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## **NSC 2015 CHIEF MARKER'S REPORT**

<b>SUBJECT</b>	LIFE SCIENCES
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<b>PAPER</b>	2
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<b>DATE OF EXAMINATION:</b>	16 NOVEMBER 2015	<b>DURATION:</b>	2,5 HOURS
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This section of the instrument is aimed at providing valuable feedback to schools, subject advisors, teachers and learners about common errors committed by candidates in the answering of questions, to assist teachers and subject advisors to identify areas that need to be given special attention in the teaching and learning of the subject in 2016.

Your responses will be based on two parts:

**Section 1:** General overview of Learner performance in the question paper as a whole

**Section 2:** Comment on candidates' performance on individual questions (Detailed explanations must be provided **per question** as follows: (You may include sub questions where necessary)

- (a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?
- (b) Why the question was poorly answered?
- (c) Provide suggestion for improvement in relation to teaching and learning
- (d) Describe any other specific observations relating to responses of learners
- (e) Any other comments useful to teachers, subject advisors, teacher development

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

**Life Sciences Paper Two** was a mixed bag of both traditional and modern CAPS oriented questions. The traditional questions like differences between DNA and RNA and modern questions like Bongo's natural selection, Ebola viruses spread etc. made the paper interesting, exciting and contextual. Many learners enjoyed it and others failed miserably! Based on the Rash analysis of 100 scripts, average for the final total is 42%. This means the average mark for the learners who wrote this paper is 63 out of 150 marks. The highest mark scored in this centre was 145 and the lowest was 04 out of 150.

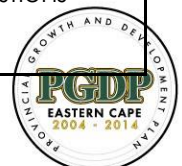
**Question 1** average performance varied from 47 to 62% and it was expected. Terminology got the lowest (47%) like in the previous years and it continues to be a sore point. Surprisingly, Evolution scored the highest in Question 1 probably because of the simple and straightforward way of asking questions on the diagram and graph.

**Question 2:** was the worst performed with the average performance ranging from 24 to 40%. Blood grouping, speciation and selective breeding pulled the marks down. Question 2.2.1 was unfair because of the way it was asked, even the best learners did not know how to answer it and the memo was far from the learner's response. This made it very difficult to mark within the tolerance range. Most learners lost 5 marks for this question.

**Question 3:** marks ranged from 32 to 72%. **Question 3.2** on DNA and RNA average was 72% and that made Question 3 the best-performed question. **3.3** on Genetics were the worst performed among the entire question 3s because the memo was rigid and varied from what learners were taught.

**Question 4:** Essay was simple and straightforward but the average was 34% only! Bright learners got full marks while poor learners got naught in many cases. Some learners did not even attempt the essay. Not sure whether it was because of insufficient time or lack of knowledge.

The Standard of the question paper was fair for an average Gr 12 learner who attends school regularly and works consistently. The paper was CAPS compliant, all cognitive skills were tested through questions of various difficulty levels covering all sections of the prescribed content. The language was appropriate for an average Gr 12 learner though our second language English speakers seemed to have struggled to comprehend some of the questions and respond appropriately.



## 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
<p><b>(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?</b></p>
<p>The response to this question varied from good to bad. The standard of question 1 was fair.</p> <p><b>Questions 1.1 – 1.1.4</b> was the most poorly answered followed by <b>1.1.6, 1.1.7, 1.1.8 and 1.1.9</b>, which many learners got wrong.</p> <p><b>1.2.1</b> Many wrote homozygous instead of homologous.</p> <p><b>1.2.3</b> Many learners wrote 'spindle' only instead of spindle fibres/ spindle threads/ spindle apparatus.</p> <p><b>1.2.5</b> Spelling of phylogenetic was a major problem (polygenic, pathogenic etc. were used instead.</p> <p><b>1.2.9</b> Was particularly under scored. Most learners and even the top learners who used the term later on to answer other questions got it wrong.</p> <p><b>1.3.1</b> Learners answered poorly. Probably they were not taught the history of the discovery of DNA sufficiently.</p> <p><b>1.4</b> Well answered although learners do not know where fossils originated. They do not know the proper /common names of fossils either. Learners answered using examples rather than terminology.</p> <p><b>1.5.1 (a)</b> Learners had problems reading and interpreting graphs.</p> <p><b>(b)</b> Very well answered, but learners did not realize the years go backwards.</p> <p><b>1.5.2</b> Learners often got <b>(a)</b> correct but <b>(b)</b> incorrect which meant many learners could not work out the scale. Learners performed reasonably well in this question.</p> <p><b>1.5.3.</b> Many learners wrote similarities between humans and other primates.</p>

<p><b>(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.</b></p>
<p>In question <b>1.2</b> terminology was a problem.</p> <p>Correct spelling of terminology e.g. Phylogenetic tree vs. polygenetic tree, learners do not know the correct spelling.</p> <p><b>1.1.3</b> The word <b>component</b> and <b>sequence</b> were <b>NOT</b> familiar to second language speakers. In some cases, learners <b>did not stick</b> to instructions on what to write.</p> <p><b>1.4.1</b> Can be considered as an unfair question because canines are <b>NOT</b> visible in the diagram but this can also be a knowledge recall question.</p> <p><b>1.4.4 and 1.5.3</b> were very similar questions and answers. Another section / skill could have been included in its place.</p> <p><b>1.2.3</b> was a bit confusing to learners because of the <b>animal cell</b> and many wrote <b>centriole</b>, which was not accepted.</p> <p><b>1.2.9</b> Many learners, even the bright ones got it wrong for no obvious reasons.</p>



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

- Compile a glossary with terminology before a lesson.
  - Short terminology tests, peer assessments etc. can help.
  - Flash cards with terminology on as learners enter the class. Cross word puzzles can help too.
  - Teachers need to adhere to examination guideline and not the textbook e.g. comparative - embryology is not in guidelines but comes up as an answer often.
  - \_Spelling needs to be learnt, spelling tests can be given at the end of each topic.
  - \_Learners should have glossary book where they write terminology related to each topic.
- 1.4.2** For the last time this year scientific names will be accepted when asked for the common names of fossils e.g. *A.africanus*, *A.prometheus* and *A.sediba* were accepted this year in place of their common names. This must be communicated to all subject advisors, teachers and learners as soon as possible.
- Teach learners to distinguish between similar words like transcription and translation, homologous and homozygous etc.
  - Include application questions in every test.

**(d) Describe any other specific observations relating to responses of learners**

In **question 1.4**, the skulls in the sketches confused the learners. Learners in general are lazy to study diagrams and sketches. Some wrote 100,000 years ago instead of mya. The grid at the beginning of the answer script was confusing to some learners. Although they were clearly instructed to **write their answers in the answer book**, many learners used it and made marking more difficult. From next year, Umalusi is NOT going to allow any answers written on the grid to be marked. This message must be communicated to all schools without fail. This must be written in **bold** with the Instructions on the first page of the question paper.

**(e) Any other comments useful to teachers, subject advisors, teacher development etc.**

All teachers, Subject advisors and training bodies need to highlight to teachers that in **question 1.3** it will no longer be acceptable to say A and B, Both, A/B, A, B etc. They must be as the instructions on the question paper say **"A ONLY, B ONLY, BOTH A AND B or NONE"**. This message must go out to schools as soon as possible. This instruction must be followed through in the internal tests and examinations as well.

**Q 1.1.7** The name **Daphnia** was unfamiliar to most learners and should have been explained in brackets.

**1.4** While teaching this section, teachers must use a map to help learners understand the concept of origin and migration of hominids in Africa and other continents. Teachers must keep up with the latest developments in the scientific arena.

- Field trips and excursions to important sites should be encouraged for learners and teachers



<b>QUESTION 2</b>
<b>(a) General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?</b>
<p>Marks range from <b>0 to 35 out of 40</b>. Bright learners did well but the weak ones did not do well at all! Many scored a zero! It is obvious that the content was not covered well by many schools. Hence, there is a lack of understanding and learners could not interpret questions.</p> <p>In <b>question 2.4.2</b> learners failed to identify the favourable and unfavourable characteristics. Natural selection was thus explained generally instead of applying it to the Bongo scenario. Also in <b>2.4.1</b>, the learners did not understand the word <b>camouflage</b> and hence failed to provide characteristics that will allow the Bongo to blend in with the environment to avoid being seen by the predators. Meaning of this word should have been provided in brackets.</p>
<b>(b) Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.</b>
<p><b>2.1.1</b> Most learners wrote, "because they are the original species" Nobody wrote the second and third points in the memo. These were NOT the response of any average learner and so it was an unfair expectation from the learners and they lost one mark!</p> <p><b>2.2.1</b> Most poorly done among all question 2s! Some learners scored 2 marks and the other 3 marks for explanation were lost for most learners. Majority of learners only compared father and child because mother was NOT mentioned in the question. If the question had given the blood groups of the parents, learners would have answered it much better and scored higher marks. Learners are more familiar with DNA profiling for paternity test than with blood grouping for paternity test.</p> <p><b>2.2.2</b> Genetic cross: majority used B/BO instead of I and i. Meiosis was written in the wrong place. Crossing with I<sup>o</sup> was not accepted and yet it appears in many CAPS approved textbooks. This message has not been communicated to schools although it was acceptable in many previous years.</p> <p><b>2.3.1</b> Many just wrote prophase and not prophase 1 and lost one mark.</p> <p><b>2.3.2</b> Many wrote, "the chromosomes overlap instead of the chromatids overlap.</p> <p><b>2.3.3</b> Only genetic variation was mentioned. Other 3 points in the memo were left out by most learners resulting in the loss of the second mark. Instead, they wrote, "shares genes from both parents." This was not credited but should have been.</p> <p><b>2.3.4</b> Incorrect labels. <b>B instead of b</b>. Label for Y chromatid omitted. Many just drew a shaded diagram. Some drew both chromosomes instead of one chromatid. They did not follow the instructions.</p> <p><b>2.4.1</b> Many gave skin colors as an answer- not linking to colors in the question disregarding information provided.</p>

**2.4.2** Lost marks for not mentioning favorable and unfavorable characteristics and because of NOT applying knowledge of Natural selection in to a given scenario.

**2.5.1** difference and definitions were given instead of similarities.

**2.5.2** No explanation given. Only reasons were given. Learners are not exposed to cause and effect type of questions

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

-Teachers should expose learners to questions on crossing over with allele.

-Learners should be exposed to application type questions on natural selection and geographic speciation not rote learning.

-Learners should prepare a terminology description of evolution and genetics topics

-Learners should be taught how to answer questions in a cause and effect manner.

-Each learner must be given a copy of the examination guidelines from the very first day.

-Train /teach learners to answer according to the mark allocation per question.

**(d)Describe any other specific observations relating to responses of learners**

**2.1.2** Learners had memorized the general answer to speciation and could not adapt to the scenario in question.

**2.3.2** Well answered from the memorized definition.

**2.4.1** Well answered from the information given.

**2.4.2** Teach learners to think outside the box and be able to apply their knowledge into any new situation.

**(e)Any other comments useful to teachers, subject advisors, teacher development etc.**

-Guide teachers and learners to stick to examination guidelines while teaching and assessing.

-Textbooks must be made available in both languages.

-Subject advisors should emphasize the importance of the examination guidelines and CAPS document in lesson preparation.

Teachers must expose learners to higher order questions to develop skills like critical thinking, analysis and evaluation

**QUESTION 3**

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

Learners in many centres performed reasonably well in this question with the highest total for the question at 38 and the lowest at 2 out of 40.



**Q 3.4.1** There was a problem with hypothesis testing. Many learners are not exposed to scientific investigations. Learners cannot interpret what hypothesis testing really is. They are unable to distinguish between hypothesis formulation, aim and conclusion in an investigation.

**3.1.1** Most learners got this right.

**3.1.2** some learners got the first part but lost the second mark for saying "virus spread more easily"

**3.2.1** Answered very well but some learners lost the mark for tabulating. Others did not understand that they needed to differentiate between, for example, the type of sugars found- in both DNA and RNA and so did not match the differences, Some learners mentioned hydrogen bonds, which were not in the memo.

**3.2.2 and 3.2.3** were answered well, although some of their answers were vague in 3.2.3 Markers/teachers needed to read carefully in order to correctly categorise the answers e.g., under human error, etc.

**3.3.1** Well answered by most learners. A few used the recessive allele in (a) -  $X^aY$  most correctly, interpreted the pedigree diagram and got all the marks.

**3.3.2** Most learners got the full marks, but some divided 3 by 12 instead of 7 and so lost both marks. Those learners did not read the question.

**3.3.3** Most learners only got one mark for saying that there is only one X chromosome in males and then they said that Y chromosome is too small to carry alleles / mask the effect of recessive allele because it was included in the diagnostic report 2013, but it was not credited. Learners also used the term affected about chromosomes. They also said the chromosomes carry the disorder thus using the terms incorrectly.

**3.4.1 and 3.4.6** many learners lost the two marks each because they only mentioned one type of chicken and did not compare the two types. Others wrote the aim instead of the hypothesis. They did not relate the hypothesis to the aim and to the dependent variables.

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

Learners do not fully elaborate. They write phrases where explanations are expected. They answer with one word when a sentence is required e.g. Crime instead of investigate crime scene.

It is good to see that some learners have grasped how to formulate a hypothesis.

**3.4.2** Some learners could not read the independent variable from the graph that is, the variable on the x-axis, some wrote time others gave days.

**3.4.3** A lot of learners got it wrong- dividing 2500-500 by 2500, therefore lost two marks.

**3.4.4** Many learners still struggle with differentiating between validity and reliability and so lost both marks.





**3.4.5** many learners just wrote the variances e.g. food, feed, age, environmental conditions etc. without indicating that these need to be the same e.g. Some amount of food, same scale, etc.

**3.4.7** Poorly answered. Many of the learners struggled with this question; some clearly did not read the question because they included increased meat production even though they were supposed to exclude them.

**3.4.8** Most of them only got one marks for 'predators killing them' and lost- the second mark for the first part about the effect of the increased weight. Instead, they mentioned that the chicken would not cope in the wild because they would not be fed anymore.

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

Teachers need to drill learners to read and understand questions and answer accordingly. Subject advisors and teachers need to demonstrate / do practicals with learners /teachers. Various steps in a scientific investigation like planning, data collection, hypothesis, aim, observation, method, result, conclusion, evaluation, etc. need to be taught from Grade 8 to develop all the scientific skills required by CAPS. All schools should have basic practical facilities. Teachers need to expose learners to the practical based questions all the time. Learners must encourage watching the telematics classes broadcasted from certain centres. Some teachers seem to be struggling with the distinction themselves and it is the responsibility of the subject advisor to assist them with this and of course of the teachers concerned to ask for assistance from others. Some teachers struggled to mark a genetic question, a clear and troubling indicator that they do not understand the topic. Question then becomes: how do they teach it to the learners? Subject advisors need to monitor this vigilantly, because learners will be asked questions on the topic and they would not have been exposed to the topic, and that would be a shame.

#### **(d) Describe any other specific observations relating to responses of learners**

Question **3.2.1** was answered well! Even the weak learners got it right!

Question **3.4.4**. Learners got reliability and validity mixed up. Reliability is about repeating the investigation while validity is about variables being manipulated. Some learners wrote only **reliability** instead of writing **more reliability / improved reliability / increased reliability**.

Question **3.3.2 and 3.4.3**. The average and bright learners did well but the weak learners performed poorly in calculations.

#### **(e) Any other comments useful to teachers, subject advisors, teacher development etc.**

Variables in scientific investigations need to be taught, how to identify them and manipulate them to suit the investigations. Provinces and districts must have workshops to train teachers on these. First week of the year should be dedicated to teaching scientific methods to





learners in Grades 10 – 12 so that they can apply it in any relevant topics. This must be included in the pacesetter.

#### QUESTION 4

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

The average performance for the essay was 34%. Many learners got 0 out of 20 in this question! Some learners had a limited grasp of how to answer the essay question. They scored between the range of 8 to 15 marks. Very few of the learners achieved good marks and had a clear indication of their depth of interpretation of this question. They scored in the range of 18 to 20 marks! These centres reflect teaching of excellence.

Poorly performing schools have to somehow be continuously supported by Life sciences subject officials through in-service training for content-lacking educators.

Intense Saturday/Spring/Winter schools tuition of learners from these centres is crucial. Learners performed well in the part of transcription and translation, but struggled with the part on mutation and how it affects protein synthesis. Mutation is a wide topic and learners had difficulty in understanding what information was expected. They deviated from the question and they included chromosomal aberration and genetic disorders. This is because they learned previous years memoranda by heart. Learners should have been credited for giving the definition and examples of mutation in the essay.

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

Protein synthesis is not being taught completely like it is supposed to be.

Learners do not understand and cannot interpret a very basic question. Many learners did not even attempt an answer. Interpretation of phases of this process is lacking in many of our learners. A dire need is that grade 12 learners need to read with understanding. Some learners seemed to have had not enough time to complete this question. Some learners wrote a lot of irrelevant information and lost a mark for relevance. Learners have memorized previous year's memos. They did not read the question and focused their answers on protein synthesis. Instead, they talked about point and frame shift mutations and how it leads to genetic disorders. Teachers must adhere to the examination guidelines. In addition, teach and assess accordingly.

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

Learners attempted to answer this question and fared better in question 4 this year than in previous years. There needs to be a limited number of words (like in an English essay) Split the essay into different topics and subtitles to give the learners direction.



Learners must be taught to expect essay questions on any topic and that an essay topic may consist of various subsections mixed together.
<b>(d) Describe any other specific observations relating to responses of learners</b>
Some learners did not answer the process of protein synthesis separately from the effect of gene mutation. These learners were confused. Mutation interpretation generally was extremely poor. Logical progression of most learner's answers also did not materialize and they lost one mark for logical sequence.
<b>(e) Any other comments useful to teachers, subject advisors, teacher development etc.</b>
-Include essays in tests and examinations from grade 10 to 12. Give learners enough practice and guidance on how to write an essay.
-Teachers should teach in English, though code switching is allowed to make certain ideas/points clearer. Learners must speak English in Life Science classes to be able to express themselves in English.
-Both teachers and learners must cultivate the habit of reading other Life Sciences related topics in English.
-Teachers must set every test/ examination following the same format as the trial and final Grade 12 paper in terms of weighting and cognitive levels using Blooms Taxonomy.
-Teachers must analyze every test / exam paper to see where the weak areas are.
-Draw a Subject improvement plan based on the findings and implements them during the year.

NAME OF THE CHIEF MARKER:

SIGNATURE

DATE

