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GCSE (9-1)

Examiners' report

GATEWAY SCIENCE COMBINED SCIENCE A

J250
For first teaching in 2017

J250/01 Summer 2018 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 J250/01 series overview

This paper examines the Biology content of Combined Science GCSE at Foundation Level. This paper links together different areas of biology within different contexts, some practical, some familiar and some novel. To do well on this paper, candidates need to be able to apply their knowledge and understanding to unfamiliar contexts and be familiar with a range of practical techniques. Candidates who did well on this paper also had adequate subject knowledge, were able to use data to make conclusions, drawing on their conceptual knowledge, and interpreting graphs. These candidates also applied their knowledge to unfamiliar contexts and completed mathematical calculations within a biological context. Candidates who did less well did not respond to questions asking them to apply their knowledge, or did not apply their knowledge appropriately. They also did not answer questions with precision or interpret graph data correctly.

Section A overview

Many candidates seemed to find this section challenging. The first two questions assessed relatively straightforward recall.

Question 1

1 Which substances are used in the synthesis of **lipids**?

A Amino acids and glucose

B Amino acids and glycerol

C Fatty acids and glucose

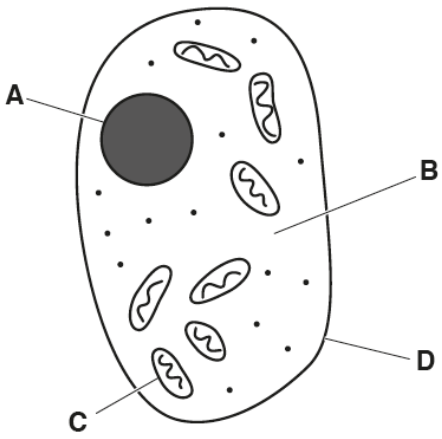
D Fatty acids and glycerol

Your answer ☐ **[1]**

Approximately 80% of candidates could not correctly identify the substances used in the synthesis of lipids. Answer D was the correct answer. This question assessed AO1.1.

Question 2

2 The drawing shows some of the structures found in an animal cell.



Which labelled structure contains enzymes for cellular respiration?

Your answer ☐ **[1]**

Over 80% of candidates could correctly identify the areas of the cell containing those enzymes used in respiration. Both B and C were allowable answers. This question assessed AO1.

Question 3

3 Photosynthesis is a process that occurs in plants.

	Type of reaction	Substrates	Products
A	Endothermic	Carbon dioxide and water	Oxygen and glucose
B	Exothermic	Carbon dioxide and water	Oxygen and glucose
C	Endothermic	Oxygen and glucose	Carbon dioxide and water
D	Exothermic	Oxygen and glucose	Carbon dioxide and water

Which row describes photosynthesis?

Your answer ☐ **[1]**

Over 50% of candidates could not correctly identify the characteristics of photosynthesis from the rows of the table (A). Many candidates gave the answer which was almost identical to the correct answer, but indicated that photosynthesis was exothermic (answer B). This may suggest confusion about whether photosynthesis is an exothermic or endothermic reaction. This question assessed AO1.1.

Question 4

4 Which substances are transported in the **phloem** vessels?

A Sucrose only

B Water and mineral ions

C Water and sucrose

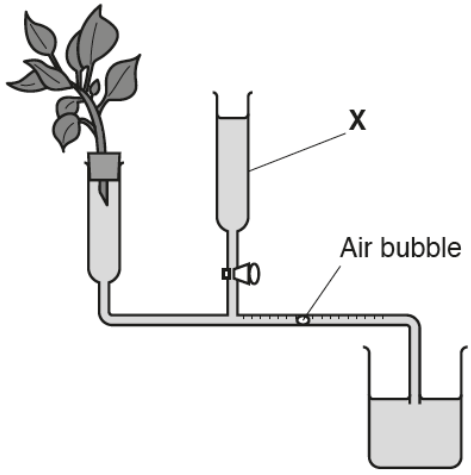
D Water only

Your answer ☐ **[1]**

Approximately 80% of candidates did not identify correctly that water and sucrose are transported in the phloem (answer C). The presence of water in the phloem is a common omission when teaching plant transport. Accordingly, the most common incorrect answers referred to sucrose only (A),or some candidates mixed up the phloem with the xylem and gave the answer water and mineral ions (B). This question assessed AO1.

Question 5

5 The diagram shows a potometer.



Why is structure **X** needed?

A Maintains temperature of the apparatus

B Provides the plant with mineral ions

C Returns the air bubble to its original position

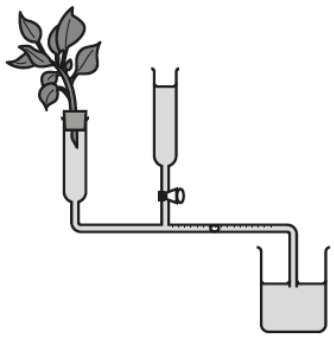
D Sucks water up from the beaker

Your answer ☐ **[1]**

Just over 40% of candidates were familiar with the functioning of a potometer, which suggested that they had encountered it as part of their practical work, although approximately 60% were not familiar enough to correctly identify how Structure X could return the bubble to its original position (correct answer C). Centres may want to think about how to embed the potometer in candidates' learning of water transport, rather than it being a stand-alone demonstration, equipment permitting. This question assessed AO2.2.

Question 6

6 Look at the diagram of a potometer.



How can the apparatus be changed to **increase** the rate of water uptake?

A Add more water to the beaker

B Place an electric fan next to the apparatus and switch the fan on

C Place a plastic bag over the plant

D Remove half of the leaves from the plant

Your answer ☐ **[1]**

Approximately 70% of candidates were unable to identify correctly how to increase the rate of water uptake (answer B), which may suggest they don't understand how water enters and leaves a plant. This question assessed AO2.2.

Question 7

7 A student investigates osmosis. They place potato chips in different sugar solutions.

The table shows their results.

Sugar solution	Mass of potato chip (g)	
	At start	After one hour
X	2.0	2.2
Y	2.0	1.9
Z	2.0	1.7

What is the **percentage change** in mass for the potato chip in sugar solution **Z**?

A −7

B −15

C −18

D −30

Your answer ☐ **[1]**

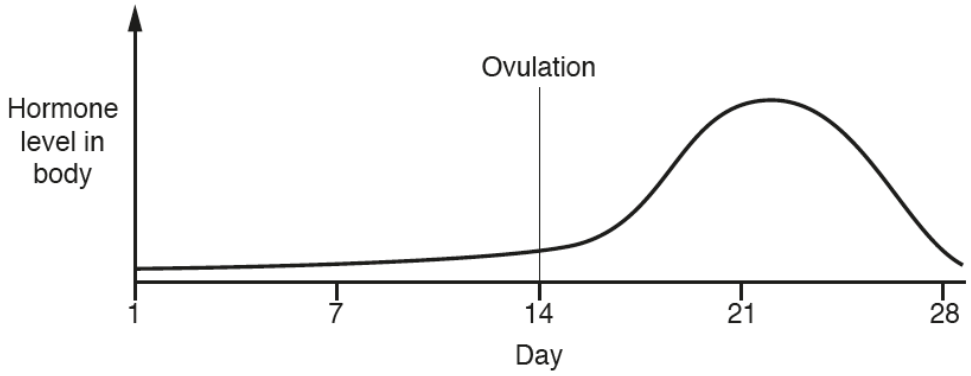
Approximately 70% of candidates could not work out the correct percentage change (answer B). It may be useful for centres to focus more on teaching appropriate mathematical skills to ensure candidates' competence and confidence in using them in biological contexts. This question assessed AO2.2.

Question 8

8 The level of some hormones change during the menstrual cycle.

The graph shows how the level of one hormone changes during the menstrual cycle.

Fertilisation has **not** taken place after ovulation.



Which hormone is represented in the graph?

A FSH

B Oestrogen

C Progesterone

D Testosterone

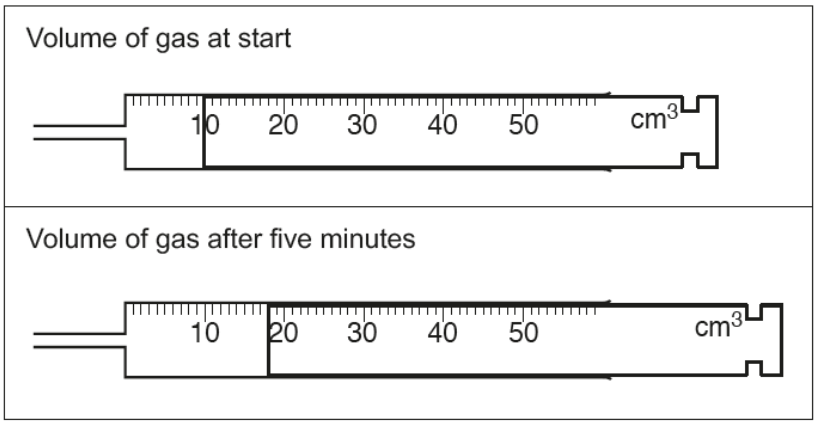
Your answer ☐ **[1]**

Over 75% of candidates were unable to identify correctly that the graph represented progesterone levels (answer C). This question assessed AO2.1

Question 9

9 A student investigates an enzyme controlled reaction. She collects the gas produced during the reaction in a gas syringe.

The diagrams show the amount of gas in the gas syringe at the **start** and after **five minutes**.



What is the rate of the reaction?

A 0.625 cm^3/min

B 1.6 cm^3/min

C 3.6 cm^3/min

D 8 cm^3/min

Your answer ☐ **[1]**

Approximately 60% of candidates could not calculate the correct rate of reaction (answer B). D was the most common incorrect answer, suggesting that candidates had forgotten to divide by time, or did not understand how to calculate a rate. This question assessed AO2.2.

Question 10

10 Which of these carbohydrates is a **polymer**?

A Glucose

B Maltose

C Starch

D Sucrose

Your answer ☐ **[1]**

A majority of candidates correctly identified starch as a polymer of glucose (answer C). This question assessed AO1.1.

Section B overview

This section tested candidates against AO1, 2 and 3, drawing on familiar and novel contexts. Some of the questions required candidates to answer precisely, applying their knowledge tightly to the context given, and using the stimulus material to work out the answer, using skills of observation and analysis. Careful reading of the question, and care in answering the question precisely was important to gain maximum credit.

Question 11 (a)

11 The picture shows plant cells as seen using a light microscope.

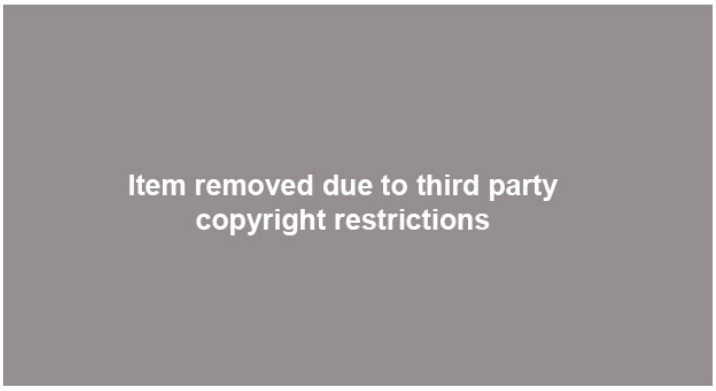


Fig. 11.1

(a) Draw a large labelled diagram of cell **X**.

[3]

This question aimed to test drawing skills and conceptual knowledge of the cell. Most candidates adequately filled the space with their drawing, gaining one mark. But because most candidates had drawn a textbook diagram of a cell, few candidates scored a mark for the resemblance between their drawing and the photograph. Labelling was poor. This was partly because label lines did not touch the structures intended, or that they were simply wrong. Centres are advised to give candidates practice drawing biological structures from prepared microscope slides, to help them interpret biological material in relation to what they know from theoretical models. This question assessed AO2.1 and 2.2.

Question 11 (b)

(b) The plant cells shown in **Fig. 11.1** are **not** root cells.

Explain how you can tell this from the picture.

.....

.....

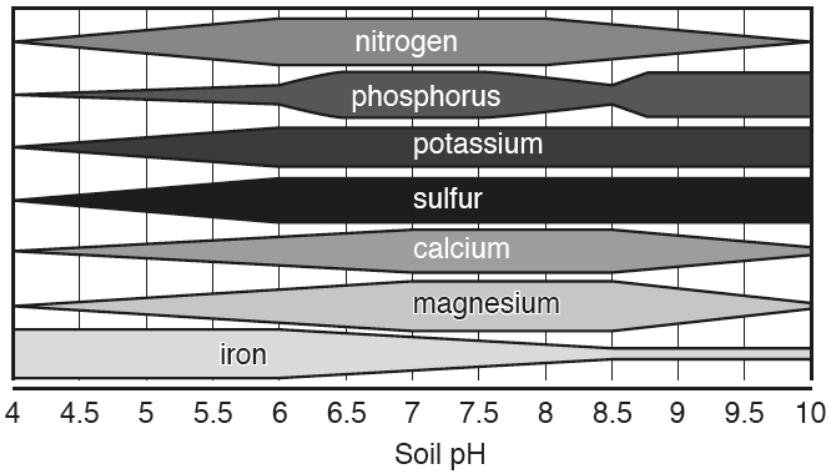
..... **[2]**

The majority of candidates scored zero on this question. This was in part because they did not know, or were unable to work out, that root cells do not contain chloroplasts (missing the first marking point), because there is no light available underground (missing the second marking point). Many referred to the lack of root hairs, which did not gain credit, and very few even talked about photosynthesis. Although prompted by the question, candidates did not use the picture to help them, but simply compared the picture to their own text book image of a root hair cell. They appeared not to realise that many root cells are not root hair cells. This question assessed AO1.1 and 2.1.

Question 11 (c) (i)

(c) Plants take mineral ions from the soil. The availability of mineral ions for plants growing in soil is affected by the pH of the soil.

The chart shows the availability of mineral ions in soils of different pH. The thicker the bar, the more available the mineral ion.



(i) A plant is growing in a soil of pH 4.

Which mineral ion will be **most** available to the plant?

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

A clear majority of candidates correctly identified iron. . Answers suggested that they may not have understood the significance of the width of the bar. Centres should continue to encourage candidates to read each question fully to understand the context (the significance of the width of the bar was given within the question). Practice in reading graphs is also advised. A significant minority of candidates gave the answer sulphur. This question assessed AO3.1a.

Question 11 (c) (ii)

(ii) Magnesium is required by plants for photosynthesis.

Growing plants in **very** alkaline soils may result in less biomass.

Use the chart to explain why.

.....

.....

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

Only a limited proportion of candidates gained marks on this question. Some candidates recognised that there would be low magnesium (for the first marking point), but less than 5% of candidates made the link to the impact on photosynthesis / biomass production (for the subsequent marking points). Of those who did not gain credit, some candidates incorrectly thought that a low pH was alkaline. Many candidates just discussed mineral ions, rather than focusing on Mg, sometimes giving a list of mineral ions which did not gain credit. This question assessed AO3.2a.

Question 11 (c) (iii)

(iii) The picture shows a root growing from a seed.

Explain how the structures seen on the root help with the uptake of minerals.

.....

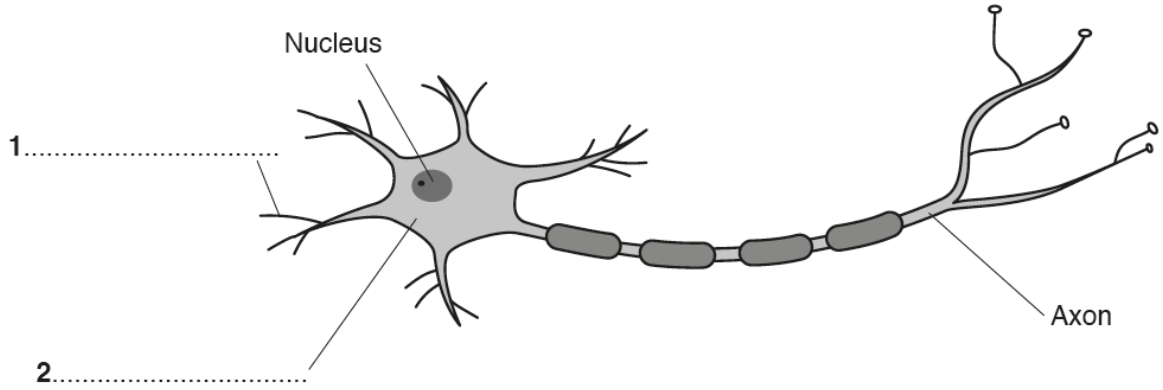
.....

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

Most candidates scored the first marking point, by recognising the structures on the root as root hairs, suggesting that this had been well taught. Some gained the second marking point by referring to increased surface area, suggesting they had an effective understanding of how the root is adapted to carry out its function. Precision in language was important, as a significant minority tried to describe the structures as fibres, tendrils etc., none of which gained credit. A common answer, which did not gain marks, involved reference to long or large roots to get water/minerals. The question asked them to focus on 'the structures seen on the root', confirming the importance of taking time to read the question and look carefully at the photograph. This question assessed AO1.1.

Question 12 (a)

12 (a) The diagram shows a motor neurone.



Label **1** and **2** on the diagram. **[2]**

Only about one quarter of candidates gained one or more marks on this question. Correct answers were 1 dendrite/cell membrane, and 2 cell body/cytoplasm. Many candidates were side-tracked by previous questions, and assumed the diagram came from a plant, labelling parts of the diagram as roots, root hairs or chloroplasts. Centres may want to recommend that candidates look at the change in question number to help them re-orient to different areas of subject knowledge. This question assessed AO1.1.

Question 12 (b) (i)

(b) Nerve impulses can travel along axons at different speeds.

The graph shows the relationship between the speed of a nerve impulse and the diameter of the axon.

(i) Describe the relationship between diameter and speed of impulse.

.....

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

A good majority of candidates could describe the relationship correctly. Many identified the trend (the larger diameter, the faster the impulse) for one mark and a positive correlation, or both increasing together as allowable alternatives. This question assessed AO2.2.

Question 12 (b) (ii)

(ii) The data was measured as part of an investigation by a scientist. The scientist made this statement.

'The data collected is mostly precise.'

What evidence is there in the graph to support this statement?

.....

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

Only about one fifth of candidates gained marks on this question. The correct answer required them to identify that the points were close to the line or that there were no anomalies. Of those who gained marks, many did so from writing about no anomalies. Some candidates talked about 'few anomalies', which did not gain credit, because it suggested there were some. Some candidates thought the evidence for precision was that a line of best fit could be drawn through the data. This did not gain marks. This question assessed AO3.1b.

Question 13(a)

13 The table compares type 1 and type 2 diabetes.

	Type 1	Type 2
Usual age of onset	.....	Adult
Development of symptoms	Very quick	May appear over several months
Percentage of diabetic population	About 10%	About 90%
Linked to obesity	Rare	Common
Cause	Beta cells (β cells) destroyed so no insulin production	Body cells may not react to insulin or not enough insulin is produced

(a) State the usual age of onset for **Type 1** diabetes.

Write your answer in the table. **[1]**

A good majority of candidates gained one mark on this question, by stating childhood, adolescence, teenage, young, or alternative wording describing anyone with an age between 1 and 20. Several candidates gave answers of 'at birth' or 'young adult', neither of which gained credit. This question assessed AO1.1.

Question 13(b)

(b) Which organ in the body contains beta cells (β cells)?

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

About one third of candidates identified correctly that the pancreas contains beta cells. Common incorrect answers were liver or kidney.

Question 13(c)

(c) Write about the different treatments for the **two** types of diabetes.

.....

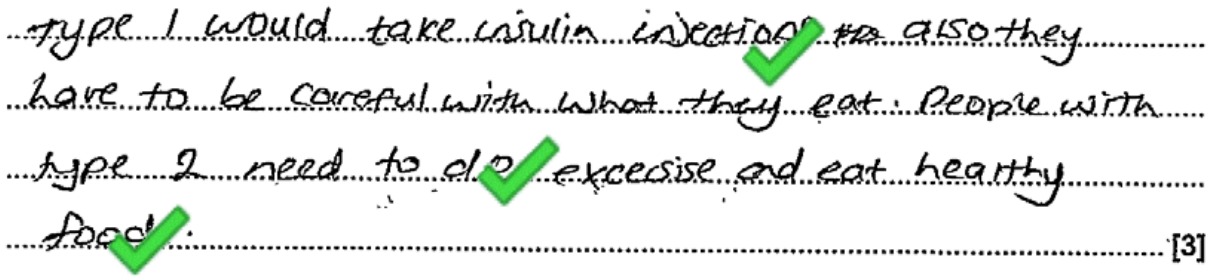
.....

.....

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

Most candidates knew about the importance of insulin, and gained one mark, even if they did not link it to type 1 or type 2. Many candidates were explicit about the treatments for type 1, or for type 2 diabetes, as required by the question, with about one third of candidates gaining two or three marks. However, a significant minority simply listed treatments without being explicit, and so were only able to gain one mark for insulin. Centres may want to focus on helping candidates to practise precise answers, which respond explicitly to the question. This question assessed AO1.1.

Exemplar 1


type 1 would take insulin injection ✓ also they have to be careful with what they eat. People with type 2 need to do ✓ excecise and eat healthy food ✓. [3]

This response gained full marks because it stated the treatment for both types of diabetes.

Question 14(a)

14 Amino acids are found in the food we eat. Different diets will contain different amounts of amino acids.

The table shows some of the amino acids we need in our diet. It also shows the mean daily intake of one adult male and the recommended daily allowance (RDA) for the same man.

Amino acid	Mean intake (g/day)	RDA (g/day)
Histidine	1.5	0.9
Leucine	3.9	2.8
Lysine	2.2	2.5
Threonine	2.3	1.3
Valine	2.8	1.6

(a) Which amino acid has the **lowest** RDA?

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

Almost all candidates were able to interpret data from the table to correctly identify histidine as the right answer. This question assessed AO2

Question 14(b)(i)

(b) (i) Calculate the mean intake as a percentage of the RDA for **lysine**.

Answer = ... % **[2]**

Less than one fifth of candidates gained marks on this question, failing to identify the mean intake as 88% of the RDA for lysine. Many candidates incorrectly added or subtracted 2.2 and 2.5, with a significant minority giving 22% as the answer. Almost no candidates gained the working mark for (2.2/2.5) x 100 on its own. This suggested that candidates had not remembered how to calculate a percentage, and/or they had misread the question. This question assessed AO1.2 and 2.2.

Question 14 (b) (ii)

(ii) Explain why this man's intake of **lysine** may affect his health.

.....

.....

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

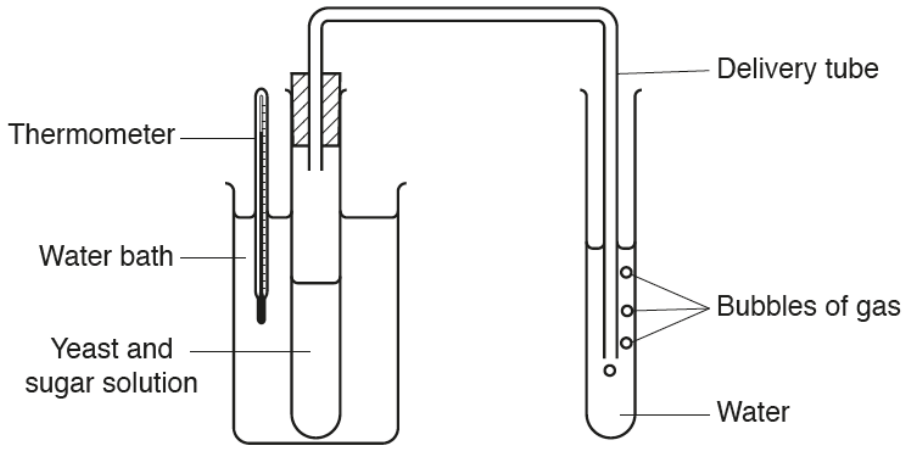
In this question about one quarter of candidates recognised that a percentage less than 100 was less than the recommended daily amount (the first marking point). Many candidates labelled any number approaching 100 as high or higher than RDA. Very few candidates made the link between lack of lysine, and the inability to make correct proteins (the second marking point). Some candidates incorrectly referred to diabetes or other illnesses, attributing their cause to high or low levels of lysine. This question assessed AO3.2b.

Question 15 (a)

15 Two students investigate the effect of temperature on respiration in yeast.

This is what they do:

- Put some yeast and sugar solution into a boiling tube
- Put the boiling tube into a water bath at 10 °C
- Connect the boiling tube to a delivery tube
- Put the other end of the delivery tube into a boiling tube filled with water
- Count the number of gas bubbles released in one minute
- Warm the water bath to 20 °C and count the bubbles again for one minute
- Repeat the last step until they have results for five different temperatures.



(a) Which gas makes the bubbles?

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

The correct answer was carbon dioxide, which most candidates did not write down. Alternative answers given were oxygen, hydrogen, nitrogen, or even 'yeast and sugar solution'. This question assessed AO1.2.

Question 15 (b)

(b)* The students think they could improve their method.

They will count the bubbles three times at each temperature. This would show up any anomalous results.

Describe other ways they could improve their method to obtain more **precise** and **repeatable** results.

For each improvement explain why it is needed.

.....

.....

.....

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

Candidates' answers to 15b suggested that they were not clear about the meaning of the terms repeatability and precision. Candidates had to give improvements and explanations. If they gave one without the other, then they achieved Level 1. If they gave a matched improvement and explanation, they achieved Level 2. If they did this for both precision and repeatability, they achieved Level 3. A very small number of candidates achieved Level 3. Common answers not gaining marks included simply stating the need for repeats, or the need to undertake a fair test. The most common answers which did gain marks included using a gas syringe (improvement) because they may miscount bubbles (explanation). There were many 'unpaired' improvements and explanations, including using a set volume of yeast (improvement) with no explanation, and difficulty counting bubbles (explanation) with no improvement. The question is very explicit about the need for both, and again, practice in reading and interpreting questions may benefit candidates. This question assessed AO3.1b and 3.3b.

Exemplar 2

(b)* The students think they could improve their method.

They will count the bubbles three times at each temperature. This would show up any anomalous results.

Describe other ways they could improve their method to obtain more **precise** and **repeatable** results.

For each improvement explain why it is needed.

When it comes to improvents, one improvent is the method of counting bubbles, an improvement is to use a gas syringe, this makes their results for more accurate as bubbles can be miscounted or their volume being different sizes.

Another improvement is insulating the beaker that has warm water in it as over the minute the ~~temperature would change as~~ heat would escape. * Insulating it means heat won't escape keeping the temperature throughout the one ~~minute~~ ~~for~~ minute accurate. **[6]**

L2

This response achieved Level 2, with 4 marks. The candidate has stated two improvements and given an explanation for each improvement, but has not described why it makes the method more precise and repeatable.

Question 15 (c) (i)

(c) The students count the bubbles three times at each temperature. They then calculate the mean number of bubbles at each temperature.

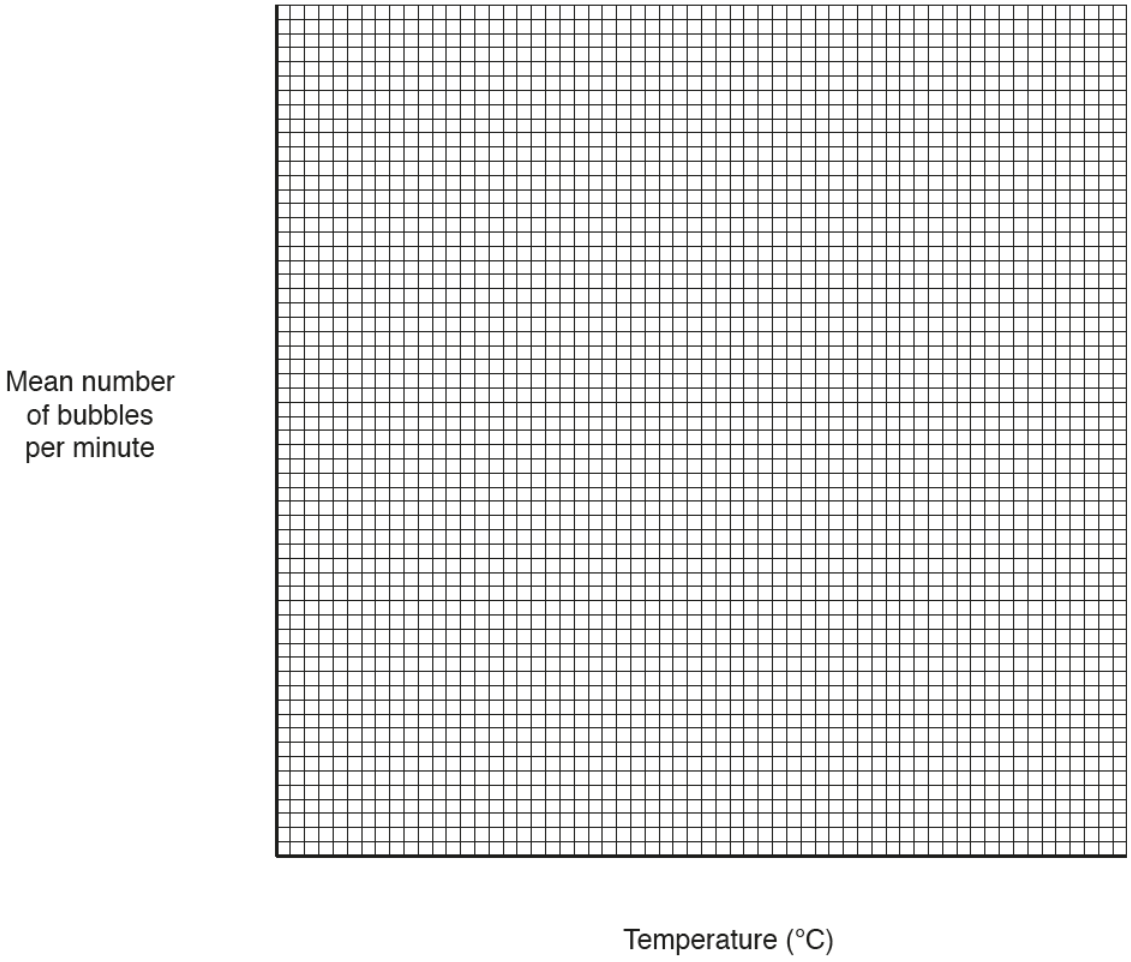
The table shows their results.

Temperature (°C)	Mean number of bubbles per minute
10	3
20	6
30	11
40	5
50	2
60	1

(i) Plot the results on the grid. **[2]**

Most candidates were able to plot a graph and use a suitable scale, with well over half of candidates gaining two marks. One mark was available for using a suitable scale on the correct axes. In this respect, centres should encourage candidates to fill the graph paper area, and to choose scales which are simple to plot against. The second mark was available for accurate plotting. Some candidates lost marks through inaccurate plotting; the use of a ruler may help ensure greater accuracy. Some plotted the data on the wrong axis; it is important to look at the graph to see if the axes are labelled before beginning plotting. This question assessed AO2.2.

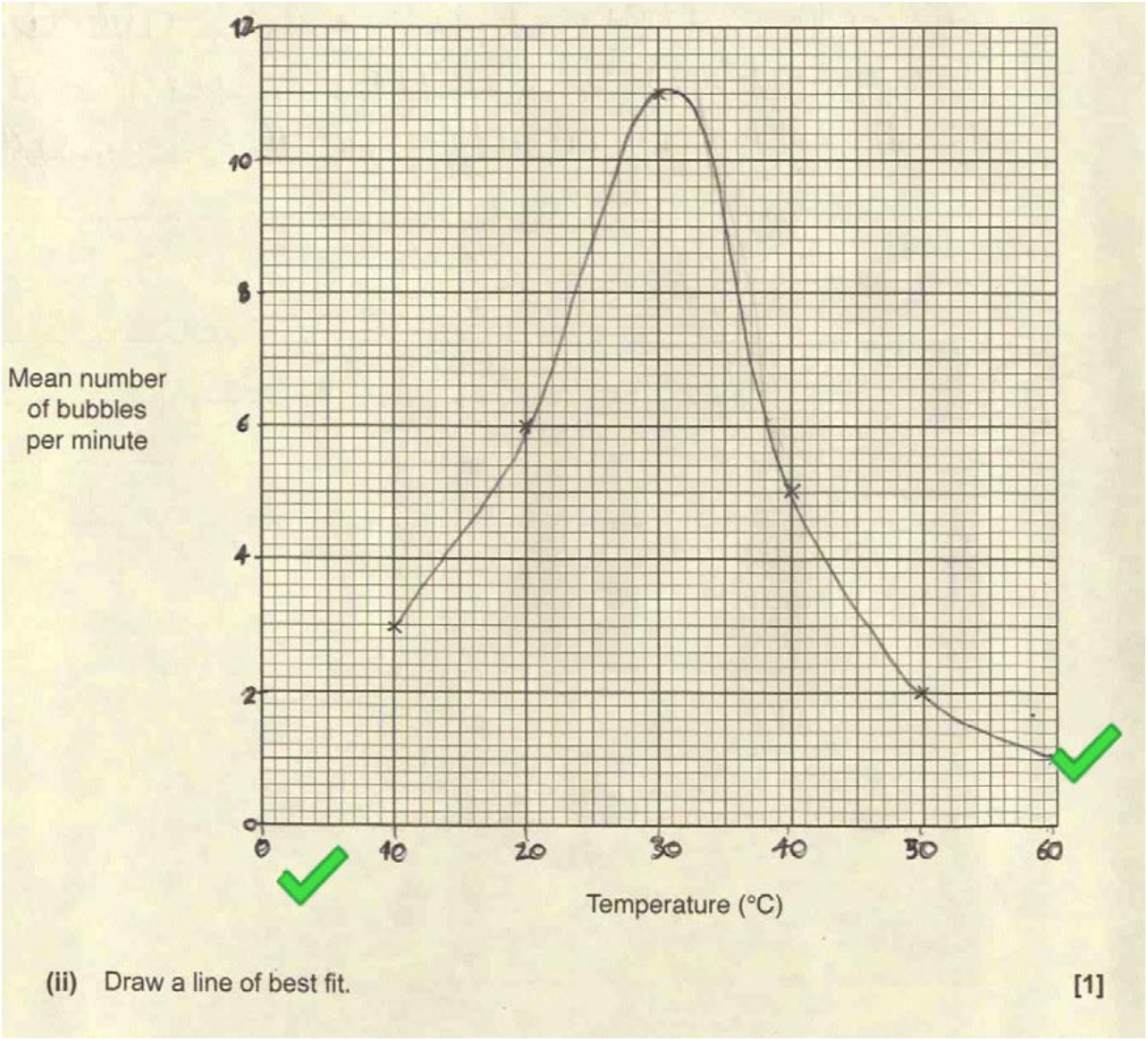
Question 15 (c) (ii)



(ii) Draw a line of best fit. **[1]**

Many candidates left this blank, appearing to forget about the question, or being uncertain what to draw. One mark was available for a suitable line of best fit. The pattern of the data was clearly suggesting a bell-shaped curve, but many candidates still drew straight lines through the data, which did not gain credit. Of those who did draw an appropriate line, some still lost the mark for overlapping lines, failing to draw a continuous single line through the data points. Some candidates' lines did pass through the points, but reached a sharp peak at the top-most data point, which also did not gain credit. Point to point lines did not gain marks. Only about 10% of candidates gained 1 mark. This question assessed AO2.2.

Exemplar 3



This candidate has drawn the line of best fit correctly and therefore gained the mark.

Question 15 (d)

(d) Respiration is an enzyme controlled reaction.

Use ideas about enzymes to explain the pattern in the results.

.....

.....

.....

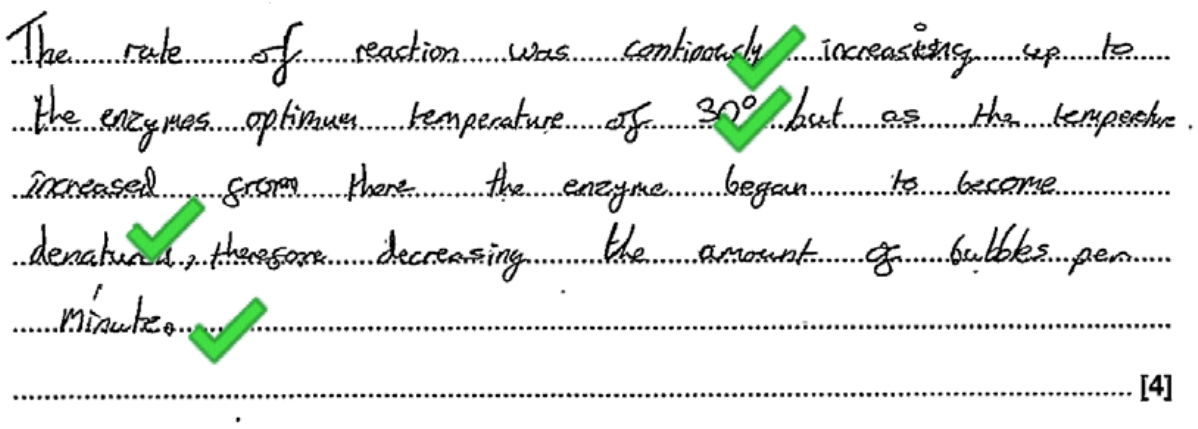
.....

.....

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

Candidates were expected to recognise the trends apparent in the graph at different temperature ranges, to describe them, and to explain them, using knowledge about enzymes. Candidates did not gain marks, because they were not explicit about the part of the graph to which they were referring (by referring to temperature), or because they quoted ideas about enzymes, without answering the question. Many candidates gained one mark for the idea that the enzyme denatures at high temperatures, or one mark for the reaction rate being highest at 30C. This question assessed AO2.1.

Exemplar 4


The rate of reaction was continously increasing up to the enzymes optimum temperature of 30° but as the temperature increased from there the enzyme began to become denatured, therefore decreasing the amount of bubbles per minute.

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

This candidate used data from the graph and their knowledge of the activity of enzymes to answer this question. This response gained 4 marks.

Exemplar 5

the rate of mean bubbles per minute is highest at 30°c because that's when enzymes work best (37°c). If the temperature is too low, enzymes will take a longer time to react. However, after the temperature increase 40°c-60°c the rate of mean bubbles drops down because the enzyme has become denatured due to the high temperature, therefore the substrate cannot fit into the active site and no reaction takes place. [4]

Exemplar 6

• Between 10° and 30° as the temperature starts to rise are increasing meaning there will be more bubbles ^ between. there will be more perfect collisions.

• at 30° the react is at its optimum temperature as its not to hot where the enzymes loose there shape and its not to cold that theres no reaction

• Between 30° and 60° the number of bubbles decreases due to the temperature gets to high and the enzyme deforming [4]

The candidate responses shown in Exemplar 5 and Exemplar 6 gained full marks because they described the activity of enzymes at different temperatures and used data from the graph to describe the pattern of results.

Question 16 (a) (i)

16 This question is about circulatory systems.

(a) The picture shows three different blood vessels **X**, **Y** and **Z**, seen using a light microscope.

(i) Compare blood vessels **X** and **Z** and describe the differences that can be **seen** in the picture.

.....

.....

.....

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

The question was explicit about comparing the two blood vessels with differences which could be seen in the pictures. One mark was available for recognising that Z has a larger lumen than X. A second mark was available for recognising that Z has a thinner wall than X. Candidates who gained both marks used comparative language when describing difference in size, such as 'larger' or 'thinner'. Candidates could also gain marks by correct description of comparative features in X and Z. Candidates who were not explicit about the comparison, simply describing e.g. the lumen size of one of the vessels, did not gain credit. Few candidates used the word lumen, using allowable alternatives. Some candidates lost marks by referring to a 'cell wall'. Many candidates identified the vessels incorrectly, and then focussed on communicating their knowledge of these vessels, rather than making comparisons based on their observations of the image. This question assessed AO2.1

Question 16 (a) (ii)

(ii) Blood vessel **Y** is a capillary. Explain how the structure of a capillary is adapted to its function.

.....

.....

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

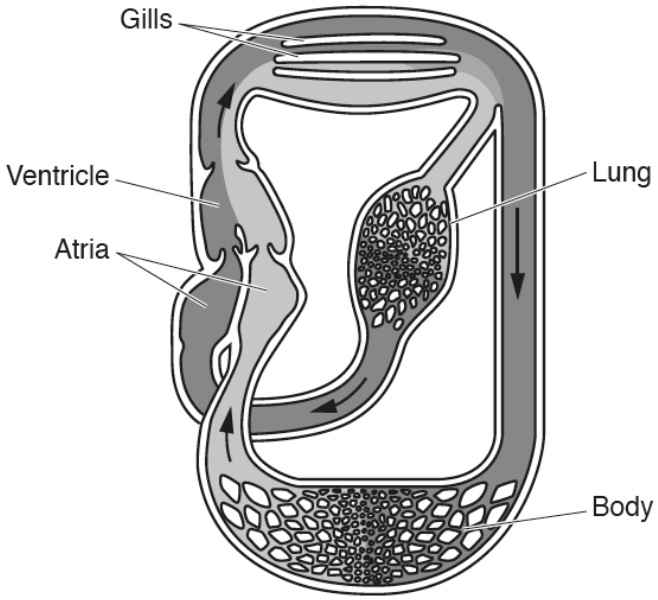
This question was challenging for candidates. One mark was available for recognising that Y had a thin wall, and a second mark for recognising that this allows for quicker diffusion, or a short diffusion distance. Reference simply to diffusion or exchange of materials alone did not gain credit. Common errors suggested that the capillary itself was only one cell thick, rather than the wall being only one cell thick. Few candidates gained credit for the effect of wall thickness on diffusion distance / speed. This question assessed AO1.1.

Question 16 (b) (i)

(b) Lungfish are fish that have both gills and a lung.

When in water, the blood flows through the gills. When on land, blood flow to the gills is stopped and the blood enters the lung instead.

The diagram shows the circulatory system of a lungfish.



The lungfish circulatory system is different to that of humans.

Blood in the lungfish can flow through gills and lungs, humans only have lungs.

(i) Write down one **other** way the **structure** of the lungfish circulatory system is different to that of humans.

.....

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

Marks were credited for recognition that the lungfish heart had three chambers, one ventricle, and only one artery leaving the heart. Equivalent credit was given for explicit mention of the equivalent in the human heart (four chambers, two ventricles, two arteries) or explicit comparison between the two. Credit was given for recognition that lungfish only have one lung, or correct references to the double circulatory system in humans or single circulatory system in lungfish. Common correct answers referred to one ventricle and single circulatory system in lungfish. However, the question was still challenging for candidates, with over 80% of candidates gaining no credit. This question assessed AO2.1.

Question 16 (b) (ii)

(ii) When lungfish and humans are on land, the human circulatory system is more efficient than that of lungfish.

Suggest why the human circulatory system is more efficient.

.....

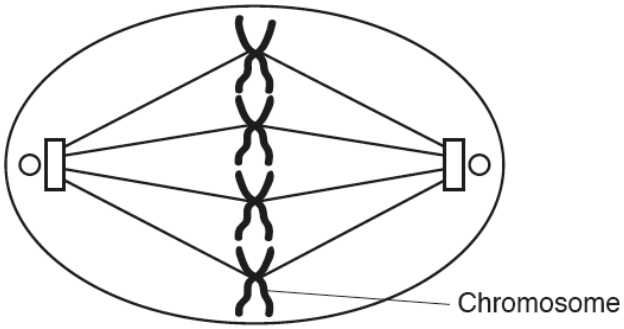
.....

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

Many candidates simply repeated aspects of their answers to 16bi, failing to provide the correct answers: oxygenated and deoxygenated blood being kept separate, and more oxygen is carried around the body / oxygen is carried more quickly around the body. Of approximately 10% of candidates who gained marks, many did so for identifying that blood pressure in humans is higher. Many candidates discussed gills and lungs, rather than focus on the circulatory system itself. Many answers talked about humans being better adapted to living on land, which did not gain credit. This question assessed AO2.1.

Question 17 (a) (i)

17 (a) The diagram shows a cell during one stage of **mitosis**.



(i) Describe **two** things that happen to the chromosomes in the next stage of mitosis.

.....

.....

.....

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

Almost half of candidates recognised that the chromosomes would be pulled apart or separated. This gained one mark. However, few candidates gained the other marking point, failing to state that the chromosomes would then move to opposite ends of the cell. Very few candidates made any reference to spindle fibres, or the formation of new nuclei or nuclear envelope. A significant number of candidates referred to cytokinesis, which did not gain credit, as the question asked explicitly what happens to the chromosomes in the next stage of mitosis. This question assessed AO1.1.

Question 17 (a) (ii)

(ii) Chromosomes are made of DNA.

Describe the structure of DNA.

.....

.....

.....

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

This question was well answered, with most of those who scored correctly referring to the double helix for one mark. Some candidates referred only to a helix, which did not gain credit. The second mark tended to be scored for correctly referring to bases, ATGC, or polymer. Fewer candidates mentioned the word nucleotides, or sugar/deoxyribose/phosphate, which also gained credit. This question assessed AO1.1.

Question 17 (b)

(b) After mitosis, cell differentiation takes place.

What is meant by the term **cell differentiation**?

.....

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

Approximately one fifth of candidates gained credit on this question, making correct reference to cells becoming specialised, or cells turning into cells with a particular role or shape. Some stated only about cells changing, which did not gain credit on its own. This question assessed AO1.1.

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