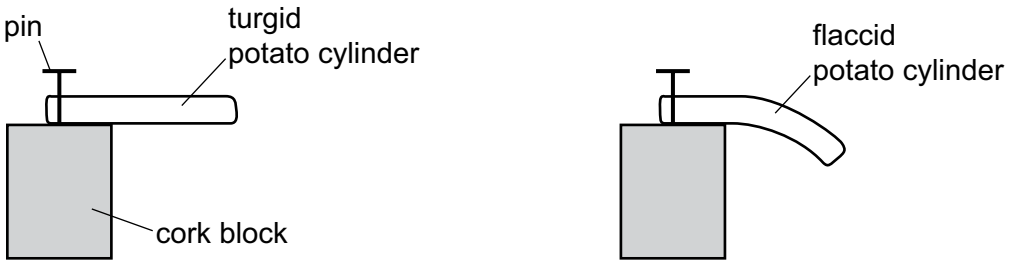
A active transport

B diffusion

C osmosis

D transpiration

6 Four freshly cut potato cylinders were soaked for one hour in different salt solutions The potato cylinders were then pinned to cork blocks. Two of the potato cylinders are shown.



Which solution would cause the potato cylinder to be the most flaccid?

A 0.1 mol per dm^3 salt solution

B 0.3 mol per dm^3 salt solution

C 0.7 mol per dm^3 salt solution

D 1.0 mol per dm^3 salt solution

7 The data show the concentrations of sugar and starch in an onion.

total sugar including reducing sugar / g per 100 g	starch / g per 100 g
3.7	0.0

The onion is tested with Benedict's solution and iodine solution.

Which set of results is correct?

	Benedict's solution	iodine solution
A	blue	blue-black
B	blue	brown
C	brick red	blue-black
D	brick red	brown

8 Which statement about the structure of DNA is correct?

A Base A always pairs with base C.

B Base A always pairs with base T.

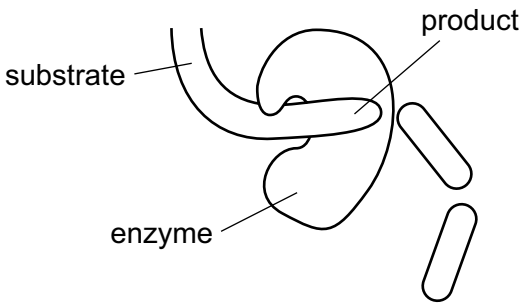
C DNA is made of protein.

D DNA forms a single helix.

9 The diagrams show a protease enzyme catalysing the breaking of part of a protein molecule into smaller pieces.

Which diagram has three correct labels?

A



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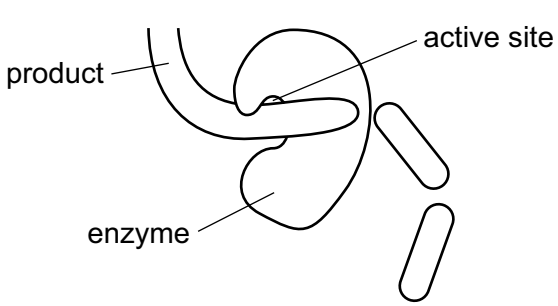

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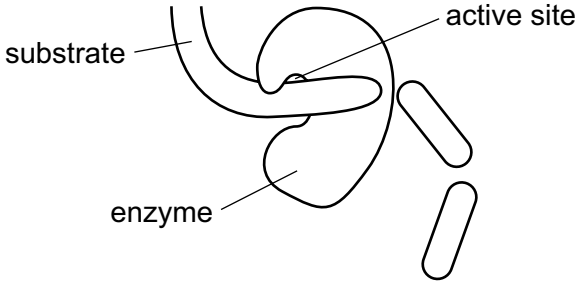

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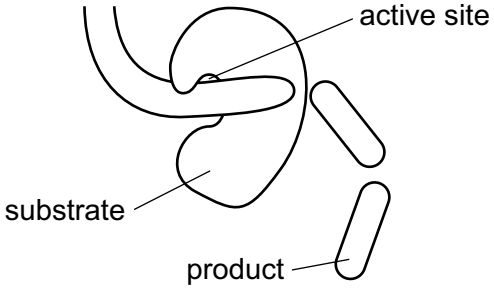


10 A student wrote some notes about enzymes.

She wrote:

'The …1… of an enzyme is …2… to an area on the substrate.

This area on the substrate can fit into it to form an …3… complex'.

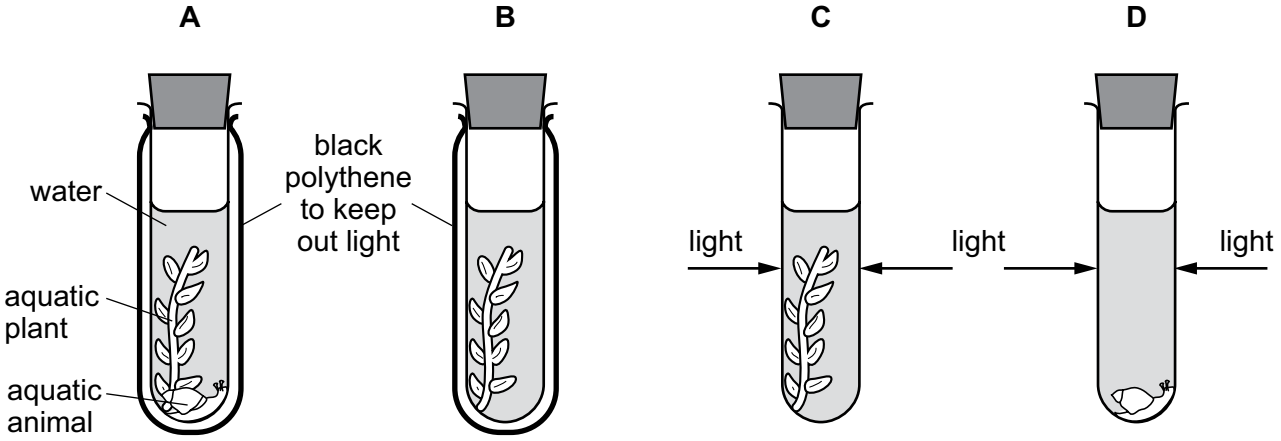
Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	active site	complementary	enzyme-substrate
B	active site	similar	enzyme-product
C	shape	complementary	enzyme-product
D	shape	similar	enzyme-substrate

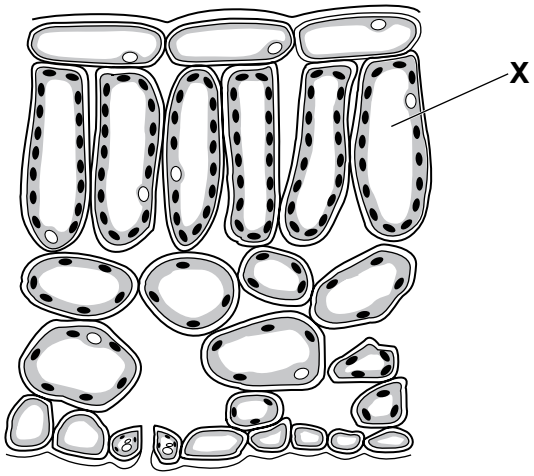
11 The apparatus shown was used in an experiment.

The carbon dioxide content of the water in each test-tube was measured at the start of the experiment and again three hours later.

In which test-tube will the carbon dioxide concentration decrease?



12 The diagram shows a cross-section of part of a leaf.



What is the name of the cell labelled X?

A epidermal cell

B guard cell

C palisade mesophyll cell

D spongy mesophyll cell

13 Why do plants need nitrate ions?

A Nitrogen is a component of amino acids.

B Nitrogen is a component of fatty acids.

C Nitrogen is a component of glucose.

D Nitrogen is a component of starch.

14 In which part of the body of a mammal does physical digestion occur?

A gall bladder

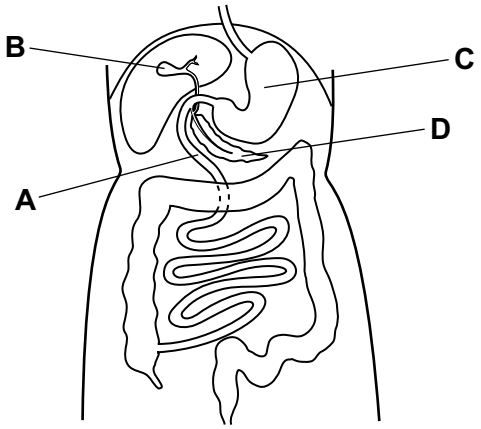
B liver

C mouth

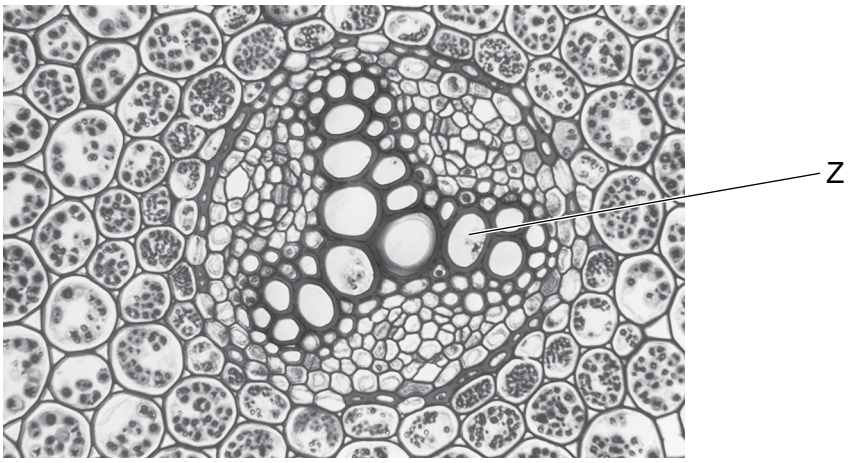
D pancreas

15 The diagram shows part of the human digestive system.

Where is protein digested by trypsin?



16 The photomicrograph shows a cross-section through the root of a buttercup plant.



What is the function of the tissue labelled *Z*?

A photosynthesis

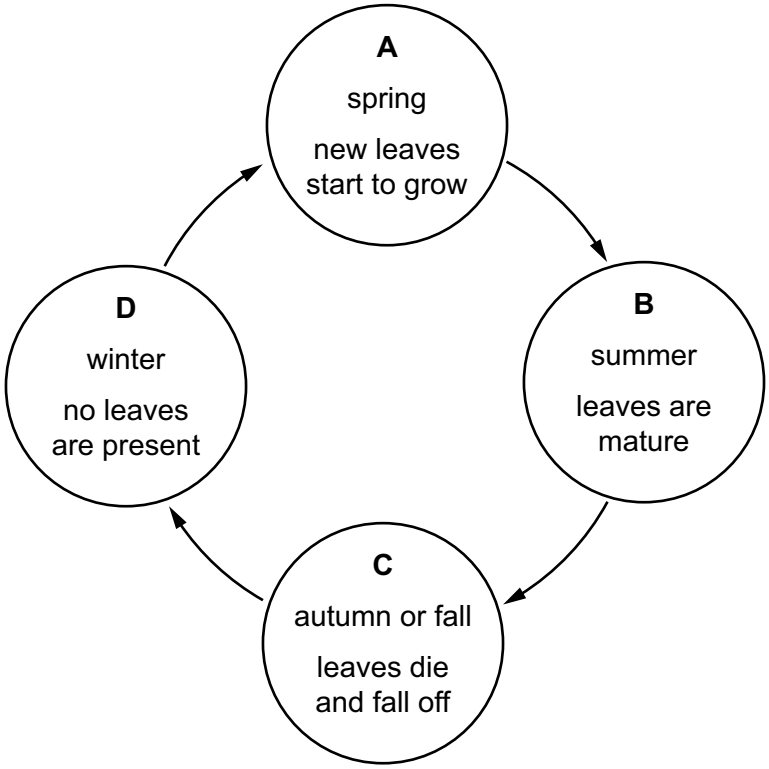
B respiration

C transport of sugars

D transport of water

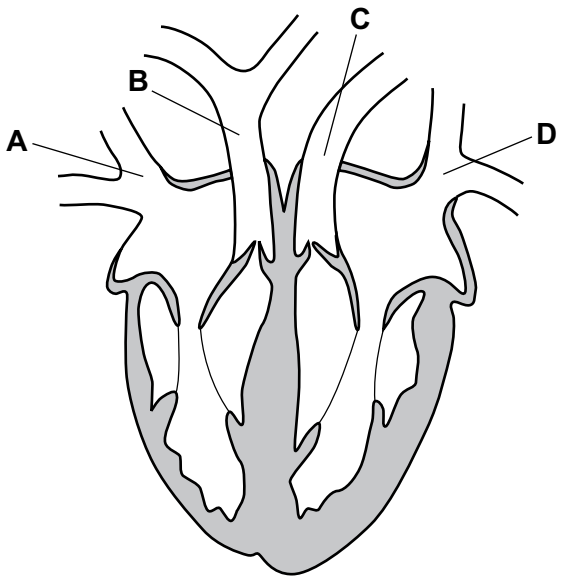
17 Roots and leaves both act as sources and sinks for sucrose and amino acids at different times during the year.

At which point in the year are the roots most active as a source?



18 The diagram shows a section through a human heart.

Which blood vessel is the pulmonary vein?



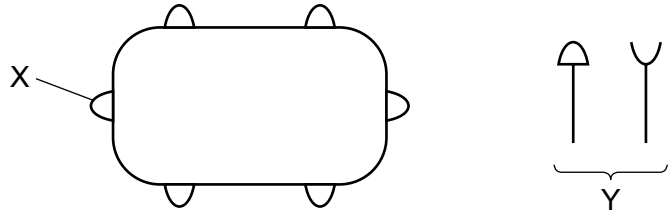
19 What happens to the heart valves when the ventricles contract?

	atrioventricular valves	semilunar valves
A	close	close
B	close	open
C	open	close
D	open	open

20 What are the approximate percentages of oxygen and carbon dioxide in inspired air?

	percentage of oxygen	percentage of carbon dioxide
A	16	4.00
B	16	8.00
C	20	0.04
D	20	4.00

21 The diagram with the structure labelled X shows a bacterium with proteins on its surface. The diagram labelled Y shows proteins made by the human body.



Which row shows the correct combination for destroying the bacterium?

	name of X	name of Y	correct shape of Y
A	antigen	antibody	
B	antibody	antigen	
C	antigen	antibody	
D	antibody	antigen	

22 Which environmental conditions must always be present for seed germination?

A carbon dioxide and water

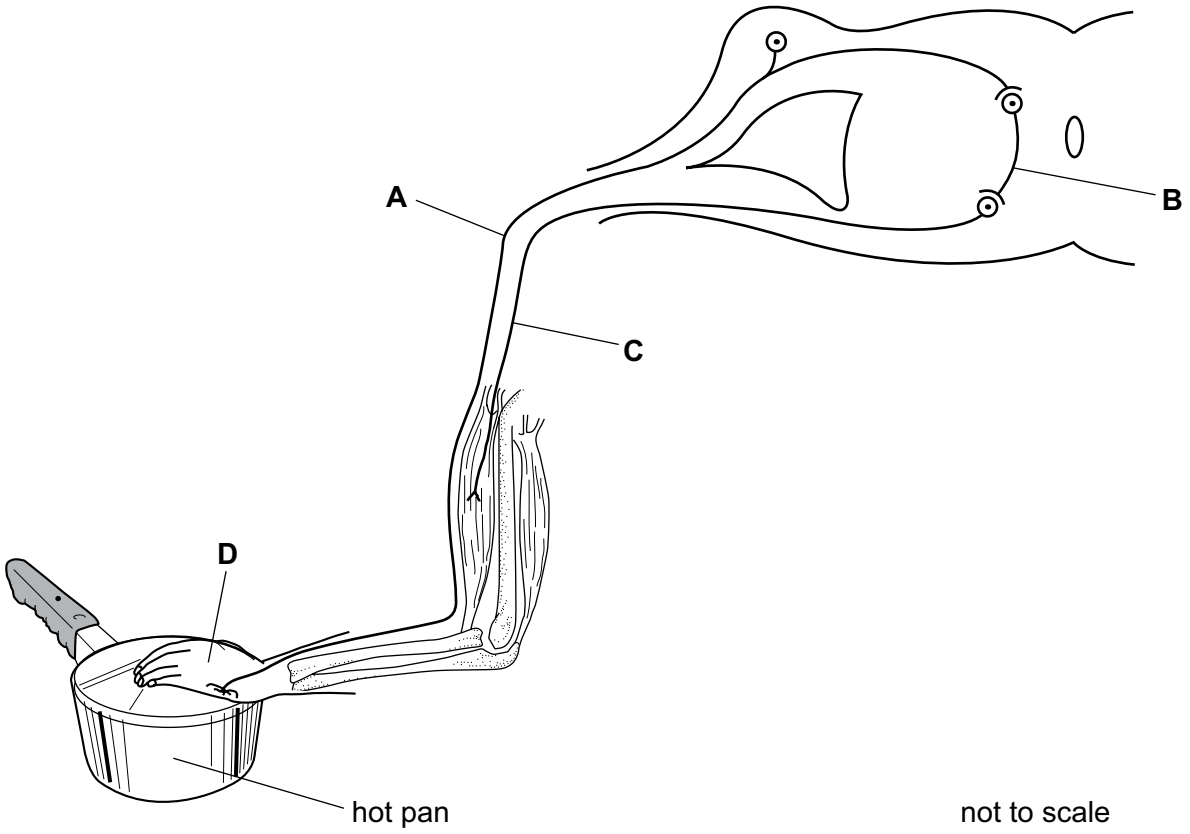
B light and suitable temperature

C oxygen and carbon dioxide

D water and oxygen

23 The diagram shows a reflex arc.

Which structure is the sensory neurone?

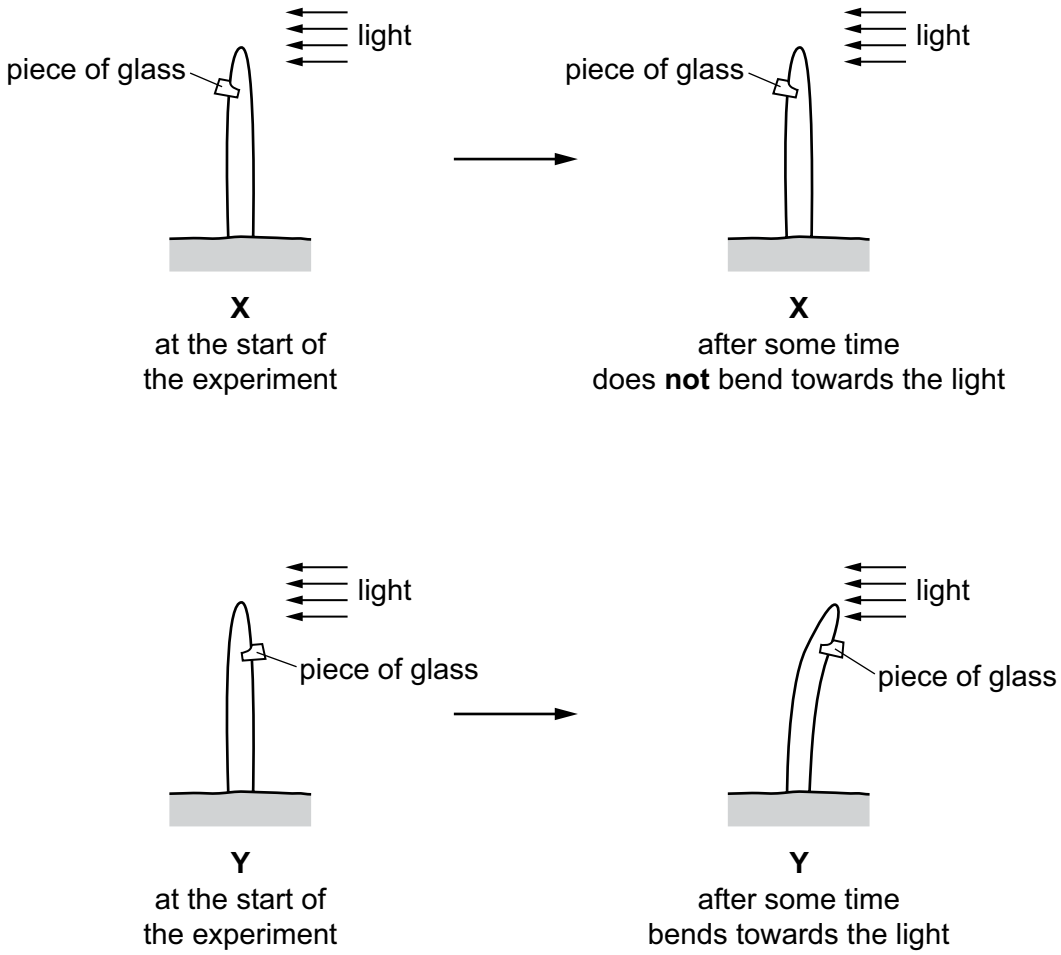


24 What happens to the muscles in the iris, to make the pupil smaller?

	circular muscles	radial muscles
A	contract	contract
B	contract	relax
C	relax	contract
D	relax	relax

25 A student used two seedlings X and Y to investigate phototropism.

The diagram shows their investigation.



Which statement explains the difference in results between **X** and **Y**?

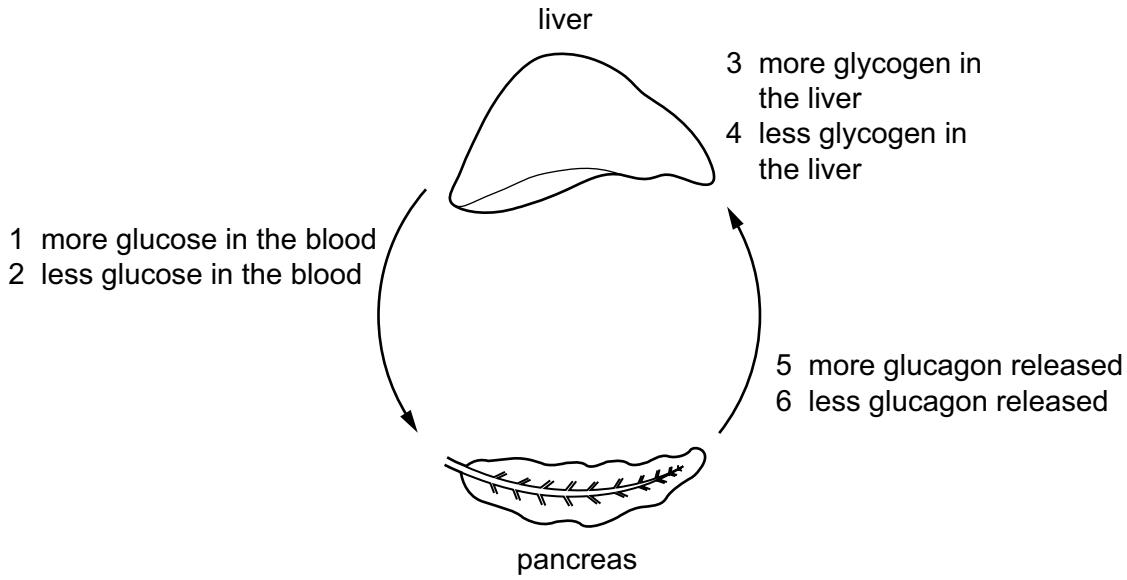
A The piece of glass destroyed the auxin on the shaded side of the seedling.

B The piece of glass destroyed the auxin on the side of the seedling facing the light.

C The piece of glass in **X** stopped the auxin diffusing down the shaded side of the seedling.

D The piece of glass in **X** stopped the auxin diffusing down the side of the seedling facing the light.

26 The diagram shows part of the mechanism that controls blood sugar concentration.



A person does one hour of exercise.

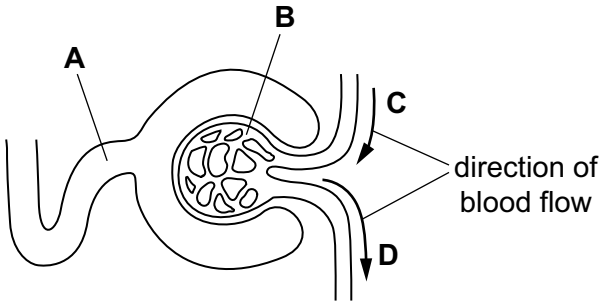
Starting with the pancreas, what is the sequence of events in which the hormone glucagon is involved?

A $5 \rightarrow 3 \rightarrow 2$ **B** $5 \rightarrow 4 \rightarrow 1$ **C** $6 \rightarrow 3 \rightarrow 1$ **D** $6 \rightarrow 4 \rightarrow 2$

27 The diagram shows the first part of a kidney nephron and its blood supply.

During filtration, protein molecules do **not** pass through the wall of the glomerulus.

Which part contains the highest concentration of protein?



28 Which row describes sexual reproduction?

	gamete nucleus	zygote nucleus	genetically different offspring produced
A	diploid	diploid	no
B	diploid	haploid	no
C	haploid	diploid	yes
D	haploid	haploid	yes

29 Which organ secretes the most progesterone during pregnancy?

A adrenal gland

B ovary

C placenta

D uterus

30 What is the role of messenger RNA (mRNA)?

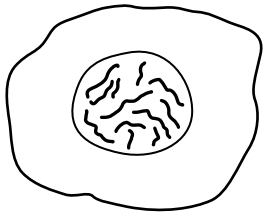
A assembles amino acids into protein molecules

B moves a copy of the gene from the nucleus to the cytoplasm

C controls cell function

D duplicates chromosomes before mitosis

31 The diagram shows the cell of an organism. The nucleus contains 12 chromosomes.



After this cell divides by mitosis, how many chromosomes would be present in one of the daughter cells?

A 6 **B** 12 **C** 18 **D** 24

32 A man marries a woman who has a different blood group from him. They have two children. The children have different blood groups from each other and different blood groups from their parents.

What are the genotypes of the parents' blood groups?

A I^AI^A and I^AI^B **B** I^AI^A and I^oI^o **C** I^AI^B and I^BI^B **D** I^AI^B and I^oI^o

33 Pure-breeding black-feathered chickens are mated with pure-breeding white-feathered chickens. All of the offspring (F1 generation) have black feathers **and** white feathers.

When two of the F1 generation chickens are crossed, what will be the ratios of offspring phenotypes?

A 1 black : 1 white

B 1 black : 2 black and white : 1 white

C 3 white : 1 black

D 3 black : 1 white

34 Over the last 30 years some antibiotics have become less effective in treating bacterial infections.

What is the reason for this?

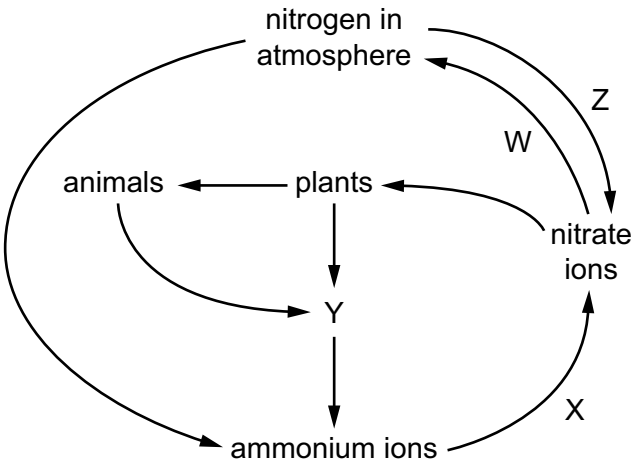
A artificial selection

B asexual reproduction

C more effective new antibiotics

D natural selection

35 The diagram shows part of the nitrogen cycle.



Which row identifies the bacteria involved in processes W, X, Y and Z?

	W	X	Y	Z
A	denitrifying	decomposer	nitrifying	nitrogen-fixing
B	denitrifying	nitrifying	decomposer	nitrogen-fixing
C	nitrifying	decomposer	nitrogen-fixing	denitrifying
D	nitrogen-fixing	nitrifying	decomposer	denitrifying

36 The table shows processes in the carbon cycle that release carbon dioxide into the air, or remove carbon dioxide from the air.

Which row is correct?

	releases carbon dioxide into the air	removes carbon dioxide from the air
A	decay	photosynthesis
B	combustion	respiration
C	photosynthesis	combustion
D	respiration	decay

37 What helps to maintain fish stocks?

A fishing during all seasons

B fishing in all areas of the oceans

C maintaining protected areas

D reducing the mesh size of nets

38 The statements describe some of the events that occur during eutrophication.

What is directly responsible for the increase in decomposers?

A a decrease in dissolved oxygen concentration

B an increase in nitrate concentration

C an increase in the population of algae

D an increase in the death of producers

39 Which cell structure makes bacteria useful for genetic modification?

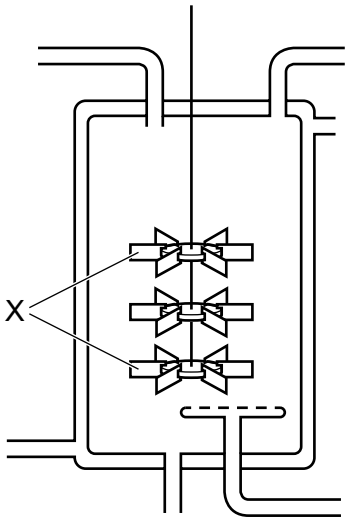
A cell membrane

B cell wall

C cytoplasm

D plasmids

40 The diagram shows an industrial fermenter that is used to produce penicillin.



What is a function of the part labelled X?

A add oxygen to the solution

B maintain an even temperature throughout the solution

C record the pH of the solution

D sterilise the solution

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