Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/21**

Paper 2 Multiple Choice (Extended) **October/November 2017**

45 minutes

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

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READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, 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.
DO **NOT** WRITE IN 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.
Electronic calculators may be used.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **15** printed pages and **1** blank page.

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1 Which term is defined as all the chemical reactions that occur in cells?

A photosynthesis

B protein synthesis

C respiration

D metabolism

2 The diagram shows a section of DNA from a chimpanzee.

A	G	C	T	A	C	A	G	A	G

Which diagram shows a section of DNA from the organism that is most closely related to the chimpanzee?

A

A	G	C	T	A	C	A	G	A	T

B

A	G	C	T	A	C	A	G	T	T

C

A	T	C	A	A	C	A	G	T	T

D

A	T	C	T	A	C	A	G	T	T

3 The length of a mitochondrion in a photomicrograph is 15 mm.

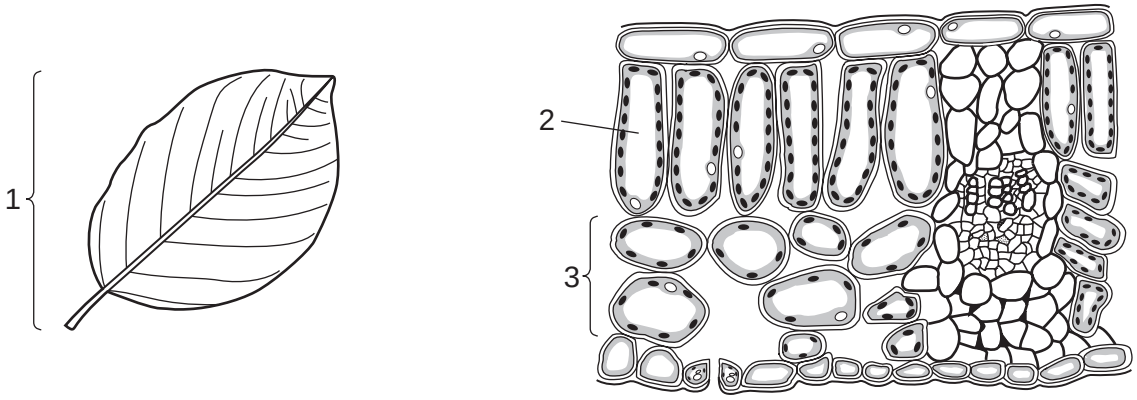
The actual length of the mitochondrion is 3 µm.

What is the magnification of the photomicrograph?

A ×5 **B** ×45 **C** ×5000 **D** ×45 000

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4 The diagrams show a leaf and its internal structure.



What are the levels of organisation of the labelled structures?

	1	2	3
A	cell	tissue	organ system
B	organ	cell	tissue
C	organ system	tissue	cell
D	tissue	cell	organ

5 Different factors affect the rate of diffusion of molecules across a membrane.

Which row represents changes to factors that will increase the rate of diffusion?

	concentration gradient across a membrane	thickness of membrane	surface area of membrane	temperature
A	decrease	decrease	increase	increase
B	decrease	increase	increase	decrease
C	increase	decrease	increase	increase
D	increase	increase	decrease	decrease

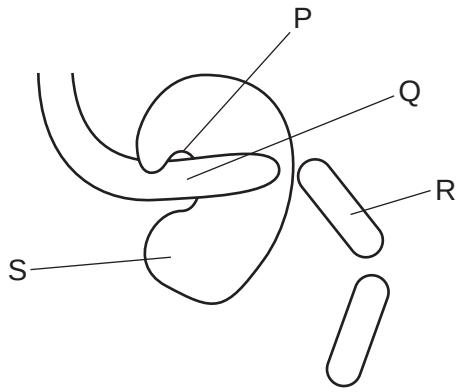
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6 A red blood cell and a palisade mesophyll cell are placed in a solution which has a higher water potential than the cells.

What will happen to each cell?

	red blood cell	palisade mesophyll cell
A	bursts	bursts
B	bursts	gains mass
C	loses mass	gains mass
D	loses mass	loses mass

7 The diagram shows a protease molecule catalysing the break down of a protein molecule.

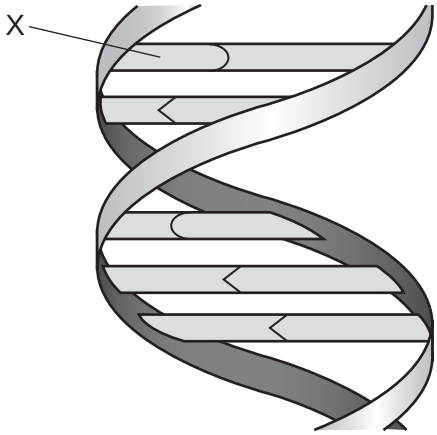


What are the parts labelled P, Q, R and S?

	enzyme	product	substrate	active site
A	P	Q	R	S
B	R	S	P	Q
C	S	P	Q	R
D	S	R	Q	P

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8 The diagram shows the structure of part of a DNA molecule.



What does X represent?

A amino acid

B base

C carbon

D protein

9 Which statement about enzymes is correct?

A Enzymes become part of the product.

B Lowering the pH always slows down the reaction rate.

C Raising the temperature always increases the reaction rate.

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

10 Which enzyme is used to produce clear apple juice?

A amylase

B lipase

C pectinase

D protease

11 Which structure would be found in large numbers in cells that have a high energy requirement?

A chloroplast

B endoplasmic reticulum

C large vacuole

D mitochondrion

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[Turn over

12 What must be increased in the diet of a person suffering from constipation?

A fats

B fibre

C iron

D protein

13 Which disease can be caused by a deficiency of iron in the diet?

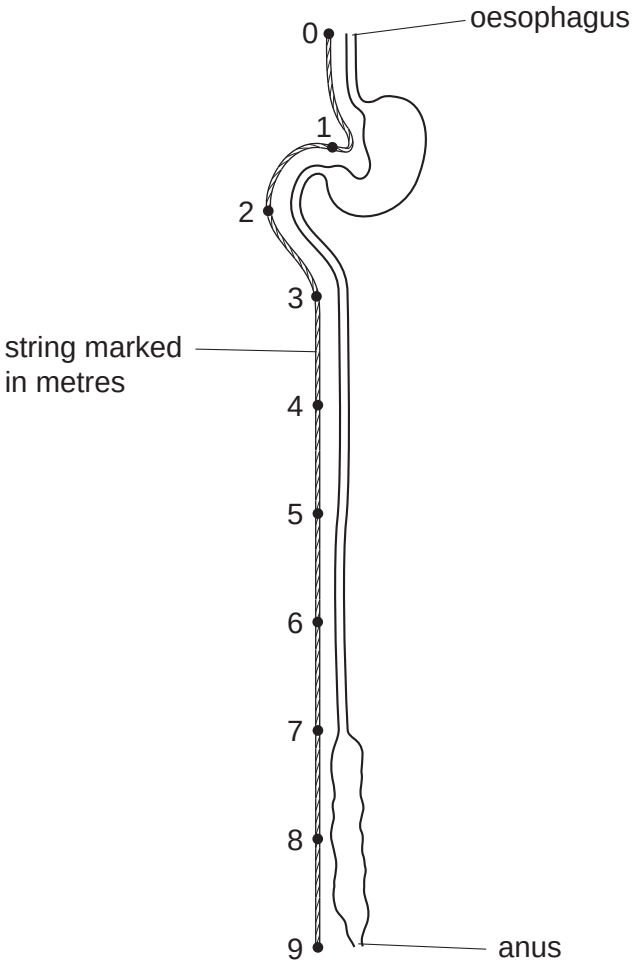
A anaemia

B kwashiorkor

C marasmus

D rickets

14 The diagram shows the human alimentary canal, with a string marked in metres beside it.

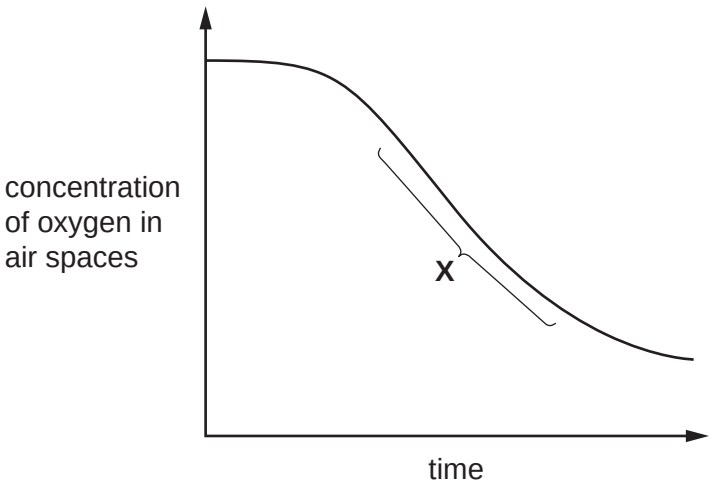


How long is the small intestine?

A 2 m **B** 6 m **C** 8 m **D** 9 m

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15 The graph shows the concentration of oxygen in the air spaces of a green leaf of a plant during a 12-hour period.



Which statement about carbon dioxide in the air spaces during time **X** is correct?

A Carbon dioxide is being produced because the rate of photosynthesis is greater than the rate of respiration.

B Carbon dioxide is being produced because the rate of respiration is greater than the rate of photosynthesis.

C Carbon dioxide is being used because the rate of photosynthesis is greater than the rate of respiration.

D Carbon dioxide is being used because the rate of respiration is greater than the rate of photosynthesis.

16 What is a description of transpiration?

A exchange of gases between the leaf and the atmosphere

B loss of water vapour from the leaves and stems of a plant

C movement of water from the roots to the leaves

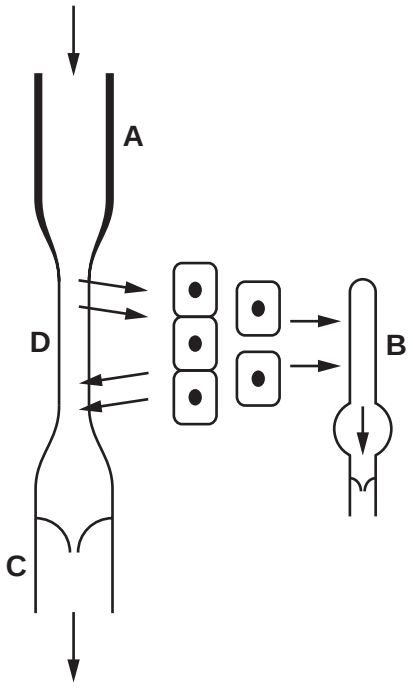
D movement of water through the cells of the leaf

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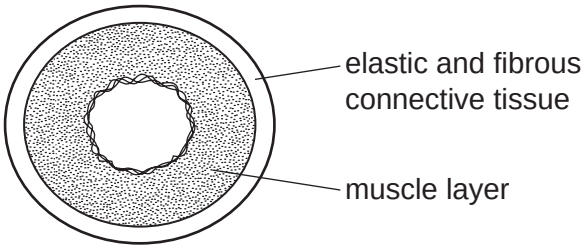
[Turn over

17 The diagram shows the vessels associated with the flow of fluids to and from body cells.

Which is the lymph vessel?



18 The diagram shows a cross-section through a human blood vessel.



Which type of blood vessel does the diagram show?

A an artery

B a capillary

C a vein

D a ventricle

19 Which are both chemical barriers to the transmission of pathogens?

A mucus and stomach acid

B mucus and white blood cells

C skin and hairs in the nose

D skin and stomach acid

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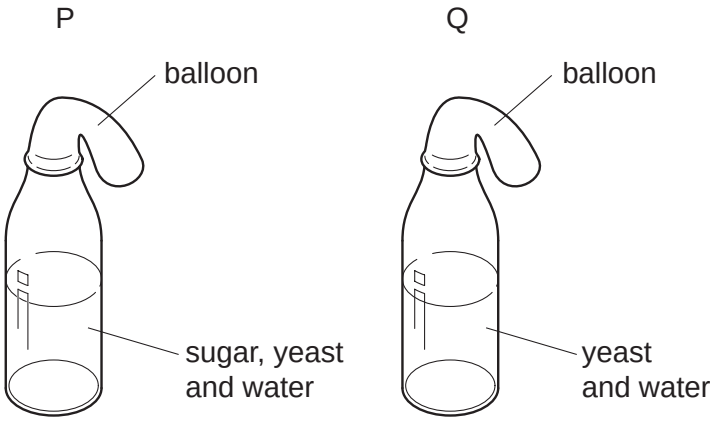
20 The table shows some of the changes that occur during breathing.

	from contracted to relaxed	from relaxed to contracted
diaphragm	P	X
external intercostals	Q	Y
internal intercostals	R	Z

Which changes occur to cause inspiration?

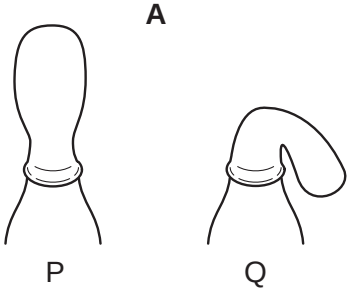
A P, Q and Z **B** X, Q and R **C** X, Y and R **D** X, Y and Z

21 In an experiment to investigate anaerobic respiration, two bottles are set up in a warm room, as shown.

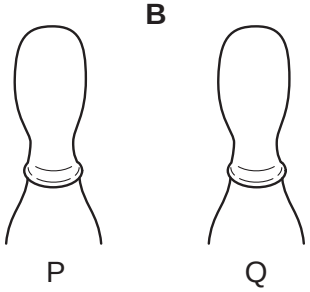


What would happen to each balloon after one day?

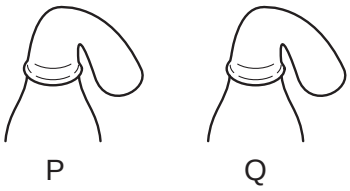
A



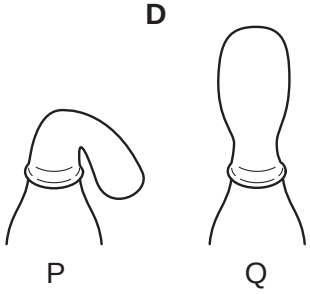
B



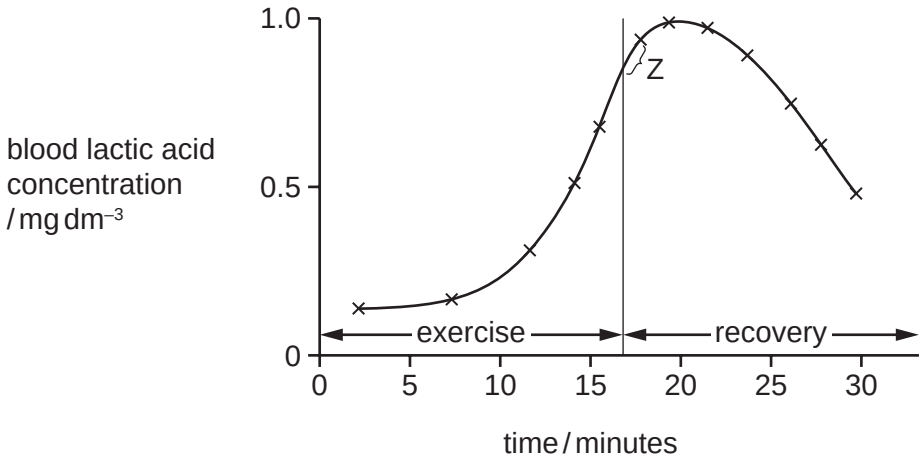
C



D



22 The graph shows the lactic acid concentration in blood during and after exercise.



The continuation of which process accounts for the shape of the graph at Z?

A deep breathing

B high heart rate

C high rate of breathing

D movement of lactic acid from the muscles

23 What is the most important function of sweating?

A to remove excess heat from the body

B to remove excess salts from the body

C to remove excess urea from the body

D to remove excess water from the body

24 Four effects of a specific hormone are listed.

- increased blood pressure
- increased blood glucose concentration
- increased rate of respiration
- reduced blood flow to the gut

What is this hormone?

A adrenaline

B glucagon

C insulin

D testosterone

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25 The diagram shows a person sweating in hot weather.



What part is played by sweat glands during the process of sweating?

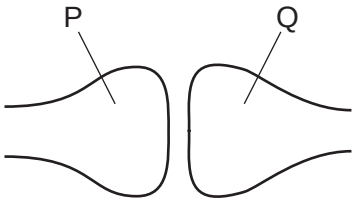
A effector

B receptor

C sense organ

D stimulus

26 The diagram shows a synapse in a reflex arc.



What are the identities of the two neurones and in which direction does the neurotransmitter pass?

	neurone P	neurone Q	direction of passage of neurotransmitter
A	motor	relay	P → Q
B	motor	sensory	P → Q
C	relay	motor	Q → P
D	relay	sensory	Q → P

27 The immune system recognises pathogens and attacks them.

Which feature of pathogens triggers this response?

A antibodies

B antibiotics

C antigens

D memory cells

28 Which environmental factor is **not** always a requirement for seed germination?

A light

B oxygen

C suitable temperature

D water

29 Which row shows the adaptive features of sperm cells?

	flagellum	jelly coat	mitochondria
A	absent	absent	present
B	absent	present	absent
C	present	absent	present
D	present	present	absent

30 In some mammals the allele for brown coat colour is dominant to the allele for white coat colour.

Which percentage of offspring will be white if a cross is made between two heterozygous mammals?

A 0% **B** 25% **C** 50% **D** 100%

31 Which term is defined as a length of DNA that codes for a protein?

A amino acid

B chromosome

C gene

D mutation

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32 The following are involved in protein synthesis.

1 amino acids assembled in order

2 mRNA moves to the cytoplasm

3 mRNA passing through a ribosome

4 DNA in the nucleus

In which order do they become involved when proteins are made?

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

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

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

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

33 What makes tongue rolling an example of discontinuous variation?

A A person can roll their tongue only when they are young.

B There are many different types of tongue rollers.

C Tongue rolling has to be learnt.

D Tongue rolling is something that a person either can or cannot do.

34 The distribution of the sickle-cell allele in human populations varies in different areas of the world.

What is an explanation for this difference?

A People that are heterozygous for the sickle-cell allele have a resistance to cholera.

B People that are heterozygous for the sickle-cell allele have a resistance to malaria.

C People that are heterozygous for the sickle-cell allele are more likely to suffer from anaemia.

D People with sickle-cell anaemia have more alleles.

35 Nitrogen in the air cannot be used by plants until it is in the form of nitrates.

Which two processes convert nitrogen from the air into nitrates?

A decomposition of faeces and nitrification

B denitrification and lightning

C nitrogen fixation by bacteria and denitrification

D nitrogen fixation by bacteria and lightning

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36 What is shown by the widest block in a pyramid of numbers for a grassland ecosystem?

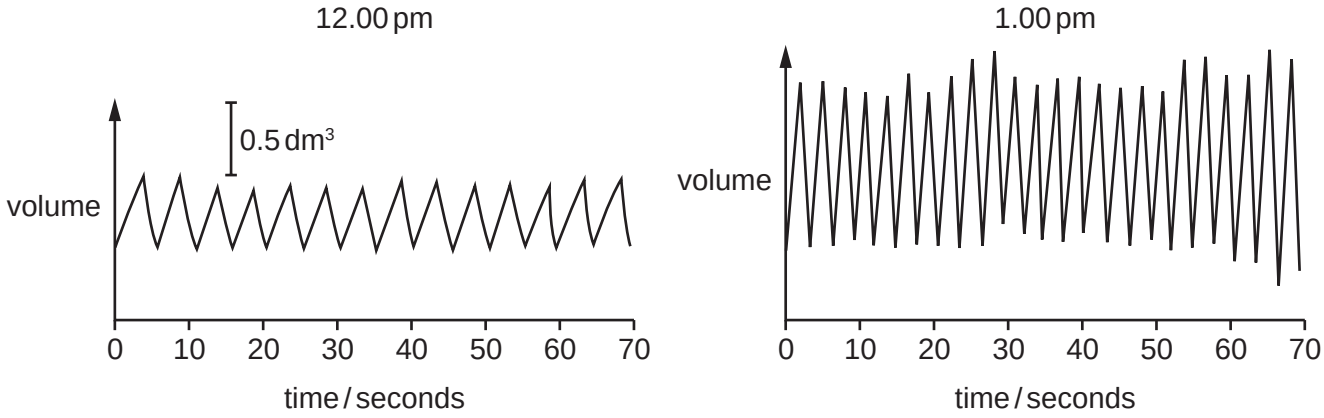
A all the consumers in the pyramid

B the carnivores in the pyramid

C the organisms at the top of the pyramid

D the producers in the pyramid

37 The diagrams show the depth and rate of breathing in a person at 12.00 pm and 1.00 pm.



What happens to the person's breathing between 12.00 pm and 1.00 pm?

	depth of breathing	rate of breathing
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

38 Ligase enzymes are used in genetic engineering to

A cut open plasmid DNA.

B insert plasmids into bacteria.

C isolate the DNA making up a human gene.

D join human DNA to plasmid DNA.

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39 What is **not** a reason for conservation programmes?

A to introduce new species

B to maintain nutrient cycles

C to maintain resources

D to protect vulnerable environments

40 Some examples of the waste products of human activity are discarded household rubbish, excess fertiliser, industrial chemicals and untreated sewage.

Which of these can **both** cause increased growth of aquatic plants?

A chemical waste and discarded household rubbish

B discarded household rubbish and excess fertiliser

C excess fertiliser and untreated sewage

D untreated sewage and chemical waste

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