

# PRINCIPAL EXAMINER'S REPORT



BOTSWANA  
EXAMINATIONS  
COUNCIL

## BGCSE HUMAN & SOCIAL BIOLOGY (HSB)

2023

### PAPER 1: Multiple Choice

#### Section 1: General Comments

Candidates en masse performed badly in this component. Candidates who take this syllabus find it difficult to access this component. In the most candidates resort to guessing as indicated by the analysis below. This portion of the report seeks to give a full item by item analysis of how candidates fared throughout the paper.

The report will also detail how candidates interacted with each key and its distractors and give a guide on distractors which were attractive to candidates as this might represent some sort of misconception.

#### Section 2: Comments on Individual Items

**Item 1:** Candidates did well in this item as about 68 percent correctly identified cell membrane, cell wall and mitochondrion (**A**) as names of structures labelled in the shown diagram of a cell.

**Item 2:** About 47 percent of the candidature got the item correct. A fair number of candidates were able to identify the level of organisation of a leaf as an organism, other options were rejected outright by candidates.

**Item 3:** Most candidates were guessing as all the options had almost equally in attractiveness though the correct answer D reducing sugar and protein was higher 0.39. Below is how the other options performed which further confirms the notion that the cohort was guessing.

A 0.11

B 0.21

C 0.29

**Item 4:** Candidates did poorly in this item as only about 11 percent knew the approximate composition of expired air.

**Item 5:** A majority candidates (**92%**) were able to identify the best way to prevent the spread of Human Immunodeficiency Virus (HIV) as option (**B**) using condoms during sexual intercourse.

**Item 6:** Most candidates (50 percent) opted for C nicotine as the substance in cigarette smoke that causes lung cancer. Only 0.37 got the answer correct tar option. This seems to suggest that candidates do not know the difference between nicotine and tar in cigarette smoke.

**Item 7:** A fair number of the candidates (0.47) were able to identify two processes that are controlled by negative feedback as (D) maintenance of a constant body temperature and regulation of blood glucose level.

**Item 8:** The item proved to be not that difficult to most of candidates as 0.55 were able to identify glucagon (**B**) as a hormone that is produced in large quantities when a person goes for a long time without food. Adrenaline (A) was also attractive as it attracted 0.24 of the candidature.

**Item 9:** About 35 percent correctly opted for **D** (protein) that enzyme is a protein molecule thought equally a significant percentage 45 wrongly opted for option **B** DNA.

**Item 10:** Candidates did fairly well in this item as 50 percent of them were able to identify **(B)** epithelial tissue as the tissue that forms the covering of the villus and the lining of the trachea.

**Item 11:** About **43** percent of candidates were able to choose starch **(D)** as the nutrient that changes in chemical structure by the time it reaches the oesophagus. Cellulose **(A)** was also attractive at 0.29.

**Item 12:** Candidates did well in this item as 82 percent of them were able identify the organism that causes malaria as option **(B)** mosquito.

**Item 13:** Candidates did not do well in this item as only 0.34 correctly suggested that **(D)** i.e. meal with higher fibre content is most likely to stimulate defecation. However, it seems as if the cohort was guessing because all the that options attracted a significant number of candidates as indicated below;

**A** 0.24

**B** 0.24

**C** 0.18

**Item 14:** A significant number of the candidates 0.53 were able identify the word equation that represent aerobic respiration as glucose oxygen carbon dioxide water but still 0.32 were equally attracted to option A carbon dioxide water glucose oxygen.

**Item 15:** It seems that most candidates 0.63 percent correctly chose (C) as the answer for heart chambers that contracts at the same time that's the right and the left atrium.

**Item 16:** Largely candidates were guessing in this item as all the four options attracted significant number of candidates as shown below;

**A** 0.24

**B** 0.26

**C** 0.18

**D** 0.32 correctly chose ulna, radius and triceps as the indicated bones **P** and **Q** and muscle **R**.

**Item 17:** Candidates did poorly in this item as only 0.34 percent of the got the order of events during childbirth correct as option **C** uterus muscles contracts, cervix dilates, baby passes through the vagina and placenta expelled. A significant number of the candidature 50 percent went for option **A** which might represent a misconception that needs to be addressed.

**Item 18:** Item 18 is another instance where candidates were guessing as they found all the options attractive as shown below



- A 0.16
- B 0.16
- C 0.24
- D 0.45

Key the item is options C at 0.24 percent which the correct pathway of an impulse in a reflex action i.e. sensory neurone intermediate neurone motor neurone. Candidates found option D to be attractive because 45 percent of the lot went for it.

**Item 19:** Just like many other Item 19 is another instance where candidates were guessing as they found all the options attractive as shown below;

- A 0.26
- B 0.39
- C 0.24
- D 0.11

Only 0.26 percent option (A) were able to correctly identify the vitreous humour in the cross – section diagram of a human eye. For some reasons option **B** was found to be attractive by the majority in the cohort at **0.39** percent.

**Item 20:** About 0.58 percent of candidates were able to correctly identify that yeast is used to produce alcohol (option A) in the production of *chibuku*.

**Item 21:** Candidates did not that cholera, gonorrhoea and typhoid can be treated using antibodies as only 0.34 percent got the item correct option **D**. it seems candidates were guessing as they were scattered across all the four options as shown below.

- A 0.21
- B 0.32
- C 0.13
- D 0.34

**Item 22:** Candidates found this item also to be more demanding as it seems again, they resorted to guessing as all the four options were found to be almost equally attractive as shown below;



- A 0.16
- B 0.29
- C 0.32
- D 0.24

Candidates were clueless as to which type of the given cells is produced by meiosis as only 0.32 percent option (C) ovum got the Item correct.

**Item 23:** About 66 percent of the candidates were able identify the type of immunity represented in graph as option (A) active artificial. Options B and C were also attractive to candidates as **0.21** and **0.26** percent of the candidates respectively.

**Item 24:** Candidates did very well in this item as 82 percent chose option (D) tuberculosis as an example of a transmissible disease.

**Item 25:** Candidates did relatively well in this item as 0.53 percent chose option (D) as the structure in the skin that produces sweat.

**Item 26:** This item appeared too complicated for candidates as 0.29 percent were able to the function of the labelled P as option (B) i.e. moving mucus. **Option A** moving carbon monoxide and **Option C** were attractive than the key as they attracted **0.34** and **0.32** percent respectively.

**Item 27:** Candidates struggled in this item because as only 0.26 percent were able to identify the carbohydrates that stored in animal tissue as option B glycogen. **Option A** cellulose and **Option C** glucose were attractive as they attracted **0.37** and **0.24** percent respectively.

**Item 28:** Candidates found the item to be most difficult as only **0.29** percent of the candidature were able to identify the most effective method of contraceptive as **Option B** contraceptive pill. It seems candidates misread the Item because 0.71 percent went of the least effective contraception method **Option D** rhythm method.

**Item 29:** Candidates did fairly well in this item because 0.53 percent of the whole candidature were able to identify the statement that correctly explains why drinking alcohol and driving is dangerous **option B** alcohol increases reaction time.

**Item 30:** This item proved to be the most demanding as less than half of the candidature **0.34** percent were able to identify the process that pushes the food along alimentary canal as option D. 50 percent of the candidates choose digestion option C which indicates a misconception between the two processes.

**Item 31:** Only 0.38 percent of candidate opted for option (B) t as where the fluid that nourishes sperms is produced in the male reproduction system. Candidates were also equally attracted to option C **22** percent and option D **32** percent.



**Item 32:** 41 percent of candidates chose option **(C)** pulmonary artery as the blood vessel that carries blood the lungs. Some candidates 22 went for aorta and a significant portion 38 percent went for pulmonary vein.

**Item 33:** Majority of candidates 59 percent wrongly choose option B genotype as the term that describes the height, colour, and sex of an organism. The correct answer option C phenotype was chosen by only 22 percent of the candidature.

**Item 34:** 43 percent of candidates chose option (C) 50% as the chance of next child being a boy for the couple who had previously had two daughters. 25 percent option B also attracted a significant number of the candidature 29 percent.

**Item 35:** There was an element of guessing in this item causing the for options were equally attractive i.e.

A 0.32

B 0.22

C 0.24

D 0.22

The correct option **(C)** as what is the function of the amniotic fluid as to provide even pressure around the foetus.

**Item 36:** There was an element of guessing in this item between options A, B and C. as the three options attracted a significant number of candidates as shown below;

A 0.41

B 0.24

C 0.30.

However, majority of candidates the 41 percent choose option A 25% as the chances of the second child be an albino.

**Item 37:** About 41 percent of the candidature chose option **(C)** as the structure that contracts in the respiratory system to increase the volume of the thorax. The other options also proved to be attractive to learners.

**Item 38:** Candidates did extremely well in this item as 65 percent of the whole candidature managed to choose option B i.e. that circular muscles contracts while the radial muscles relax to make the pupil smaller. However, a noticeable number of candidates found option C to attractive as 24 percent went for it.

**Item 39:** Candidates did extremely well in this item as 84 percent were able identify increase in soil erosion as a direct result of deforestation.



**Item 40:** Candidates found this item to be very difficult as a result only 30 per cent of the total candidature got the item by choosing option C lead as a substance that causes learning disability in children. A noticeable percentage of the candidature were attracted to option B chloro fluorocarbons.

### PAPER 2: Written

#### Section 1: General Comments

As per the recommendations that were made last year, centres provided candidate with single sheets to answer section. This helps in preventing candidates from writing section A in separate answer sheet instead of the question paper itself. This is highly applaudable. It has also been observed that none of the candidates used a pen for drawing a graph, a commendable improvement.

In general, the 2023 cohort left most questions unanswered. Candidates could not recognize simple diagrams; patterns hence failed to interpret or explain accordingly. Majority could not calculate the mean, let alone taking the readings from the given samples. Most candidates could not spread out a graph to fill the given grid from a narrow scale. Centres are encouraged to advise candidates that numbering of axes does not have to start with zero, but with any number if is indicated in the grid.

A significant number of the candidates could not follow instructions on the 'match' question. candidates used letters from the diagram to match the given statements, but some decided to write names which still in most cases were nonetheless wrong. Section B was poorly done as over 3/4 of candidates did not attempt it.

#### Section 2: Comments on Individual Questions

##### Section: A

- 1 (a) (i) The item was attempted fairly. Majority of the candidates managed to label the cell wall correctly. However, some showed no idea at all, as they labelled other cell organelles.  
(ii) This part item was poorly done by most candidates as only a few of them labelled the cytoplasm correctly. Most candidates labelled the nucleus or chloroplasts instead of the cytoplasm. There was noticeable element of guessing.
  - (b) (i) majority of candidates did well in this part item as most came up with a variety of correct possible answer. The most common answers were vacuole and cell wall however a few did mention nucleus or chloroplasts as answers.  
(ii) A reasonable number of students did well in this part item though some candidates confused the correct answer to be cell wall instead of nucleus or chloroplasts or vacuole or mitochondria.
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- 2 (a) (i) Candidates did poorly in this item as most were not able identify the blood vessel properly as the common wrong answer, but the correct answer is the capillary.  
(ii) Most candidates failed give reasons of they answer at 2 (i) i.e. because it is a capillary the space is large enough only to allow a single red blood cell to pass through and the features shows possibility of some permeability.



- (b) The item was fairly done by most candidates. Candidates who missed it just wrote that 'it has haemoglobin', or some would wrongly state that red blood cells transport blood. Instead of stating that it transports oxygen around the body.
- (c) The question was poorly done by a lot of candidates. Some candidates confused facts between arteries and capillaries. Majority of candidates could not pick that aorta is an artery, so it has a thicker wall or many layers; has a larger lumen and that its walls are impermeable.
- 3 (a) Most candidates performed badly on this part item as most could not take readings appropriately. That is, some candidates were putting values at wrong places. But majority had values that are not anywhere closer to the expected. Even with their wrong values still could not calculate the mean. Some even got mean values with decimals. Using a ruler with the lowest value in millimetres (mm), it is not scientifically to get a value less than a zero. However, a few managed to get all the available six marks.
- (b) (i) The question was fairly attempted by a significant number of the candidatures. The most missed mark was that of the size of the graph or the scale. Candidates failed to demonstrate the skill of able to spread out the scale when values are too close to each other in order to maximize the given space on the grid. Those who managed to plot the graph, majority would get 4/5 missing only on scale. But otherwise, they were fine with graph orientation; labelling of axes and units; plotting with correct notations as indicated in the syllabus and lastly, joining only the plotted points. Candidates should be advised that they should strictly join only the points plotted. If there are more than one coordinates in one value, then the mark for plotting is forfeited. Units must be written as is in the table for example /mm NOT (mm).
- (ii) Candidates also performed badly on this part question. The majority had no graph hence could not attempt the questions. Candidates were expected to pick from the graph that the presence of salt makes the potato chips lose water and that those without salt had absorbed water.
- (iii) The part item was fairly attempted by significant number of candidates. However, a lot of confused osmosis for diffusion.
- 4 (a) Majority of the candidates failed to define the term vector. Those who got a single mark they were defining a pathogen, so they got a mark on 'organism' but otherwise the following statement being wrong. Instead of saying an organism that transmit a pathogen; they would say that carries diseases. Only few got it wrong by being specific to the mosquito, just because is the diagram.
- (b) (i) This part question was poorly attempted by most candidates. Candidates gave specific names but not group names. They wrote mosquito or fly instead of 'insect or Arthropoda'.
- (ii) This part of the question was fairly attempted by noticeable number of candidates. Candidates in the large managed to get observable features well, such as the presence of

antennae; wings; 3 body parts and jointed legs (or any correct reference to legs). However, note that candidates marked wrong if they wrote wrong number of legs (for insects, is six).

(c) The cohort the performed badly in this part question. Majority of the candidates did not realize that the question was on the 'larval' stage only hence majority were irrelevant as they were talking of the insect itself or the adult stage. The expected responses were on chemical use; cover water surface with oil; use of fish / *Gambusia* and bacteria / *B. thuringiensis*.

5 (a) A significant number of candidates did fairly well in this part question as most got 1 of the 2 marks available, the common answer be catalyst. Only few got both marks by stating that enzyme is a protein or biological catalyst.

(b) (i) Candidates did poorly in this part question. They failed to note that the size or amount of the sweet potato is the same, the difference is on how much of the chopping has been done. Candidates failed to notice that the reaction was increasing as the surface area to volume ratio increased.

(ii) Candidates did fairly well in this item as most got 1 mark out of the available 2 marks. The common correct answer was that the chewing breaks food into smaller pieces but failed to mention the advantage of the action to the enzyme to digest faster when pieces are smaller.

(iii) Candidates performed badly in this question. The common wrong response was to increase the amount of the enzyme however it is accurate results or to ensure the amount of enzyme present in the potato was the same.

(c) Candidates struggled to answer this question as most of those who attempted were thinking the potato and enzyme, not recalling that enzyme activity is affected by temperature; pH; substrate concentration and enzyme concentration.

6 (a) Candidates did fairly well on this part item. Majority of the candidates got a mark in line with movement of oxygen and carbon dioxide but failed to mention the place where it takes place, the alveoli / lungs.

(b) Most candidates got the item wrong. The common wrong response was 'air' while candidates were supposed to know that is 'breathing in' not just breathing.

(c) This part of the question was poorly done by most candidates. Most candidates were not able realise that the blood was flowing into the lungs at 'S' and out of the lungs at 'T'. that is, deoxygenated blood at entry from the rest of the body and leaves the lungs oxygenated.

(d) (i) Most candidates were able name the component in cigarettes that causes cancer as tar while a noticeable number of responses were nicotine and marijuana.

- (ii) Majority of the candidates managed to get a mark out of the available 2 by suggesting that lung cancer can affect breathing i.e. 'difficulty in breathing' or gaseous exchange slows down. However, candidates in the whole failed to note that is due to reduced surface area to volume ratio.
- 7 (a) (i) The item was poorly done by most candidates as majority of the candidates said that structure labelled N is medulla or just membrane, instead of the cortex.
- (ii) Candidates also performed poorly in this part item, as most of the time it was left blank or the few were putting 'X' on the medulla while there was a vast space for pelvis.
- (iii) A significant number of candidates performed poorly in this part question. All various responses were given such as anus, uterus and urethra. Failing to note that is the urinary bladder. However, candidates were NOT penalized for omitting the word 'urinary' in bladder.
- (b) (i) The item was poorly done by most candidates The candidates who attempted got a single mark on the reagent 'Benedict's solution' but failed to include the amount and that the mixture is heated gently or using a water bath. The common wrong response was iodine solution.
- (ii) The item was poorly done by most candidates. Candidates failed to realize that the student was healthy, proteins are too large to pass through the cell membrane, so not expected in the filtrate. The other thing is that all the glucose in the filtrate has been re-**absorbed** into the blood not just absorbed. Candidates were expected to use the correct terminology.
- 8 (a) Candidates did fairly on part (a) as about 50% of the candidates who answered this question got 4 marks out of the 5 marks available. Those who missed was that they could not match correctly. Others wrote names which were equally wrong.
- (b) The item was fairly done by most candidates in the cohort. The answer was either testis or letter 'D' from the diagram. However, a noticeable number of candidates response was scrotum.
- 9 The item was poorly attempted by many candidates as they failed to demonstrate the distinction between stimulus and the function of an organ. For example, some wrote stimulus for an eye as 'seeing'. Some candidates just copied the given example and added the respective organ, chemicals in the nose, ear etc.

The common single mark candidates managed to secure was on the skin. The responses such as touch; pressure; pain; heat; cold or temperature.

### Section: B

The whole section was poorly done as less than 10% of the candidature attempted this section. Candidates failed draw a genetic diagram and to describe Downs Syndrome its causes and characteristics.

- 10 (a) Majority got a single mark on nuclear division only, failing to note that this cell division results into halving chromosome number and providing variation which is meant for gamete formation.
- (b) (i) Candidates could not pick that the rare trait comes from parents that are heterozygous. Candidates could not draw a genetic diagram except for about a 1% who drew the punnet square. Candidates could not come up with alleles that denote the skin colour. As a result, there was not much displayed by the candidates. They only got a mark or two. Which means only 2 marks were obtained from gametes and by showing the relationship of the parents.
- (ii) The item proved to be difficult to those who attempted as it proved impossible for candidates to get the ratios.
- (c) (i) Almost all the candidates demonstrated lack of knowledge in the aspect of Down syndrome. Could not state that it was a genetic disorder or mutation that affects the number of chromosomes particularly at chromosome 21.
- (ii) Candidates were not able to come up with characteristics of Downs Syndrome. The most common wrong response was 'big head' instead of small skull, upward slanting eyes or tiny eyes, short height, cognitive disability etc.
- 11 (a) Almost all the candidates could not describe a spinal reflex. Those who attempted were confusing the sequences. Majority got 3 marks on the impulses, stimulus, and sensory neuron, or just mentioning the three neurones. Otherwise, the grey matter, effector and response and the synapse were never mentioned.
- (b) The item was poorly attempted by most candidates as Poorly done. Candidates could not get to 3/5 marks. They only talked about the speed and type of the message. However, failure to mention that hormonal system uses chemicals but just saying 'hormones' a mark is forfeited. The mode of transmission, spread and duration of the effect were never mentioned by the candidates. Candidates need to know that both sides were to be mentioned to attract a mark.

### Conclusions:

The multiple-choice question paper suggests that throughout the paper students were guessing as the were attracted to almost all the available options in any given question. Centre are encouraged to urge their students to seriously prepare of the examination. The same trends were observed in paper 2 as most questions were left unanswered.