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Cambridge Assessment International Education

Cambridge IGCSE™

BIOLOGY **0610/22**

Paper 2 Multiple Choice (Extended) **October/November 2022**

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.

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1 Which process provides an organism with the raw materials needed for tissue repair?

A excretion

B growth

C nutrition

D respiration

2 Which name is given to a group of individuals that can reproduce to produce fertile offspring?

A a genus

B a kingdom

C a species

D an organ system

3 Root hair cells are found on plant roots.

Which feature is present in a root hair cell but **not** in a sperm cell?

A cell membrane

B cell wall

C chloroplasts

D cytoplasm

4 The cells listed have specialised structures that allow them to carry out their functions.

1 ciliated cell

2 nerve cell

3 root cortex cell

4 sperm cell

Which cells have structures that can move?

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

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5 Some examples of substances moving across membranes are listed.

1 glucose molecules into the epithelium that lines the small intestine

2 nitrate ions from a dilute solution in soil into a more concentrated solution in root hair cells

3 water molecules from mesophyll cells into the air spaces of a leaf

For which examples must oxygen be present?

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

6 Plant tissue is placed in a solution.

What would cause plasmolysis of the plant cells?

1 the external solution having a higher water potential than the plant cells

2 the external solution having a lower water potential than the plant cells

3 water moving out of the plant cells

4 water moving into the plant cells

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

7 DNA is a molecule consisting of two linked strands.

Part of a single strand of DNA has the sequence of bases shown.

ACCGTTGAA

What is the sequence of bases in the second strand?

A ACCGTTGAA

B GTTACCAGG

C TGGCAACTT

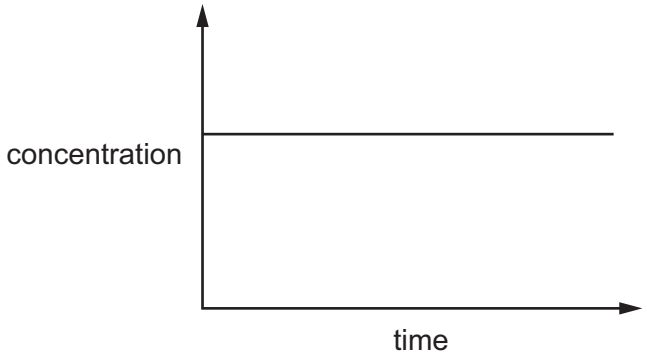
D CAATGGTCC

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8 The graph shows the concentration of a substance during the course of an enzyme-controlled reaction.



Which substance is this?

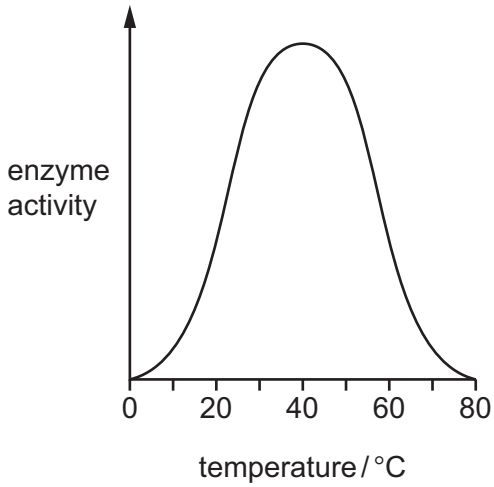
A enzyme

B enzyme-substrate complex

C product

D substrate

9 The graph shows the effect of temperature on the activity of an enzyme.



At which temperature do effective collisions happen most frequently?

A 15 °C **B** 40 °C **C** 60 °C **D** 80 °C

10 Which statement about enzymes is correct?

A They are made of carbohydrates.

B Their activity is unaffected by pH.

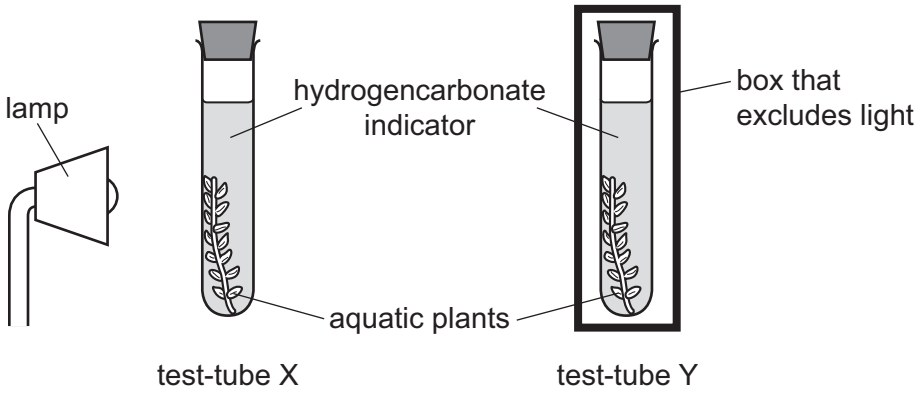
C They are used up during the reaction.

D They have a complementary shape to their substrate.

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11 Two test-tubes were filled with hydrogencarbonate indicator. An aquatic plant was placed into each test-tube and the test-tubes were sealed with bungs, as shown.



Test-tube X was illuminated and test-tube Y was kept in the dark. The results are shown.

test-tube	colour of the hydrogencarbonate indicator	
	at the start of the investigation	at the end of the investigation
X	orange	red
Y	orange	yellow

What causes the colour changes in the hydrogencarbonate indicator in X and Y?

	X	Y
A	a decrease in the concentration of carbon dioxide	an increase in the concentration of carbon dioxide
B	a decrease in the concentration of oxygen	an increase in the concentration of oxygen
C	an increase in the concentration of carbon dioxide	a decrease in the concentration of carbon dioxide
D	an increase in the concentration of oxygen	a decrease in the concentration of oxygen

12 The substances listed are found in the leaf of a plant.

Which substance is obtained from the soil?

A carbon dioxide

B chlorophyll

C glucose

D mineral ions

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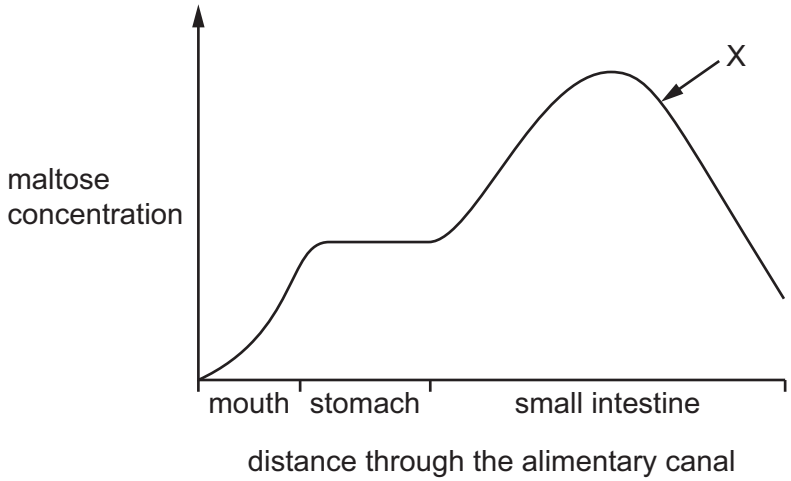
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13 The cholera bacterium produces toxins that cause chloride ions to be secreted into the small intestine.

What is the immediate effect of this on the water potential of blood in the intestinal capillaries, and on the water potential of the contents of the small intestine?

	water potential	
	blood in capillaries	contents of small intestine
A	lowered	lowered
B	lowered	raised
C	raised	lowered
D	raised	raised

14 The graph shows the concentration of maltose in different parts of the alimentary canal.



What causes the change in concentration at X?

A absorption of maltose

B action of amylase

C action of maltase

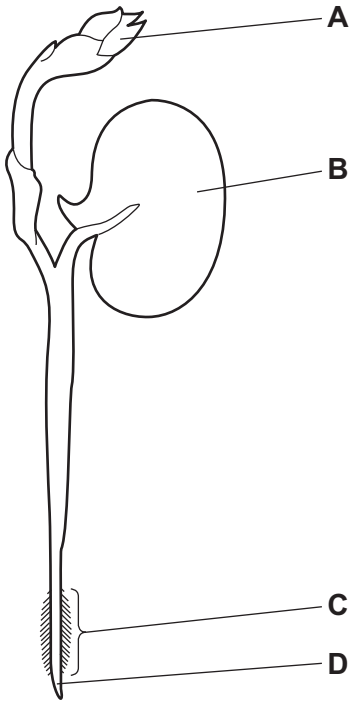
D assimilation of maltose

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15 The diagram shows a bean seedling soon after it has germinated.

Where is most water absorbed?



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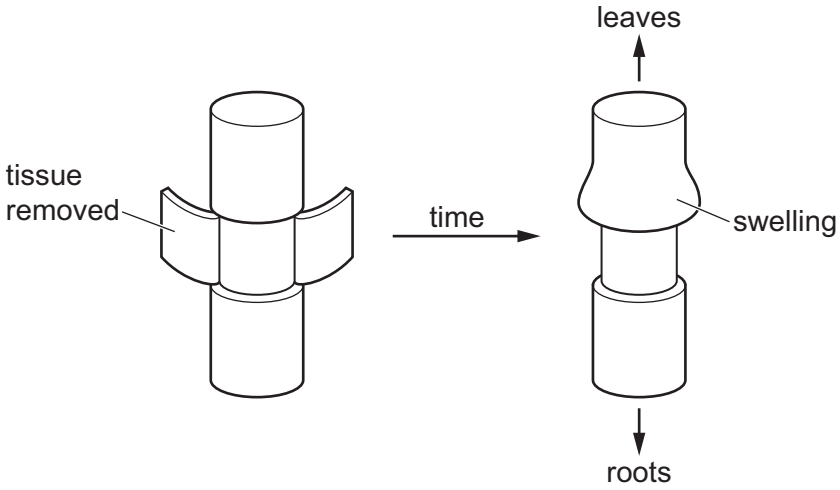
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16 Scientists investigate the movement of substances in a plant.

They cut a ring of tissue from the stem.

Removing the tissue removes some of the transport vessels found around the edge of the stem.

A few days later they notice swelling above the area where the tissue has been removed.



What causes the swelling?

A Phloem vessels have been removed and sucrose cannot move to the sink.

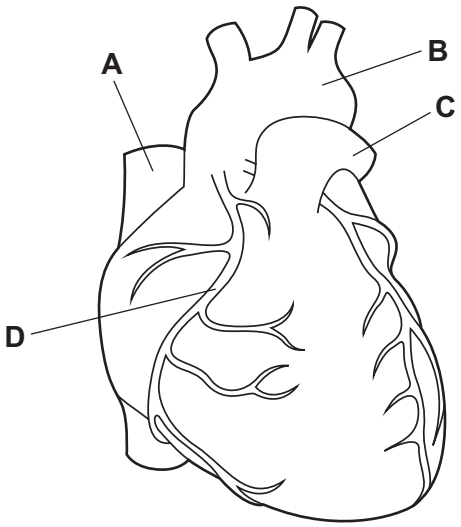
B Phloem vessels have been removed and sucrose cannot move to the source.

C Xylem vessels have been removed and minerals cannot move to the sink.

D Xylem vessels have been removed and minerals cannot move to the source.

17 The diagram shows the outside of a human heart.

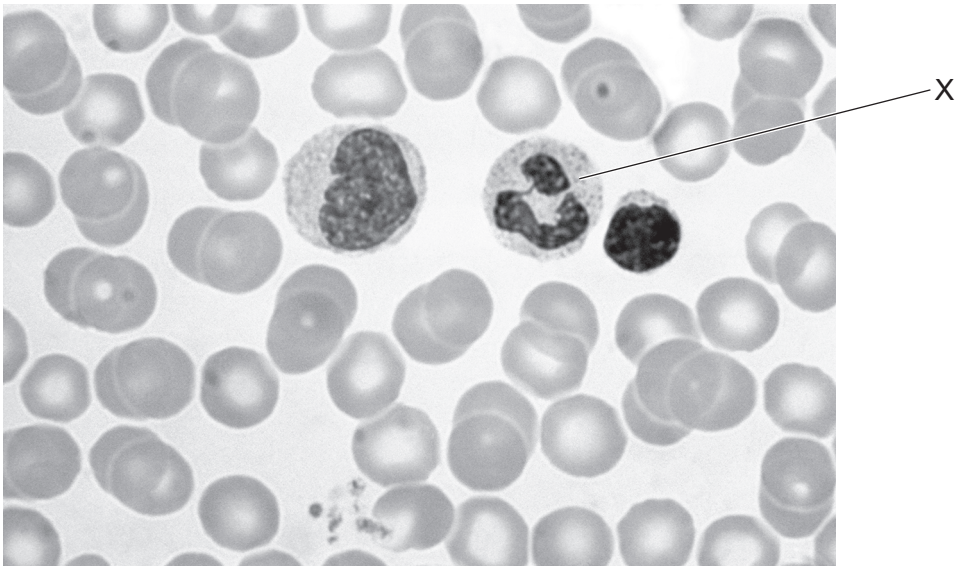
Which structure is a coronary artery?



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18 The photomicrograph shows some different types of blood cell.



What is the function of the cell labelled X?

A clotting blood

B phagocytosis

C producing antibodies

D transporting oxygen

19 *Campylobacter* is a bacterium that can cause food poisoning.

Which word describes *Campylobacter*?

A antibody

B disease

C pathogen

D symptom

20 What is the approximate percentage of oxygen in expired air?

A 0.04% **B** 4% **C** 16% **D** 21%

21 Which process could continue without energy from respiration?

A active transport

B growth

C osmosis

D protein synthesis

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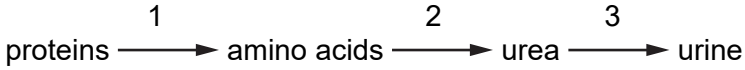
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22 Which row shows the products of anaerobic respiration in humans and yeast?

	products in humans	products in yeast
A	lactic acid only	alcohol only
B	lactic acid only	alcohol and carbon dioxide
C	lactic acid and carbon dioxide	alcohol only
D	lactic acid and carbon dioxide	alcohol and carbon dioxide

23 A person eats foods containing proteins. Some of the amino acids in the proteins are converted to urea and excreted from the body.



Which row identifies the sites of processes 1, 2 and 3?

	site of process 1	site of process 2	site of process 3
A	stomach	liver	kidney
B	liver	kidney	bladder
C	stomach	kidney	liver
D	liver	stomach	kidney

24 What is a response to a low concentration of glucose in the blood?

A Glucagon will cause the body to convert glucose into glycogen.

B Glucagon will cause the body to convert glycogen into glucose.

C Insulin will cause the body to convert glucose into glycogen.

D Insulin will cause the body to convert glycogen into glucose.

25 Which hormone causes an increase in breathing rate, an increase in heart rate and the widening of pupils?

A insulin

B adrenaline

C oestrogen

D testosterone

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26 Which row about tropic responses is correct?

	gravitropism	phototropism
A	root grows away from gravity	shoot grows away from light source
B	root grows away from gravity	shoot grows towards light source
C	root grows towards gravity	shoot grows away from light source
D	root grows towards gravity	shoot grows towards light source

27 What is the definition of a drug?

A a substance produced by a gland that is carried in the blood and alters the activity of target organs

B a substance produced by white blood cells that is carried in the blood and destroys bacteria and viruses

C a substance taken into the body that modifies or affects chemical reactions carried out in the body

D a substance that increases the rate of chemical reactions in the body and is not changed by the reaction

28 What is the sequence of events in sexual reproduction in plants?

A growth of pollen tube → fertilisation → pollination

B growth of pollen tube → pollination → fertilisation

C pollination → fertilisation → growth of pollen tube

D pollination → growth of pollen tube → fertilisation

29 Which statement describes passive immunity?

A the process of antigen production in the body

B defence against pathogens by antibodies acquired from another individual

C the type of immunity that results from vaccination

D immunity that results in the production of memory cells

30 What happens to the number of chromosomes when a cell divides by meiosis?

A doubles from diploid to haploid

B doubles from haploid to diploid

C halves from diploid to haploid

D halves from haploid to diploid

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31 A sex-linked condition is caused by a recessive allele. A healthy male and female are both unaffected by the condition but the female has one copy of the recessive allele.

What is the chance of their offspring being affected by the sex-linked condition?

A 50% of all their offspring

B 100% of male offspring and 0% of female offspring

C 25% of all their offspring

D 50% of male offspring and 25% of female offspring

32 The diagram shows the unspecialised cells of a mammalian embryo soon after fertilisation.



What is the correct description of these cells?

A embryo cells undergoing meiosis

B gametes undergoing mitosis

C stem cells undergoing mitosis

D zygote undergoing meiosis

33 Which feature is a leaf adaptation for a xerophyte?

A hair-like structures on the leaves

B large surface area

C many stomata

D thin waxy cuticle

34 What is an example of evolution?

A the genetic engineering of bacteria to produce human insulin

B the development of antibiotic-resistant bacteria

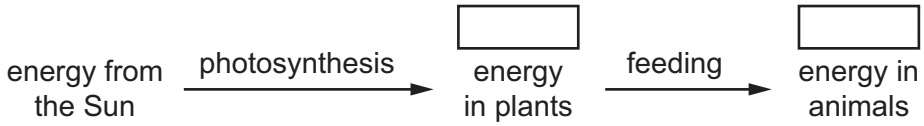
C the changes made to livestock as a result of artificial selection

D the production of lactose-free milk

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35 The diagram shows the flow of energy through living organisms.



Which term should be placed in both boxes to complete the diagram?

A chemical

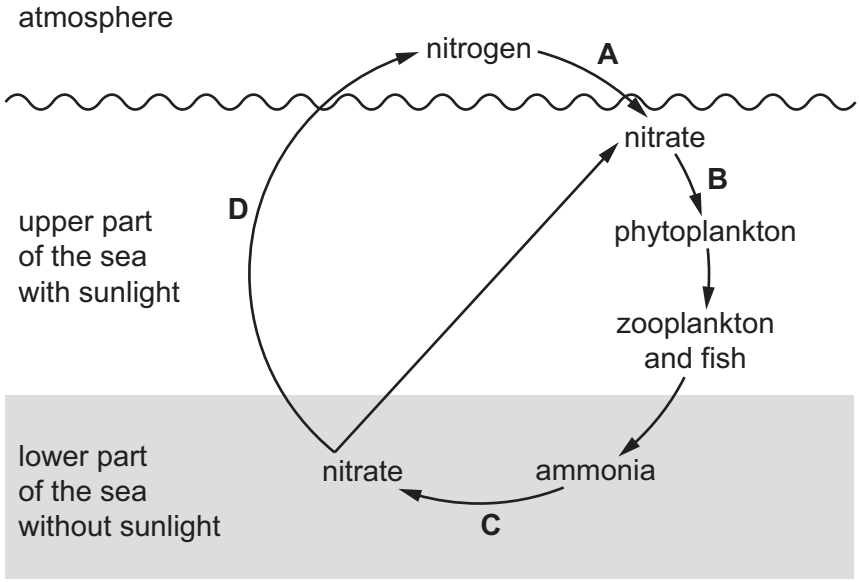
B heat

C kinetic

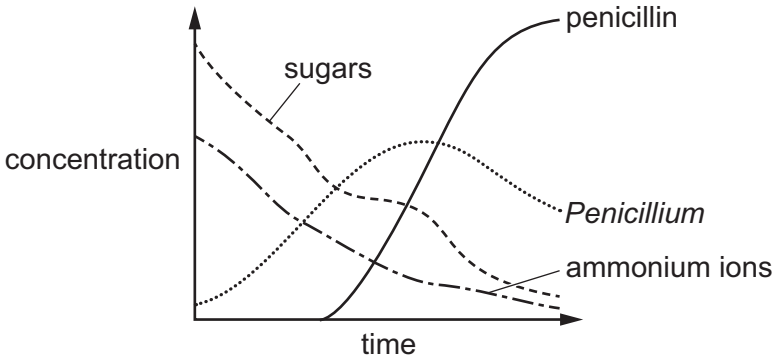
D light

36 The diagram shows the nitrogen cycle in the ocean.

Which stage represents nitrification?



37 The graph shows how much penicillin is produced by the fungus *Penicillium* in a fermenter. It also shows the concentrations of sugars, ammonium ions and *Penicillium*. *Penicillium* uses sugars as a food source and needs ammonium ions.



What does the graph show about the conditions needed for penicillin production?

A A high concentration of ammonium ions must be maintained.

B Most penicillin is produced when nutrient concentrations are low.

C *Penicillium* cannot produce penicillin when its concentration decreases.

D Sugars must be added constantly to the fermenter.

38 The list shows some of the steps in the production of human insulin by genetic engineering.

1 The human insulin gene is inserted into a bacterial plasmid using DNA ligase.

2 A recombinant plasmid is inserted into a bacterium.

3 The bacterium containing the recombinant plasmid replicates.

4 The insulin gene is removed from human DNA using a restriction enzyme.

What is the correct sequence of these steps?

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

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

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

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

39 Deforestation results in an increase in the concentration of carbon dioxide in the atmosphere.

What is the correct explanation?

A There is less decay.

B There is less photosynthesis.

C There is less respiration.

D There is less transpiration.

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40 Which definition of sustainable development is correct?

A providing for the needs of an increasing human population without harming the environment

B using a resource more quickly than it can be replaced

C using increasing areas of land for crops, livestock production and housing

D conservation of endangered species by captive breeding programmes and seed banks

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