UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

BIOLOGY **5090/12**

Paper 1 Multiple Choice **October/November 2012**

1 hour

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

* 4 9 0 0 3 8 4 2 9 3 *

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.

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1 Some processes which occur in flowering plants are listed.

1 ion uptake by roots hairs

2 water uptake by root hairs

3 ion movement up the xylem in the stem

4 water vapour loss by the mesophyll cells of the leaves

Which processes are controlled by cell surface membranes?

A 1 only

B 1 and 3

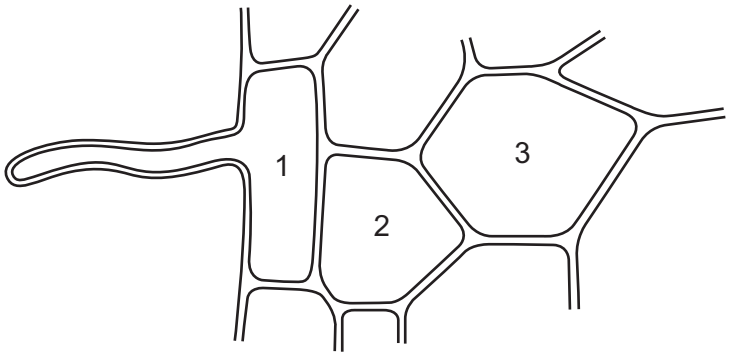
C 2 only

D 3 and 4

2 Through which organs do carbon dioxide molecules, magnesium ions and nitrate ions enter plants?

	carbon dioxide molecules	magnesium ions	nitrate ions
A	leaves	roots	leaves
B	leaves	roots	roots
C	roots	leaves	leaves
D	roots	leaves	roots

3 The diagram shows some cells in the root of a plant that is absorbing water from the soil.



How does the water potential of the cell marked 2 differ from the water potentials of the cells marked 1 and 3?

A higher than cell 1 and cell 3

B higher than cell 1 and lower than cell 3

C lower than cell 1 and higher than cell 3

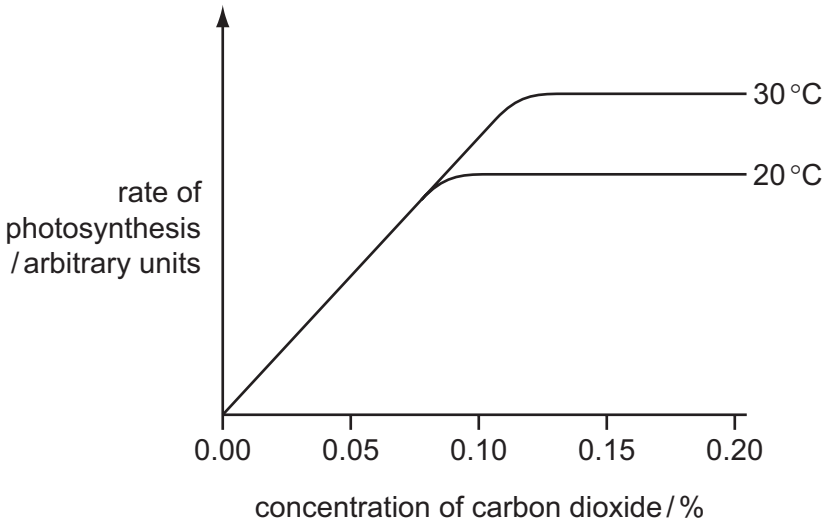
D lower than cell 1 and lower than cell 3

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4 According to the lock and key hypothesis, which is the lock and which is the key for the enzyme lipase?

	key	lock
A	fatty acids	lipids
B	lipase	lipids
C	lipase	fatty acids
D	lipids	lipase

5 The graph shows the rate of photosynthesis in a plant in full sunlight at two different temperatures and different concentrations of carbon dioxide.



At normal atmospheric carbon dioxide concentrations, what limits the rate of photosynthesis?

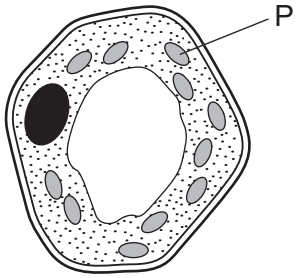
A carbon dioxide concentration

B light intensity

C temperature

D water availability

6 The diagram shows a plant cell.



Compared with the rest of the cell, which row describes the concentrations of oxygen and magnesium inside structure P during the daytime?

	oxygen	magnesium
A	high	high
B	high	low
C	low	high
D	low	low

7 For which processes do plants need either nitrate ions or magnesium ions?

	synthesis of cellulose	synthesis of chlorophyll	synthesis of proteins
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✗
D	✗	✓	✓

key

✓ = nitrate ions or magnesium ions needed

✗ = nitrate ions or magnesium ions not needed

8 A person tries eating a diet consisting only of lettuce leaves and water.

Which condition might develop?

A constipation

B heart disease

C rickets

D scurvy

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9 When a person eats some egg white, protein and water enter the stomach. Which substances are found leaving the stomach and leaving the small intestine?

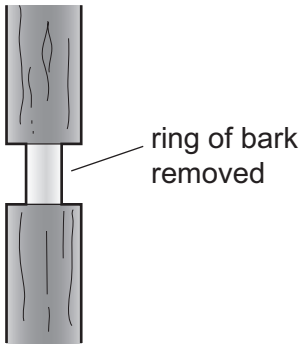
	leaving the stomach	leaving the small intestine
A	amino acids and water	amino acids and water
B	fatty acids, glycerol and water	fatty acids, glycerol and water
C	protein and water	fatty acids and glycerol
D	protein, amino acids and water	water

10 The table shows the compositions of four foods.

Which food provides the most energy per gram?

	carbohydrate %	fat %	protein %	water %
A	1	16	28	55
B	2	83	2	13
C	5	4	3	88
D	25	20	23	35

11 The diagram shows a tree trunk, with a ring of bark, which includes the phloem, removed.



The tree will eventually die because this action cuts off the supply of

A mineral salts to the leaves.

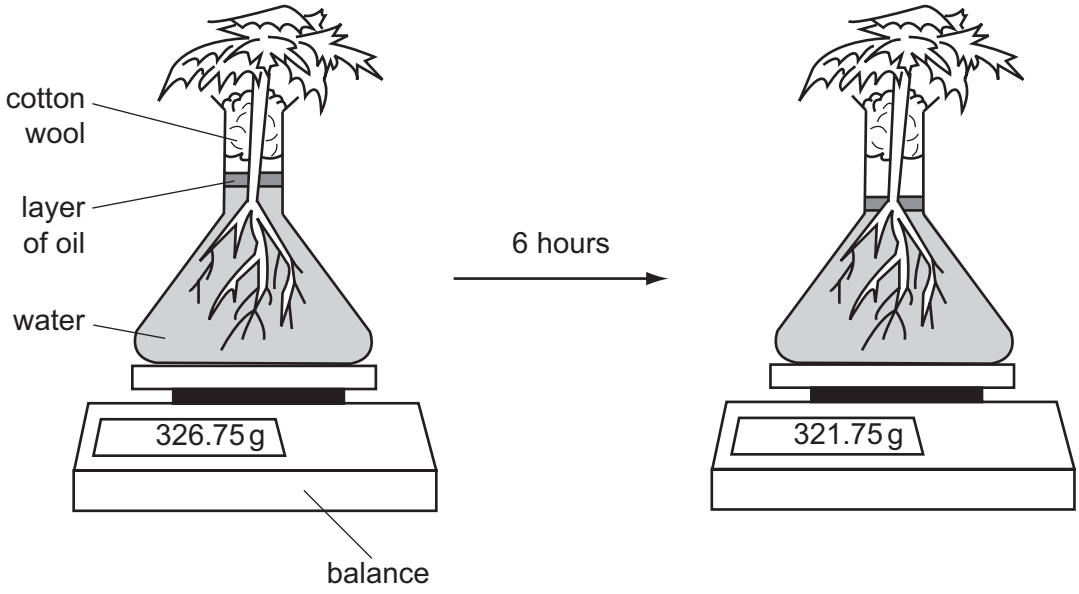
B organic nutrients to the roots.

C oxygen to the roots.

D water to the leaves.

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12 The diagrams show a plant in a flask of water. It is left in the light at 16 °C for six hours.



What explains the change in mass after six hours?

A absorption of water into the root hairs

B evaporation of water from the flask

C photosynthesis in the leaves of the plant

D transpiration from the leaves of the plant

13 In the human circulatory system, what causes the transfer of materials from the capillaries to the tissue fluid?

A active transport

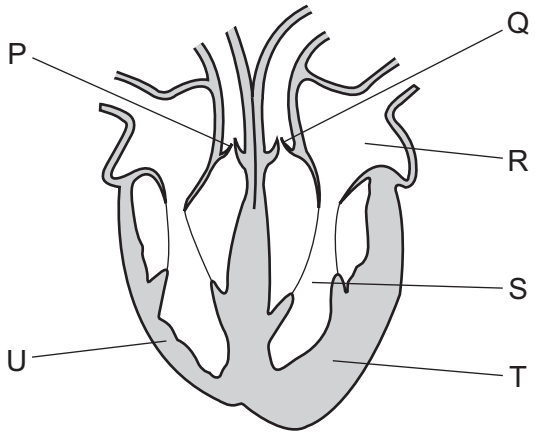
B blood pressure

C capillarity

D osmosis

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14 The diagram shows a section through the human heart.



Which labelled features suggest that blood leaves the heart at different pressures, when going to the lungs and to the body?

A Chambers R and S have different volumes.

B The walls of the atria are thinner than the walls of the ventricles.

C Valve P is stronger than valve Q.

D Wall T is more muscular than wall U.

15 Which blood vessel carries blood with the highest concentration of urea?

A hepatic artery

B hepatic vein

C renal artery

D renal vein

16 The table shows the percentage composition of four samples of air.

Which sample has been breathed out by a person?

	oxygen	carbon dioxide	water vapour
A	16	0.3	saturated
B	16	4	saturated
C	21	0.03	trace
D	21	3	trace

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[Turn over

17 What properties make the alveoli walls efficient at gas exchange?

	elastic tissue in walls	equal oxygen concentrations inside and out	walls one cell thick
A	✓	✓	✗
B	✓	✓	✓
C	✓	✗	✓
D	✗	✓	✓

18 What are the products of anaerobic respiration in muscle?

	alcohol	carbon dioxide	glucose	lactic acid	water
A	✓	✓	✓	✗	✗
B	✗	✓	✗	✓	✓
C	✓	✗	✓	✗	✓
D	✗	✗	✗	✓	✗

19 What is **not** an excretory product of mammals?

A carbon dioxide in expired air

B undigested food in faeces

C urea in sweat

D urea in urine

20 Which process is **not** a result of negative feedback?

A A decrease in the surrounding temperature leads to a decrease in respiration rate.

B A decrease in the surrounding temperature leads to a decrease in sweating.

C A decrease in the surrounding temperature leads to a decrease in blood flow through the skin surface.

D A decrease in the surrounding temperature leads to shivering.

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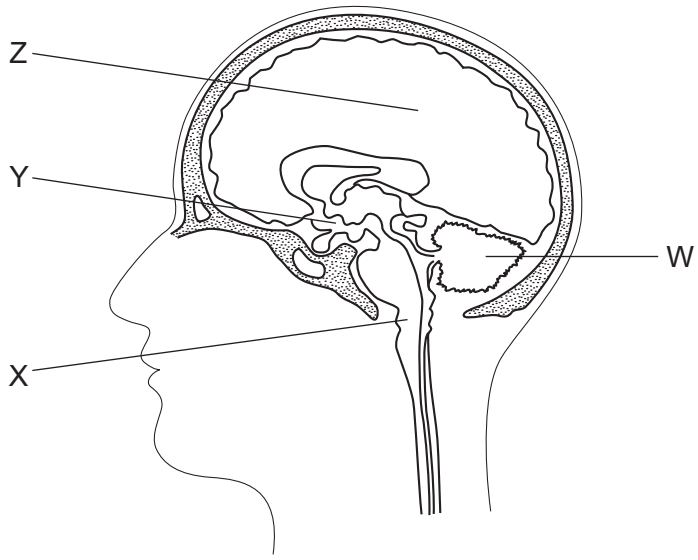
21 Three directions in which nerve impulses in neurones can travel in the nervous system are listed.

1 away from the central nervous system
2 towards the central nervous system
3 within the central nervous system

In which direction do impulses in sensory and relay (intermediate) neurones travel?

	sensory neurone	relay neurone
A	1	2
B	1	3
C	2	1
D	2	3

22 The diagram shows a section through the brain.



Which regions control balance, breathing and memory?

	balance	breathing rate	memory
A	W	X	Z
B	X	Y	Z
C	Y	Z	W
D	Z	W	Y

23 How do the biceps and triceps muscles work to straighten the arm?

A The biceps contracts and the triceps contracts.

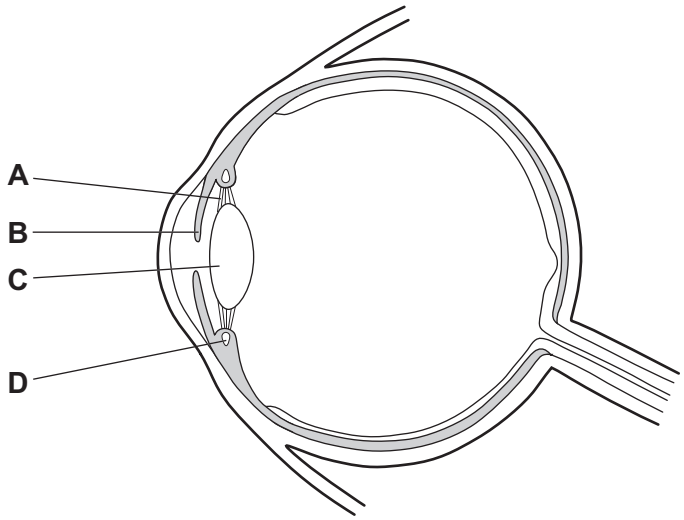
B The biceps contracts and the triceps relaxes.

C The biceps relaxes and the triceps contracts.

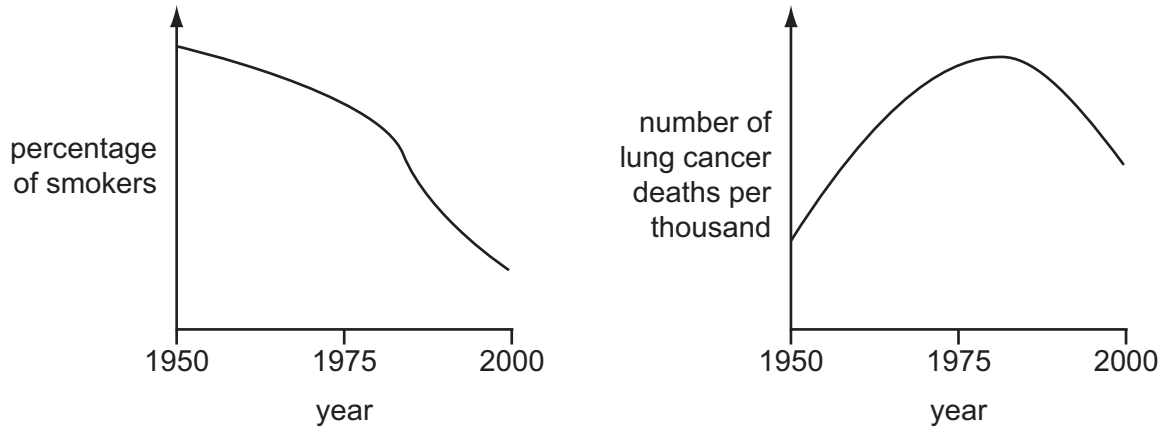
D The biceps relaxes and the triceps relaxes.

24 The diagram shows a section through a human eye.

Which structure contains muscle fibres that contract in response to sudden changes in light intensity?



25 The graphs show changes in percentage of smokers and number of lung cancer deaths in a country between 1950 and 2000.



What could have caused the change in the number of deaths from lung cancer between 1950 and 1975?

A lower percentage of smokers before 1950

B lower percentage of smokers after 1950

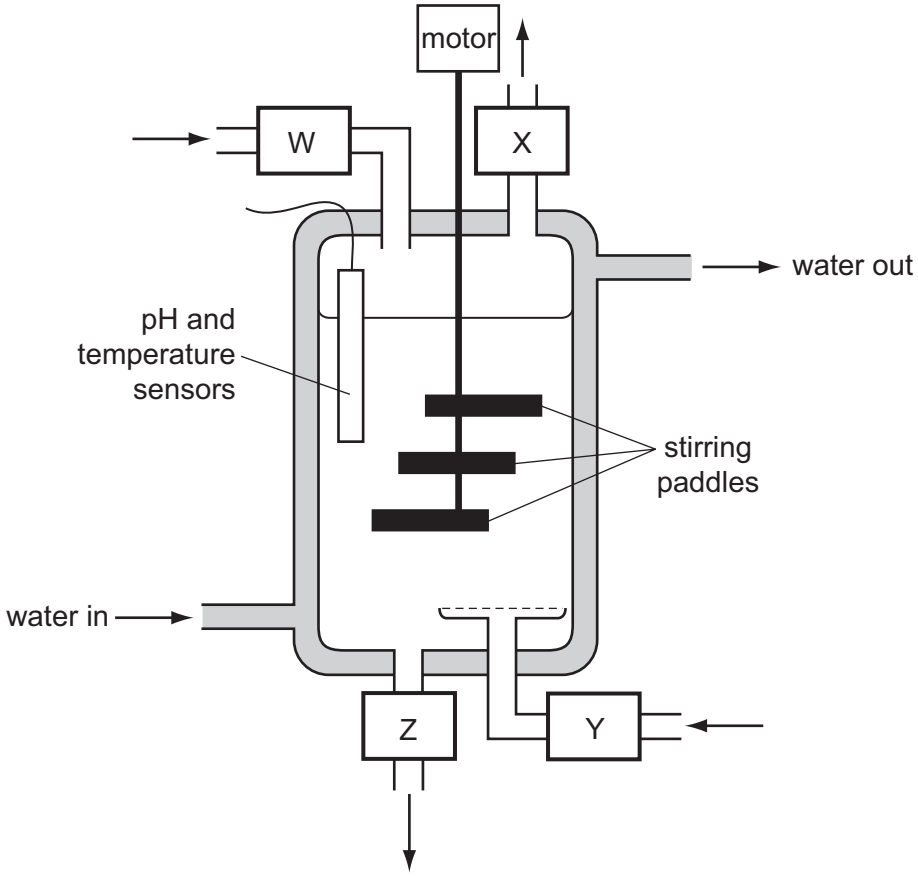
C higher percentage of smokers before 1950

D higher percentage of smokers after 1950

26 Which muscles contract when breathing out powerfully, such as when playing the trumpet?

	diaphragm	external intercostals	internal intercostals
A	no	no	yes
B	no	yes	no
C	yes	no	yes
D	yes	yes	no

27 The diagram shows a fermenter used for the production of antibiotics.

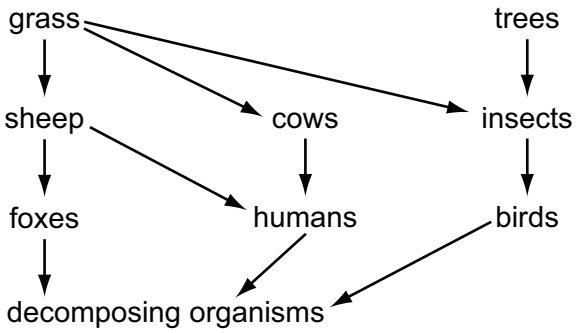


Where do air and nutrients enter, and where do antibiotics and waste leave?

	air in	antibiotics out	nutrients in	wastes out
A	W	X	Y	Z
B	Y	Z	W	X
C	Y	X	W	Z
D	W	Z	Y	X

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28 The diagram shows part of a food web.



What is the original source of energy for this food web?

A decomposer organisms

B light

C oxygen

D producer organisms

29 The presence of high concentrations of nitrogen-containing fertilisers in a pond can lead to the death of fish.

What is the sequence of events leading to the death of the fish?

A increase in algae → algae die → increase in bacteria → drop in oxygen

B increase in algae → drop in oxygen → increase in bacteria → algae die

C increase in bacteria → drop in oxygen → increase in algae → algae die

D increase in bacteria → increase in algae → algae die → drop in oxygen

30 Nitrogen is cycled in ecosystems. In what form is most of the nitrogen in animals?

A amino acid

B nitrogen gas

C proteins

D urea

31 To transmit malaria in the human population, how many times **must** a mosquito feed on human blood?

A only once

B twice

C three times

D more than three times

32 What is correct for the organisms at the beginning of every food chain?

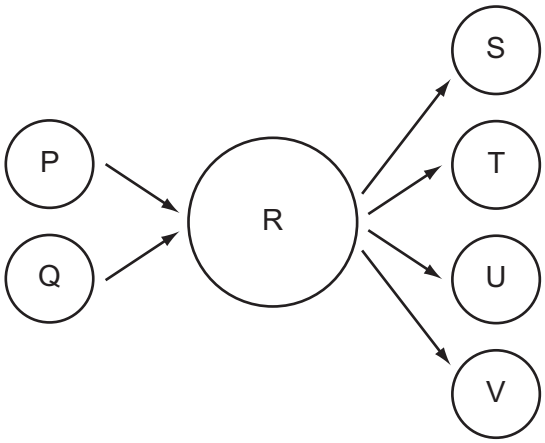
A They cause decay and provide minerals for the ecosystem.

B They feed on animals and recycle energy.

C They feed on plants and provide food for animals.

D They absorb nutrients and photosynthesise.

33 The diagram represents gametes P and Q fusing to give cell R. Cell R then produces gametes S, T, U and V.



Which statement about the numbers of chromosomes in the cells and gametes is correct?

A The numbers of chromosomes in P and Q are different.

B The numbers of chromosomes in P and S are the same.

C The number of chromosomes in S is one quarter of the number of chromosomes in R.

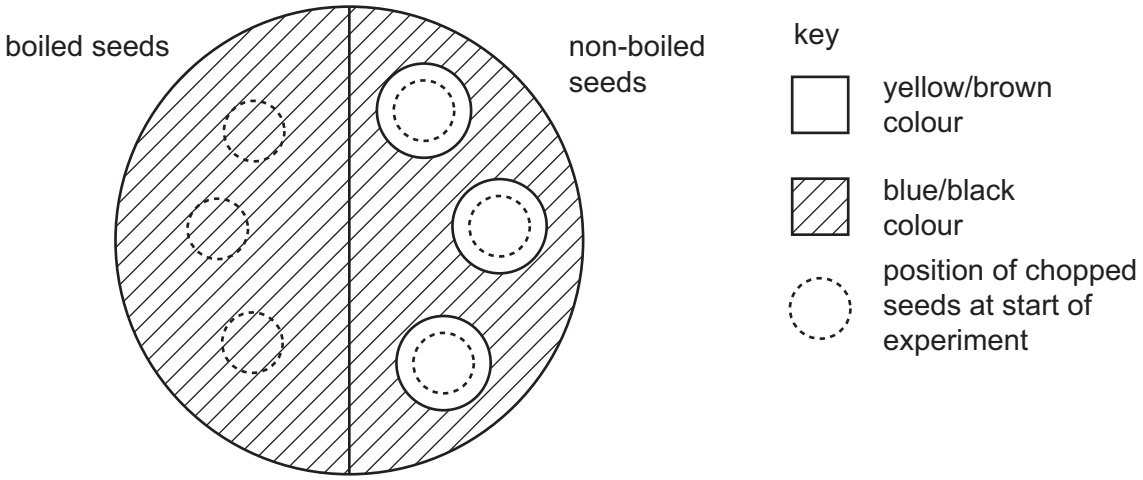
D The number of chromosomes in T is half the number of chromosomes in Q.

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34 Six bean seeds were soaked in cold water. Three of them were boiled and cooled. The boiled and the non-boiled seeds were chopped up and then placed on the surface of agar jelly containing starch.

After two days, all the seeds were removed and the jelly was tested with iodine solution.

The diagram shows the result of the experiment.



What is the explanation for the results with the non-boiled bean seeds?

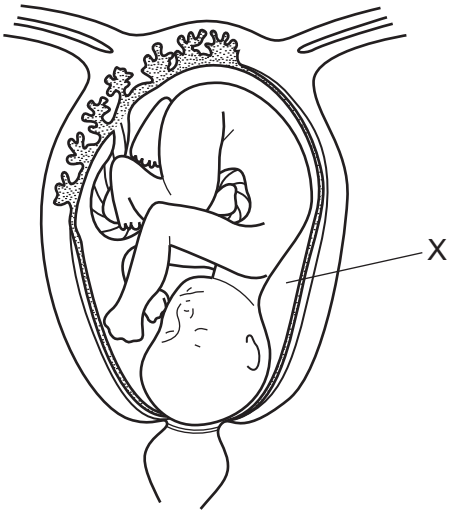
A They absorb iodine.

B They absorb starch.

C They contain acid.

D They contain amylase.

35 The diagram shows a developing fetus in the uterus.



What is the liquid at X called?

A amniotic fluid

B blood

C urine

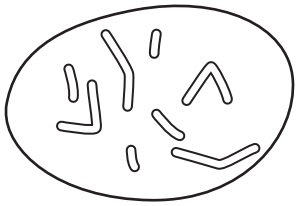
D water

36 Which statement correctly describes how a method of birth control works?

	method	mechanism
A	chemical	prevents eggs from passing down the fallopian tubes
B	hormonal	paralyses sperm after ejaculation
C	mechanical	inserts a barrier between egg and sperm
D	surgical	cuts the urethra so no sperm can emerge

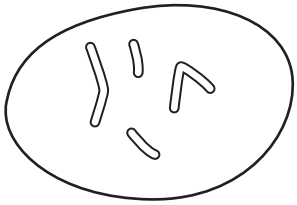
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37 The diagram shows the chromosomes in the nucleus of a cell that divides by mitosis.

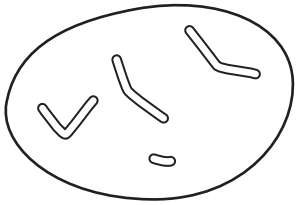


Which diagram shows the chromosomes in the nucleus of one of the daughter cells produced?

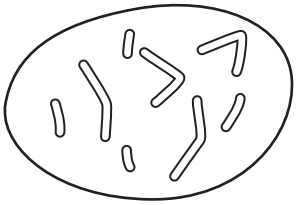
A



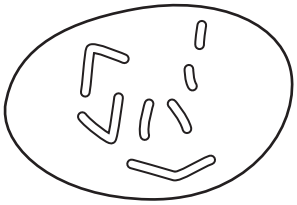
B



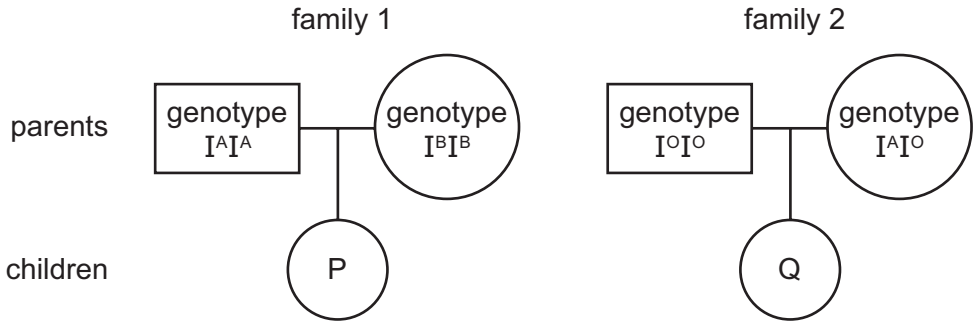
C



D



38 The diagram shows inheritance of blood groups in two different families.



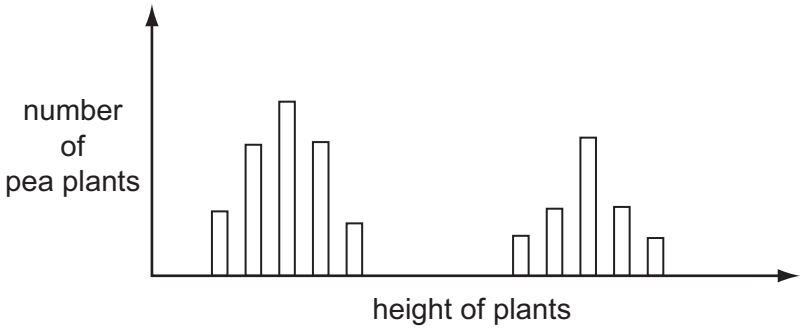
For each of P and Q, what is the probability that they have a co-dominant genotype?

	P	Q
A	0.0	1.0
B	0.5	1.0
C	1.0	0.0
D	1.0	0.5

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[Turn over

39 The bar chart shows the heights of pea plants grown from 500 pea seeds.



What variation do the plants show?

A continuous variation only

B discontinuous variation only

C both continuous variation and discontinuous variation

D neither continuous variation nor discontinuous variation

40 A man of blood group A, and his wife of blood group O, had two children, both of blood group A. The man concluded that he must be homozygous for the allele I^A, since he thought half his children would be of group O if he were heterozygous.

Why was his conclusion unsound?

A Blood group mutations are common.

B Genetic ratios are unreliable for small numbers.

C His wife might have been heterozygous.

D The expected ratio for a heterozygous father and group O mother is 3 group A: 1 group O.

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