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AS LEVEL

Examiners' report

BIOLOGY A

H020

For first teaching in 2015

H020/02 Summer 2023 series

Version 1

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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 answers 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 OCR.

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Paper 2 series overview

This paper covers a broad range of AS Biology topics with two level of response questions. Practical based knowledge was assessed with one of the level of response questions. Mathematical skills were diverse and included graph interpretation, ratios, means, rate and unit conversions. Questions ranged from simple recall to evaluation questions.

Most candidates attempted all questions and did not use the additional pages at the back of the paper. Calculations were well presented.

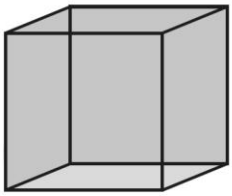
Candidates who did well on this paper generally:	Candidates who did less well on this paper generally:
• answered all questions with very few non responses seen • rounded their answers to the correct number of significant figures and showed clear workings • used precise scientific terminology, e.g. mitosis produces genetically identical cells • read all parts of the question so avoided answers that were already stated in the question stem, e.g. did not reference how to set up a potometer when asked about an investigation using a potometer that was already set up • had a clear understanding of scientific terms and definitions, e.g. species richness and evenness.	• left a lot of questions blank, quite a few non responses seen • could not recall how to calculate, e.g. surface area, and did not round their answers correctly • did not read the stem of the question and referred to information in their answer that was already stated in the question, e.g. setting up a potometer when asked about an investigation using a potometer that was already set up • confused closely related biological structures/ methods, confusing xylem with phloem, confusing starch test with reducing sugars test.

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Question 1 (a) (i)

1 (a) **Fig. 1.1** shows two cubes that represent a large and a small multicellular plant.

Fig. 1.1

Large multicellular plant	Small multicellular plant
	
Length = 2 cm Width = 2 cm Depth = 2 cm	Surface area : volume = 6:1

(i) Using the data provided in **Fig. 1.1**, calculate the surface area : volume of the large multicellular plant.

Surface area : volume = ... **[2]**

The majority of candidates achieved this mark and showed clear calculation steps for their workings. Some candidates did not simplify their ratio or worked out the volume: surface area ratio, instead.

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Question 1 (a) (ii)

(ii) Explain why a large multicellular plant needs a transport system but a small multicellular plant does not.

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

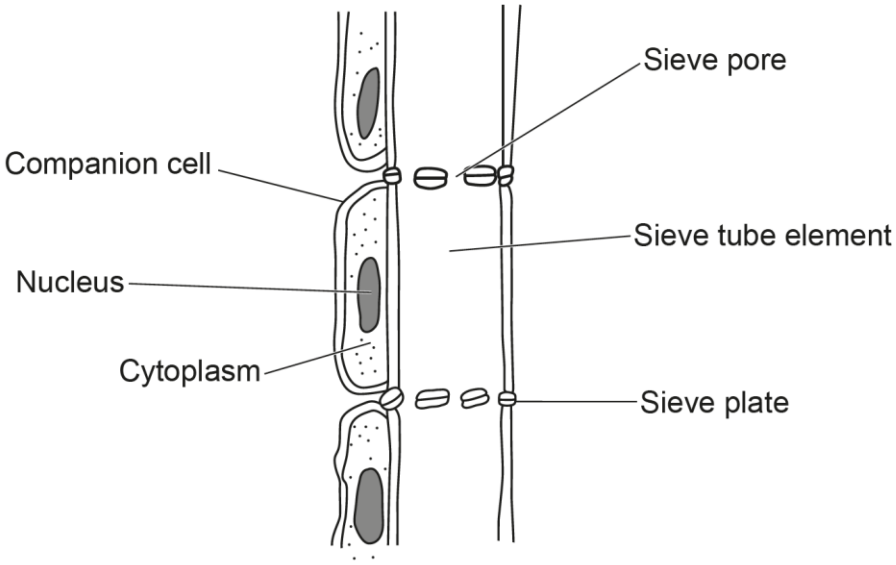
This question was well answered with most candidates achieving 1 mark for recognising that large multicellular plants have a small SA:V although less successful candidates stated they had a large SA:V. Candidates who did not achieve maximum marks discussed the increased distance in large plants without relating this to diffusion.

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Question 1 (b)*

(b)* **Fig. 1.2** shows a diagram of phloem tissue in the stem of a herbaceous dicotyledonous plant.

Fig. 1.2



With reference to **Fig. 1.2** outline the structure and function of phloem tissue in the stem of a herbaceous dicotyledonous plant.

.....

.....

.....

.....

.....

..... **[6]**

This was a highly discriminatory question. More successful candidates referred to the wording in the question to set out their answer, discussing structure of the phloem first and then function. Less successful candidates confused the phloem with xylem, with lots of references to water and mineral ion transport as well as the sieve tube elements composed of dead/lignified cells. Few candidates referred to sieve tube elements having limited cytoplasm although they did recognise that companion cells provide life support to the sieve tube elements. Candidates often referred to assimilates simply as sugars or substances and sometimes glucose.

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Exemplar 1

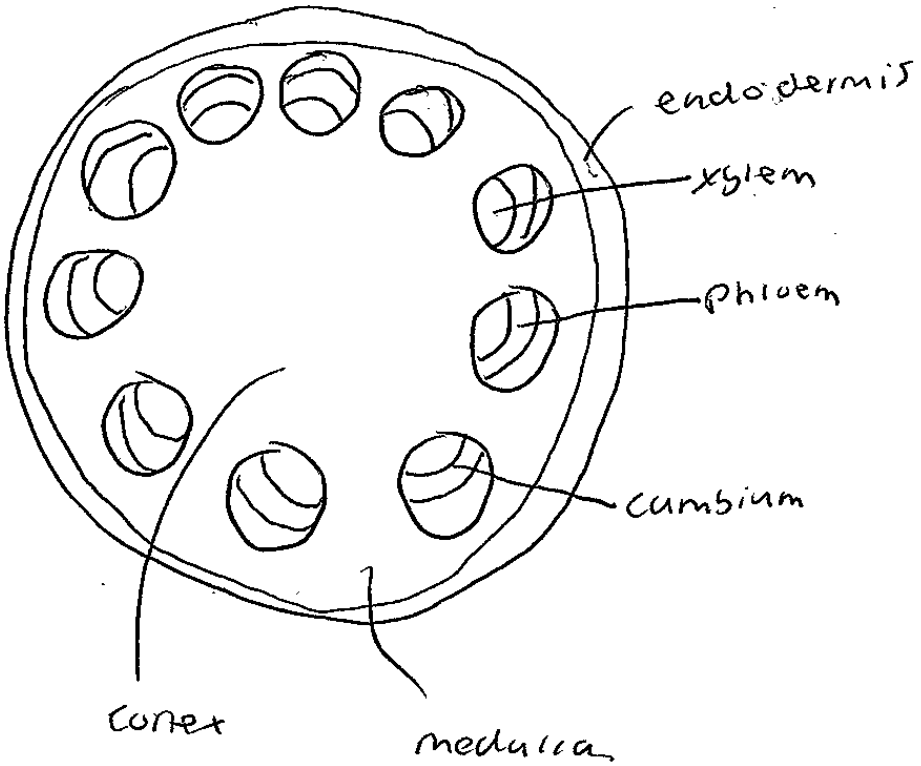
Phloem tissue in the stem of a dicot plant is contained within the vascular bundle. It's function is to transport assimilates* both up and down a plant. Phloem ~~cell~~ tissue is made from companion cells and sieve tube elements. The companion cells are responsible for actively loading the sieve tube elements with sucrose. The sieve tube elements ~~or~~ is where the transport takes place.

companion cells have a very dense nucleus, a dense cytoplasm and many mitochondria. The mitochondria are responsible for providing large amounts of ATP needed to actively move H^+ ions out from the companion cell. The sieve tube elements do not have a nucleus and have little cytoplasm and other organelles as this gives more space for transport of assimilates up and down the vessel. Single sieve tube elements are joined together to form **[6]**

* ~~ASSIM~~ e.g. amino acids, sucrose.

Continuous column but there are sieve plates in between ~~of~~ them which ~~helps~~ allows for the movement of assimilates from one element to the next through the sieve pores. Assimilates are loaded via translocation and are transported up and down via mass flow.

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The answer was a Level 3 and scored 6 marks. This candidate gives a simple discussion of the function as their introduction with good use of appropriate terminology (use of assimilates to encompass both sucrose and amino acids). They differentiate between the components of the phloem, referring to the labels in the diagram and then discuss each component with a summarising role discussing each component in detail. The candidate then discusses the sieve tube element in the same manner, with clear structural features and their functions. A diagram is included which, although it does not add to the written text and mark, clearly focuses the student and shows they have a holistic knowledge of vascular bundles.

Misconception

Many candidates struggled to explain the energy requiring process of translocation, referring to the movement of assimilates through the sieve tube element as energy requiring. Candidates should be aware that the energy requiring component of translocation occurs when loading the sucrose into the sieve tube element by the companion cell but once the assimilates are in the sieve tube element, movement is by mass flow.

Assessment for learning

To help embed the understanding of sucrose being transported in phloem, reference could be made to aphids and insects that suck out the cell sap and the relative sweetness of sucrose compared to glucose (or indeed water as some candidates stated). Acronyms like PSST (whispered) are good tools for recall, Phloem (with) Sweet Sucrose (for) Transport- as an example.

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Question 2 (a) (i)

2 (a) (i) State the cause of transpiration in plants.

.....

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

Although this was a state descriptor, candidates struggled to summarise one aspect of water transport that could cause transpiration and often referred to the movement of water through the xylem rather than the terminal aspect of transpiration in the leaf. Some candidates did refer to the loss of water but were not precise enough with their language and did not refer to water vapour or evaporation.

Question 2 (b) (i)

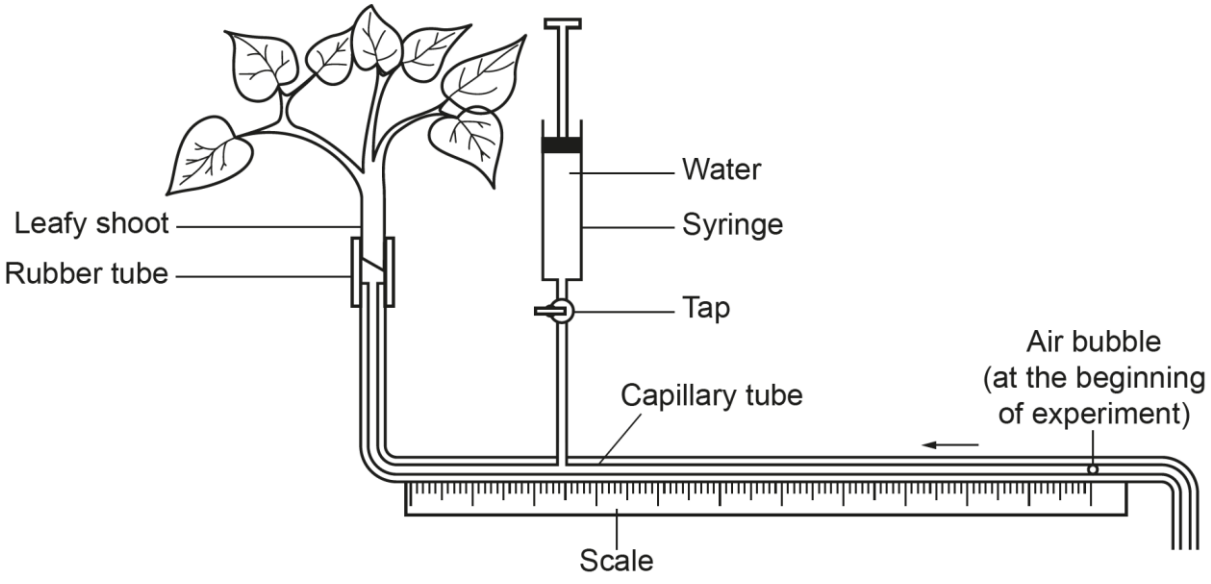
(b) A class of students investigated the effect of humidity on the rate of transpiration from a leafy shoot.

They made the assumption that the volume of water uptake by a leafy shoot is equivalent to the volume of water lost through transpiration.

This is the method the class followed:

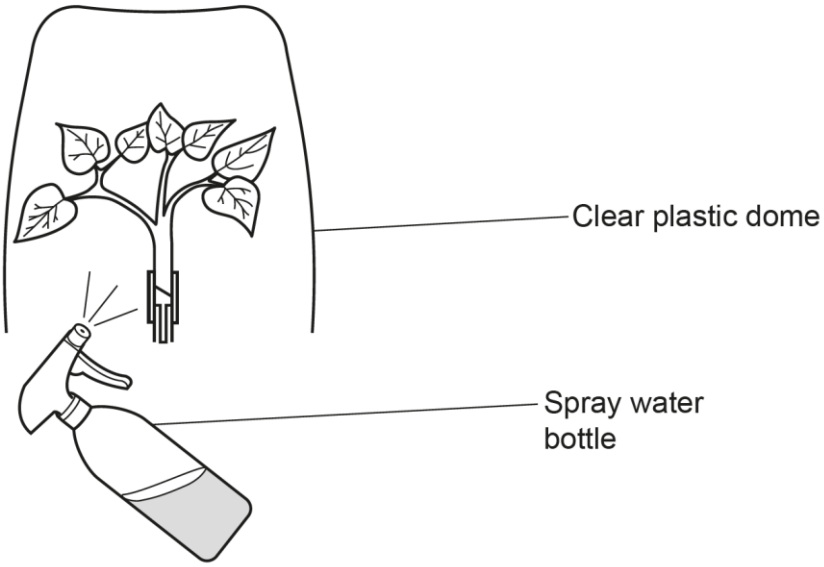
- The class was divided into three groups.
- Each group had a potometer and a leafy shoot, shown in **Fig. 2.1**.
- Each group investigated one humidity level and completed three trials.
- They measured the distance moved by the air bubble in a fixed time.
- Group A used only the apparatus shown in **Fig. 2.1**.
- Groups B and C added to the apparatus. They put a clear plastic dome over the leafy shoot and used a water spray to vary the humidity around the leafy shoot. This is shown in **Fig. 2.2**.

Fig. 2.1



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Fig. 2.2



(i) Suggest **three** improvements the students could have made to their investigation.

Improvement 1

.....

.....

Improvement 2

.....

.....

Improvement 3

.....

.....

[3]

Most candidates achieved 1 mark although few achieved all 3 marks available. Candidates tended to confuse the improvements with the setting up of the potometer itself. Candidates were discussing how to make sure the potometer is set up under water and various aspects of the components in Figure 2.1, suggesting they had not appreciated the given statement that all groups already had the potometer set up. Many candidates did appreciate that the volume of water in each spray should be constant but did not state volume, referring to amount of water.

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Assessment for learning



Visualisation is key to questions like this that have more than one figure and a long stem. Candidates should realise that each group had the same set up, then they varied in their experimental design and it is the latter that the question was asking about. Working in groups, potometers could be already set up on tables (or cut out from a picture if actual apparatus is not plentiful) and then candidates asked to add apparatus that could test a particular factor. This will make it clear that all questions related to potometers are not just about how they are set up and how they work but what else can be added to enhance an investigation into transpiration rate.

Assessment for learning



Precision of language is very important and a good mantra to use with candidates every lesson is to 'be as precise as you can with the knowledge that you have'.

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Question 2 (b) (ii)

Group A. Experiment conducted for 3 minutes.

Number of sprays of water	Distance moved by bubble (mm)				
	Trial 1	Trial 2	Trial 3	Mean	Rate of bubble movement (mm min^{-1})
0	34	30	31	.....	.....

Group B. Experiment conducted for 5 minutes.

Number of sprays of water	Distance moved by bubble (mm)				
	Trial 1	Trial 2	Trial 3	Mean	Rate of bubble movement (mm min^{-1})
1	31	34	32	32.3	6.5

Group C. Experiment conducted for 5 minutes.

Number of sprays of water	Distance moved by bubble (mm)				
	Trial 1	Trial 2	Trial 3	Mean	Rate of bubble movement (mm min^{-1})
2	12	10	9	10.3	2.1

(ii) Complete the table by filling in the missing values for mean **and** rate of bubble movement for group A.

Give your answers to **1** decimal place.

Mean = ... mm

Rate of bubble movement = ... mm min^{-1}

[2]

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Most candidates correctly worked out a rate from their mean value. The most common error for the mean was 31.6 from an incorrectly rounded calculation. Some candidates wrote 31.6 with the recurring dot notation without appreciating that this is not showing the answer to one decimal place.

OCR support

Correctly rounding values is discussed in maths skills handbook as well as the 'Maths for Biology' resources (Module 0).

Question 2 (b) (iii)

(iii) State the conclusion that can be drawn from the students' results.

.....

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

A lot of candidates stated the conclusion 'of' the candidate's results with reference to the movement of the bubble with increasing sprays. They did not develop this further to a conclusion that can come 'from' the candidate's result by referring back to humidity and transpiration as stated in the original stem of the question.

Question 2 (c)

(c) The students wanted to see how air movement affects rate of transpiration.

Describe how you would **modify** the apparatus shown in **Fig. 2.1 and Fig. 2.2** to determine how air movement affects rate of transpiration.

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.....

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

This question was well answered with most candidates referring to the use of fan at different settings. It was often not stated that the plastic dome should be removed to avoid humidity being a conflicting variable. Candidates should appreciate that investigations at this level should focus on one variable only and control any other factor that could have an impact on the results.

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Question 3 (a) (i)

3 (a) A group of students was provided with a sample of an unknown liquid and various chemical reagents. It was suggested that the sample of unknown liquid contained protein.

Here is the chemical test proposed by one of the students to test this suggestion:

- Add 3 cm^3 of unknown liquid sample to an equal volume of sodium hydroxide solution
- Mix
- Leave to stand for 5 minutes.

(i) The above test would not detect the presence of protein in the sample.

State the change that needs to be made to this test to enable protein to be detected.

.....

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

This question was well answered with candidates clearly knowing how to test for proteins. Some answers did refer to Benedict's reagent. The spelling of Biuret varied greatly.

Assessment for learning

Scientific spelling of words that can easily morph into other scientific words should be emphasised and discussed. Phonetic spelling out of words is very important to help candidates visualise the word and not confuse it with other words, e.g. biuret with burette.

OCR support

Always encourage candidates to check their spelling, especially for scientific terms, at the end of a test/exam/question practice.

The OCR guide to examinations is a document that should be referred to throughout the teaching of A Level Biology to make sure a well-structured approach to exams is part of the teaching ethos.

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Question 3 (a) (ii)

(ii) Sodium hydroxide is a white solid ionic compound which is highly soluble in water. It consists of anions and cations.

Complete the table below.

State the chemical symbol of the **anion** present in sodium hydroxide.	
State one use of this **anion** in a biological process.	

[2]

Few candidates named an anion. Those candidates who did state hydroxide often referred to a role as hydrolysis, a clear confusion with water.

Question 3 (b)*

(b)* The students were provided with another sample of an unknown liquid. They carried out chemical tests on this sample to determine what biological molecules were present. Their findings are shown in the table below.

Biological molecule	**Present**
Lipids	Yes
Starch	Yes

Describe the chemical tests you would carry out to see if the students' findings were correct. Include the **apparatus** and **reagents** you would use and the results that you would expect.

.....

.....

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.....

..... **[6]**

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Most candidates attempted this question with many gaining Level 3. More successful candidates made clear reference to the apparatus used and the colour changes that would occur for a positive result. Candidates often omitted the addition of water to the emulsion test or added a heating step. Some candidates struggled to remember the words for spotting tiles, referring to them as white tiles.

A few candidates discussed crushing up samples before doing the tests so had not appreciated the 'sample of unknown liquid' as stated in the stem of the question. Candidates who did not state the correct test often confused the starch test with the test for reducing sugars.

A few candidates referred to the Sudan test for lipids. Some answers added in an extra test. Candidates should be reminded that answers should focus on the information provided and not to add in extra information that does not enhance the question.

Assessment for learning



When preparing for questions on practical methodology it is useful to write each stage on a separate line, cut out each line and ask candidates to put the steps in the correct order. When demonstrating food tests before the candidates performing the experiment, show what would happen if you omitted a step so they can see it would not work effectively without that step.

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Exemplar 2

First, I would prepare 5cm^3 of unknown liquid in 2 different boiling tubes.
Then to one of the boiling tubes I would add 1cm^3 of iodine solution and shake it. If there is a colour change from orange to black then starch is present, if the solution remains orange then it is not present.
To measure the 5cm^3 of unknown liquid and 1cm^3 of iodine I would use a pipette.
Now to test for lipids I would measure a volume of 1cm^3 of ethanol using a pipette and add it to the pre prepared boiling tube containing the unknown. I would then shake the tube and then add 1cm^3 of distilled water using another pipette. Now, I would shake the tube and if a white emulsion appears then lipids were present. If a white emulsion does not appear then it is not present. **[6]**
To make the colour change more visible I would hold the tube upto a white paper for the starch test and hold the lipid test tube upto a black paper as colour change is subjective

This answer is Level 3 and scored 6 marks. This candidate is writing as if they are setting their experiment up in the laboratory. It shows a clear use of the relevant apparatus, the steps involved and the result expected. Each step is set out as a set of instructions, this has enabled the candidate not to miss out a step in each test. Volumes are stated which, although not required to score full marks, shows a thorough understanding of the tests and the relevance of the apparatus stated, e.g. 5cm^3 is a suitable volume to use in a boiling tube.

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Question 3 (c) (i)

(c) (i) The students were then asked to carry out an experiment to determine the glucose concentration of another test solution using a colorimeter.

Describe how the students would use a colorimeter in their experiment.

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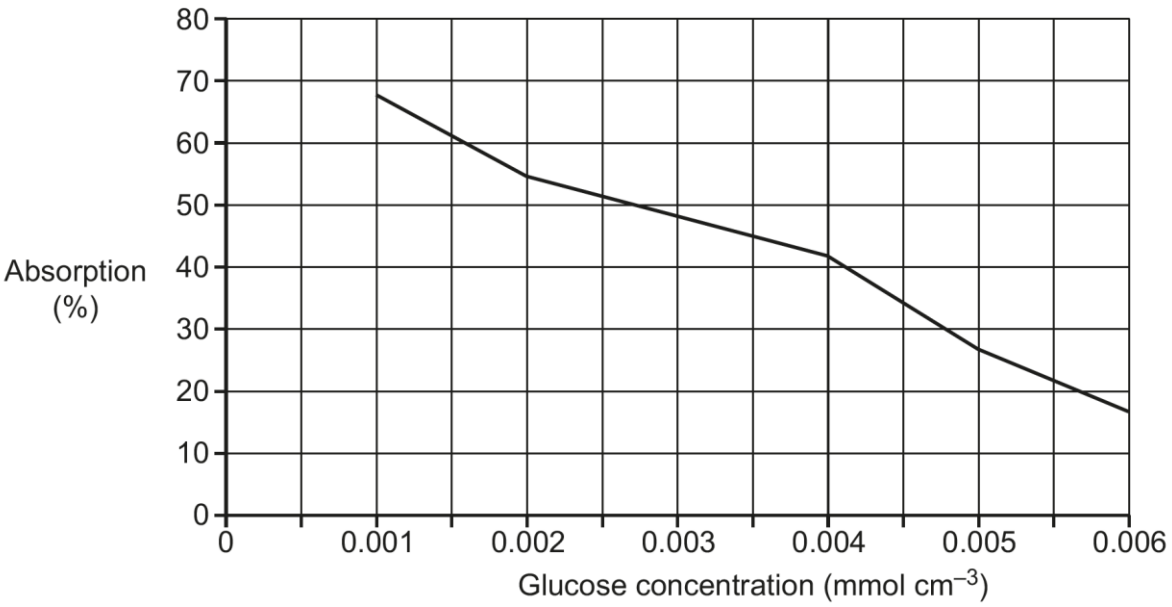
.....

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

This was a discriminating question. Many candidates were familiar with a colorimeter and referred to light absorbance and the use of distilled water as a way of calibrating the machine. Some candidates stated the use of cuvettes but many could not remember the word and referred to them as 'special tubes'. A few answers referred to the initial Benedict's test being performed without appreciating that the question focuses on the use of the colorimeter only.

Question 3 (c) (ii)

(ii) The students plotted their results, shown in the graph.



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The students found that the test solution had an absorption value of 45%.

Use the graph to estimate the glucose concentration in the test solution.

Give your answer in mmol dm^{-3}.

Concentration = ...mmol dm^{-3} **[2]**

The majority of candidates achieved 1 mark for correctly estimating from the graph.

Few candidates recognised that the units on the graph were mmol cm^{-3} and a unit conversion was required. Those that did appreciate that a conversion was required then divided by 1000 without realising that it was asking for the number of mmol in dm^3, not just cm^3 being converted into dm^3.

OCR support

Candidates should not limit their unit conversions to simply mm to nm for example but realise what happens when you have concentrations in different units. So although converting cm to dm would be dividing by 1000, if you have x mol in 1 cm^3 then the number of moles in 1 dm^3 would be 1000 x more.

Unit conversion help can be found in the maths for biology information guide.

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Question 4 (a)

4 (a) The Humboldt penguin is protected by the Convention on International Trade in Endangered Species (CITES).

- The Humboldt penguin lives on the Pacific coast of South America.
- The breeding grounds for the Humboldt Penguin contains layers of guano.
- Guano is the accumulated excrement of seabirds.
- Guano was collected by humans as it is a valuable fertiliser.
- Penguins were killed for their oils and skin.

Suggest how CITES can help prevent the decline of the Humboldt penguin.

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

A lot of candidates recognised that CITES was involved with trade, often quoting the whole name at the start of their answer. Some answers then discussed banning hunting and making it illegal to kill penguins, not appreciating that this would not be beyond the remit of trade. A few candidates discussed ex situ conservation methods so did not understand the role of CITES.

Some answers referred to cleaning up the guano to provide a cleaner breeding site for the penguins, so the indicative points in the question were not clearly understood.

Assessment for learning

The CITES website is a good start to introduce candidates to the role they play.

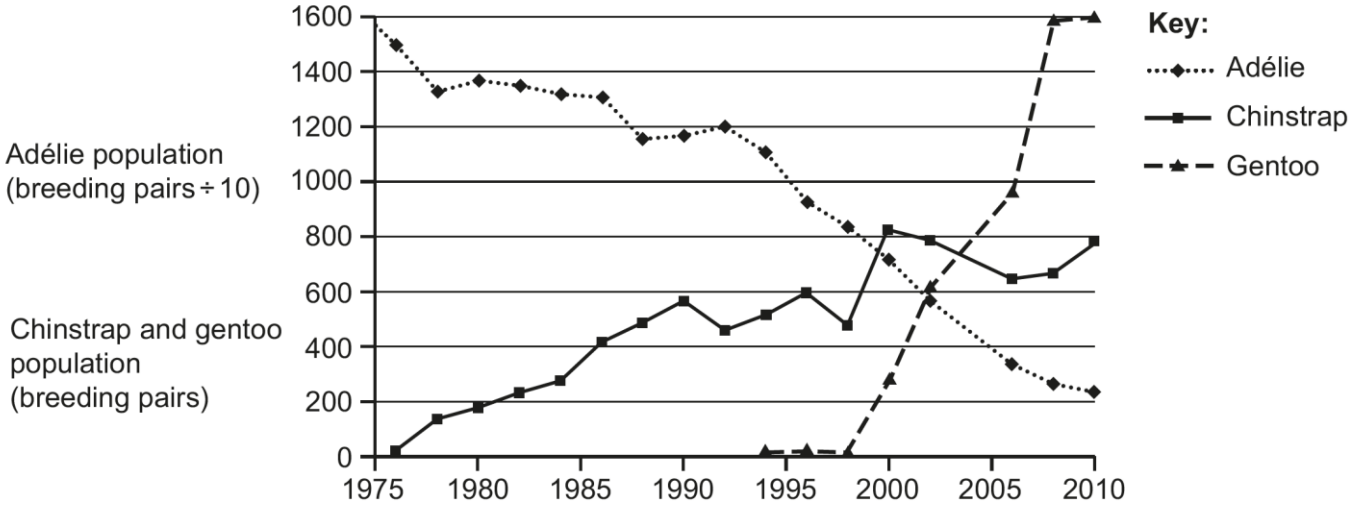
and there are many examples of illegal trade that can be investigated by candidates and discussed – see this WWF factsheet as a starting point.

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Question 4 (b)

(b) A study was carried out to monitor the population of three penguin species on an island near Antarctica.

The graph shows the results of this study.



Use the graph to compare the species richness and species evenness of the penguins found on the island in the years 1980 and 2010.

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

Most candidates did not score well with this question. Although some candidates quoted the meaning of species richness and evenness in their answer, they did not refer to the two time periods stated in the question. Many answers referred to all the years between 1980 and 2010 without emphasising those specific years. This might be because they misunderstood the question and thought it was referring to 'from 1980 to 2010' rather than 'in the years 1980 and 2010'. The lack of focus on the appropriate years led to answers indicating that species evenness was greatest in 2000 but was very low by 2010.

Many candidates did appreciate the increase in species richness with the introduction of the Gentoo penguin. Some answers referred to the species evenness and richness of each species in turn, so did not understand the definitions of these terms.

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Misconception

Many candidates discussed the species evenness of the Gentoo, then the species evenness of the Adele penguin, etc. Candidates should realise that the term species can mean 'within the species' but can also mean across species - it is both a plural and singular word. So the definitions of species evenness/richness means across lots of species.

Question 5 (a) (ii)

(ii) Student **A** studied the data in the table and made the following statement:

'The MMR vaccination programme is not working because although the number of children vaccinated has reduced, measles incidence has also reduced.'

In response, student **B** stated:

'You cannot tell this from the data provided here.'

With reference to the data in the table, discuss whether student **B** is correct.

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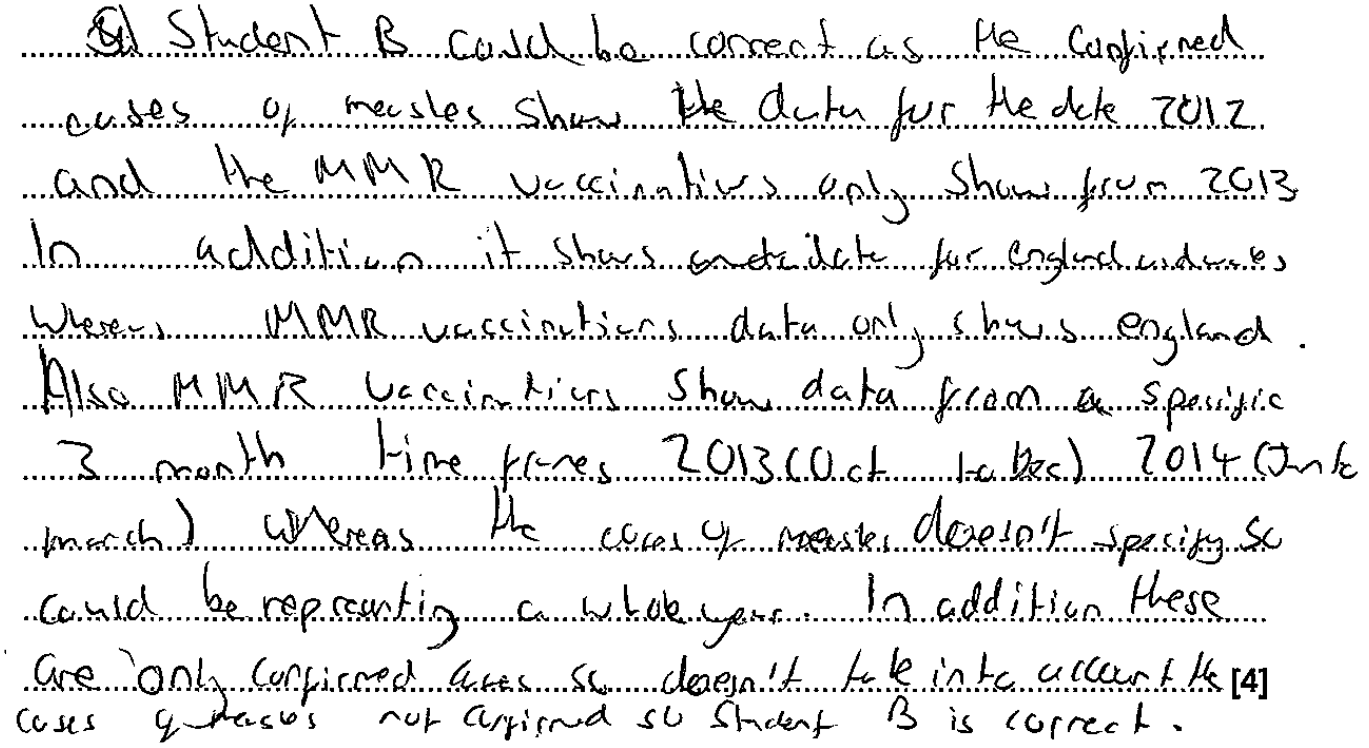
..... **[4]**

This was a highly discriminating question that challenged all candidates. Most candidates did not focus their whole answer on the data provided in the table and student B's statement about this data. Candidates did not interpret this question as student B criticising the validity of the data but instead focused on whether student A was correct. Therefore, most answers referred to the role of vaccines and herd immunity in preventing measles.

Very few candidates appreciated that the vaccine data referred to a combined vaccine but the disease discussed was only measles. Some candidates did realise that not all cases of measles would be reported and also appreciate the discrepancies with the inclusion of Wales in some years but not others.

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Exemplar 3



[4]

This candidate focused only on student B only, as asked in the question, and clearly went through each part of the data to see if there were issues with its validity. The answer begins with the obvious differences between the 2 parts of the data: vaccines and cases of measles, commenting on the lack of parity between the data provided for vaccines versus the data provided for cases of measles. They finish by recognising that the data states confirmed cases of measles and this may not be indicative of all cases of measles. The candidate scored 4 marks.

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Question 5 (a) (iii)

(iii) A student made the following statement about the influenza (flu) vaccination programme:

'The flu vaccination programme involves giving the same flu vaccine to different age groups and to medically vulnerable people every year, as it is for the same disease.'

Discuss the accuracy of the student's statement.

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

Most candidates attempted to critique the statement and appreciated that there were incorrect and correct statements, often referring to the medically vulnerable as the correct part of the statement. A large majority of candidates did state that the vaccines changed every year. Many answers referred to the disease/influenza mutating without reference to the virus itself.

A lot of answers discussed a different vaccine for the medically vulnerable as they would need a weakened version due to a weak immune system. This suggests a lack of understanding of how vaccines work and the vulnerability referring to their vulnerability of the disease/virus not to the vaccine that would provide protection.

Assessment for learning

Different vaccines and how they work is a great discussion point for AS Level Biology, especially with the advent of the new RNA vaccines. Candidates could each have a vaccine to research and then present it to the class.

The NHS website lists all the vaccines and who receives them and when. This will help to make it clear to candidates that everyone should have the opportunity to get a vaccine and the vulnerability of a person is not related to the vaccine but to the susceptibility they have, in getting the actual disease.

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Question 5 (a) (iv)

(iv) Explain how vaccination programmes can play a role in preventing epidemics.

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

Many candidates did refer to herd immunity, but they didn't discuss how mass vaccination prevents the spread of a disease. A lot of answers discussed vaccinations in terms of the individual and did not realise the question was about a vaccination programme rather than a single vaccine.

Question 5 (b) (i)

(b) Rheumatoid arthritis is an autoimmune disease that causes pain in skeletal joints.

(i) Explain the meaning of the term **autoimmune disease**.

.....

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

Few candidates gave the correct meaning as they did not refer to why the immune system was attacking body cells. Some answers referred to the body attacking its own cells without specifying the immune system. Some candidates confused this with a disease that attacks the immune system itself.

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Question 5 (b) (ii)

(ii) Collagen is a protein found in ligaments. Ligaments attach bone to bone and stabilise joints.

State the properties of collagen that make it suitable for this function.

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

Most candidates recognised that collagen was a fibrous protein and some answers referred to it being insoluble. Many candidates gave statements about it needing to be strong for its role but not being precise with the type of strength it exhibits. Some answers referred to collagen as having elastic properties, confusing collagen with elastin.

Question 5 (b) (iv)

(iv) A student wrote the following passage about the immune system:

'T helper cells produce cell signalling molecules called perforins. These stimulate the activity of B cells which increase antibody production. Agglutinins cause pathogens with antigen-toxin complexes to clump together.'

Identify **two** errors in the statement and write a correction for each error.

1 .....

.....

2 .....

.....

[2]

Most candidates identified the errors in the statement, but some struggled to correct those errors. Perforins to interleukins was recalled the most but very few candidates were able to correct antigen-toxin to antigen-antibody. Some candidates did not state the error and only stated the correction.

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Question 5 (c)

(c) Parkinson's disease is a neurological condition which results in problems with co-ordination of body movements.

- It can be caused by the death of dopamine producing nerve cells in a part of the midbrain called the substantia nigra.
- Body movements become slow and abnormal due to reduction in dopamine.
- Drugs are available but they only slow down the progress of Parkinson's disease.

Suggest and explain how stem cells might be used to help treat Parkinson's disease.

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

The majority of candidates could define a stem cell as an undifferentiated cell and stated that it could specialise into a nerve cell. Few candidates went further with how these differentiated nerve cells could be used, jumping their answer from specialising into a nerve cell to treating Parkinson's disease.

A few candidates stated that the stem cell could differentiate to dopamine, not appreciating that dopamine is a chemical not a cell. Some answers simply referred to stem cells turning into nerve cells.

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Question 6 (a) (i)

6 (a) Here is some information about reproduction in two members of the animal kingdom.

- Komodo dragons are large lizards that usually reproduce sexually, but very rarely females can reproduce asexually.
- Starfish can reproduce asexually by a process known as fragmentation. This is when a small piece of the adult starfish breaks off and starts to grow on its own to form a clone of its parent.

(i) Describe the role of mitosis in fragmentation.

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

Most candidates did state that daughter cells would be identical but did not say 'genetically' so did not use precise enough scientific terminology. Few candidates indicated that mitosis would give lots of cells that would be required for a starfish to form, limiting their answer to mitosis producing two cells.

Question 6 (a) (ii)

(ii) State **one** other function of mitosis in starfish.

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

This question was well answered. Some candidates referred to repair of cells. Candidates should appreciate that individual cells cannot be repaired by mitosis, they can only be replaced.

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Question 6 (a) (iii)

(iii) When Komodo dragons reproduce sexually the gametes are produced by meiosis.

Explain how meiosis produces genetic variation in the offspring.

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

Most candidates stated crossing over although some could not recall the stage of meiosis when it occurs. Few candidates could describe independent assortment and did not appreciate the difference between chromosomes and chromatids in metaphase 1 and 2, respectively. No candidates stated that DNA could mutate to give variation.

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Question 6 (b)

(b) HeLa cells and RPE1 cells are cell lines that are commonly used in research. Scientists can use these cell lines to observe mitosis in human tissues outside the human body.

Scientists use the term mitotic index to describe the proportion of cells in a sample that are undergoing mitosis.

A study was carried out using a chemical CDK1. This chemical increased the mitotic index of HeLa and RPE1 cells so that mitosis could be better observed.

Here are the results from the study:

- 31 HeLa cells were found to be undergoing mitosis in the field of view through a microscope.
- The mitotic index for HeLa cells was found to be 0.36.
- The mitotic index for RPE1 cells was found to be 0.16.
- Total number of RPE1 cells in the field of view were 75.

Calculate the total number of HeLa cells that were in the field of view.

Use the formula: $\text{Mitotic index} = \frac{\text{Number of cells in the field of view undergoing mitosis}}{\text{Total number of cells in the field of view}}$

Give your answer to **2** significant figures.

Total number of HeLa cells = ... **[2]**

This question was well answered although a few candidates did not attempt the question at all. Some candidates multiplied 31 by 0.36 and some candidates did not answer to two significant figures. Most candidates should clear steps in their workings.

OCR support

Correctly rounding values is discussed in maths skills handbook as well as the 'Maths for Biology' resources (Module 0).

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Question 7 (a)

7 The diagrams below are of two specialised cells.

Fig. 7.1 shows a sperm cell from a mammal. **Fig. 7.2** shows a palisade cell from a plant.

Fig. 7.1

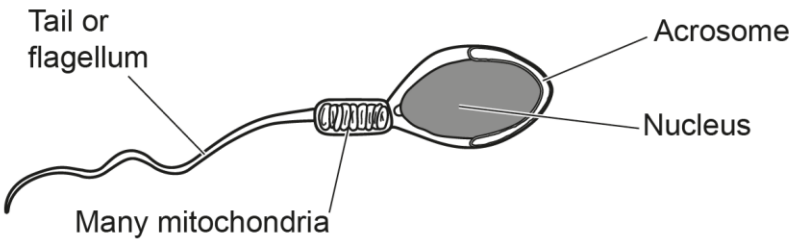
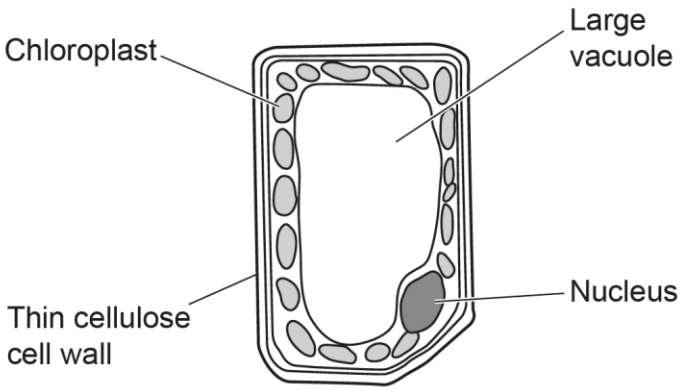


Fig. 7.2



(a) With reference to the features shown in **Fig. 7.1**, explain how the sperm cell is adapted to its function.

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

This question was well answered with most candidates achieving both marks. A few answers referred to the acrosome as an enzyme rather than a structure that contains enzymes. The outer layers of the egg were sometimes referred to as a membrane or cell wall.

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Question 7 (b)

(b) With reference to the features shown in **Fig. 7.2**, explain how the palisade cell is adapted to its function.

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

Most candidates achieved 1 mark, usually for the role of chloroplasts in photosynthesis. Many answers did refer to all the components in the picture and attempted to give roles for all of them. Candidates should be reminded that the mark total is an indicator of the level of detail required.

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Question 5 (c), Context introduction on Parkinson's disease. Name of part of the mid brain called the substantia nigra, © Crown Copyright. NHS, 'Parkinson Disease - causes', www.nhs.uk. Accessed 14.1.22.

Question 4 (a), Context introduction. Adapted text from website. Bullets adapted from Information about Humboldt penguins and guano, © Humboldt penguin, Wikipedia. Reproduced under the terms of a Creative Commons Attribution-ShareAlike License 3.0.

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