Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **1522/22**

Paper 2 Multiple Choice (Extended) **May/June 2021**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **16** pages.

[Turn over

1 Which characteristic of living organisms is the taking in of materials for energy, growth and development?

A respiration

B nutrition

C excretion

D reproduction

2 Which pair of plant species belong to the same genus?

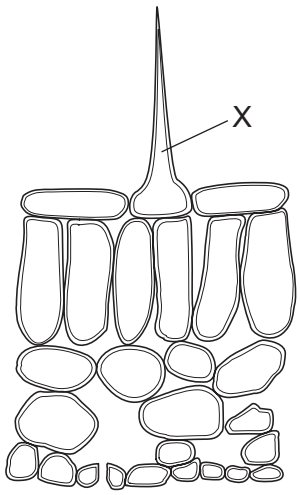
A *Callisia repens* and *Juncus bulbosus*

B *Juncus bulbosus* and *Ranunculus bulbosus*

C *Callisia repens* and *Ranunculus repens*

D *Ranunculus bulbosus* and *Ranunculus repens*

3 The diagram shows part of a cross-section of a leaf, as viewed under a microscope.



Which level of organisation is shown by structure X?

A an organ system

B an organ

C a specialised cell

D a tissue

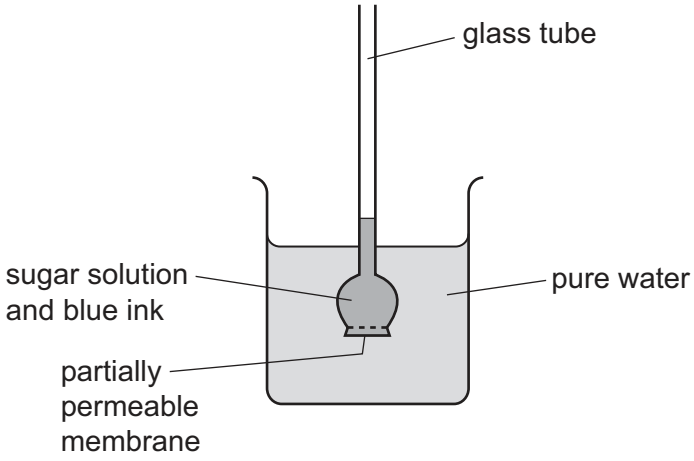
4 A student draws a diagram of a plant cell.

The diagram is 25 mm wide. The actual plant cell is 50 μm wide.

What is the magnification of the diagram?

A ×50 **B** ×200 **C** ×500 **D** ×2000

5 The apparatus shown was set up.

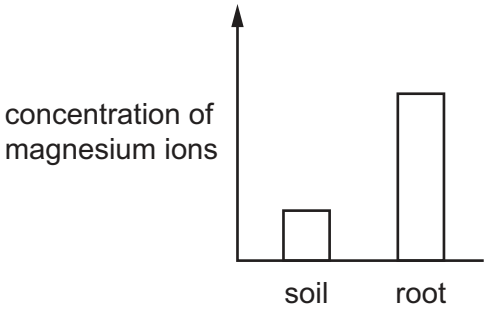


A few hours later, the water in the beaker had turned blue, and the liquid in the glass tube had moved upwards.

Which processes caused these changes?

	water in the beaker turned blue	liquid in the glass tube moved upwards
A	osmosis	diffusion
B	active transport	osmosis
C	diffusion	active transport
D	diffusion	osmosis

6 The bar chart shows the concentration of magnesium ions in the soil and in a plant root.



Which process will move magnesium ions from the soil into the root?

A active transport

B diffusion

C osmosis

D transpiration

7 Which element is found in proteins but is absent from fats?

A carbon

B hydrogen

C nitrogen

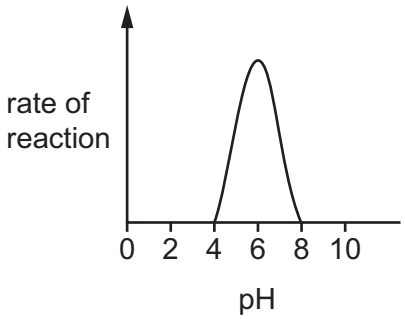
D oxygen

8 The structures of antibodies, DNA molecules and enzymes are specific to their actions.

Which feature of each molecule makes it specific?

	antibody	DNA	enzyme
A	active site	binding site	base sequence
B	base sequence	active site	binding site
C	base sequence	binding site	active site
D	binding site	base sequence	active site

9 The rate of reaction of an enzyme at different pH values was investigated. The graph shows the results of the investigation.



At which pH is the enzyme most active?

A pH 2 **B** pH 6 **C** pH 8 **D** pH 11

10 Why does salivary amylase **not** work in the stomach?

A It is produced in the mouth.

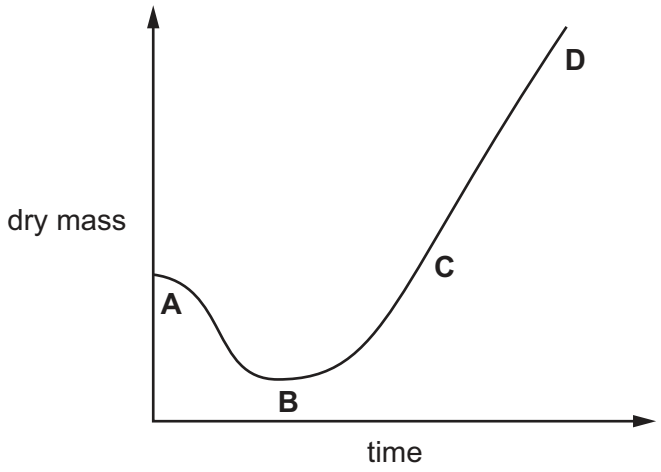
B Starch is not present in the stomach.

C The pH of the stomach is acidic.

D The temperature of the stomach is 37 °C.

11 The graph shows changes in dry mass as a seed germinates and becomes a seedling.

At which point is it respiring and photosynthesising at the same rate?



12 The mineral ions present in four different soils are shown.

Which soil would be best for growing healthy, green plants?

	nitrate ions	magnesium ions
A	absent	absent
B	absent	present
C	present	absent
D	present	present

13 Some of the nutrients that form part of a balanced diet are listed.

1 calcium
2 fat
3 fibre
4 vitamin D

Which nutrients are needed for healthy bones?

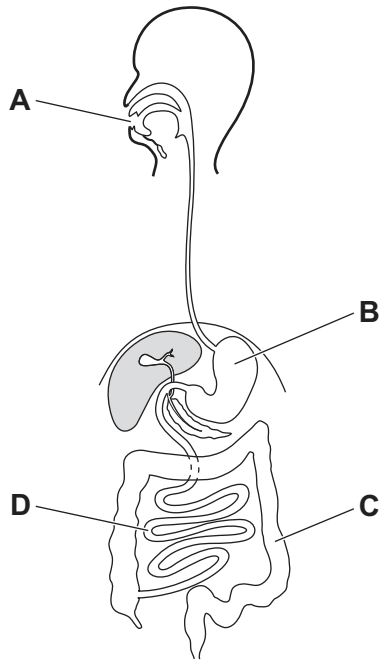
A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

14 Which descriptions of mitosis and meiosis are correct?

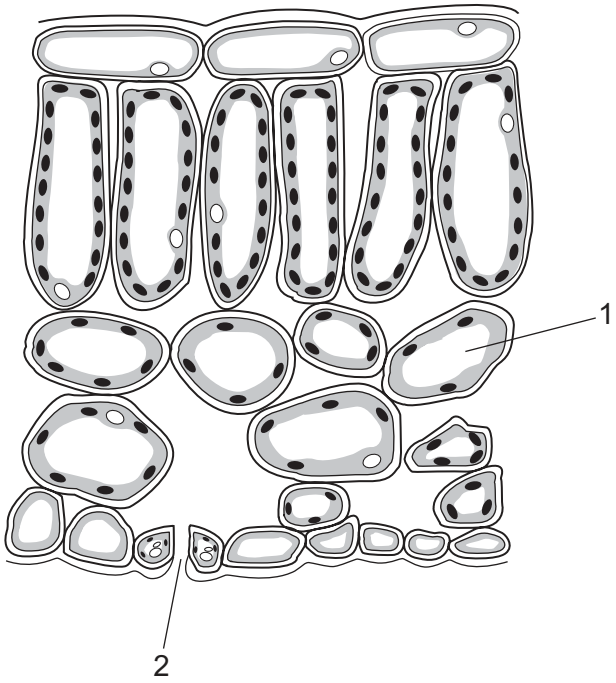
	mitosis	meiosis
A	produces genetically identical cells	repairs damaged cells
B	halves the chromosome number	produces genetically identical cells
C	involved in asexual reproduction	halves the chromosome number
D	involved in sexual reproduction	doubles the chromosome number

15 The diagram shows the alimentary canal and associated organs.

In which part of the alimentary canal is most water absorbed?



16 The diagram shows part of a cross-section through the leaf of a plant that is watered regularly.



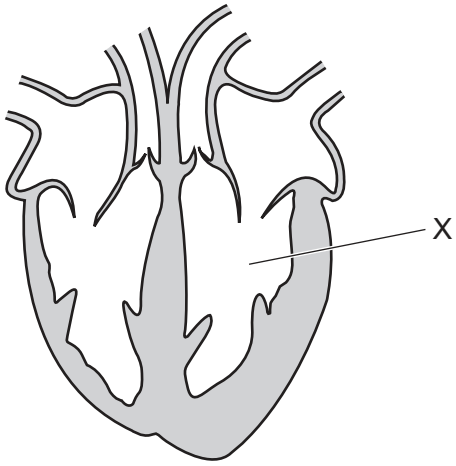
The water supply is removed and the plant wilts.

What is the state of 1 and 2 in a wilted leaf, and how will the water potential change in cell 1?

	state of cell 1	state of 2	water potential in cell 1
A	turgid	closed	higher
B	flaccid	closed	lower
C	turgid	open	lower
D	flaccid	open	higher

[Turn over

17 The diagram shows a cross-section through a heart.



What is the name of the heart chamber labelled X?

A left atrium

B left ventricle

C right atrium

D right ventricle

18 The diagram shows a human blood cell.

What is its function?

A antibody production

B fibrinogen production

C oxygen transport

D phagocytosis

19 The body has different types of defences against pathogens. The list shows some of these defences.

1 antibodies

2 hairs in the nose

3 mucus

4 skin

Which defences help to prevent pathogens reaching the alveoli when breathing in?

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

20 Which features are present in gas exchange surfaces?

	large surface area	good blood supply	thick walls
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✓
D	✓	✓	✓

key

✓ = present

✗ = not present

21 Which organ detects the changes in the carbon dioxide concentration of the blood?

A brain

B liver

C lungs

D pancreas

22 What is the equation for anaerobic respiration in yeast?

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

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

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

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

23 Which food type, when eaten in excess, will cause a rise in the urea content of urine?

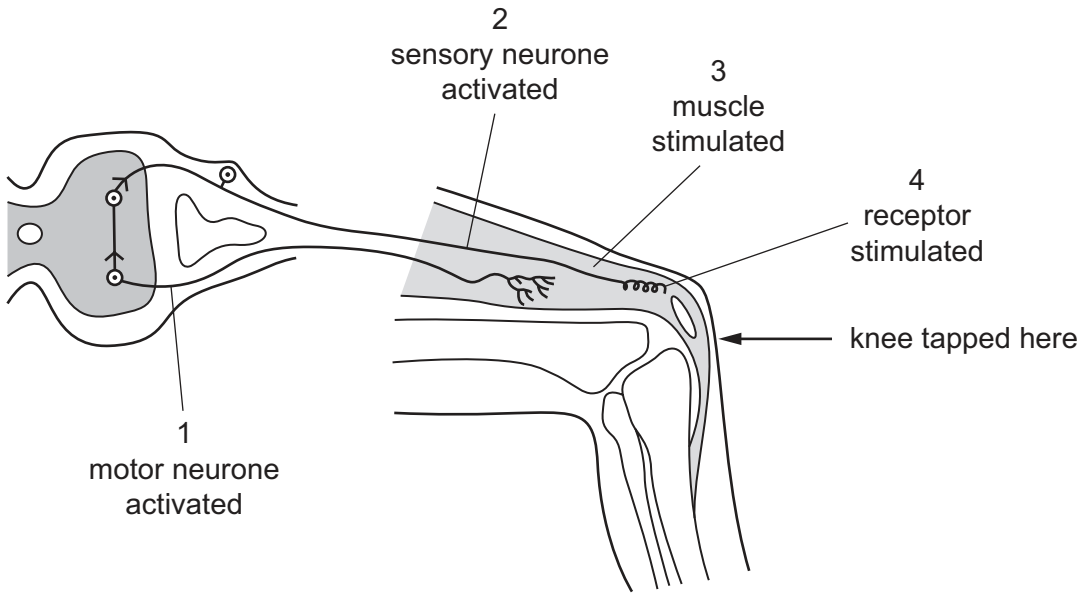
A carbohydrate

B fat

C mineral salts

D protein

24 The diagram shows a simple reflex arc.



What is the correct order of events after the knee is tapped?

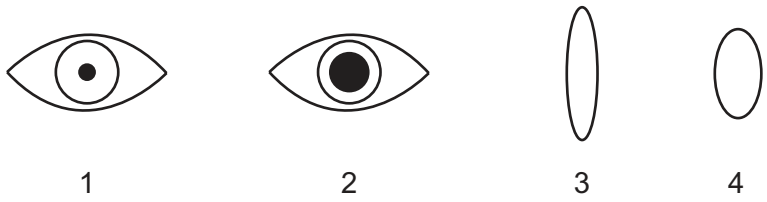
A $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

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

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

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

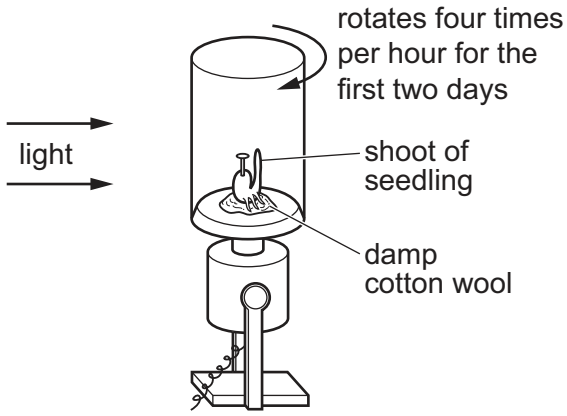
25 Diagrams 1 and 2 show the appearance of the front of an eye. Diagrams 3 and 4 show the shape of the lens when viewed from the side.



Which diagrams show the appearance of the eye when focusing on a near object in bright daylight?

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

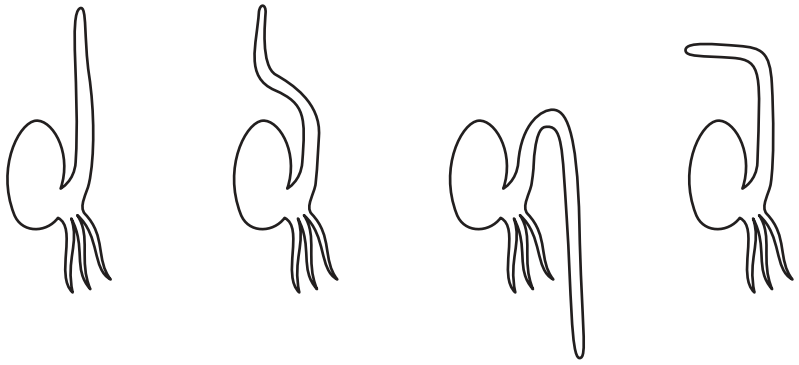
26 The diagram shows a seedling, fixed to a rotating platform. Light is directed from one side only.



The platform was allowed to rotate for two days. The rotation was stopped and the apparatus remained still for a further two days.

Which diagram shows the appearance of the seedling after this four-day period?

A **B** **C** **D**



27 Alcohol is a drug.

Which statement is correct?

A It can cause COPD.

B It is a depressant.

C It is not addictive.

D It reduces reaction times.

28 Which statement about fertilisation is correct?

A One diploid gamete nucleus divides to form a haploid zygote.

B One haploid gamete nucleus divides to form a diploid zygote.

C Two diploid gamete nuclei fuse to form a haploid zygote.

D Two haploid gamete nuclei fuse to form a diploid zygote.

29 Which row links the hormones with their roles in controlling the menstrual cycle?

	causes the egg cell to mature	causes repair and thickening of the uterus lining	causes release of the egg cell	maintains the uterus lining
A	FSH	progesterone	LH	oestrogen
B	FSH	oestrogen	LH	progesterone
C	LH	oestrogen	FSH	progesterone
D	LH	progesterone	FSH	oestrogen

30 In a cell, where are amino acids assembled to form protein molecules?

A cell membrane

B nucleus

C ribosomes

D vesicles

31 A man has the genotype X^aY for a recessive sex-linked condition. A woman is heterozygous for this condition.

What are the chances of the man and woman having a daughter with this sex-linked condition?

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

32 In an animal, the allele for black fur (B) is dominant to the allele for white fur (b). The Punnett squares show four crosses.

1

	male gametes: B	male gametes: B
female gametes: B	BB	BB
female gametes: b	Bb	Bb

2

	male gametes: B	male gametes: B
female gametes: b	Bb	Bb
female gametes: b	Bb	Bb

3

	male gametes: B	male gametes: b
female gametes: b	Bb	bb
female gametes: b	Bb	bb

4

	male gametes: b	male gametes: b
female gametes: b	bb	bb
female gametes: b	bb	bb

Which two Punnett squares show test crosses?

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

33 People who are heterozygous for the sickle cell allele (Hb^AHb^S) have a survival advantage over people who are homozygous for the sickle cell allele (Hb^SHb^S).

What is the reason for this?

A People who are heterozygous live only outside the areas where malaria is common.

B People who are heterozygous have only sickle-shaped red blood cells in their bloodstream.

C People who are heterozygous are resistant to malaria.

D People who are homozygous have no sickle-shaped red blood cells in their bloodstream.

34 Some features of plants are listed.

1 large air spaces inside the leaves

2 stomata on the upper surface of the leaves

3 large root system

4 thick cuticle

Which features are found in hydrophytes?

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

35 Ammonification is the decomposition of plant and animal protein to ammonium ions.

Which sequence of events can occur in the nitrogen cycle?

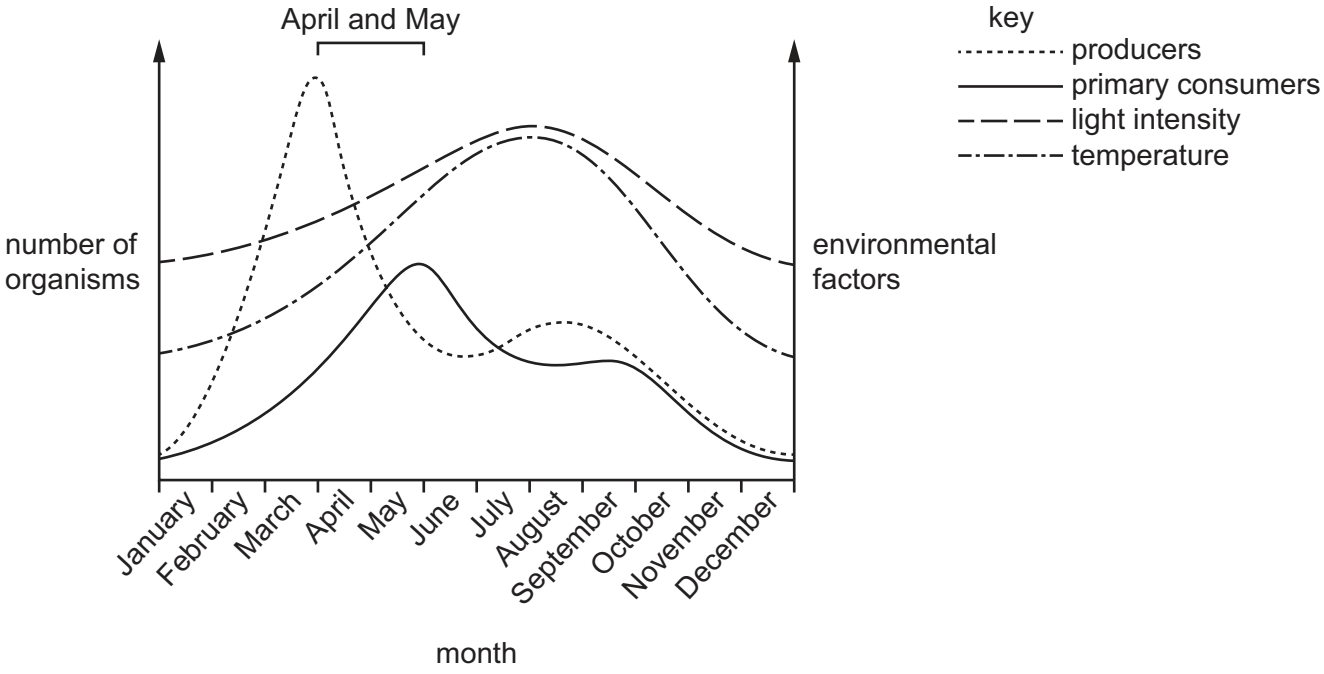
A ammonification → nitrification → denitrification → nitrogen fixation

B denitrification → nitrogen fixation → denitrification → nitrification

C nitrification → nitrogen fixation → denitrification → ammonification

D nitrogen fixation → denitrification → ammonification → nitrification

36 The graph shows the number of producers and primary consumers in a lake over one year. Temperature and light intensity are also shown.



What is most likely to cause the decrease in the number of producers during April and May?

A a decrease in the number of primary consumers

B an increase in the number of primary consumers

C low light intensity

D low temperature

37 Some statements about bacteria are listed.

1 They contain plasmids.

2 They can make complex molecules.

3 They have a rapid reproduction rate.

4 They contain many chromosomes.

5 They do **not** share their genetic code with all other organisms.

Which statements are reasons why bacteria are used in biotechnology and genetic engineering?

A 1, 2 and 3 only

B 1, 3 and 5 only

C 2, 4 and 5 only

D 1, 2, 3, 4 and 5

38 Which enzyme is used to create complementary sticky ends in genetic engineering?

A DNA ligase

B trypsin

C restriction enzyme

D lipase

39 In 1870, approximately 20.4 million people died as a result of famine.

In 1890, approximately 10.0 million people died as a result of famine.

To the nearest whole number, what is the percentage decrease in deaths from 1870 to 1890?

A 204% **B** 49% **C** 104% **D** 51%

40 Some fish populations have greatly reduced in size as a result of overfishing.

What are the effects on a species of having a very small population size?

A better adapted to environmental changes

B reduced genetic variation

C more competition for resources

D fewer genetic diseases