UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

BIOLOGY **5090/11**

Paper 1 Multiple Choice **May/June 2012**

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 **20** printed pages.

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[Turn over

1 What is found in both animal and plant cells?

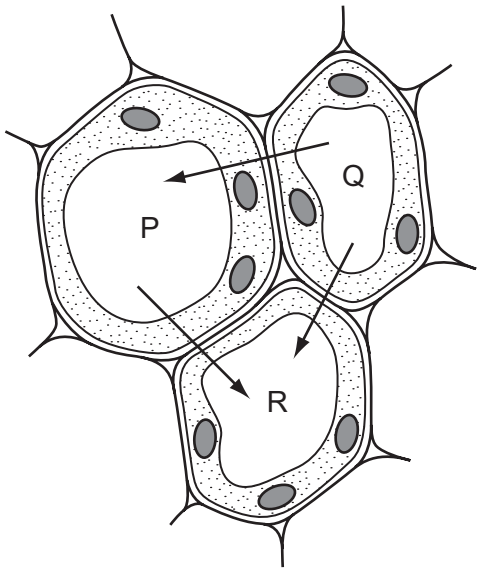
A cellulose cell wall

B chloroplast

C starch grain

D vacuole or vacuoles

2 The diagram shows part of a leaf with three spongy mesophyll cells labelled P, Q and R. The arrows show the direction of water movement by osmosis.

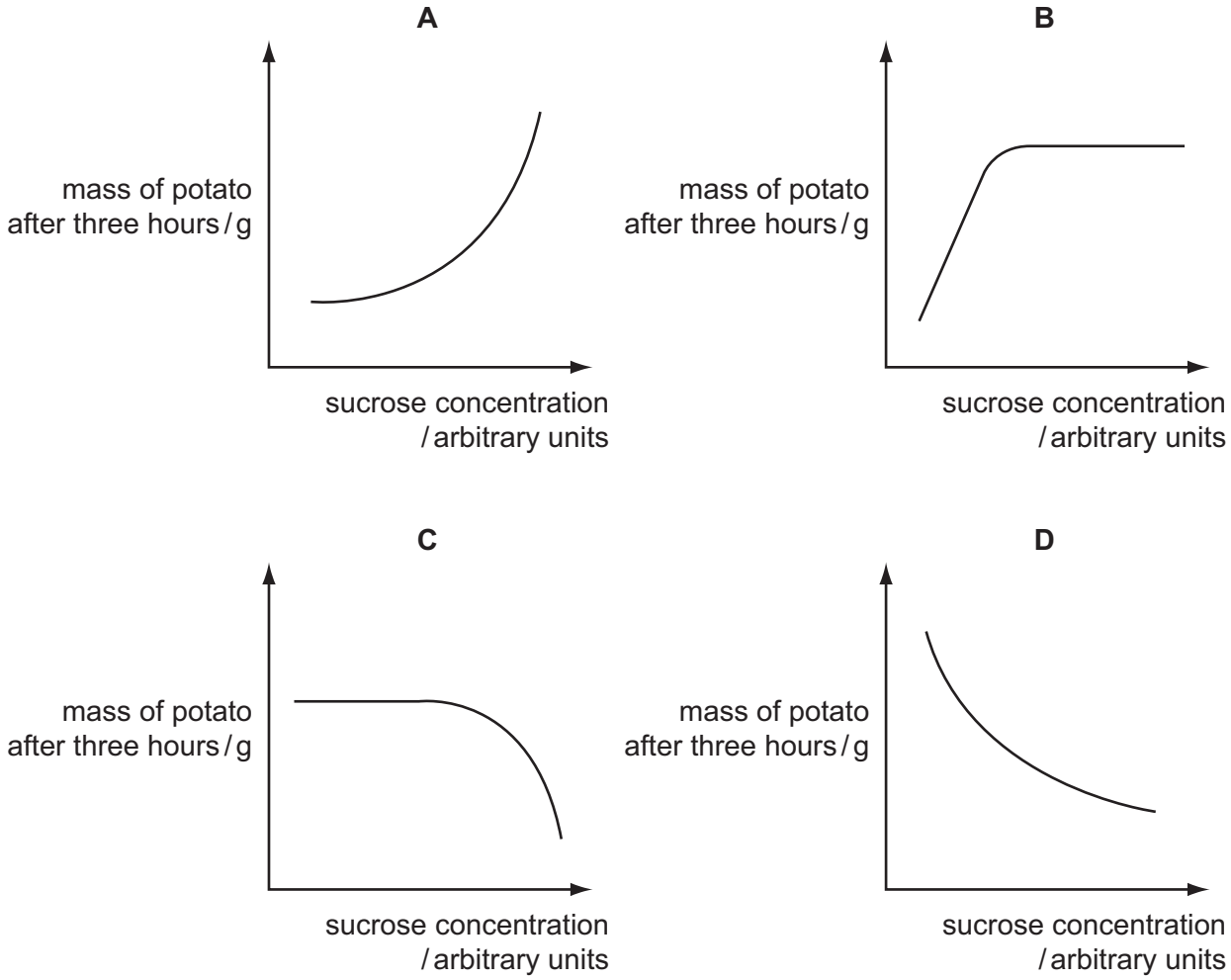


Which is the correct order of water potential in the cells from the highest to the lowest?

	highest	middle	lowest
A	P	Q	R
B	P	R	Q
C	Q	P	R
D	R	P	Q

3 Identical pieces of potato are placed in sucrose solutions of different concentrations. After three hours, the mass of each potato piece is measured.

Which graph shows the results of this experiment?

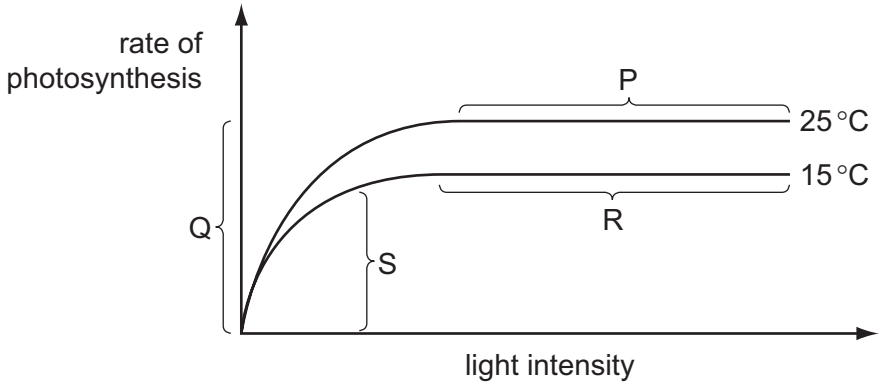


4 Starch is digested to maltose by the enzyme amylase.

According to the 'lock and key' hypothesis, which is the 'key' and which is the 'lock'?

	'key'	'lock'
A	amylase	maltose
B	amylase	starch
C	starch	amylase
D	starch	maltose

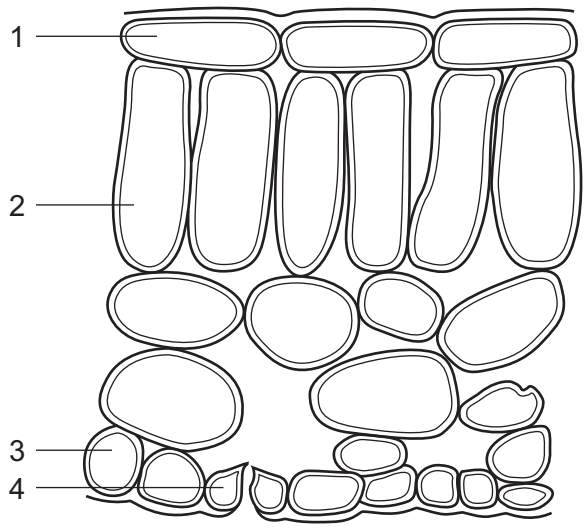
5 The graph shows how the rate of photosynthesis varies with light intensity at two different temperatures. Other variables are kept the same.



In which sections of the graph is light intensity limiting the rate of photosynthesis?

A P and R **B** Q and S **C** R and Q **D** S and P

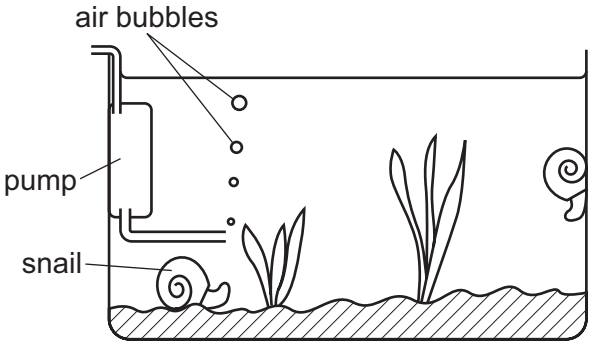
6 The diagram shows cells in a section through a leaf of a green plant.
(No cell contents are shown.)



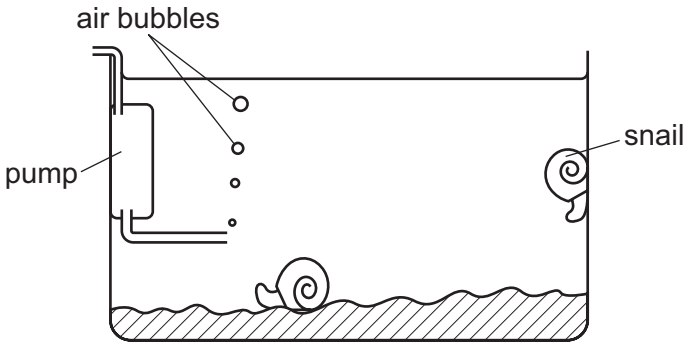
Which cells contain chloroplasts?

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

7 Two aquarium tanks are set up as shown.



tank **X**
contains animals and plants



tank **Y**
contains animals

After a week, all the animals in tank **Y** show signs of distress.

This is because the animals have run out of

A carbon dioxide.

B food.

C nitrate.

D oxygen.

8 Which chemical elements are present in **both** fats and proteins?

A carbon, hydrogen, oxygen and nitrogen

B carbon, hydrogen and oxygen only

C carbon, hydrogen and nitrogen only

D carbon, oxygen and nitrogen only

9 Which two foods would provide the best sources of carbohydrates, calcium, fibre (roughage) and vitamin C?

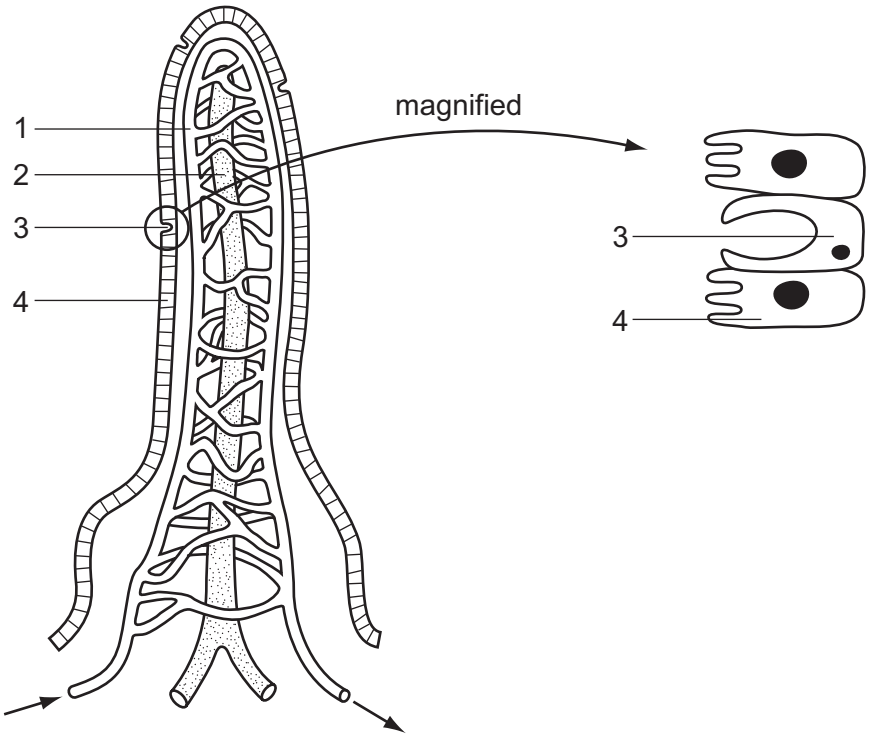
A fish and eggs

B green beans and cereal

C meat and milk

D yoghurt and cheese

10 The diagram shows a section through a villus.



Which sequence correctly describes the functions of the numbered parts?

	1	2	3	4
A	transports digested fats	transports glucose	absorbs digested food	produces mucus
B	transports digested fats	transports glucose	produces mucus	absorbs digested food
C	transports glucose	transports digested fats	absorbs digested food	produces mucus
D	transports glucose	transports digested fats	produces mucus	absorbs digested food

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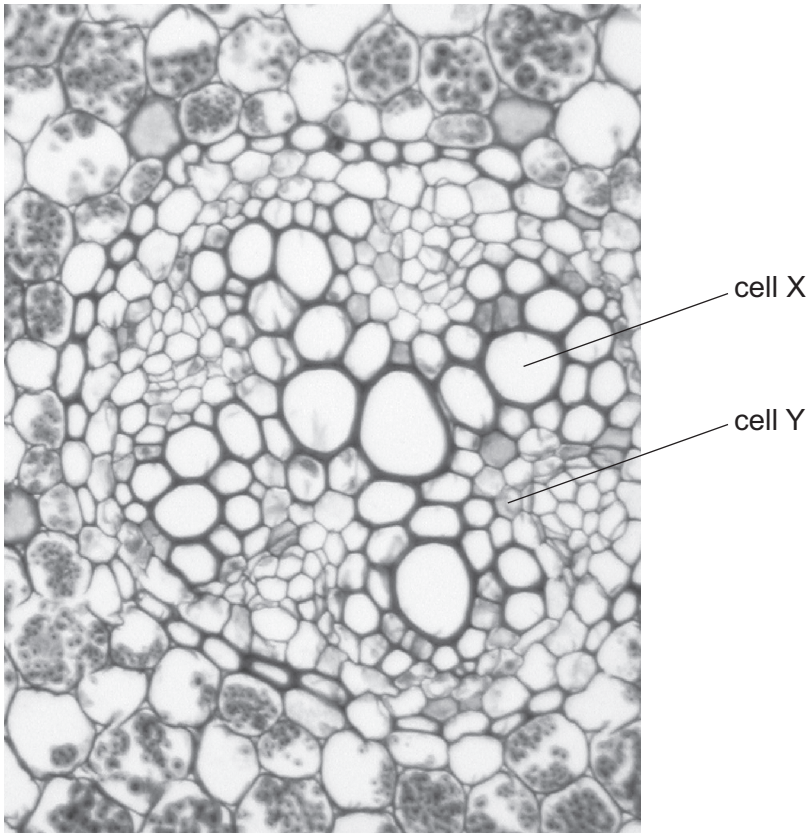
11 The photomicrograph shows part of a section through a stem.



The contents of cell X and the contents of cell Y are each tested with Benedict's reagent and with iodine solution.

What results are expected?

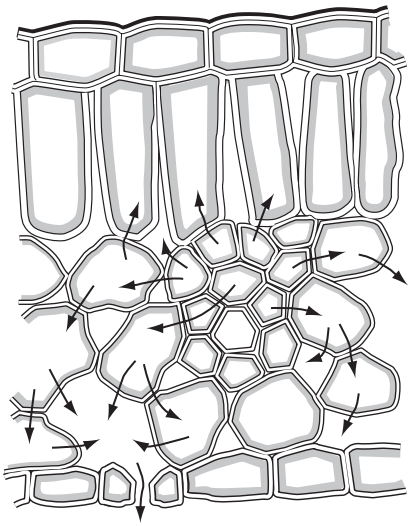
	cell X		cell Y	
	Benedict's reagent	iodine solution	Benedict's reagent	iodine solution
A	+	+	–	–
B	+	–	+	+
C	–	+	–	+
D	–	–	+	–

key

+ = positive result

– = negative result

12 The diagram shows a section through a green leaf.



The arrows represent the movement of

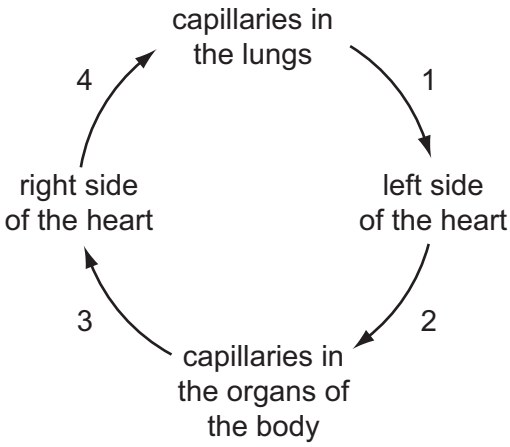
A carbon dioxide during respiration.

B oxygen during photosynthesis.

C sugars during translocation.

D water during transpiration.

13 The diagram shows the direction of blood flow in the human body.



Which numbered stages have blood containing the most oxygen?

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

14 Which row in the table describes the features of the pulmonary vein?

	feature of pulmonary vein		
	blood	lumen	muscle layer
A	deoxygenated	narrow	thin
B	deoxygenated	wide	thick
C	oxygenated	narrow	thick
D	oxygenated	wide	thin

15 Which is a difference between plasma and tissue fluid?

	plasma	tissue fluid
A	less dissolved glucose	more dissolved glucose
B	dissolved glucose	no dissolved glucose
C	more protein molecules	fewer protein molecules
D	no white blood cells	white blood cells

16 What is the equation for anaerobic respiration in yeast?

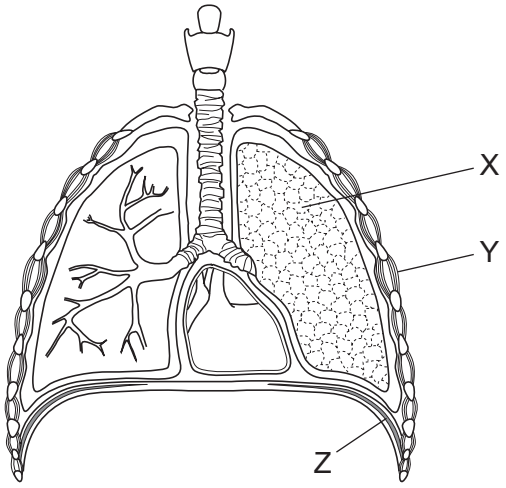
A $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

B $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

C $C_6H_{12}O_6 \rightarrow 2C_3H_6O_3$

D $C_6H_{12}O_6 \rightarrow 2CO_2 + 2C_2H_5OH$

17 The diagram represents the human respiratory system.



Which structures contain muscles that contract when breathing in?

A X only

B X and Y only

C Y and Z only

D X, Y and Z

18 Which process does **not** require energy?

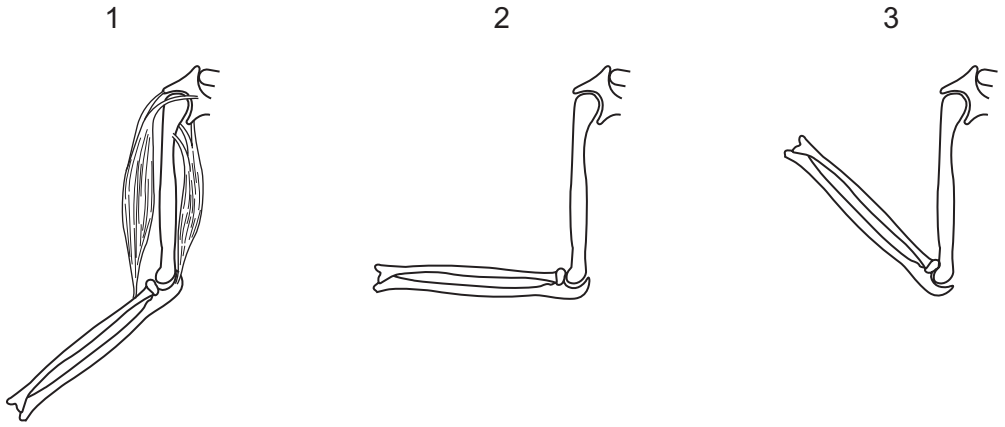
A focussing of eye

B growth of hair

C secretion of sweat

D tissue respiration

19 The diagrams show the positions of the bones of the forearm as it is raised. The muscles which move the bones are only shown in the first diagram.



What is the action of the muscles as the arm moves from the first position to the second and then to the third?

	between 1 and 2		between 2 and 3	
	biceps	triceps	biceps	triceps
A	contracts	contracts	contracts	relaxes
B	contracts	relaxes	contracts	relaxes
C	relaxes	contracts	relaxes	contracts
D	contracts	relaxes	relaxes	relaxes

20 In a kidney machine, protein molecules are not lost from the blood.

How is loss of protein prevented?

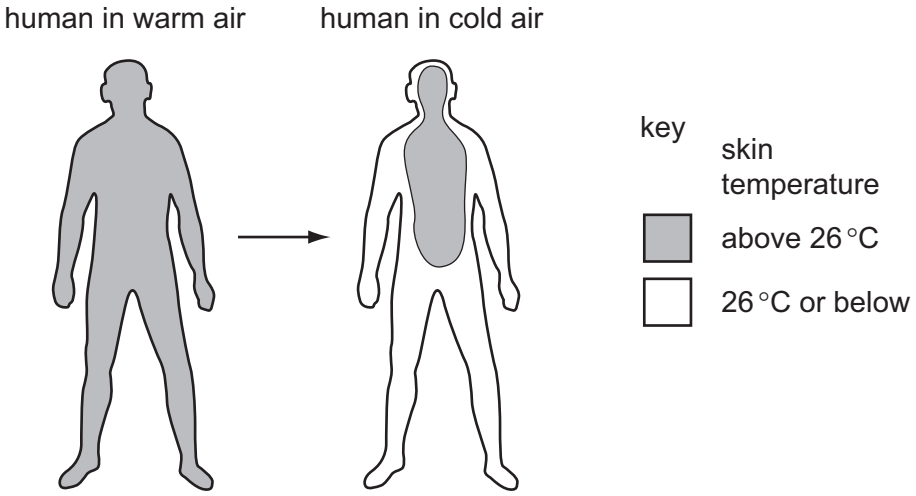
A Membranes prevent protein molecules diffusing out of the blood.

B Proteins are actively transported back into the blood.

C Proteins do not enter the kidney machine.

D The dialysis fluid contains protein, so there is no diffusion gradient.

21 The diagram shows skin temperature of a human when exposed to warm air and then exposed to cold air.



What causes the observed change in skin temperature on exposure to cold air?

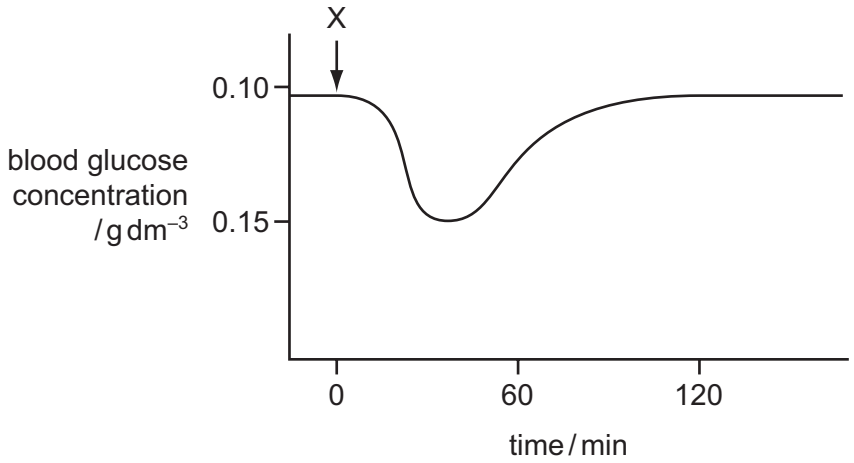
A less blood flowing just below the skin

B less blood going to the heart and lungs

C more blood flowing just below the skin

D more blood going to the heart and lungs

22 The graph shows the changes in blood glucose concentration following the injection of a small amount of a substance into the blood of a person at time X.



Which substance was injected at time X?

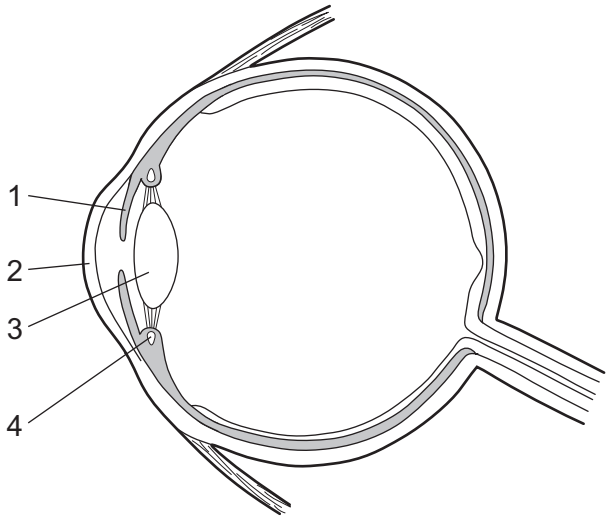
A adrenaline

B insulin

C oestrogen

D penicillin

23 The diagram shows a section through an eye.



Which parts help to focus an image on the retina?

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

24 What happens when the body temperature of a human is controlled?

A body temperature is made more different from environmental temperature

B body temperature is made more different from ideal body temperature

C body temperature is made more similar to environmental temperature

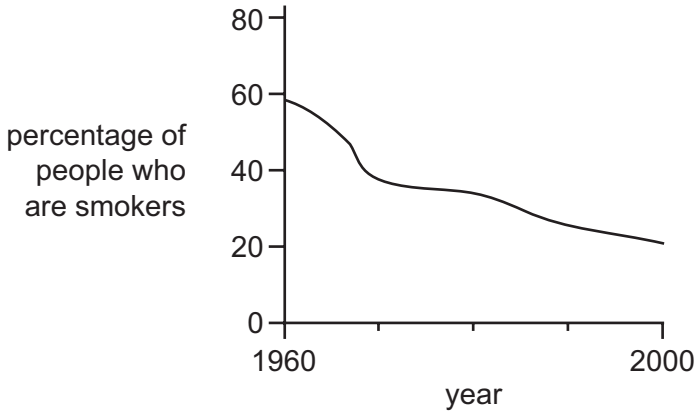
D body temperature is made more similar to ideal body temperature

25 The table shows some of the possible effects of three drugs.

Which combination of effects is correct?

	heroin	carbon monoxide	alcohol
A	addiction	addiction	liver damage
B	addiction	emphysema	increased reaction time
C	depressant	reduced birth weight of babies	increased reaction time
D	depressant	reduced birth weight of babies	lung cancer

26 The graph shows, for one country, the percentage of people who smoked cigarettes in the years 1960–2000.



Which statement about what happened after 1960 is supported by the graph?

A fewer people were dying of lung cancer

B more smokers were dying

C smoking was becoming less socially acceptable

D smoking was causing more lung cancer

27 Which statement describes a problem of using antibiotics?

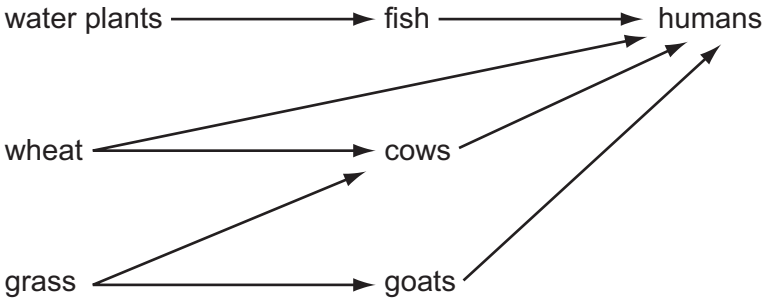
A Antibiotics can cause bacteria to become immune.

B Antibiotics cannot be taken orally.

C Antibiotics have no effect on viruses.

D Antibiotics stimulate the growth of bacteria in the gut.

28 The diagram shows a food web.



What is the energy source for this food web?

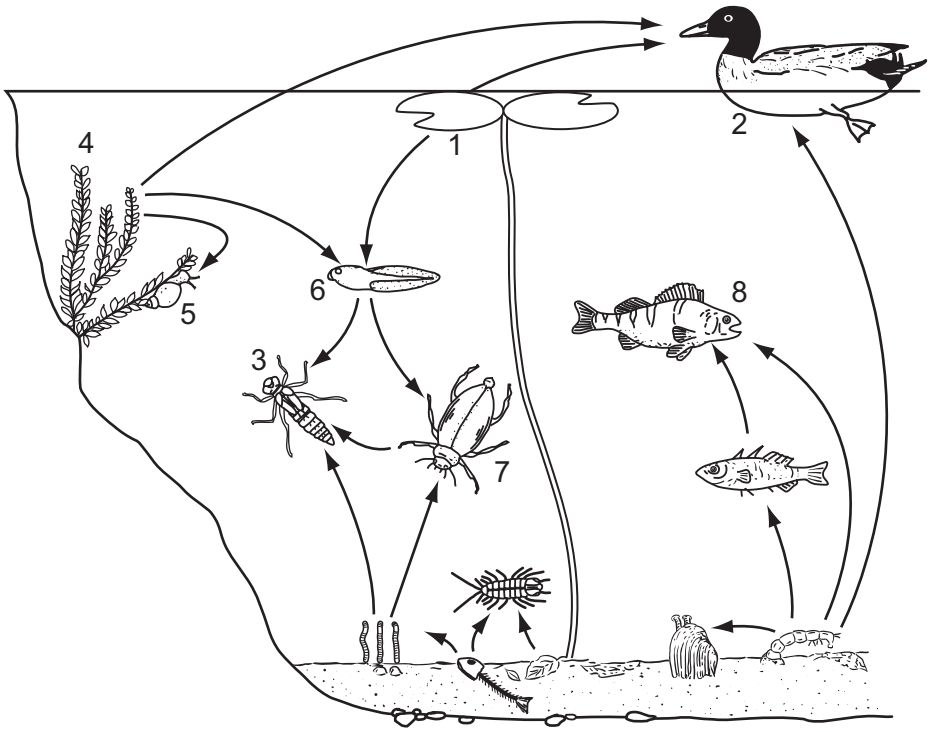
A carbohydrate

B heat

C minerals

D sunlight

29 The diagram shows a food web in a pond.

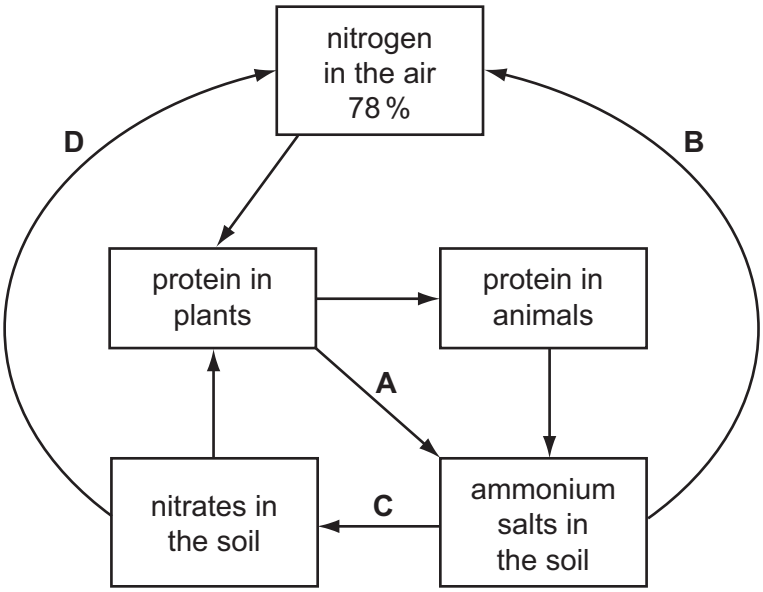


Which of the organisms is a carnivore, which is a herbivore and which is a producer?

	carnivore	herbivore	producer
A	3	8	1
B	7	6	1
C	8	3	4
D	5	2	4

30 The diagram shows part of the nitrogen cycle.

At which stage do bacteria cause decomposition?



31 Which method of control would **not** be effective against the spread of the malarial parasite?

A drainage of swamps and marshes

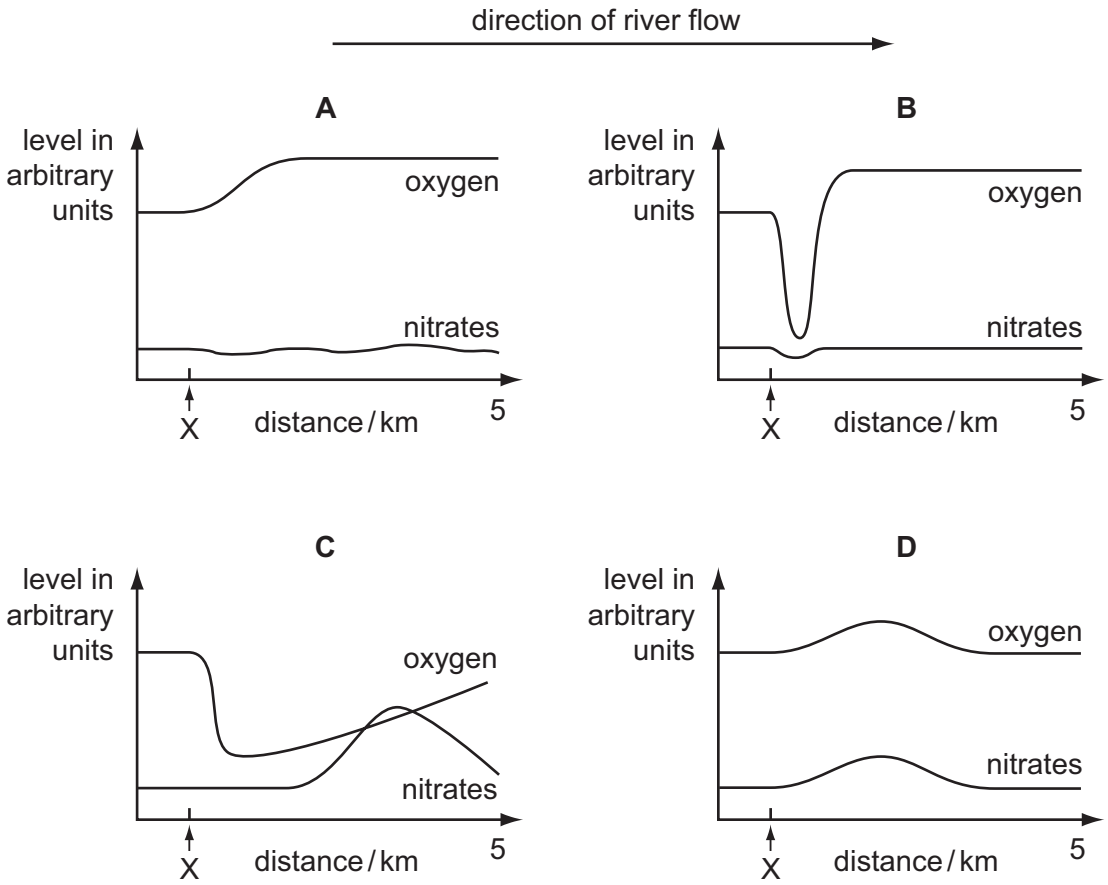
B safe disposal of sewage solids

C sleeping under a mosquito net

D spraying walls of houses with insecticide

32 The graphs show how the levels of dissolved oxygen and nitrates change along the length of a river.

Which graph shows the effect of sewage entering the river at the point marked X?



33 The seeds of some plants will not normally germinate until they have been in the ground for several months.

Some seeds were collected from a plant of this type.

The seeds were divided into three groups.

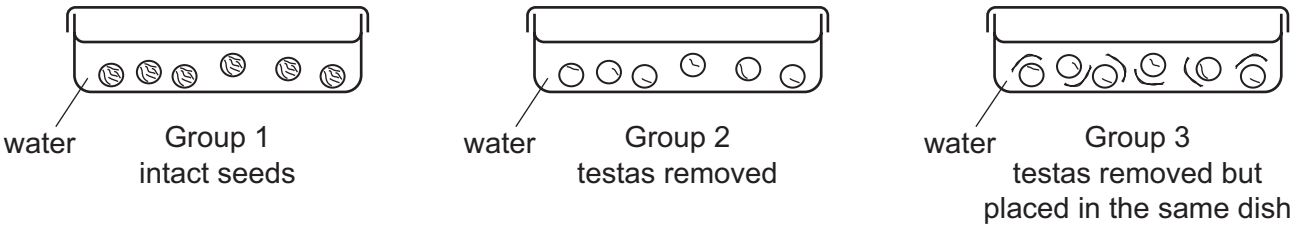
Each group of seeds was put into a shallow dish and covered with water.

The lid that was used was loose fitting so that oxygen could reach the seeds.

Group 1 were intact seeds.

Group 2 were seeds from which the testas had been removed.

Group 3 were seeds from which the testas had been removed, but the testas were placed separately in the same dish.



Only the seeds in Group 2 germinated.

What would be the most logical extension of this experiment?

A Change the water of the seeds in group 1 every day to see if they germinate.

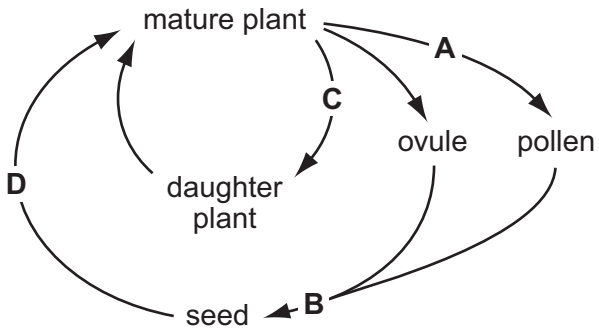
B Compare the germination of aerated seeds with an unaerated control group.

C Repeat the experiment at several different temperatures.

D Repeat the experiment using different species of seed.

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

During which stage does meiosis (reduction division) occur?



35 Which disease is first recognised by painless ulcers which can be anywhere on the body?

A anaemia

B rickets

C scurvy

D syphilis

36 In the female reproductive cycle, which sequence of events could occur in 28 days?

A fertilisation → ovulation → implantation

B implantation → ovulation → fertilisation

C menstruation → ovulation → fertilisation

D ovulation → fertilisation → menstruation

37 Bacteria can be genetically engineered to produce human insulin by adding a human insulin gene to the bacterial DNA.

An advantage of this procedure is that

A the bacteria do not need a source of glucose.

B the bacteria grow faster than before being engineered.

C the insulin does not need to be purified before being injected into a patient.

D the insulin is unlikely to cause an immune response when injected into a patient.

38 A person has blood group A.

Which statement about his genotype is correct?

A At least one of his alleles is dominant.

B He must be heterozygous.

C He must be homozygous.

D His alleles are codominant.

39 In fruit flies, the allele for an ebony coloured body is recessive to the allele for a grey coloured body. In an investigation, an ebony-bodied fly was crossed with a grey-bodied fly.

What will be the body colour of the offspring if the grey-bodied fly was heterozygous?

A all ebony

B all grey

C half ebony and half grey

D three-quarters grey and one-quarter ebony

40 Which statement about dominant and recessive alleles is **not** correct?

A A dominant characteristic is seen in the phenotype of a heterozygote.

B A homozygous genotype may be either dominant or recessive.

C Recessive phenotypes always have two recessive alleles.

D The phenotype of a homozygote is always dominant.

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