

PRINCIPAL EXAMINER'S REPORT



BOTSWANA
EXAMINATIONS
COUNCIL

BSSE BIOLOGY 2025

PAPER 1: WRITTEN PAPER

General Comments

The examination paper covered a comprehensive range of syllabus topics from the five BSSE Biology modules, testing candidates' knowledge and understanding of biological concepts, application skills, and ability to construct coherent responses. Overall, candidate performance was fair, with notable strengths observed in questions requiring data interpretation and diagram construction. Questions 2 and 6 were particularly well answered, demonstrating that candidates had a good grasp of cell structure and ecological concepts. However, several areas require attention to improve future performance.

A significant concern raised was the quality of spelling in scientific terminology. Common errors included 'loop of Henle' being written as 'loop of helen' and 'Bowman's capsule' as 'bore'mans capsule'. Such misspellings can result in the loss of marks where precise scientific vocabulary is required. Centres are strongly advised to emphasise the importance of accurate spelling of key biological terms and to encourage candidates to proof-read their work carefully before submission.

Presentation of work was generally satisfactory, though some candidates produced responses that were difficult to read. As all scripts are scanned for electronic marking on ScoreOnWeb, Centres should remind candidates of the importance of writing legibly using black or dark blue pen as specified in the rubric to ensure optimal scanning and readability during online marking. Another recurring issue was non-adherence to rubric requirements. In Question 1(a) for example, some candidates matched more stages than instructed. Centres should advise candidates to read instructions carefully and follow them precisely.

Comments on Individual Items

- 1 (a) This matching question was fairly done. A reasonable number of candidates correctly identified metaphase II where chromosomes were clearly aligned at the equator, and prophase I showing pairing of homologous chromosomes. However, some candidates matched too many stages, failing to follow the instruction to 'draw four lines only'. Centres should emphasise the importance of adhering to rubric instructions.
- (b) This question was poorly done. Many candidates confused the importance of meiosis with mitosis, describing the formation of body cells rather than gametes. Candidates who performed well explained that meiosis produces haploid cells and maintains the chromosome number during fertilisation. Centres should ensure candidates understand the distinct purposes of mitosis and meiosis.
- 2 (a) (i) This part was generally well done. Most of the candidates correctly identified part F as the cell membrane and G as the flagellum. A small number identified G as a 'tail', which was incorrect.
- (ii) The part question was well done by most of the candidates who correctly identified the site of respiration to release energy. Centres should note that, the correct terminology is that energy is released during respiration, not produced.
- (iii) The performance of candidates on this part question was poor. Many candidates were unable to state a feature of a eukaryote. Those who gained credit identified the presence of a nucleus or membrane-bound organelles. Candidates were required to give one reason why the cell in

Fig. 2.1(a) is an eukaryote, instead, the candidates merely stated general features of a typical eukaryotic cell.

- (b) This part question was well done. Most of the candidates missed the third marking point was often missed as because they failed to explain that in the absence of a cell wall, the cell would burst due to excessive water uptake. Some incorrectly stated the cell would burst because it was turgid.
- 3 (a) (i) The part question was poorly done. Many of the candidates failed to identify blood vessel V as the umbilical artery, giving incorrect responses such as 'umbilical cord' or 'pulmonary artery'.
- (ii) This part question was also poorly done. Many of the candidates merely stated that the twist would lead to blockage and foetal death, or that the foetus becomes less active. They failed to link reduced blood flow to decreased respiration and consequently less energy release, which is needed for muscular contractions. Centres should emphasise the importance of using comparative terms such as 'less' or 'more' where appropriate, as failure to do so resulted in loss of marks.
- (b) The part question was fairly done. Most of the candidates were able to state that the dense network of capillaries increases surface area. The second marking point was less well answered, with many candidates merely giving the general function of the placenta rather than explaining the specific advantage of the dense capillary network.
- 4 (a) The part question was well done. Most of the candidates correctly identified diabetes and cancer as non-communicable diseases. Those who failed this question, typically circled more than two diseases, contrary to the instructions.
- (b) Candidates did well in this part question. They gave correct responses such as reducing salt intake, eating fruits and vegetables, and avoiding fatty foods. The majority showed good understanding of hypertension and its dietary causes, demonstrating sound knowledge of health and nutrition concepts.
- 5 (a) The part question was poorly done. Most of the candidates were only able to state that glucose increases. They did not explain that since the patient has pancreas failure, they cannot produce insulin, and therefore the liver is not stimulated to convert excess glucose to glycogen.
- (b) This part question was also poorly done. Most of the candidates gained one mark for stating that glucose level decreases. Many failed to show that the patient was injected with insulin, incorrectly stating that the pancreas secreted insulin when the question stated the pancreas was not working. Some candidates suggest taking insulin as tablets by mouth. But this won't work because insulin is a protein, and it gets broken down by digestion before it can do its work in the body. A few candidates were able to correctly give the function of insulin in the liver and the conversion of glucose to glycogen.

- 6 (a) Candidates performed well in this question. The pyramid of biomass was correctly constructed using the given data. Some candidates failed to label the levels correctly, with others using the amount (numerical) of Biomass instead of the actual names of organisms. A few candidates drew inverted pyramids, which was incorrect.
- (b) (i) The part question was fairly done. Approximately half of the candidates correctly identified the technique as a quadrat.
- (ii) Candidates performed poorly done. The reason for choosing the quadrat technique was not clearly stated. Many candidates failed to give the essential response that trees are stationary organisms, making the quadrat method appropriate.
- 7 (a) The part question was fairly done. Candidates generally identified P as Bowman's capsule (though spelling errors were common) but failed to identify Q as the loop of Henle. This indicates partial understanding of nephron structure. Wrong spellings for loop of Henle and Bowman's capsule were frequently observed. Some candidates incorrectly identified P as glomerulus.
- (b) Candidates performed poorly in this part question. They failed to link strenuous exercise to increased ADH secretion, more water reabsorption from the collecting duct, increased sweating, and greater water loss from the body. Some candidates misunderstood the question and only gave a response that described *madila* production.
- (c) Candidates performed well in this part of the question. They correctly stated valid causes of kidney failure such as diabetes, high blood pressure, or infection.
- 8 (a) The part question was well done. Candidates gave correct and relevant reasons, showing good understanding of why microorganisms are chosen for biotechnological applications, including their rapid reproduction and ability to produce specific substances.
- (b) This part question was poorly done. This part showed a lack of understanding of lactose-free milk production. Many candidates incorrectly stated that milk is cultured, rather than explaining that bacteria are cultured to produce the lactase enzyme needed to break down lactose in milk.
- (c) This question was poorly done. Most of the candidates were able to name mutation. However, they failed to explain that due to alteration of a gene, there would be no genetic code to produce the correct enzyme. Some candidates confused gene mutation with chromosomal mutation.
- (d) Candidates performed well in this question. Most of them drew correct genetic diagrams, which was commendable. A few candidates used incorrect genotypes.
- 9 (a) This question was poorly done. Few candidates showed clear understanding of pollination and fertilisation. Many mixed-up information in their responses. Some confused self-pollination with cross-pollination. For fertilisation, many failed to state that the male and female nuclei fuse to form a zygote, merely mentioning that gametes fuse, which did not gain full credit. Some candidates failed to describe the transfer of pollen grains from anther to stigma correctly. Some incorrectly stated that the pollen grain was transported by the pollen tube.



- (b) Candidates performed poorly. Many of them showed lack of understanding of self-pollination. Most of them referred to maintenance of desirable traits, though some repeated this point in different ways. Centres should ensure candidates understand that 'no variation' or 'less variation' are just varying degrees of variation expressing the same concept.
- (c) The question was poorly done. Most of the candidates had difficulty connecting protein transport and synthesis with seeds. They failed to identify that simple proteins are transported as amino acids via phloem, and that protein synthesis occurs at ribosomes in seed cells. The term 'ribosomes' was rarely seen in the candidates' responses.

PAPER 2: PRACTICAL TEST

General Comments

Generally, candidates performed fairly well on this paper. There was a visible improvement on biological drawings presentation. Also, a significant improvement on calculation as well as correct expression of magnification was noted across all centres. Most of the candidates have shown an improvement on following instructions and conducting experiments. There was a significant improvement on drawing of bar chart by most of the candidates with correct labelling of axis and providing a consistent scale. However, lack of neatness of drawings is still a concern that was picked across all centres.

Comments on Individual Questions

- 1
 - (a) This part question was well-done by most of the candidates. They were able to draw a suitable table and record their observations correctly. However, a few candidates chose to use the word “length” instead of “height”, for recording the height of froth in the table which was not correct for column headings. Also, there was inconsistency observed on recording the values accurately to the unit used.
 - (b) This question was well done. Most of the candidates “labelled the axis correctly, provided a consistent scale and drew bars to the expected heights and spacing.
 - (c) This part question was done well by most of the candidates by noting that **S** had highest froth and **U** had the lowest froth recorded.
 - (d) The part question was fairly done. Some candidates wrote “time and volume of solutions” which were not the expected responses.
 - (e) This question was well-done by most of the candidates. The expected responses were either parallax or Human reaction time error.
 - (f) Candidates performed poorly on this part question. Most of them made references to irrelevant responses such as “*placing the test tubes on a flat surface, using same volume of yeast / solutions etc*” instead of stating that improvements to the investigation could be achieved by “using calibrated instrument to measure the gas / using a carbon dioxide probe / using a monitored water bath”
 - (g) This question was well-done by most of the candidates. However, some candidates rather wrote that yeast was the enzyme, instead of “yeast contains enzymes” which is incorrect
 - (h) Fairly done. Some candidates lost marks due to stating that “energy is **produced**”. It was rather expected that candidates write that “energy is **released** from respiration”.
 - (i) Fairly done. Some candidates lost marks by stating that the yeast solution should be placed on a white tile for viewing the cells under a microscope, instead of using a microscope slide.
- 2
 - (a) This part question was well-done by most candidates. Large and labelled diagrams were presented. However, marks were lost for lack of neatness on the diagrams.

- (b) (i) This question was well-done by most of the candidates. They were mostly able to indicate with a line where the measurement was taken and also provided a value correctly expressed to the units. However, some candidates were either writing values with incorrect units or with no units at all which was not acceptable.
- (ii) This part question was well-done by most of the candidates. The calculation and expression of magnification were satisfactorily done.
- (c) Most of the candidates did well on this part question. Candidates were able to state similarities and differences between the two specimens satisfactorily.
- (d) (i) This part question was well done by most of the candidates, by stating that heavy air pollution would result in a reduction in the number of fruits produced.
- (ii) This question was fairly done by most of the candidates. Those who got maximum marks were able to state that the reduction in number of pollinators was due to “death of pollinators / damage or death of flowers / loss of scent trail / leading to less pollination etc.
- 3 (a) (i) This question was well done by most students. Candidates were provided with data to calculate the value of energy, and they were able to perform the task satisfactorily.
- (ii) Candidates did very well on this part question. Correct substitution into the given formula to obtain the energy released.
- (iii) Candidates did very well on this part question. They were able to correctly substitute the given values into the formula to obtain the energy released.
- (b) This part question was poorly done by most of the candidates since they failed to state that the anomalous result was due to the incomplete combustion of food sample or loss of heat to the environment.

PAPER 3: ALTERNATIVE TO PRACTICAL TEST

General Comments

Generally, candidates performed fairly well on the paper. There was a visible improvement on biological drawings presentation. Also, a significant improvement on calculation as well as correct expression of magnification was noted across all centres. Most candidates have shown an improvement on following instructions and conducting experiments. There was a significant improvement on drawing of bar chart by most candidates with correct labelling of axis and providing a consistent scale. However, lack of neatness of drawings is still a concern that was picked across all centres.

Comments on Individual Questions

- 1 (a) This part question was well-done by most of the candidates. They were able to draw a suitable table and record their observations correctly. However, a few candidates chose to use the word "length" instead of "height", for recording the height of froth in the table hence which was incorrect for column headings. Also, there was inconsistency observed on recording the values accurately to the unit used.
 - (b) This question was well done. Most of the candidates "labelled the axis correctly, provided a consistent scale and drew bars to the expected heights and spacing.
 - (c) This part question was done well by most of the candidates by noting that **S** had highest froth and **U** had the lowest froth recorded.
 - (d) The part question was fairly done. Some candidates wrote "time and volume of solutions" which were not the expected responses.
 - (e) This question was well-done by most of the candidates. The expected responses were either parallax or Human reaction time error.
 - (f) Candidates performed poorly in this part question. Most of them made references to irrelevant responses such as "*placing the test tubes on a flat surface, using same volume of yeast / solutions etc* instead of stating that improvements to the investigation could be achieved by "using calibrated instrument to measure the gas / using a carbon dioxide probe / using a monitored water bath"
 - (g) This question was well-done by most of the candidates. However, some candidates rather gave the incorrect response "yeast was the enzyme" instead of "yeast contains enzymes".
 - (h) Candidates performed fairly on this part question. Some candidates lost marks due to stating that "energy is **produced**" instead of "energy is **released** from respiration".
 - (i) The part question was fairly done. Some candidates lost marks by stating that the yeast solution should be placed on a white tile for viewing the cells under a microscope, instead of using a microscope slide.
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- 2 (a) (i) Candidates did very well on this part question. They were able to correctly substitute the given values into the formula to obtain the energy released.

- (ii) Candidates did very well on this part question. They managed to correctly substitute into the given formula to obtain the energy released.
 - (iii) Candidates did very well on this part question. They were able to correctly substitute the given values into the formula to obtain the energy released.
 - (b) This part question was poorly done by most of the candidates since they failed to state that the anomalous result was due to the incomplete combustion of food sample or loss of heat to the environment.
- 3**
- (a) This part question was well-done by most of the candidates. Large and labelled diagrams were presented. However, the candidates lacked neatness on the diagrams.
 - (b)
 - (i) This question was well-done by most of the candidates. They were able to indicate with a line where the measurement was taken and also provided a value correctly expressed to the units. Some candidates did not indicate exactly on their drawings where measurements were obtained and were either writing values with incorrect units or with no units at all.
 - (ii) This part question was well-done by most of the candidates. The calculation and expression of magnification were satisfactorily done.
 - (c) Most of the candidates did well on this part question. Candidates were able to state similarities and differences between the two specimens satisfactorily.
 - (d)
 - (i) This part question was well done by most of the candidates, by stating that heavy air pollution would result in a reduction in the number of fruits produced.
 - (ii) This question was fairly done by most of the candidates. Those who got maximum marks were able to state that the reduction in number of pollinators was due to “death of pollinators / damage or death of flowers / loss of scent trail / leading to less pollination etc.

PAPER 5: ALTERNATIVE TO COURSEWORK

General Comments

The Candidates demonstrated knowledge of the subject. Most of the responses were biologically correct. Even though the responses were good, the candidates across the centres, use two (2) sided answers, i.e. the use of brackets (), the use of slashes / and the word “or” in their responses. This is not a good practice since it does not give a definite answer to the question. Centres should discourage candidates from using such responses.

Comments on Individual Items

1 This was the question on planning investigation. candidates were to demonstrate knowledge on how to carry out an investigation.

- (a)**
 - (i)** The question was well responded to, candidates responded very well on this part. Most of the candidates were able to correctly formulate the title of the investigation.
 - (ii)** This is the part that gave candidates some challenges. Some candidates failed to differentiate between a “title” and an “aim”. In an aim they should have used action verbs such as “to determine, to find out etc.”
- (b)**
 - (i)** Most candidates did well in this part. They were able to satisfactorily come up with the “hypothesis”. Most of the hypotheses given were relevant and researchable.
 - (ii)** Candidates did well in this part, but Candidates should be encouraged to make question than statements, some Candidates did not give question. The expected responses should have been questions related to investigation on the investigation of the importance of water to germination e.g. “Is what need for seed germination?” or alternatives of this question. Responses such as “why is water need for germinations?”, “How is water important for germination?” which do not address the investigation in question.
- (c)**
 - (i)** The part question was fairly done. Most of the candidates listed correct basic list of materials needed for the investigation. Basic list is the materials that without them the investigation cannot run e.g. water, seeds, sawing materials (cotton wool, soil, tissue paper). It was also observed that some Candidates assumed that light is needed for germination. In the list of materials, they included light sources which were irrelevant to the investigation.
 - (ii)** Procedure was well written in a logical way with diagrams. Most of the candidates did not use the relevant duration for germination, some were observing germination in 24 hours others stating duration of a month. Mostly the problem in this part was the duration of the investigation.
 - (iii)** This part was poorly done. Most of the candidates could not differentiate between dependent, independent and unknown variables.
 - (iv)** the part question was fairly done. Most of the candidates got the variable correct, they mostly gave “temperature” as the answer but could not correctly explain how the variable was controlled.

- (d) This part of the question was fairly done. Some stated precautions were not relevant to the investigation in question. Precautions should always be related to the inconveniences or dangers associated with the investigation being done.
- (e) This part was well done though some candidates stated just “temperature”, which is not a correct answer, instead of “suitable temperature”. Some candidates stated light as a condition for germination.

2 This is the question on data analysis and interpretation. Candidates were to demonstrate the skills on data analysis. Doing calculations and drawing conclusions.

- (a) The part question was well answered by most of the candidates. The formula was given and it made it easy for Candidates to work out the answers.
- (b) Interpretation of results was poorly done. Candidates were failing to state the patterns / relationships between the variables and effects. The conclusion was well answered.
- (c) This question was fairly done. Most of the candidates correctly stated that repeating the investigation would improve its accuracy but failed to propose additional methods for enhancing the investigation. Some candidates did not follow instructions guiding them on where to write their responses. Centres should encourage candidates to follow instructions.
- (d) Most of the candidates were able to state that alcohol consumption can result in increased number of road accidents. They failed to correctly explain the effects of alcohol in the nervous system that will result in the driver not able to respond timeously.
- (e) This question was fairly done, as most of the candidates correctly named one example of stimulants as nicotine, caffeine, and cocaine etc. The most common incorrect answers were coffee, energy drinks, marijuana, tobacco and medicinal drugs.
- (f) (i) Detoxification was given by most of the candidates. They failed to correctly describe how alcohol is broken down in the liver to water and carbon dioxide. Most of the candidates stated that alcohol can be removed from the blood by the kidneys and eventually removed out of the body as urine. Some Candidates were describing the functions of the structure of the kidney detailing how the kidney works. This deviated them from the answer as some couldn't correctly describe the processes.
- (ii) This part question was well done. Candidates demonstrated knowledge on the functions of the liver. A few of them stated “storage of glucose / storage of excess glucose” as the function of the liver which is incorrect.