



EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE

Home of Examinations and Assessment, Zone 6, Zwelitsha, 5600

REPUBLIC OF SOUTH AFRICA, Website: www.ecdoe.gov.za

2020 NSC CHIEF MARKER'S REPORT

SUBJECT:	LIFE SCIENCES
PAPER:	1
DURATION OF PAPER:	2 ½ hours

SECTION 1: (General overview of Learner Performance in the question paper as a whole)

Life Sciences Paper 1 was a fair paper with all questions falling within the prescribed guidelines. Learners had enough time to answer all questions. Questions also assessed all cognitive levels with enough lower-order questions placed towards the beginning of the paper to build learner confidence.

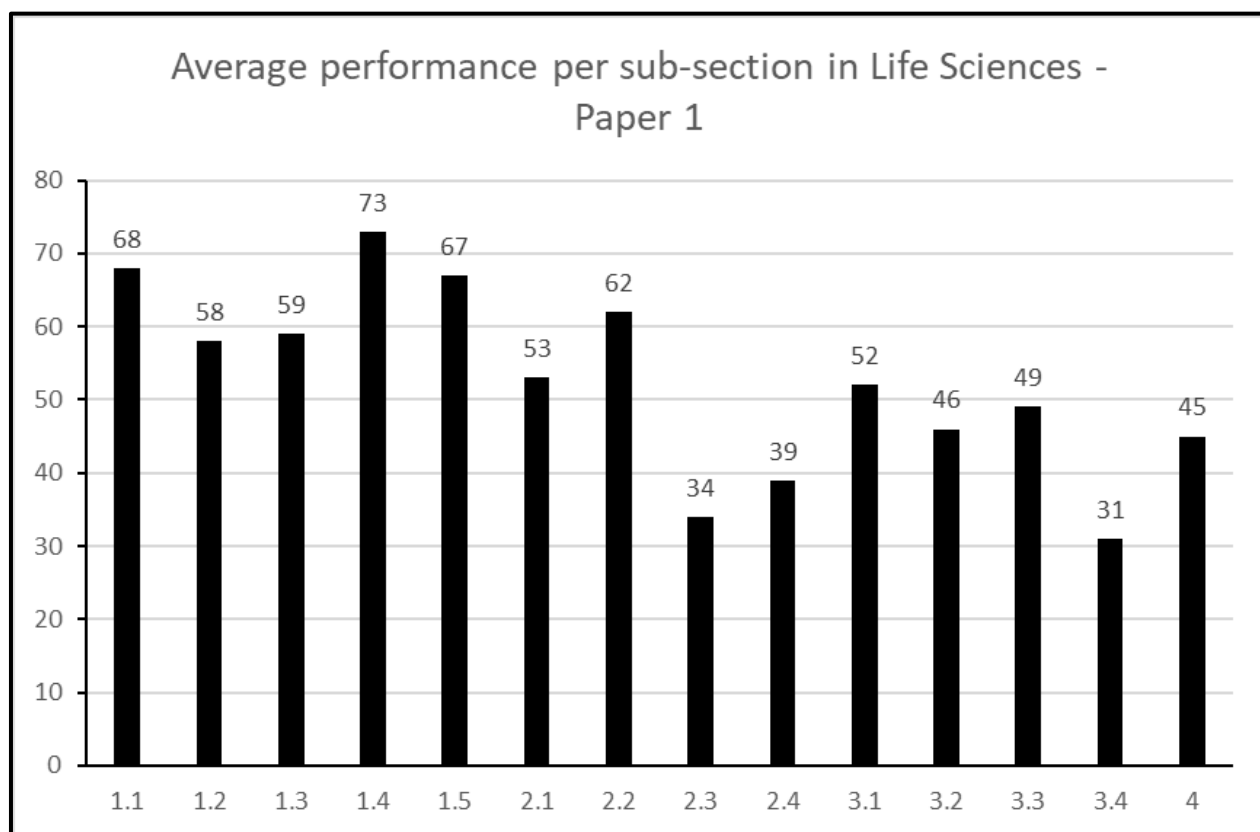
Learners still perform much better in questions that require a short response and have great difficulty describing processes and writing the essay. Many learners did not even attempt the essay.

The paper was also well balanced in terms of cognitive levels with enough level 1 questions to allow learners to pass.

The response to the paper showed that most learners thought this paper was fair and it can be seen that most learners achieve at the level expected from previous examinations. We have seen a greater number of strong distinctions. This is probably due to the fact that top candidates were able to cope with the disruptions to the academic year, and had additional time and resources at hand to improve their understanding. However, it is evident that learners from under-resourced schools battled this year as is reflected in the results. This has meant that overall learners have underperformed compared to previous years.

Learners continue to battle due to poor language skills and do not have the Life Sciences vocabulary required to answer questions fully. Learners also do not understand what the question requires and often give answers which reflect rote learning from the textbook, not directly related to what is being asked.





SECTION 2:

Comment on candidates' performance in individual questions

(It is expected that a comment will be provided for each question on a separate sheet).

QUESTION 1

(a) General comment on the performance of learners in the specific question.
Was the question well answered or poorly answered?

QUESTION 1 RASCH ANALYSIS - (AVERAGE PERCENT PER SUB-SECTION)

1.1	1.2	1.3	1.4	1.5
68	58	59	73	67

Question 1 (1.1; 1.2; 1.3; 1.4 and 1.5) was attempted by all candidates and they performed better in this question than in the rest of the paper.

Learners performed well in the multiple-choice questions.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

1.2 Terminology

1.2.4 Learners wrote *tropism* instead of specifying the type of tropism.

1.2.5 Learners confused the abbreviations for Luteinising Hormone (LH) and wrote *FSH* or *LSH* demonstrating that learners did not make a clear distinction between these hormones.

1.2.6 The term *corpus collosum* was confused with *corpus luteum*.

1.2.7 Learners wrote *umbilical cord* instead of the blood vessel *umbilical artery*.

1.2.8 Learners are unfamiliar with the term *grommet*. It was often confused with a hearing aid.

1.2.10 Learners confused the terms *choroid*, *cornea* and *chorion*.

1.3 Matching Columns

1.3.3 Learners did not identify that *altricial* and *precocial* development were reproductive strategies. These are clearly listed as reproductive strategies in the Life Science Guidelines of 2017.

1.4

1.4.1 Learners confused the term *acrosome* with *autosome*.

1.4.2 When asked for the name of the organelle, some learners wrote *mitochondrial DNA* instead of *mitochondrion*.

1.4.4 Learners wrote *nucleolus* instead of *nucleus*.

1.4.5 Learners confused the type of cell division taking place in the developing embryo. many wrote *meiosis* instead of *mitosis*.

1.5

1.5 Learners did not read the question correctly and gave only ONE number instead of TWO which the question asked for.

Learners are also not familiar with the action words used to ask a question. They cannot distinguish between NAME, DESCRIBE and EXPLAIN.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

We continue to emphasise the importance of correct terminology in Life Sciences. It is vitally important that **learners are provided with terminology lists for each topic**. This terminology should be constantly used and emphasised while teaching so that learners become familiar with using these terms.

Testing on terminology should frequently be part of a lesson. This testing should also focus on spelling, as many learners lost marks due to poor spelling which made words unintelligible.

Being able to give labels and functions on diagrams is fundamental in Life Sciences. Teaching should always include the use of diagrams. The *Mind the Gap* study guide contains many clear diagrams and should be used to make annotated diagrams for the purpose of studying.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Learners need to be taught how to read a question properly and distinguish between the different **action words**. A list of words can be found in the CAPS document. Learners should be taught what each of these words mean. e.g. **Name** requires you to give a name, no explanation. **Explain** questions should be answered by giving both a cause and an effect. **Describe** requires learners to describe a sequence of events step by step.

Learners should be in the habit of underlining this action word when they read a question, so that it is clear what is required of them in an answer.

QUESTION 2

- (a) General comment on the performance of learners in the specific question.**
Was the question well answered or poorly answered?

2.1	2.2	2.3	2.4
53	62	34	39

Question 2 was poorly answered with many learners scoring low marks.

- 2.1 This question was well answered with the majority of learners attempting it. However, learners struggled with 2.1.5 and 2.1.6.
- 2.2 This was a level 1 question which the majority of learners attempted. However, it is evident that many learners do not even grasp this basic concept.
- 2.3 Learners struggled to understand the passage given, and also to interpret the graph. This question introduces a disease with which learners are unfamiliar, and the majority of learners battled to understand the concept which they were required to read. This is exacerbated by the language barrier they face which makes reading and understanding a real challenge.
- 2.4 This question posed the biggest challenge to learners as they could not grasp the procedure followed in this experiment and therefore responses were very poor.

- (b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.**

2.1

- 2.1.5 Learners did not stick to the question asked. Rather, they wrote a full response on how balance is brought about, ignoring the role of the cerebellum which was asked for.
- 2.1.6 Learners have an understanding of the concept of hearing, but battle to apply the information in a different situation. Many described the process of hearing, without specifying how the hardening of the oval window would lead to hearing loss.
- The terms stimulus and impulse are confused by some learners.

2.2 Although this question was an easy level 1 question, requiring a description of accommodation for distant vision, many learners struggled, and confused the terminology. They used phrases like '*suspensory ligaments contract*', which is incorrect, as suspensory ligaments are not muscles and therefore cannot contract. They also confused '*concave*' with '*convex*'. Some learners confused some terms applicable to the pupillary mechanism e.g. circular muscles, with those applicable to accommodation i.e. ciliary muscles. In describing accommodation, some learners wrote that the ciliary body contracted, instead of the ciliary muscle.

2.3

2.3.1 Learners failed to read information from the graph. This basic skill needs to be practised.

2.3.2 The majority of learners were unable to calculate the percentage increase. Although calculations are not taught specifically, learners are expected to be able to handle basic calculations such as *calculating the difference, percentage, percentage increase and ratios*.

2.3.3 Learners performed very poorly in this question. Many learners just copied sentences from the extract provided. They could not make the connection between the hormone and its function. This was to be expected as this is a higher order question. Many learners wrote that *energy* would be used up instead of that *glucose* would be used up. Learners were not able to express that if the metabolic rate increases, the rate of cellular respiration will increase. If cellular respiration increases, more glucose is required; therefore, more glucose and fat will be used and less stored. It is not the *energy* that is used but rather the *glucose and fat* which will provide the energy. The correct response required that learners remembered certain concepts from Gr 11, such as respiration and also what becomes of the products of food digestion (nutrition chapter). This question has nothing to do with the rate at which food is digested, but everything to do with how quickly food reserves were metabolised (utilised).

2.3.4 Learners were unable to conclude that if there is a high concentration of thyroxine due to the ground beef which had been eaten, that the level of TSH would be low. Many learners confused *thyroxine* with *TSH*.

- 2.4 Learners were unable to understand the experiment on plant hormones given. It is clear that they had not been exposed to this type of question and did not understand what agar was. Agar is a clear jelly obtained from seaweed. It is most often used in laboratories to make growth plates for bacteria and should be taught in Grade 11 when teaching bacteria. Here it is used to absorb the auxin from the apical bud. Similar questions to this are found in most textbooks, but it appears that many teachers skip over this and only teach plant hormones theoretically. It is important that plant hormones be taught with practical questions such as this one and those found in previous papers. Learners must not think that auxins are always associated with tropic movements. Sometimes their role is simply to stimulate growth. Note: auxins have a variety of functions.
- 2.4.1 Learners could not grasp the concept that agar is a jelly and can absorb hormones like auxin.
- 2.4.2 When describing the results of pot plant 1, most learners identified that lateral branches had developed but they failed to identify that the plant stem had not grown upwards. The response “*due to apical dominance*” was not credited, as learners were asked to describe what had happened. If the question had asked “Explain the results obtained” then the learner would be required to explain that the results were due to the removal of the phenomenon of apical dominance. This is once again a question that highlights the importance of learners understanding the difference between the action verbs in a question i.e. Describe / explain / name / suggest. Explanations can be found in the CAPS document for Life Sciences.
- 2.4.3 Learners were able to deduce that farmers would *get more fruit/ greater yield*. However, many confused auxins with gibberellins and wrote *larger fruit size* or *faster growing instead* of more fruit.
- 2.4.4 Learners confused this experiment with phototropism and brought in the response to light although no light was mentioned in the question. The majority of learners could not answer this question as they did not understand that the agar block contained auxin.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

2.1.6 Learners must be taught that they will not always be asked to describe processes directly. Sometimes they will be asked what the effect will be if there is an interruption in the process as it usually occurs. In this case, learners need to use their knowledge, and work out how the usual process will be impacted. They must not describe the usual procedure, as they will not be credited. They must answer the question as it is asked e.g. “Explain how this condition may lead to hearing loss” must not be answered by describing the way hearing usually occurs. Teachers are encouraged to help learners understand the differences between the following terms: Sound waves occur in the air (a gas); vibrations in a solid eg in ear drum, ossicles and oval window; pressure waves occur in a liquid e.g. in perilymph and endolymph.

Learners require more exposure to application-type questions. Questions such as 2.3 and 2.4 should be filed and used for revision when teaching those sections.

2.3.3 Because this question was answered correctly by so few learners, it appears that teachers had never pointed out the link between the rate of metabolism and weight gain/loss. Wherever possible educators are encouraged to point out applications of what they are studying, to everyday life. Perhaps this connection had not previously been clear to teachers themselves.

Basic mathematical calculations for Life Science should be taught in Grade 10 and included in all test and examination papers to give learners practice. Plant hormones is still a chapter neglected by many teachers, even though it has featured strongly in past papers. Teachers should use the many questions found in past papers to use as practice when teaching this chapter. Investigative type questions continue to be poorly answered as in previous years. We continue to stress the importance of including these types of questions, as well as questions including the interpretation of graphs in all tests and examinations from Grade 10 to ensure learners have enough practice. Spelling errors are a major concern. Although credit is given if the word can be identified, many learners spell so badly that the word no longer sounds like the original. Continued testing of terminology remains important. Learners are still confusing hearing and balance.

Teachers need to make clear distinctions between these two processes when teaching.

Accommodation is also confused with the pupillary mechanism and these concepts need to be clearly defined when teaching. Teachers should emphasise that accommodation is the adjustment of the eye **to view objects at different distances**, while the pupillary mechanism controls the **amount of light** entering the eye. Learners show that they know the names of structures, but not their functions. More emphasis should be placed on teaching and testing the functioning of organs and structures in the body. Teaching needs also to integrate different sections. Question 2.1 is an example where *hearing* and the *brain functioning* were asked together. Many learners did not see the connection between the ear and cerebrum and cerebellum when shown in diagrams. Reading remains a constant concern as many learners do not read correctly. Employing methods such as underlining key words as they read and using a ruler when reading to focus on the question, are helpful ways to get learners to slow down when reading and to pay more attention to what is asked.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Workshops on plant hormones should be conducted to improve teacher knowledge as many teachers are not familiar with the experiments and therefore do not bring them into their teaching.

It would be beneficial for teachers if a more detailed document on plant hormones were compiled as most textbooks are very superficial and do not give teachers enough understanding on plant hormones to be able to teach it adequately.

Teachers are encouraged to expose learners to several investigative type questions from past papers, as learners are not executing these questions successfully, as seen in question 2.4.

Training on setting test and examination papers is important as many teachers have never set their own tests or exams, and rely on district and provincial papers. This means they are not familiar with the format and style of questioning and therefore cannot convey this to their learners.

Emphasis should be placed on the *action verb* in the question i.e., Name,

give, state, explain, describe, suggest.

Also, teachers need to highlight mark allocation as many learners do not explain in enough detail according to the mark allocation. This is often not because they don't know the answer but rather because they try to explain in the shortest way possible, ignoring the number of marks allocated.

QUESTION 3

(a) General comment on the performance of learners in the specific question.
Was the question well answered or poorly answered?

QUESTION 3 - RASCH ANALYSIS – AVERAGE PERCENT PER SUB-SECTION

3.1	3.2	3.3	3.4
52	46	49	31

Learners fared poorly in this question. They had spelling problems and could not express themselves. This question was not particularly challenging but responses showed that there is a gap that needs to be addressed. Learners tended to answer all questions and often wrote a lot, but answers were incorrect. Learners fared better in questions 3.1 and 3.2 than in 3.3 and 3.4

- 3.1 Learners were able to attempt the majority of this question and were able to score marks. However, they struggled with 3.1.3 and 3.1.7 which required describing and explaining.
- 3.2 This question was also attempted by most learners who managed to score marks in 3.2.1 and 3.2.2. Learners performed poorly in 3.2.3 even though this answer is laid out clearly in the Life Sciences guidelines and is therefore considered a level 1 question. Questions 3.2.4 and 3.2.5 were not well answered, as many learners did not understand what was required by the question and therefore their responses did not address the actual question. Some thought was called for; not only a repetition of material directly from the textbook.
- 3.3 This investigative question posed a challenge to learners. They were able to answer 3.3.1, 3.3.2 and 3.3.5 well but struggled on those questions that required application.
- 3.4 This question was also challenging for learners and they were not able to apply their knowledge to answer the question.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

3.1

3.1.1 *Centromere* was given as an answer instead of *centriole/centrosome*.

3.1.3 Learners did not identify the stage asked as Anaphase 2. Instead, they explained crossing over.

3.1.6 Learners wrote 23 chromosomes instead of 23 pairs of chromosomes when describing the number of chromosomes humans have.

3.1.7 Learners cannot distinguish between *chromosomes* and *chromatids*. Describing structure B as having two chromosomes instead of two chromatids. They also do not describe chromosomes as *replicated* and *unreplicated*. (Refer to 2018 Chief Markers report). This has been highlighted previously and should be part of teaching.

The term *centromere* is confused with centrosome again here. The terms diploid and haploid were also used here incorrectly. Many learners also described crossing over instead of comparing the structure of the two chromosomes. This indicates clearly that they misinterpreted the question. Some learners also described B as a homologous chromosome. This was not relevant in distinguishing B from C.

3.2

3.2.3 The process of oogenesis was poorly answered. This process is clearly laid out in the 2017 Life Sciences Guidelines and should be taught as such. Many textbooks go into more detail than the guideline requires and learners were credited for this.

However, many learners described the ovarian cycle and ovulation rather than oogenesis. Many learners remembered that both mitosis and meiosis formed part of oogenesis, but could not recall which one took place first.

3.2.4 Instead of identifying the structural suitability of the uterus for pregnancy, learners provided the function of the uterus.

3.2.5 Learners focused on the development of ova which would not occur, as the reason for no menstruation, and were unable to identify that it was in fact the developing follicle that produced oestrogen and later the corpus luteum which produced progesterone that caused thickening of the endometrium. Without these hormones the endometrium would not

thicken and therefore, there would be no endometrium to be shed as the menstrual period/menstruation.

3.3

3.3.1 Learners wrote the aim instead of the dependent variable. They need to be taught to identify the dependent and independent variables **in the aim**.

3.3.3 Many learners listed health related issues. These were not given marks, as this factor had already been referred to, as the investigation selected healthy men. Learners had to identify other issues besides health that needed to be taken into consideration when selecting volunteers. Race was also not accepted as a response, as it does not influence sperm production.

3.4

3.4.2 Learners described eutrophication and did not answer the question. Many did not refer to the data in the graph when answering. The graph shows that beyond a certain amount of fertiliser, more fertiliser does not increase crop yield. However, it does not cause it to decrease either, but rather reaches a maximum level, after which it remains constant. Learners also do not understand that economic benefits refer to money lost or gained.

3.4.4 Learners wrote about water pollution and oxygen depletion instead of describing eutrophication. The focus in this question was in fact how an increase in nitrogen fertilizer would affect the number of bacteria in the water. Learners did not seem to understand the reason for the increase in the number of bacteria. This relates directly to the amount of dead organic material in the water (dead plants and animals). The plants died because they could not photosynthesize (sunlight blocked). The bacteria which would thrive and multiply in such an environment are the decomposition bacteria, which would decompose the abundant dead organic matter.

(c) Provide suggestions for improvement in relation to Teaching and Learning.

The following is important to note when teaching the structure of chromosomes:

When explaining the structure of a chromosome, we say that a replicated chromosome has two chromatids. It is NOT made of two strands of DNA. Each chromatid consists of a DNA molecule which is made of two DNA strands joined together to form a ladder-like structure. Therefore, each chromatid consists of a double stranded DNA molecule. A replicated chromosome consists of two DNA molecules not two DNA strands. Also refer to the 2018 and 2019 Chief Markers' reports for more guidelines on teaching chromosome structure. It was gratifying to note that some learners made use of the terms 'replicated' and 'unreplicated' in describing the differences between chromosomes B and C. This suggests that some teachers have paid attention to last year's Chief Marker's Report.

A deeper understanding of both chromosome structure and meiosis is required by learners as many are able merely to repeat work directly straight from the textbook.

The in-depth details of the process of oogenesis are not required. Many teachers are still teaching the process in full detail. This may be helpful in getting the learners to understand the process, but they are required only to study the outline as stated in the 2017 Life Sciences guidelines.

Teachers also need to distinguish between the processes of oogenesis (as laid out in the Exam guidelines) and the ovarian cycle.

Teachers should highlight words such as social benefits, economic benefits and health benefits etc. They should teach learners to distinguish between them.

Once again it is important for learners to study diagrams thoroughly as these are a source of easy marks in an exam.

As with question 2 more practice is needed in investigative-type questions and graph work. Using past papers to revise is important.

Learners know the reproductive hormones and their functions but cannot deduce what happens if there is an over-secretion or under-secretion of the hormones. Discussing and knowing about side effects is an important part of teaching, especially for learners aiming at levels 6 & 7.

All grade 12 learners should be provided with a copy of the Grade 12 Life Sciences Guidelines 2017. They should use this when studying to ensure that they cover all work required as well knowing what is required.

Again, it is pointed out that terminology and spelling must be emphasised.

Teachers should also use telematics lessons and worksheets available to revise lessons for learners. These were listed in the Amended Teaching Plan for 2020. Lessons can be uploaded on tablets and phones to use when learners are not able to attend school.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Teacher workshops on chromosome structure and Meiosis are needed to ensure that teachers have an adequate understanding of the topic.

Giving learners investigative type questions to work through at home and present in class will encourage them to look deeper into a question and encourage greater understanding.

The Chief Marker's report should be presented at District level and all Grade 12 teachers should be invited to ensure that the relevant information gets to all teachers. These reports should be presented by an experienced teacher who is a DCM or Senior Marker in the relevant paper.

QUESTION 4

(a) General comment on the performance of learners in the specific question.
Was the question well answered or poorly answered?

QUESTION 4 – RASCH ANALYSIS – AVERAGE PERCENT – ESSAY

45

Learner performance was poor with some learners not even attempting to answer. This essay should have been answered better as similar questions had appeared in the Trial exam and in the previous two years' papers. This indicates that learners do not use past papers to revise.

(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.

Many learners did not even attempt to answer this question. The idea of an essay puts them off. When these questions are asked as short questions they are always attempted.

This question also shows that revision of previous exam papers is not taking place, as parts of the essay had appeared in previous exam papers which these learners had written.

Response to an increase in temperature

Learners wrote on both an increased temperature and a decreased temperature (which was not asked). They therefore lost marks for relevance.

Response to high carbon dioxide levels

Learners could not identify the location of the receptor cells which are in the carotid artery and aorta. They also confused the medulla oblongata with the hypothalamus.

Effect of carbon dioxide on temperature

Learners still struggle with understanding the greenhouse effect as opposed to the **enhanced greenhouse effect**.

They also bring in information about the ozone layer which is a completely separate concept and does not relate directly to global warming.

Learners must be encouraged to be very specific in answering questions that relate to negative feedback. A very common error was that learners lost marks which they may quite easily have gained, had they been more careful...

Examples: ...blood flows to the surface of the skin... instead of

... more blood flows to the surface of the skin...

...sweat is produced... instead of

...more sweat is produced...

...carbon dioxide is exhaled...instead of

...more carbon dioxide is exhaled...

(c) Provide suggestions for improvement in relation to Teaching and Learning.

Learners are encouraged to identify the sub-topics in an essay. They should use a highlighter to mark off the different subsections on the question paper. It is also recommended that learners do some rough work planning before attempting to write their final answer. This should assist them in writing a logical essay.

Essay writing skills will not be assessed in November 2021. This change will come as a welcome relief to many learners.

Learners must be encouraged to be very specific in answering questions that relate to negative feedback.

(d) Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.

Some learners were unable to distinguish between the effects of vasoconstriction and vasodilation. In the homeostatic processes, teachers are encouraged to focus on the logical sequential steps which make up the entire process. Invariably one intervention leads to a specific consequence. This should be emphasised. It is puzzling to read a learner's answer in which the effect is written before the cause, as if they do not understand the logic of one step resulting in another.



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

LIFE SCIENCES P1

**SENIOR CERTIFICATE/
NATIONAL SENIOR CERTIFICATE**

GRADE 12

LIFE SCIENCES P1

NOVEMBER 2020(2)

MARKS: 150

TIME: 2½ hours

This question paper consists of 16 pages.



★ L F S C E 1 ★



INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in the ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Present your answers according to the instructions of each question.
6. Do ALL drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts only when asked to do so.
8. The diagrams in this question paper are NOT necessarily drawn to scale.
9. Do NOT use graph paper.
10. You must use a non-programmable calculator, protractor and a compass, where necessary.
11. Write neatly and legibly.



SECTION A**QUESTION 1**

- 1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A to D) next to the question numbers (1.1.1 to 1.1.10) in the ANSWER BOOK, e.g. 1.1.11 D.

- 1.1.1 Which part controls the amount of light entering the eye?
- A Cornea
 - B Iris
 - C Choroid
 - D Lens
- 1.1.2 Which ONE of the following refers to an aquifer?
- A An increase in the temperature of water bodies as a result of water from industries
 - B Planting of the same crop on the same area repeatedly
 - C An underground permeable rock saturated with water
 - D The release of water with chemicals from mines
- 1.1.3 The structure in the amniotic egg that removes waste products:
- A Yolk sac
 - B Chorion
 - C Amnion
 - D Allantois
- 1.1.4 Which ONE of the following is CORRECT with regard to astigmatism?
- A Light cannot pass through the cornea
 - B Light cannot pass through the lens
 - C Refraction of light rays by the cornea is uneven
 - D The lens cannot become more rounded
- 1.1.5 Which structures secrete progesterone during pregnancy?
- A Adrenal gland and corpus luteum
 - B Corpus luteum and placenta
 - C Thyroid gland and Graafian follicle
 - D Pituitary gland and Graafian follicle



- 1.1.6 Which ONE of the following shows the correct sequence of an impulse from the receptor in a simple reflex arc?
- A Sensory neuron through the dorsal root → motor neuron through the ventral root → effector
 - B Motor neuron through the dorsal root → sensory neuron through the ventral root → effector
 - C Sensory neuron through the dorsal root → effector → motor neuron through the ventral root
 - D Effector → interneuron through the dorsal root → motor neuron through the ventral root
- 1.1.7 Which ONE of the following would be a disadvantage when a biological method is used to control alien plant invasion?
- A Able to control alien plants without the use of harmful chemicals
 - B Some part of the alien plant may be left to regrow when mechanically removed
 - C The species introduced might be alien in the area and outcompete the indigenous species
 - D Chemicals might affect the indigenous plants in the area
- 1.1.8 Which ONE of the following is a consequence of the destruction of wetlands?
- A Increased biodiversity
 - B Decreased water availability
 - C Decreased global warming
 - D Increased water quality
- 1.1.9 Nocturnal animals have the ability to see clearly in the dark. They have ...
- A bigger eyes.
 - B more rods in the retina.
 - C more cones in the retina.
 - D no blind spot.
- 1.1.10 Which ONE of the following is CORRECT regarding the homeostatic control of glucose in the human body?

	GLAND	HORMONE SECRETED	EFFECT ON BLOOD GLUCOSE LEVEL
A	Pancreas	Insulin	Increase
B	Pituitary	Glucagon	Increase
C	Pancreas	Insulin	Decrease
D	Pancreas	Glucagon	Decrease

(10 x 2)

(20)



1.2 Give the correct **biological term** for each of the following descriptions. Write only the term next to the question numbers (1.2.1 to 1.2.10) in the ANSWER BOOK.

- 1.2.1 The layer in the atmosphere that protects living organisms from the ultraviolet rays of the sun
- 1.2.2 The illegal hunting and killing of animals
- 1.2.3 A condition of the cell where there is only one set of chromosomes
- 1.2.4 The response of a part of a plant to a light stimulus
- 1.2.5 A hormone that stimulates ovulation in humans
- 1.2.6 The part of the brain that connects the left and right hemispheres
- 1.2.7 The blood vessel that transports deoxygenated blood from the foetus towards the placenta
- 1.2.8 A small device that is inserted in the ear to drain fluids caused by a middle-ear infection
- 1.2.9 The branch of the autonomic nervous system that restores an increased heart rate back to normal
- 1.2.10 A structure in the eye that absorbs light to prevent internal reflection (10 x 1) **(10)**

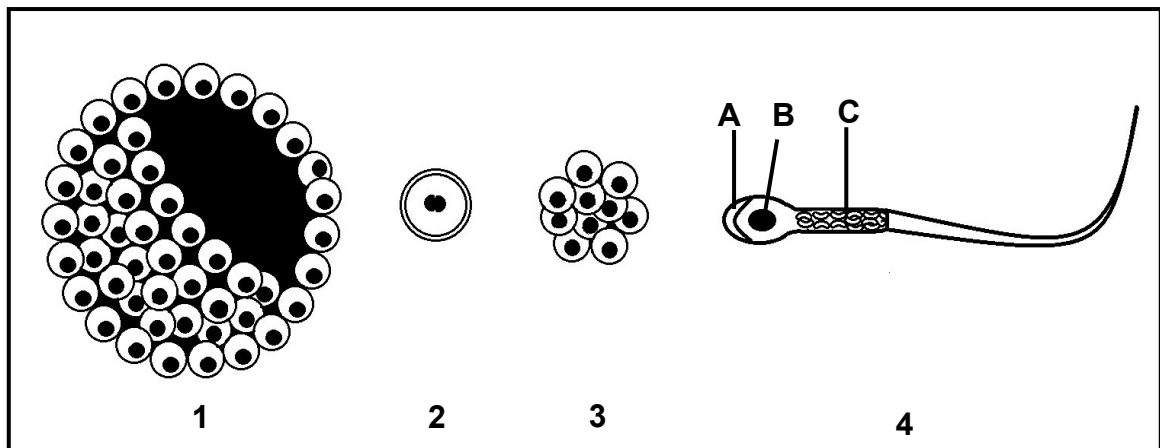
1.3 Indicate whether each of the descriptions in COLUMN I apply to **A ONLY**, **B ONLY**, **BOTH A AND B** or **NONE** of the items in COLUMN II. Write **A only**, **B only**, **both A and B** or **none** next to the question numbers (1.3.1 to 1.3.3) in the ANSWER BOOK.

COLUMN I		COLUMN II
1.3.1	The functional connection between two consecutive neurons	A: Receptor B: Synapse
1.3.2	The young develops and is nourished in an amniotic egg that is retained in the mother's body	A: Ovipary B: Vivipary
1.3.3	A reproductive strategy in vertebrates where internal fertilisation occurs	A: Altricial development B: Precocial development

(3 x 2)

(6)

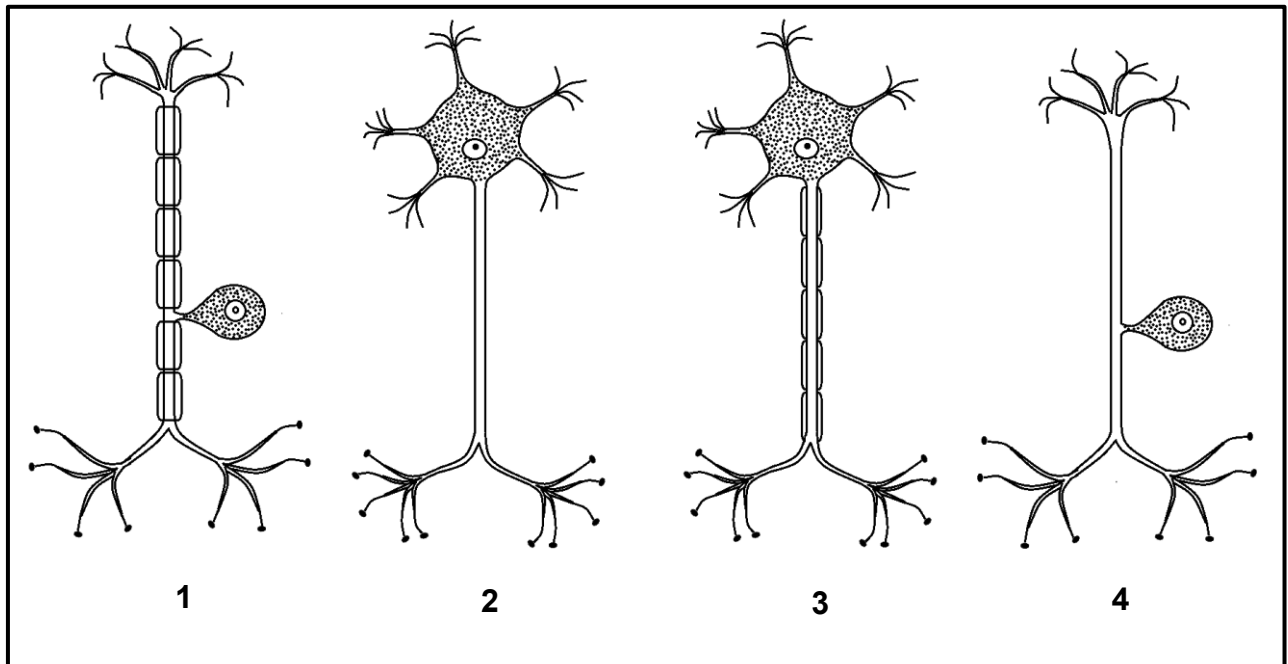
1.4 The diagrams below show structures formed during human reproduction.



- 1.4.1 Identify part **A**. (1)
- 1.4.2 Name the organelle found in large numbers in part **C**. (1)
- 1.4.3 Give the NUMBER (1, 2, 3 or 4) only of the diagram that represents the following:
- (a) Morula (1)
 - (b) Structure that will implant in the uterus (1)
 - (c) Blastula/Blastocyst (1)
- 1.4.4 Give the LETTER and NAME of the part that will enter the ovum during fertilisation. (2)
- 1.4.5 Name the type of cell division that occurred to produce the structure in diagram 3. (1)
- (8)**



1.5 The diagrams below show different neurons.



Give only the NUMBERS (1, 2, 3 or 4) of TWO neurons that:

1.5.1 Transport impulses from the receptor to the central nervous system (2)

1.5.2 Will have a faster transmission of impulses (2)

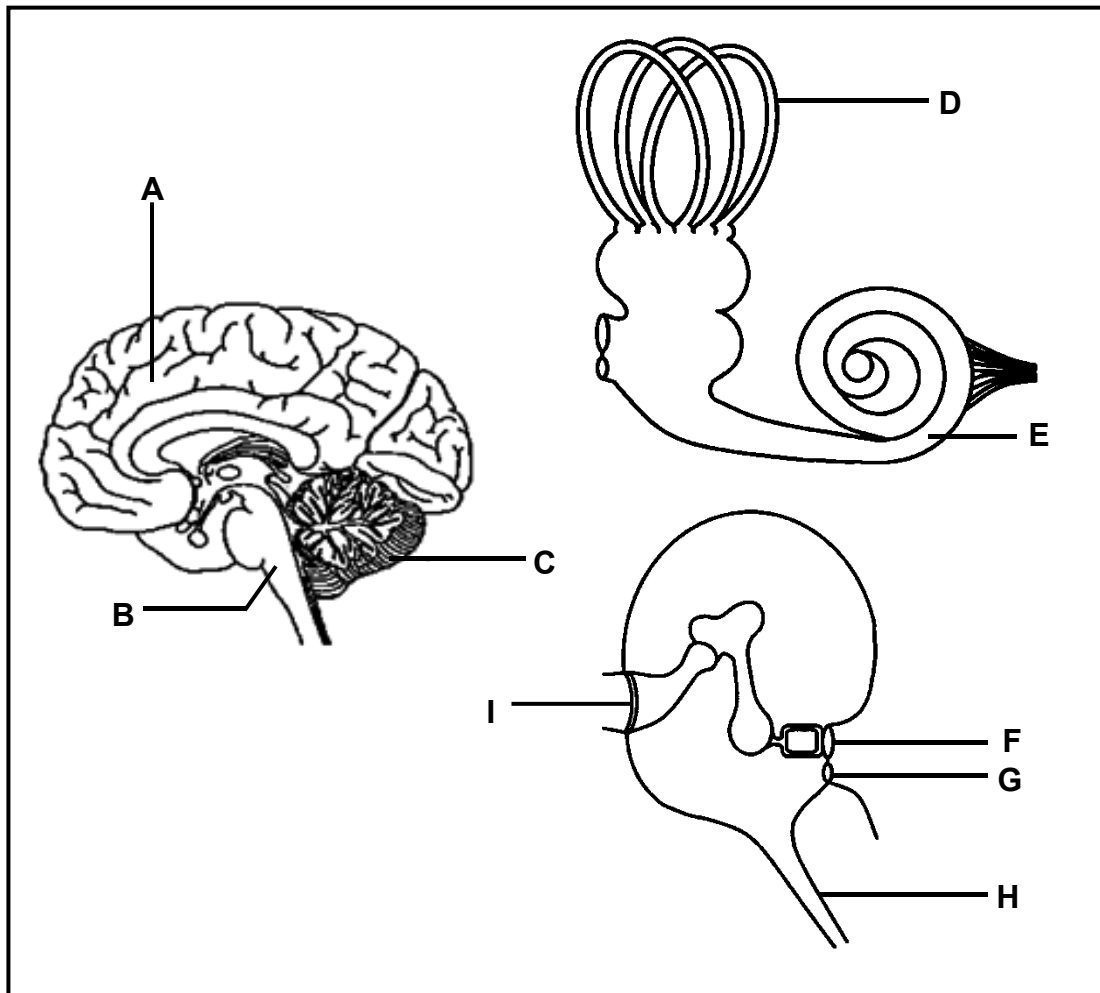
1.5.3 Are damaged if a person can feel the stimulus but is unable to react (2)
(6)

TOTAL SECTION A: 50



SECTION B**QUESTION 2**

2.1 The diagrams below show different parts of the brain and the ear.



2.1.1 Identify part:

- (a) **A** (1)
- (b) **B** (1)
- (c) **H** (1)

2.1.2 Give the LETTER and NAME of the part of the ear that absorbs excess pressure waves from the inner ear. (2)

2.1.3 Name the receptors found at part **E**. (1)

2.1.4 Explain why damage to part **B** can lead to instant death. (2)



- 2.1.5 Describe how part **C** responds to impulses received from part **D**. (3)
- 2.1.6 In older people, part **F** of the ear may harden.
Explain how this condition may lead to hearing loss. (4)
(15)
- 2.2 Describe the accommodation of the eye for distant vision. (5)
- 2.3 Read the extract below.

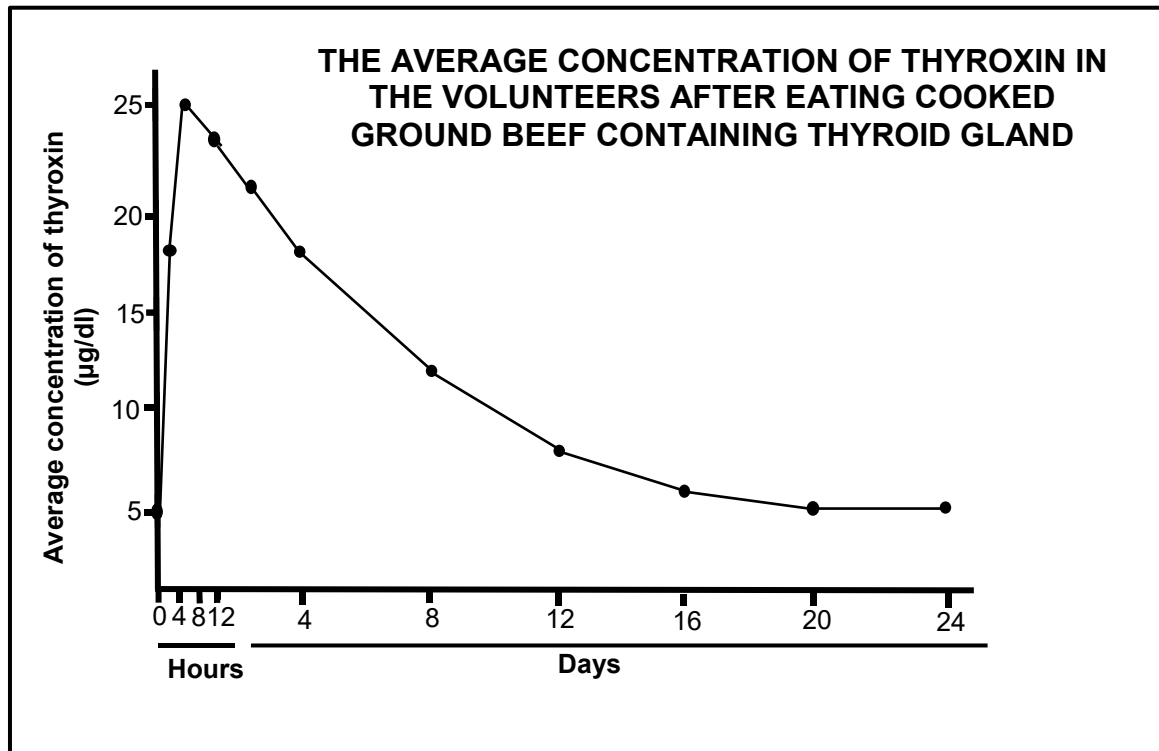
AN OUTBREAK OF THYROTOXICOSIS

Thyrotoxicosis is a medical condition caused by high levels of thyroxin in the blood. There was a sudden increase in the number of reported cases of this condition in one city. They suspected that this was due to people eating ground beef (minced meat) from a local butcher. The butcher added the thyroid glands of cattle when he produced the ground beef. Some people who ate this ground beef showed symptoms of increased heart rate, excessive sweating and weight loss.

Doctors conducted an investigation to determine if the ground beef caused the thyrotoxicosis. The normal thyroxin levels of 5 volunteers were measured. They were then given cooked ground beef from the butchery to eat. Their thyroxin concentration was measured every **4 hours on day 1** and then **once a day for the next 23 days**. The average thyroxin levels was calculated and recorded.

The results are shown in the graph below.





- 2.3.1 Give the average normal thyroxin concentration ($\mu\text{g/dl}$) in the blood of the volunteers. (1)
- 2.3.2 Calculate the percentage increase of the average thyroxin concentration in the first 8 hours after eating the ground beef. Show ALL working. (3)
- 2.3.3 Explain why thyrotoxicosis causes weight loss. (3)
- 2.3.4 Explain the expected concentration of TSH in the blood 8 hours after eating the ground beef. (4)
- (11)**

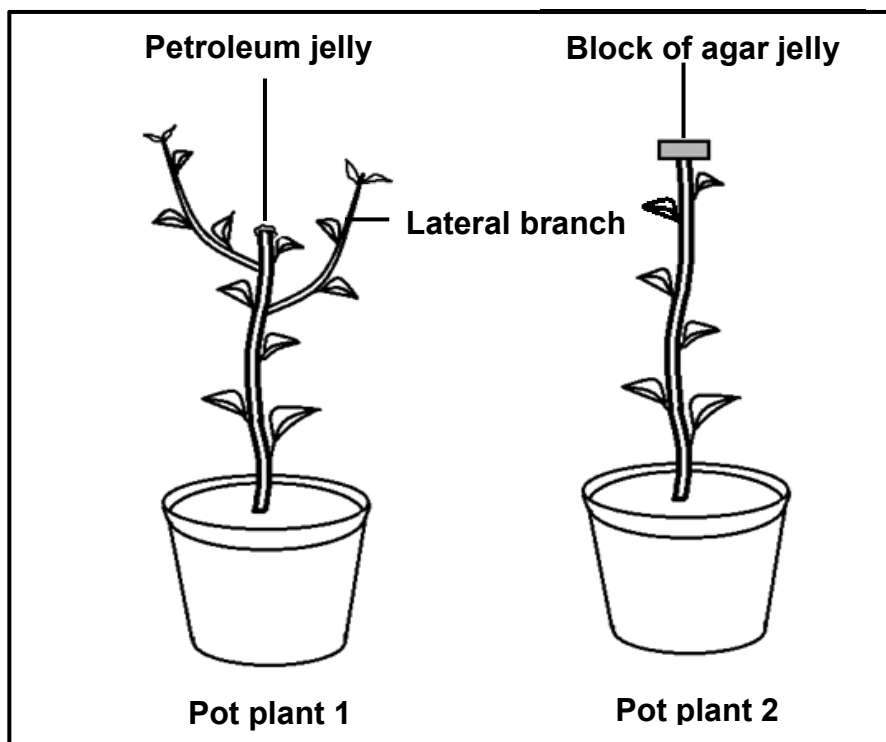


2.4 An investigation was done to determine the effect of a plant hormone on plant growth:

The procedure was as follows:

- Two pot plants (1 and 2) of the same species and age were used.
- The apical buds of both plants were cut at the same length along the stem.
- The cut surface of plant 1 was sealed with **petroleum jelly**.
- The cut apical bud of pot plant 2 was placed on a **block of agar jelly** for 2 hours.
- The block of agar jelly was then placed on the cut surface of plant 2.
- The plants were exposed to the same environmental conditions for 2 weeks.
- The growth of both plants was observed at the end of this period.

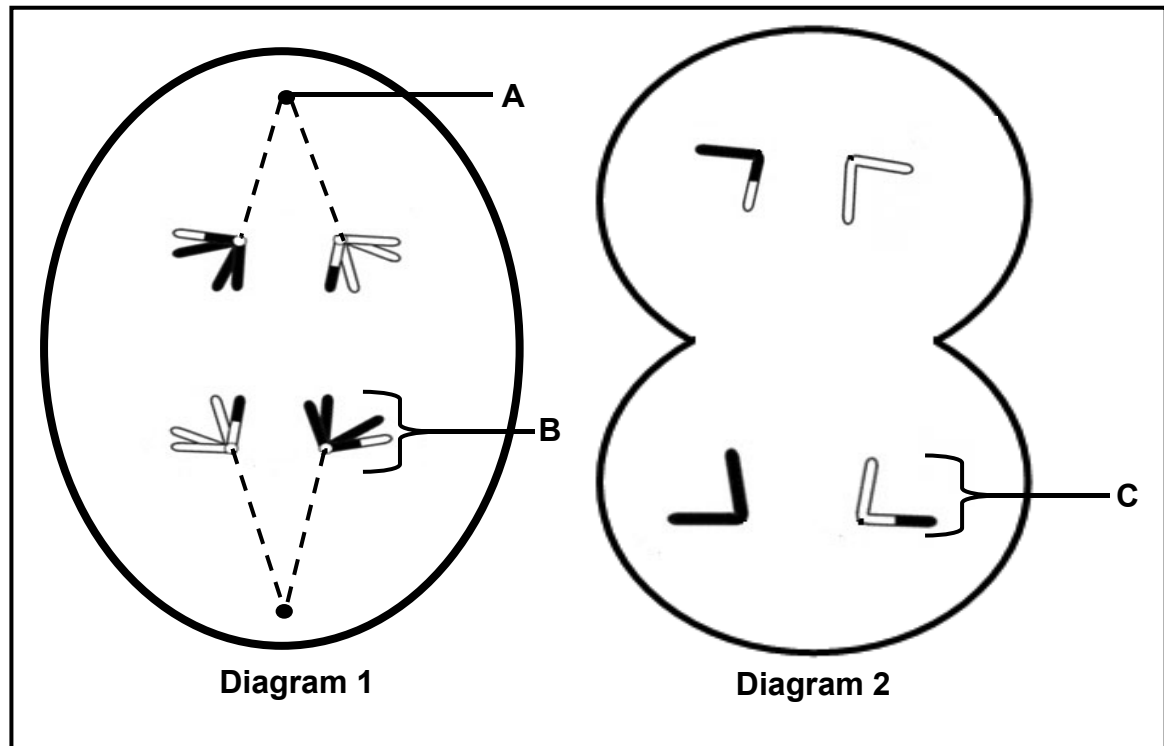
The diagrams below show the **results** obtained.



- 2.4.1 State why the apical bud was placed on a block of agar jelly for 2 hours. (2)
- 2.4.2 Describe the results obtained for plant 1. (2)
- 2.4.3 Explain how fruit farmers can use the knowledge from the results in QUESTION 2.4.2 to their benefit. (2)
- 2.4.4 Explain why the stem in pot plant 2 grew upwards. (3)
- (9)
- [40]

QUESTION 3

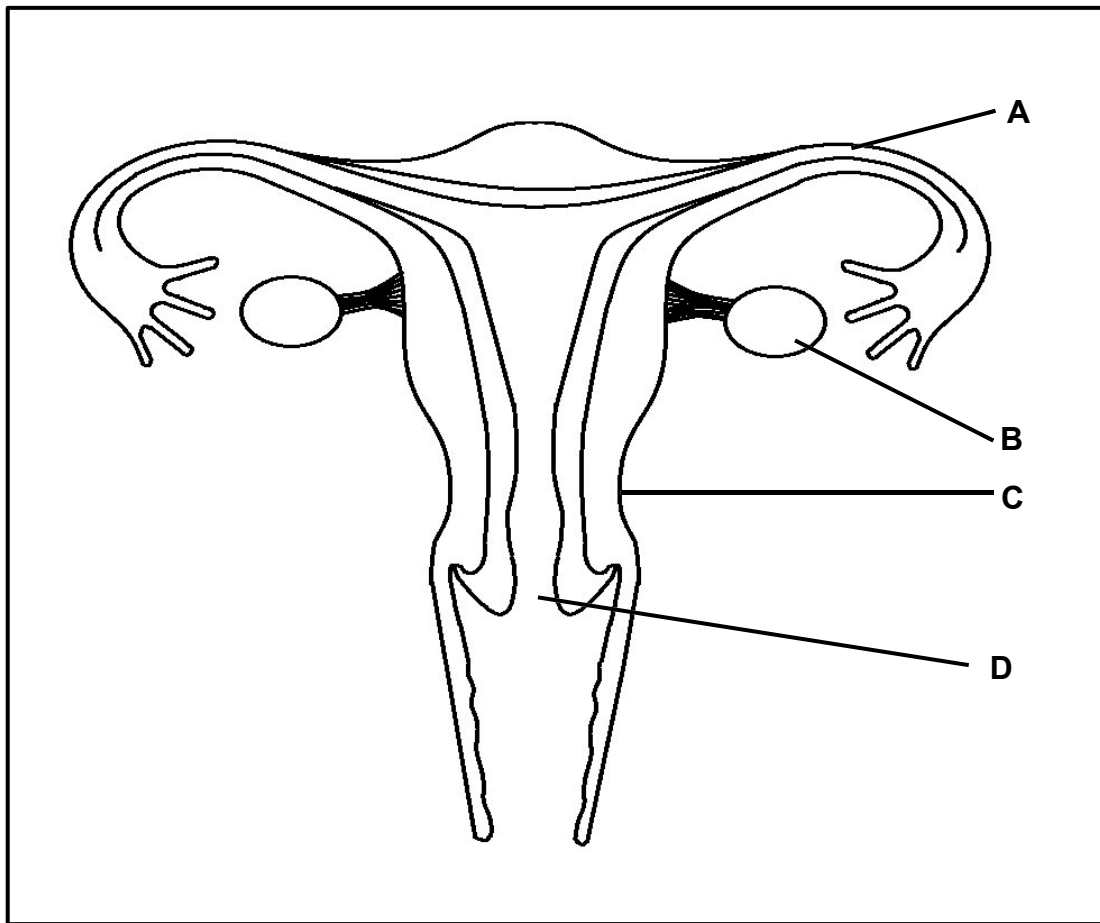
3.1 The diagrams below represent two phases of meiosis.



- 3.1.1 Identify part **A**. (1)
- 3.1.2 Identify the phase represented by diagram 1. (1)
- 3.1.3 Describe the events that took place in the phase before the one represented in diagram 2. (2)
- 3.1.4 Name the process that causes the chromosomes to have a combination of genes as shown in the diagrams. (1)
- 3.1.5 Give ONE reason why the process named in QUESTION 3.1.4 is important. (1)
- 3.1.6 If this was a human cell, how many chromosomes would be present in the cell during the phase represented in diagram 1? (1)
- 3.1.7 Structure **B** and structure **C** are both chromosomes. (3)
Explain why they are structurally different. (10)



3.2 The structure below represents a part of the female reproductive system.



- 3.2.1 Identify part **D**. (1)
- 3.2.2 State ONE function of part **A**. (1)
- 3.2.3 Describe the process of oogenesis as it occurs in part **B**. (4)
- 3.2.4 State ONE way in which structure **C** is suited for its function during pregnancy (1)
- 3.2.5 A person undergoes a surgical operation to remove part **B** on both sides.
- Explain why this person will not menstruate. (3)
- (10)**

- 3.3 Male hormone contraceptive (birth control) pills have been in development for over 50 years. The pills contain a substance called TU, which inhibits the secretion of testosterone. There is, however, no product available on the market yet, mainly due to many side effects associated with the product.

An investigation was done to determine how TU affects male fertility.

The procedure was as follows:

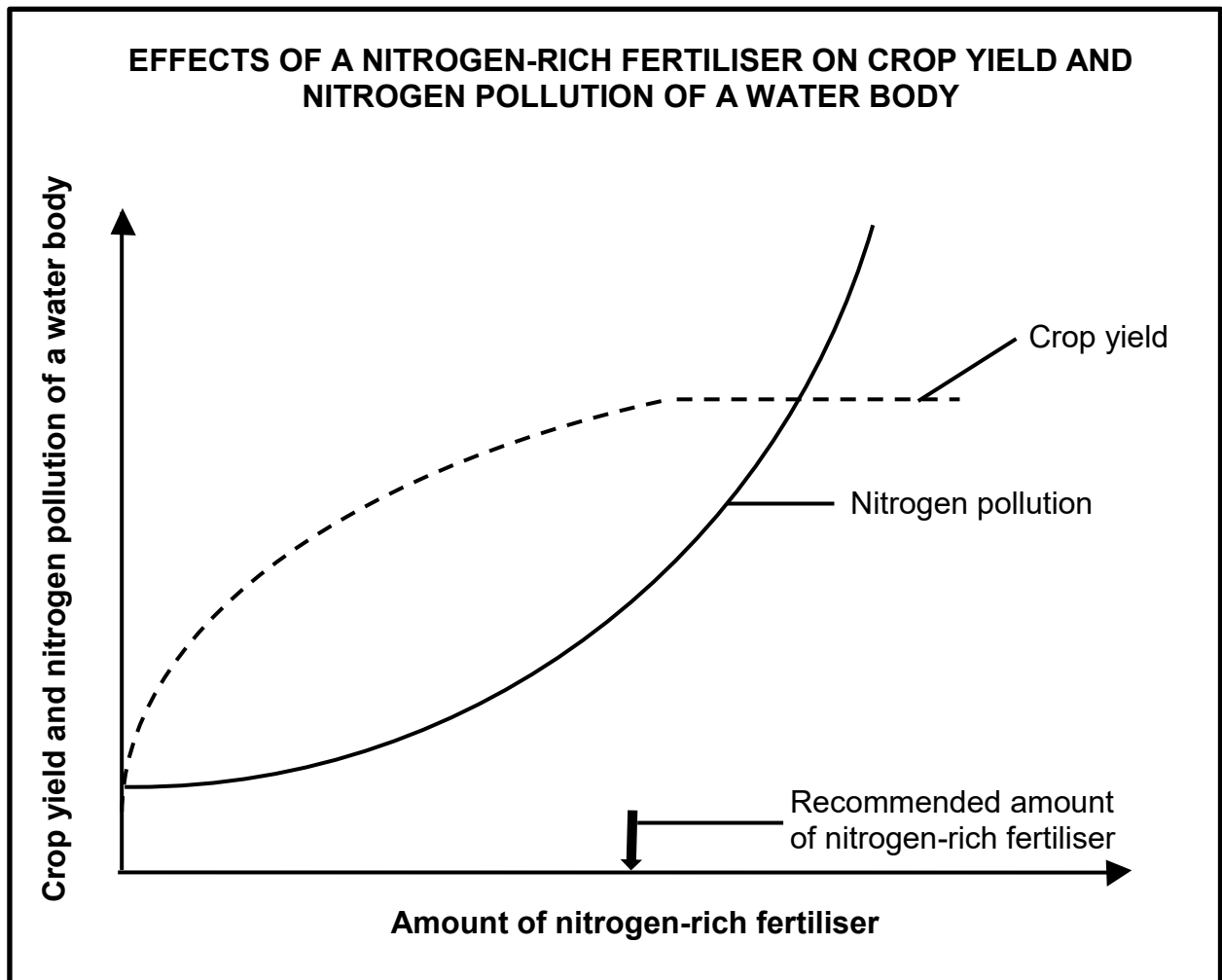
- 308 healthy, male volunteers were selected.
- A sperm count for each volunteer was done initially.
- Each volunteer was given 500 mg of TU monthly over a period of 12 months.
- During the period of the investigation, the volunteers were asked to wear loose-fitting trousers and underwear made of the same light fabric.
- A sperm count was done weekly over a period of 24 months.
- The average sperm count was calculated per volunteer.

NOTE: Sperm count refers to the total number of healthy sperm per ml of semen and is an indication of male fertility.

- 3.3.1 Identify the dependent variable in the investigation. (1)
- 3.3.2 State how the dependent variable in QUESTION 3.3.1 was measured. (1)
- 3.3.3 Name TWO other factors that should be considered when selecting volunteers. (2)
- 3.3.4 Explain how TU reduces fertility. (2)
- 3.3.5 Explain why wearing tight-fitting trousers will decrease male fertility. (2)
- 3.3.6 Suggest ONE reason for doing the sperm count for an additional 12 months after stopping the TU treatment. (1)
- 3.3.7 The contraceptive options that are currently available for men are limited to condoms and vasectomy. Vasectomy involves the cutting and tying of both the vas deferens.
- Explain how a vasectomy prevents pregnancy. (2)
- (11)**



- 3.4 The graph below shows the influence of a nitrogen-rich fertiliser on crop yield and nitrogen pollution of a nearby water body.



- 3.4.1 Name the process whereby excess nutrients accumulate in a water body. (1)
- 3.4.2 Explain why it will not economically benefit the farmer to use more than the recommended amount of fertiliser. (3)
- 3.4.3 Suggest ONE reason why farmers are advised to apply fertilisers to the soil during the dry season of the year. (1)
- 3.4.4 Explain the effect that an increase in nitrogen pollution will have on the number of bacteria in the water. (4)
(9)
[40]

TOTAL SECTION B: 80

SECTION C**QUESTION 4**

Describe how the human body maintains the temperature and carbon dioxide concentration in the blood when they rise above normal limits.

Also, describe the importance of carbon dioxide in regulating atmospheric temperature, and why increasing levels of carbon dioxide leads to global warming.

Content: (17)
Synthesis: (3)
[20]

a

NOTE: NO marks will be awarded for answers in the form of flow charts, tables or diagrams.

TOTAL SECTION C: 20
GRAND TOTAL: 150





basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE/ NATIONAL SENIOR CERTIFICATE

GRADE 12

LIFE SCIENCES P1

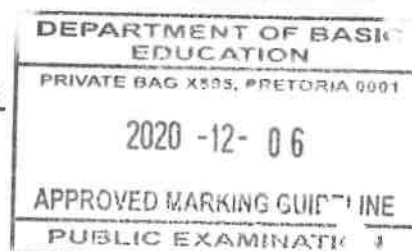
NOVEMBER 2020(2)

MARKING GUIDELINES (FINAL - 06/12/2020)

MARKS: 150

R VAN DER WATT
INT: MODERATOR
Watt
06/12/2020

HAMIDA MOOSA
INT. MODERATOR
Moosa
06/12/2020



These marking guidelines consist of 10 pages.

Approved
G S PILLAY
EXTERNAL MODERATOR
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Pillay 6/12/2020

Approved
P.B. MAJOZI

P.B. Majosi
UMALUSI Moderator
06/12/2020

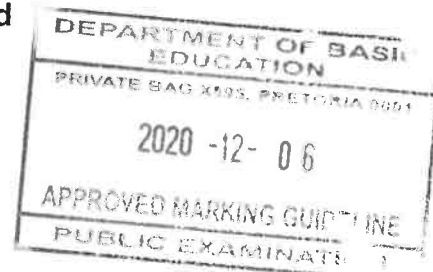
Approved

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Preethiall
06/12/2020

PRINCIPLES RELATED TO MARKING LIFE SCIENCES

1. **If more information than marks allocated is given**
Stop marking when maximum marks is reached and put a wavy line and 'max' in the right-hand margin.
2. **If, for example, three reasons are required and five are given**
Mark the first three irrespective of whether all or some are correct/incorrect.
3. **If whole process is given when only a part of it is required**
Read all and credit the relevant part.
4. **If comparisons are asked for, but descriptions are given**
Accept if the differences/similarities are clear.
5. **If tabulation is required, but paragraphs are given**
Candidates will lose marks for not tabulating.
6. **If diagrams are given with annotations when descriptions are required**
Candidates will lose marks.
7. **If flow charts are given instead of descriptions**
Candidates will lose marks.
8. **If sequence is muddled and links do not make sense**
Where sequence and links are correct, credit. Where sequence and links are incorrect, do not credit. If sequence and links become correct again, resume credit.
9. **Non-recognised abbreviations**
Accept if first defined in answer. If not defined, do not credit the unrecognised abbreviation, but credit the rest of the answer if correct.
10. **Wrong numbering**
If answer fits into the correct sequence of questions, but the wrong number is given, it is acceptable.
11. **If language used changes the intended meaning**
Do not accept.
12. **Spelling errors**
If recognisable, accept the answer, provided it does not mean something else in Life Sciences or if it is out of context.
13. **If common names are given in terminology**
Accept, provided it was accepted at the national memo discussion meeting.
14. **If only the letter is asked for, but only the name is given (and vice versa)**
Do not credit.



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15. If units are not given in measurements

Candidates will lose marks. Marking guidelines will allocate marks for units separately.

16. Be sensitive to the sense of an answer, which may be stated in a different way.**17. Caption**

All illustrations (diagrams, graphs, tables, etc.) must have a caption.

18. Code-switching of official languages (terms and concepts)

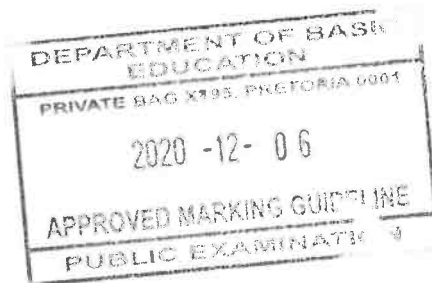
A single word or two that appear(s) in any official language other than the learner's assessment language used to the greatest extent in his/her answers should be credited, if it is correct. A marker that is proficient in the relevant official language should be consulted. This is applicable to all official languages.

19. Changes to the marking guidelines


No changes must be made to the marking guidelines. The provincial internal moderator must be consulted, who in turn will consult with the national internal moderator (and the Umalusi moderators where necessary).

20. Official marking guidelines

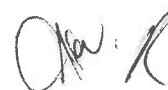
Only marking guidelines bearing the signatures of the national internal moderator and the Umalusi moderators and distributed by the National Department of Basic Education via the provinces must be used.




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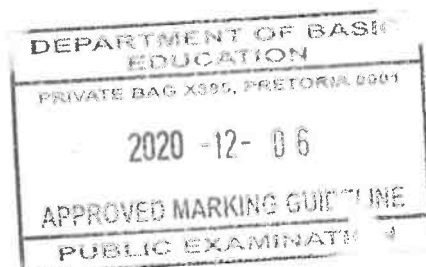
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SECTION A**QUESTION 1**

- | | | | | |
|-----|--------|------------------------------------|----------|------|
| 1.1 | 1.1.1 | B✓✓ | | |
| | 1.1.2 | C✓✓ | | |
| | 1.1.3 | D✓✓ | | |
| | 1.1.4 | C✓✓ | | |
| | 1.1.5 | B✓✓ | | |
| | 1.1.6 | A✓✓ | | |
| | 1.1.7 | C✓✓ | | |
| | 1.1.8 | B✓✓ | | |
| | 1.1.9 | B✓✓ | | |
| | 1.1.10 | C✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | Ozone✓/stratosphere | | |
| | 1.2.2 | Poaching✓ | | |
| | 1.2.3 | Haploid✓ | | |
| | 1.2.4 | Phototropism✓ | | |
| | 1.2.5 | Luteinising✓ hormone/LH | | |
| | 1.2.6 | Corpus callosum✓ | | |
| | 1.2.7 | Umbilical artery✓ | | |
| | 1.2.8 | Grommet✓ | | |
| | 1.2.9 | Parasympathetic✓ nervous system | | |
| | 1.2.10 | Choroid✓ | (10 x 1) | (10) |
| 1.3 | 1.3.1 | B only✓✓ | | |
| | 1.3.2 | None✓✓ | | |
| | 1.3.3 | Both A and B✓✓ | (3 x 2) | (6) |
| 1.4 | 1.4.1 | Acrosome✓ | | (1) |
| | 1.4.2 | Mitochondria✓ | | (1) |
| | 1.4.3 | (a) 3✓ | | (1) |
| | | (b) 1✓ | | (1) |
| | | (c) 1✓ | | (1) |
| | 1.4.4 | B✓ - Nucleus✓ | | (2) |
| | 1.4.5 | Mitosis✓ | | (1) |
| | | | | (8) |
| 1.5 | 1.5.1 | 1✓ and 4✓
(Mark first TWO only) | | (2) |
| | 1.5.2 | 1✓ and 3✓
(Mark first TWO only) | | (2) |
| | 1.5.3 | 2✓ and 3✓
(Mark first TWO only) | | (2) |



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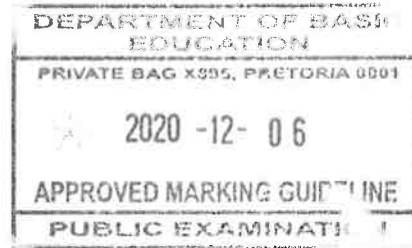
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TOTAL SECTION A: 50

Alan R

SECTION B**QUESTION 2**

- 2.1 2.1.1 (a) Cerebrum ✓ (1)
- (b) Medulla oblongata ✓ (1)
- (c) Eustachian tube ✓ (1)
- 2.1.2 G✓ Round window ✓ (2)
- 2.1.3 Hair cells ✓ / Organ of Corti (1)
- 2.1.4 - Part B controls vital processes ✓ / heartbeat / breathing (2)
- These processes will stop ✓ leading to death
- 2.1.5 - The impulses will be interpreted ✓ (3)
- and sent to the skeletal muscles ✓
- to maintain balance ✓
- 2.1.6 - The oval window / Part F will not vibrate ✓ freely (4)
- Fewer / no vibrations will be carried to the cochlea ✓ / inner ear
- Fewer / no pressure waves will form ✓ in the cochlea
- There will be less / no stimulation of the organ of Corti ✓ / hair cells
- Fewer / no impulses will be transmitted to the cerebrum ✓ leading to hearing loss Any (15)
- 2.2 For distant vision:
- The ciliary muscle is relaxed ✓
- The ciliary body / choroid layer moves backward ✓ / away from the lens
- The suspensory ligaments are tight ✓ / taut
- Tension on the lens is increased ✓
- The lens is less convex ✓ / flatter
- Light rays are refracted less ✓
- so that a clear image falls on the retina ✓ / yellow spot Any (5)
- 2.3 2.3.1 5 ✓ µg/dl (1)
- 2.3.2 $\left(\frac{25 - 5}{5} \right) \times 100 \checkmark$
- $= 400 \checkmark \%$
- OR
- $\left(\frac{24 - 5}{5} \right) \times 100 \checkmark$
- $= 380 \checkmark \%$
- Accept a range between:
- 24 and 25 for the first value and
- 380% and 400% for the answer



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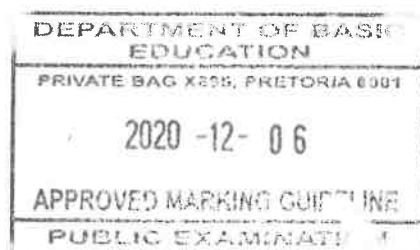
SC/NSC – Marking Guidelines

- 2.3.3 - Thyrotoxicosis increases the metabolic rate✓/rate of cellular respiration
 - More glucose is used✓
 - less glucose is stored✓
 - fat is broken down✓ causing weight loss Any (3)
- 2.3.4 - The high levels of thyroxin✓ in the blood
 - causes the pituitary gland✓/hypophysis
 - to secrete less TSH✓ into blood
 - causing the level of TSH to decrease✓ (4)
(11)
- 2.4 2.4.1 - So that the plant hormone✓/ auxins from the apical tip
 - could diffuse into the block of agar jelly✓ (2)
- 2.4.2 - The stem stopped growing upwards✓
 - Lateral branches developed✓ (2)
- 2.4.3 - (Lateral) branches develop✓
 - that can bear more fruit✓/increased yield
OR
 - Shorter trees✓ /development of lateral branches
 - makes harvesting of fruit easier✓ Any (1 x 2) (2)
- 2.4.4 - Auxins✓ in the block of agar jelly
 - move downwards ✓into the stem
 - causing (cell) elongation✓/growth
 resulting in upward growth of the stem (3)
(9)
[40]

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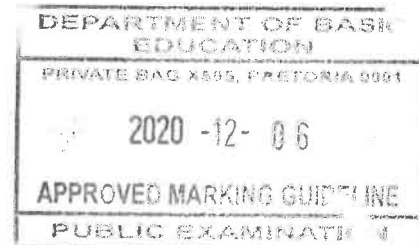
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**QUESTION 3**

- 3.1 3.1.1 Centriole✓/centrosome (1)
- 3.1.2 Anaphase I✓ (1)
- 3.1.3
- The spindle fibres contract✓
 - The centromeres split✓
 - Each chromatid is pulled to the opposite poles✓ Any (2)
- 3.1.4 Crossing over✓ (1)
- 3.1.5 It leads to (genetic) variation✓ (1)
(Mark first ONE only)
- 3.1.6 46✓/23 pairs (1)
- 3.1.7
- Structure B consists of two DNA molecules✓/contains a double thread/is made up of two chromatids
 - because of DNA replication✓
 - Structure C consists of one DNA molecule✓/ contains a single thread/chromatid
 - because it is unreplicated✓/as a result of the splitting of the chromosome during anaphase 2 Any (3)
(10)
- 3.2 3.2.1 Cervix✓ (1)
- 3.2.2
- The site of fertilisation ✓
 - The site of zygote division✓
 - The transfer of the ovum/embryo to the uterus✓ Any (1)
- (Mark first ONE only)**
- 3.2.3
- Diploid cells in the ovary undergo mitosis✓
 - to form numerous follicles✓
 - Under the influence of FSH✓
 - one cell undergoes meiosis✓
 - to form a (haploid) ovum✓ Any (4)
- 3.2.4
- It is a hollow organ✓
 - It has a muscular wall✓
 - It has a blood-rich lining✓/endometrium Any (1)
- (Mark first ONE only)**
- 3.2.5
- No follicle will develop✓
 - No oestrogen produced✓
 - and no progesterone produced✓
 - Therefore, the endometrium will not develop✓* to be shed during menstruation **Compulsory mark✓*1 + Any 2 (3)
(10)**

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SC/NSC – Marking Guidelines

- 3.3 3.3.1 Male fertility✓ (1)
- 3.3.2 Measuring the sperm count✓ (1)
- 3.3.3
- Age✓
 - Diet✓
 - Exercise✓
 - Activity level✓
 - Lifestyle✓
 - Occupation✓ etc
- (Accept factors that are NOT related to health; race) Any (2)
- (Mark first TWO only)**
- 3.3.4
- TU inhibits the secretion of testosterone✓
 - spermatogenesis cannot take place✓/no sperm will be produced (2)
- 3.3.5
- The higher temperature/pressure on the testes✓ due to the tight underwear
 - could decrease the sperm count✓/sperm production/lead to the production of abnormal sperm (2)
- 3.3.6
- To determine if TU is still effective after 12 months✓
 - To see if the sperm count returns to normal✓ when the treatment stops Any (1)
- (Mark first ONE only)**
- 3.3.7
- No sperm will be transported✓
 - from the epididymis to the urethra✓
 - Semen without sperm will be released✓ Any (2)
- (11)**
- 3.4 3.4.1 Eutrophication✓ (1)
- 3.4.2
- The crop yield reaches a maximum at the recommended amount✓
 - Using more fertilizer will cost more✓ without increasing crop yield
 - Therefore the profit will be less✓ (3)
- 3.4.3
- Less fertiliser will be lost due to run-off✓/leaching (1)
- (Mark first ONE only)**
- 3.4.4
- Algal bloom✓ occurs
 - A layer of algae will form on the water, blocking out sunlight✓
 - The (water) plants die because they are unable to photosynthesise✓
 - Animals that feed on the plants will also die✓
 - Decomposition✓ of the dead plants and animals
 - cause an increase in the number of bacteria✓*

Compulsory mark✓*1 + Any 3

(4)

(9)

[40]

80

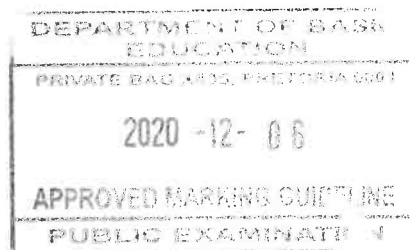
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TOTAL SECTION B:

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SECTION C**QUESTION 4****When temperature rises above normal (T):**

- Receptors are stimulated✓
- and send impulses to the hypothalamus✓
- The hypothalamus sends impulses to the blood vessels in the skin✓
- and to the sweat glands✓
- The blood vessels in the skin dilate✓/vasodilation takes place
- More blood flows to the surface of the skin✓/sweat glands so that
- (More) heat is lost from the body✓
- More sweat is produced✓ and
- (More) heat is lost when sweat evaporates✓
- The temperature of the body returns to normal✓

Any (7)

When the carbon dioxide levels rise above normal (C):

- Receptor cells in the (carotid) artery in the neck/aorta are stimulated✓
- to send impulses to the medulla oblongata✓
- The medulla oblongata sends an impulse to the breathing muscles✓
- to contract more actively✓
- and increase the rate/depth of breathing✓
- An impulse is also sent to the heart✓
- to beat faster✓
- More carbon dioxide is taken to the lungs✓/exhaled
- The carbon dioxide levels return to normal✓

Any (5)

Importance of carbon dioxide in regulating atmospheric temperature and its influence on global warming (A):

- Carbon dioxide is a greenhouse gas✓
- It traps heat/ prevents it from escaping from the atmosphere✓
- This is called the greenhouse effect✓ which
- keeps the earth warm to make life on earth possible✓
- An increase in carbon dioxide levels in the atmosphere causes an enhanced greenhouse effect✓
- More heat is trapped in the atmosphere✓
- causing an increase in the average global temperature✓

Any (5)

Content (17)
 Synthesis (3)
(20)

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ASSESSING THE PRESENTATION OF THE ESSAY

RELEVANCE	LOGICAL SEQUENCE	COMPREHENSIVE
All information provided is relevant to the question	Ideas arranged in a logical/ cause-effect sequence	Answered all aspects required by the essay in sufficient detail
All the information is relevant to: <ul style="list-style-type: none"> - Homeostatic control of temperature when it rises above normal - Homeostatic control of CO₂ - Importance of CO₂ in regulating atmosphere temperature and its influence on global warming No irrelevant information	The sequence of the events in the: <ul style="list-style-type: none"> - Homeostatic control of temperature - Homeostatic control of CO₂ - Importance of CO₂ in regulating atmosphere temperature and its influence on global warming are in a logical sequence	The following must be included: <ul style="list-style-type: none"> - Homeostatic control of temperature (T: 5/7) - Homeostatic control of CO₂ (C: 3/5) - Importance of CO₂ in regulating atmospheric temperature and its influence on global warming (A: 3/5)
1 mark	1 mark	1 mark

TOTAL SECTION C: 20
GRAND TOTAL: 150

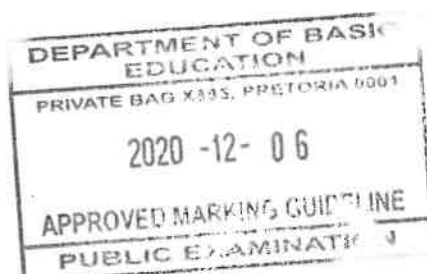
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