

Examiners' report

GCSE

GATEWAY SCIENCE BIOLOGY A

**OCR Level 1/Level 2 GCSE (9-1) in Biology A
(Gateway Science)**

J247

For first teaching in 2016

J247/01 Summer 2025 series

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Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. A selection of candidate responses is also provided. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

Where overall performance on a question/question part was considered good, with no particular areas to highlight, these questions have not been included in the report.

A full copy of the question paper and the mark scheme can be downloaded from [Teach Cambridge](#).

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Paper 1 series overview

J247/01 is the first paper candidates take for the foundation tier Gateway GCSE Biology suite. It assesses content from specification topics B1-3 and B7 practical skills. Therefore, for candidates to perform well on this paper they will need to have sound knowledge of the theory covered in B1- B3 and be able to apply this to novel situations. The J247/01 component includes a multiple-choice section and a short response section that also includes a Level of Response question. The Level of Response question assesses the quality of communication as well as knowledge and understanding.

Candidates need to apply the skills and understanding that they have developed through practical activities covered in B7. There are also questions that involve the assessment of key mathematical requirements from Appendix 5f of the specification.

It is important that candidates understand the command words and what is expected when a particular command word is used. In some cases, responses were given when explanations were needed, and so candidates did demonstrate an explanation in their answer to access the marks. In other case responses were given that did not respond to the question in terms of the context in which the question was set and apply their knowledge and understanding.

Exam practice is essential so that candidates understand the requirements of a paper. In some cases, it was clear candidates were not reading the question carefully and did not gain marks due to not using the information provided.

It is good that candidates are attempting more of the paper with the omit rate low due to increased accessibility of the paper and candidates being well prepared for most questions. Candidates are gaining more marks due to maths calculations. Showing workings out is essential and best practice.

Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
- demonstrated knowledge and understanding in: - identify different biological molecules (Question 17 (e)) - identify processes that move substances in and out of cells (Question 17 (e)) - recall role of the reproductive hormones in the menstrual cycle (Question 19 (a)) - describe how to focus cells under a light microscope in (Question 24 (b)) - successfully applied knowledge and understanding in: - calculating percentages of bases in DNA (Question 16 (c)) - calculating percentages on heart valve replacements in (Question 22 (b) (i)) - how to carry out a scientific drawing (Question 17 (b)) - ideas of enzyme action and key properties (Question 18 (b) and (c)) - analyse ideas to interpret the effect of temperature on enzyme activity (Question 18 (d)) - analyse information and ideas to develop experimental procedures in (Question 18 (d) (ii)) - analyse information and ideas to evaluate data on ovulating rates in (Question 19 (b) (iii)) - analyse information and ideas to draw conclusions on thermoregulation in the =Level of Response (Question 20 (a)) - analyse information and ideas to make judgements from data and graphs on heart valve replacement in (Question 22 (b) (ii)) - analyse information and ideas to improve experimental procedures in (Question 24 (e))	- found it challenging to describe and identify the parts of DNA (Question 16 (a) (b)) - could not identify the cell structures found in different types of cells and the role of key sub-cellular structures (Question 17 (c) (d)) - seemed to lack understanding on enzyme action (Question 18 (b) (c)) - seemed to lack understanding on blood vessels (Question 22 (a)) - seemed to lack understanding on structures and function in the eye (Question 22 (a)) - found it difficult to describe how to focus cells under a light microscope in (Question 24 (b)) - found it difficult to extract information to draw conclusions in the Level of Response question on thermoregulation (Question 20 (a)).

Section A overview

Candidates responded well to Section A and made sure they selected a multiple-choice response for Questions 1-15. The multiple-choice questions concentrated on Assessment Objectives 1 and 2 (AO1 and AO2).

There was a noticeable increase in candidates who are selected lower case responses which is not best practice to make sure the desired letter is easily distinguishable.

All candidates attempted all the questions.

Questions 1, 2 and 3 discriminated between candidates at different grades and many were answered correctly. Questions 5, 6 and 14 were the most challenging questions in this section.

Question 1

1 Which of these is a plant hormone?

- A Auxin
- B FSH
- C Insulin
- D Testosterone

Your answer

[1]

Most candidates could identify Auxin as a plant hormone. The most common incorrect response selected was FSH, whereby insulin and testosterone candidates were more familiar with these terms as animal hormones.

Question 5

5 A student tests a sample of milk to see if it contains sugar.

Which reagent would the student use and what colour would be observed for a **positive** result?

	Reagent	Colour observed for a positive result
A	Benedict's solution	purple
B	Benedict's solution	red
C	Biuret solution	purple
D	Biuret solution	red

Your answer

[1]

Candidates found this question challenging as they needed to have knowledge and understanding of two different pieces of information for a positive result and correct reagent used for the test for sugar. Only a third of candidates were able to successfully achieve this mark. It was evident that there was an element of guesswork as answers were spread from A-D.

Question 6

6 Which two substances are products of **anaerobic** respiration in plants?

- A Ethanol and carbon dioxide
- B Glucose and carbon dioxide
- C Lactic acid and carbon dioxide
- D Water and carbon dioxide

Your answer

[1]

Question 6 proved challenging with many candidates not gaining this mark for the two products of anaerobic respiration in plants.

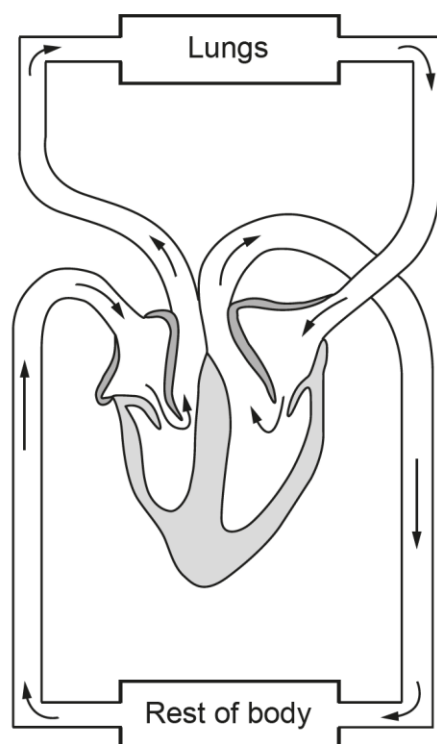
Assessment for learning



Knowledge gap identified. Candidates did not seem to have knowledge and understanding of anaerobic respiration in plants. Candidates would benefit from regular retrieval practice revisiting different types of respiration in animals and plants.

Question 8

8 The diagram shows the human circulatory system.



What describes the route the blood will take when it leaves the lungs and passes to the rest of the body?

- A Pulmonary artery → left atrium → left ventricle → aorta (artery)
- B Pulmonary artery → right atrium → right ventricle → vena cava (vein)
- C Pulmonary vein → left atrium → left ventricle → aorta (artery)
- D Pulmonary vein → right atrium → right ventricle → vena cava (vein)

Your answer

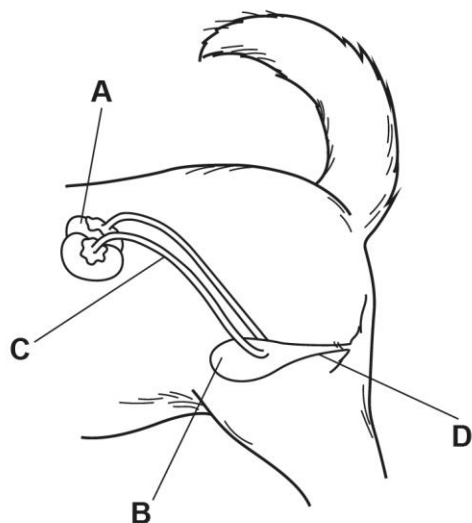
[1]

Less than half of candidates did not achieve this mark. The most common incorrect answer was A mixing up the pulmonary vein with pulmonary artery.

Question 13

13 The diagram shows a dog's excretory system.

Which labelled part is a **kidney**?



Your answer

☐

[1]

This was the most correctly answered multiple-choice question on the paper. Most of the candidates correctly identified the location of the kidney from the diagram. The most common incorrect response was the bladder which had a similar shape to the diagram.

Question 14

14 Which mechanism is used to control **water balance** in the human body?

- A Adjusting the glucose concentration of the urine
- B Altering the volume of urine produced
- C Changing the rate of urea production
- D Varying the rate of sweat production

Your answer

[1]

This question was challenging as it required candidates to understand the role of the kidney in urine production which is a topic candidates generally find challenging, and the question is at standard demand. The most common incorrect answer was mixing up volume of urine and rate of urea production in the control of water balance.

OCR support



OCR have support available for areas of the specification whereby candidates could benefit with further assessment preparation on the role of water balance. [ExamBuilder](#) can identify suitable questions from a question bank to personalise your exam practice on specific areas of the specification.

Section B overview

This section assesses AO1, AO2 and AO3 and includes a selection of questions where candidates choose between options provided (linking boxes with connecting lines, gap fill or by ticking a box), plus short open responses and an extended writing Level of Response question. The overlap questions were Question 23 and Question 24 in this paper.

Candidates generally scored well on the questions which did not require open responses to avoid the tendency to repeat the stem of the question or write an answer which does not hit the key terminology required. The candidate knowledge and understanding on light microscopes and scientific drawings has been mastered the most in the specification assessed in the paper.

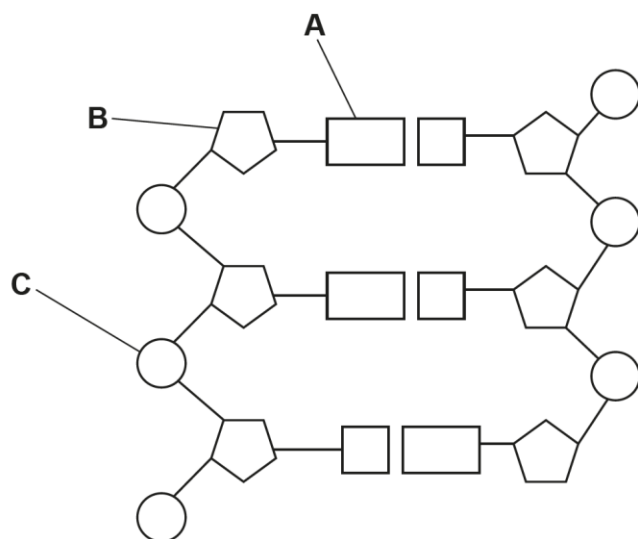
Most questions were attempted with a low omit rate. The exception were the questions on processes that can move substances in and out of cells, enzyme action, application of photosynthesis, osmosis, translocation of sugars and the Level of Response on thermoregulation.

Knowledge gaps have been identified and the key misconceptions where centres could focus and revisit more often throughout the GCSE course with exam technique. Where candidates did not score, it was due to a lack of use of scientific subject-specific terminology and vague responses. Teachers can improve this by using knowledge organisers in lessons for candidates to refer to and retrieval practice revisiting key ideas and knowledge.

Most candidates did not require the extra pages provided at the end of the exam booklet, but it was utilised when necessary.

Question 16 (a)

16 The diagram shows DNA.



(a) Complete the table to show which letter represents each part of DNA.

Part of the DNA	Letter
Base	
Phosphate	
Sugar	

[2]

This question was answered well, and most candidates were able to access at least one mark by correctly identifying parts of DNA. Nearly half of all candidates gained full marks.

Question 16 (b)

(b) Which words can be used to describe DNA?

Tick (✓) **three** boxes.

Double helix

☐

Molecule

☐

Monomer

☐

Polymer

☐

Protein

☐

Single helix

☐

[3]

Most candidates were given either two or maximum marks for their knowledge and understanding of DNA. The most common error was a lack of understanding of a monomer and a polymer as candidates would identify DNA as both. Double helix was the most familiar term the candidates were able to recognise.

Question 16 (c)

(c) A sample of DNA is analysed.

15% of the bases in the sample are Adenine (A).

Calculate the percentage of the bases that are Guanine (G).

Percentage = % [3]

This calculation discriminated well between candidates at different grades. The majority were unable to apply their knowledge and understanding of the complementary base pair rule to the question.

Some candidates did not demonstrate best practice by showing their working out, potentially missing out on a mark here. It is important to remind candidates to show their working as they can gain marks, even if their final answer is incorrect.

The most common error candidates took the 15% of base A away from 100% and gave an answer of 85% instead of knowing there are four bases to consider with equal percentages.

Question 17 (a)

17 A student is observing onion cells using a light microscope.

(a) The student used an objective lens with a magnifying power of $\times 40$ to view the onion cell. The eyepiece had a magnifying power of $\times 10$.

Calculate the total magnification they used to view the onion cell.

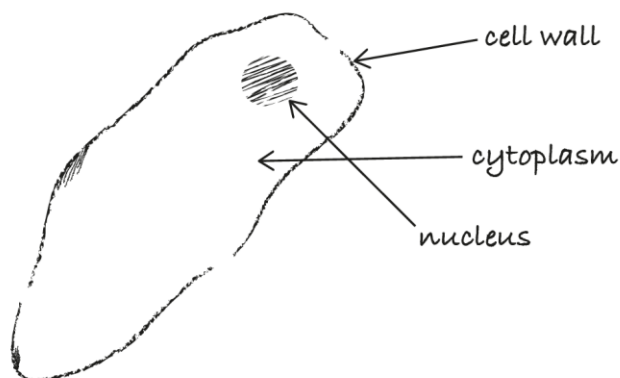
Total magnification used to view the onion cell = [2]

It was clear centres had identified this calculation as a knowledge gap as most candidates were able to calculate the total magnification and gain maximum marks.

The most common error candidates made was adding not multiplying the eyepiece lens by objective lens and gave an answer of $40+10 = 50$ or $40/10=4$ in some instances.

Question 17 (b)

(b) The student produces a labelled scientific drawing of one onion cell.



Describe **three** ways the student could improve their scientific drawing.

- 1
- 2
- 3

[3]

This question required candidates to apply their knowledge and understanding of scientific drawings.

This challenged many candidates as more than half of all candidates did not gain any marks here.

The most common none scoring response was the drawing would benefit to add more detail with labelled sub-cellular structures such as mitochondria, ribosomes which would not be visible. The most common correct response that the candidates were able to identify that the lines should be continuous. Very few candidates know that the drawing should have the magnification added.

Assessment for learning



Centres should make sure that PAG's delivered allow for candidates to develop their skills and rules for scientific drawings.

Question 17 (c)

(c) Animal and bacterial cells have some cell structures that are the same and some that are different.

Identify which structures are present in each type of cell.

Tick (✓) **one** box in each row.

One has been done for you.

Cell structure	In animal cells only	In bacterial cells only	In both animal and bacterial cells
Ribosome			✓
Nucleus			
Plasmid			
Mitochondria			

[3]

Many candidates were able to achieve at least one mark here for correctly identifying that the nucleus is only found in animal cell and not bacterial cells.

Candidates were least confident in their knowledge of mitochondria and if bacteria cells had this sub-cellular structure which candidates did not know or were aware that they lack membrane bound sub-cellular structures.

Question 17 (d)

(d) Which cell structure shown in the table is the site of protein synthesis in cells?

..... [1]

Roughly half of candidates did know that ribosomes are the site of protein synthesis, which is factual recall.

The most common incorrect response was identifying the mitochondria or nucleus.

Question 17 (e)

(e) Substances can move into and out of cells.

Give **two** processes that can move substances into or out of cells.

1

2

[2]

This question on processes that can move substances in and out of cells discriminated well.

This was a factual recall question testing their knowledge and understanding which is an AO1 skill .
There were a significant minority of candidates who did not attempt to answer this question.

The common incorrect response was transpiration, translocation mitosis, sub-cellular structures named.

Assessment for learning



Key process in the movement of substances in and out of cells has been identified as a knowledge gap. Candidates would benefit from revisiting the role of diffusion, osmosis and active transport through and interleaved in the GCSE course to embed this key fundamental knowledge.

Question 18 (a)

18 Amylase is an enzyme that is produced by the salivary glands and is released into the mouth in saliva.

In the mouth, amylase begins the breakdown of starch.

(a) What monomers are large carbohydrates such as starch made from?

..... [1]

This question on knowledge on biological molecules challenged the students as the term monomer may have been unfamiliar to them.

This was a factual recall question testing their knowledge and understanding which is an AO1 skill.
There were a significant minority of candidates who did not attempt to answer this question or receive this mark.

A common incorrect response was protein or amino acids.

Assessment for learning



Knowledge and understanding of biological molecules have been identified as a knowledge gap. Candidates would benefit from revisiting proteins, lipids, carbohydrates and DNA and understand the monomers that make up the polymer molecules through and interleaved in the GCSE course to embed this key fundamental knowledge.

Question 18 (b)

(b) Explain why the enzyme amylase cannot break down the substrate protein.

Include ideas about the active site.

.....

.....

.....

.....

..... [3]

This question required candidates to apply their knowledge and understand of enzyme action. This was challenging for the candidates with a high omit rate and just over half of candidates did not gain a mark.

The most common given mark was the idea that the protein wouldn't fit into the (active site) of the enzyme. Candidates did not know the key properties of enzymes and therefore couldn't apply their knowledge in the level of detail required with the use of the term active site.

Misconception



A misconception has been identified as some students did not understand the term denatured, which is when the active site changes shape and the substrate no longer fits. The enzyme will only denature above and below the optimum pH or above the optimum temperature.

Assessment for learning



Knowledge and understanding of enzyme action has been identified as a knowledge gap. Candidates would benefit from revisiting key properties of enzymes and familiarise themselves with the term active site through and interleaved in the GCSE course to embed this key fundamental knowledge.

Question 18 (c)

(c) Amylase is an enzyme that works best in alkaline conditions.

State what will happen to the structure of the enzyme when it enters the acidic conditions of the stomach.

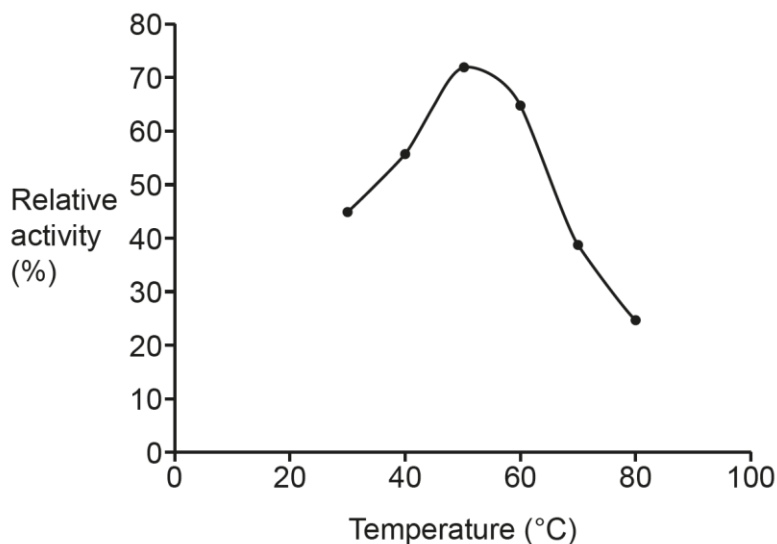
.....
..... [1]

Roughly half of candidates were able to correctly identify that the enzyme would denature in the acidic conditions of the stomach. Candidates who did not gain the mark was due to the lack of scientific language and stating that the enzyme will break down or be destroyed. Candidates need to be familiar with the term denatured in the correct context.

Question 18 (d) (i)

(d) Bacteria also use the enzyme amylase.

The graph shows the results of an experiment to investigate the effect of temperature on the relative activity of this enzyme.



(i) Describe how temperature affects the relative activity of this enzyme.

.....

.....

.....

..... [2]

Half of candidates scored one or two marks on this question on describing the effect of temperature on activity rate. The most common mark was identifying that 50 degrees was the optimum rate. Some candidates did not describe the graph below the optimum temperature and only at higher temperatures. The most common responses which did not gain any marks was not understanding the command words describe and differentiating it from explain. Some candidates tried to explain the graph in terms of the enzyme denaturing.

Assessment for learning



Knowledge and understanding of key command words has been identified as a knowledge gap. Candidates would benefit being more familiar with key command words and be able to differentiate the terms describe with explain through the GCSE course to embed this key fundamental knowledge.

Question 18 (d) (ii)

- (ii) Describe how this experiment could be improved to determine a more accurate optimum temperature for this enzyme.

.....
..... [1]

Most candidates could not analyse the information to improve the experiment to gain a more accurate optimum temperature for this enzyme. A lot of candidate's responses centred around extending the temperature range instead of a narrower temperature range around the optimum temperature.

Assessment for learning



Knowledge gap identified in candidates' understanding of AO3 skills on improving experimental procedures.

The OCR specification clearly states that candidates will be assessed on working scientifically skills and WS1.2e evaluate methods and suggest possible improvements and further investigations. Centres should make sure that these skills are taught alongside the PAG practicals.

OCR support



The [Language of measurement in context for Biology](#) would be useful to share with candidates. This exemplifies where terms such as accuracy are relevant in a practical context to support with questions such as this.

Our Purposeful practical [investigating the effect of temperature on lipase](#) has extension questions that encourages candidates to consider evaluations and improvements to experiments.

Question 19 (a) (i)

19 Hormones are important for human reproduction.

(a) Four human hormones are given below.

FSH

oestrogen

progesterone

testosterone

Identify which hormone fits each of these descriptions.

(i) A hormone that maintains the lining of the uterus.

..... **[1]**

This question involved knowledge and understanding of the hormones involved in the regulation of the menstrual cycle and a large majority of candidates did not have the factual recall.

The most common error was mixing and confusing the role of progesterone and oestrogen.

Question 19 (a) (ii)

(ii) A hormone that causes the lining of the uterus to thicken.

..... **[1]**

This question involved knowledge and understanding of the hormones involved in the regulation of the menstrual cycle and a large majority of candidates did not have the factual recall.

The most common incorrect response the candidates gave from the word bank was testosterone, which is the hormone produced for sperm production.

Assessment for learning



Knowledge and understanding of the regulation of the menstrual cycle by hormones has been identified as a knowledge gap. Candidates would benefit from being able to differentiate the role of key hormones and revisit this through the GCSE course to embed this key fundamental knowledge.

Question 19 (b) (i)

- (b) Female sheep (ewes) have a reproductive cycle which is also controlled by hormones. During their reproductive cycle, ewes will ovulate. However, in some places ewes do not ovulate throughout the year.

The table shows some information about when ewes ovulate in two different places, Idaho and Texas.

Month	Ewes ovulating (%)	
	Idaho	Texas
January	100	100
February	100	94
March	94	52
April	32	32
May	2	31
June	7	75
July	6	94
August	41	100
September	100	94
October	94	100
November	100	91
December	100	100

A farmer will introduce a male sheep into a flock of ewes when the ewes are most likely to be ovulating.

- (i) Which **three** months are **least** likely to result in pregnancy for the sheep in Idaho?

..... [1]

This question tested the ability of the candidates to analyse information and make judgements from data from a table. This was a high scoring question, and most candidates could retrieve this information.

Question 19 (b) (ii)

- (ii) Which **two** months would be **most** likely to result in pregnancy for sheep in both Idaho **and** Texas?

..... [1]

This question tested the ability of the candidates to analyse information and make judgements from data from a table. This was a high scoring question, and most candidates could retrieve this information.

Question 19 (b) (iii)

- (iii) Texas is closer to the equator than Idaho.
Sheep that live closer to the equator tend to ovulate all year round.

Explain how the data supports this statement.

.....
.....
.....
..... [2]

This question tested their ability to analysing information and ideas and evaluate the data. Half of candidates were able to achieve at least one mark here but very few achieved full marks.

This skill comes under working scientifically WS1.3f part of the specification. Centres should make sure that candidates are familiar with this AO3 skill when carrying out PAG activities and in schemes of work.

Question 19 (b) (iv)

- (iv) Pregnancy in sheep lasts 5 months.

Suggest why sheep in colder climates do **not** ovulate in the summer months.

.....
..... [1]

The candidates found this question on applying their scientific knowledge and understanding one of the most challenging on the paper with just a fifth of candidates achieving this mark. The most common response was the idea it was too hot to get pregnant in the summer rather than understanding that they would birth in the winter when it was too cold.

Question 20 (a)*

20 Fig. 20.1 shows a jackrabbit.

Jackrabbits are adapted to live in the desert where it can be cold at night and very hot during the day.

Fig. 20.1



(a)* Explain how the jackrabbit's body regulates its body temperature during the day.

In your answer include:

- the role of the jackrabbit's skin in keeping cool
- how its ears are adapted to increase heat loss.

.....

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.....

..... [6]

The Level of Response extended writing question discriminated well between candidates at different grades. It was based on applying their knowledge and understanding on thermoregulation and analysing information and ideas to make judgements. Most scoring responses were from the skill to analyse the information and extract that the rabbit had big ears and a large surface area which helped in temperature regulation. Most candidates did not apply their knowledge and understanding of the role of the skin and vasodilation and heat loss.

Exemplar 1

During the day it is likely the rabbits breathing is slower reducing the respiration so less water ect is used so the rabbit is cool and fur locks in heat for the cold night. The big ears produce large surface area for heat loss to cool the rabbit down.

In this candidate's response they have given a basic explanation how the jack rabbit is adapted to life in the hot desert with big ears which a large surface area. They have not linked this to increased heat loss by radiation or the role of vasodilation. They have not addressed the role of the skin and only about the need for fur at nighttime when the question is about daytime. This response achieved Level 1, 2 marks.

Question 20 (b)

(b) Explain why it is important for the jackrabbit to maintain a constant temperature.

.....

.....

.....

..... [2]

This question was one of the most challenging on the paper with candidates demonstrating a lack of knowledge and understanding on the importance of homeostatic processes in the body.

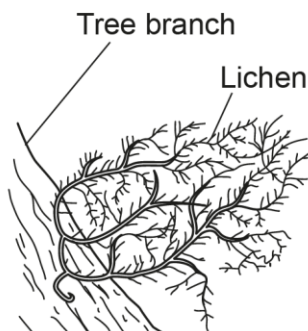
Assessment for learning



Knowledge and understanding of homeostasis in its regulation of a stable internal environment for key metabolic process to occur and enzymes to work in their optimum range has been identified as a knowledge gap. Candidates would benefit being able to regularly revisit this through the GCSE course to embed this key fundamental knowledge.

Question 21 (a)

21 The diagram shows a lichen growing on a tree branch.



A lichen is not a single organism but consists of algae and a fungus living together. Each organism gains something from the other.

The algae in the lichen have chlorophyll. The fungus obtains sugars from the algae.

(a) Explain how the algae produce sugars for the fungus.

.....

.....

.....

.....

..... [3]

Roughly half of candidates achieved at least one mark here, but did seem to find the question challenging to apply their knowledge of photosynthesis in their responses. The most common mark scored was the stating that the algae photosynthesised. Very few candidates identified that the chlorophyll would trap light energy. The most common response which did not achieve any marks was the confusion that the tree would pass sugar to the algae which transfer it onto the fungus.

Question 21 (b)

(b) Explain how the production of sugars in the algae allows the algae to take up water.

.....

.....

.....

..... [2]

This was the most challenging question on the paper and candidates could not apply their knowledge and understanding of osmosis and increasing solute/sugar concentration would have on uptake of water by the algae.

Misconception



Many candidates thought that the algae took up water by active transport and needed the sugar from photosynthesis to do this.

A knowledge gap has been identified, and candidates should revisit osmosis frequently throughout the GCSE course as key fundamental knowledge and ideas in Biology.

Question 22 (a)

22 There are three main types of blood vessel in the circulatory system.

(a) Complete this table by:

- writing the missing types of blood vessel
- putting a tick (✓) or a cross (X) to identify the two missing characteristics.

Characteristic	Type of blood vessel		
		Vein	
Valves along their length	X	✓	
Wall one cell thick	X		✓

[3]

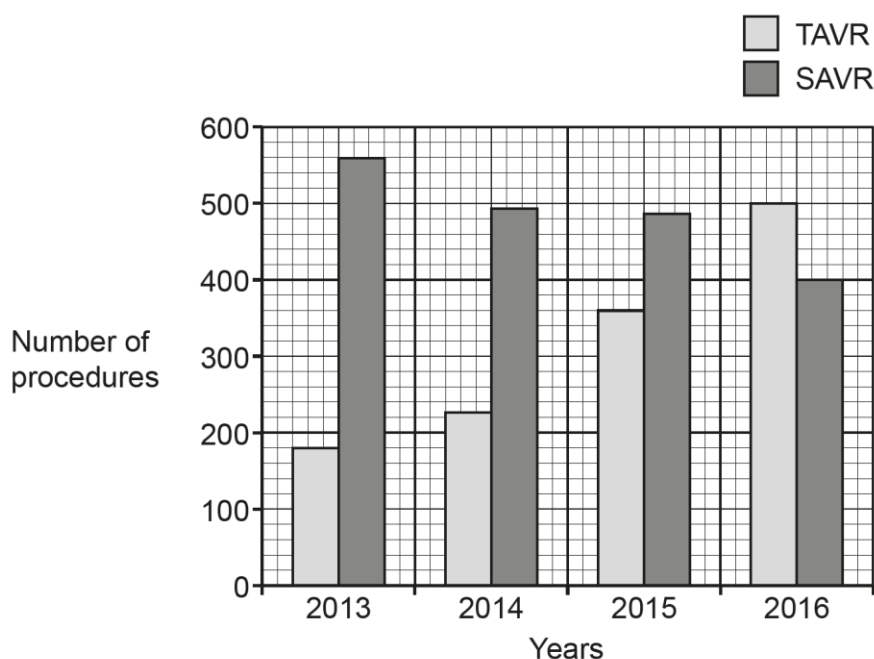
This question discriminated well between candidates, with a good range of marks given. This question was on knowledge and understanding of blood vessels. Over half of the candidates could identify correctly at least one blood vessel based on the characteristics provided. Knowledge retrieval on key powerful knowledge should be addressed throughout the GCSE course and revisited to embed this knowledge.

Question 22 (b) (i)

- (b) Valves in the aorta sometimes need replacing.
There are two procedures that doctors can use to replace these valves.
They are called TAVR and SAVR.

Fig. 22.1 shows the numbers of each of these two procedures that took place in Finland between 2013 and 2016.

Fig. 22.1



- (i) Calculate the percentage of all the replacements in 2016 that used the TAVR procedure.
Give your answer to 1 decimal place.

Percentage using TAVR procedure = % **[4]**

This maths calculated was well attempted by most candidates. Half of all candidates did not know how to calculate the percentage. Candidates who could correctly calculate went on to incorrectly round the answer and were unable to gain one of the marking points.

It is best practice to show all workings and a small minority did not gain marks because of this. Centres should embed the maths skill requirements which make up a minimum of 10% of the paper.

Question 22 (b) (ii)

- (ii) After valve replacement, patients can develop kidney damage or have strokes.

The table shows the percentage of patients that develop kidney damage or strokes after each type of procedure.

	Percentage of patients developing	
	Kidney damage	Strokes
After TAVR	0.5	2.5
After SAVR	2.5	4.0

Use the data in the table to explain the changes in the percentage of patients having each type of procedure shown in **Fig. 22.1**.

.....

.....

.....

.....

.....

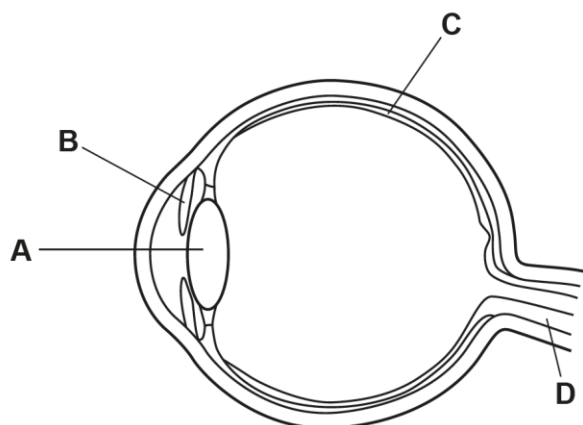
..... **[3]**

This question discriminated well between candidates. This is an AO3 skill working scientifically WS1.3e, and candidates should be mastering the skill of analysis of data. The most common given response was that TAVR has a lower percentage of patients developing kidney damage and strokes over SAVR.

Very few responses used the information in Fig 22.1 that the number of procedures for TAVR was increasing or SAVR was decreasing.

Question 23 (a)

23 The diagram shows the human eye.



(a) State which letter in the diagram performs each of the following functions:

Controls the size of the pupil

Focuses the light on the retina

Transmits electrical impulses to the brain

Detects light

[3]

This question discriminated well with a good range of marks given across the candidates. This was a standard demand question which is challenging of the candidates taking the foundation tier paper. Many candidates had the knowledge and understanding to match up the function of at least two parts of the eye with its function and correctly name those parts. Very few candidates did not score at least one mark here.

Question 23 (b) (i)

- (b) Short-sightedness is a condition that causes the light entering the eye to be focused before it reaches the retina.

Opticians measure the focusing power of the eye in dioptres (D).
It is written as a minus number and indicates how short-sighted you are.

	Focusing power in dioptres (D)
Low short-sightedness	less negative than -3.0
Mild short-sightedness	-3.0 to -4.0
Moderate short-sightedness	-4.1 to -6.0
High short-sightedness	more negative than -6.0

- (i) A student has an eye test.
The optician tells the student that the focusing power of their eyes is -3.5 dioptres.

Explain to the student what this result means and how it is likely to be treated.

.....

.....

.....

..... [2]

This question discriminated well with a good range of marks given across the candidates. This was a standard demand question which is challenging of the candidates taking the foundation tier paper. Many candidates who were given one mark gained it for correctly identifying that the student had mild short sightedness by extraction the information from the table which is an AO3 skill. Those candidates who did not obtain full marks did not have the knowledge and understanding that short sightedness is treated with concave lenses.

Question 23 (b) (ii)

(ii) Once short-sightedness has developed, it usually gets worse.

Another student has a focusing power of -1.0 D which is changing by -0.5 D per year.
Using a drug called atropine will reduce the change to -0.2 D per year.

Calculate how many **more** years it will take for them to develop **mild short-sightedness** if they use the drug compared to not using the drug.

Number of years more = [2]

This question discriminated well with a good range of marks given across the candidates. This was a standard demand question which is challenging of the candidates taking the foundation tier paper. Half of candidates did not score on this question which was a maths calculation. Centres should make sure that maths is embedded with in the KS4 programme of students as some of all questions will be maths.

Question 24 (a)

24 A student is investigating mitosis in garlic roots.

The student grows some garlic for 10 days as shown in **Fig. 24.1** and removes a root.

The student takes a sample of tissue from four parts of the root, **A**, **B**, **C** and **D**, as shown in **Fig. 24.2**.

Fig. 24.1

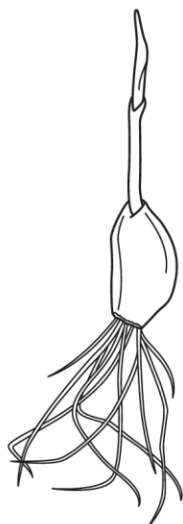
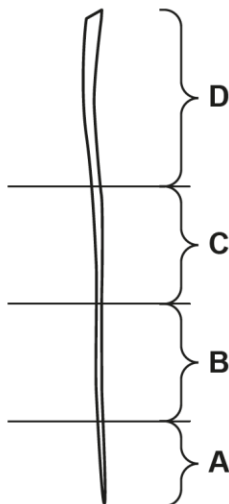


Fig. 24.2



- (a)** The student prepares a slide to look for mitosis in the different parts of the root.
The student adds a stain when preparing the slide.

Explain why the student adds a stain to look for mitosis.

.....
..... [1]

This question in Section B the candidates found challenging, with the vast majority did not score here. The most common response which did not gain the mark was to see the cell more clearly without being specific to mitosis which is to see the chromosomes.

Question 24 (b)

(b) The student uses a light microscope to look at the garlic root cells on the prepared slide.

Describe how the student would set up the microscope so that the details of the garlic root cells are clearly visible.

.....

.....

.....

.....

.....

.....

.....

..... [4]

This question discriminated well with a good range of marks given across the candidates who scored marks. This was a standard demand question which is challenging of the candidates taking the foundation tier paper and few candidates were able to access those top marks for this question. A common response which did not score any marks was describing how to prepare the slide rather than how to use the microscope to focus the image to see the cells.

Assessment for learning



Knowledge gap identified in candidates' understanding of how to use a microscope to see a specimen.

The OCR specification clearly states that candidates will be assessed on working scientifically skills and Centres should make sure that these skills are taught alongside the PAG practicals.

Question 24 (c)

(c) The student takes two measurements when observing the cells under the microscope:

- the total number of cells in the field of view
- the number of cells in the field of view that are undergoing mitosis.

The results are in the table.

Part of the root	Total number of cells in field of view	Number of cells undergoing mitosis in field of view	Percentage of cells undergoing mitosis in field of view (%)
A	120		75
B	125	55	44
C	88	0	0
D	78	0	0

Calculate the number of cells undergoing mitosis in the field of view in part **A**.

Number of cells = [2]

This question was again testing their mathematic ability to apply their maths skills. Candidates either gained full marks or zero marks, with a roughly 1:1 ratio.

Question 24 (d)

(d) The student concludes that only cells found in certain parts of the root can divide by mitosis.

How does the data in the table support their conclusion?

.....
 [1]

This question discriminated well with roughly half of candidates accessing his mark by extracting information and drawing conclusions which is a AO3 skill.

Question 24 (e)

(e) The student wants to improve their experiment to:

- make a more accurate conclusion about where cells in the root can divide by mitosis
- check that their results are reproducible.

Draw **two** lines to connect each **improvement** with **how it can be achieved**.

Improvement	How it can be achieved
Make a more accurate conclusion.	Compare the results with other students' results.
Check that the results are reproducible.	Use a lower magnification so that more cells can be counted.
	Sample from more points in regions A and B .

[2]

This question discriminated well between candidate with a good spread of marks weighted equally.

The OCR specification clearly states that candidates will be assessed on working scientifically skills and WS1.3g states the ability to evaluate in terms of accuracy and reproducibility. Centres should make sure that these skills are taught alongside the PAG practicals.

Question 24 (f)

(f) Cells located in region **D** differentiate to form a tissue responsible for translocation.

State the name of this tissue.

..... [1]

This question had the highest omit rate with roughly a third of candidates not attempting this question. The most common responses which did not gain a mark were meristem; xylem; stomata; transpiration and root hair.

Assessment for learning



Knowledge and understanding of translocation of sugars by the phloem has been identified as a knowledge gap. Candidates would benefit being able to regularly revisit this through the GCSE course to embed this key fundamental knowledge of transport systems in plants.

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