NATIONAL SENIOR CERTIFICATE EXAMINATION
SUPPLEMENTARY EXAMINATION – MARCH 2019

LIFE SCIENCES: PAPER II

MARKING GUIDELINES

Time: 2 hours 100 marks

These marking guidelines are prepared for use by examiners and sub-examiners, all of whom are required to attend a standardisation meeting to ensure that the guidelines are consistently interpreted and applied in the marking of candidates' scripts.

The IEB will not enter into any discussions or correspondence about any marking guidelines. It is acknowledged that there may be different views about some matters of emphasis or detail in the guidelines. It is also recognised that, without the benefit of attendance at a standardisation meeting, there may be different interpretations of the application of the marking guidelines.

SECTION A

QUESTION 1

1.1 1.1.1 A change in genetic structure; inserting/deleting nucleotides change in DNA in a gene/addition/deletion of a piece of a chromosome.

1.1.2 (a) Wrong nucleotide added during complementary base pairing/addition of extra nucleotide/loss of nucleotide/no nucleotide added; translocation; inversion.

(b) Non disjunction due to spindle fibre failure so homologous partners/chromatids are not separated/chromosome breakage causing loss of parts or whole of chromosome/parts of homologous partner not swapped during crossing over.

1.1.3 Down's/Edwards/Patau/Klinefelter's/Turner's, etc.

1.2 nitrogenous base/ A C T G

1.3 1.3.1 True

1.3.2 True

1.3.3 False

1.3.4 False

1.3.5 True

1.4 AAT G CGGTTAT A

1.5 1.5.1 Francis Crick was one of the discoverers of the double helix structure of DNA.

1.5.2 Safety has to be verified in animals, and in clinical trials, must find best way to deliver editor to right cells, must find best time to deliver gene therapy.

1.6 1.6.1 CRISPR involves cutting through the sugar phosphates, scissors represent cutting through DNA.

1.6.2 Individual "letters" can be "erased" and a new nucleotide can be written in.

1.7 1.7.1 The "letters" (nucleotides) "spell out" codes for amino acids/ sets of nucleotides make up codons which code for amino acids.

1.7.2 Uracil is a nucleotide that only occurs in RNA.

QUESTION 2

2.1 2.1.1 A

2.1.2 D

2.1.3 B

2.1.4 C

2.1.5 D

2.2 2.2.1 (a) Functional allele or gene inserted into virus.

(b) Virus inserts functional allele or gene into stem cell.

2.2.2 Cells with DNA from another species.

2.3 Table showing advantages and disadvantages of gene therapy to enzyme treatments.

Gene therapy	Enzyme treatments
• Cures disease • Cheaper in long run • Could result in inflammation • DNA could insert in wrong place in cell	• Life-long treatments required • Expensive • Safe treatment • Safe treatment

Heading + column headings + 3 comparisons

2.4 2.4.1 94–97% (100 – 3 or 4)

2.4.2 Plasma

2.5 2.5.1 During meiosis I, homologous partners/chromosomes are separated from one another by contracting spindle fibres and move to opposite poles eventually into different cells. In meiosis II, chromatids separate, move into two cells 50% chance of gamete inheriting X^r or X^R.

2.5.2 (a) X^RX^r

(b) X^RY

2.5.3 (a) False

(b) True

(c) False

SECTION B

QUESTION 3

Private companies have the right to patent their crops	
Yes	**No**
SOURCE A Companies have rights to protect their investment so they can collect money back. Farmers have to enter into a contract with company as seeds belong to company.	**SOURCE A** Farmers have to buy new seed every year. Concern that farmers are dependent on large companies for seeds. Large companies have used intellectual property laws to modify the world seed supply, maximise profits by eliminating Farmers' Rights. Lack of competition in the marketplace reduced farmers' choices and enabled seed producing companies to control seed access.
SOURCE B Enforcement of intellectual property rights is normal, need money to invest in resources for research. Patents ensure companies are paid for products and for the investments. Monsanto reinvests more than R34,6 million per day in research and development that ultimately benefits farmers and consumers. No business can survive without being paid for its products or services.	**SOURCE B** Only 18% of seeds are from seeds saved by farmers, large companies supply rest. Corn and soybean prices have increased a lot.
SOURCE C Farmers not forced into buying any particular seed. Laws are not restrictive.	**SOURCE C**

SOURCE D Need patents to protect business interests and provide motivation for spending millions of dollars on research. Unilever has right to patent seeds – they discovered genetic combination.	**SOURCE D** Danger that prosecution can occur if seeds are accidentally grown. Monsanto sued farmers to protect patent rights, attempting to dominate seed industry. Control and ownership now in hands of multinational companies, undermines farmer rights. Increases seed cost prevents farmers trading seeds. Drive to patent may hurt those in developing countries most. Ethically wrong – companies do not have right to patent seeds they did not invent.
SOURCE E Need to have new developments in food production to cope with population increase. Companies are doing good work developing new technology. Golden rice available for free, helping developing countries, only have to pay for it if farmers earn more than R136 000 per year.	**SOURCE E**
SOURCE F	**SOURCE F** Number of patents increasing. Increasing control by companies.
SOURCE G Farmers do not rely on replanting seed due to it being inbred. Improvements in yields been made by large companies.	**SOURCE G**

Own: cannot ethically "own" species.

Some seeds are the same as farmers have always been growing (biopiracy).

Total: 100 marks

Note: Essay should be 2½ to 3 pages in length.
Time allocation suggestion: reading of sources 10 min.; planning 10 min.; writing essay 40 min.

	1 mark	2 marks	3 marks	4 marks	Possible mark (40)
Planning **× 2**	• Decision given • Key points present for and against the argument	• Decision given • Key points developed for and against the argument	• Decision given • Key points developed for and against the argument • Source references identified (e.g. Source A/own information)		6
Decision	• Vague • Changed position within essay	• Clear decision made			2
Use of knowledge from sources **× 2**	• Up to ¼ of potential detail in sources used to support argument	• Up to ½ of potential detail in sources used to support argument	• Up to ¾ of potential detail in sources used to support argument	• Source detail – very close to full potential used to support argument	8
Use of own knowledge	• Some facts given beyond the source to support argument	• Many facts given beyond the source to support argument	• Some facts given beyond the source to support argument • Facts integrated into the argument	• Many facts given beyond the source to support argument • Facts integrated into the argument	4
Content relevance	• Repetition mostly avoided • Some minor digression • Supporting argument relevant	• Repetition mostly avoided • Some minor digression • Supporting argument relevant • Quality of source extracts acknowledged			2

	1 mark	2 marks	3 marks	4 marks	Possible mark (40)
Quality of argument supporting decision × 2	• Writing consists of facts with little linkage or reasoning • Reasoning incorrect	• **Maximum if no clear decision in support** • Reasoning correct, but hard to follow • Ordinary: some linkage evident	• Supports the position • Reasoning is clear • Minor errors in flow • Linkage sometimes missed	• Strongly supports a clear position • Reasoning is very clear and succinct • Flow is logical • Compelling with regular linkage • Well-integrated argument	8
Fairness – counter opinions to decision	• One to two counter opinions given from the sources	• Three to four counter opinions given from the sources	• Integration of one to two counter opinions from the sources into argument	• Integration of three to four counter opinions from the sources into argument	4
Presentation	• Writing is almost unintelligible • Tone, language, terminology unscientific and very weak • Introduction **and/or** conclusion **not** present	• Tone, language, terminology weak • Introduction **and** conclusion present	• Tone is consistent and suited to scientific language • Good and appropriate language and terminology • Mostly appropriate paragraphing • Introduction and conclusion have merit	• Tone is mature and suited to scientific language • Excellent and appropriate language and terminology • Correct paragraphing with good transitions • Interesting introduction, satisfying conclusion	4
Scientific merit	Essay shows academic rigour, accurate reasoning, insight and cohesiveness.				2