

Specimen Paper Answers – Paper 2

Cambridge IGCSE™ / IGCSE (9–1)

Biology 0610 / 0970

For examination from 2023



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Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge IGCSE / IGCSE (9-1) Biology 0610 / 0970, and to show examples of very good answers.

In this booklet, we have provided answers for all questions with examiner comments. This paper requires candidates to answer multiple choice questions. Candidates are awarded a maximum of 40 marks for this paper and the mark scheme provides the answers required to gain the marks.

Each question and answer is followed by an examiner comment on how each answer should be determined. Additionally, the examiner has set out a number of common mistakes that occur when candidates answer the questions. In this way, it is possible to understand what candidates have done to gain their marks and how they could avoid errors.

The mark schemes for the Specimen Papers are available to download from the School Support Hub at www.cambridgeinternational.org/support

2023 Specimen Paper 2 Mark Scheme

Past exam resources and other teaching and learning resources are available on the School Support Hub www.cambridgeinternational.org/support

Assessment at a glance

The syllabus for Cambridge IGCSE Biology 0610 is available at www.cambridgeinternational.org

All candidates take three papers. Candidates who have studied the Core syllabus content, or who are expected to achieve a grade D or below, should be entered for Paper 1, Paper 3 and either Paper 5 or Paper 6. These candidates will be eligible for grades C to G.

Candidates who have studied the Extended syllabus content (Core and Supplement), and who are expected to achieve a grade C or above, should be entered for Paper 2, Paper 4 and either Paper 5 or Paper 6. These candidates will be eligible for grades A* to G.

Core assessment

Core candidates take Paper 1 and Paper 3. The questions are based on the Core subject content only:

Paper 1: Multiple Choice (Core)		
45 minutes		
40 marks	30%	
40 four-option multiple-choice questions		
Externally assessed		

Paper 3: Theory (Core)		
1 hour 15 minutes		
80 marks	50%	
Short-answer and structured questions		
Externally assessed		

Extended assessment

Extended candidates take Paper 2 and Paper 4. The questions are based on the Core and Supplement subject content:

Paper 2: Multiple Choice (Extended)		
45 minutes		
40 marks	30%	
40 four-option multiple-choice questions		
Externally assessed		

Paper 4: Theory (Extended)		
1 hour 15 minutes		
80 marks	50%	
Short-answer and structured questions		
Externally assessed		

Practical assessment

All candidates take one practical paper from a choice of two:

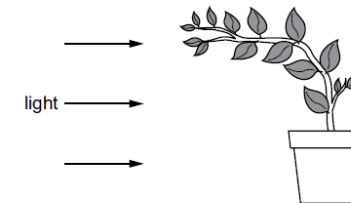
Paper 5: Practical Test		
1 hour 15 minutes		
40 marks	20%	
Questions will be based on the experimental skills in Section 4		
Externally assessed		

Paper 6: Alternative to Practical		
1 hour		
40 marks	20%	
Questions will be based on the experimental skills in Section 4		
Externally assessed		

Specimen answers

Question 1

- 1 The diagram shows a plant.



Which characteristic of living organisms is shown by the plant in the diagram?

- A excretion
- B reproduction
- C respiration
- D sensitivity

Candidate answer: D

Mark awarded = 1

Examiner comment

The candidate needs to recognise that the plant is growing towards the light and that this represents the ability to respond to a stimulus.

Question 2

- 2 Lichens are formed from two different organisms living together.

Organism X and organism Y are found in most lichens.

The table shows some of the characteristics of organism X and organism Y.

X	Y
made of strands called hyphae	single-celled
hyphae have cell walls and many nuclei	cell contains a nucleus and chloroplasts

Which kingdoms do X and Y belong to?

	X	Y
A	fungus	prokaryote
B	fungus	protocist
C	protocist	fungus
D	protocist	plant

Candidate answer: B

Mark awarded = 1

Examiner comment

Candidates need to use the descriptions in the first table and then apply their knowledge of the features used to place organisms into kingdoms.

Common mistakes

Some candidates may see that Y contains chloroplasts and assume that it is a plant. It is important to read all the information in the first table before making a decision.

Question 3

3 Which part of a plant cell controls the movement of substances into and out of the cell?

- A cell membrane
- B cell wall
- C cytoplasm
- D vacuole

Candidate answer: A

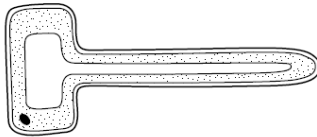
Mark awarded = 1

Examiner comment

This question tests recall of the functions of parts of a cell.

Question 4

4 The diagram shows the structure of a plant cell.



What is a function of this specialised plant cell?

- A It absorbs carbon dioxide from the air.
- B It absorbs ions from the soil.
- C It transports sucrose from leaves.
- D It transports water in stems.

Candidate answer: B

Mark awarded = 1

Examiner comment

To answer this question, candidates need to recognise that this is a root hair cell and then recall the functions of root hair cells.

Question 5

5 How do carbon dioxide and oxygen move into and out of a mesophyll cell?

- A active transport
- B diffusion
- C osmosis
- D transpiration

Candidate answer: B

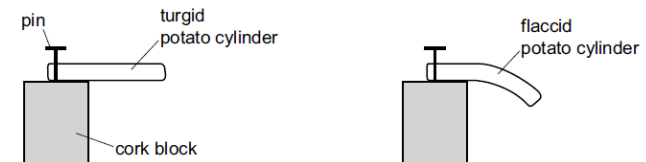
Mark awarded = 1

Examiner comment

This is a recall question requiring knowledge both of diffusion and the role of mesophyll cells in photosynthesis.

Question 6

6 Four freshly cut potato cylinders were soaked for one hour in different salt solutions. The potato cylinders were then pinned to cork blocks. Two of the potato cylinders are shown.



Which solution would cause the potato cylinder to be the most flaccid?

- A 0.1 mol per dm³ salt solution
- B 0.3 mol per dm³ salt solution
- C 0.7 mol per dm³ salt solution
- D 1.0 mol per dm³ salt solution

Candidate answer: D

Mark awarded = 1

Examiner comment

The context provided at the start of the question is helpful if candidates are not sure of the meaning of the term 'flaccid'.

Question 7

- 7 The data show the concentrations of sugar and starch in an onion.

total sugar including reducing sugar /g per 100 g	starch /g per 100 g
3.7	0.0

The onion is tested with Benedict's solution and iodine solution.

Which set of results is correct?

	Benedict's solution	iodine solution
A	blue	blue-black
B	blue	brown
C	brick red	blue-black
D	brick red	brown

Candidate answer: D

Mark awarded = 1

Examiner comment

Candidates should first think about the reagents used to test for reducing sugar and starch, then recall the colours that they give with a negative and positive result, and finally apply this thinking to the information provided in the table.

Common mistakes

Candidates may confuse the colours given in the different food tests.

Question 8

- 8 Which statement about the structure of DNA is correct?

- A Base A always pairs with base C.
- B Base A always pairs with base T.
- C DNA is made of protein.
- D DNA forms a single helix.

Candidate answer: B

Mark awarded = 1

Examiner comment

This is a recall question, requiring knowledge of the structure of DNA.

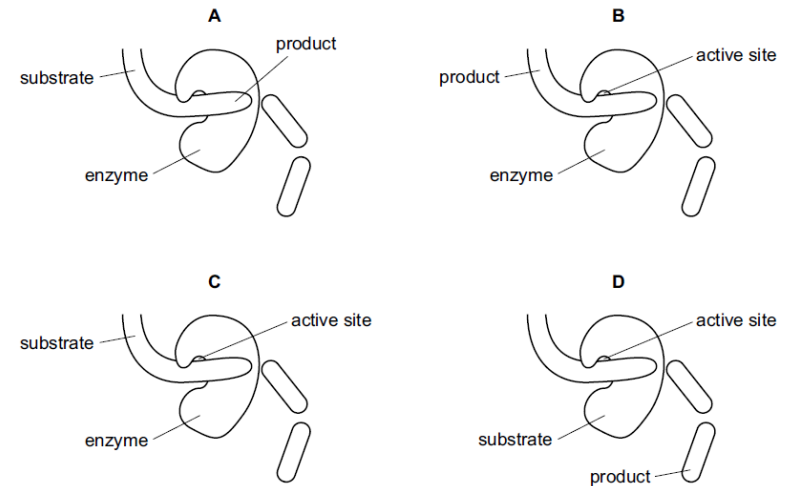
Common mistakes

Any of the three incorrect options could be selected by candidates who are not sure of this topic. Confusing DNA with protein is quite a common error, a misconception that could result in answer C.

Question 9

- 9 The diagrams show a protease enzyme catalysing the breaking of part of a protein molecule into smaller pieces.

Which diagram has three correct labels?



Candidate answer: C

Mark awarded = 1

Examiner comment

This question requires understanding of the terms substrate, product, enzyme and active site. Once these terms have been recalled, the candidate needs to work carefully through each of the four diagrams.

Common mistakes

Working too quickly can produce an incorrect answer. For example, a candidate may see the correctly labelled 'active site' and 'enzyme' on diagram B and not take the time to look at options C or D.

Question 10

10 A student wrote some notes about enzymes.

She wrote:

'The ...1... of an enzyme is ...2... to an area on the substrate.

This area on the substrate can fit into it to form an ...3... complex'.

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
A	active site	complementary	enzyme-substrate
B	active site	similar	enzyme-product
C	shape	complementary	enzyme-product
D	shape	similar	enzyme-substrate

Candidate answer: A

Mark awarded = 1

Examiner comment

This is basically a recall question requiring knowledge of the terminology associated with enzyme function.

Common mistakes

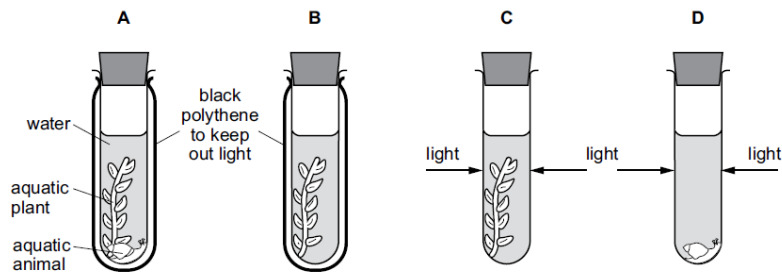
The term enzyme-substrate complex tends to be the least well-known of the three terms required for a correct response.

Question 11

11 The apparatus shown was used in an experiment.

The carbon dioxide content of the water in each test-tube was measured at the start of the experiment and again three hours later.

In which test-tube will the carbon dioxide concentration decrease?



Candidate answer: C

Mark awarded = 1

Examiner comment

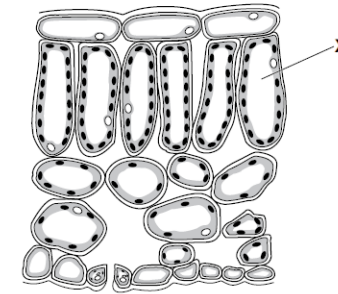
There is quite a lot of information to be carefully read and understood, both in words and in the labelled diagrams. The candidate then needs to recall that photosynthesis uses carbon dioxide, that respiration produces it, and that photosynthesis can occur only in the light.

Common mistakes

Failing to consider all the information provided, or confusing the processes of photosynthesis and respiration, can lead to an incorrect response. For example, a candidate who fails to notice the black polythene around tube B could incorrectly give B as their answer.

Question 12

12 The diagram shows a cross-section of part of a leaf.



What is the name of the cell labelled X?

- A epidermal cell
- B guard cell
- C palisade mesophyll cell
- D spongy mesophyll cell

Candidate answer: C

Mark awarded = 1

Examiner comment

This question requires recall of the structure of a leaf.

Question 13

13 Why do plants need nitrate ions?

- A Nitrogen is a component of amino acids.
- B Nitrogen is a component of fatty acids.
- C Nitrogen is a component of glucose.
- D Nitrogen is a component of starch.

Candidate answer: A

Mark awarded = 1

Examiner comment

This is also a recall question.

Question 14

14 In which part of the body of a mammal does physical digestion occur?

- A gall bladder
- B liver
- C mouth
- D pancreas

Candidate answer: C

Mark awarded = 1

Examiner comment

Here, candidates need first to think about what physical digestion is. They then need to consider what happens in each of the listed parts of the digestive system, and recognise that digestion of any kind occurs only in the mouth. This is also the only one of the four organs through which food passes.

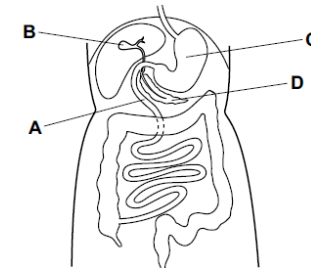
Common mistakes

Candidates may incorrectly suggest A if they remember that the gall bladder produces bile, that bile emulsifies fats, and that this is physical digestion. However, digestion does not happen in the gall bladder as food does not pass through it.

Question 15

15 The diagram shows part of the human digestive system.

Where is protein digested by trypsin?



Candidate answer: A

Mark awarded = 1

Examiner comment

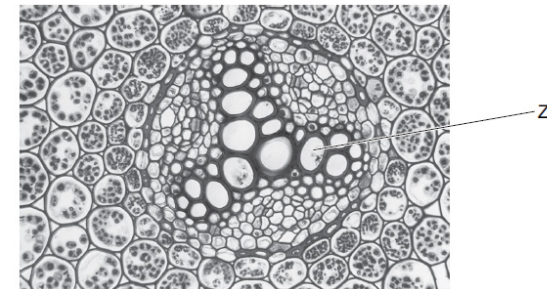
This is a recall question.

Common mistakes

Some candidates may wrongly give the answer D thinking about where trypsin is made rather than where it acts.

Question 16

16 The photomicrograph shows a cross-section through the root of a buttercup plant.



What is the function of the tissue labelled Z?

- A photosynthesis
- B respiration
- C transport of sugars
- D transport of water

Candidate answer: D

Mark awarded = 1

Examiner comment

Interpretation of photomicrographs can be difficult, but this one is very clear and candidates may have seen a similar one during their course. They first need to recognise that Z is a xylem vessel and then recall its function.

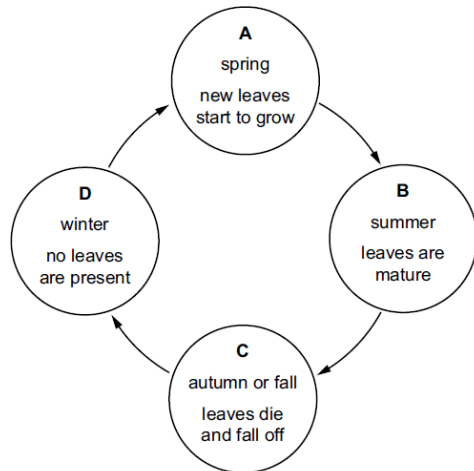
Common mistakes

Candidates could wrongly identify Z as phloem, in which case they might give answer C. Alternatively they might correctly identify Z as xylem, but confuse the functions of xylem and phloem, again wrongly arriving at answer C.

Question 17

- 17 Roots and leaves both act as sources and sinks for sucrose and amino acids at different times during the year.

At which point in the year are the roots most active as a source?



Candidate answer: A

Mark awarded = 1

Examiner comment

Candidates need to remember the meaning of the terms source and sink and then apply their knowledge to this new context. They will need to use the information in the diagram about the leaves and consider how this will affect the uptake or release of sucrose and amino acids from the roots.

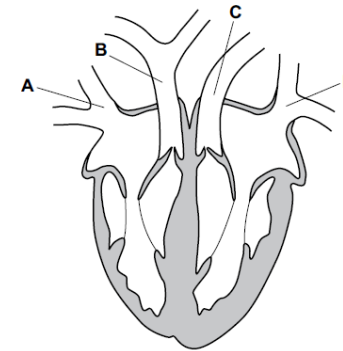
Common mistakes

Incorrect answers could occur if a candidate does not understand the meanings of the terms source and sink. A candidate could also go wrong if they are not able to correctly identify the likely direction of movement of assimilates (sucrose and amino acids) at each time of year shown in the diagram.

Question 18

- 18 The diagram shows a section through a human heart.

Which blood vessel is the pulmonary vein?



Candidate answer: D

Mark awarded = 1

Examiner comment

This is a recall question.

Question 19

- 19 What happens to the heart valves when the ventricles contract?

	atrioventricular valves	semilunar valves
A	close	close
B	close	open
C	open	close
D	open	open

Candidate answer: B

Mark awarded = 1

Examiner comment

This question requires recall of valve action during the different stages of heart activity.

Question 20

20 What are the approximate percentages of oxygen and carbon dioxide in inspired air?

	percentage of oxygen	percentage of carbon dioxide
A	16	4.00
B	16	8.00
C	20	0.04
D	20	4.00

Candidate answer: C

Mark awarded = 1

Examiner comment

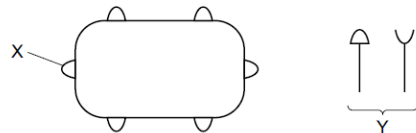
This question requires candidates to recall the values for concentrations of different gases in inspired air.

Common mistakes

There is a possibility that a candidate might confuse inspired air with expired air which would result in giving answer A.

Question 21

21 The diagram with the structure labelled X shows a bacterium with proteins on its surface. The diagram labelled Y shows proteins made by the human body.



Which row shows the correct combination for destroying the bacterium?

	name of X	name of Y	correct shape of Y
A	antigen	antibody	
B	antibody	antigen	
C	antigen	antibody	
D	antibody	antigen	

Candidate answer: A

Mark awarded = 1

Examiner comment

The first step in answering this question is to identify the structures labelled X and Y using the information in the introductory sentence as well as the diagram. Once this has been done correctly, selection of the correct option should be straightforward.

Common mistakes

Candidates may confuse the term antigen and antibody which could result in wrongly selecting option C. If they do not understand the concept of complementary shape, they could select an option that includes the wrong shape of Y.

Question 22

22 Which environmental conditions must always be present for seed germination?

- A carbon dioxide and water
- B light and suitable temperature
- C oxygen and carbon dioxide
- D water and oxygen

Candidate answer: D

Mark awarded = 1

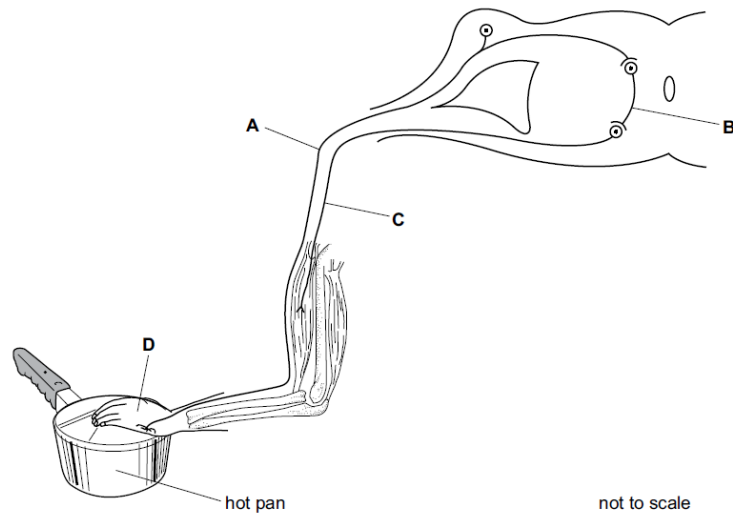
Examiner comment

This is a recall question. Candidates should have investigated the conditions required for germination of seeds and know that water, oxygen and a suitable temperature are always required.

Question 23

23 The diagram shows a reflex arc.

Which structure is the sensory neurone?



Candidate answer: A

Mark awarded = 1

Examiner comment

This diagram, or one that is fairly similar to it, should be familiar to most candidates. They need to recall what a sensory neurone looks like and its position in a reflex arc, and then apply this knowledge to the diagram.

Common mistakes

Candidates sometimes confuse the sense organ, which would be in the part labelled D, with a sensory neurone.

Question 24

24 What happens to the muscles in the iris, to make the pupil smaller?

	circular muscles	radial muscles
A	contract	contract
B	contract	relax
C	relax	contract
D	relax	relax

Candidate answer: B

Mark awarded = 1

Examiner comment

This will be a simple recall question for some, but others may need to think carefully about the effect of contraction and relaxation of each set of muscles.

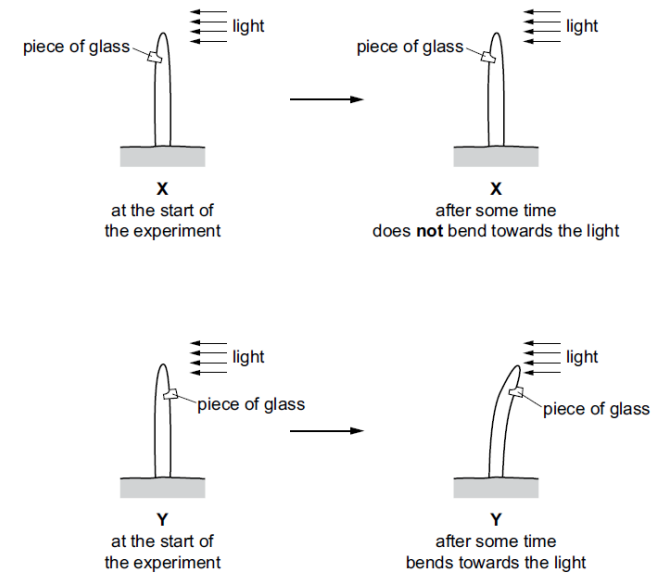
Common mistakes

It is easy to get confused here, perhaps misreading the question and thinking about making the pupil larger rather than smaller, or thinking about making the iris (not the pupil) smaller. It may be helpful for candidates to make a sketch of the iris and the two sets of muscles in it, and then think about what happens when each of them contracts or relaxes.

Question 25

25 A student used two seedlings X and Y to investigate phototropism.

The diagram shows their investigation.



Which statement explains the difference in results between X and Y?

- A The piece of glass destroyed the auxin on the shaded side of the seedling.
- B The piece of glass destroyed the auxin on the side of the seedling facing the light.
- C The piece of glass in X stopped the auxin diffusing down the shaded side of the seedling.
- D The piece of glass in X stopped the auxin diffusing down the side of the seedling facing the light.

Candidate answer: C

Mark awarded = 1

Examiner comment

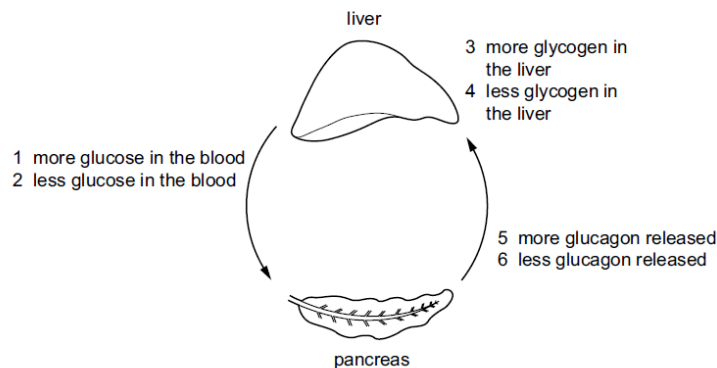
This question may feel quite daunting. It is important to read through the whole question before trying to answer it. The candidate then needs to think about what they know about the role of auxin in phototropism and apply their understanding to this novel situation.

Common mistakes

There is always a temptation to rush a question like this rather than giving it the time and attention that it needs. This can result in an incorrect response even if the candidate has good understanding of how auxin affects phototropism.

Question 26

26 The diagram shows part of the mechanism that controls blood sugar concentration.



A person does one hour of exercise.

Starting with the pancreas, what is the sequence of events in which the hormone glucagon is involved?

A 5 → 3 → 2 **B** 5 → 4 → 1 **C** 6 → 3 → 1 **D** 6 → 4 → 2

Candidate answer: B

Mark awarded = 1

Examiner comment

This is another question that requires careful thought. Candidates need to read all the information carefully and consider what is shown on the diagram. Then they need to draw on their knowledge of the functions of glucagon and work their way around the diagram, starting at the pancreas and following the arrows.

Common mistakes

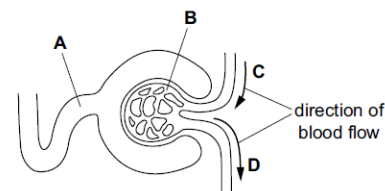
Once again it is important for enough time to be allocated to allow all the information to be fully absorbed, before attempting to select an answer. Candidates who do not know the function of glucagon could go wrong at any stage. They will also make mistakes if they fail to take in the information about the hour of exercise, which could lead to them starting with step 6 rather than step 5.

Question 27

27 The diagram shows the first part of a kidney nephron and its blood supply.

During filtration, protein molecules do **not** pass through the wall of the glomerulus.

Which part contains the highest concentration of protein?



Candidate answer: D

Mark awarded = 1

Examiner comment

The information at the start of the question is very helpful and candidates who read this carefully and recognise which part of the diagram shows the glomerulus can use it to work out the correct response.

Common mistakes

A candidate who does not recognise the structures labelled on the diagram, or who does not know where filtration occurs, could choose any of the incorrect options.

Question 28

28 Which row describes sexual reproduction?

	gamete nucleus	zygote nucleus	genetically different offspring produced
A	diploid	diploid	no
B	diploid	haploid	no
C	haploid	diploid	yes
D	haploid	haploid	yes

Candidate answer: C

Mark awarded = 1

Examiner comment

Candidates need to recall their knowledge of the processes occurring during sexual reproduction.

Question 29

29 Which organ secretes the most progesterone during pregnancy?

- A adrenal gland
- B ovary
- C placenta
- D uterus

Candidate answer: C

Mark awarded = 1

Examiner comment

This is also a recall question testing knowledge of the sources of progesterone during pregnancy.

Question 30

30 What is the role of messenger RNA (mRNA)?

- A assembles amino acids into protein molecules
- B moves a copy of the gene from the nucleus to the cytoplasm
- C controls cell function
- D duplicates chromosomes before mitosis

Candidate answer: B

Mark awarded = 1

Examiner comment

This question tests understanding of the role of mRNA during protein synthesis.

Common mistakes

If the role of mRNA is confused with the role of ribosomes, candidates may wrongly give A as an answer.

Question 31

31 The diagram shows the cell of an organism. The nucleus contains 12 chromosomes.



After this cell divides by mitosis, how many chromosomes would be present in one of the daughter cells?

- A 6
- B 12
- C 18
- D 24

Candidate answer: B

Mark awarded = 1

Examiner comment

Candidates will use their knowledge that mitosis maintains chromosome number.

Common mistakes

This question may be seen as asking something more difficult than it actually does. For example, some candidates may think about duplication of chromosomes before division, which could lead to the answer D. Another possible error is to confuse meiosis and mitosis, resulting in answer A.

Question 32

32 A man marries a woman who has a different blood group from him. They have two children. The children have different blood groups from each other and different blood groups from their parents.

What are the genotypes of the parents' blood groups?

- A $I^A I^A$ and $I^A I^B$
- B $I^A I^A$ and $I^O I^O$
- C $I^A I^B$ and $I^B I^B$
- D $I^A I^B$ and $I^O I^O$

Candidate answer: D

Mark awarded = 1

Examiner comment

Most candidates will need to use trial and error to find their answer to this question. Some may be able to see that, to produce children who are different from each other and from their parents, all three blood group alleles must be involved – you cannot get this result with only two alleles. This leads to answer D, which can then be checked using a genetic diagram.

Common mistakes

Faulty reasoning at any stage, or a too-hasty decision without checking with a genetic diagram, could result in an incorrect response.

Question 33

33 Pure-breeding black-feathered chickens are mated with pure-breeding white-feathered chickens. All of the offspring (F1 generation) have black feathers and white feathers.

When two of the F1 generation chickens are crossed, what will be the ratios of offspring phenotypes?

- A 1 black: 1 white
- B 1 black: 2 black and white: 1 white
- C 3 white: 1 black
- D 3 black: 1 white

Candidate answer: B

Mark awarded = 1

Examiner comment

Candidates can use the information at the start of the question to identify that this characteristic involves codominant alleles. They can either use recall of the results of a cross between the F1, or sketch a genetic diagram, to arrive at their answer.

Common mistakes

If the candidate does not appreciate that codominance is involved, they may give answer C or D.

Question 34

- 34 Over the last 30 years some antibiotics have become less effective in treating bacterial infections.

What is the reason for this?

- A artificial selection
- B asexual reproduction
- C more effective new antibiotics
- D natural selection

Candidate answer: D

Mark awarded = 1

Examiner comment

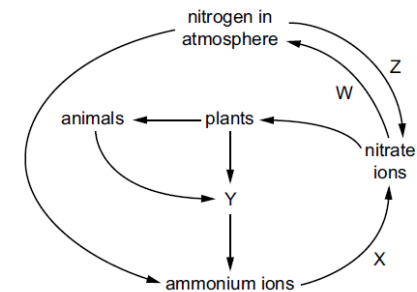
This question requires recall of the processes that lead to the development of resistance to antibiotics in bacterial populations.

Common mistakes

Candidates sometimes think that, because this process involves humans, it is artificial selection.

Question 35

- 35 The diagram shows part of the nitrogen cycle.



Which row identifies the bacteria involved in processes W, X, Y and Z?

	W	X	Y	Z
A	denitrifying	decomposer	nitrifying	nitrogen-fixing
B	denitrifying	nitrifying	decomposer	nitrogen-fixing
C	nitrifying	decomposer	nitrogen-fixing	denitrifying
D	nitrogen-fixing	nitrifying	decomposer	denitrifying

Candidate answer: B

Mark awarded = 1

Examiner comment

This requires candidates to remember what they have learnt about the roles of bacteria in the nitrogen cycle.

Common mistakes

These terms are not always easy to remember, so almost any mistake could be made. Nitrogen-fixing bacteria are usually the best known with nitrification being less well remembered.

Question 36

- 36 The table shows processes in the carbon cycle that release carbon dioxide into the air, or remove carbon dioxide from the air.

Which row is correct?

	releases carbon dioxide into the air	removes carbon dioxide from the air
A	decay	photosynthesis
B	combustion	respiration
C	photosynthesis	combustion
D	respiration	decay

Candidate answer: A

Mark awarded = 1

Examiner comment

This question tests recall of the carbon cycle.

Question 37

37 What helps to maintain fish stocks?

- A fishing during all seasons
- B fishing in all areas of the oceans
- C maintaining protected areas
- D reducing the mesh size of nets

Candidate answer: C

Mark awarded = 1

Examiner comment

This question requires knowledge of how sustainable resources such as fish stocks can be maintained.

Question 38

38 The statements describe some of the events that occur during eutrophication.

What is directly responsible for the increase in decomposers?

- A a decrease in dissolved oxygen concentration
- B an increase in nitrate concentration
- C an increase in the population of algae
- D an increase in the death of producers

Candidate answer: D

Mark awarded = 1

Examiner comment

The question asks for the process that is *directly* responsible for the increase in decomposers, so candidates need to use their knowledge of eutrophication to work through the sequence of events that occur so that they can identify the appropriate one.

Common mistakes

All the processes in the options do occur during eutrophication so a wrong answer can be given if candidates do not fully understand the way in which one event causes the next during this process.

Question 39

39 Which cell structure makes bacteria useful for genetic modification?

- A cell membrane
- B cell wall
- C cytoplasm
- D plasmids

Candidate answer: D

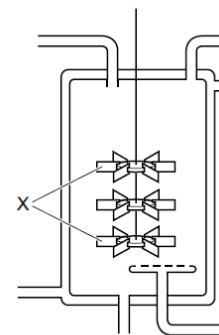
Mark awarded = 1

Examiner comment

This is a recall question.

Question 40

40 The diagram shows an industrial fermenter that is used to produce penicillin.



What is a function of the part labelled X?

- A add oxygen to the solution
- B maintain an even temperature throughout the solution
- C record the pH of the solution
- D sterilise the solution

Candidate answer: B

Mark awarded = 1

Examiner comment

Candidates need to recall and recognise the different parts of a fermenter and recall what the paddles do.

Common mistakes

If the paddles are not recognised as something that rotates within the liquid, then candidates could give any of the other options as their answer.

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