OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL AS LEVEL BIOLOGY

(9610) BL01 Unit 1 The Diversity of Living Organisms

Report on the examination

January 2023

REPORT ON EXAMINATION: INTERNATIONAL AS LEVEL BIOLOGY 9610 UNIT BL01 JANUARY 2023

There did not appear to be any issues with timing as students reached the end of the paper.

Maths questions were generally well attempted, but there were some issues with students not clearly showing working for intermediate marks when final answers were incorrect. Instructions on the paper need to be followed, for example, giving numerical answers in the correct format.

QUESTION 01

01.1

This question asked for the reason for the difference in resolution between the optical microscope and TEM, but many answers just stated the difference rather than giving the reason for it. Many of the incorrect answers said that the optical microscope had a longer wavelength, or the TEM had a shorter wavelength rather than giving the correct context of electron beams or light rays.

01.2

Almost three quarters of students gained both mark for this question about the limitations of the TEM. All marking points were seen with the most common being not being able to look at living material, specimen must be thin, and the image is in black and white.

01.3

A number of students could not describe the functions of the nucleus with a lot of incorrect answers stating that the nucleus controls what goes into and out of the cell. Many of the 1-mark answers just stated that the nucleus contains DNA or genetic material, but reference to RNA was required to gain 2 marks.

01.4

This calculation required students to accurately measure the diameter of the nucleus in **Figure 1**, use the formula for magnification to find the actual diameter and then give the answer in micrometres correct to 2 significant figures. As with several other questions on this paper, the instruction to give the answer to 2 significant figures was ignored by a large number of students with ’12.5’ being the most common response. Answers were also given with an incorrect order of magnitude showing that some students did not know how to convert between cm, mm and μm.

01.5

Few students could correctly identify this organelle as a mitochondrion so many incorrect answers described the role of ribosomes in protein synthesis. In answers that correctly identified organelles, many students gained the mark for ATP production, but did not refer to the use of energy provided to join amino acids. Less than 10% of students gained both marks for this question.

01.6

This multiple-choice question was well answered and the majority of students gained the mark.

01.7

The general structure of an amino acids is given in the specification and students should know that dipeptides form when amino acids join by condensation to form a peptide bond. Students struggled to

apply this knowledge to draw a dipeptide using the R-groups given in **Figure 2** and just over a quarter gained both marks.

01.8

About half of the students gained 1 mark for this question generally giving answers that were awarded marking point 2 but were insufficient to gain marking point 1. Answers that just stated 'spin at high speed' would not lead to separation of organelles; an increasingly higher speed would be necessary to separate out the organelles according to their densities.

01.9

This question was very well answered with most students gaining both marks. Those that did not gain marks tended to just subtract 20.5% from 100.

QUESTION 02

02.1

A very poorly answered question with three-quarters of students either not attempting the question or scoring 0. Incorrect answers tended to refer to how the student determined percentage plasmolysis, or how to control variables used in the investigation. This question was based on required practical 2, so students should have experience with sampling techniques; mathematical requirement 7 states that students should understand the need for random sampling and appropriate sample sizes to ensure that data are representative.

02.2

This question asked students to explain the results for 0.2 mol dm^{-3} sodium chloride and expected an explanation of why 6% of cells are plasmolysed, or why 94% of cells are **not** plasmolysed. Marking points 1 and 2 required the correct use of the terms 'water potential' and 'osmosis'. Less than a quarter of students gained all three marks and this question proved to be a good discriminator.

02.3

It was pleasing to see almost a quarter of students gaining all three marks for correctly plotting this line graph. Very few questions were unattempted, or had incorrect bar charts drawn. Axes were generally the correct way round. A few students lost marking point 1 for a non-linear x-axis scale (omitting 0.3), or for missing off the unit. The labelling and unit should be the same as the ones given in the table, but a few students gave the unit for concentration as mol/dm^{-3}

A smooth curve was needed for marking point 3 or points connected using a ruler; a hybrid of these was not accepted, nor was a straight line ignoring many of the points.

It would make the graph easier to plot if students chose a scale that was easy to work with, for example, a y-axis scale from 0 to 100 with intervals of 10. Some students made plotting the graph more difficult by selecting intervals of 6, 8, or 9.

02.4

Students found it surprisingly difficult to use their own scale and read off a value, with about 75% of them gaining the mark. Drawing lines on the graph from 50% to the curve, then from the curve to the x-axis intercept reduces the chance of misreading from the graph.

02.5

The data in **Table 1** on the paper shows that 42% of cells are plasmolysed at 0.4 mol dm^{-3} and 74% of cells are plasmolysed at 0.5 mol dm^{-3} ; this information together with the value of incipient plasmolysis determined in **02.4** should have provided some guidance to the answer to this question. Using 'more concentrations' was insufficient, and using a greater range of concentrations would not help, nor would using 0.3 mol dm^{-3}. Some students managed to describe what they meant but seemed unfamiliar with the term 'smaller intervals'.

02.6

This was not a well answered question with just over 10% of students gaining the mark. Two parts to the answer were needed: a reference to the effect of methylene on blue and a suggestion that this would affect the percentage plasmolysis.

02.7

Over half of the students scored no marks for this question which was surprising. Many of the incorrect answers focused on adding more detail or more organelles to the drawing; this included structures that would not be seen using a light microscope like ribosomes or DNA.

QUESTION 03

03.1

This was a well answered question with almost a fifth of the students scoring both marks. The terms 'bivalent' and 'synapsis' were not often seen, but most answers recognised that the chromosomes were in homologous pairs for the first marking point.

03.2

Three-quarters of students gained at least one mark for this question with marking point 1 'crossing over' being the most awarded. Despite knowing the term 'crossing over', fewer students were able to explain how this leads to genetic variation, and the term 'alleles' had to be correctly used to gain marking point 2.

03.3

Although many students obtained all three marks for this straightforward recall of key terms question, over 10% scored zero, and many mixed up introns and exons. Students are reminded of the importance of correct spelling of key terms, as 'extrons' was not accepted.

QUESTION 04

04.1

Although the formula for index of diversity was provided, a surprising number of students did not know how to use it. Almost 5% of questions were unattempted, and over 40% of students scored 0. Many students lost a mark for incorrect rounding giving answers of 6.06 instead of 6.07, or 6.067 instead of 6.068.

04.2

Less than 20% of students gained both marks for this question about index of diversity; definitions of species richness and index of diversity are given in the specification, and students should ensure they can accurately recall them.

04.3

Many answers to this question were too vague to be awarded the marking point; just stating that the fish were difficult to count was insufficient.

04.4

Although this was very well answered question with almost three-quarters of students gaining the mark, a number of answers were seen that incorrectly substituted ‘genus’ for ‘genome’ or ‘gene’.

QUESTION 05

05.1

Very well answered with two-thirds of students gaining both marks, most frequently for flagellum, plasmid and capsule. Some incorrect answers just referred to ribosomes rather than the smaller 70S ribosomes found in prokaryotes or confused ‘capsule’ with ‘capsid’ found in viruses.

05.2

Almost half of the students were not awarded the mark for this question as they tended to omit the idea of polymers forming from ‘many’ monomers or subunits; ‘monomers joined together’ was insufficient for the mark.

05.3

This was a straightforward question but over half of the students gave incorrect answers that were not the names of chemical elements including glucose, peptidoglycan, and muramic acid.

05.4

There were three steps to this 3-mark calculation: calculating the number of cells after four hours with a doubling time of 24 minutes, determining the number of cells in 1 mm^3 from the number of cells in 0.005 mm^3, and then giving the answer in standard form. A lot of the answers awarded 2 marks had skipped the final step, and students are reminded to read the question carefully and give their answers in the correct format. Many of the answers awarded 1 mark had correctly calculated 8400 cells in 1 mm^3 but then multiplied this by 10 rather than 2^{10}.

05.5

Although all marking points were seen, most answers gained one mark for stating that new cell walls could not be synthesised; many of these answers then went on to say that this prevented the growth of the population of bacteria which is just a repetition of the question stem. An incorrect reference to bacteria not being able to divide by mitosis was seen a few times. Some of the better answers made a clear link between a weakened cell wall and osmotic lysis of cells.

QUESTION 06

06.1

In this straightforward recall question, over 70% of students scored 0. Although most students knew that the cells performed a specific function, many of those that did not gain the mark had omitted the fact that the cells were similar or identical.

06.2

Section 3.1.5.1 of the specification refers to the relationship between the size of an organism and its surface area to volume relationship, and the role of mass transport in the efficient supply of materials in large organisms. This link was not made by most students and many answers were vague.

06.3

Although the question asked for a comparison of the structures of maltose and sucrose, many answers referred to their formation by condensation reactions, or to them being reducing/non-reducing sugars. The most common correct answers gave glucose and glycosidic bonds as similarities; there was no need to refer to the 1,4-glycosidic bonds of maltose and the 1,2-glycosidic bonds of sucrose, but some students gave incorrect bonds, for example, 1,6-glycosidic bonds.

06.4

Most answers gave dry conditions and were awarded the mark. Many incorrect answers referred just to high temperatures, but it can be hot with plentiful water.

06.5

There was only one mark available for this calculation which just involved dividing the area of a palm tree leaf (4.5 m^2) by the area of an acacia leaf (0.0008 m^2), then giving the answer to 2 significant figures. As with the calculation in **05.4**, many students did not give their answer in the correct format and so were not awarded the mark.

06.6

The answer to this question required students to refer to both small leaves and the thick, waxy cuticle. Some answers that did not gain marks were too vague and stated that surface area was reduced and/or diffusion distance was increased without explaining how this was a disadvantage to the plant.

06.7

Students must carry out the required practicals identified in the specification, and this question was based on required practical 3: Use of chromatography to investigate the pigments present in leaves. Few students were awarded 5 marks even though there were eight possible marking points available. Several answers were seen that used water as the solvent, but not all leaf pigments are soluble in water. Few answers stated that the paper should be removed when the solvent was near the top of the paper or gave a method of standardising the technique. Quite a lot of answers gave an incorrect method of calculating the Rf value.

QUESTION 07

07.1

A very well answered question with over a third of students including both elements of each marking point. The question just asked about the role of the diaphragm, so references to the intercostal muscles were irrelevant.

07.2

Knowledge of haemoglobin structure was good with over a quarter of students scoring the maximum 2 marks. Many answers went into more detail than was required, with references to the alpha and beta polypeptide chains.

07.3

Some very good answers to this interpretation of an oxygen dissociation curve were seen with good references to affinity for oxygen and the effect on oxygen supply to the tissues. Some students could state that a shift to the left increased affinity but did not know how this affected oxygen release.

07.4

Despite students having a good knowledge of haemoglobin's structure as demonstrated in **07.2**, and the stem of the question referring to oxygen binding sites, many students lost the first marking point for using the term 'active site'.

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