Name	Reg. No	Class

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4EX

BIOLOGY

6093/01

Paper 1 Multiple Choice [40 Marks]

PRELIMINARY EXAMINATION
September 2019
1 hour

Additional Materials:
Approved calculator
OTAS

Instruction to Candidates

Do not start reading the questions until you are told to do so.

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class, and index number on the OTAS provided.

Information for Candidates

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 OTAS.

Read the instructions on the OTAS 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.

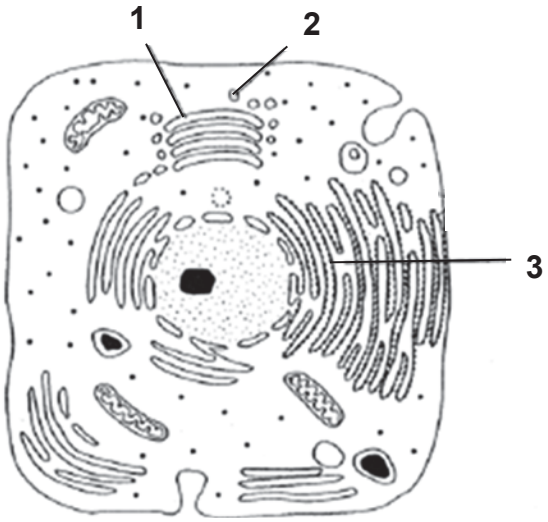
This question paper consists of **20** printed pages.

Setter: Mr Timothy Ng

Vetter: Mrs Marie Huang

[Turn Over

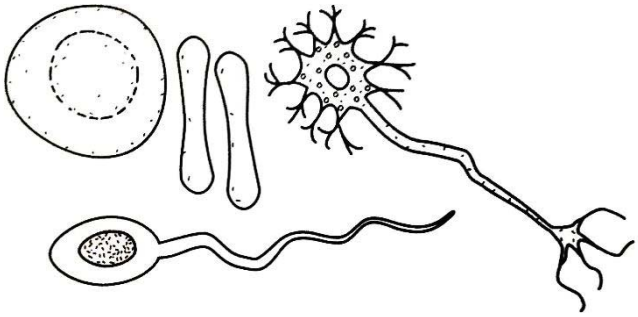
1 The diagram shows the magnified structure of an animal cell under an electron microscope.



What are the functions of the labelled structures?

	synthesizing protein from amino acids	exporting proteins out of the cell	modify, store and package proteins
A	1	2	3
B	1	3	2
C	3	1	2
D	3	2	1

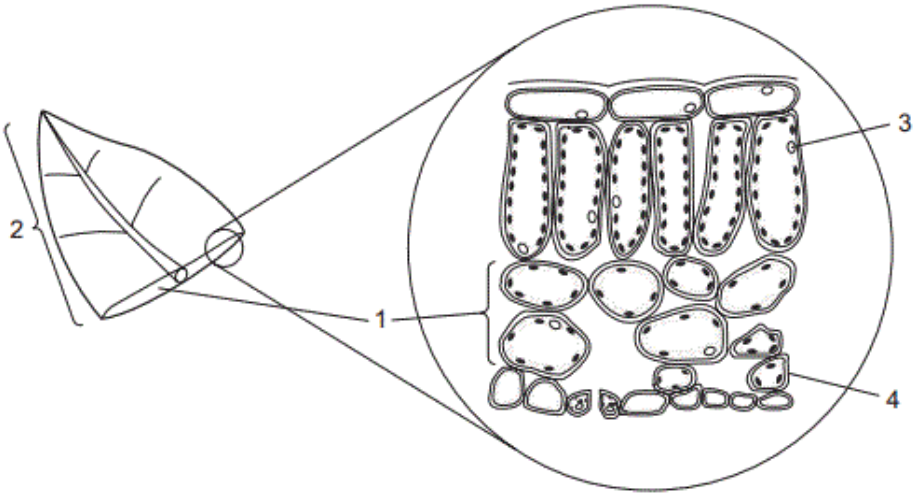
2 The diagrams below show several different types of human cells.



Which of the following statements is correct?

A All the cells can move.
B All the cells can undergo cell division.
C All the cells have a nucleus.
D All the cells have a plasma membrane.

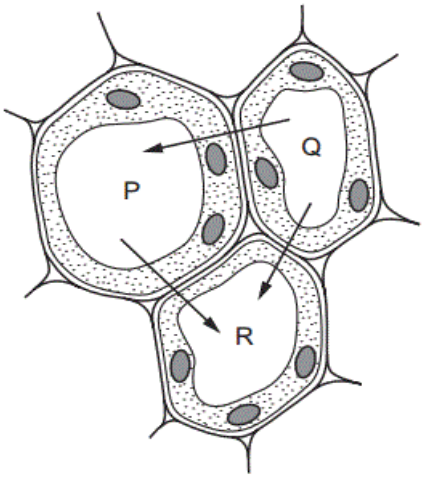
3 The diagram shows the structure of a leaf.



Which letter identifies a cell, a tissue and an organ?

	Cell	Tissue	Organ
A	3	2	4
B	1	4	3
C	4	1	2
D	2	3	1

4 The diagram shows three plant cells labelled P, Q and R. The arrow shows the movement of water by osmosis.



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

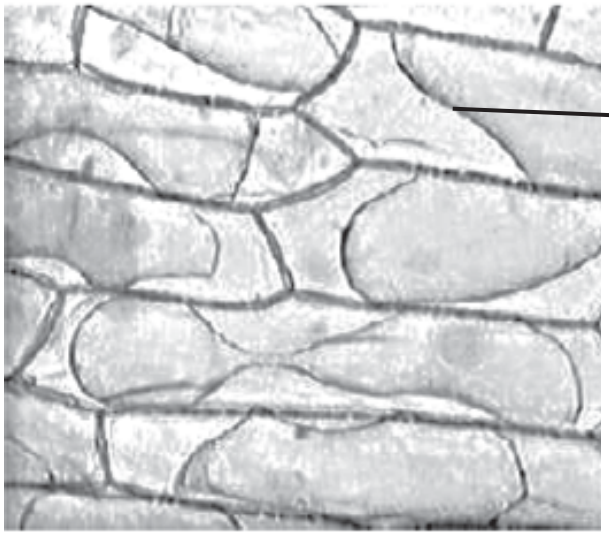
	Highest	Middle	Lowest
A	P	Q	R
B	P	R	Q
C	Q	P	R
D	R	P	Q

[Turn Over

5 Which of the following correctly states a difference between diffusion and osmosis?

	Diffusion	Osmosis
A	against a concentration gradient	along a concentration gradient
B	does not require energy	requires energy
C	requires a partially-permeable membrane	does not require a partially-permeable membrane
D	involves all particles	involves mainly water molecules

6 The light micrograph below shows the appearance of some onion cells after they had been placed in a concentrated salt solution for some time.



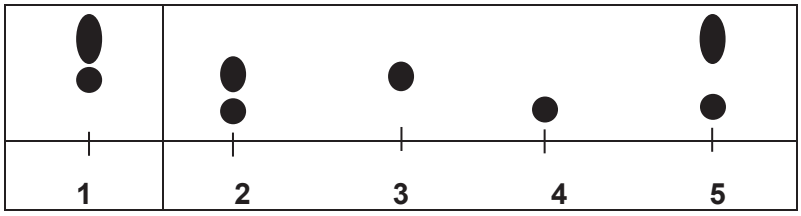
Identify X and the condition of the cells above.

	X	Condition of cells
A	cell membrane	crenated
B	cell membrane	plasmolysed
C	cell wall	crenated
D	cell wall	plasmolysed

7 Which of the following correctly states the digestion of sucrose?

	nutrient	enzyme	products of digestion
A	sucrose	amylase	glucose only
B	sucrose	lactase	glucose and galactose
C	sucrose	lipase	fatty acids and glycerol
D	sucrose	sucrase	glucose and fructose

8 Five disaccharides were each hydrolysed with dilute acid and the purified products were separated by chromatography. The results are shown in the diagram below.



Spot 1 in the diagram represents the products obtained from the hydrolysis of sucrose.

Which of the following represents the results obtained from the hydrolysis of lactose and maltose?

	lactose	maltose
A	2	3
B	2	4
C	5	2
D	5	3

9 A student tested his fluid lunch in the following ways and got the results as shown.

Treatment	Results
Added 1 ml of alcohol followed by water 1 ml of water to a sample of the fluid lunch.	A white emulsion was formed.
Added 1 ml of Biuret solution to a sample of the fluid lunch.	The Biuret solution turned violet.
Added 2 ml of Benedict's solution to a sample of the fluid lunch and placed it in a boiling water bath for 3 minutes.	The Benedict's solution turned into a brick-red precipitate.
Added 3 drops of iodine solution to a sample of the fluid lunch.	The iodine solution remained brown.

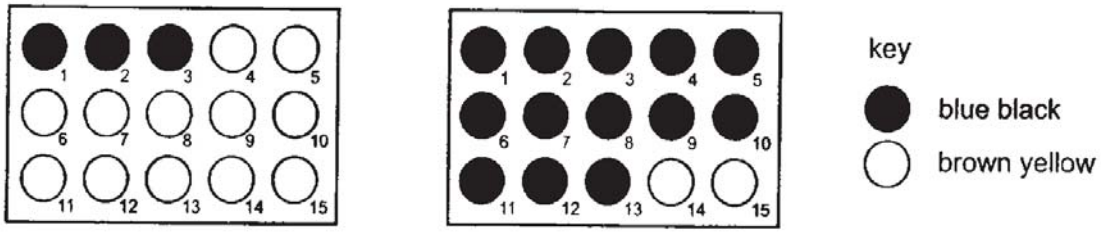
The food substances present in the lunch could contain some of the following nutrients:

1. fat
2. protein
3. reducing sugar
4. starch

From the results of the tests, which of the nutrients were present in his lunch?

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

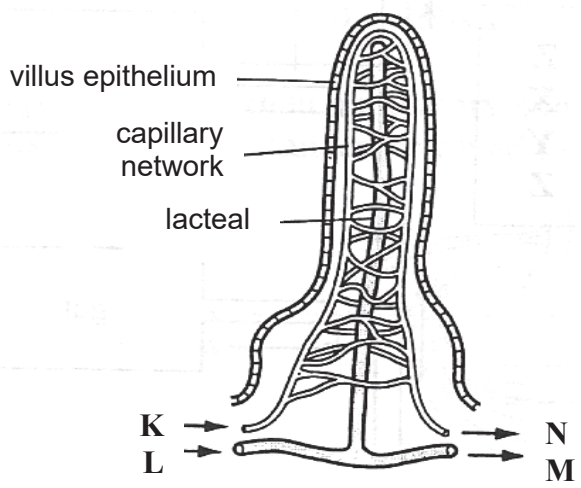
10 An experiment was carried out to investigate the digestion of starch using amylase at two different temperatures. A sample was removed from each mixture at 15 seconds intervals and placed into a spotting tile well containing two drops of iodine solution. The results are shown in the diagram.



Which of the following shows the correct temperatures and times for the complete digestion of starch?

	Time for digestion of starch / s	
	10°C	**30°C**
A	0.45	19.50
B	19.50	0.45
C	45.00	195.00
D	195.00	45.00

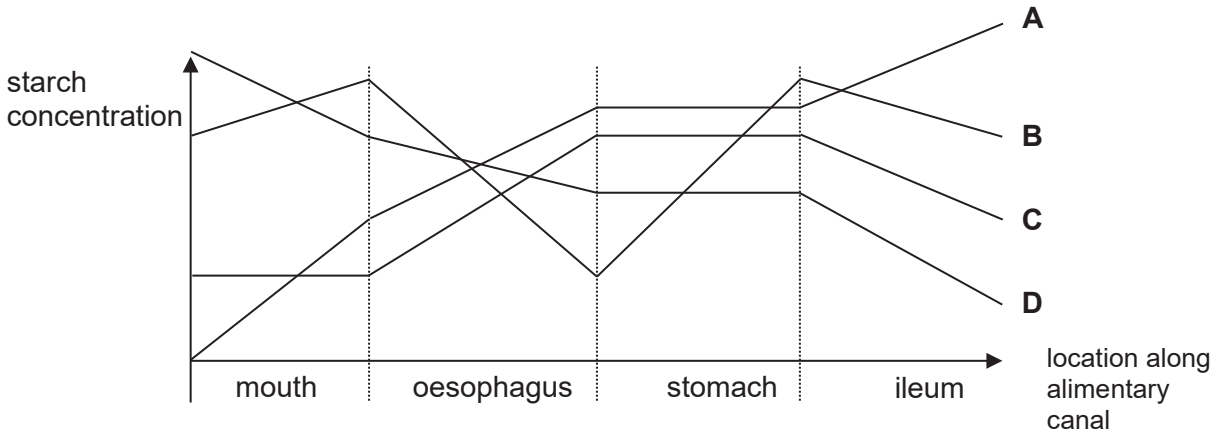
11 The diagram shows the structure of a villus found in the small intestine. The arrows show the direction of flow of the fluids from the products of digestion absorbed by the villus.



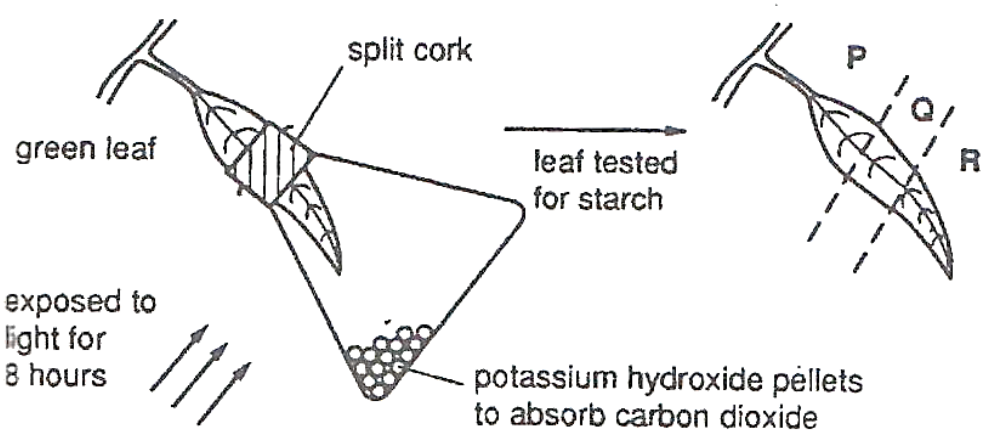
After a meal, where will you find the highest concentrations of amino acids and glucose?

	amino acids	glucose
A	K	N
B	L	M
C	M	M
D	N	N

12 Which of the graphs below represent starch digestion along the alimentary canal?



13 The diagram shows an experiment which was carried out to investigate photosynthesis.

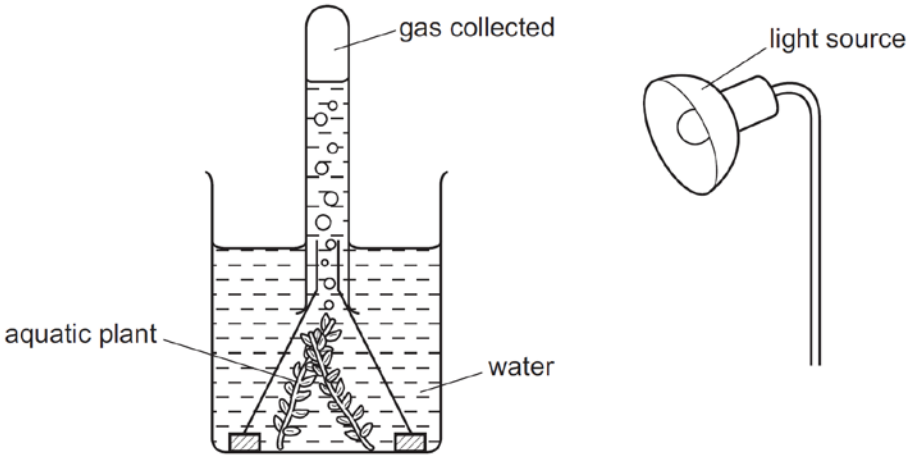


What were the colours of regions Q, and R, after the leaf had been tested for starch using iodine solution?

	Q	R
A	blue-black	brown
B	brown	brown
C	blue-black	blue-black
D	brown	blue-black

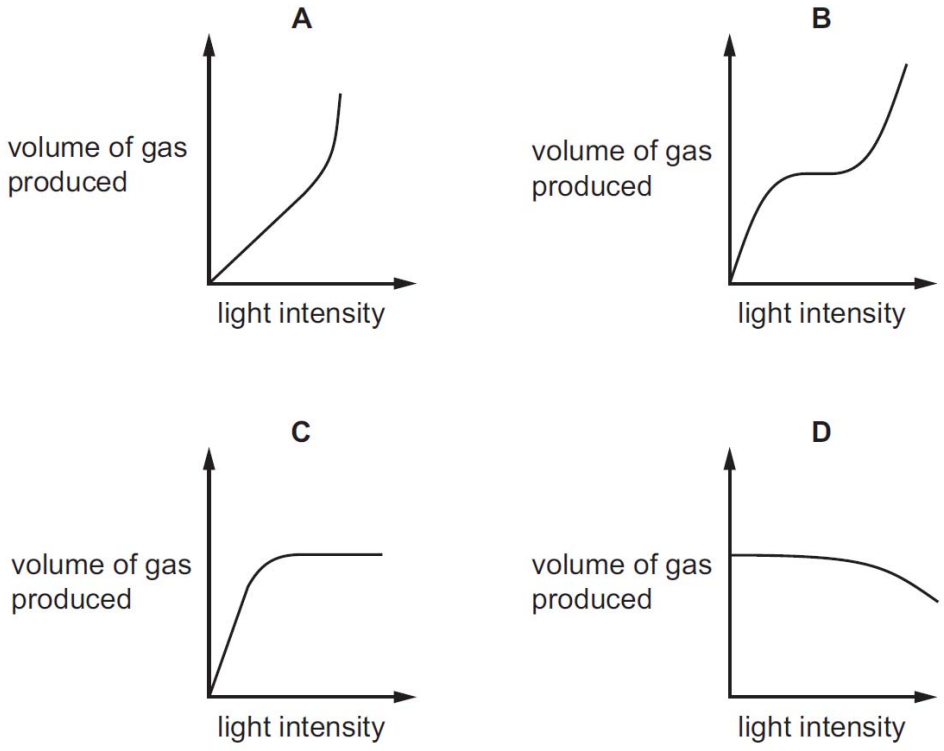
[Turn Over

14 An experiment is set up as shown. The volume of gas collected is measured after 30 minutes.

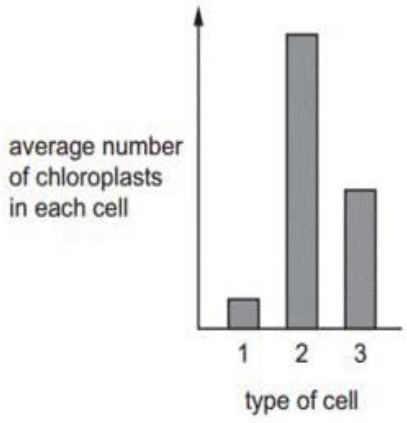


The experiment is repeated several times. Each time the light intensity is increased.

Which graph shows the results?



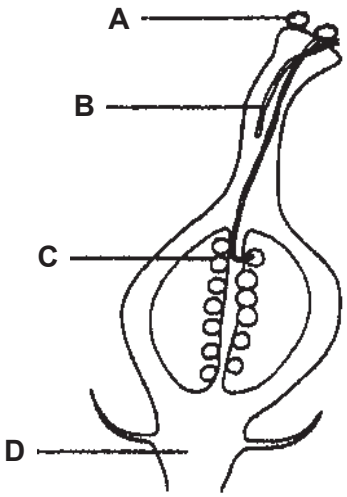
15 The chart shows the average number of chloroplasts in each of three different types of leaf cell.



What are the three types of leaf cell?

	1	2	3
A	guard cell	palisade mesophyll cell	spongy mesophyll cell
B	palisade mesophyll cell	spongy mesophyll cell	guard cell
C	spongy mesophyll cell	guard cell	palisade mesophyll cell
D	spongy mesophyll cell	palisade mesophyll cell	guard cell

16 In cell tissue culture, cells are taken from the parent plant and grown in a cell culture. From which part of the plant would cell samples be taken so that the new plants would be genetically identical to the parent plant?



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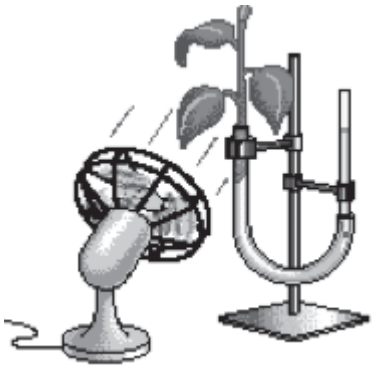
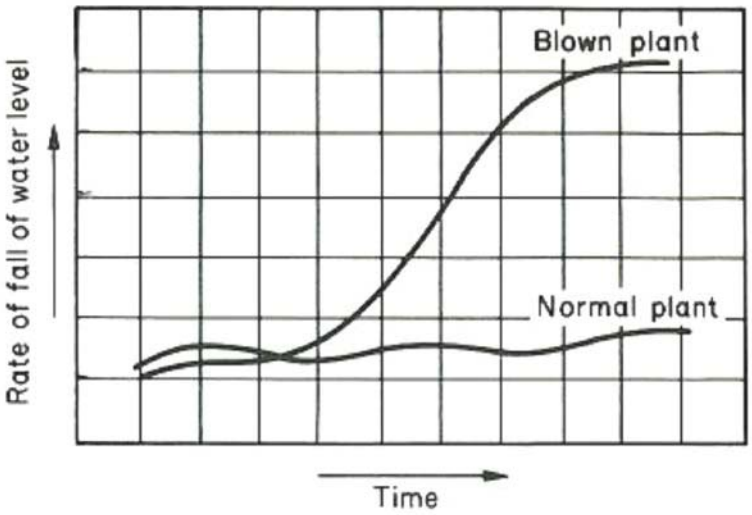
17 An experiment was conducted to investigate the effect of wind on the rate of transpiration in plants. One plant had a fan directed at it throughout the experiment.



The graphs below show the rate of fall of the water levels in two plants.

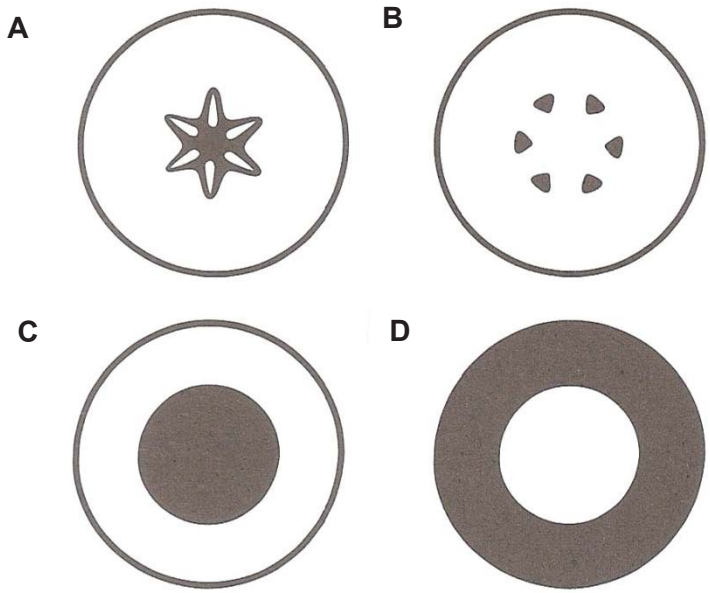


Which statement is the best explanation of the difference between the two graphs?

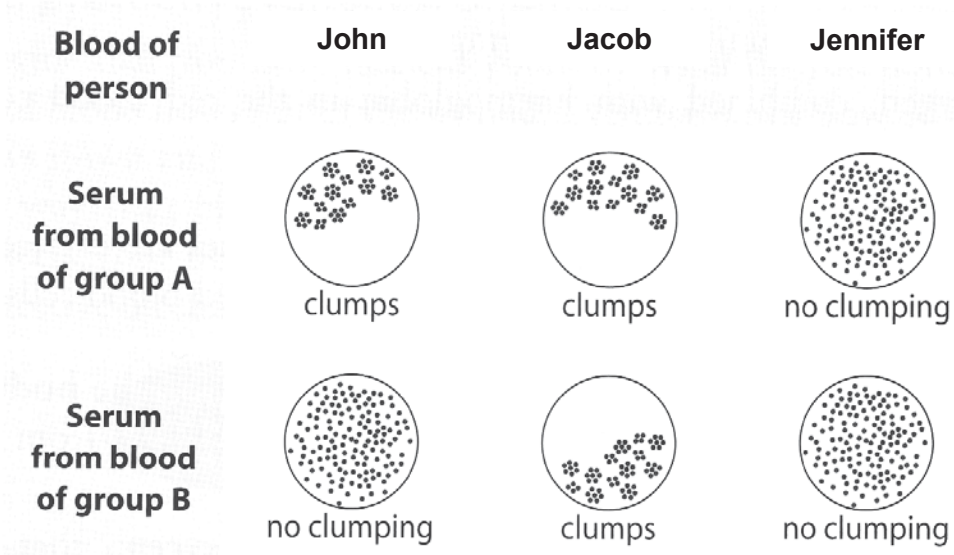
A The fan caused an increase in the rate of translocation, resulting in increased water uptake.
B The fan caused more evaporation of water from the cylinder and the leaves.
C The plant has a greater transpiration rate due to the increased air movement.
D The plant took up less water as the fan cooled the temperature.

18 A plant was exposed to radioactive carbon for a period of time. Six hours later, the cross-section of the stem tissue shown below was cut from the plant and dried in an oven. it was pressed against photographic plates that became black when exposed to radioactivity.

Which of the following shows the appearance of the photographic plate taken at the end of the experiment?



19 The test results of blood group testing of three people, John, Jacob and Jennifer are shown below.



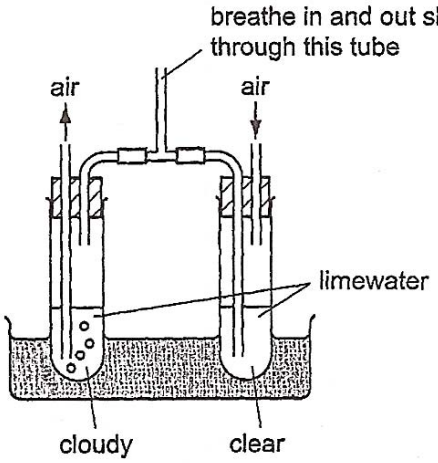
Which of the following correctly identifies their blood groups?

	John	Jacob	Jennifer
A	A	B	AB
B	AB	A	B
C	B	AB	O
D	O	AB	A

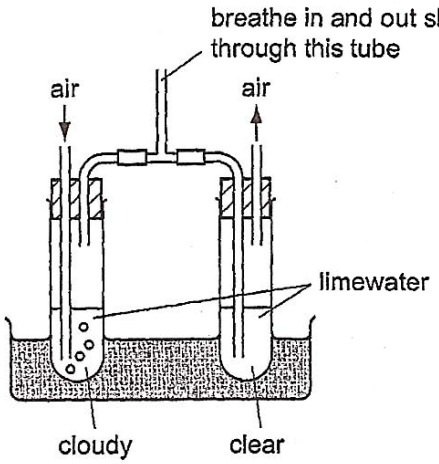
[Turn Over

20 Carbon dioxide turns limewater cloudy. Which one of the following demonstrates that expired air contains much more carbon dioxide?

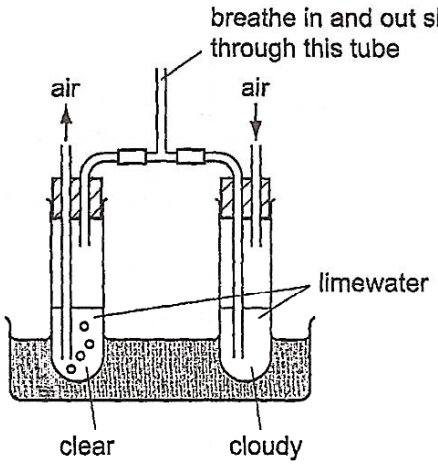
A



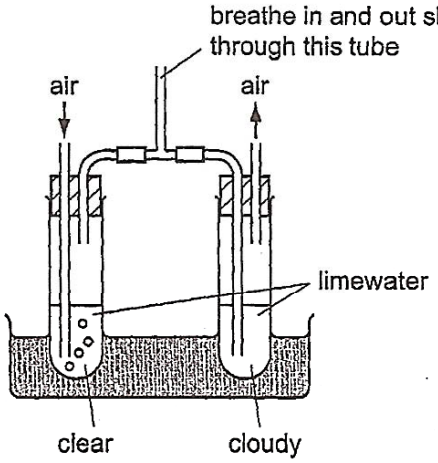
B



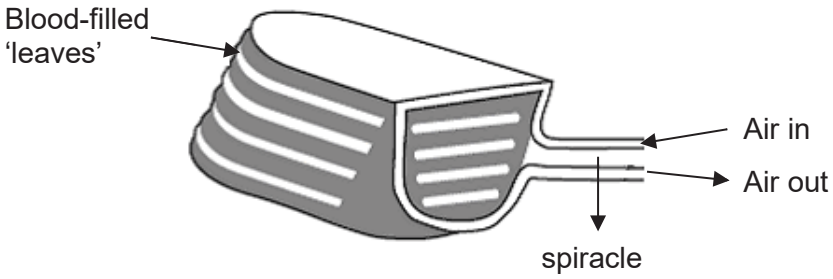
C



D



21 Scorpions have breathing organs called 'book lungs'. These consist of blood-rich tissues arranged like the leaves of a book. Air enters the 'book lungs' through a small opening called a spiracle. Gases can be exchanged between the air and the blood.



Which of the following will speed up gas exchange between the blood in the 'leaves' and the air around them?

A Increasing the flow of blood through the 'leaves'.
B Lowering the blood temperature.
C Reducing the number of 'leaves'.
D Reducing the size of the spiracle.

22 The following table gives the events involved in the secretion and action of anti-diuretic hormone (ADH).

Which row shows the correct chain of events?

Key
+ = Increased
- = Decreased

	Water level in blood relative to normal	**Amount of ADH produced relative to normal**	**Amount of water reabsorbed by kidneys**
A	+	+	-
B	+	-	+
C	-	+	+
D	-	-	-

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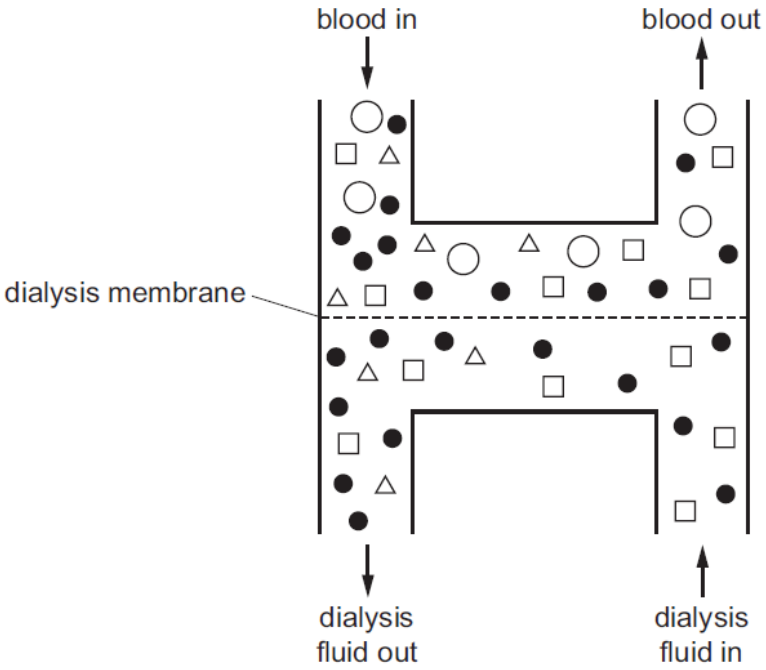
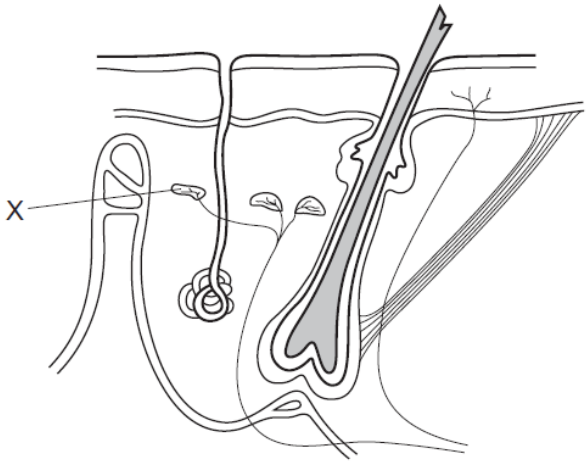
23 The diagram shows how a kidney dialysis machine works. Each shape represents a molecule found in blood or dialysis fluid.



Which shape represents urea?

A ○
B ●
C □
D △

24 The diagram shows some of the structures seen in a section through human skin.



What is the function of structure X?

A to cause capillaries to constrict
B to detect changes in temperature
C to receive impulses from the central nervous system
D to stimulate sweat glands to release sweat

25 Four processes that take place in the human body are listed.

1. absorption of amino acids through the villi
2. maintenance of a constant body temperature
3. production of lactic acid in muscles
4. regulation of blood glucose concentration

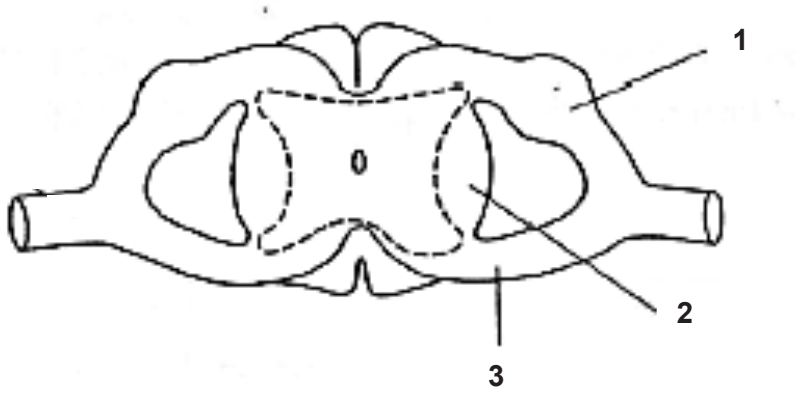
Which two processes are directly controlled by negative feedback?

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

26 How is the concentration of blood glucose regulated?

	Blood glucose concentration	Pancreas stimulated to secrete	Liver converts
A	fall	glucagon	glycogen to glucose
B	fall	insulin	glucose to glycogen
C	rise	glucagon	glucose to glycogen
D	rise	insulin	glycogen to glucose

27 Part of the spinal cord of a person was damaged. A pin prick was applied to the base of the person's foot. It was observed that the person felt the pain but was unable to jerk his foot away from the pin.



If the diagram represents the spinal cord of the person, which area(s) is/are likely to be damaged?

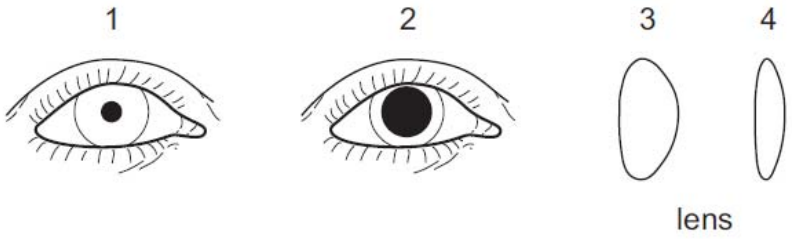
A 1 only
B 3 only
C 1 and 2
D 2 and 3

[Turn Over

28 Which of the following actions is **not** a reflex action?

A choking and coughing when food get stuck in your throat
B closing your eyelids as dust particles from smoke hit your face
C crying when you feel sad
D pulling your hand away after touching a candle flame

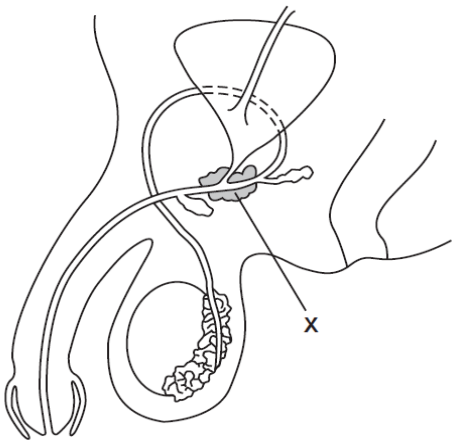
29 The diagrams show the eye viewed from the front and its lens in cross-section.



Which diagrams show the appearance of the pupil and the shape of the lens when looking up at the sky at night?

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

30 The diagram shows part of the male reproductive system.



What will be the effect of removing gland X?

A prevention of the storage of sperm before fertilisation
B reduction of the nutrients in the seminal fluid
C slowing down of the production of sperm
D stoppage of the secretion of a male hormone

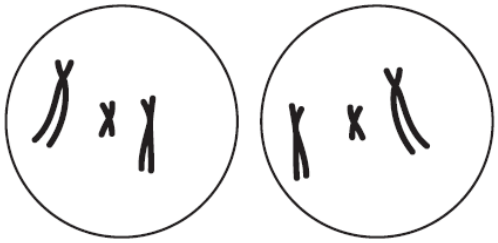
31 Which of the following occurs in mitosis but **not** in meiosis?

A crossing over between homologous chromosomes
B homologous chromosomes are sorted to different nuclei
C independent assortment of chromosomes at metaphase
D nuclear envelope reforming around a diploid number of chromosomes at telophase

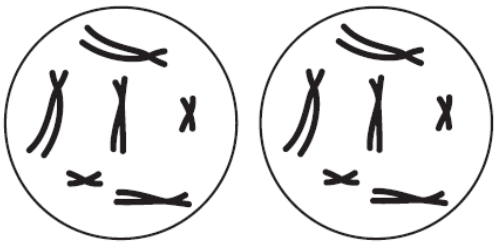
32 The diagram shows the chromosomes in a cell.

Which diagram shows the product of **one** division of the cell by mitosis?

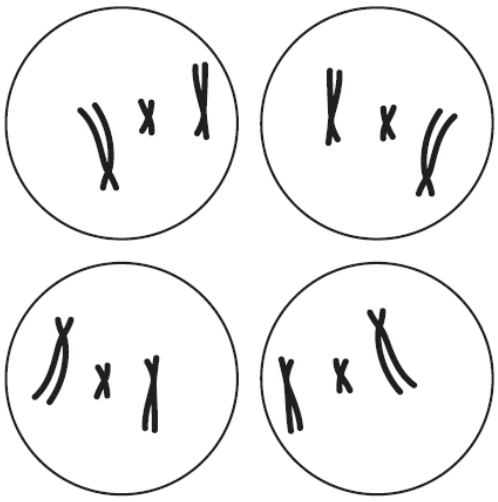
A



B



C



D

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33 In some species of dragonflies, the females have two X chromosomes while the males have one X chromosomes and no Y chromosomes. If the normal diploid number in a dragonfly is 16, what would be the number of chromosomes in the body cells of the male and female dragonflies?

	Male dragonfly	Female dragonfly
A	7	8
B	8	16
C	15	16
D	16	16

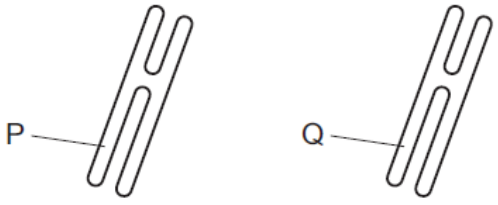
34 The following table shows the base composition of the chromosome in a particular insect.

Base composition/%			
Adenine	**P**	**Q**	**R**
31.6	18.0	18.4	32.0

Which of the following correctly identifies the unknown bases?

	P	Q	R
A	cytosine	guanine	thymine
B	guanine	cytosine	uracil
C	guanine	uracil	cytosine
D	thymine	guanine	cytosine

35 The diagram shows a pair of chromosomes from the same cell.

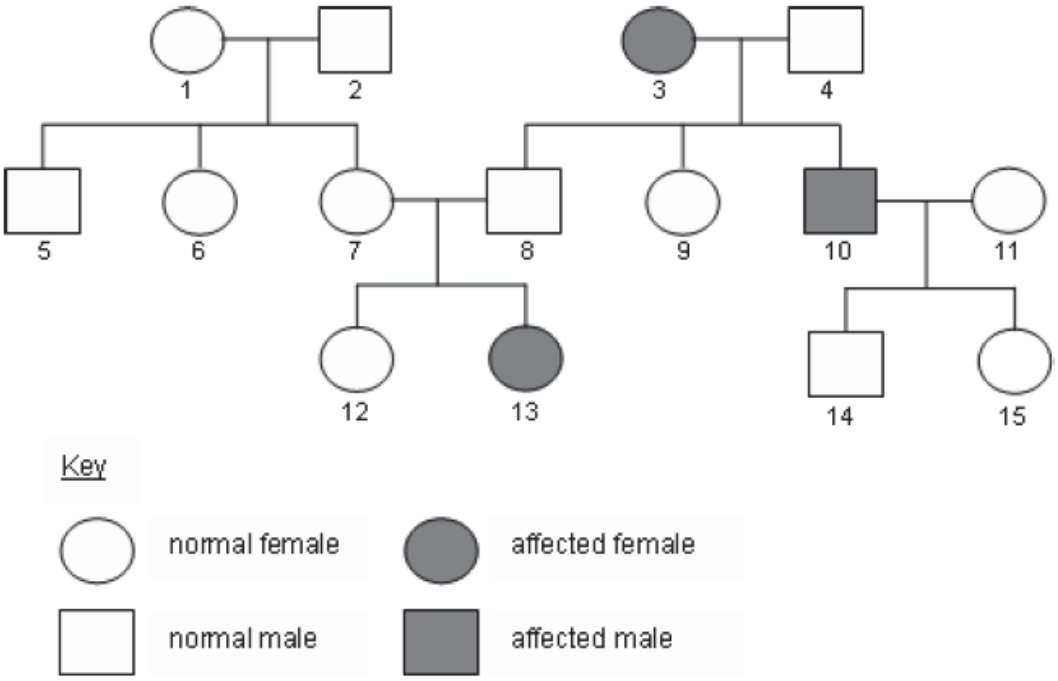


A gene is found at the point labelled P.

In a heterozygous individual, what will be found at the equivalent position labelled Q?

A a different allele of a different gene
B a different allele of the same gene
C a different gene of the same allele
D the same gene of the same allele

36 The family tree shows the inheritance of a condition caused by the recessive allele **g**.



What is/are the possible genotypes for individual 11?

A Gg
B GG
C GG and Gg
D GG, Gg and gg

37 In a species of plant, the allele for yellow flowers is dominant to the allele for white flowers.

Which offspring is it possible to produce from a cross between two plants heterozygous for flower colour?

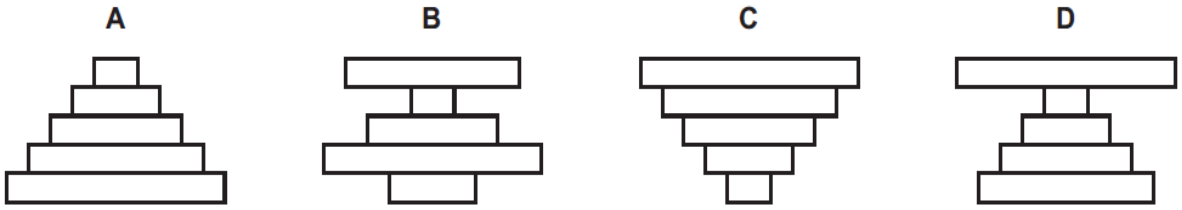
A heterozygous yellow and heterozygous white
B heterozygous yellow only
C heterozygous yellow, homozygous yellow and homozygous white
D homozygous yellow only

[Turn Over

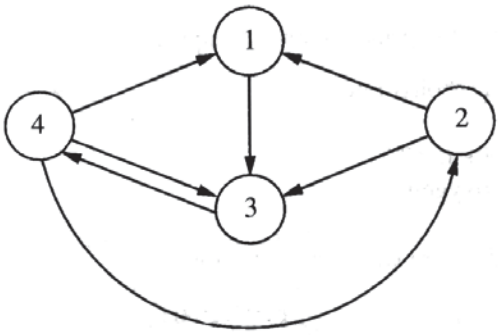
38 A food chain is shown.

wheat → insects → small birds → owls → lice

What is the pyramid of numbers for this food chain?



39 In the diagram below, arrows represent the movement of carbon compounds in the carbon cycle. The circles represent carbon compounds in animals, decomposers, plants and the atmosphere.



Which of the following options correctly identifies the four circles?

	1	2	3	4
A	atmosphere	plants	decomposers	animals
B	animals	atmosphere	Plants	decomposers
C	decomposers	animals	atmosphere	plants
D	plants	decomposers	animals	atmosphere

40 Which change would lead to an increase in biodiversity in an area?

A building a large number of blocks of family dwellings in a city
B increasing the number of cows in a pedigree herd
C replacing a forest with a large palm oil plantation
D stopping fishing in an area of sea for several years

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