EXAMINATIONS COUNCIL OF ESWATINI

Eswatini General Certificate of Secondary Education

Biology (6884)

Examination Report for 2024

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EGCSE BIOLOGY

Paper 6884/01

Short Answers

General Comments

This is a short answer question paper testing about 80% knowledge and understanding of biology concepts, while 20% concepts require handling of given information. It is marked out of 40.

The 2024 paper was well balanced as questions came from all sections of the syllabus. As a result the performance in 2024 seemed to be better than that of the previous year. There was also a significant decrease in the number of candidates who left blank spaces.

However, most candidates still failed to bring out the desired responses, thus scoring lower marks than expected. Various factors like incorrect spellings, insufficient use of biology concepts, language barrier and failure to read and understand the question, contradictory statements within a question made the candidates fail to perform to their full potential. This resulted in quite a number of candidates scoring zero.

Questions that proved to be easy for a majority of the candidates were question **2**, **7 (a)**, **15**, **19(b)** and **22**, and questions that proved to be challenging were question **1**, **3(b)**,**7 (c)**, **8**, **9**, **11**, **12**, **14**.

Comments on specific questions

Question 1

This question was inaccessible to a majority of candidates. The question required candidates to name a phylum and class to which a centipede belong. For phylum candidates gave incorrect responses such as invertebrates, animalia, chordate, centipede. Some candiates lost a mark due to incorrect spellings such as anthropods for phylum and gave mariopods, myriopods for class.

Expected response: p*hylum – arthropods/arthropoda*

class – myriapods

Question 2

This was a generally well answered question. Candidates were given a diagram showing a reproducing fungus, and were asked to name the species name, and to state the type of reproduction.

(a) This was a generally well attempted question with a majority of candidates scoring a mark. The question required candidates to state the species of the fungus, *Rhizopus stolonifer.*

Expected response: *stolonifer*

(b) This was another generally well done question as most candidates were able to state the correct type of reproduction shown by the fungus. However, some candidates lost a mark because they gave an example of asexual reproduction, spore production and binary fission, while some gave incorrect spellings for asexual, such as asectual, asexctual.

Expected response: *asexual*

Question 3

This question proved to be challenging for a majority of the candidates. It was based on respiration where candidates were expected to give a use of energy not listed in stem, and to correctly identify anaerobic respiration in muscles using the given an equation. However, most candidates failed to give the correct use of energy, and to correctly identify the type of respiration shown.

(a) Candidates failed to read the question with understanding and as result gave a use of energy that was already given in the question. Candidates were expected to name a use of energy in humans other than the stated ones. Other common incorrect responses included movement of organisms. As a result quite a number of candidates lost the mark.

Expected response*: protein synthesis/ active transport/ passage of nerve impulses*

(b) This was a poorly done question as most candidates failed to associate the given equation with the correct process. The question required candidates to name the process represented by an equation ($C_6H_{12}O_6 \longrightarrow 2C_3H_6O_3$), and to state where the process occurs. For the equation, candidates gave photosynthesis as the most common incorrect response, while those who were able to correctly identify the process gave incorrect spellings such as anaerobic/ anerobic/ unaerobic,/anaerobic. Some candidates stated that the process occurs in humans, in liver, in leaves and they did not earn the mark.

Expected response: process-*anaerobic respiration*

where it occurs- *muscles*

Question 4

This was a fairly done question. It required candidates to state what happens to the external intercostal muscles and pressure during breathing in. Candidates were able to state that muscles contract even though some had spelling challenges such as contrast, contruct, constract, constrict resulting in a loss of a mark. For the pressure in the lungs, incorrect responses included small, less, low and these responses did not show change in pressure as required by the question.

***Expected response**:* external intercostal muscles – *contract*

pressure - *decreases*

Question 5

This was generally not well done. Candidates were expected to state how stomata enable photosynthesis to take place in leaves. Most candidates lost a mark for not stating the direction of the movement of the gas, some made reference to sunlight and water being absorbed through the stomata, while some stated that stomata allow air in and out.

Expected response: *allows carbon dioxide to enter into the leaf/ releases oxygen/ for gaseous exchange*

Question 6

This was a fairly attempted question. It required the candidates to complete a table by stating a substance and tissue involved in translocation and transpiration. However, a number of candidates gave glucose as transported in phloem and lost a mark. Some gave incorrect spellings such as zylem in transpiration.

Expected response: translocation: *sucrose + phloem*

transpiration: *mineral ions (or named ion) + xylem*

Question 7

This question was based on the exchange between tissues and capillaries. Candidates were expected to identify a capillary, and to identify a substance that passes from tissues back to capillaries, and to state a function of the lymphatic system. It was a fairly answered question, but very few candidates scored full marks.

(a) This question was accessible to most candidates. It required candidates to name a labelled blood vessel. The most common wrong response was vein, with a few giving an artery and hepatic portal vein as their responses. Some candidates gave an incorrect spelling such as carpilary, capillary, and so lost the mark.

Expected response: *blood capillary*

(b) Candidates were expected to name a substance that diffuses from the body cells into a capillary. However, a large number of the candidates lost the mark because they failed to correctly interpret the arrow. Candidates gave the useful substances needed by the cell, instead of the waste products or substances in excess. The most common incorrect responses were glucose, amino acids and salts.

Expected response: *urea/carbon dioxide/used hormones/water*

(c) The question proved to be challenging to most candidates, and many candidates were not able to state a function of a lymphatic system. Common wrong responses included “produce antibodies”, “fight infections”, “transport tissue fluid’, “absorb fatty acids”, and these were not awarded credit.

Expected response: *produce lymphocytes/returns lymph to circulatory system/transport fatty acids and glycerol*

Question 8

Candidates were given a photograph of a cactus plant and asked to state, with a reason, the environment to which it is adapted. However, it proved to be challenging as most candidates referred to the stem as leaves stating that the plant has thick leaves with thorns and lost the mark. Some gave vague responses in reference to the environment such as drought, hot, Lowveld, Lubombo region, and this resulted in a loss of a mark. Some candidates also referred to a pine tree by stating that the leaves are needle-shaped and could not be awarded credit. A common incorrect spelling was dessert instead of desert.

Expected response: environment - *desert/dry environment*

reason - *thick stem/ presence of thorns or spikes*

Question 9

This question proved to be challenging as many candidates failed to describe how blood vessels near the skin surface regulate the body temperature when it falls below normal. Most candidates gave the wrong spelling for vasoconstriction, e.g. vascoconstriction, vasoconstriction, visocontriction. Some described the process as the contraction of blood vessels instead of narrowing/constriction, so could not be given credit. Some candidates described vasodilation, while some described sweating and hair standing to trap in heat.

Expected response: *vasoconstriction/ arteriole become narrow/constrict*

less blood flow to surface capillaries

less heat radiated/lost

Question 10

This question was generally well answered by a majority of the candidates. They were given a structure of a nephron, and asked to identify filtration (labelled process **D**), and to name a substance that is reabsorbed in kidney tubule. Candidates showed an understanding of the concepts and gave correct responses.

(a) This was a generally well done question. It required candidates to name the process that occurs at the glomerulus to allow substances to pass in to the Bowman’s capsule. However, some candidates confused glomerular filtrate with filtration. Candidates who had the correct process lost a mark

because they gave the wrong spelling such as infiltration and filtraction. Some candidates could not score a mark since they gave incorrect responses such as reabsorption and diffusion.

Expected response: *(ultra/pressure) filtration*

(b) This question was generally well done. It required candidates to name one substance that is reabsorbed into the blood from the tubule. Candidates were able to show understanding of the substance being reabsorbed. Incorrect responses included excess water, excess salts, urea, and glucose

Expected response: **E** – *glucose/salts/or named salt/water/amino acids*

Question 11

This was a fairly attempted question. Candidates were expected to state the role of luteinizing hormone in the menstrual cycle. However, some candidates showed no understanding of the concept as they gave vague responses such as to luteinize the egg, for menstruation, to release the egg. Some confused the ovary with the ovum, stating that it triggers release of ovary so could not score a mark. Some candidates stated that the hormone releases the egg, yet it stimulates the release.

Expected response: *promotes/stimulates ovulation*

Question 12

This was a fairly done question. Candidates were expected to state one treatment to be given to cervical cancer patients. Most candidates had a fair idea about the treatment of cancer but failed to use the correct terminology, e.g. cutting out of cancer cells/ removing the affected part. Some gave wrong spellings for correct responses such as kemotherapy, chemotheraphy, kimotherapy. Common wrong responses included burning of cancer, radiation, scanning, operation, use of antibiotics

Expected response: *chemotherapy/radiography*

Question 13

(a) This question required candidates to name the trophic level of the thrush. It was a generally well done question as candidates were able to correctly identify the trophic level. Common incorrect responses such as second level, secondary level, second trophic level.

Expected response: *secondary consumer/trophic level 3*

(b) The question proved to be a challenge to most candidates. Many were able to state that the rabbit had more energy though they could not state the reason in terms of the length of the food chain. The question required candidates to state the advantage of a hawk feeding on a rabbit than a thrush. A large number of candidates were stating that the hawk will get more energy in rabbit and failed to

state that it was because of the shorter food chain between rabbit and the hawk than between caterpillar, thrush and hawk. A majority stated the availability of a lot of nutrients/carbohydrates/proteins as an advantage and this was not awarded any credit. Some candidates referred to the distance between the animals being short, while some made reference to shorter food web instead of food chain. A common misconception included: rabbits have more meat/more nutrients/is bigger.

***Expected response**: shorter food chain in rabbit + more energy available / less energy lost OR*

longer food chain thrush + less energy available/more energy lost

Question 14

This was a very challenging question to a majority of candidates as candidates showed no understanding of nuclear fall-out as a pollutant. Candidates were expected to state an undesirable effect of nuclear fall-out on animal cells. Common incorrect responses included cell division, uncontrolled cell activities, no cell nucleus, and death of cells. Some candidates interpreted the question as the effect of losing a nucleus so gave responses such as death of cell or no cell division which scored no mark.

***Expected response**: damages DNA/causes cancer*

Question 15

This was a generally well done question, as most candidates were able to arrange the given stages in correct order, showing an understanding of the concept on cloning. Candidates were given stages involved in reproductive cloning, in no particular order and asked to arrange them in the correct order using the numbers given. Very few candidates missed the part on the use of numbers but instead wrote the steps, so lost a mark for failing to answer according to the command statement “list the numbers”.

***Expected response**: 1 → 3; and 4 → 2*

Question 16

This was a generally well done question as most candidates were able to name a threat to biodiversity apart from alien species. Some candidates failed to understand the stem of the question, instead wrote names of alien plants, e.g. sandanezwe or of threatened species such as a rhino

Expected response: *habitat change/unsustainable resource extraction/ wild fires/ climate change/ soil erosion.*

Question 17

This question was fairly done. Candidates were expected to state any two features of a wind-pollinated flower. However, some candidates could not score marks as they give incomplete and vague responses

such as dull flowers/dark flowers/no petals only/ small stigma. Some candidates could not give the correct spelling for feathery, such as fetherly, further, and furtherly.

Expected response: *feathery stigma*
anthers exposed/stigma exposed
large anthers
bracts instead of petals

Question 18

This was a fairly done question. This question required candidates to describe how the surface of a molar tooth is, and to relate the structure to its function. However, most candidates could not score full marks as they were only able to state the function without describing the structure. A majority of these candidates described the structure as having bumps/ cuspids/dents/mountains, and these descriptions were awarded no credit. Some candidates lost marks because they gave functions of other teeth such as tearing and biting. Some candidates also lost a mark for giving the incorrect spelling for grinding, such as grunding, grainding, gridding.

Expected response*:* *grooved/ridged/has cusps*
to grind /chew/crush (food substances)

Question 19

Candidates were given a diagram showing the pathway of an impulse during a reflex action. This was an accessible question for most candidates as they were able to give the correct responses.

(a) A majority of the candidates were able to correctly name the relay neurone as structure **F**. However, a few confused the neurone with a synapse and lost the mark, while some could not state that it was a neurone but only wrote relay.

Expected response*:* *relay neurone*

(b) Candidates were expected to draw a line labelled **G** to identify an effector related to this reflex action. However, for some candidates the line was not touching the muscle, some would use an arrow instead of a label line, while some only wrote the letter **G** on the muscle without the label line. All these responses were not awarded credit.

Expected response*:* *label line to biceps with the label **G***

Question 20

This question was well answered by most candidates as they were able to state reasons why bacteria are useful organisms in genetic engineering. Some candidates confused genetic engineering with asexual reproduction, giving incorrect responses based on asexual reproduction, such as only one parent is needed, bacteria divide by binary fission, and these could not be awarded a mark.

Some other misconceptions that could not be awarded marks were:

- Bacteria reproduce by binary fission without stating that it is fast
- Bacteria produce fast instead of reproduce fast
- Bacteria are cheap instead of the process being inexpensive

***Expected response**: reproduces fast*
no ethical issues
no allergies
enucleated/no nucleus/ DNA is easily manipulated
the process is inexpensive

Question 21

This was a fairly answered question. Candidates could not clearly differentiate between a social and a personal problem associated with excessive alcohol consumption. The question required to state a social problem, but most answers were based on personal problems such as addiction, liver cirrhosis, financial problems, stress and poverty, and these could not be awarded credit.

Expected response: *violence/ family breakups/road accidents*

Question 22

This was a well answered question by most candidates. The question required candidates to state the effect of ciliary muscles when focusing on nearby objects. Candidates had the correct response but could not the awarded the mark since they gave wrong spellings such as contrast, contruct, constract, constrict resulting in a loss of a mark. A few candidates stated that the muscles relax and lost the mark. Others

***Expected response**: contracts*

EGCSE BIOLOGY

Paper 6884/02

Structured Questions5

General Comments

There were about 15 963 candidates who wrote the paper. This indicates a slight increase from the previous year of about 14 979 candidates.

Generally, the performance was average. The very good candidates scored above 50 but less than 60. Only a few very good candidates scored above 60, with a highest mark of 70. Some candidates scored 0 and many candidates got single digit scores.

Questions that seemed easily accessible to candidates were **1(a)**,**2(b)(i)**, **2(b)(ii)**, **3(b)**, **3(c)(i)**, **4(a)**, **5(a)(i)**, **6(a)**, **6(b)**, **7(a)(i)** and **8(a)**.

The most challenging questions were **3(c)(ii)**, **4(c)**, **4(d)**, **7(c)**, **7(d)(i)** and **(ii)**.

Candidates also had challenges expressing themselves, for example,

(a) Question **3(b)**, they would write “platelets produce fibrinogen”. This made them lose both marks for reference to platelets and fibrinogen.

(b) Question **2(d)** they would write “insulin converts glucose to glycogen”. This resulted in a loss of marks.

(c) Question **2(e)** they would write “avoid eating carbohydrates” instead of “reduce carbohydrate intake” Wrong spelling still remains a challenge to many candidates. In some cases, it resulted in the loss of marks. Such spellings that resulted in the loss of marks include glucagon instead of glycogen, meiotic instead of meiosis. Grammar and spelling still continue to be a challenge. Some spelling mistake led to loss of marks where the wrongly spelt word had another biological meaning.

The time allocated for the paper seemed adequate as some candidates were able to answer all the questions.

Comments on individual questions

Question 1.

It was fairly done question by most candidates. A majority of candidates were able to score 5 and above.

(a) Candidates performed fairly in this question. Candidates were given a diagram showing an animal and plant cell, and were asked to name **two** visible features of a cell that are shown in both cells. Some candidates did not read or understand the question. Spelling mistakes were common

especially for nucleus. There was evidence of reliance on past papers asking them to differentiate between animal and plant cells.

Expected response: *nucleus*
cytoplasm
cell membrane

(b) The question was challenging for most candidates. Candidates were required to describe and explain **one** adaptation of the animal cell for its function. The majority of the candidates failed to fully explain the movement of cilia.

Expected response: *cilia that beat to and from/ back and forth*
to remove bacteria and dust laden mucus as well as move ovum in oviduct.

(c) The question was fairly done. Candidates were required to describe and explain the effect of leaving the cell in distilled water for 15 minutes. Most obtained three marks for osmosis, water entering into cell, turgidity of cell. Most candidates did not fully explain the concentration gradient. They did not mention the two regions. They failed to identify the cell as a plant cell as most of them said the cell would burst. A common misconception was on use of the terms “flaccid” and “turgid” with candidates failing to differentiate between the two.

Expected response*:* *water moves into cell*
by osmosis
from high water potential in distilled water to low water potential inside the cell
vacuole enlarges pushing against cytoplasm/cell wall/exert turgor
pressure/causing the cell to be turgid
the cell wall prevents cell from bursting

Question 2

This question was fairly done by most candidates.

(a) This question was fairly done. Candidates were required to define the term *chemical digestion.* Most scored one mark for mentioning enzymes. Most failed to describe “large insoluble molecules”. The incorrect terms “particles” and “pieces” were not given credit.

Expected response: *breakdown of large, insoluble food molecules to into small, soluble molecules*
by enzymes

(b) This question was well done. and most candidates were able to score 2 out of 3.

(i) This question was fairly done by most candidates. Candidates were asked to describe how food moves through region **C** (*oesophagus).* Common mistakes were on use of "constract" for "contract", wrong spelling for circular muscle and peristalsis.

Expected response: *peristalsis through*
alternate contraction and relaxation
of circular and longitudinal muscles

(ii) This question was well done. Most candidates were able to correctly state the function of the ileum as absorption. A few common mistakes were stating that it is used for reabsorption or the absorption of water.

Expected response: *absorption/ digestion*

(c) This was generally well answered. Most candidates were able to describe a treatment that should be given to reduce the effects of diarrhea, and they earned full marks. Common incorrect responses were referrance to ORS as oral dehydration solution, oral hydration, salt solution, sugar solution.

Expected response: *ORS*
to replace lost salts and fluids

(d) The question was challenging for most candidates. Candidates were expected to describe the role played by the pancreas and liver in controlling the concentration of glucose in the person's blood after eating this meal. Most candidates failed to explain it with reference to the meal containing a lot of carbohydrates hence high glucose levels. Some candidates incorrectly made reference to both high and low glucose levels hence lost marks. Some referred to insulin as an enzyme, and also wrote the function of the liver on the role of the pancreas. Other roles of the liver were mentioned e.g. deamination and detoxification. There was a misconception between glycogen and glucagon.

Expected response: pancreas – *secretes insulin*

liver – *converts excess glucose to glycogen*

for storage of glycogen

increases the absorption of glucose by the liver cells

(e) This question was well done. Candidates were able to describe prevention of diabetes. However, some lost marks for incorrect the statements "avoid less sugar" or "avoid carbohydrates", failure to describe a balanced diet for diabetes, and incorrectly referred to "reduce salt intake".

Expected response: *exercise*
reference to reducing carbohydrates/ fats in diet
eat more fruits and vegetables

Question 3

The question was challenging to most candidates.

(a) This part question was challenging for a majority of candidates. A few candidates were able to explain why active immunity is more advantageous than passive immunity. got full marks. Common mistakes were vaccinations give passive immunity, vaccinations trigger allergic reactions while active immunity occurs naturally, active immunity is cheaper than passive immunity, active immunity is faster than passive immunity, antibodies remain as memory cells instead of lymphocytes remaining as memory cells.

Expected response: a*ctive immunity is long lasting/permanent OR passive immunity is short-lived or temporal*

results in the formation of memory cells or no memory cells formed in passive

antibodies are produced by lymphocytes OR passive antibodies not produced

(b) This question was challenging for most candidates. Candidates were expected to describe the process by which such a blood clot forms when a skin is cut. Several misconceptions were observed in the candidates responses, and these included 'platelets converted to fibrinogen to fibrin, platelets secrete of produce fibrinogen, enzyme fibrinogen converts to fibrin, fibrinogen is broken down to fibrin, fibrinogen is insoluble and fibrin is soluble, and mesh fibres trapping blood instead of red blood cells'. Common spelling mistakes were plateles or plalet for platelets, fibrogen or fribrinogen for fibrinogen, and fribrils or fribin for fibrin, which led to loss of marks.

Expected response: *platelets*
fibrinogen
changes to fibrin
to trap blood cells (in a network of fibres)
refer to soluble and insoluble

(c) **(i)** This part question seemed to be a fair. A majority of candidates were able to state "coronary artery" as the name of the blood vessel. However, weaker responses referred to any blood vessel e.g. pulmonary artery, vena cava, vein, artery.

Expected response: *coronary artery*

(ii) This was not challenging for some candidates. Most candidates were not able to describe how these blood vessels (*coronary artery)* may become blocked. Most stated that a fatty diet, fatty acids and glycerol block coronary arteries instead of stating that fat/ cholesterol from a fatty diet is deposited along the walls of arteries. Most candidates failed to mention that it was the internal diameter of the artery or lumen that was reduced and just said the diameter of the artery is reduced. Very few mentioned the formation of atheroma.

Expected response: *fat/ cholesterol from a fatty diet is deposited along the walls of arteries.*

forming atheroma/ atherosclerosis

narrows lumen/ reduces internal diameter of artery

Question 4

This question generally proved to be challenging to most candidates.

(a) Candidates were required to state the equation for photosynthesis in symbols. Some candidates had a problem with writing the correct formula for glucose. Others wrote the equation for respiration instead of photosynthesis. There were mistakes with the formulae as well e.g. H2O instead of H_2O, Co_2 instead of CO_2

Expected response: $6CO_2 + 6H_20 \rightarrow C_6H_{12}O_6 + 6O_2$

(b) This seemed to be a challenging question to some candidates. Candidates were expected to describe and explain the changes in the rate of photosynthesis as the light intensity increases from 0 arbitrary units. Most candidates could not interpret data from the table, instead they transferred data from the table to the answering space without describing or explaining it. For example, when the light intensity is 1 AU, the rate of photosynthesis is 4 AU. Some candidates exchanged light intensity with temperature and used temperature in their explanation, and others swapped light intensity and had it as the dependent variable and the rate of photosynthesis as the independent variable in their description e.g. as the rate of photosynthesis increases, the light intensity also increases. The response “the higher the light intensity, the higher the rate of photosynthesis” did not earn a mark. A large number of candidates showed an understanding of limiting factors.

Expected response: *at 0 AU. No light and no photosynthesis (0 photosynthesis was rejected)*

as light intensity increases, the rate of photosynthesis also increases

light is a limiting factor

rate of photosynthesis does not increase after 3 AU/ photosynthesis constant after 3 AU.

there must be a limiting factor/ named limiting factor

(c) Candidates were given that plants grown in greenhouses may have a higher rate of photosynthesis than similar plants grown outdoors, and were asked to explain why this may be the case when coal is burnt in a greenhouse in cooler weather. Most candidates failed to respond appropriately. Most candidates wrote that burning coal will release carbon dioxide and heat and not explain that this will increase the carbon dioxide concentration and will increase the temperature.

Expected response: *burning coal increases temperature or temperature becomes warmer to increase/ optimum enzyme activity*

burning coal gives off carbon dioxide so levels may be higher/ increase carbon dioxide

(d) This proved to be a fair question to some candidates. Candidates were required to explain why plants grow less well when the oxygen level in the soil is low. A few candidates referred to respiration and active transport without stating that it will be less. Instead of less, they said that there will be no, not enough, insufficient respiration. They did not mention the effect of less respiration on active transport and absorption. Other incorrect responses were on the need of oxygen for formation of nitrates and the need of oxygen for organisms living in the soil.

Expected response: *less respiration*
less energy
less active transport
less absorption of ions/nutrients/named ions e.g. magnesium, nitrates

Question 5

The question was challenging to most candidates.

(a) (i) This question was challenging to most candidates. Candidates were given a diagram showing a plant growth response to light, and were asked to draw an arrow to show the direction of light. Most candidates drew arrows from the left side of the plant away from the plant. Some drew arrows from the right side towards the plant. A few arrows were coming from the top of the plant towards the roots.

Expected response: *an arrow drawn from the left-hand side of the page towards the plant*

(ii) This was also a very challenging question to some candidates. Candidates were expected to describe and explain what has happened in the plant to cause the curved growth. Candidates were unable to write the correct spelling for auxins. Candidates were using the terms upper/lower and left/right to state where the auxins accumulated. Most candidates used sunlight instead of light and stated that the plant follows the direction of the sunlight instead of bending towards the light.

Expected response: *auxins*

accumulate/move on the shaded area or darker side

promotes/ accelerates/stimulates/causes more growth/ cell division/cell elongation + on darker side/shaded side/retarded growth

on illuminated/lighted/exposed part/ differential growth

shoot/plant/stem bends towards the light/positive phototropism

(b) The question seemed to be challenging to some candidates. Candidates were expected to explain why a person is able to see an object but not distinguish its colour when the light is very dim. There was uncertainty in some responses, and many candidates seemed to lack understanding of what the question required. Common errors included candidates referring to accommodation, pupil reflex and colour blindness. A few candidates that understood the question focused on rods and not cones. There were incorrect spellings for rods and cones. Common incorrect spellings for rods and cones were rhodes, corn.

Expected response: *rods sensitive to dim light/low light*

shades of grey/black and white/shapes seen

cones only sensitive to bright light/high light intensity/cones not sensitive to dim light

to detect colour

Question 6

This question was fairly well done with most candidates obtaining at least 4 marks out of 9

(a) This question was also fairly done. Some candidates labelled the ovary instead of the oviduct. Others used arrows instead of the label line. A few drew a line without the letter **E**. Others used the letter **F** instead of **E** which resulted in loss of marks.

Expected response: *label line with E to the oviduct*

(b) This question was well answered by most candidates. A few confused the amniotic fluid with the amniotic sac or with the placenta.

Expected response: *cushions baby/foetus/shock absorber/ protects foetus from injury/physical/ mechanical damage*

prevents collapse of umbilical cord

allows movement/ gives foetus buoyancy/floating / support

(proper) development of lungs

maintains/ regulates constant temperature/ prevents temperature fluctuation

lubrication during delivery

prevents foetus from drying out

absorbs some of the excretory material/provides sterile environment

(c) This question proved to be the most challenging to most candidates. Their responses included all hormones involved in the female reproductive system e.g. LH, FSH. Most candidates lost marks for using uterus wall instead of lining. The most common error was stating that progesterone thickens the uterus lining without mentioning "further".

Expected response: *oestrogen*

stimulates repair of uterus lining/ endometrium

progesterone

maintains/continues/ thickness of the uterus lining/increase blood vessels

(d) This question was accessible to a majority of candidates. However, a few candidates lost marks for only focusing on the male counterpart. Common errors for birth control were only stating trapping sperms without referring to deposition into the vagina. Some candidates were mentioning fertilisation in the ovary for preventing HIV. The common errors were mentioning that the condom prevents skin to skin contact with no reference to mixing of fluids.

Expected response: in birth control:

prevents sperm from reaching oviduct/uterus/cervix/vagina/ovum/egg

in HIV prevention:

ensures there is no mixing of fluids/named fluids e.g. semen/ vaginal fluids/blood

Question 7

This question was challenging to most candidates, and they scored below half the number of marks. There were a lot of mistakes observed due to misconceptions.

(a) (i) This question was fairly done. Most candidates were unable to correctly spell meiosis. Some wrote meitosis and no mark was awarded for such aspelling error.

Expected response: *meiosis*

(ii) This part of the question was also very challenging for most candidates. Candidates were required to state the number of chromosomes in the cells of the organ that produced the nucleus of a gamete containing 8 chromosomes. The candidates did not read the stem of the question properly and assumed that the question was asking for the number of chromosomes in gamete cell of humans. Some candidates simple divided the 8 by 2 and got 4 as an answer.

Expected response: *16*

(b) This part was also challenging for most candidates, and were not able to draw a correct genetic diagram. A few candidates were using X instead of alleles (I^A, I^B and I^O) given in the question. Most candidates missed out on labels on their diagrams. Some could not write out correct parental genotypes which led to loss of marks. Others were failing to write the offspring phenotypes, for instance, for blood group AB, they wrote A/B or A and B. For Blood group A, they wrote AO, and BO for blood group. Labels for offspring phenotypes were often omitted by some candidates.

Expected response:

Parental genotypes:	I^AI^o		I^BI^o	
gametes:	I^A	I^o	I^B	I^o
offspring/F1 genotypes:	I^AI^B	I^AI^o	I^BI^o	I^oI^o
offspring/F1 phenotypes:	*AB*	*A*	*B*	*O*

correct labels (parental genotypes, gametes, offspring genotypes and offspring phenotypes

(c) This question was fairly done. Some candidates were able to explain the cause of Down's syndrome in children. Some of the common errors included the mention of more than 1/extra or less chromosomes. Some candidates mentioned gene mutation as the cause instead of chromosome mutation. Most candidates had no idea that it is the ovum that end up with 24 chromosomes and they lost the second mark.

Expected response: *chromosome/genetic mutation*

meiosis/gamete/ovum has 24 chromosomes

chromosomes 21 fails to separate /segregate at meiosis

gamete/ovum has 24 chromosomes or ovum has extra chromosome or there is incomplete separation/ non-disjunction

zygote has 47 chromosomes / extra chromosome

(d) **(i)** This question was challenging to a majority of candidates, and were getting 0 out of 3.

Candidates were required to explain how people who have the sickle cell trait are not likely to suffer from malaria. Common wrong responses included using the terms parasite/ plasmodium, a virus/ bacterium.

***Expected response**:* *people with sickle cell trait have both normal and abnormal /faulty haemoglobin*

red blood cells assume sickle cell shape

malaria parasite/plasmodium fails to enter sickle cells/killed in sickle cell-shaped cells/plasmodium fails to breed or reproduce

(ii) This was also was challenging to a majority of candidates. Some candidates could not differentiate if question was about multi-drug resistance or evolution, so they did not respond correctly. A number of then answered referring to malaria. A common misconception was natural selection leading to variation instead of variation leading to natural selection. A very few candidates mentioned changes to environment.

***Expected response**:* *(genetic) variation/mutations*

ref. to changes in the environment or described e.g food shortage / drought/ outbreak of diseases

there is survival of the fittest, the best adapted organisms survive

breed and pass on their advantageous genes/alles to their offspring

the less adapted organisms die and are unable to pass their disadvantageous genes.

Question 8

This question also proved to be challenging to some candidates. A majority of candidates scored less than 3 out of 5.

(a) This was poorly done as most candidates failed to mention the types of organism but instead gave examples of named organisms e,g nitrogen fixing bacteria, yeast etc

***Expected response**:* *bacteria/bacterium*

fungi/fungus

(b) This was also not well done as candidates described the processes instead of stating them.

***Expected response**:* ***G**: nitrogen fixation*

***H**: Ammonification/decay/decomposition*

***J**: nitrification*

EGCSE BIOLOGY

Paper 6884/03

Practical Test

General Comments

Biology Paper 3 is a practical paper designed to test Assessment Objective **C** which aims at assessing the candidates' attainment in investigative skills and the scientific method of inquiry. The nature of the paper demands that candidates are exposed to practical activities and the science process skills including observation, presenting data in different formats and drawing conclusions from an investigation or a given set of data. It assesses candidates' familiarity with basic laboratory equipment and apparatus as well as manipulative skills. This paper tests if candidates have acquired skills on the scientific method of inquiry including but not limited to designing of investigative experiments and the underlying investigative activities such as controlling variables, ensuring validity and reliability of experimental results, creating and recording experimental data, data presentation skills as well as drawing conclusions from experimental data. Furthermore, it assesses candidates' ability to evaluate and improve methods used in investigative processes.

The 2024 paper was no different from previous papers in terms of the difficulty level. It comprised of **two** compulsory questions with a maximum possible score of 40. Most centers reported that they did not encounter problems in providing the required examination materials.

Generally, the candidates' performance was fair compared to the previous two years. However, there were instances where the candidate's responses indicated lack of exposure to practical knowledge and experience. The quality of responses for the 2024 candidature showed a decline from the previous year. The highest score was thirty-two (32) marks as opposed to the highest score of thirty-eight (38) which was attained in the year 2023. In 2023, the lowest score has been a zero, but there were no candidates who attained a zero in 2024 as the lowest score was one (1). English expressions showed to be a challenge to a number of candidates which disadvantaged them on being able to communicate the correct Science.

Question **1** proved to be more challenging for candidates compared to Question **2**. Candidates were supposed to test for the presence of starch in two samples whereby one was exposed in boiled enzyme and another exposed in live enzyme for question 1. However, evidence from their responses showed that learners assumed the test was on proteins as quite a number of them were giving positive color test for presence of proteins. Questions that proved to be particularly difficult for candidates were **1(b)**, **1(c)**, **1(h)**, **1(i)(i)**, **1(k)** and **2(c)**. Questions that proved to be particularly easy and accessible to a majority of the candidates were **1(a)(i)** and **(ii)**, **2(a)** and **(b)(i)**.

Comments on individual questions

Question 1

This question was based on investigating the effect of an enzyme on a substrate. Candidates were provided with two starch solutions on different test tubes and two test tubes each containing amylase enzyme solution. They were expected to test for the presence of starch using iodine solution on both starch solutions which were supplied to them and record their observations. Thereafter, they were told to add the different enzyme solutions on the different starch solutions as per the given procedure and give time for the amylase enzyme to act on the starch solution and record their observations and stating conclusions. They were further expected to test for the presence of reducing sugars thereafter.

(a) **(i)** and **(ii)** Candidates were expected to observe and record the final colour of iodine solution after adding it to the starch solution. A number of candidates got this correctly, only a few wrote incorrect responses such as purple, mauve, (which are positive colour tests for proteins), yellow, blue and brown.

Expected response: *blue-black for both*

(b) This question required candidates to state a reason for leaving the test tubes in the water bath for 10 - 20minutes. Candidates responses were referencing to giving time for the enzyme to react which couldn't score them a mark.

Expected response: *to give the enzyme enough time to act on the substrate/ give enough time for reaction to occur/to give time for amylase to act on starch/ give time for enzyme activity;*

(c) Candidates were required to state the importance of cleaning the pipette after each use. This question was challenging as most candidates were making reference to rinsing the pipette without stating the importance of the rinsing process. Common response was 'to remove the contents of test-tube **1** from the pipette'.

Expected response: *reference to avoid contamination/ to avoid mixing of mixture **A** and **4***

(d) This question required candidates to suggest reason for providing temperature of 35℃ - 45℃ for the test tubes. Most candidates' responses were to increase rate of reaction or to make the reaction to be fast.

Expected response: *ref to optimum/ best/ good/ suitable temperature for enzyme action/maximum enzyme activity/ so that the enzyme work at its best.*

(e) Candidates were expected to test for the presence of starch from both test-tubes after leaving the mixtures for 10 - 20 minutes and write their observations and conclusions. Some candidates

recorded similar observations of either bule-black or yellow for both test-tubes. Some recorded orange and purple colours which did not earn credit.

***Expected response**: colour of drop from test-tube **1**: yellow/ yellow-brown/ light brown*

conclusion : no starch present/ ref to starch digested/ negative test for starch

colour from test-tube 2: blue-black

conclusion: starch present/ starch not digested

(f) Most candidates were able to score marks in this question on describing the test for reducing sugars. However, most could not score both marks for not qualifying the water bath for heating the mixture as a hot one. Some wrote wrong spellings for Benedict's solution. common spellings were amongst others: benedict, Benedictus, Bernedit, Beneddict, Benedit.

***Expected response**: add drops of Benedict solution;*

heat in a water bath/ place test tubes in a hot water bath

(g) This question required candidates to perform test for the reducing sugar on both test tubes and record their observations and conclusion. Some candidates stated their conclusions in place of observations. It was noted that a significant number of candidates are still unable to distinguish between conclusion and observations. Others showed lack of understanding of what reducing sugars are as their conclusions were referencing to sugar being reduced or sugars not reduced. It was noted that to a few candidates, test-tube **3** observations were observed in test-tube **4**, vice versa. Some would simply write 'negative test'/ 'positive test' which was unacceptable.

Expected responses: *test-tube **3**: observation: green / yellow/ orange/ brick red*

conclusion: reducing sugars present

*test-tube **4**: observation: blue*

conclusion: no reducing sugar

(h) A few candidates got this question correctly. Candidates were expected to give explanation of observation made in test-tube **4**.

***Expected responses**: enzyme had been denatured/ deactivated/ boiled*

(i) **(i)** This question also proved to be challenging to most candidates as they are unable to identify dependent variable from an investigation.

***Expected response**: colour change*

(ii) This question was well attempted by a number of candidates, however, some gave volume of amylase solution which had already been controlled in the procedure.

Expected responses*: volume/ amount of starch solution*
concentration of amylase solution
concentration of starch solution
volume of test solutions
volume of samples from test-tubes 3 and 4(used for reducing sugar test)
temperature
pH
time (for reducing sugar test)

(j) More than half of candidates were able to get 1 of 2 marks in this question. They were able to state that repeating the investigation is a method which can be used to improve reliability. However, some candidates said the investigation must be repeated in another region of the country, which therefore compromises control of variables. Some wrote unqualified food samples, which possibly cannot be starch then.

Expected response*: ref to repeat/ duplication of the investigation*
use more samples/multiple setups/ increase sample size
to identify anomalies

(k) Most candidates proved to lack objective C6 which requires them to plan a scientific investigation. Some candidates left this part question unanswered. Others, failed to express themselves which led to contradictory statements. Some just drew the apparatus which were given on the previous procedure on the answer space provided. Some would simply describe a test for starch in a leaf.

Expected response: Independent variable: *reference to at least two different pH values or how pH will be varied*

Variables kept constant : *same temperature*
same volume of Iodine/ Benedict solution
same volume/ concentration of amylase used
same volume/ concentration of starch used

Dependent Variable: time for reaction to take place measured/ ref to Timing regularly sampling for presence/ absence of reducing sugars/starch

Conclusion: pH at which absence of starch/ presence of reducing sugars is seen first is optimum

Reliability: repeat/ replicate/ use more samples

Question 2

This question was generally well answered, than question **1**. Candidates were given two specimens, a seed and a fruit containing seeds and were to answer the questions based on the two specimens.

(a) Candidates were required to note observable differences between the two seeds from the two specimens. Some zeros were recorded in this question part because candidates were unable to align their differences correctly, for example, some were making reference to colour of embryo, yet the seed was not yet cut. Some were differentiating the same feature twice and could not earn marks. Some candidates were writing the correct observations of specimen **W1** on **W2** column and for **W2** on **W1** column.

***Expected response*:**

	W1	***Seed from W2***
difference 1 (colour)	*brown/cream/white*	*green*
difference 2 (size)	*larger*	*smaller*

(b) **(i)** Candidates were expected to make a drawing of **W1** which consisted of the embryo to test their observation and drawing skills. It was expected that candidates draw a large and neat diagram with a continuous outline without test, showing embryo and plumule in correct position. Some candidates lost marks for drawing:

- diagrams that were significantly smaller than the prototype as well as for shading
- failing to draw the embryo and plumule in correct position
- plumule having one leaflet
- diagrams with two layers representing the testa

Some candidates were drawing the whole pea pod with seeds of the pea seed instead of the bean seed. Some were drawing the whole bean seed.

Expected response: *drawing technique: outline drawn with clear continuous line*

size: minimum acceptable size (60 mm is reasonable)

following instructions: embryo drawn in position

observation: detail of radicle and plumule drawn

(ii) This question required candidates to draw and correctly measure a line from one end to the other of the longest length of their diagram and also measure the longest length of their **W**. Some did not draw the line, and some measured their lines incorrectly or using wrong units, **cm** instead of **mm**.

Expected response: *line correctly drawn on drawing + correct measurement of drawing*

correct measurement of seed

correct units for both measurements

(iii) Candidates were expected to use their measurements on **(ii)** to calculate magnification, giving their answers in **two** decimal places. Some candidates couldn't apply the formula of calculating magnification correctly, some didn't use their figures obtained on (ii). A number of candidates failed to round off their answers to two decimal places. Some were omitting the X sign when writing their answers.

Expected response*: correct answer to 2 dps with working*

(c) A few candidates were able to obtain full marks on this question part. Candidates were expected to suggest mechanism of dispersal for **W2** with a reason for their choice. A number of candidates were able to suggest explosive or self-dispersal as the mechanism but without stating the correct reason. Most common response on the reason was that the seed pot opens when drying up due to tension. Some instead of explosive they wrote explosion.

Expected response: mechanism: *explosive/ self disepersal/mechanical*

reason*: presence of line of weakness/ suture which can split when the pod is dry.*

EGCSE BIOLOGY

Paper 6884/04

Alternative to Practical Test

General Comments

The alternative to practical paper mainly tests candidate's ability to demonstrate a wide range of practical skills. Candidates should have experience in practical work in preparation for this paper.

The paper was fairly accessible and comparable to that of the previous year but the performance was not impressive for a significant number of candidates. Candidates should read all instructions and information thoroughly before attempting to answer questions. When drawing biological specimens, candidates need to be reminded to include detail without the use of shading. Candidates also need to understand the dependent and independent variable before they can make their experimental design.

Most candidates were familiar with the tests for starch and reducing sugars hence they found question **1(a)(i)**, **(ii)**, **(d)**, **(e)** and **(f)** easy. Question **2(b)(ii)** which was on measurement skills was also well attempted by a majority of candidates. Candidates struggled to score marks in question **1(g)** where they were expected to suggest a reason for observed results and also in question **1(i)(i)** where they had to identify a dependent variable. The question on experimental designing in question **1(k)** also proved challenging for most candidates. A majority of candidates also struggled on how specimen **W2** in question in **2(c)** is adapted for explosive mechanism of dispersal.

Comments on Specific Questions

Question 1

(a) **(i)** Candidates were expected to state the colour of iodine solution and a majority of candidates were familiar with the colour of iodine solution.

Expected responses: *yellow/ brown/ light brown.*

(ii) A majority of candidates were familiar with the positive test for starch and so they were able to identify that substrate **X** *contained starch*. A common error was to state that substrate **X** is a carbohydrate.

(b) This question was not well attempted by a number of candidates. A common mistake in most responses was to make reference to optimum temperature yet the question required candidates to suggest why the test-tubes were left for a duration of 15 minutes in the water-bath.

Expected response: *to give the enzyme enough time to act on the substrate/ give enough time for the amylase to digest starch.*

(c) Candidates were required to suggest why a temperature of 40ºC was provided for the test-tubes. A significant number of candidates incorrectly gave a general statement that an increase in temperature increases enzyme activity instead of focusing on why the test-tubes were kept at a specific temperature of 40ºC. Another common mistake was to assume that at 40ºC enzymes will be denatured.

Expected response*: optimum temperature/suitable temperature/ best temperature for enzyme activity.*

(d) Most candidates showed familiarity with the test for starch. Candidates were expected to make conclusions from the results presented about mixtures in test-tubes **1** and **2**. A common error was to write ‘’positive test’’ and ‘’negative test’’ without specifying the nutrient being tested.

Expected response: *test-tube **1**: no starch present*

*test-tube **2**: starch present*

(e) Candidates were required to describe a test for reducing sugars and also state the colour of the reagent to be used. A majority of candidates were able to describe the test for reducing sugars with a few that lost a mark by not mentioning the need for heating in a water-bath. A common error was to state the final colour for a positive test for reducing sugars instead of stating the colour of the reagent to be used.

Expected response: *add drops of Benedict’s solution*

heat in a water bath

Benedict solution is blue

(f) A majority of candidates were able to state the correct conclusion from the results of reducing sugar tests. It was worth noting though that some candidates were not familiar with what ‘’reducing sugars’’ are and focused on the term ‘’reduce’’ for ‘’ little’’ when expressing their responses.

Expected responses: *test-tube 3: reducing sugars present*
test-tube 4: reducing sugar absent

(g) Candidates were required to suggest a reason for the results observed in test-tube **2** where starch was not digested and hence resulting in the absence of reducing sugars in test-tube **4.** This question proved to be very challenging for a majority of candidates.

Acceptable responses: *enzyme denatured/deactivated/boiled*

active site of enzyme destroyed or distorted

pH unsuitable

(h) A fairly accessible question for most candidates with a few who did not understand the question and opted to describe how to use a pippete instead. Most candidates were able to write correct responses such as *washing or rinsing the pippete to prevent contamination*.

(i) **(i)** Candidates were expected to identify the dependent variable in the investigation. This question proved challenging for a significant number of candidates. Candidates are to be reminded that a dependent variable is the variable that is measured or observed in an experiment.

Expected response: *colour change*

(ii) Candidates were required to identify two variables that were kept constant in the investigation. This question proved to be accessible to a majority of candidates. Candidates should be encouraged to be specific when they respond to such a question e.g. instead of writing *''**amylase**''* alone it should be *<u>volume</u> of amylase/ <u>concentration</u> of amylas*e or specify the volume if it has been specified in the procedure.

Expected responses: *concentration of: amylase/substrate **X**/ iodine /Benedict's*

temperature of the water bath

volume of: amylase/ iodine

ref. to same duration/time

(iii) A significant number of candidates did not read this question thoroughly. In this question candidates were required to identify variables that were not kept constant during the investigation but should have been kept constant. A common error was to write about variables that were controlled during the investigation.

E***xpected responses***: *volume of: substrate **X**/ drops of iodine/ samples in test-tubes*

length of time for reducing sugar test

pH

(j) Most candidates were able to score at least 1 mark in this question. The concept of reliability was known to a majority of candidates with a few that confused it with validity.

***Expected responses**:* *repeat/duplicate the investigation*

use more samples/more set-ups to identify anomalies

(k) This question was on experimental design. A significant number of candidates found this question challenging and therefore lost marks. Some candidates did not understand the whole concept of designing/ planning an investigation (C6 objective).

Expected response: Independent variable: *reference to at least two different pH values or how pH will be varied*

Variables kept constant : *same temperature*

same volume of Iodine/ Benedict solution

same volume/ concentration of amylase used

same volume/ concentration of starch used

Dependent Variable: *time for reaction to take place measured/ ref to timing*

regularly sampling for presence/ absence of reducing sugars/starch

Conclusion: *pH at which absence of starch/ presence of reducing sugars is seen first is optimum*

Reliability: *repeat/ replicate/ use more samples*

Question 2

(a) This question tested candidate's observational skills. Candidates were required to state visible differences between specimens **W1** and **W2**. A common mistake was to state differences that were not visible. Candidates are to be reminded to compare one feature a time.

Acceptable responses:

*specimen **W1** has patches/speckles whilst specimen **W2** has no patches/no speckles*

*specimen **W1** is larger whilst specimen **W2 i**s smaller*

(b) **(i)** Most candidates were able to score the mark for a large drawing. A significant number of candidates lost marks by not showing a clear outline and details of the specimen such as the plumule and the radicle. Candidates should be reminded to pay attention to the details as they make their drawing and to also avoid shading their drawings.

Acceptable responses: *drawing technique: outline drawn with clear continuous line*

size: minimum acceptable size

following instructions: embryo drawn in position

observation: detail of radicle and plumule drawn

(ii) Most candidates were able to accurately measure the line for the first part of this question with a few that struggled to read the scale in mm. Candidates are to be reminded to use mm as units unless instructed otherwise. For the second part of the question, candidates were instructed to draw a line on their drawing and measure its length, a significant number of candidates lost a mark by not following this instruction.

Expected response: *line correctly drawn on drawing + correct measurement of drawing*

correct measurement of seed

correct units for both measurements

(iii) The calculation of magnification was well done by most candidates but the challenge was failing to express the answer to 2 decimal places and some included wrong units.

Expected response*: correct answer to 2 dps with working*

(c) Candidates were required to suggest the method of dispersal for specimen **W2**. Some candidates were able to identify that specimen **W2** will be dispersed by explosive mechanism but the challenge was identifying a feature of specimen **W2** that makes it adapted for explosive mechanism.

Expected response*:* method of dispersal: *explosive/self-dispersal/mechanical*

reason*: presence of line of weakness which splits open when the pod is dry.*