



# Cambridge O Level

**BIOLOGY**

**5090/11**

Paper 1 Multiple Choice

**May/June 2024**

**1 hour**

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.

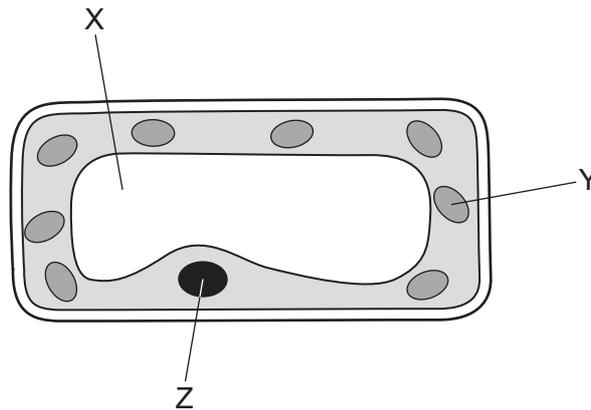
## INFORMATION

- 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 **20** pages. Any blank pages are indicated.



- 1 The diagram shows some of the structures in a plant cell.



Which labelled parts show a sap vacuole, a nucleus and a chloroplast?

	sap vacuole	nucleus	chloroplast
<b>A</b>	X	Y	Z
<b>B</b>	X	Z	Y
<b>C</b>	Y	Z	X
<b>D</b>	Z	Y	X

- 2 A new organism is discovered. It contains DNA in a cellular structure.

To which group of organisms could it belong and to which group could it **not** belong?

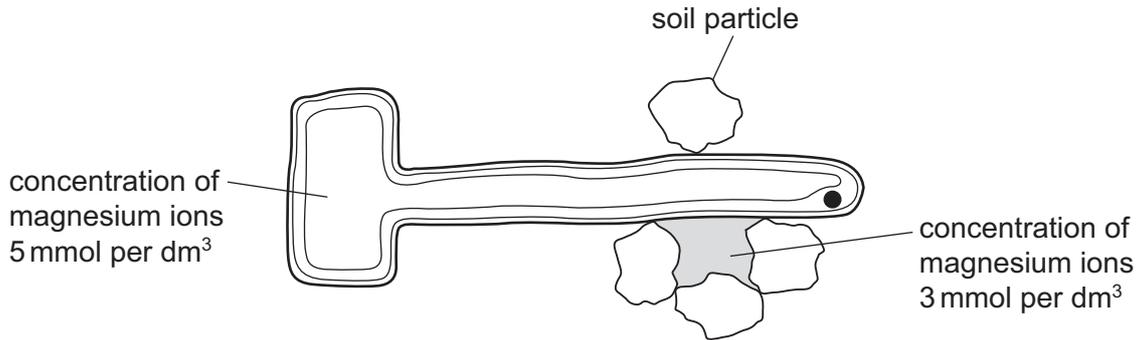
	could belong to	could <b>not</b> belong to
<b>A</b>	bacteria	fungi
<b>B</b>	bacteria	viruses
<b>C</b>	fungi	bacteria
<b>D</b>	viruses	bacteria

- 3 When animal cells and plant cells are placed in distilled water, the animal cells burst but the plant cells do not.

Which statement explains this difference?

- A** Animal cells do not contain starch grains, so there is no osmosis.
- B** Only plant cells have a permanent vacuole which stores water.
- C** Plant cells have a stronger cell membrane than animal cells.
- D** The cell wall of plant cells resists turgor pressure.

- 4 The diagram shows the concentration of magnesium ions in a root hair cell of a healthy plant and in the soil water surrounding the root hair cell. The plant continuously uses up magnesium ions.



For the plant to remain healthy, how will the magnesium ions move?

- A into the cell by active transport
  - B into the cell by diffusion
  - C out of the cell by active transport
  - D out of the cell by diffusion
- 5 The key shows shapes representing small food molecules.

key

- amino acid
- ◡ fatty acid
- △ glucose
- glycerol

Large food molecules are made from smaller food molecules.

Which diagram represents part of a glycogen molecule?

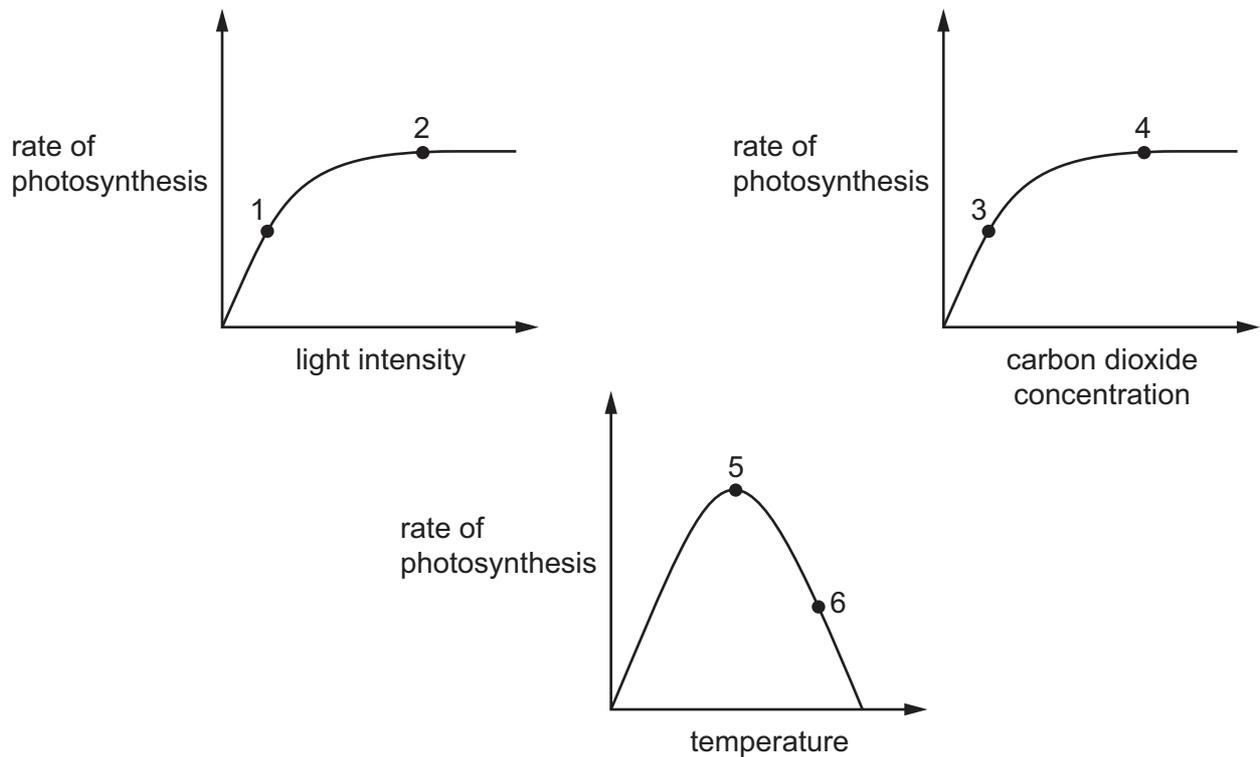
- A —○—△—○—△—○—△—
- B —△—△—△—△—△—△—
- C —○—○—○—○—○—○—
- D —□—◡—□—◡—□—◡—

6 Enzymes are biological catalysts.

Which type of molecule can be an enzyme?

- A carbohydrate
- B fat
- C nucleotide
- D protein

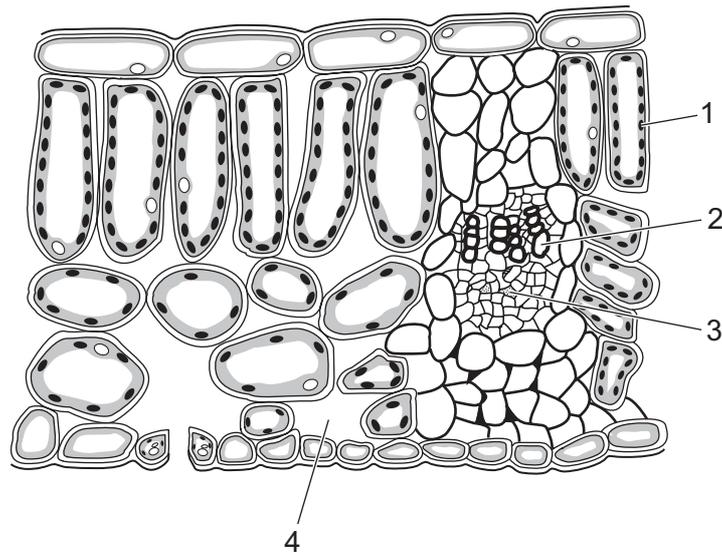
7 The graphs show factors affecting the rate of photosynthesis.



At which points on the graphs could the rate of photosynthesis be limited by light intensity?

- A 1, 3 and 6
- B 1, 4 and 5
- C 2, 3 and 5
- D 2, 4 and 6

8 The diagram shows a section through a leaf.



What are the functions of the parts labelled 1, 2, 3 and 4?

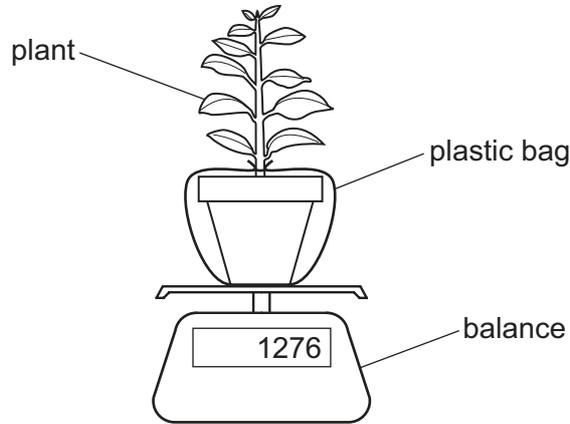
	1	2	3	4
<b>A</b>	gaseous exchange	transporting sucrose	transporting water	photosynthesis
<b>B</b>	gaseous exchange	transporting water	transporting sucrose	photosynthesis
<b>C</b>	photosynthesis	transporting sucrose	transporting water	gaseous exchange
<b>D</b>	photosynthesis	transporting water	transporting sucrose	gaseous exchange

9 Which pathway is taken by water and mineral ions through a plant?

- A** root hair cells → mesophyll cells → xylem → cortex cells
- B** root hair cells → cortex cells → phloem → mesophyll cells
- C** root hair cells → mesophyll cells → phloem → cortex cells
- D** root hair cells → cortex cells → xylem → mesophyll cells

- 10 A student investigated the rate of transpiration in a green plant. The plant was growing in soil in a pot.

The student watered the plant and then put a plastic bag around the pot, leaving the leaves of the plant outside the bag. She measured the mass of the plant in the pot at the start and repeated this every two hours for six hours.



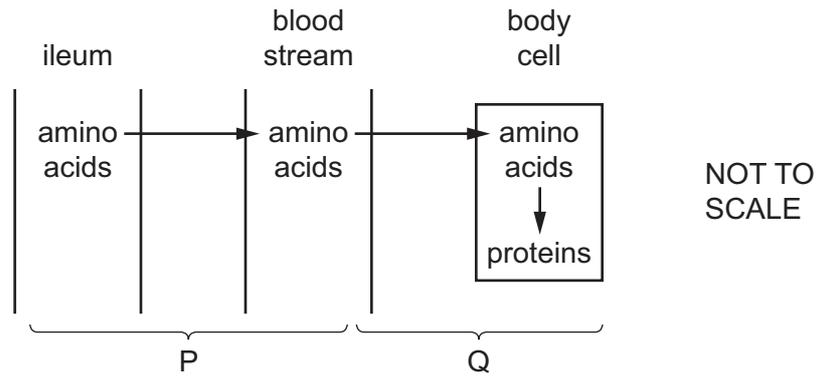
The results of the investigation are shown.

time of day	mass of pot and plant / g
09:00	1276
11:00	1270
13:00	1258
15:00	1252

What is the mean rate of transpiration over the six-hour period?

- A** 43g/h      **B** 12g/h      **C** 8g/h      **D** 4g/h

11 The diagram shows what happens to amino acids in part of the human body.

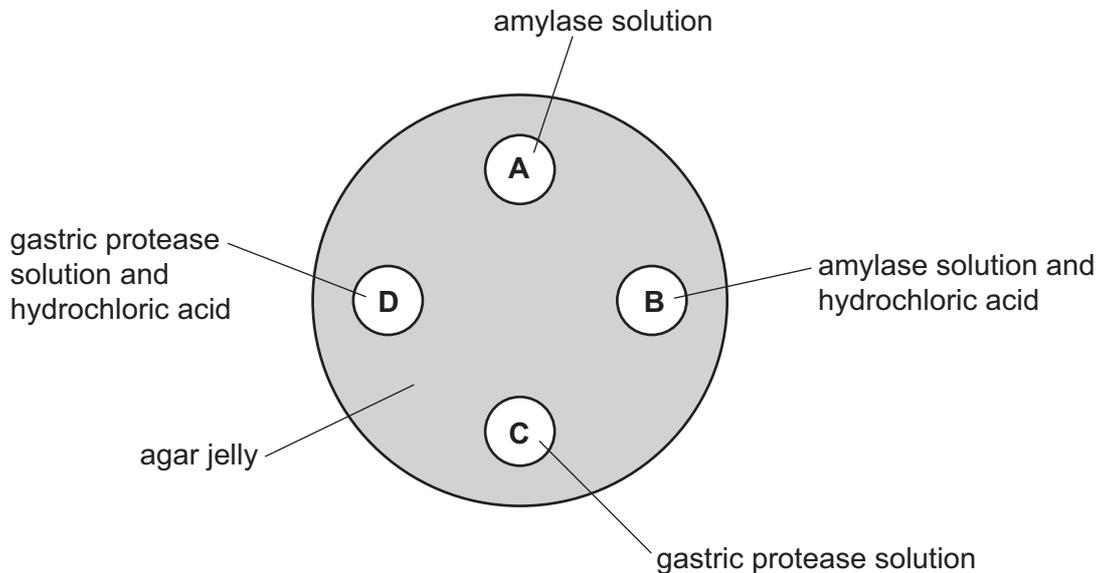


What describes processes P and Q?

	P	Q
<b>A</b>	absorption	assimilation
<b>B</b>	absorption	digestion
<b>C</b>	digestion	absorption
<b>D</b>	digestion	assimilation

12 A dish is filled with agar jelly containing starch. Four holes are cut in the jelly and each hole is filled as shown in the diagram.

After 30 minutes, which hole will be surrounded by the largest area without starch?



13 A healthy person eats a meal containing carbohydrates.

Two hours later, which structure will contain a liquid with an increased concentration of glucose?

- A colon
- B hepatic portal vein
- C renal artery
- D ureter

14 Which cells in the gas exchange system produce mucus?

- A ciliated cells
- B goblet cells
- C lymphocyte cells
- D red blood cells

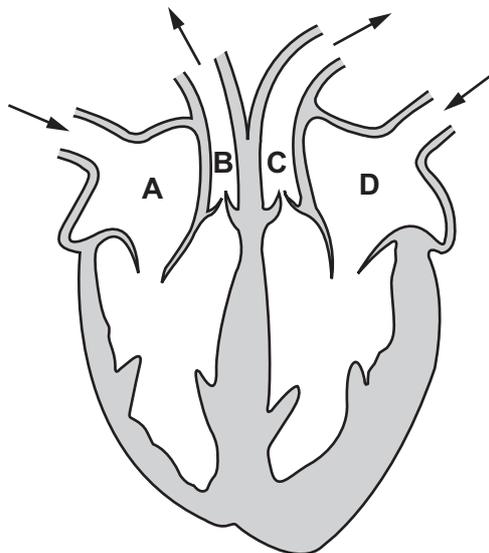
15 Which equation represents anaerobic respiration in humans?

- A glucose + carbon dioxide → lactic acid
- B glucose → alcohol + carbon dioxide
- C glucose → lactic acid
- D glucose → lactic acid + carbon dioxide

16 The heart acts as a pump, pushing blood through the circulatory system.

The arrows on the diagram of the heart indicate the direction in which blood flows.

At which point is the pressure of the blood the greatest?



17 A person's cuts and grazes do not heal and their blood does not clot easily.

What may be the cause of these symptoms?

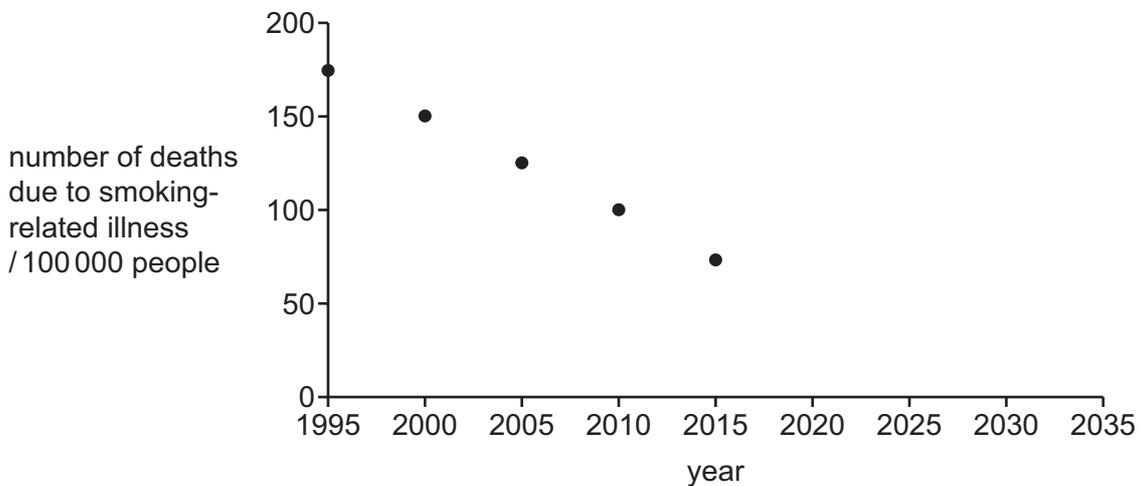
- A a higher than normal level of fibrinogen in the blood
- B a higher than normal level of red blood cells in the blood
- C a lower than normal level of platelets in the blood
- D a lower than normal level of iron in the blood

18 How is the malarial parasite transmitted to humans?

- A by close contact with a person infected with malaria
- B by drinking water infested with parasites
- C by eating food contaminated with mosquito saliva
- D by mosquito saliva entering the bloodstream

19 Some fatal diseases are associated with smoking tobacco.

In 1990, the government of a country began a campaign to persuade people to stop smoking. The graph shows the numbers of people dying from smoking-related diseases in the years after 1990.



If the number of people dying from smoking-related diseases continued to fall at the same rate, in which year would there be no deaths caused by smoking?

- A 2020
- B 2025
- C 2030
- D 2035

20 Which diseases can be treated effectively with antibiotics?

- 1 HIV
- 2 malaria
- 3 cholera

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

21 In 2022, many countries required travellers to be fully vaccinated against the COVID-19 virus. New Zealand's requirements stated: 'You need to have had the last vaccination at least 14 days before you arrive.'

Why did New Zealand require a period of 14 days after vaccination before entry was allowed?

- A** to make sure there were no bad side effects from the vaccination
- B** to allow time for the production of antibodies
- C** to allow time for the production of antigens
- D** to make sure the person did not have COVID-19

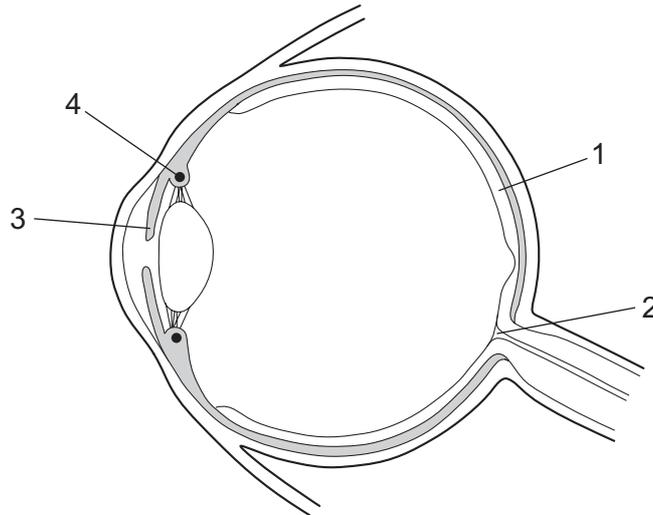
22 Which row identifies the contents of urine in a healthy person?

	glucose	urea	water	ions
<b>A</b>	✓	x	✓	x
<b>B</b>	✓	✓	✓	✓
<b>C</b>	x	x	✓	✓
<b>D</b>	x	✓	✓	✓

23 Which statement describes the roles of components of the nervous system?

- A** Effectors respond to environmental changes and send impulses to the central nervous system (CNS).
- B** Parts of the central nervous system (CNS) can only transmit impulses to a single effector at a time.
- C** Parts of the peripheral nervous system (PNS) carry impulses to effectors and receptors from the central nervous system (CNS).
- D** Receptors respond to environmental changes and send impulses to the central nervous system (CNS).

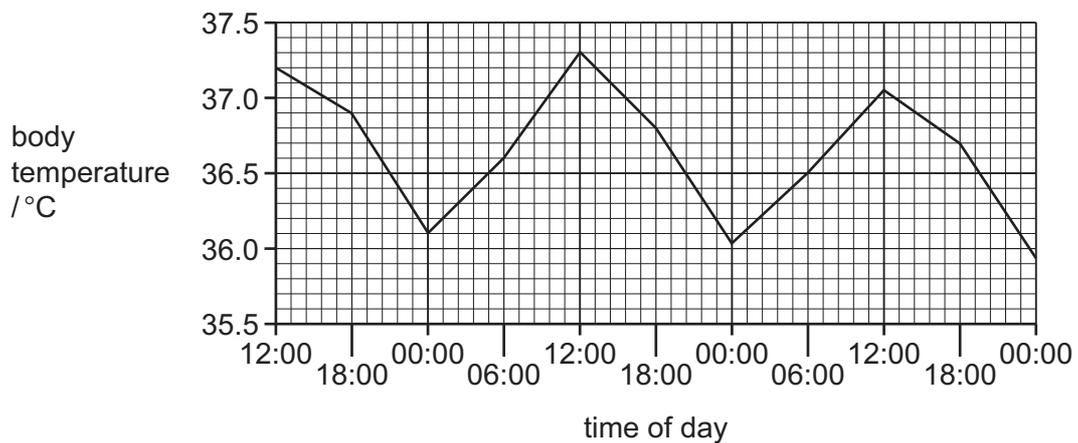
24 The diagram shows a section through the eye.



In the pupil reflex, which row gives the sites of the effectors and receptors involved?

	effectors	receptors
<b>A</b>	3	1
<b>B</b>	3	2
<b>C</b>	4	1
<b>D</b>	4	2

25 The graph shows changes in the body temperature of a person over a 60-hour period.



Which statement about the graph is correct?

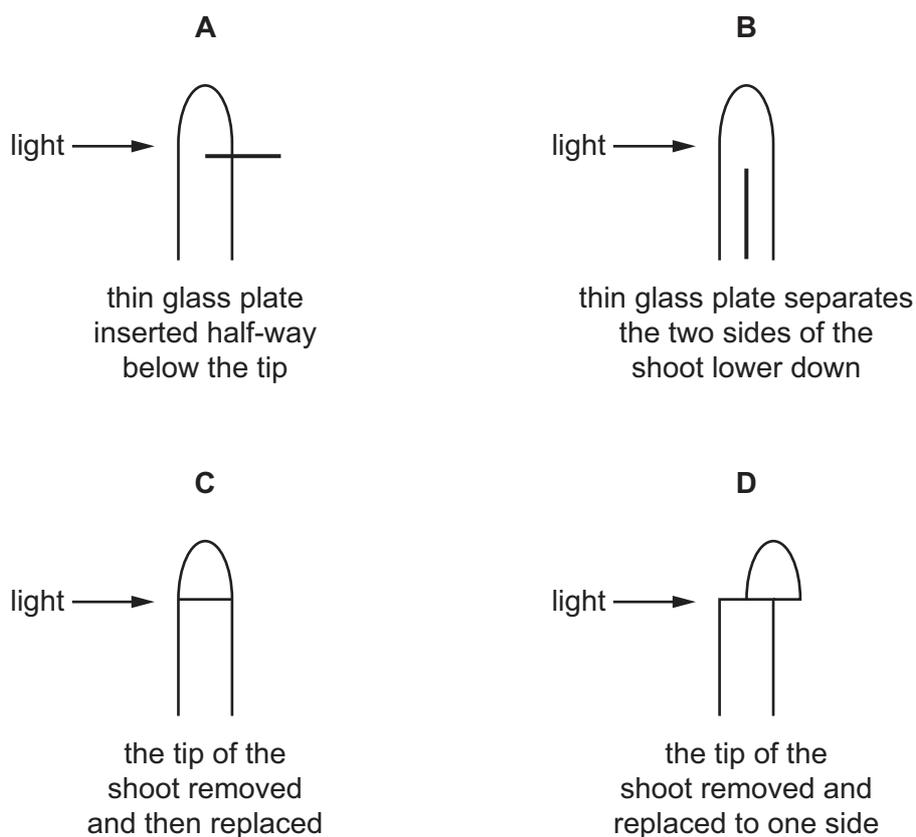
- A** The temperature of the person is always lower at 18:00 than at 06:00.
- B** The range shown by the data is 1.0 °C.
- C** The temperature of the person after 9 hours from the start is 36.8 °C.
- D** Over this period, the mean temperature of the person at 18:00 is 36.8 °C.

26 Which process is stimulated by adrenaline in the cells of the liver?

- A breakdown of glycogen, increasing the blood glucose level
- B breakdown of excess amino acids, forming urea
- C breakdown of proteins, releasing amino acids into the blood
- D conversion of excess blood glucose to glycogen

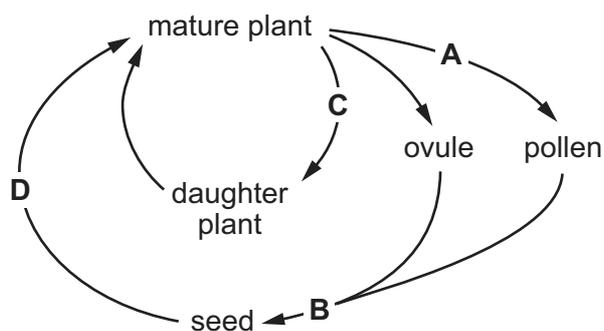
27 The diagrams show experiments to investigate the response of plant shoots to light.

Which shoot will **not** grow towards the light?



28 The diagram shows the life cycle of a species of plant.

During which stage does meiosis (reduction division) occur?



29 What is an advantage of sexual reproduction in plants?

- A It is faster than asexual reproduction.
- B Offspring show genetic variation.
- C Only one parent is needed.
- D Pollinators are not needed.

30 Some features of four flowers, **A**, **B**, **C** and **D**, are recorded in the table.

Which flower is most likely to be pollinated by wind?

	smooth pollen	sticky pollen	anthers inside petals	stigma outside petals	small petals	large petals
<b>A</b>	✓	x	x	✓	✓	x
<b>B</b>	x	✓	✓	x	x	✓
<b>C</b>	✓	x	x	✓	x	✓
<b>D</b>	x	✓	✓	✓	x	✓

key

✓ = present

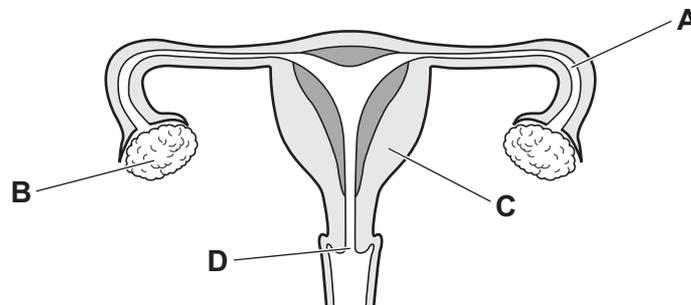
x = absent

31 What is the path taken by sperm cells during ejaculation from the male reproductive system?

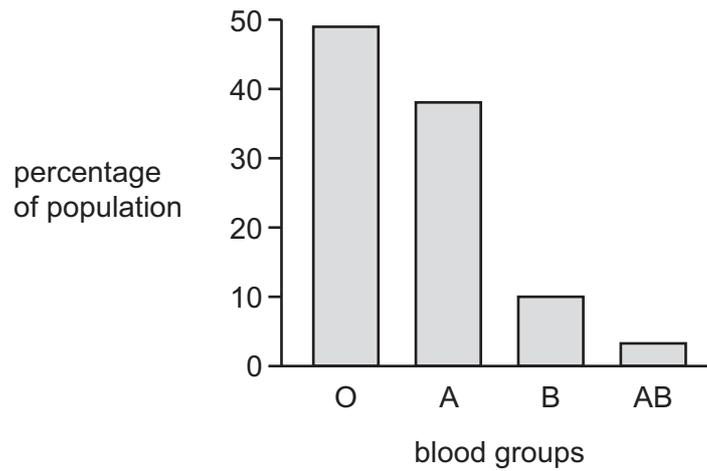
- A sperm duct → testis → urethra
- B sperm duct → urethra → testis
- C testis → sperm duct → urethra
- D testis → urethra → sperm duct

32 The diagram shows the female reproductive system.

Which label identifies the cervix?



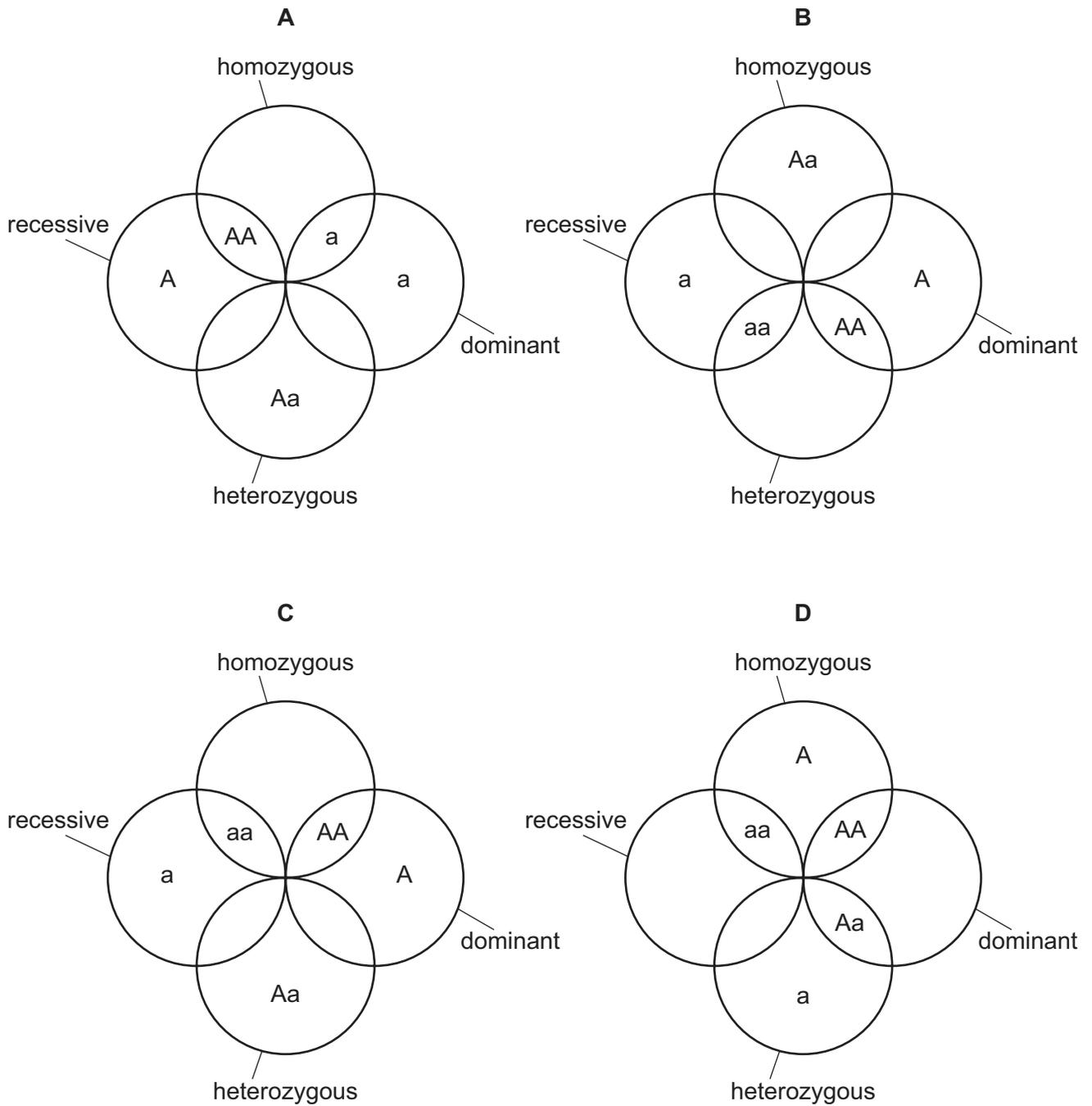
33 The graph shows the percentage of the population with different ABO blood groups in one region.



How does the graph suggest that variation in ABO blood groups is discontinuous?

- A There are intermediates.
- B The percentage of the population with each blood group is different.
- C There is a limited number of phenotypes.
- D There is a range of phenotypes between two extremes.

- 34 For a gene with two alleles, A and a, which diagram identifies these alleles and the genotypes they can form?



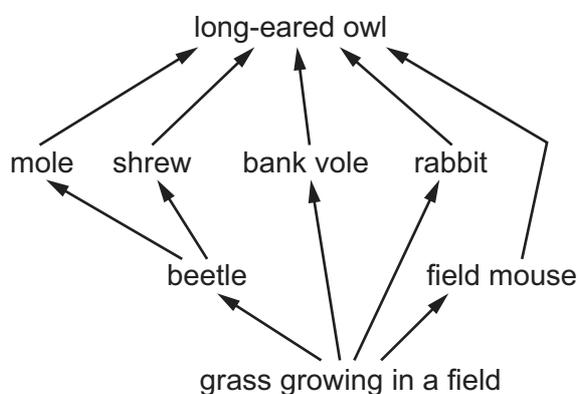
- 35 Over time, a species of bird develops a more pointed beak. The more pointed shape of the beak helps the birds to catch small insects that may be hiding in cracks in the rocks.

What is a reason for the change in the shape of the birds' beaks?

- A Birds develop more pointed beaks as they search for insects in cracks in the rocks.
- B Individuals with less pointed beaks are better fitted to their environment and more likely to survive.
- C Individuals with more pointed beaks are better able to compete for food.
- D When reproducing, birds are more likely to seek out mates with less pointed beaks because these are better adapted.
- 36 In the process of genetic modification to make artificial insulin (a protein), which material is inserted into the host bacterium and what effects does this have?

	material inserted	effects in bacterium
A	bacterial DNA	synthesis of protein and multiplication of bacteria
B	bacterial DNA	synthesis of protein and cell death
C	human DNA	assembly of amino acids and synthesis of a protein
D	human DNA	assembly of amino acids and multiplication of bacteria

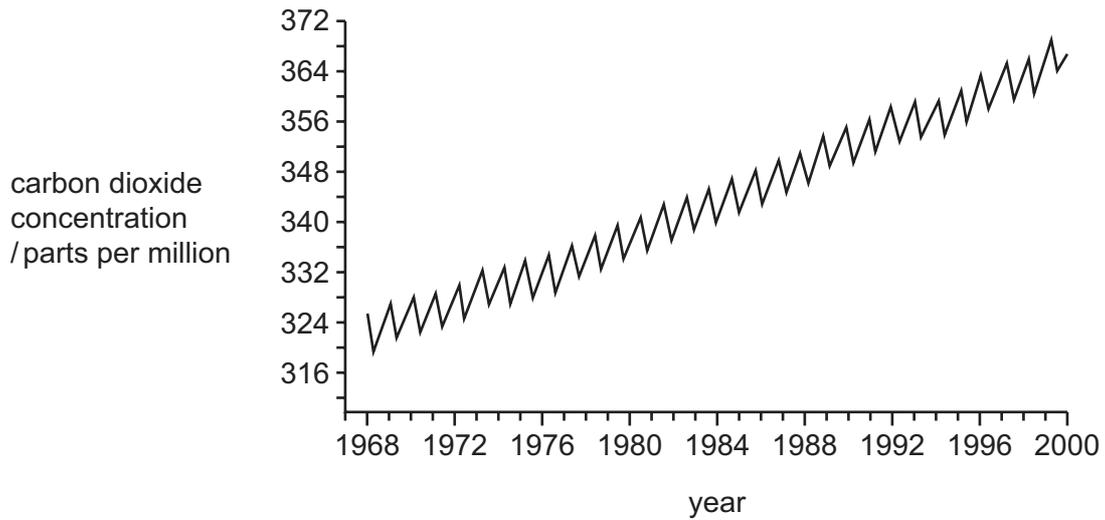
- 37 The diagram shows a food web for an ecosystem.



Which group of organisms in an ecosystem is **not** shown in this food web?

- A carnivores
- B decomposers
- C herbivores
- D producers

38 The graph shows the atmospheric carbon dioxide concentration from 1968 to 2000 in a country.

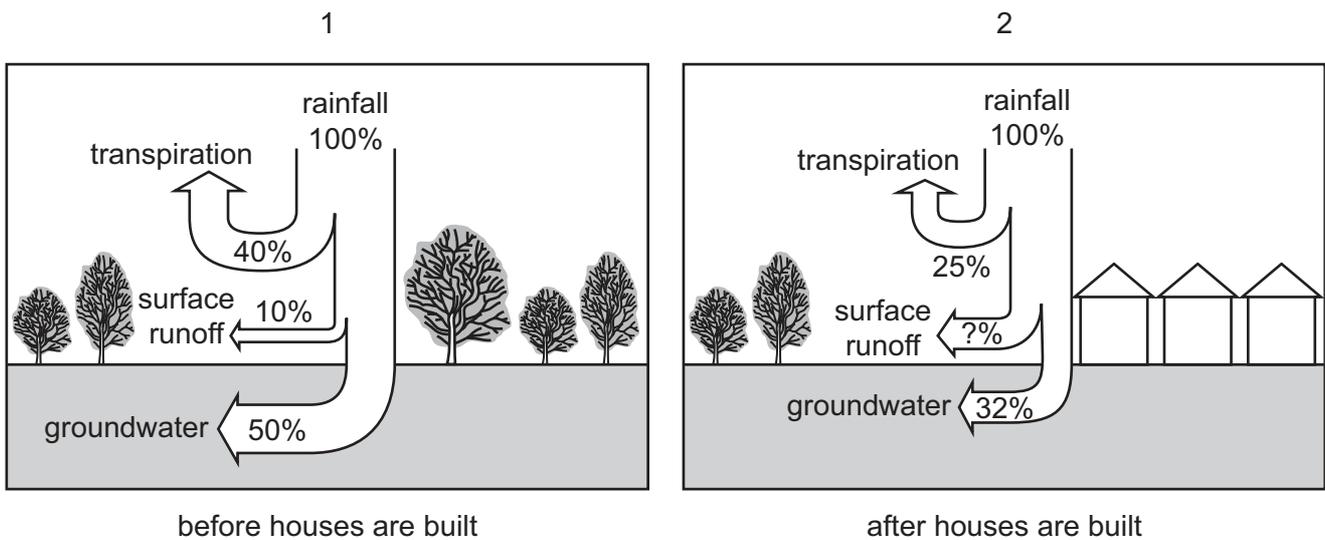


Every year there are variations in carbon dioxide concentration.

What is the best explanation for these variations?

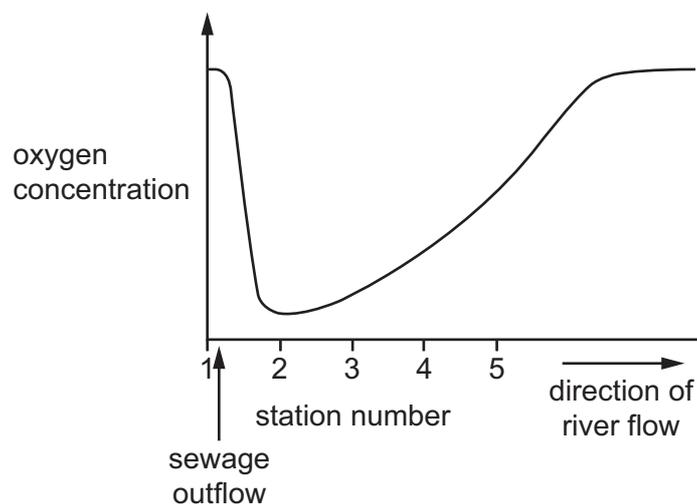
- A increased rate of photosynthesis in the summer months of each year
- B increased rate of respiration in the winter months of each year
- C higher rainfall in the summer months of each year
- D increasing yearly temperatures due to global warming

- 39 The diagrams show what happens to rain when it falls on an area of forested land before and after houses are built.



What is the difference in the percentage of surface runoff before and after building the houses?

- A increases by 33%  
 B increases by 43%  
 C decreases to 43%  
 D decreases to 33%
- 40 The graph shows the concentration of oxygen in a river, measured at stations 1 to 5, each 100 m apart. There is a sewage outflow just after station 1.



At which stations are the concentrations of organic matter **lowest**?

- A 1 and 5      B 2 and 3      C 3 and 4      D 4 and 5



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