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GCSE (9-1)

Examiners' report

GATEWAY SCIENCE BIOLOGY A

J247
For first teaching in 2016

J247/01 Summer 2019 series

Version 1

Contents

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. 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 can be downloaded from OCR.

Paper 1 series overview

This is the second examination of the GCSE Gateway Specification A. The J247/01 component includes a multiple-choice question section of 15 marks and a short answer question section of 75 marks that also includes one Level of Response type question. The Level of Response question assesses the quality of communication as well as knowledge and understanding. Throughout the paper there are some questions that are designed to assess candidates' knowledge and understanding of practical skills used in the specification. These questions demand responses that identify a candidate's awareness of the skills required to successfully complete practical activities and investigations.

Candidates who did well on this paper generally did the following:

- Performed standard calculations following the required rubric (e.g. clear working, units, significant figures) relating to ratios: Q13, calculate surface areas and volumes of cubes: Q14, percentages: Q18(c), identifying graph representing a linear relationship: Q19(c)(ii), make estimates of the results of simple calculations: Q21(c)(i) and Q22(c)(ii).
- Produced clear and concise responses for the Level of Response question, including graph analysis and applying this to knowledge of diabetes: Q20(a)(iii).
- Identified the enzyme would denature and described what this meant in terms of the shape of the enzyme: Q21(c).
- Work scientifically and safely apply a knowledge of techniques and instruments: Q18(a)(i) and Q18(a)(ii).
- Applied knowledge and understanding to questions set in a novel context.

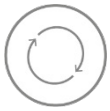
Candidates who did less on this paper generally did the following:

- Found it difficult to apply what they had learnt to unfamiliar situations.
- Found it difficult to explain differences between animal and plant stem cells, many focussing on the idea of animals being larger than cauliflowers or discussing ethics.
- Explaining double circulation and applying their understanding of this: Q21(a) and Q21(b).
- Lacked knowledge of reactants and products in anaerobic and aerobic respiration: Q22(a) and Q22(b).
- Questions designed to assess candidates' practical abilities were challenging and indicated a lack of awareness of the skills involved in practical activities and investigations.

There was no evidence that any time constraints had led to a candidate underperforming.

Section A overview

Candidates coped well with selecting choices, however, there were some instances where candidates used lower case letters in their response. This should be discouraged as it can be difficult due to handwriting styles to distinguish the desired letter.

	**AfL**	There were occasionally some candidates who had 'No Response' answers which could be easily overcome through developing examination technique. Candidates should also be discouraged from choosing numbers from the set of alternatives and entering this in their answer box, rather than the letter of the alternative they think is correct.

Question 2

2 How many different bases are in DNA?

A 2

B 4

C 23

D 46

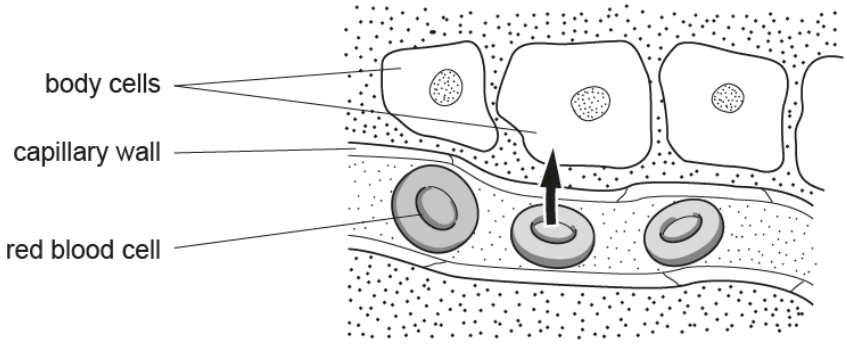
Your answer ☐ **[1]**

	**AfL**	Although many candidates answered this correctly, several did so by writing the number in the answer box rather than the correct letter. Candidates who wrote 4 were credited but it is something they should be encouraged to avoid and to only use letters A, B, C or D.

Question 3

3 The diagram shows the direction of **oxygen** transfer from red blood cells to body cells.

What process does the arrow show?



A Active transport

B Diffusion

C Osmosis

D Transpiration

Your answer ☐ **[1]**

This is an AO1.1 question testing recall of transport in and out of cells. In general, candidates chose either A or B. Only candidates who performed well overall chose the correct answer B.

Question 7

7 Light travels through different parts to reach the back of the eye.

Which structure does light pass through first when it enters the eye?

A Cornea

B Lens

C Pupil

D Retina

Your answer ☐ **[1]**

?	**Misconception**	This is an AO1.1 question testing recall of the structure of the eye and its functions. Many candidates chose either C or B. Only candidates who performed well overall chose the correct answer A. Candidates seem to have the misconception that light enters the eye first through either the pupil or lens and very few were aware of the function of the cornea.

Question 13

13 A cube of potato is used to investigate the effect of surface area on osmosis.

The cube is 3 × 3 × 3 cm.

What is the surface area to volume ratio of the cube?

A 1:2

B 2:1

C 6:1

D 1:6

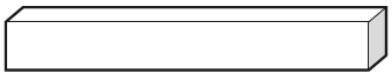
Your answer ☐ **[1]**

This is an AO2.2 question testing the ability to apply knowledge of ratios. Several candidates answered A, with correct workings shown for the surface area and volume. This indicates that the candidate could not apply their knowledge of surface area and volume to producing a ratio.

Question 14

14 An experiment is carried out to find the concentration of potato tissue.

Four chips are cut from a potato.



At the start, each chip is 50 mm long, 10 mm wide and 10 mm high.

Each chip is put in a different sucrose solution **A**, **B**, **C** and **D**.

The volumes of the chips are calculated after 1 hour.

Sucrose solution	Volume of chip (mm^3)
A	50
B	500
C	5000
D	50 000

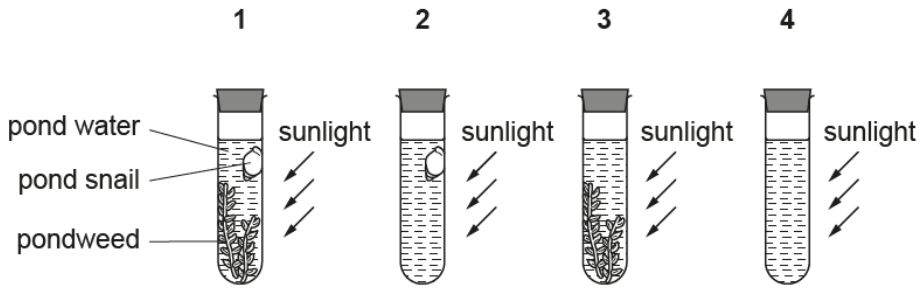
Which sucrose solution has the same concentration as the potato tissue?

Your answer ☐ **[1]**

This is an AO2.2 question testing the ability to apply knowledge of osmosis to changes in volume, and was well answered by many candidates. Candidates clearly understood there would be no change in volume if put in the same sucrose concentration.

Question 15

15 Pond snails and pondweed are living in water in sealed test tubes.



Carbon dioxide dissolves in water and forms an acid.

In which test tube would the water become most acidic?

A 1

B 2

C 3

D 4

Your answer ☐ **[1]**

	AfL	Very few candidates answered this challenging AO2.1 question correctly. Again, several did so by writing the number in the answer box rather than the letter. Candidates who wrote 2 were credited but it is something they should be encouraged to avoid and to only use letters A, B, C or D.

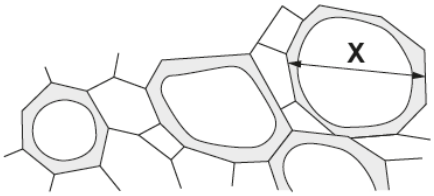
Section B overview

Candidates coped well with interpreting graphical information and demonstrated a sound understanding of how enzymes function. However, there were a number of instances where candidates found it challenging to respond to questions that targeted practical skills. Candidates should further develop their ability in applying their knowledge and understanding of practical skills in questions set in the context of practical activities and investigations.

	AfL	Compared to last year's examination, there was some evidence of reduction in the numbers of candidates who had 'No Response' answers throughout Section B, particularly in box ticking or word-fill examples. However, there are still improvements that can be made; in particular longer type responses where candidates could be encouraged to bullet-point responses in order to get something that could gain credit.

Question 16 (a)

16 The diagram shows cells that are important in the process of **transpiration** in plants.



(a) The diameter of cell **X** has been magnified 500×.

Calculate the actual diameter of cell **X**.

Use the equation: actual diameter = measured size ÷ magnification

Diameter = ... mm **[2]**

This AO2.2 question often resulted in candidates only scoring 1 mark, with relatively few candidates answering this correctly. Common mistakes were inaccurate measurement of the line, not converting the measurement into mm and not applying the formula correctly. Quite a few candidates wrote 2/500 = 250.

Question 16 (b)

(b) What is the name of plant cell **X**?

Tick (✓) **one** box.

Phloem cell ☐

Root hair cell ☐

Xylem cell ☐

[1]

This AO1 question was targeting candidates' knowledge of plant transport structure, with many candidates opting between xylem and phloem in almost equal numbers.

Question 16 (c)

(c) State **two** ways that cell **X** is adapted to its function in a plant.

1 .....

2 .....

[2]

Very few gave 2 correct responses to this AO1 question. Most common responses related to thick cell walls, lignified cells and dead cells. Some candidates did not score due to just referencing normal plant cell features such as a rigid cell wall or cell membrane rather than adaptations shown by xylem. Some candidates who had put phloem for Q16(c) were able to get the ECF (error carried forward), but usually only 1 mark for perforated end or no nucleus but rarely both. This does indicate a need to reinforce the difference between xylem and phloem and the differences in their adaptations.

Question 16 (d)

(d) Light microscopes let us see objects as small as 0.2 micrometres.

The diameter of cells similar to cell **X**, can vary between 0.008 mm and 0.5 mm.
(1 mm = 1000 micrometres)

Is it possible to see all these types of cells using a light microscope?

Explain your answer.

.....

.....

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

This AO2.2 question was testing candidates' ability to work scientifically and interconvert units. It proved challenging. The vast majority of candidates concluded that the cells could not be seen so did not gain credit. Those that thought the cells could be seen often did not explain why adequately e.g. 'it has a better magnification', and did not use the measurements in the stem. Some did attempt to convert but were unsuccessful.

Question 16 (e)

(e) State why electron microscopy has increased our knowledge of sub-cellular structures.

.....

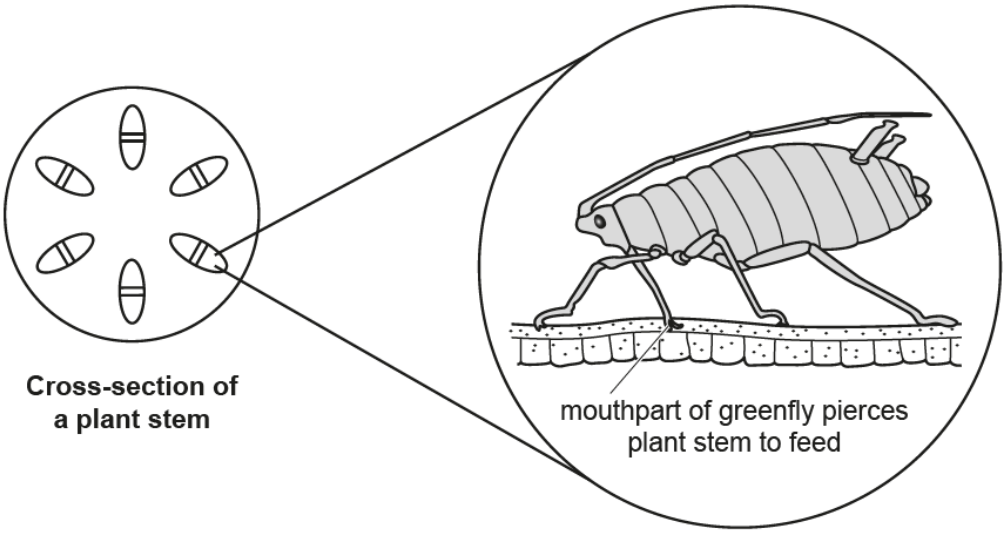
..... **[1]**

The question was testing AO1 recall of the use of EM. Many candidates simply said 'it allows us to see cells in more detail' or similar without linking this to subcellular structures.

Question 17 (a) (i)

17 (a) The diagram shows a cross-section of a plant stem.

A greenfly feeds on the plant by piercing through to the tissue shown in the cross-section of a plant stem.



Greenfly

(i) What is the name of the tissue in the stem that the greenfly is trying to reach with its mouthpart?

Tick (✓) **one** box.

- Phloem ☐
- Root hair ☐
- Xylem ☐

[1]

This AO1 question was targeting candidates' knowledge of the location of plant transport structures. Like in the previous question on adaptations, many candidates opted between xylem and phloem in almost equal numbers.

Question 17 (a) (ii)

(ii) Explain why plants infested with greenfly have very poor growth.

.....

.....

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

This AO2.1 question tested candidates' ability to apply knowledge of plant transport. Many candidates thought the greenfly was feeding from the xylem or that phloem transported water, and therefore focused on the plant having insufficient water for growth. Others thought that the greenfly was damaging the plant and the need for repair of the damage would prevent growth.

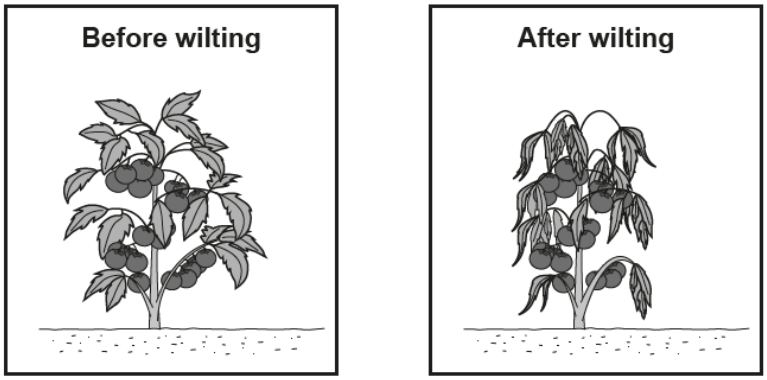
Question 17 (b) (i)

(b) A gardener carries out an experiment using two similar tomato plants. The tomato plants are grown in pots.

She puts one inside a glasshouse and one outside beside the glasshouse.

To decide which plant loses the most water, the gardener looks to see which plant wilts first.

The diagrams show a plant before and after it has wilted.



(i) On a windy day, the plant **outside** the glasshouse wilts first.

Explain why.

.....

.....

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

Most marks gained on this AO2.1 question were often for the idea of wind causing water loss or drying out the plant. However, some candidates incorrectly thought it may be colder/less sunny in the wind and therefore there would be less photosynthesis.

Question 17 (b) (ii)

(ii) The gardener's results do not provide very accurate information about the effect of wind on water loss.

How could the gardener improve the design of her experiment?

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

This question targeted AO3.3a on developing experimental procedures. The most common correct responses were for measuring water loss, repeats and controlling the wind by using a fan. Quite a few candidates wrote 'make sure you only change one variable' without identifying which one.

Question 17 (c)

(c) Fifty years ago scientists experimenting on plants had to inject dyes to measure water flow.

Now they can use modern methods such as MRI and X-ray imaging.

Scientists are now developing new ideas on how water flows through a plant that are different from theories developed fifty years ago.

Explain why.

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

This AO3.1 question required evaluation. A lot of candidates thought that plants may have evolved in the last 50 years so water moves differently. However, most just restated the question without addressing the idea of collecting new evidence, so did not demonstrate an ability to evaluate.

Question 18 (a) (i)

18 (a) A scientist clones a cauliflower plant.

He uses small pieces of the cauliflower plant called explants.

This is the method the scientist uses to get the explants:

- Place the equipment in a beaker of bleach and swab the bench with 70% alcohol.
- Collect a small piece of cauliflower and place on a white tile.
- Use a scalpel to cut the piece of cauliflower lengthways into small 3–5 mm pieces called explants.
- Measure the mass of the explants.

(i) Suggest why the scientist uses a scalpel rather than a kitchen knife.

.....

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

Most candidates scored this AO2.2 mark, many correctly referring to precision or sharpness. However, several responses identified a concern about contamination with a kitchen knife and this was not appropriate in the context of the stem of the question so did not gain credit.

Question 18 (a) (ii)

(ii) Write down **one** safety precaution that the scientist should take when using a scalpel.

.....

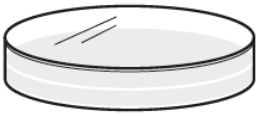
..... **[1]**

Again, many candidates scored this AO2.2 mark, with many correctly referring cutting away from yourself or, in some cases, keeping fingers away from the blade. However, several responses identified wanting to wear gloves, goggles etc and these were not accepted for correct responses. Some also wrote about being sensible, careful or responsible with the scalpel but not how to do that, so did not gain credit.

Question 18 (a) (iii)

(iii) The explants are then prepared for cloning by placing on an agar jelly plate.

Agar jelly contains water, sugars and minerals.



Agar jelly plate

When the explants are placed on the agar jelly plate they have no roots or leaves.

Explain why the explants must be placed on the agar jelly plate.

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

	AfL	In this AO2.2 question the most common response was about being able to see the explants clearly or preventing contamination and very few candidates referred to the words in the question explaining there were no roots or leaves. Candidates should be encouraged to highlight, key words or phrases that might be important to consider in their responses. Most candidates who scored got the 1 mark for the allow in the guidance column of the mark scheme. It was very rare that any candidate scored 2 marks.

Question 18 (b) (i)

(b) To grow the explants, the scientist places the agar jelly plate in a warm room near to a window.

(i) Explain why this will help the explants grow and develop into clones.

.....

.....

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

This AO2.1 question mainly gained marks from candidates who referred to warm conditions speeding up growth. Few mentioned light, and even fewer were able to link the light to photosynthesis.

Question 18 (b) (ii)

(ii) Using a heated cabinet with light bulbs inside the cabinet would improve this method.

Explain why.

.....

.....

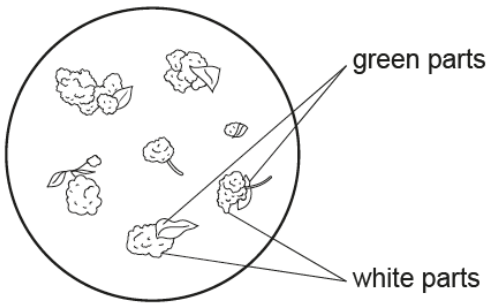
..... **[2]**

Candidates were able to identify that this AO3.3a question as developing an experiment by introducing an element of control. Where candidates only scored 1 mark it was usually for the idea of controlling the light by allowing continuous light. Some candidates did not score the first marking point as they were describing controlling heat rather than temperature, which was not given.

Question 18 (b) (iii)

(iii) The scientist examines the agar jelly plate regularly.

Growth of the explants is visible in the plate within 10 days and parts of the explants are turning green.



What conclusion can be made about why the explants have parts that are turning green?

.....

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

This AO3 question proved quite challenging but candidates who did gain credit usually gained the mark for recognition of photosynthesis, with fewer identifying that chlorophyll would be present. There were a significant number of candidates who wrote about growth of mould.

Question 18 (c)

(c) The mass of the explants at the start was 15 g.

After 10 days the mass of the explants was 28 g.

Calculate the percentage increase in mass of the explants.

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

Percentage increase = ... % **[3]**

This question covering AO1.2 and AO2.2 was challenging. Some common errors included not using a calculator but rather using an estimation method leading to inaccurate responses and also not working out the change in mass. A significant number of those who correctly completed the calculation did not round it correctly, giving 86.6 as their answer or commonly 86.6 recurring.

Exemplar 1

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

28 - 15 = 13

$\frac{13}{28} \times 100 = 46.42$

Percentage increase = 46.4 % **[3]**

	AfL	In this exemplar, ECF was applied to the percentage calculation with incorrect value (though numbers are linked to the question), then correct rounding was done by the candidate. This highlights how important it is for candidates to show their working out as the candidate would not have scored any marks if all they had put was 46.4 on the answer line, as it would not have been possible to apply ECF.

Question 18 (d)

(d) The cells in cauliflower explants behave the same way as embryonic stem cells do in animals.

Explain why it is more difficult to clone adult animals than to clone cauliflowers.

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

This AO2.1 question found candidates having considerable difficulty in applying their knowledge and understanding of stem cells. Most concentrated on the idea of animals being larger or more developed or advanced than cauliflowers. Others discussed ethics and only higher ability candidates were writing about differences in ability to differentiate in their responses.

Question 19 (a)

19 Plant hormones are involved in controlling some processes in plants.

(a) Which processes in plants are controlled by plant hormones?

Tick (✓) **three** boxes.

- Flower opening ☐
- Germination ☐
- Photosynthesis ☐
- Pollination ☐
- Respiration ☐
- Shedding of leaves ☐

[3]

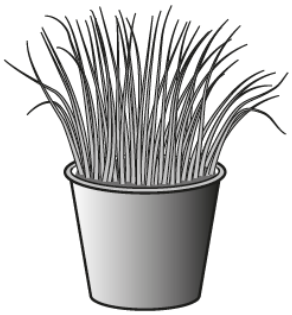
This AO1.1 question rarely scored full marks. Often candidates scored 1 or sometimes 2 marks but there was no obvious pattern to which ones they got correct.

Question 19 (b) (i)

(b) A child sets up an experiment to grow grass seeds in a plastic cup.

The grass seeds in cup **A** are grown directly under a window.
The grass seeds in cup **B** are grown by a window to the side.

Look at the results.

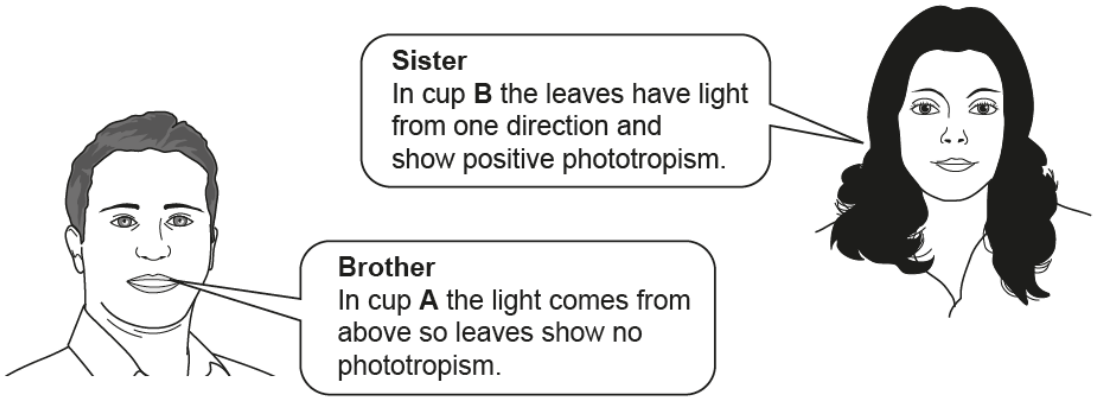


A
Grass seeds grown directly under a window

B
Grass seeds grown by a window to the side

The child's older brother and sister try to explain what has caused the results.

They make different conclusions.



(i) Explain why the sister has given the better conclusion.

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

This AO3.1 question did see most candidates score at least 1 mark. This was identifying that the sister had said it was 'positive'. Candidates sometimes did not gain credit on the first marking point because they did not give any indication it was growth of the plant to the light source.

Question 19 (b) (ii)

(ii) Name the hormone that causes phototropism.

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

Again, this AO1.1 recall question was reasonably well answered, although there was some confusion with some candidates putting insulin.

Question 19 (c) (i)

(c) (i) Different hormones control the human menstrual cycle.

Complete the sentences to describe how the menstrual cycle is controlled.

Use words from the list.

Each word can be used once, more than once, or not at all.

fetus **follicle** **FSH** **oestrogen** **progesterone**

The hormone released by the pituitary gland is called ..... .

This hormone acts on the ovary and causes the growth of a ..... .

The hormone that maintains the lining of the uterus is called ..... .

[3]

This AO1.1 recall question discriminated well, and a full range of responses were seen. The most common correct response where only 1 mark was scored was progesterone. Fetus rather than follicle was seen quite often.

Question 19 (c) (ii)

(ii) The table shows the concentration of oestrogen in the blood during the first 7 days of the menstrual cycle.

Time in days	Oestrogen (mg/100 cm^3 of blood)
1	20
2	20.5
3	25
4	27.5
5	30
6	32.5
7	34

Put a (ring) around the days below which show a steady increase in the concentration of oestrogen.

Days 1–4 **Days 2–5** **Days 3–6** **Days 4–7**

[1]

This AO2.2 question testing mathematical skills did gain credit with higher ability candidates. The most common incorrect answer was 4-7 days.

Question 19 (d)

(d) The lining of the uterus is shed during menstruation.

New cells are needed to replace the lining of the uterus.

Describe the processes that occur to make these new cells.

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

A large number of candidates found this AO1.1 question about cell division challenging and did not identify it as asking about how new cells are made, so did not make the link to cell division. Many described how the menstrual cycle was controlled by hormones and how they affected the thickness of the lining. There were some very good responses from those candidates that recognised this was about cell division but some mentioned meiosis rather than mitosis.

Question 20 (a) (i)

20 (a) (i) Diabetes occurs when blood sugar levels are not controlled.

Which hormone reduces blood sugar levels?

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

This AO1.1 question was answered correctly by many candidates, but a number of candidates did not respond.

Question 20 (a) (ii)

(ii) Hormones are produced in endocrine glands.

Describe how hormones control different parts of the body.

.....

.....

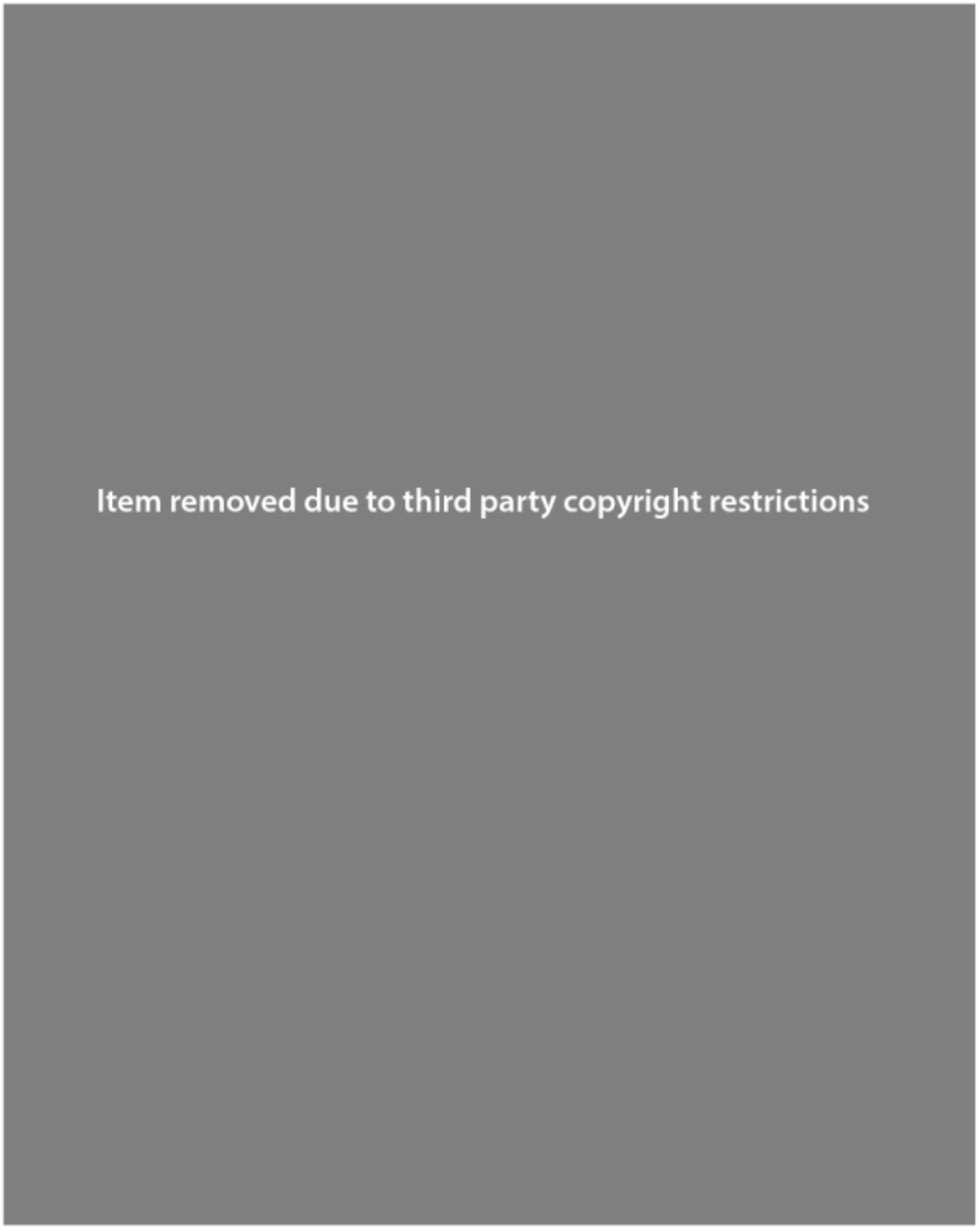
..... **[2]**

Another AO1.1 question that proved challenging for many. Where candidates did provide responses, many wrote about examples of what hormones can do but not how. There was a big focus on hormones affecting either puberty or fight/flight responses, but these did not gain any marks as they only wrote in their responses 'hormones make you emotional' or 'adrenaline gets you ready for action' and had not identified where they were produced, or how they got to different parts of the body.

Question 20 (a) (iii)

(iii)* A glucose tolerance test can help identify if a person has diabetes.

The graphs show a glucose tolerance test in three people **A**, **B**, and **C**.



One person is healthy and the other two people have different types of diabetes.

Explain the differences between the three graphs and describe how each person with diabetes could control their blood glucose levels.

Use information from the graphs in your answer.

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.....

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

This question covering AO1, AO2 and AO3 discriminated well. Most candidates gained at least L1, by identifying at least one person or describing a treatment. Many got L2, by identifying and describing the patterns on the graphs and identifying the treatments/people. Relatively few candidates got up to L3, as there was often a mistake in identifying which person was healthy, Type 1 or Type 2. Many thought the third graph was the healthy person due to the correlation in pattern.

Exemplar 2

Person A shows that the hormone and glucose are working at the same rate. At 1.5 hours both the hormone and glucose reach its peak then decreases. This shows that the person is healthy. Person B shows high levels of glucose and very little of the hormone. At 4 hours the person reaches 400 mg/dL of glucose. This shows that the person has type 1 diabetes as they are unable to produce the hormone/insulin. Person C has an increase of the hormone overtime and the glucose level begins to decrease between 2-3 hours. This shows that the person (C) has type 2 diabetes. Person B with type 1 diabetes can control their glucose levels by injecting themselves. Type 2 can be controlled with exercise and maintaining a healthy lifestyle. **[6]**

Here, the candidate has identified all people, with good evidence from graph for each. Treatments have been given for both types, but Type 1 does not specify what to inject. So L3 5 marks as treatment for type 1 lacked full communication but there was sufficient communication of Type 2 with exercise & healthy lifestyle being identified.

Question 20 (b)

(b) Diabetes can often result in high levels of glucose in the urine.

Which organ usually prevents glucose being lost from the blood when urine is made?

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

Candidates in the main were able to identify the kidney in this AO1.1 question. However, examples were seen where the liver, bladder and pancreas had been identified.

Question 20 (c)

(c) Drugs can be used to treat one type of diabetes. One drug prevents an enzyme working properly.

Suggest how a drug can stop an enzyme working.

.....

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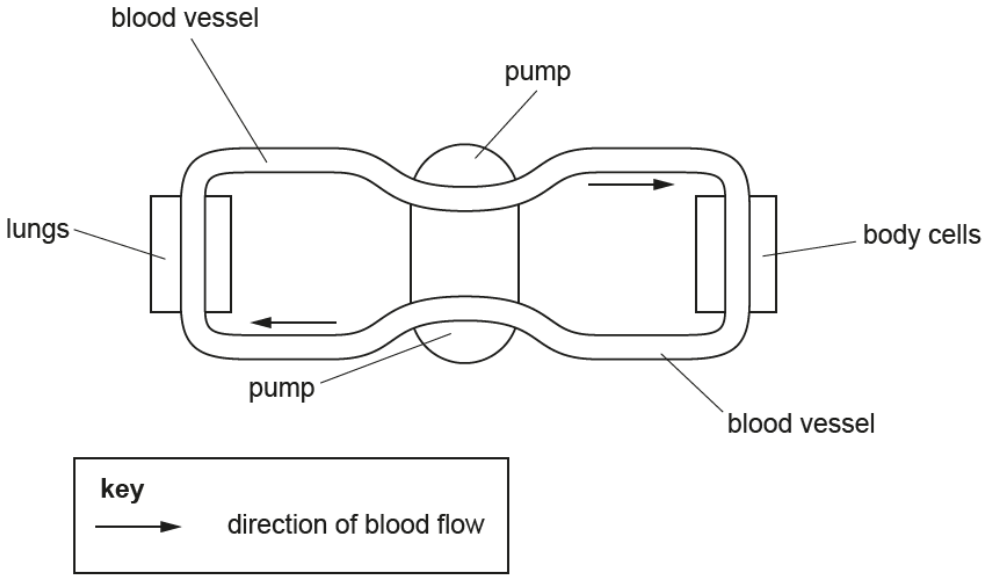
..... **[2]**

This AO2.1 question was answered well by higher ability candidates. Most candidates realised the enzyme could denature. Some went further to describe what this meant in terms of the shape of the enzyme.

Question 21 (a)

21 Look at the diagram. It represents the human circulatory system.



(a) Describe how the diagram shows that humans have a double circulatory system.

.....

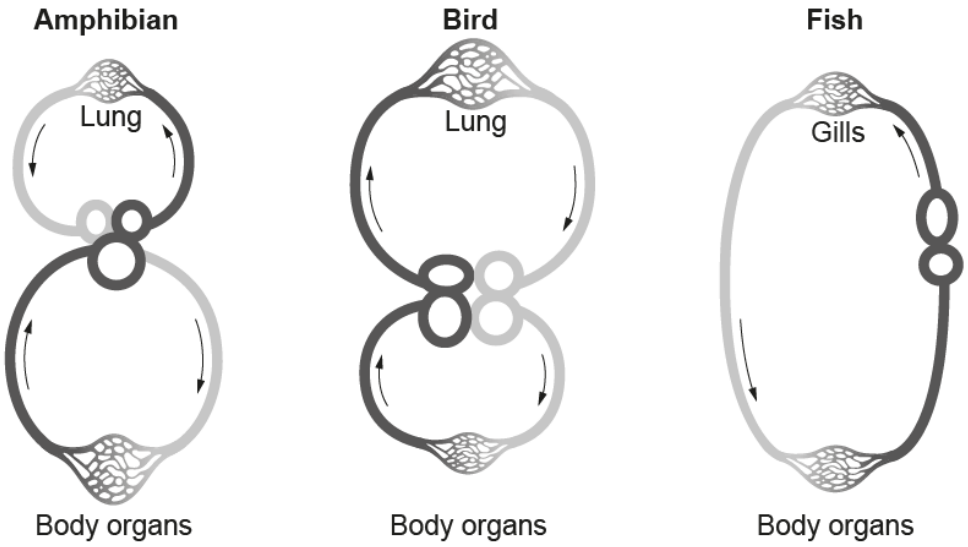
.....

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

In this AO1.1 question many candidates described the diagram but got confused. Some wrote about blood vessels rather than the heart. Candidates that gained credit identified that blood passes through the heart twice but were often unable to identify that this happens on a complete full circuit of the body.

Question 21 (b)

(b) Look at the diagrams of the circulation systems in an amphibian, bird and fish.



Which of these has a circulatory system most similar to humans?

Tick (✓) **one** box.

Amphibian ☐

Bird ☐

Fish ☐

Explain your choice.

.....

.....

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.....

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

In this AO2.1 question many candidates were identifying the bird, and some went on the justify their choice. However, most candidates often repeated similar descriptions to their previous answer, with few clearly identifying birds as having double circulation. It was very rare to see candidates who had recognised both birds and humans as having 4 chambers to the heart. Some did gain credit for this mark for correctly naming all 4 chambers.

Question 21 (c) (i)

(c) Scientists investigate how exercise affects blood flow to different organs in the body.

This is their method.

- Ask a healthy person to sit in a room at 20 °C
- Measure the blood flow to different organs in the person's body
- Repeat this with the person exercising at a constant speed on a treadmill in the same room.

The table shows the scientists' results.

Organ	Rate of blood flow (ml per minute)	
	Sitting	Doing exercise
Brain	750	750
Heart muscle	250	1000
Muscles	1200	22 000
Skin	500	600
Other organs	3100	650
Total	**5800**	**25 000**

(i) By how many times has the **total** blood flow increased by doing exercise?

Give your answer to the **nearest whole number**.

Number of times the total blood flow has increased = ... **[2]**

This question tested AO1.2 and AO2.2. Most candidates did this correctly although some stated 4.3 and did not gain the second marking point. There were a minority who just subtracted the two numbers.

Question 21 (c) (ii)

(ii) The table shows that blood flow to other organs has decreased by nearly 5 times when a person is **doing exercise**.

The blood flow to the muscles has increased by more than eighteen times.

Explain these changes to blood flow rate.

.....

.....

.....

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

This AO3.2 question proved challenging. Most responses focused on increased blood flow but gave no indication of why this was needed. Marks were often gained for muscles needing 'more oxygen' or 'other organs not needed', with a few marks being given for the lactic acid/respiration ideas.

Question 22 (a)

22 Yeast cells can respire anaerobically.

(a) Complete the word equation for **anaerobic** respiration in yeast.

glucose ⟶ ..... + ... **[1]**

In this AO1.1 recall question, candidates seemed to either know this or got both products incorrect.

Question 22 (b)

(b) Write down **two** ways in which anaerobic respiration in yeast cells is different from anaerobic respiration in human muscle cells.

1 .....

.....

2 .....

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

In general, if candidates had scored a mark on Q22(a), they often scored marks for this AO1.1 question as well. Some candidates managed to write enough to score 1 mark, as they knew humans produced lactic acid. However, quite a few thought yeast was a plant, or that oxygen was produced.

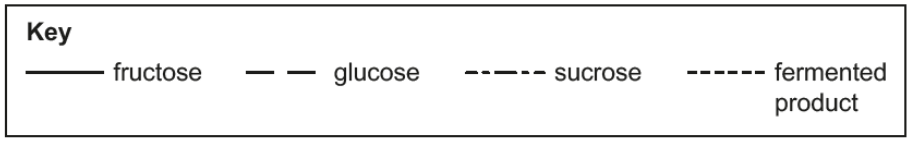
Question 22 (c) (i)

(c) Date fruits contain three different sugars, fructose, glucose and sucrose.

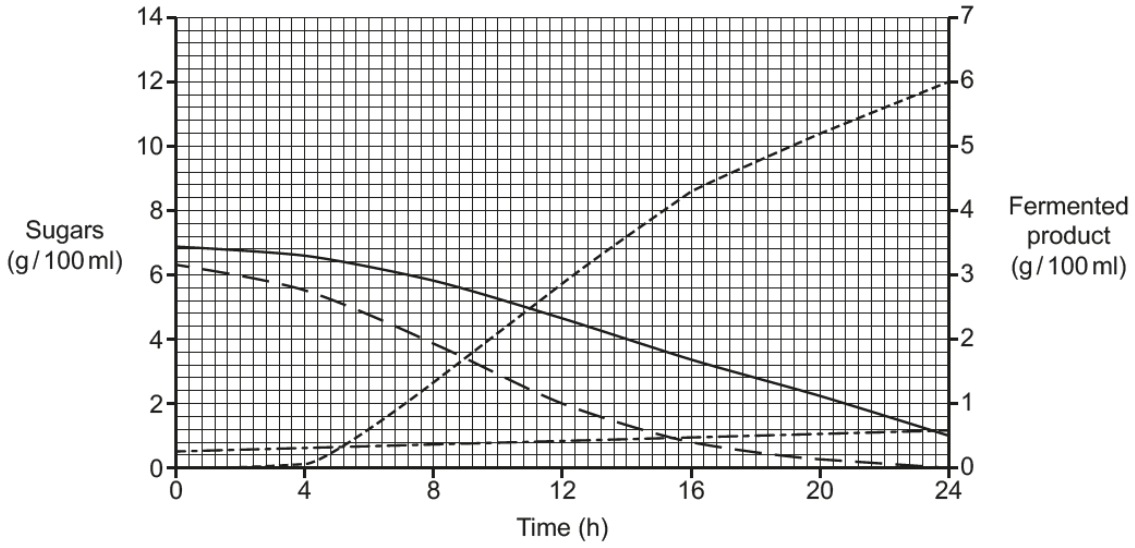
Different strains of yeast can ferment different sugars to produce a fermented product.

Scientists investigate how two different strains of yeast, **A** and **B**, ferment sugars inside date fruits.

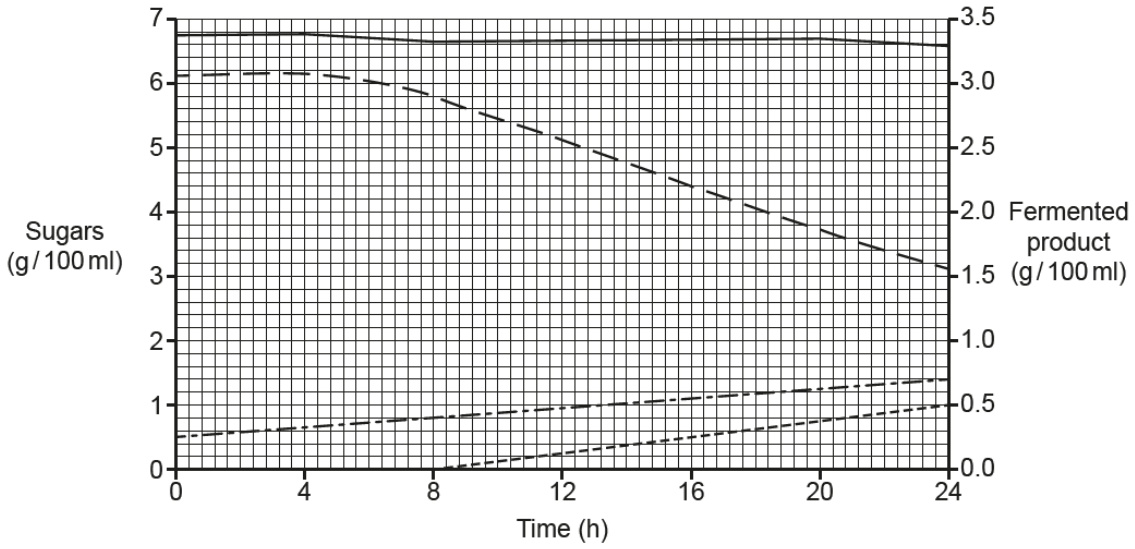
Look at their results.



Yeast A



Yeast B



(i) Which sugar is **not** fermented by either strain of yeast?

Tick (✓) **one** box.

Fructose ☐

Glucose ☐

Sucrose ☐

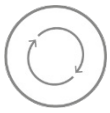
[1]

Candidates in the main were able to interpret the graph in this AO3.2 question.

Question 22 (c) (ii)

(ii) After 24 hours, how many times higher is the fermented product yield of yeast **A** compared to yeast **B**?

Number of times higher = ... **[2]**

	**AfL**	This AO2.2 question was reasonably well answered. However, because candidates often did not include working out they often scored 2 marks or nothing. Several candidates did a subtraction, 6 - 0.5 rather than dividing. This is another example of where a candidate who is encouraged to show their working out may well obtain at least 1 mark rather than none.

Question 22 (c) (iii)

(iii) Which sugar would increase fermentation the **most** if added to either yeast **A** or yeast **B**?

Tick (✓) **one** box.

Fructose ☐

Glucose ☐

Sucrose ☐

[1]

Candidates in the main were able to interpret the graph in this AO3.2 question.

Question 22 (c) (iv)

(iv) Fermented dates are used to supply both fructose and fermented product.

Explain why it would be best to use yeast **B** to ferment dates to supply both fructose and fermented product.

.....

.....

.....

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

Some candidates did not answer this AO3.1 question. This may be due to it being the last question but could be that they were unsure how to respond. Many candidates who did respond had the right ideas but did not articulate clearly enough, saying that there was more fermented product in yeast B or similar.

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