UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

BIOLOGY **5090/01**

Paper 1 Multiple Choice **October/November 2009**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and candidate 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 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 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.

This document consists of **18** printed pages and **2** blank pages.

1 Which processes can take place in a root hair cell when oxygen is **not** available?

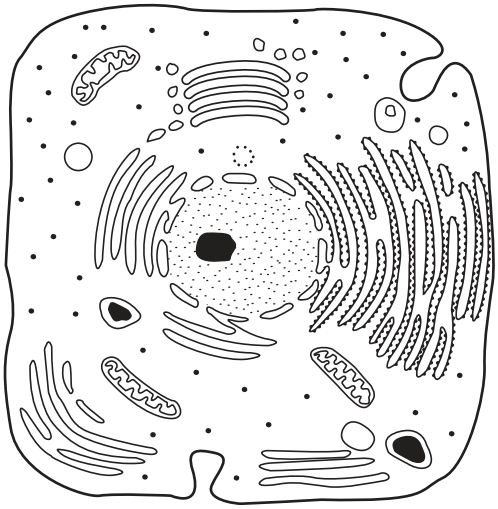
A active transport only

B diffusion only

C active transport and osmosis only

D diffusion and osmosis only

2 The diagram represents a cell as seen under the electron microscope.



What type of cell is this?

	type of cell	reason
A	animal cell	outer layer is the cell membrane
B	bacterium	no chromosomes are visible
C	plant cell	cytoplasm is visible
D	plant cell	cell wall is visible

3 The table shows the concentrations of some mineral ions in the root hair of a plant and in the soil around it.

mineral ion	concentration in the root hair (arbitrary units)	concentration in the soil (arbitrary units)
magnesium	75	15
nitrate	126	47

How are these mineral ions absorbed from the soil by the plant?

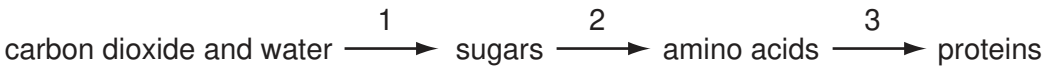
	magnesium	nitrate
A	active transport	active transport
B	active transport	diffusion
C	diffusion	active transport
D	diffusion	diffusion

4 Protease breaks down proteins into amino acids.

In the 'lock and key' hypothesis, what is the lock and what is the key?

	lock	key
A	amino acid	protease
B	protease	amino acid
C	protease	protein
D	protein	protease

5 The diagram shows some chemical reactions that occur in plants.



Which stage or stages depend on the use of nitrate ions as a raw material?

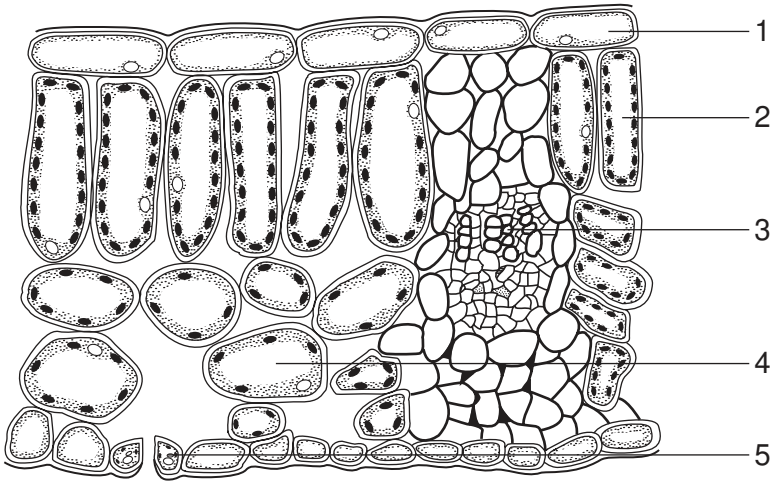
A 1 only

B 2 only

C 1 and 3 only

D 2 and 3 only

6 The diagram shows a transverse section of a leaf.

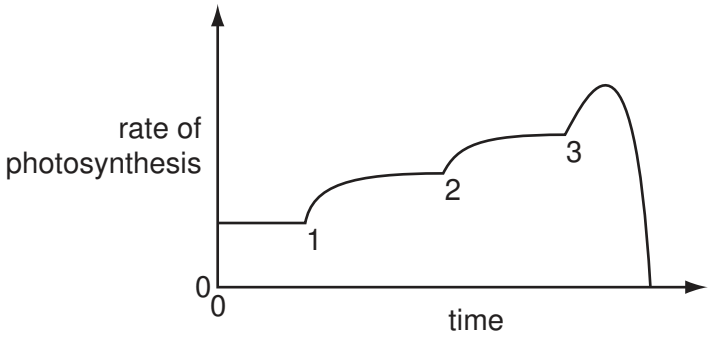


Which cells absorb carbon dioxide?

A 1, 2 and 3 **B** 2, 3 and 4 **C** 2, 4 and 5 **D** 1, 3 and 5

7 Temperature, light intensity and carbon dioxide concentration are three limiting factors in photosynthesis.

In an experiment, each factor is increased in turn. The graph shows the results.



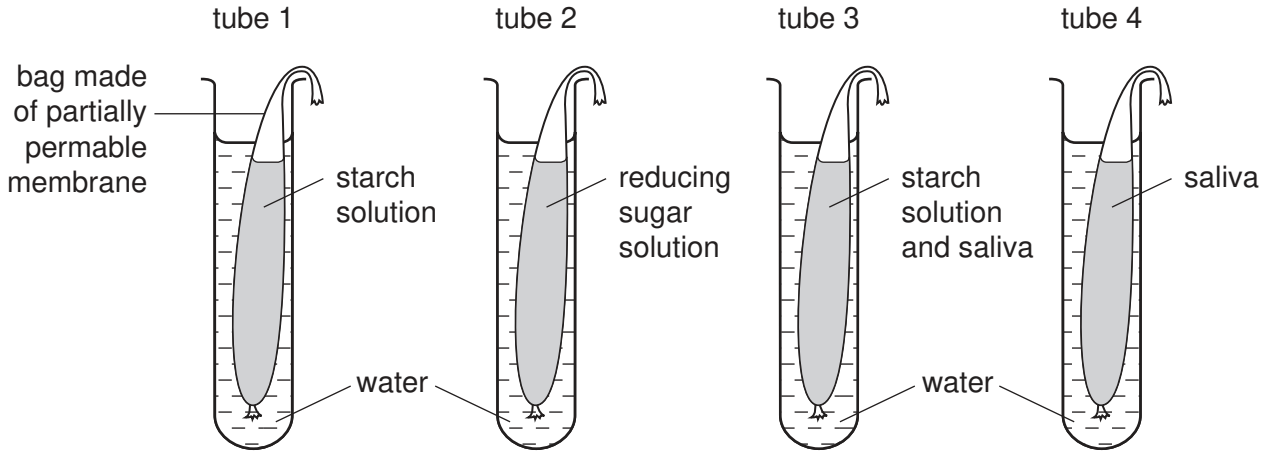
Which numbered points represent when each factor was increased?

	carbon dioxide concentration	light intensity	temperature
A	1	2	3
B	2	3	1
C	3	1	2
D	3	2	1

8 Which row in the table correctly identifies the deficiency diseases caused by lack of vitamin C, calcium and iron?

	lack of vitamin C	lack of calcium	lack of iron
A	anaemia	rickets	scurvy
B	brittle bones	anaemia	rickets
C	rickets	scurvy	brittle bones
D	scurvy	brittle bones	anaemia

9 Four bags made of partially permeable membrane are placed in tubes of water as shown in the diagram.



After 20 minutes at 35 °C a sample of the water around the bag in each tube is boiled with Benedict's solution.

What are the expected results?

	tube 1	tube 2	tube 3	tube 4
A	blue	orange	blue	orange
B	blue	orange	orange	blue
C	orange	blue	orange	blue
D	orange	orange	blue	orange

10 Four foods were analysed for protein, fat and carbohydrate.

Which food contains the most energy in a 100 g portion?

	protein %	fat %	carbohydrate %
A	20	7	1
B	10	9	20
C	4	5	6
D	0.5	0.5	5

11 During translocation in plants, which substance is moved and in which direction?

	substance	from	to
A	sucrose	anthers	stigmas
B	sucrose	leaves	roots
C	water	roots	leaves
D	water	soil	root hairs

12 Which substances are transported in the phloem and which in the xylem?

	phloem	xylem
A	nitrate ions	sugar
B	starch	nitrate ions
C	sugar	water
D	water	starch

13 Blood enters the left atrium (left auricle) of the heart through

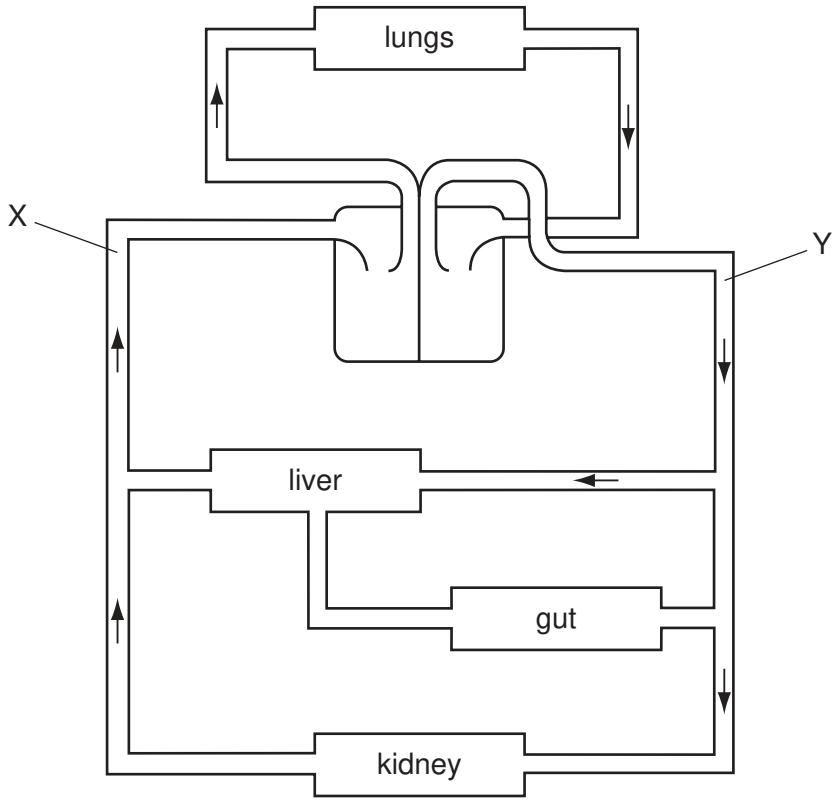
A the aorta.

B the bicuspid valve.

C the posterior vena cava.

D the pulmonary vein.

14 The diagram shows a plan of part of the circulatory system.



Which vessel **must** the blood pass through in flowing from X to Y?

A hepatic artery

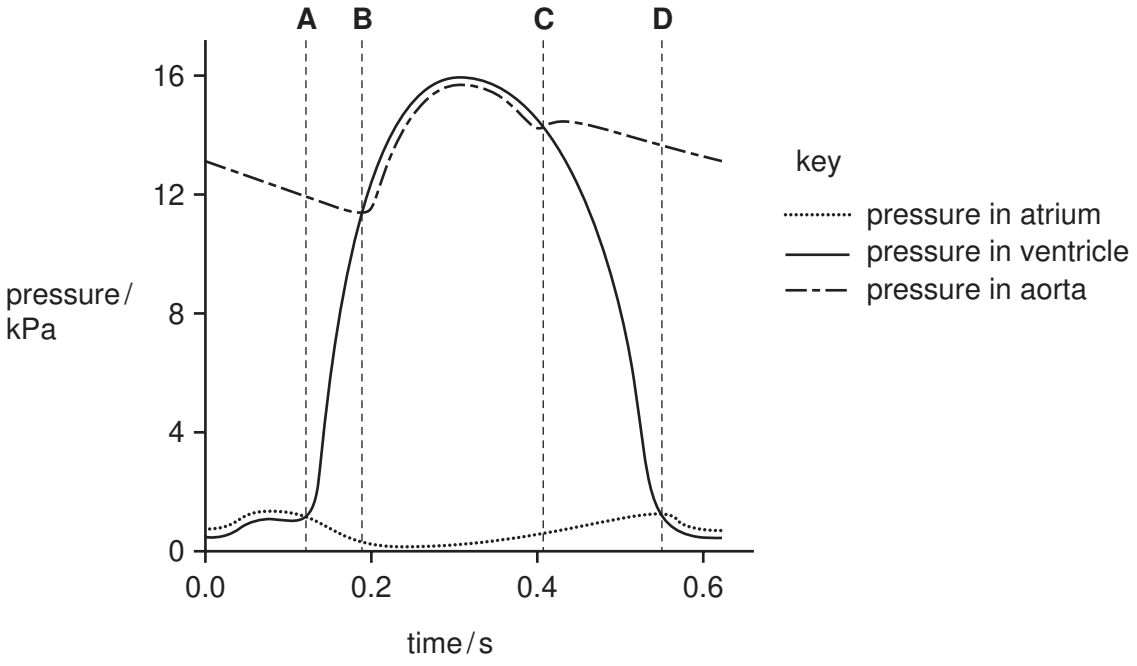
B hepatic portal vein

C pulmonary artery

D renal vein

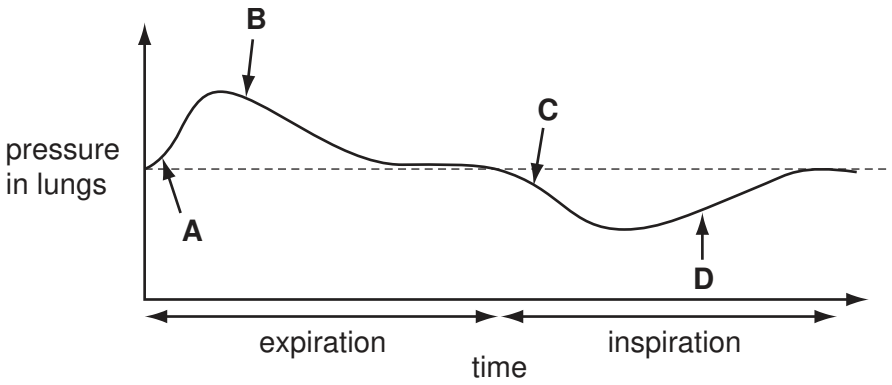
15 The graph shows pressure changes in the left side of the heart, during a single heart beat.

At which point do the semi-lunar valves open?

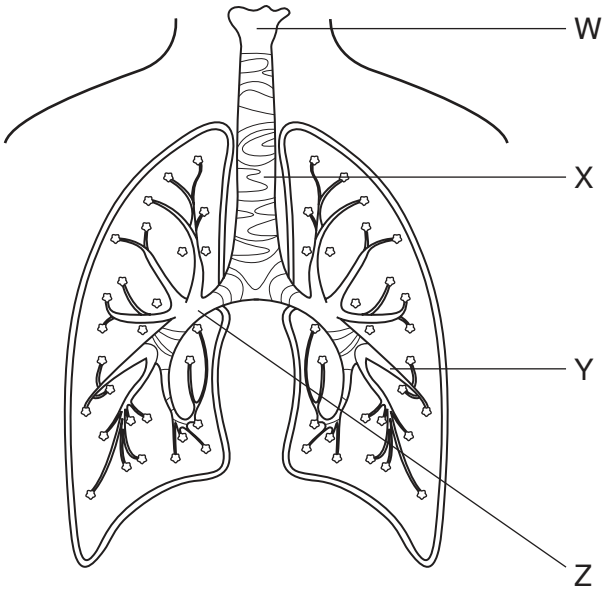


16 The diagram illustrates changes in air pressure taking place inside the lungs during a complete cycle of breathing.

Which position on the graph corresponds to the point at which the ribs are beginning to be raised?



17 The diagram shows part of the human gas exchange system.



What are W, X, Y and Z?

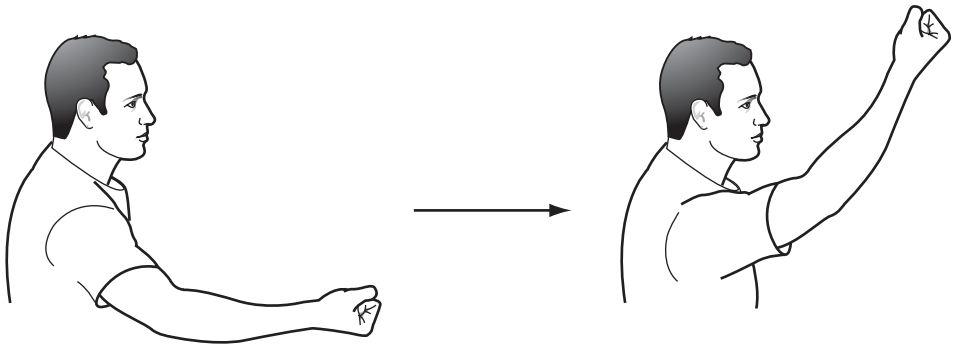
	bronchus	bronchiole	larynx	trachea
A	W	X	Z	Y
B	X	Z	Y	W
C	Y	W	X	Z
D	Z	Y	W	X

18 When breathing out, which changes occur in the volume of the thorax, the rib cage and the diaphragm?

	volume of thorax	rib cage	diaphragm
A	decreases	lowered	rises
B	decreases	raised	pulled down
C	increases	lowered	rises
D	increases	raised	pulled down

[Turn over

19 The diagram shows an arm movement.



Which joint is working to allow this movement?

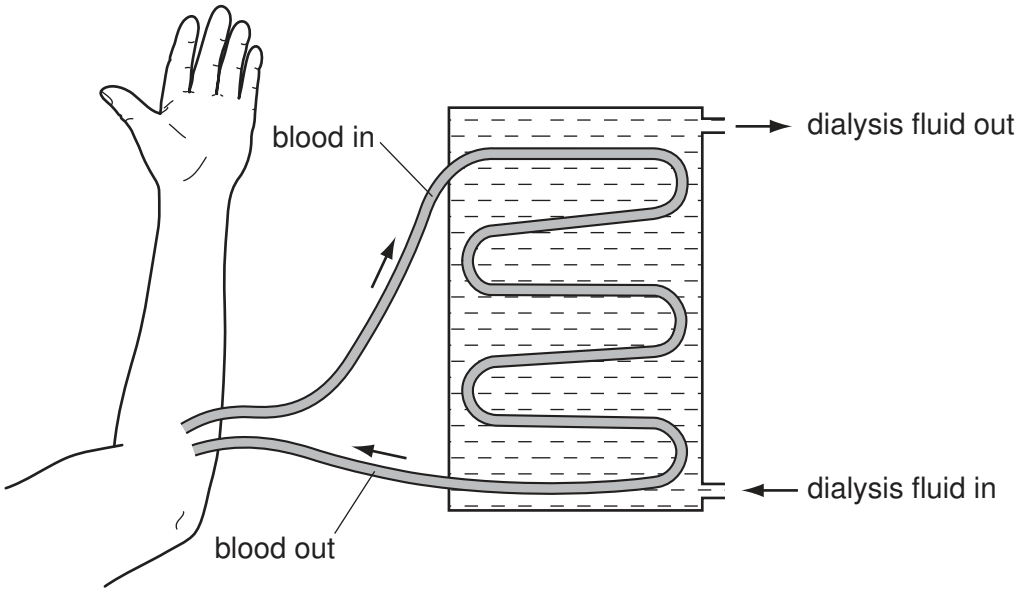
A a ball and socket joint at the elbow

B a ball and socket joint at the shoulder

C a hinge joint at the elbow

D a hinge joint at the shoulder

20 The diagram represents part of a kidney machine.



Which substance must be at the same concentration in the dialysis fluid and in the blood?

A glucose

B salt

C urea

D water

21 When a person moves from a cold room into a hot room, the following responses occur.

1 The brain co-ordinates the response.

2 The skin begins to secrete sweat.

3 Sweat evaporates from the skin surface.

4 Temperature receptors are stimulated in the skin.

What is the correct sequence of events?

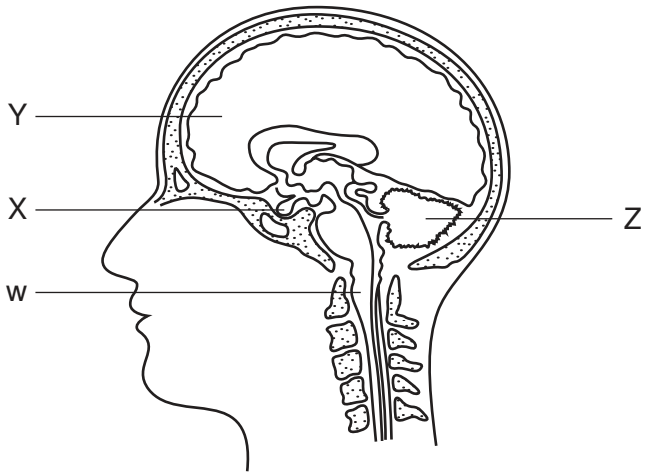
A $3 \rightarrow 4 \rightarrow 1 \rightarrow 2$

B $2 \rightarrow 3 \rightarrow 4 \rightarrow 1$

C $4 \rightarrow 1 \rightarrow 2 \rightarrow 3$

D $1 \rightarrow 4 \rightarrow 2 \rightarrow 3$

22 The diagram is a section through the human head showing the brain and associated structures.



Where are the cerebellum and the pituitary gland?

	cerebellum	pituitary gland
A	W	Z
B	X	Y
C	Y	W
D	Z	X

23 A person is sitting in a dark room.

What happens in the eye when a light is switched on?

	circular muscle of iris	size of pupil
A	contracts	decreases
B	contracts	increases
C	relaxes	decreases
D	relaxes	increases

24 Which disease can be caused by excessive consumption of alcohol?

A bronchitis

B cirrhosis

C emphysema

D lung cancer

25 A patient with a sore throat went to the doctor. The doctor examined the patient and then prescribed an antibiotic as treatment.

What was the cause of the sore throat?

A bacteria

B tobacco smoke

C viruses

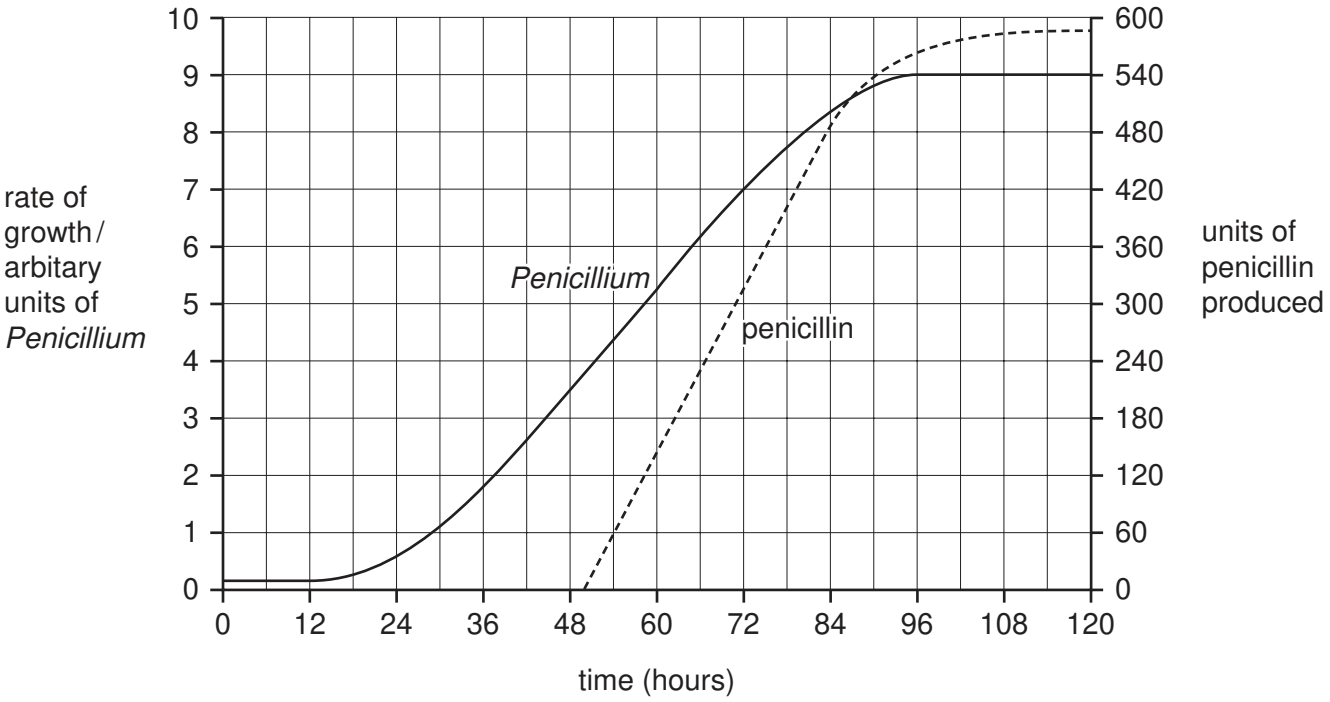
D yeasts

26 Two species of bacteria work together and make yoghurt.

What do they produce?

	ethanol	lactic acid	protease
A	✓	✓	✓
B	✗	✓	✓
C	✓	✗	✓
D	✓	✓	✗

27 The graph shows the rate of growth of the fungus *Penicillium* and the amount of penicillin produced when grown in a fermenter.



After how long should the penicillin be removed from the fermenter to obtain the most yield in the shortest time?

A 54 hours **B** 80 hours **C** 96 hours **D** 120 hours

28 Which situation does **not** involve the cycling of the factor named?

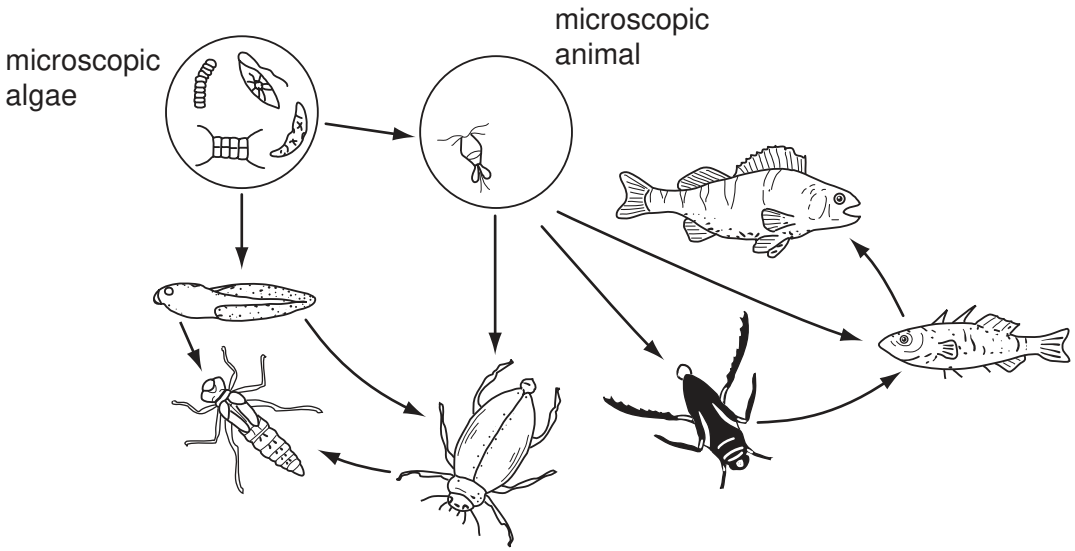
A carbon dioxide between plants, animals and the atmosphere

B energy along a food web of producers and consumers

C nitrogen between plants, animals, bacteria and the atmosphere

D water in an ecosystem

29 The diagram below shows part of a pond food web.

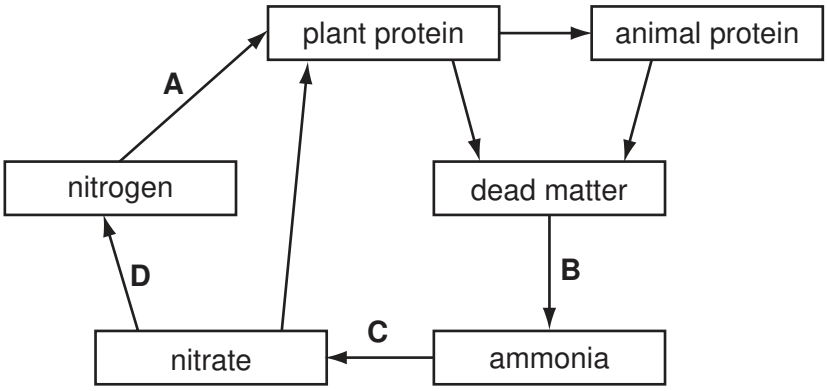


How many primary consumers are shown in this food web?

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

30 The diagram shows part of the nitrogen cycle.

Which stage depends on nitrifying bacteria?



31 What are the roles of the mosquito and the malarial parasite in the spread of malaria?

	mosquito	malarial parasite
A	host	vector
B	pathogen	host
C	pathogen	vector
D	vector	pathogen

32 A farmer sprays some fields with nitrogen fertilizers. Soon afterwards, the fertilizer is washed off by heavy rain into a nearby lake. Then, a few weeks later, most of the organisms in the water die.

The list includes the main stages of this process.

P Light is blocked from deeper water plants.

Q Plants cannot photosynthesise and die.

R Algae multiply rapidly on the lake surface.

S Oxygen levels fall and aerobic organisms die.

T Aerobic bacteria feed on dead plants.

In what order do these stages occur?

A P → R → T → Q → S

B Q → S → P → R → T

C R → P → Q → T → S

D S → T → P → Q → R

33 Male and female sea urchins release their sperm and eggs into the water where fertilisation takes place.

How can their reproduction be described?

A asexual reproduction which results in genetically dissimilar offspring

B asexual reproduction which results in genetically identical offspring

C sexual reproduction which results in genetically dissimilar offspring

D sexual reproduction which results in genetically identical offspring

34 A plant P is pollinated. A seed from this plant develops into plant Q.

The cells of plant Q contain 14 chromosomes.

How many of these chromosomes are identical to chromosomes from plant P?

	if P was self pollinated	if P was cross pollinated
A	7	7
B	7	14
C	14	7
D	14	14

35 What is the sequence of structures through which a mammalian sperm passes after leaving the penis and before fusing with an ovum?

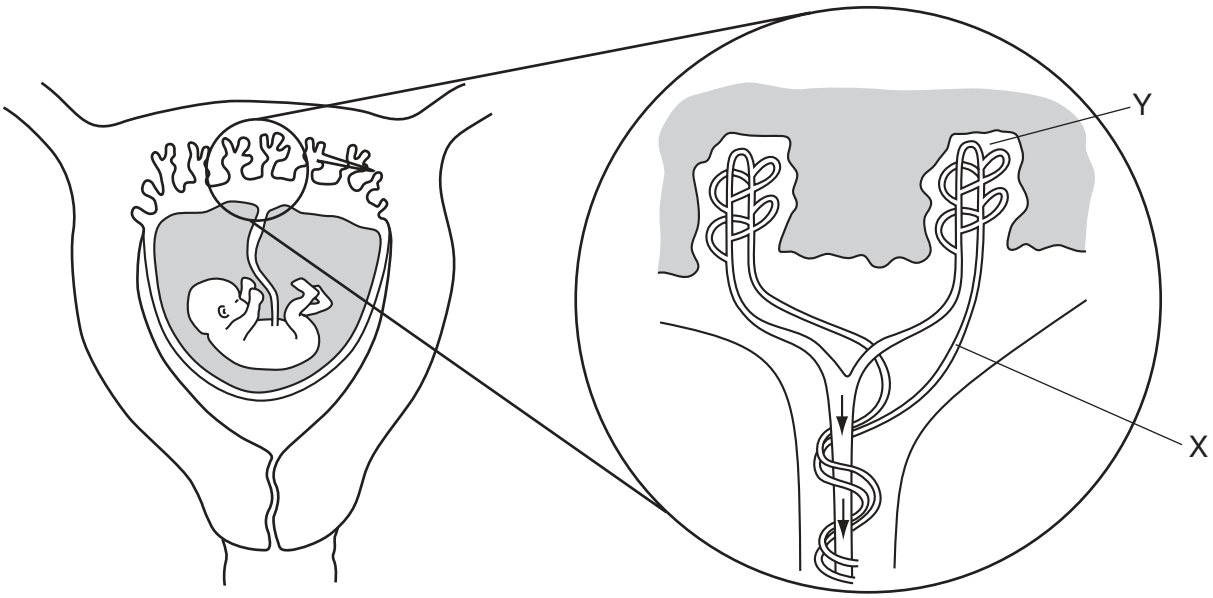
A ureter → uterus→ vagina

B vagina → fallopian tube → ovary

C vagina → urethra → fallopian tube

D vagina → uterus → fallopian tube

36 The diagram shows a fetus in the uterus.



Which substances will be at a higher concentration at Y than at X?

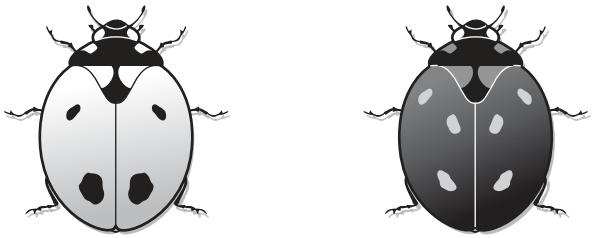
A carbon dioxide and glucose

B carbon dioxide and urea

C glucose and oxygen

D oxygen and urea

37 The diagram shows two distinct forms of beetle. The difference between them is controlled by a single gene. The allele for the black form is dominant to the allele for red.



red form
with black spots

black form
with red spots

What kind of variation is shown by the beetle and why?

A continuous variation because it is controlled by genes

B continuous variation because there are two forms

C discontinuous variation because it is controlled by genes

D discontinuous variation because the two forms are distinct

38 A pregnant woman is told by a genetic counsellor that her baby has equal chances of being blood group A or blood group AB.

What are possible genotypes of the woman and her husband?

A AA and BO

B AB and BO

C AO and BB

D AB and AO

39 Which statement about the genotypes of organisms is correct?

A Dominant alleles are only found in homozygotes.

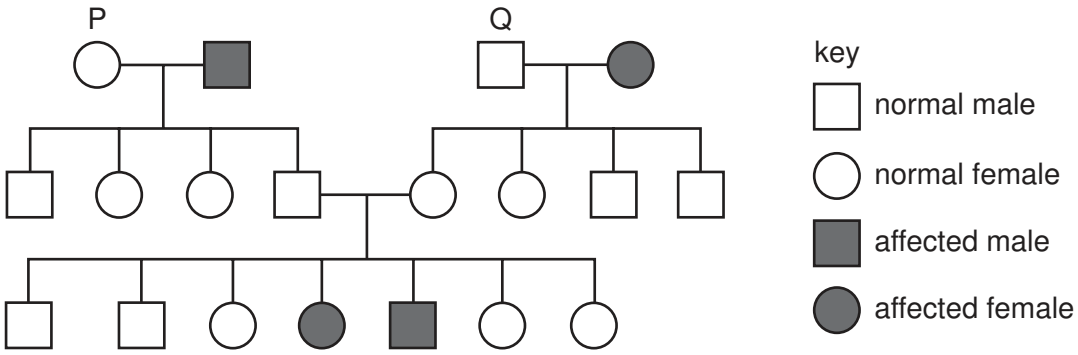
B One recessive allele always causes a recessive phenotype.

C Recessive phenotypes must be homozygous.

D The dominant phenotype must be heterozygous.

[Turn over

40 The diagram shows the inheritance of a recessive characteristic that is controlled by a single pair of alleles, T and t.



T represents the dominant allele and t represents the recessive allele.

What are the most likely genotypes of individuals P and Q?

	P	Q
A	Tt	Tt
B	Tt	TT
C	TT	Tt
D	TT	TT

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