

EXAMINATIONS COUNCIL OF ESWATINI

EGCSE

EXAMINATION REPORT

FOR

BIOLOGY (6884)

YEAR

2020

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EGCSE BIOLOGY**Paper 6884/01****Short Answers****General Comments**

The paper is a short answer paper consisting of 40 marks. It tests knowledge with understanding and some questions based on handling and solving problems.

The 2020 paper was fair and less difficult as compared to 2019 paper. The syllabus was fairly covered as the questions were from all four sections. However, the questions were a bit tricky as candidates failed to understand what each question really required. As a result, their responses were partially correct, thus could not score all the marks allocated for various questions. This resulted in the poor performance in the 2020 examination when compared with 2019. Also it was noted that questions with diagrams proved to be a challenge to candidates. They failed to extract the information for their answers e.g. **Question 3 and Question 5**.

Even though the paper seemed less difficult than that in 2019, it was not easy for candidates to get marks above 30. Very few candidates scored above 30 and many scored below 20. Also there was a substantial high number of zeros and one digit scores. The poor performance might be attributed to some of the following factors:

- Failure to read and understand the questions
- Wrong spellings
- Language barrier
- Lack of revision time in most centres
- Failure to complete the syllabus, especially Section III and IV

Comments on Specific Questions**Question 1**

The question required the candidates to state the characteristic of living organism shown by the baby when laughing after being tickled.

This was an easy question which was well attempted by candidates. However, some candidates lost a mark by writing the incorrect answer which was respond or response instead of response to stimuli. Common errors included that of stating movement as the answer yet it is also a result of sensitivity.

Expected response: sensitivity/ irritability/ response to stimulus

Question 2

The question required candidates to describe a test for vitamin C in the orange juice. It was an easy question but the majority of candidates could not get the marks allocated. Most candidates had no idea of how to test for vitamin C. Common responses were using the blue litmus paper which changes to red as the juice is an acid. Some decided to name other reagents such as iodine solution, Biuret solution, barium sulfate and Benedict's solution, and for the result they stated the positive colour changes for starch, protein and reducing sugars. The majority of those who had an idea of the vitamin C test got one mark for failing to state the original colour of DCPIP even though they knew that the reagent decolorizes. Some scored a zero for wrong spelling for DCPIP.

Expected response: add few drops of orange juice to DCPIP:

DCPIP changes from blue to colorless

Question 3

(a) Candidates were required to state the type of response shown by the growing shoot in the dark and this seemed to be difficult to most candidates. They failed to read the stem of the question and ended up giving positive phototropism as their response. It was also noted that candidates have a misconception that whenever a shoot bends it does so because of responding to light.

Response: negative gravitropism/geotropism

(b) Candidates were required to explain why the shoot grew in upward direction in the dark. Instead of addressing how auxins brought about negative gravitropism they described how they bring about positive phototropism. Common wrong responses included that the shoot

bent upwards searching for light. Candidates also failed to relate the auxin distribution to differential growth.

Expected response: auxins concentrated on the lower side;
ref. to growth rate in shoots stimulated growth on lower side/
differential growth;

Question 4

This was an easy question where candidates were required to state and explain the main agent of dispersal for the fruit in the diagram. However, most candidates scored one mark for correctly stating the agent of dispersal and zero for the reason. They did not pay attention to the colour of the fruit that was mentioned in the stem. Instead they described how animals disperse seeds e.g. seeds are not digestible and they are passed out during egestion, animals eat the fruit and throws the seed away or the seeds get hooked to the skin of animals and fall off away from parent plant. Common wrong error was that of stating the agent as insects.

Expected response: agent – animal
reason – red/colorful to attract animals

Question 5

This was the most poorly answered question. Candidates were required to describe how male circumcision could help to control the spread of HIV/AIDS. Most candidates failed to describe the role played by circumcision in controlling the spread of HIV/AIDS. They associated circumcision with a way of keeping the penis clean or making it easy to clean it especially because the foreskin that is being removed is dirty and always keeps viruses which can be transferred to another person during sexual intercourse. Also a number of candidates did not differentiate between the foreskin and the glans penis. Most said circumcision results in making the foreskin or the whole penis dry and hard thus creating unsuitable conditions for the viruses to multiply as they thrive well in moist areas. The name 'glans' was not known by candidates. They referred to it as the fore head/ shaft/ tip of the penis. Also most candidates failed to state that viruses enter through the bruises on the foreskin caused by friction during sexual intercourse.

Expected response: the glans penis becomes hard/dry/less bruised;
reduces chances of entry of the virus;

Question 6

A fairly done question. Most candidates paired the bases correctly. However, some lost marks for pairing the bases vertically not horizontally. Some were totally not familiar with the structure of the DNA so they put the letters in the column or between the double line separating the bases.

Expected response: A – T;
C – G;

Question 7

(a) This was an easy question but most candidates failed it by stating the wrong term e.g. focusing, magnification, pupil reflex. Some stated the name of the lens shown instead of accommodation.

Expected response: accommodation

(b) This was a fair question as long as one realises it was accommodation not a reflex action. Those who realised it was accommodation did well but those who thought it was reflex action failed it. However, there were candidates who confused ciliary muscles with circular muscles, thus lost a mark. Some lost a mark for saying suspensory ligaments relax instead of slacken.

Expected response: ciliary muscles contract;
suspensory ligament slacken;

Question 8

This was also an easy question and most candidates did well. A few lost the mark by confusing the phloem with xylem.

Expected response: label line to the phloem

Question 9

Another fair question where most candidates did well. Common wrong responses were pulmonary artery instead of pulmonary vein. Also the spelling for semi-lunar valve proved to be a challenge to some candidates. Some candidates lost a mark for writing left ventricle instead of semi-lunar valve because the pathway given had skipped the ventricle.

Expected response: pulmonary vein;
semi-lunar valve;

Question 10

It was well answered by most candidates as most knew the part labelled **T** as the pancreas and also knew its functions. However, a few lost marks for stating that the pancreas stimulates the liver to regulate glucose concentration. Also some candidates scored one mark for separating the secretion of insulin and glucagon, making two separate points yet they were in the same marking point.

Expected response: secretes digestive enzymes/named;
secretes hormones/named

Question 11

This was an easy question where candidates were required to name two substances that can pass through the capillary walls into the tissue fluid. Most candidates did well. However, a number of them lost the mark by naming one correct and one wrong substance as the mark required them to have two correct substances for one mark. Weaker candidates just listed substances which are found in the blood regardless of being soluble or not, waste or essential.

Expected response: any two from: amino acids/ glucose/oxygen/vitamins/mineral
salts/hormones.

Question 12

This was fairly attempted by most candidates. They were required to match hormones to their functions. A majority scored all the three marks. A few who did not get all the marks confused the function of FSH and LH while others had two arrows from the same hormone pointing at two different functions.

Expected response: FSH causes an ovum to mature in the ovary
LH causes the mature ovum to be released from the ovary
progesterone maintains the lining of the uterus

Question 13

This was one of the easiest questions. It required candidates to state the type of reproduction and support their answer. Most candidates stated the type of reproduction correctly. However, it was very difficult to state that the organism reproduces by spore formation. Most stated the advantages of asexual reproduction versus sexual reproduction e.g. one parent needed/no gametes/no fertilisation, genetically identical offspring are produced, all of which were not shown in the diagram

Expected response: type of reproduction: asexual

reason: spores formed/ small buds develop and fall off

Question 14

(a) The question was not a difficult one but candidates did not perform as expected. It required candidates to identify the pituitary gland in the brain. A number of them managed to do that but they had a challenge in spelling pituitary correctly. The other candidates confused the pituitary with the hypothalamus or medulla oblongata.

Expected response: U - pituitary gland

(b) This question required the function of the cerebellum and it was poorly attempted. Most stated the function of the cerebrum instead of the cerebellum. Some lost the mark by saying the cerebellum controls involuntary actions instead of voluntary muscle movements. Others lost the mark by just writing 'balance' or 'posture' instead of stating that these are being coordinated.

Expected response: coordination of muscular movements/ maintenance of equilibrium and balance

Question 15

This question was fairly attempted by candidates. Common wrong responses included hepatic artery, hepatic vessel and vena cava.

Expected response: hepatic portal vein

Question 16

The question required the candidates to fill in the blanks in a sentence describing gaseous exchange. It was an easy question but most candidates did not do well. It was noted that candidates do not know the changes caused by breathing. They were just guessing the answers. Most of them knew the diaphragm flattens but they had a problem of the spelling thus lost the mark. Pressure changes in the thorax were not known by most candidates.

Expected response: diaphragm;
contracts;
decreases;

Question 17

The question on importance of conserving species was well answered by most candidates. This showed that they had a clear understanding of conservation issues. However, some got one mark for writing the same point in different ways.

Expected response: prevention of extinction
maintain biodiversity
benefits associated with ecological importance/ medicinal use of
the species

Question 18

(a) The question was challenging for most candidates as most wrote wrong terms like ammonification or decomposition. Those who knew the processes had a problem with the spelling. e.g. nutrofication for nitrification.

Expected response: **V-** de-nitrification
W- Nitrification

(b) This was one of the most difficult questions and the candidates could not score all the three marks. The majority got only one mark and a few got two marks. Candidates failed to explain the disadvantage of humans eating beef rather than eating legumes. Most candidates were able to state that there is less energy in beef, and a few mentioned that there is energy being lost between trophic levels and none mentioned the marking point

where they were required to state that humans are in the third trophic level when eating beef but second when eating legumes.

The candidates did not understand the question at all. Some of the incorrect responses mentioned were that there is less energy in beef because it is not easy to digest beef than legumes or the cow loses a lot of energy during movement.

Expected response: humans are in second trophic level when eating legumes and third when eating beef/ beef longer food chain;
less energy in beef;
as energy is lost between trophic levels;

Question 19

This question required candidates to name one substance that causes acid rain. It was fairly attempted by most candidates. However, some lost the mark by writing sulfuric acid instead of sulfur dioxide. Other common errors were carbon monoxide, fossil fuels, car exhaust fumes, methane and CFCs. Others lost a mark for writing wrong formulae

Expected response: sulfur dioxide/ nitrous oxides/ carbon dioxide;

EGCSE BIOLOGY**Paper 6884/02****Structured Questions****General Comments**

There were about 15 000 candidates who registered and wrote this paper, a slight increase compared to the 2019 paper.

Generally, this paper was poorly done compared to the previous year even though the paper was perceived to be less challenging than that of the previous year.

No candidate scored 70 and above while quite a number scored between 5 and 9.

Questions that seemed to be easy were **Question 3 (c)**, **Question 4 (a)**, **Question 5 (a) (ii)**, **Question 6 (a)**, **Question 7 (a) (i)**, **Question 7 (b) (i)**. The most difficult questions were **Question 2 (b)**, **Question 5 (a) (i)**, **Question 5 (b) (i)**, **Question 5 (b) (iii)**, **Question 6 (c)**, **Question 7 (b) (ii)**, **Question 7 (b) (iii)**, **Question 8 (a) (ii)** and **Question 8 (a) (v)**.

Grammar still remain a challenge like in the previous years, spelling was also a challenge even for words that were on the question paper e.g. hominids spelt as homids, polio as polio/ pilio/ polo. The use of comparative language still remains a challenge, candidates still fail to compare correctly e.g. in **Question 3 (a)**, some candidates would say anaerobic respiration uses lactic acid while aerobic respiration does not. Anaerobic respiration produces lactic acid than anaerobic respiration. Aerobic respiration has carbon dioxide while anaerobic respiration does not.

Candidates displayed an inability to understand questions well hence they gave poor responses, e.g. **Question 6 (c)**, most candidates wasted the given space describing the function of magnesium in plants instead of describing the effect of the lack of magnesium.

Many candidates showed over reliance on past exam papers as the concepts that were being tested for the first time e.g. **Question 7** (immunity) proved to be difficult for them.

A majority of candidates had a challenge of questions that required knowledge application. It seemed they knew their biology but could not use their knowledge in a novel situation.

On another note, it was difficult to determine whether candidates had enough time to answer the paper as some left blank spaces especially towards the end of the paper.

Comments on Specific Questions

Questions 1

It was a fair question and was fairly done by most candidates. A majority of candidates were able to score above average. Instead of filling up using the provided information from the question, candidates just wrote the names of the levels of classification. Some candidates were able to pick up the information from the question but failed to put the information in their corresponding boxes. The majority failed to identify 'mammal' as part of the classification level and ended up getting 4 out of 5. A few candidates had wrong spellings even though the information was provided for them in the question. Only a few just recorded '*Homo sapiens*' in the last box without filling every other box.

Expected response: Mammal;
Primates;
hominids;
Homo;
Sapiens;

Question 2

This question was poorly done and most candidates scored way below average, 2 out of 7.

- (a) (i) It was poorly done. Very few candidates associated the optimum temperature for enzyme activity for bacterial activity. For those candidates that associated the temperature with enzyme activity, they could not explain clearly how and had responses like 'to activate the enzyme, for enzyme activity, for enzyme reaction', to name a few. They were scoring 0 out of 1. The correct response was "optimum enzyme activity".
- (ii) This part was fairly done, with most candidates scoring 1 out of 2. Most candidates mentioned all the processes for yoghurt making instead of focussing on the process that leads to the sourness of yoghurt. A majority of the candidates only got a mark for

mentioning the process fermentation or anaerobic respiration. A great misconception was to state that the 'milk' was converted to lactic acid instead of lactose or milk sugar.

Expected response: Fermentation/anaerobic respiration;

Lactose changed into lactic acid;

(b) This question was poorly done with a majority of candidates scoring 0 out of 4.

Most candidates had no idea as to what the question really required but instead, they wrote anything associated with bacteria, such as the use of bacteria in insulin production. There was no reference of biological terms such as mutation, natural selection, gene instead they were using general terms such 'resistant bacteria develop'. A misconception with most candidates was that mutation is brought about by the taking of an incomplete antibiotic course. After the mutation the candidates failed to specify that mutated bacteria are the ones that will reproduce. Candidates also failed to state that it is the mutated gene that is transferred to the offspring than resistance being transferred. For the candidates that mentioned natural selection, they failed to specify which bacteria died and which survived, instead they were too general e.g. 'some die and some live'.

Expected response: ref. to natural selection of mutated bacteria;

Antibiotic kills normal bacteria and leave mutated bacteria;

Mutated bacteria reproduce;

Passing the mutated gene;

Question 3

This was a fair question but it was poorly done. Most candidates were not able to score above average.

(a) This question was fairly done with a majority of candidates scoring 1 out of 2. The loss of marks was due to an incomplete comparison on the designated answering space which was then completed on the second answering line. Misconceptions were identified such as: 'in aerobic respiration more energy is used' instead of produced.

'Aerobic respiration has oxygen' instead of 'use oxygen'

anaerobic respiration occurs in muscles cells while aerobic respiration occurs in body cells'.

Other candidates failed to read the question properly and made reference to anaerobic respiration in yeast cells hence they lost marks.

Expected response: Candidates were expected to compare the two as follows:

Oxygen is needed for aerobic respiration but not needed in anaerobic respiration;

More energy is released in aerobic respiration than in anaerobic;

Production of carbon dioxide in aerobic but no carbon dioxide in anaerobic;

Lactic acid is produced in anaerobic but not in aerobic respiration

(b) (i) This question was poorly done. Most candidates scored 1 out of 2.

Candidates only gave the description but failed to give the explanation. Candidates who were unable to score marks couldn't interpret graphs and give a comparison between student **A** and student **B**.

Description

Student B had lower heart rate or pulse;

Student B heart rate returns to normal faster.

Explanation

Student B exercises more regularly/has a larger cardiac output/improved circulation/larger blood volume

(ii) This question was well done, with worst candidates scoring 2 out of 3.

A majority of candidates lost marks due to reference of more energy being supplied instead of released. Candidates had misconceptions such as 'respiration occurs first in the body cells then the energy released is transported to muscles. Respiration occurs in muscles themselves. Candidates failed to relate that an increase in the heart rate leads to more oxygen and more glucose supplied to muscles.

Expected response: Faster blood flow hence;

More oxygen/glucose to muscles resulting

In faster respiration/ more energy being released.

- (c) This question was well done. Most candidates scored 2 out of 3 for how it develops and scored 1 out of 1 for the prevention. Candidates failed to identify the blocked artery as the coronary artery. They simply stated artery; hence they lost the mark. Candidates also lost marks for failure to state that less oxygen is supplied to the heart muscles, omitting the word muscle. Most candidates wrote 'no oxygen/ no glucose supplied to the heart muscle' instead of 'less oxygen/ less glucose.

How it develops

Clot formation;

blood flow restricted;

heart muscles starved of oxygen and glucose

Prevention

Most candidates referred to exercise as a method of prevention yet this was already stated in the question. Other candidates were stating "eat unsaturated fats" instead of "avoiding/reducing the fats". Other candidates wrote eat healthy/balanced diet hence lost marks.

Expected response: Stop smoking/less fat diet especially animal fat/ avoid stress

Question 4

This question was fairly done, most candidates could answer the questions and were able to score half of the marks.

- (a) This question was fairly done. Most candidates were able to score 1 out of 3. Most candidates wrote that the light sensitive cells are concentrated in the retina instead of the fovea which was the expected response. Most candidates were able to write that the nerve impulse travels along the sensory neurone, however, some had challenges with the spelling of "sensory". Most candidates were not able to write that the radial muscle of the iris will relax, most wrote "contract".

- (b) This question was fairly well done. A majority of the candidates were able to score 2 out of 2.

Most candidates who did not score maximum marks wrote about too much bright light damaging the eye, instead of writing that it is the retina that will get damaged. Others wrote about the lens being damaged. Another common error was confusing the question with the response of radial and circular muscles. Also, candidates wrote of the pupil 'contracting' instead of constricting.

The correct response: Reduces light that enters the eye;
Preventing damage of the retina/ light sensitive cells;
Pupil constricts;

- (c) This question was poorly done. Most candidates scored 1 out of 3.

Candidates could not do the comparisons very well. They would mention coordination by hormones and not say anything about coordination in the eye. They also mismatched the features being compared. For example, transmission by hormonal control is through blood and then coordination in the eye is by electrical impulse. Candidates were writing that coordination by hormones is through hormones instead of chemicals. Hormones was already in the question therefore could not be accepted as a response. Another error was that of speed of transmission. Candidates wrote of hormonal control of speed of transmission 'taking a long time' instead of 'slower', which could have been confused with the duration of the effect.

Accepted comparison:

	In eye	hormones
Messages:	electrical/nerve impulses	chemicals
Transmission:	in neurones/nerves	in blood
Speed of transmission:	very quick/fast	slow
Effect:	localised	widespread
Duration:	short-lived	long-lasting

Question 5

This was a challenging question and most candidates did not do well. A majority of the candidates failed to obtain average marks.

(a) (i) This was poorly done. Most candidates scored 0 out of 1.

A majority of the candidates were writing responses like fertilisation, menstruation and ovulation being the most common. The expected response was meiosis.

(ii) This was fairly done.

A majority of the candidates wrote 23 chromosomes, which was incorrect response. The are 46 chromosomes.

(iii) Many of the candidates did not recognise the structure labelled **D**. Most made reference to the whole cell (sperm). In their responses they were giving the functions of the sperm. Some were referring to structure **D** as the acrosome. Those who recognised structure **D**, which is the middle piece, were failing to mention that it has many mitochondria, therefore lost marks. However, they were able to state function of the mitochondria.

Expected response was:

Structure **D** has many mitochondria to release a lot of energy for movement.

(b) (i) This was poorly done.

A majority of the candidates failed to define sex linked characteristics instead they associated the term with sexual intercourse. Some stated that these characteristics are only found in one sex, which was a misconception. Some mentioned that these characteristics are found on sex gametes/sex cells/X or Y chromosomes which did not score a mark.

Expected response:

Sex linked characteristics - a characteristic in which the gene responsible is located on a sex chromosome and that this makes it more common in one sex than the other.

(ii) This question was not well done.

Many candidates failed to use the given alleles but opted for their own symbols and hence lost one mark. Others used XX for both male and female instead of XY for the male and hence lost all the marks. Those who remembered the Y chromosome for

males mistakenly added the gene for colour blindness on it (Y^b) which is wrong. A majority of candidates stated the probability in relation to all offspring instead of the daughters i.e. $\frac{1}{4}$.

The correct genetic diagram:

Parents genotypes	$X^B X^b$	$X^b Y$		
Gametes	X^B	X^b	X^b	Y
F1 genotypes	$X^B X^b$	$X^B Y$	$X^b X^b$	$X^b Y$
F1 Phenotype	carrier	normal	coloublind	colourblind
	Female	male	female	male

Chances of a coloublind daughter is $\frac{1}{2}$ or **50%**

(iii) This question was poorly done. Most candidates obtained 0 out of 2.

A majority of candidates mentioned that the mother's alleles are dominant over the father's allele. Some stated that the gene for colour blindness is only passed on by the mother, which is not true.

Expected response:

The trait is carried on the X chromosome; the father donates Y chromosome (which does not contain the allele).

Question 6.

This question was poorly attempted. The common average score was 3 out of 8.

(a) Most candidates were able to get the correct response. The common errors in their responses were "to trap sunlight, to attract light, to reflect light". A few candidates made reference to tropisms such as the plants growing towards the light.

Expected response was: "to allow light to pass through".

(b) This was poorly done with an average mark of 1 out of 3.

Some could not relate that the combustion of coal releases more carbon dioxide for plants to increase the rate of photosynthesis. Most candidates wrote about the process of

photosynthesis without mentioning the effect of coal combustion. A very common incorrect response was that the burning of coal produces potassium which adds nutrients to the soil.

Another incorrect common response was that warmth is being produced instead of increase in temperature which increases the rate of photosynthesis/increase in enzyme activity.

Expected response:

Increase temperature/ more heat;

More carbon dioxide;

More photosynthesis;

Faster growth/ bigger yield;

(c) This question was poorly done with an average mark of 1 out of 4.

Most candidates wrote about the use of magnesium for making chlorophyll and the process of photosynthesis without explaining the effect of the lack of magnesium. A common error was of most candidates writing that no light absorbed, no photosynthesis instead of less light absorbed and less photosynthesis. Another common error was that of glucose instead of proteins being used for growth. Most candidates wrote about chlorosis or yellowing of the leaves.

Expected response: Chlorosis/ yellowing of the leaves;

Less absorption of light energy;

Less photosynthesis;

Less amino acids/proteins

Question 7

This was not well answered by a majority of candidates with an average mark of 5 out of 13.

(a) (i) Most candidates got this question right. The most common incorrect response was white blood cell which might have been caused by the labelling on the given photomicrograph which showed a cluster of cells other than just a single cell, the correct response was red blood cell

- (ii) It was fairly done. Those candidates who did not obtain the mark, had the idea but did not give a full response. They would mention “it kills bacteria” or “it engulfs bacteria”. Candidates also gave the function of a red blood cell which was incorrect. The correct function of the white blood cell is to ingest/engulf + digest/kill bacteria/phagocytosis.
- (iii) It was a fairly done question. Most candidates got 1 out of 2 for stating fibrin. The common errors were, candidates stating that platelets produce fibrinogen or that they release fibrinogen. For most candidates they had a spelling challenge in writing these two terms e.g. fibrogen for fibrinogen or fibre for fibrin.

Expected response: Change of (soluble) fibrinogen to (insoluble) fibrinogen.

- (b) (i) It was fairly done, those who did not get the mark would give an example of the pathogen e.g. it is a virus that causes diseases, while there are many others. Others would call it “a substance that causes disease” some stated that “it is a disease caused by bacteria”. A pathogen is a disease -causing organism
- (ii) It was poorly done. Candidates had a challenge with relating what they know to the given diagram. They also wrote about phagocytosis instead of lymphocytes from stage 2 to stage 6.

Stage 1

A few candidates got the mark, those who did not, simply mentioned what was seen on the diagram which was “vaccination against polio” without describing what the vaccine was.

Expected response: a weakened/ killed/attenuated form of pathogen/virus(vaccine) injected.

Stage 2

It was poorly done since most candidates omitted the production of antibodies by lymphocytes. Common wrong answers included; immune system produces antibodies; antibodies combine with the vaccine; phagocytes digest the vaccine.

Expected response:

Lymphocytes produce antibodies.

Stage 3

Most candidates gave a part of the response, they only stated that antibodies remained living out the destruction of the pathogen.

Expected response:

Pathogen destroyed + memory cells remain produced.

Stage 4

Pathogen invades the body

Most candidates got this mark. Common wrong answers included that the polio virus is living; polio is trying to attack the immune system. Candidates could not write the correct spelling of polio even though it was given.

Stage 5

It was poorly done because candidates could not see that there were more antibodies in this stage. They only mentioned that the pathogen is killed hence losing the mark.
response:

Antibodies produced + to kill the pathogen/virus.

Stage 6

Pathogen/virus completely destroyed.

- (iii) It was not well done and most candidates got 1 mark because they ignored stating that antibodies are transferred between organisms but simply gave an example of it being seen from mother to child. Candidates were only stating differences between passive and active immunity and mostly concentrated on active immunity while the marks were awarded for describing passive immunity only.

Passive immunity is a short-term defence against a pathogen; antibodies acquired from another (named) individual/by injection

Question 8

Generally, this question was poorly done. Most candidates obtained marks below average and this proved to be a more difficult question for most candidates.

- (a) (i) This part was fairly done by most candidates obtaining full marks. Some candidates failed to score full marks because they mentioned proteins and included other substances like glucose which were filtered in the kidney instead of only stating the proteins. Some candidates failed to give the reason why proteins were not filtered in the kidney. Common wrong responses included candidates stating that proteins are needed by the body that's why they were not filtered.

Expected response:

Proteins, they are large molecules.

- (ii) This part was also poorly done and most candidates scored no marks at all. Most candidates mentioned the de-amination process which was not the expected response. Some candidates did not attempt the question. Those who attempted made a reference to filtration but failed to refer to ultra-filtration. They did not make a reference to the glomerular filtrate and that urea was not re-absorbed, they only mentioned substances like water and glucose being re-absorbed living out that re-absorption of water increases the concentration of urea in urine.

Expected response: ultra-filtration resulting to formation of glomerular filtrate

urea not re-absorbed

re-absorption of water increases concentration of urea.

- (iii) It was fairly done. Most candidates were able to state the condition as diabetes and the reason being the presence of glucose in urine. However, other candidates mentioned the condition as kidney failure or hypertension which was incorrect. Some responses on the reason were high concentration of glucose in blood/plasma, high concentration of salt and urea which was incorrect.

Expected response: condition: sugar diabetes

reason: glucose in urine

- (iv) This part was poorly done. Most candidates did not show any understanding of what the question really required. A majority of candidates were stating that a high concentration of glucose in the blood resulted in diabetes, obesity and too much energy in the body which was incorrect.

Expected response:

Water molecules move from the cells to the blood;
by osmosis;
resulting to dehydration of cells;
and hence less chemical reaction in cells.

- (v) This part was fairly done. Most candidates were able to mention diffusion which was correct but failed to mention that it is the dialysis tubing which is partially permeable.

- (b) This part was fairly done as most candidates were able to obtain full marks. But some candidates did not score marks for mentioning blood vessels instead of arterioles. Some mentioned vasoconstriction instead of vasodilation. The spelling of vasodilation proved to be a challenge for most candidates. Some candidates mentioned that the dilation of arteries causes the sweat pores to open and release sweat thus cooling the body which was incorrect.

Expected response:

Vasodilation; increased/more blood flow to the skin; heat lost to the environment.

EGCSE BIOLOGY**Paper 6884/03****Practical Test****General Comments**

Biology Paper 3 is a practical paper designed to test Assessment Objective C of the Assessment syllabus. It aims at assessing the level of candidate achievement in investigative and manipulative skills embracing the scientific method of inquiry. The nature of the paper demands that candidates are exposed to as much practical activities and the science process skills as possible. Candidates need to be familiarised with basic laboratory equipment and apparatus as well as the skills to correctly use them. Over and above that, candidates need to be trained on the scientific method of inquiry, including designing of investigative experiments and the basic principles underlying investigative activities such as ensuring validity and reliability of experimental data, drawing conclusions from experimental data as well as improving the methods used in investigative procedures.

The paper was perceived to be of the same difficulty level as the previous papers. As usual, it consisted of two questions with a maximum possible score of 40. Most centres provided the required examination materials without problems. Despite the paper bearing the same difficulty level as the previous two years, the 2020 performance was the worst. The highest score was 34 as opposed to the 37 that was attained in the previous two years. The lowest in 2020 was zero and quite a handful of zeros were recorded as opposed to the lowest score of 4 that was recorded in 2019. In general, the paper was poorly done with Question 2 better performed than Question 1 and very few candidates scoring 25 marks and above out of 40 marks.

It was noted with concern that the level of English expressions continued to threaten good grades. A lot of candidates used direct translation from Siswati to English to express themselves and more often than not, this either clouded the science concepts or distorted the scientific facts culminating to loss of marks. It is noteworthy as well as highly commendable that the use of 'slang' language was minimal.

When considering factors that could have made the performance to be low, it was envisaged that the closure of schools for a long time could have impacted negatively on candidature preparedness both psychologically and emotionally. Most likely, when the candidates returned to school after the COVID-19 break, teachers focused more on covering the theoretical aspects of the syllabus at the expense of practical work in the process leaving the manipulative and investigative skills unattended.

Although both questions were perceived to be accessible, **Question 1** proved to be particularly difficult for candidates especially **Question 1 (a) (iv)**, **Question 1 (c)**, **Question 1 (f)**, **Question 1 (g)** and **Question 1 (h)** where **Question 1 (h)** displayed lack of investigative skills. **Questions 2 (a) (i)**, **(ii)** and **(iv)** as well as **Question (b) (i)** proved to be particularly easy for candidates.

Comments on Specific Questions

Question 1

This question was an investigation on the effects of temperature on starch hydrolysis by the enzyme amylase. The investigation entailed placing amylase solution and a starch-iodine mixture in different test-tubes in three water baths at 0, 35 and 90°C respectively for 5 minutes and then mixing the contents of the test-tubes in each water bath. After mixing, candidates were expected to observe and record the changes observed.

- (a) (i)** This was a high scoring question as a majority of candidates correctly observed colour change to blue/black. A few observed a purple colour while others observed brown.
- (ii)-(iii)** were instructions culminating to **(iv)** which required candidates to fill in a table with the observations made in all the three water baths at intervals of two minutes for ten minutes. It was expected that for the water bath:
- **ice water (0°C)** - a blue/black colour would be observed throughout the 10 minutes.
 - **warm water (35°C)** - a blue/black colour would be seen within the first two minutes and then fading with time leading to a brown colour or shades of brown. Common errors included responses such as clear, no colour and

transparent. Other candidates responded with either "nothing", no reaction or mentioning the speed of a reaction. Quite a number of candidates wrongly recorded the change in temperature with time.

- **hot water (90°C)** - it was expected that candidates would observe a white emulsion/suspension down the column. A purple colouration was acceptable within the first two minutes and it was expected that the colour would fade within the 10 minutes. The lack of observation and recording skill pointed to either minimal or complete lack of exposure in the manipulative and investigative skills. A handful of candidates, particularly the good ones, reported a blue/black colour throughout the column and this was most likely based on theory.

(b) This question required candidates to explain why the use of powdered starch to prepare the starch solution would be advantageous over using other forms of starch. Expected responses included a reference to increasing the surface area which would in turn increase the rate at which the starch would dissolve. The powder would also ensure that all of the starch would be in solution as well as ensuring an even distribution of the starch or a uniform concentration of starch in all the test-tubes. Some candidates lost marks by referring to dissolving as a reaction stating that the powder would increase the reactivity of the starch while others thought it would increase the enzyme reactivity. Most candidates were able to score a mark out of the two.

(c) This question required candidates to explain the observations they had recorded in Table 1.1. It was noted that a majority of candidates described their observations instead of explaining them. Expected responses were as follows:

- **ice-cold water:** reference to starch was present because the temperature was too low and the enzyme or amylase was inactive.
- **warm water:** reference to absence of starch as temperature was optimum for amylase to digest or hydrolyse all of the starch to sugar or a named sugar.
- **hot water:** candidates were expected to refer to the starch being present because of the enzyme being denatured at high temperatures.

Common errors included the insinuation of starch as an enzyme while others wrongly stated that the enzyme as a reactant and therefore reacting. Some candidates responded theoretically without relating to the observations they had recorded. Candidates who had recorded temperature in Table 1.1 either described the decrease in temperature with time or left the question without a response. Quite a number of candidates lost marks by stating that enzymes were killed or destroyed by heat instead of the term "denatured".

- (d) This question required candidates to state a reason why it was important to leave the test-tubes in the water baths for 5 minutes before mixing the contents. Most candidates had the correct reason, but in some cases failed to clearly articulate it. They were expected to refer to the two tubes acquiring the same temperature or acclimatising to the temperature of the water baths. Common errors were to the effect that the test-tubes had to absorb, adapt, adopt, take or even hold the temperature of the water baths.
- (e) This question was easy for a majority of candidates. Most of them scored the mark for correctly identifying one independent variable in the experiment as either time or temperature of the water baths. A common error was to refer to optimum temperature.
- (f) This question was poorly done. Candidates were expected to state two measures that could be taken to make the experiment a fair test. They were expected to make reference to same volumes of starch/amylase solution, same number of drops of iodine solution, same concentration of starch/amylase solutions, same time intervals for data collection. It was noted with concern that a majority of candidates used amount of reactants or named reactants as though amount is a synonym for volume. Scientific terminology should be encouraged as much as possible. Poor scientific language was also manifest in responses such as "use equal sizes of solutions or same measurements of solutions, etc."

Also noted was the fact that candidates could not distinguish between the terms "fair test", "validity" and "reliability". This could be deduced from the many responses relating to repeating the investigation, doing it in groups or on different days. They also wrongly referred to using the same temperature of the water baths.

- (g) This question, which required candidates to describe how the reliability of the experimental results could be improved, was also low scoring. The expected responses included reference to repeating the experiment, increasing the temperatures e.g. 5 different temperatures used instead of three and increasing the sample size. Many candidates confused the demands of reliability with those of validity. Some candidates suggested addition of more solutions and increasing the temperature.
- (h) This question which tested experimental design skills was poorly done. The question required candidates to describe an improvement they would make to the procedure in order to determine the optimum pH for the enzyme amylase. Candidates were expected to describe how they would vary pH or at least the idea that the pH had to be varied while maintaining an optimum temperature for the enzyme amylase and controlling such variables as volumes of starch/iodine solutions and their concentrations. A data collection strategy had to be clearly described which could be measuring the time taken for the blue/black colour to disappear. Lastly, the candidates had to state how they would use their data to draw the conclusion e.g. the pH at which the blue/black colour disappears fastest would be the optimum pH for the enzyme amylase.

This question pointed to a need to expose candidates more to the manipulative and investigative skills during the teaching and learning process. It was very common for candidates to refer to pH as a substance that could, for instance, diffuse through a boiling tube to get to the contents of the tube. Some candidates wrongly committed themselves on the pH of certain substances such as stating that salt is alkaline. Most candidates lost the mark on how they would conclude their experiment as they did not arrive at the conclusion stage.

Question 2

This question was generally better scoring than Question 1. Candidates had to demonstrate their skill in using a dichotomous key, drawing and observation. Comments on the individual sub-questions follow.

- (a) (i) This was a high scoring question with a large number of candidates scoring the total marks. Candidates were provided with five dicotyledonous leaves, **G, H, J, K** and **L**, and required to use a dichotomous key to identify them. The leaves were *Prunus persica*, *Psidium guajava*, *Brassica olearacea*, *Persea americana* and *Solanum lycopersicum* respectively.

A few candidates lost marks by simply writing the common names for the different leaves e. g. peach leaf, broccoli/ cabbage, tomato, etc. This was a clear indication that they had not used the dichotomous key as instructed and marks were lost in such cases. Others decided to write the letters of the leaves instead of writing their scientific names. A few way-off responses directed the examiners to their own dichotomous key. Much as the question was a high scoring one, it was noted with concern that an overwhelming majority of candidates were not following the rules for the binomial nomenclature; hence the genus and species names were not underlined.

- (ii) This question required candidates to state two features of the leaves that identified them as dicotyledonous leaves. It was readily accessible to a large number of candidates who correctly identified the reticulate, network or branching veins and also noted that the leaves were all broad. Some candidates lost marks by writing jointed veins or veins meeting at an acute angle instead of writing the scientific names for the veins. Others wrote opposing features for the same marking point e.g. the leaves are narrow and broad. Some candidates correctly referred to presence of lateral veins although the spelling was more often than not a challenge as candidates wrote “literal veins”.
- (iii) This was a fairly well-done question which required candidates to draw one of the leaves and label a vascular bundle. It was expected that a large, proportional drawing of the leaf showing alternating veins, with a neat and continuous outline was drawn. Only one label, vascular bundle, was expected. Quite a number of candidates lost marks by shading their diagrams, making them small, with jagged or discontinuous outlines and opposing veins as well as labelling a whole lot of parts of the leaf instead of the one they were instructed to label. Some candidates labelled the vascular

bundle as **K** while others labelled it as either the xylem, the phloem or the xylem and phloem. A few candidates lost the mark for a realistic drawing by zooming in on their drawings to highlight a vascular bundle showing the xylem and phloem cells. Some way-off drawings were those of a cross section of a leaf as seen under the microscope. Marks were not earned for this drawing.

(iv) This question was perceived to be very easy and as a give-away yet not so with candidates. About half of the candidature lost the first mark on measuring the length of the leaf they had drawn for the following reasons:

- measurement was presented in centimetres instead of millimetres;
- readings presented in mm were wrong e.g. 170.1mm for 171mm;
- no indication was made on the diagram where the measurement had been taken;
- the width was measured instead of the length;
- the recorded measurement did not tally with the indicated length on the drawing.

Most candidates recalled the formula for calculating the magnification, but substitution of numbers into the formula was a different case. Some of those that substituted well lost the mark because:

- they presented their answer without the times sign;
- they presented the magnification with units such as mm or cm;
- they did not round up to two decimal places or they rounded up wrongly;
- they presented their magnification with the letter x instead of a "times" sign.

It was also noted with concern that some candidates had no idea how the magnification is calculated. Consequently, some multiplied the measurements, others added them while others subtracted one from the other leading to loss of marks.

(b) (i) This question was fairly well done with most candidates attaining at least 1 mark. They were expected to observe one of the leaves and compare the lower and the upper surfaces. It was expected that candidates would observe that: the upper surface was shiny while the lower one was dull

the upper surface was smooth while the lower surface was rough
the upper surface had the veins less prominent while the lower surface had more prominent veins.

Candidates, apparently, confused the lower part for the part of the leaf with the stalk and the upper part was considered as the part of the leaf with the apex. Candidates lost marks if their responses lacked comparison and if they compared different aspects at a go such as in "the upper part is dark green while the lower part is rough".

- (ii) This question was fairly well done. Candidates were expected to explain their observations as listed in **(b) (i)**. It was expected that they would attribute the shininess and smoothness of the upper part to the presence of cuticle and the darker colour on the upper side to more chloroplasts or chlorophyll present on upper surface.

Candidates lost marks by providing explanations that did not match their observations while others lost a mark by simple stating that the upper surface was darker because it had chloroplasts or chlorophyll.

- (iii) This question was poorly done. Candidates were required to dip a leaf into hot water for about one minute, observe both surfaces and record their observations after which they were supposed to explain their observations. It was expected that they would observe bubbles forming on the lower surface and none on the upper surface. They were expected to refer to both surfaces in their responses. The explanation was expected to relate to more stomata on the lower surface than on the upper or even no stomata on the upper surface. It was also expected that their explanations would refer to the origin of the bubbles, that is, gases or air in air chambers being heated up, gaining kinetic energy, expanding and escaping through the stomata.

Common errors included references to change in colour of the surfaces of the leaf and texture of the surfaces. A lot of candidates referred to water droplets on the lower

surface but none on upper surface leading them to relate their explanations to transpiration. It was again noted that use of scientific terminology was a challenge as candidates referred to stomata as holes, openings, pores as well as spores.

Conclusion

In a nutshell, it can be concluded that the candidature was not well prepared for the practical paper as evidenced in the mistakes they made. Centres are as such encouraged to inculcate the manipulative and investigative skills during the teaching and learning. There is also great need to improve on English expressions to avoid the direct translation of Siswati to English which ultimately leads to distortion of science concepts and loss of marks.

EGCSE BIOLOGY**Paper 6884/04****Alternative to Practical Test****General Comments**

The overall performance of candidates showed a decline as compared to the previous year. Some candidates did not always show a good understanding of the command words and therefore did not address the questions directly and wrote responses that were not relevant to the question. Poor spelling and use of language to express biological meaning created problems for a number of candidates when trying to clearly describe or explain answers. Questions **1 (d)** and **(k)** proved to be the most challenging questions for most candidates.

Candidates attempted all questions and showed that they had adequate time to finish the paper. **Questions 1(a), (c)** and **2(a)** were accessible to most candidates as they were able to score reasonable marks in each of those questions.

Comments on Specific Questions**Question 1**

- (a)** This question was generally well answered by most candidates. Most candidates were able to conclude that starch was present in the blue/black colour, whilst it was diminishing in the dark blue/blue and absent or completely digested between 8 and 10 minutes where the colour was brown.
- (b)** Fairly done by most candidates although most candidates could not score the 2 marks. Candidates were expected to suggest that the powder will dissolve quicker, with all powder dissolving and ensuring a uniform concentration of starch within the solvent.
- (c)** Most candidates were able to explain that shaking mixed the contents of the solution to prepare a uniform sample. Reference to avoidance of spillage was also credited.

- (d) This question proved challenging for most candidates. Most candidates wrote conclusions instead of giving an explanation of why the colour changed to brown between 8 and 10 minutes. Very few candidates were able to recognise that all the starch had been digested to maltose by the amylase as it had enough time to digest the starch.
- (e) A significant number of candidates were unable to identify the purpose of test-tube **A** as a control. A common mistake was to write that it was used to test for starch yet starch was tested in all the other test tubes.
- (f) Quite a number of candidates displayed that they could not identify the independent variable from the investigation. Candidates need to be reminded that an independent variable is the variable that is changed/manipulated in an investigation whilst the dependent variable is the variable that is measured in an investigation. Time therefore is an independent variable from the investigation that was carried.
- (g) Many good responses were seen for this question. Some of the responses that were credited included: the same volume of starch/iodine, amylase and starch solution left for the same duration.
- (h) Most candidates could not properly phrase the conclusion but instead wrote the results or observation from Table 1.1. Marks were credited for a conclusion that showed a relationship between time and the presence/absence of starch.
- (i) Few candidates gained full marks for this question. Marks were awarded for responses that included, repeat of the investigation, increase sample size/ more set-ups.
- (j) Candidates were expected to predict and explain the observation of the solution at 10 minutes if boiled amylase solution was used. A common error was to assume that if amylase was boiled then there would be a faster reaction not acknowledging that enzymes are denatured by high temperatures. A significant number of candidates were able to recognise that if amylase was boiled it would be denatured and therefore unable to digest the starch resulting in the solution remaining blue-black.

- (k) Most candidates found this question challenging. This question tested the candidates' ability to design an experiment to determine the optimum pH for enzyme amylase. It was common for candidates to design their own investigation other than the one asked in the question. Candidates should be able to design an experiment that takes into consideration the control of variables, how the data is going to be collected and how the data will be analysed.

Marks were awarded for responses that demonstrated an understanding of the question such as having different set-ups and varying the pH, naming factors that should be kept constant such as temperature, volume of iodine/amylase etc., stating how the results will be measured and stating how they will interpret their results in their conclusion.

Question 2

- (a) (i) A majority of candidates were able to use a dichotomous key to identify each of the leaves given. It was common for some candidates to write incorrect spellings even though they were given the correct spellings.
- (ii) Generally well attempted by a majority of candidates. Most candidates were able to state two visible features that identifies the leaves as a dicotyledonous such as network of veins and broad. Some lost marks by opting for features that were invisible yet the question was about visible features.
- (iii) Most candidates were able to produce an adequate drawing of leaf J. Most drawings were drawn to an appropriate size with an appropriate level of detail and suitable shape. Drawings must have a continuous clear outline, without either feathered lines or shading. Candidates should always use a sharp pencil when drawing. Candidates should ensure that they draw the correct specimen, in this case Fig. 2.1, leaf J. Candidates are to be reminded that they should include all the necessary details to gain marks. Candidates are **not** expected to label more than the parts they have been asked to label.

- (iv)** Well attempted by most candidates. Candidates are to be reminded that they should always use mm as units in their measurements unless they have been asked to use other units. It was noted that a significant number of candidates could not use or read the scale in a ruler especially when they have to use millimetres. Candidates are to be reminded that there are no units in the magnification but instead it should be \times or times to indicate how many times the actual object/photo has been magnified. The final magnification should be up to 2 decimal places.
- (b) (i)** Most candidates did not give satisfactory responses on why leaf **K** is darker green and shinier on its upper surface. Candidates need to remember that in such questions comparative responses are required. Candidates that scored marks were those that were able to recognise that the upper surface is shinier because it has more cuticle to minimise water loss whilst it is darker because of more chlorophyll for efficient absorption of sunlight. A common mistake was to assume that there was no chlorophyll on the lower surface.
- (ii)** Generally well answered by most candidates although some lost marks by not using comparative responses. Most candidates acknowledged that on the lower surface there are more stomata where gases diffuse through.