MINISTRY OF EDUCATION, SINGAPORE
in collaboration with
CAMBRIDGE ASSESSMENT INTERNATIONAL EDUCATION
General Certificate of Education Ordinary Level

BIOLOGY 6093/01

Paper 1 Multiple Choice **For examination from 2024**

SPECIMEN PAPER

1 hour

Additional Materials: Multiple Choice Answer Sheet

0123456789

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and index number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE ON ANY BARCODES.

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.
The use of an approved scientific calculator is expected, where appropriate.

This document consists of **20** printed pages.

Singapore Examinations and Assessment Board

Cambridge Assessment International Education

1 Which structure is found **only** in plant cells?

A cell membrane

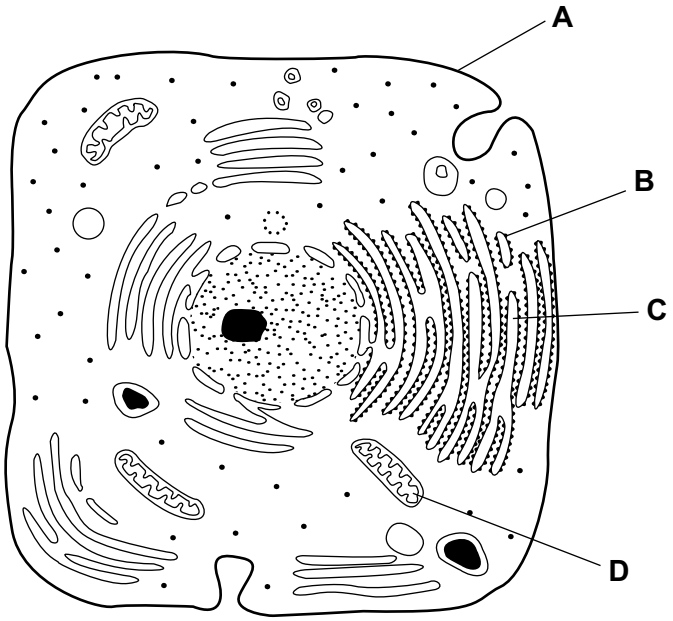
B endoplasmic reticulum

C Golgi body

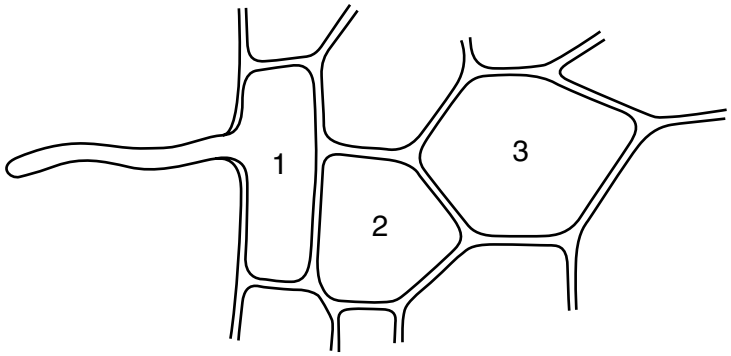
D large vacuole

2 The diagram shows a drawing of an electron micrograph of an animal cell.

Which labelled structure is the site of protein synthesis?



3 The diagram shows some cells in a root of an actively growing plant. The root is growing in soil with poor nutrient content.



How does the water potential of cell 2 differ from the water potential of cell 3 **and** how do mineral ions mainly enter cell 1?

	water potential of cell 2	mineral ions mainly enter cell 1 by
A	higher than cell 3	active transport
B	higher than cell 3	diffusion
C	lower than cell 3	active transport
D	lower than cell 3	diffusion

4 Which row shows the uses of protein in living organisms?

	growth and repair	insulation
A	✓	✓
B	✓	×
C	×	✓
D	×	×

key

✓ = is used for

× = is not used for

5 Four statements about the active site of an enzyme in the human body are given.

1 The shape of the active site changes when the temperature falls to 10 °C and does not return to its original shape when the temperature returns to 37 °C.

2 The active site of the enzyme has the same shape as the substrate molecule.

3 The specificity of the enzyme depends on the shape of its active site.

4 The shape of the active site changes when the enzyme is heated to 60 °C and does not return to its original shape when the temperature returns to 37 °C.

Which statements are correct?

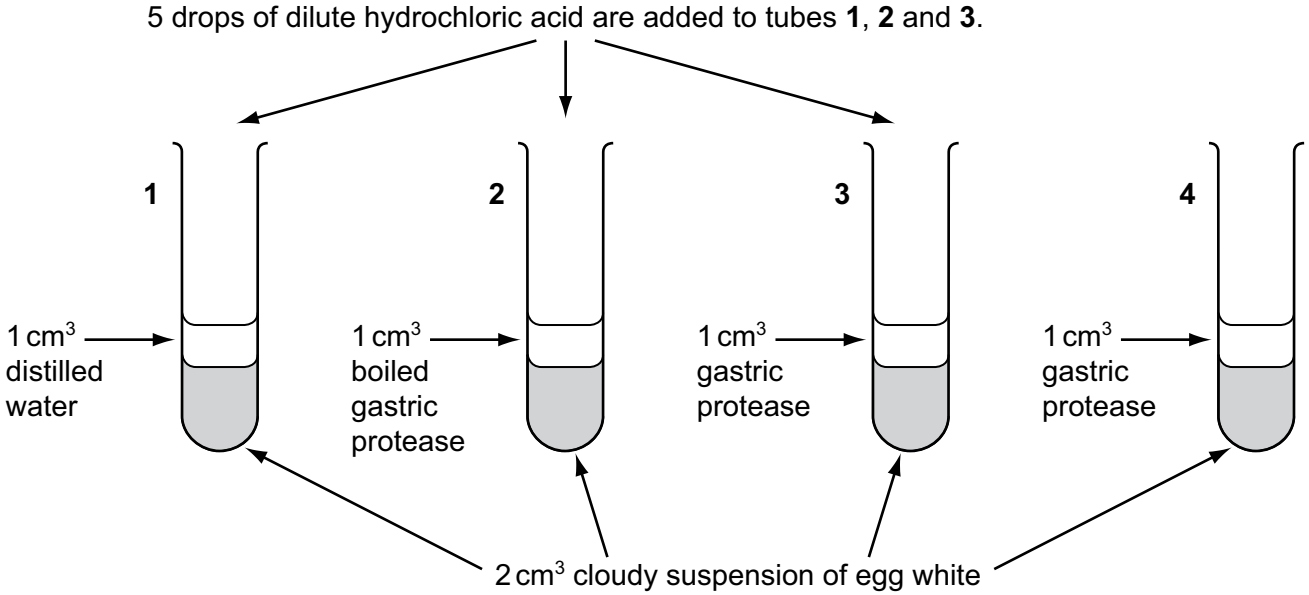
A 1, 2 and 3

B 1 and 4

C 2 and 3 only

D 3 and 4

6 Four test-tubes are set up as shown. Egg white protein is mixed with distilled water to make a cloudy suspension.

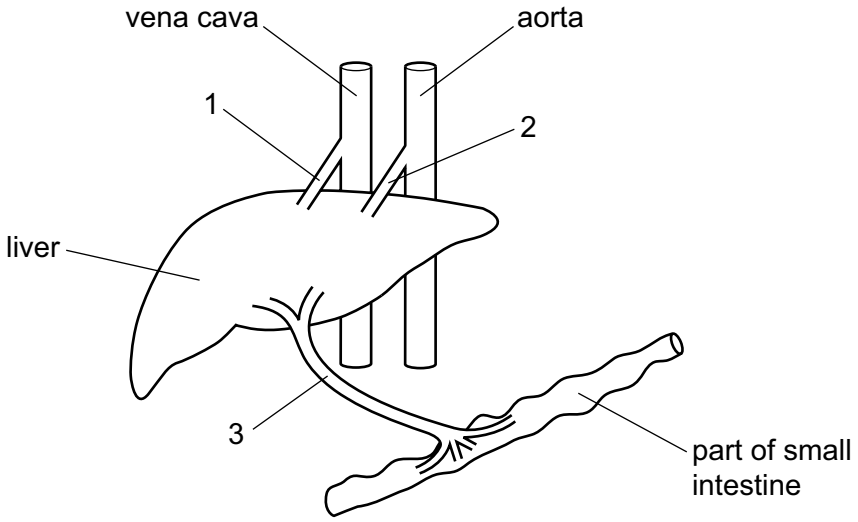


The contents of all four tubes are stirred and the tubes are then placed in a water-bath at 37 °C for 20 minutes.

What is the result?

	tube number			
	1	**2**	**3**	**4**
A	clear	clear	clear	clear
B	clear	cloudy	cloudy	clear
C	cloudy	cloudy	clear	cloudy
D	cloudy	cloudy	cloudy	clear

7 The diagram shows the liver and some associated blood vessels.



Which blood vessel or blood vessels contain blood flowing away from the liver?

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

8 Which process is an example of assimilation?

A formation of carbon dioxide from glucose molecules

B formation of glycogen from glucose molecules

C formation of sweat from blood plasma

D formation of urea from amino acids

9 Blood samples from three veins in the body were tested for the concentration of oxygen, carbon dioxide and urea. The results, in arbitrary units, are shown in the table.

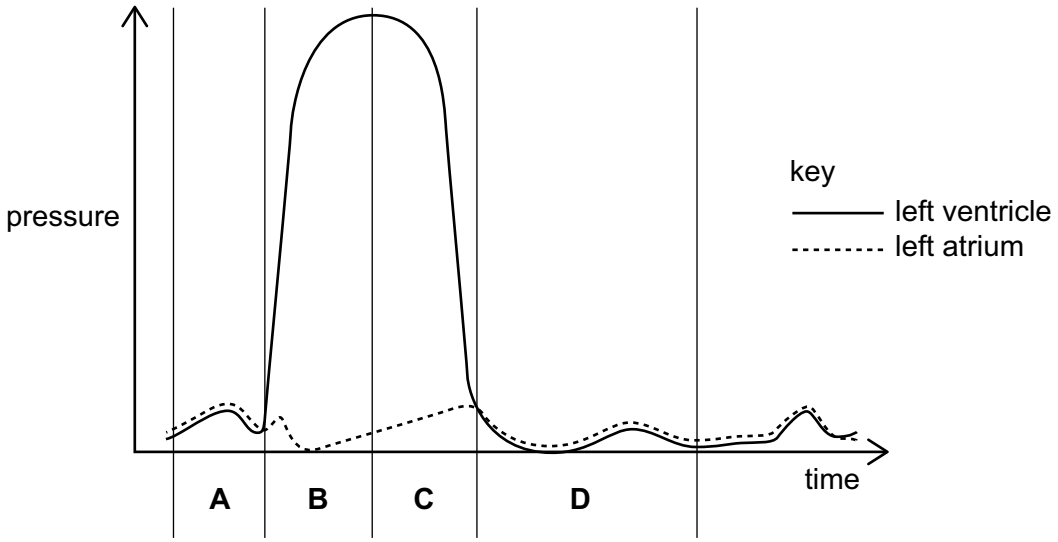
vein	oxygen concentration	carbon dioxide concentration	urea concentration
1	40	48	1.5
2	40	48	7.5
3	90	40	4.0

Which correctly identifies veins 1, 2 and 3?

	hepatic vein	pulmonary vein	renal vein
A	1	2	3
B	2	3	1
C	3	1	2
D	3	2	1

10 The graph shows pressure changes in the left ventricle and the left atrium during one heartbeat.

During which period of time is the ventricle contracting?



11 Which row shows the functions of blood plasma?

	forms antibodies	carries hormones to target organs	contains haemoglobin	converts fibrinogen to fibrin	transports glucose, salts and vitamins
A	✓	✓	×	×	✓
B	✓	×	✓	✓	×
C	×	✓	×	×	✓
D	×	×	✓	×	✓

key
✓ = is a function of blood plasma
× = is not a function of blood plasma

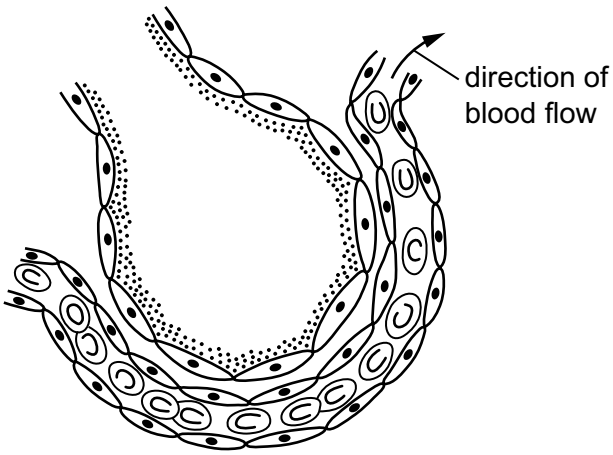
12 What happens during anaerobic respiration in muscle cells?

	carbon dioxide produced	oxygen used	water produced
A	no	no	no
B	no	yes	yes
C	yes	no	yes
D	yes	yes	no

13 When a student runs in a long-distance race, what happens during expiration?

	external intercostal muscles	internal intercostal muscles	muscle of the diaphragm
A	relax	contract	contract
B	contract	relax	contract
C	contract	relax	relax
D	relax	contract	relax

14 The diagram shows the flow of blood through a capillary surrounding an alveolus.



A student suggests four possible ways to increase the rate of oxygen absorption into the capillary.

1 decrease the amount of liquid lining the alveolus wall

2 increase the concentration of carbon dioxide in the alveolus

3 increase the rate of blood flow through the capillary

4 increase the surface area of the alveolus wall

Which suggestions are correct?

A 1 and 2

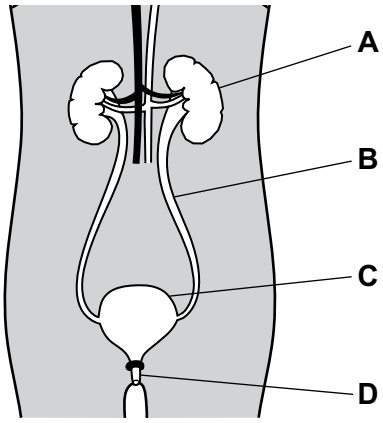
B 1 and 3

C 2 and 3

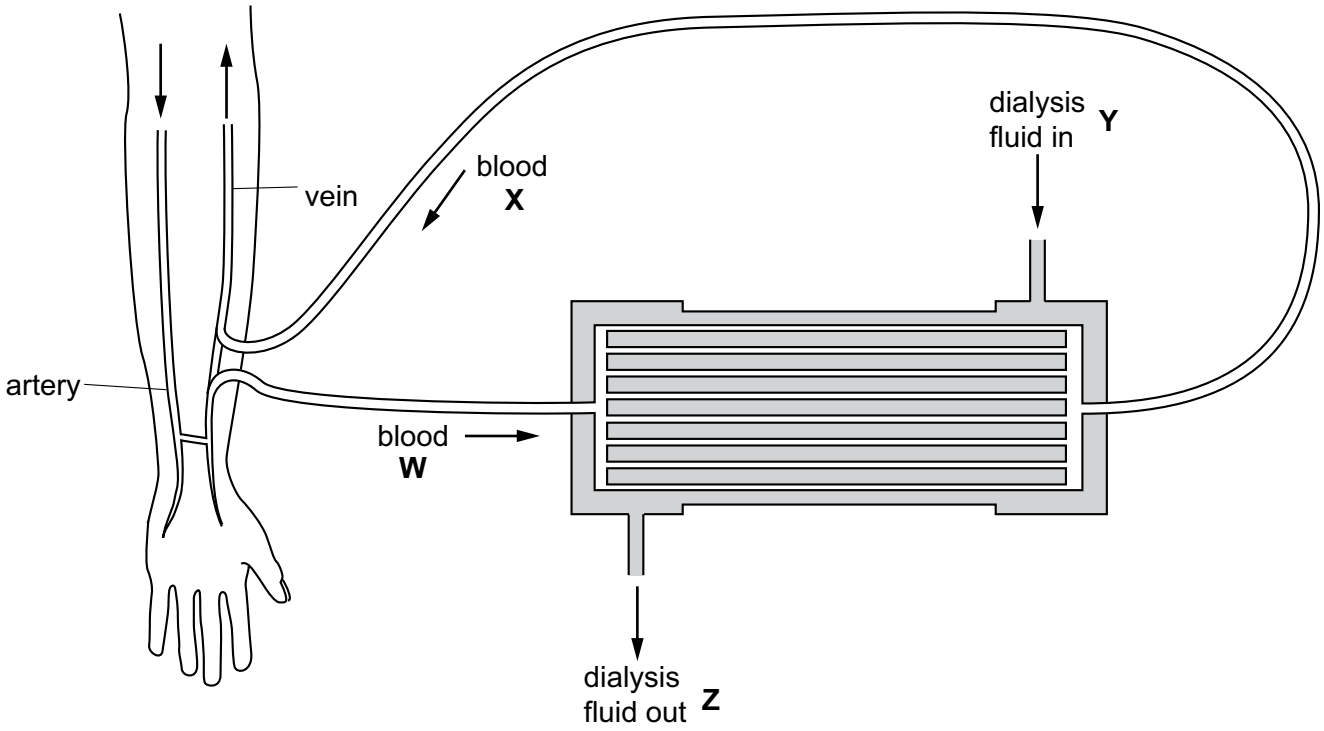
D 3 and 4

15 The diagram shows some structures in the human body.

Which label identifies the ureter?



16 The diagram shows the flow of blood and dialysis fluid through a kidney machine.



Where would the concentration of urea be highest?

A **W** and **X**

B **X** and **Y**

C **Y** and **Z**

D **Z** and **W**

17 What is meant by negative feedback?

A A change away from a set point causes a change back towards the set point.

B A change away from a set point causes further change away from the set point.

C A change towards a set point causes a change away from a set point.

D Changes away from a set point are prevented.

18 Changes take place in the human body when the external temperature drops.

1 body temperature falls

2 body temperature rises

3 brain detects cooler blood

4 shivering begins

In which order do the changes occur?

	first → last			
A	1	3	4	2
B	1	4	3	2
C	3	2	4	1
D	3	4	2	1

19 What is an effect of insulin?

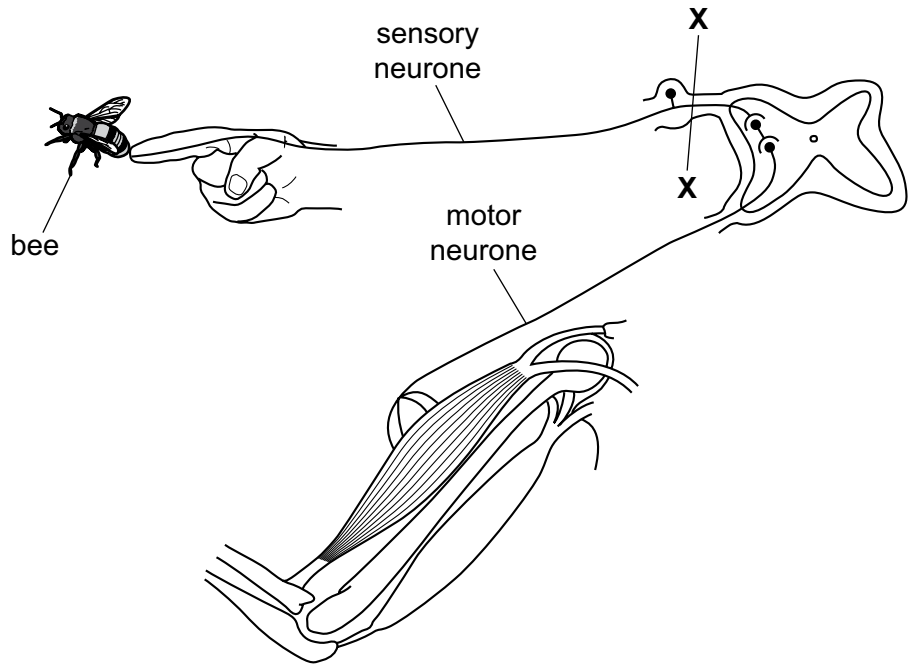
A decreased cell respiration

B decreased absorption of glucose by cells

C increased excretion of glucose

D increased synthesis of glycogen

20 The diagram shows part of a person's nervous system that has been cut at **X**–**X**.

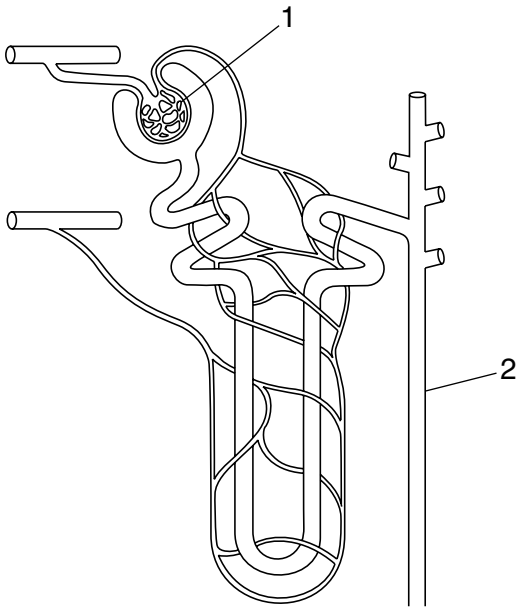


A bee stings the finger, as shown.

What are the effects of this sting on the person?

	pain felt	arm moved
A	no	no
B	no	yes
C	yes	no
D	yes	yes

21 The diagram shows a kidney tubule.

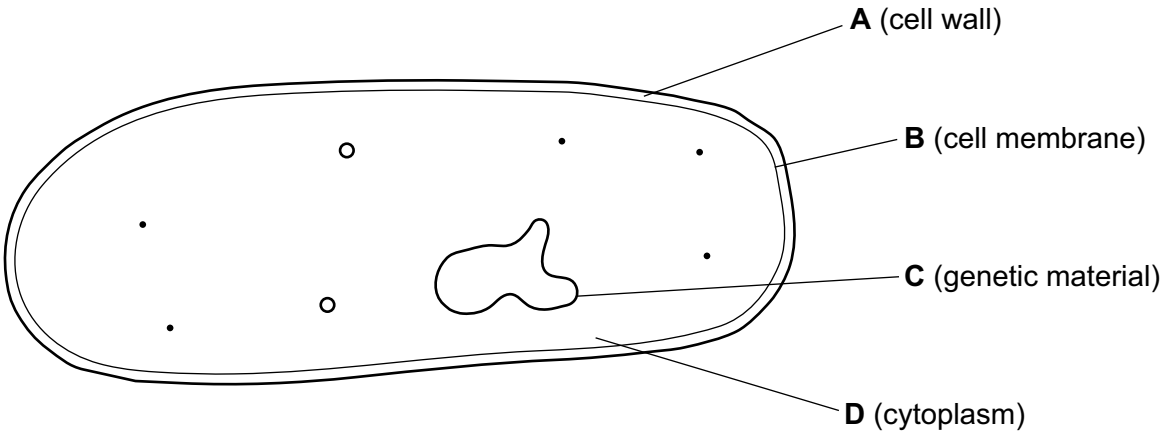


At which site does anti-diuretic hormone (ADH) have its effect and what effect does it have?

	site	effect
A	1	less water reabsorbed
B	1	more water reabsorbed
C	2	less water reabsorbed
D	2	more water reabsorbed

22 The diagram shows a bacterial cell with some features labelled.

Which labelled feature is also found in a virus?



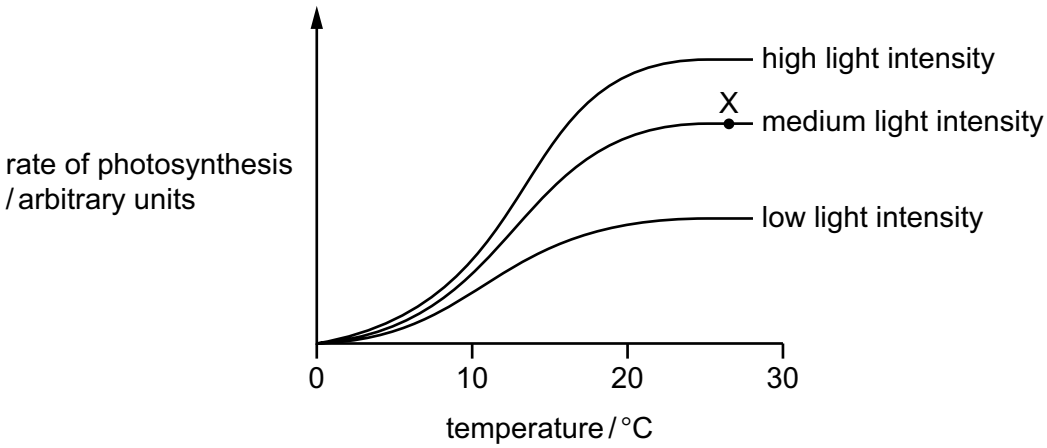
23 A student counted the number of chloroplasts found in four different types of leaf cell.

Which row shows the expected results?

	guard cell	palisade mesophyll cell	spongy mesophyll cell	upper epidermis cell
A	6	24	16	0
B	6	24	16	6
C	0	16	24	6
D	2	24	0	0

24 The graph shows how the rate of photosynthesis varies with temperature when a plant is kept under different light intensities.

All other factors are kept constant.



Which factor or factors are limiting the rate of photosynthesis at point X?

	light intensity	temperature
A	✓	✓
B	✓	×
C	×	✓
D	×	×

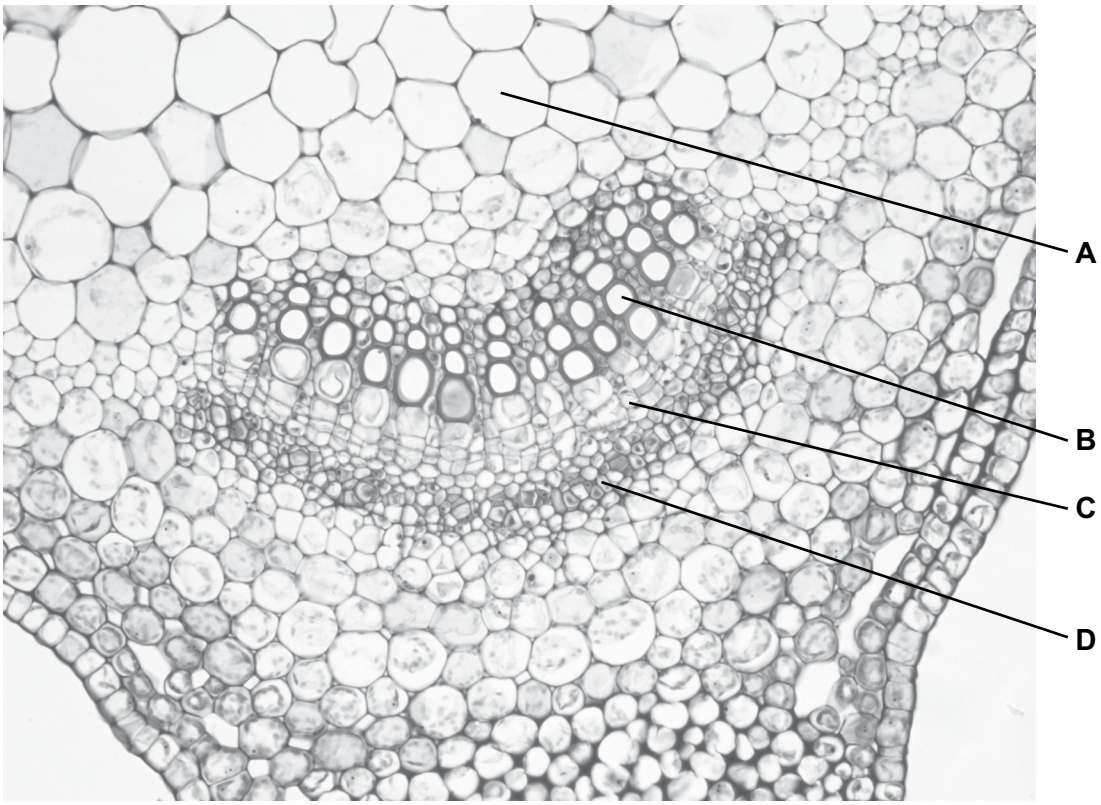
key

✓ = limiting

× = not limiting

25 The photomicrograph shows a section of a plant stem.

Which cell transports sugars and amino acids?



26 During translocation in plants, what substance is moved from which location to which location?

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

27 Which statement describes what causes water to move through the stem of a plant?

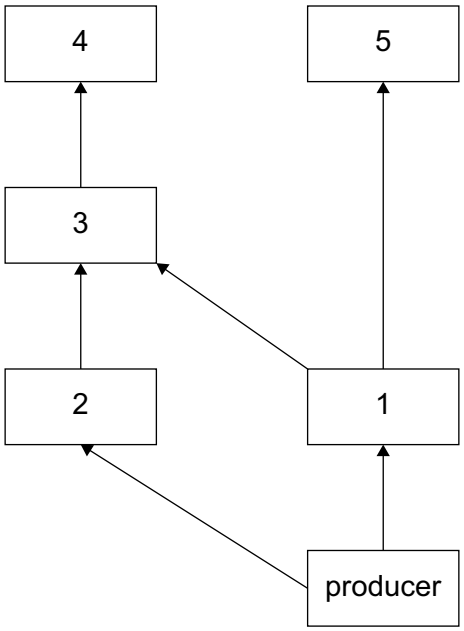
A It is moving from an area of lower water potential to a higher water potential.

B It is pulled up by the loss of water from the leaves.

C It is pushed by water being pumped up through the phloem.

D It is replacing water constantly used in photosynthesis.

28 The diagram shows a food web.



Which organisms occupy the same trophic level?

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

29 Which statement about carbon sinks is correct?

A All carbon sinks are fossil fuels.

B Carbon sinks emit more carbon dioxide than they absorb.

C Carbon sinks remove carbon dioxide permanently from the atmosphere.

D Increasing carbon sinks could reduce global warming.

30 Which human activity contributes most to global warming?

A air pollution by insecticides

B reducing global meat production

C emissions from burning fossil fuels

D water pollution by sewage

31 Which statement describes a gene?

A a base with a sugar and a phosphate group

B a number of DNA molecules

C a sequence of nucleotides coding for a polypeptide

D the chain of alleles on a chromosome

32 Bacteria can be used to produce human insulin.

Some stages involved in the transfer of the gene responsible for insulin production from a human to a bacterium are listed.

1 Cut the gene from the human chromosome.

2 Identify the gene controlling insulin formation.

3 Extract the human insulin from the mixture in the fermenter.

4 Insert the gene into the bacteria.

5 Allow the bacteria to reproduce in a fermenter.

What is the correct order for the stages in the production of insulin?

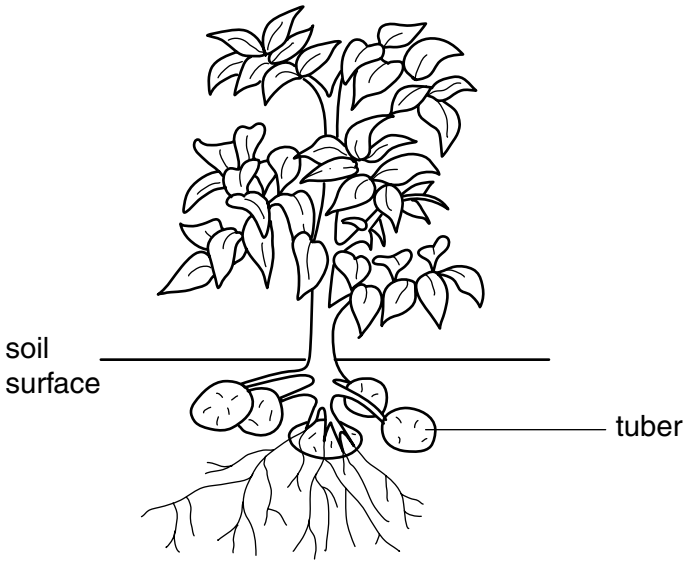
A $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5$

B $2 \rightarrow 1 \rightarrow 4 \rightarrow 5 \rightarrow 3$

C $3 \rightarrow 5 \rightarrow 4 \rightarrow 1 \rightarrow 2$

D $4 \rightarrow 1 \rightarrow 5 \rightarrow 2 \rightarrow 3$

33 The diagram shows a potato plant reproducing asexually by tubers.



Four observations were made about the potato plant.

1 There is one parent plant.

2 The tubers are attached to the parent.

3 The tubers are genetically identical to the parent.

4 The tubers store food.

Which of these observations describe asexual reproduction?

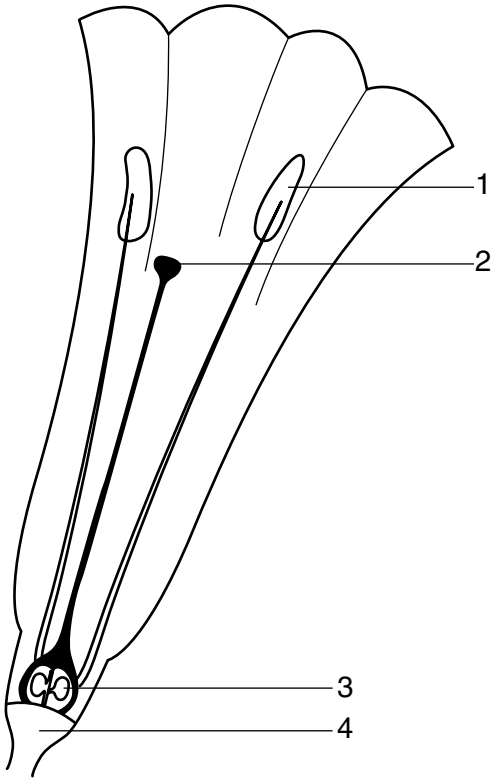
A 1 and 3

B 1 and 4

C 2 and 3

D 2 and 4

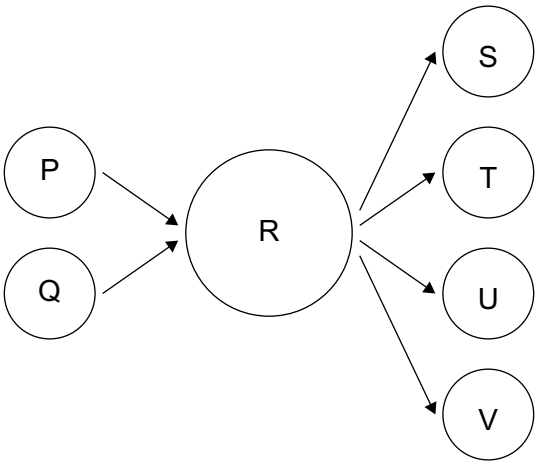
34 The diagram shows a section through a flower.



In which structures are haploid nuclei formed by reduction division?

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

35 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.

36 To which of the processes shown does mitosis contribute?

	genetic variation	increase in cell number	replacement of damaged cells
A	✓	✓	×
B	✓	×	×
C	×	✓	✓
D	×	×	✓

key

✓ = contributes to process

× = does not contribute to process

37 A recessive homozygote is crossed with a heterozygote of the same gene.

What will be the phenotypes of the F_1 generation?

A all dominant

B 75% dominant 25% recessive

C 50% dominant 50% recessive

D 25% dominant 75% recessive

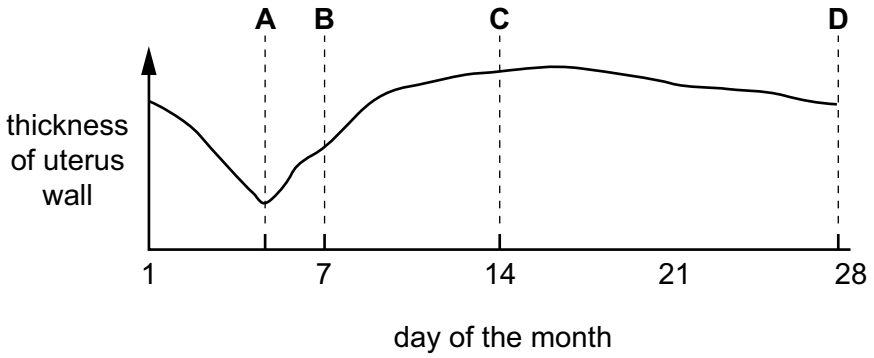
38 The chromosomes in a number of human cells are examined.

What is an example of chromosome mutation?

	total number of chromosomes	number of X chromosomes	number of Y chromosomes
A	23	0	1
B	23	1	0
C	46	1	2
D	46	2	0

39 The diagram represents one menstrual cycle.

At which point will the levels of both oestrogen and progesterone be lowest?



40 Which set of conditions is necessary for substances to be transferred across the placenta so that the fetus develops successfully?

	substance	concentration in fetal blood flowing to the placenta	concentration in maternal blood in placenta
A	carbon dioxide	low	high
B	glucose	low	high
C	oxygen	high	low
D	vitamins	high	low