**EXAMINATIONS AND ASSESSMENT CHIEF DIRECTORATE**
**Home of Examinations and Assessment, Zone 6, Zwelitsha, 5600**
**REPUBLIC OF SOUTH AFRICA, Website: www.ecdoe.gov.za**

# 2025 NSC CHIEF MARKER'S REPORT

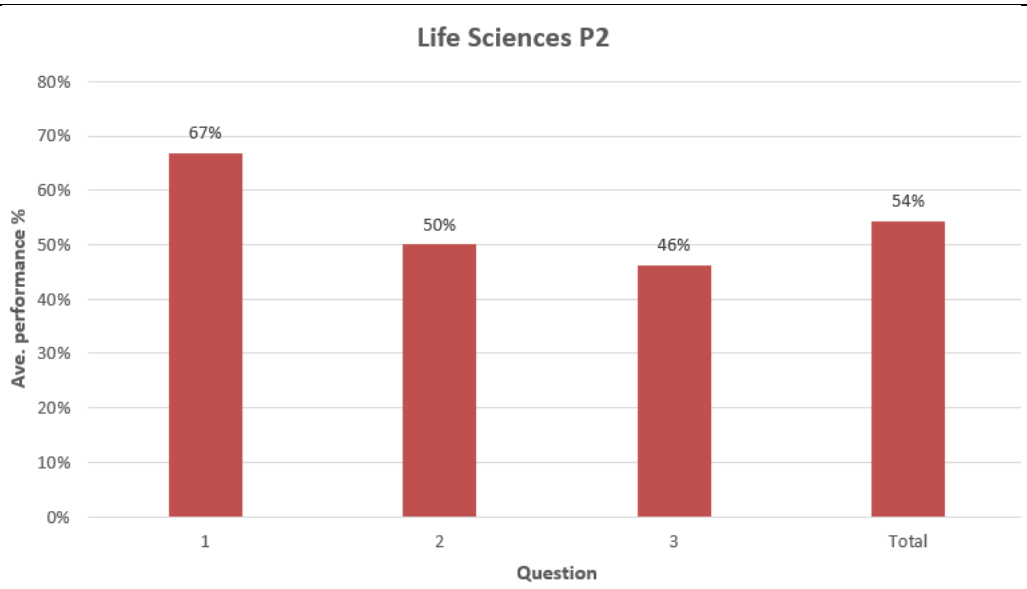
| | | | |
|---|---|---|---|
| **SUBJECT** | **LIFE SCIENCES** | | |
| **QUESTION PAPER** | 1 | 2 x | 3 |
| **DURATION OF QUESTION PAPER** | **2 ½ HOURS** | | |
| **PROVINCE** | **EASTERN CAPE** | | |
| **NAME OF THE INTERNAL MODERATOR** | SANDA ZIMASA | | |
| **NAME OF THE CHIEF MARKER** | **DLAMINI PHUMZILE** | | |
| **DATES OF MARKING** | **28/11/25 – 13/12/25** | | |
| **HEAD OF EXAMINATION:** | **MR E.M. MABONA** | | |

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

The overall performance of candidates was evaluated using a sample of 100 scripts drawn from the 12 districts in the province. To ensure broad representation, only one script was sampled per centre, covering low, mediocre, and high levels of achievement.
Distribution of sampled scripts:

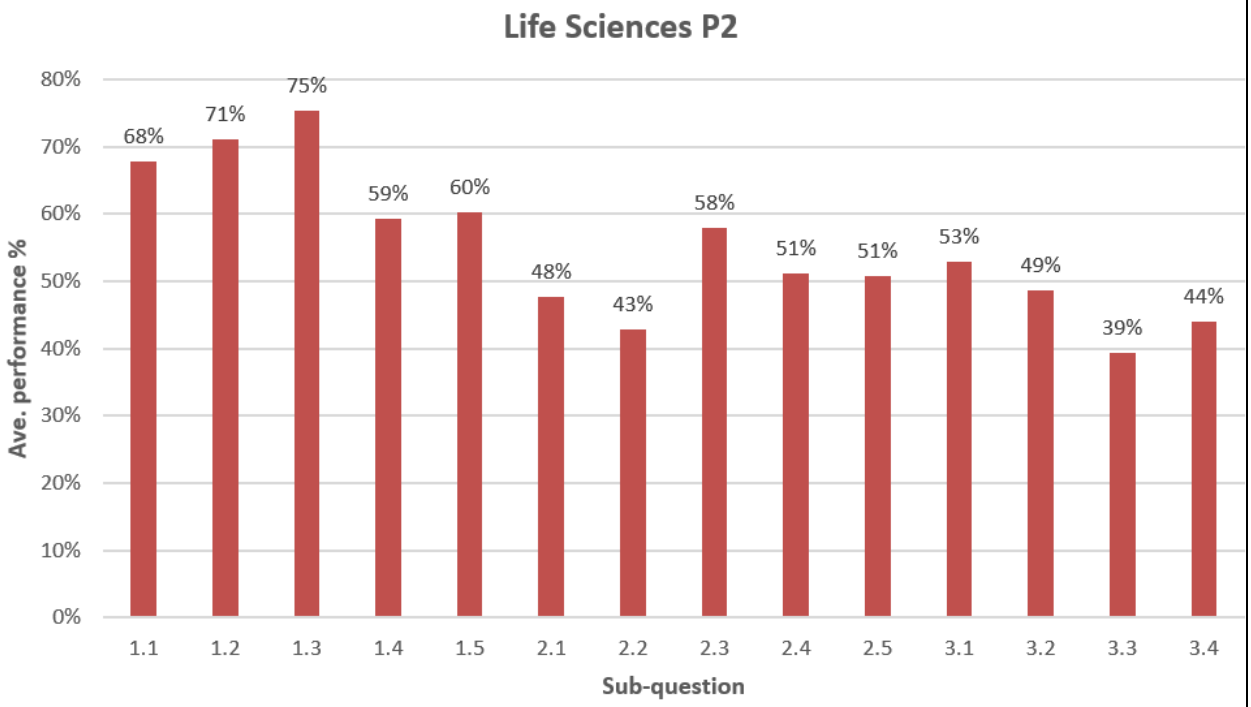
- Low Performance (Level 1–2; 0–59 marks): 36 scripts
- Mediocre Performance (Level 3–5; 60–104 marks): 40 scripts
- High Performance (Level 6–7; 105–150 marks): 24 scripts

The graph below depicts the average performance of the candidates per question and average performance in the paper as a whole.




The analysis revealed a slight decline in overall average performance, with a 1% decrease compared to 2024. Candidates performed best in Question 1, achieving an average of 67%, which translates to a 4% improvement in this question when compared to performance in 2024. Performance in Question 2 declined by 7% compared to the previous year. Although Question 3 was the weakest question with an average of 46%, there was a 2% improvement in this question compared to 2024. Question 3 focused entirely on evolution (50 marks).Given that evolution accounts for 54 marks in Paper 2 and is taught in the third term, it is likely that limited time for revision contributed to weaker outcomes in this section.

Performance by Sub-Question




Analysis of sub-questions shows that candidates achieved their highest average in Question 1 with Q1.2 and Q1.3 being the best performed sub-questions at 71% and 75% respectively.

The candidates also performed fairly well in the following questions:

- Question 1.1 (68%) Multiple choice questions from various topics
- Question 1.5 (60%) based on the translation stage of protein synthesis.

The most poorly answered questions with the candidates achieving below 50% were:

- Question 3.3 (39%) based on biogeography and reproductive isolation mechanisms
- Question 2.2 (43%) on DNA profiling and its application on solving crimes and paternity testing
- Question 3.4 (44%) based on scientific investigation on starvation resistance and application of natural selection
- Question 2.1 (48%) based meiosis and non-disjunction on sex chromosomes
- Question 3.2 (49%) based on human evolution

**SECTION 2: Comment on candidates' performance in individual questions**

**Section A QUESTION 1**

| **QUESTION 1** |
| --- |
| **General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?** |
| Candidates performed much better in Question 1 than in Question 2 and Question 3. Quite a number of candidates from the moderated scripts achieved full marks in Question 1 i.e. 50 marks. There was a 9% improvement in Question 1.2 (Terminology) and 18% improvement in Question 1.3 compared to 2024.<br>Question 1.1 Multiple Choice Questions<br>The average performance was 68%<br>Poorly answered questions:<br>- Question 1.1.7 (36%) based on identification of nitrogenous bases on a DNA molecule<br>- Question 1.1.9 (49%) based on estimating the number of possible genotypes on a dihybrid cross<br>- Question 1.10 (34%) based on application of sex-linked inheritance<br>Question 1.4 Comparison of Mitosis and Meiosis<br>Poorly answered questions:<br>- Question 1.4.2 (59%) based on identifying the phase of Meiosis represent by the diagrams given<br>- Question 1.4.3 (a) (22%) based on determining the number of chromosomes at the end of Mitosis<br>- Question 1.4.3 (b) (31%) based on determining the number of chromosomes at the end of Meiosis<br>- Question 1.5.2 (b) (56%) based on stating the sequence of nitrogenous bases on the DNA based on the mRNA codon |

**QUESTION 2**

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

- Question 1.1.7: Many candidates struggled to provide the correct combination of nitrogenous bases for molecules 2 and 3. The task required them to use the template strand with the given bases to determine the complementary strand, which proved confusing for a significant number of learners.
- Question 1.1.9: A number of candidates were unable to determine the possible genotypes in a given dihybrid cross.
- Question 1.10: Learners were required to apply their knowledge of sex-linked inheritance to a disorder caused by a dominant allele. This was challenging, as most candidates are more familiar with examples involving recessive sex-linked disorders.
- Question 1.2: Generally well answered, but spelling errors remain problematic:
    - *Q1.2.1:* "Peptide bond" was misspelt as *peptile* or *peptine*, resulting in lost marks.
    - *Q1.2.2:* Candidates confused mitochondria with mitochondrial DNA.
    - *Q1.2.4:* Some wrote "stem cell research" instead of "stem cells." Since stem cell research refers to scientific study and experimentation, it could not be credited.
    - *Q1.2.5:* Incorrect terms such as "helix" or "double stranded" were used instead of "double helix."
    - *Q1.2.6* A few candidates wrote extant for extinction and lost a mark as extant means a group which has survived to the present day i.e. still in existence, which is the opposite of extinction.
    - *Q1.2.9* "Locus" was misspelt as *locust or Lucas* resulting in lost marks
- Question 1.4.1:
    - *(b)* Spelling errors persisted with "spindle fibres," written as *springle fibres*, *sprindle fibre*, or *spring fibres*.
    - *(c)* Confusion between the *centrosome* and *centromere* was evident.
- Question 1.4.2 (a): Many candidates wrote "W/Y" instead of a single letter. The principle of marking the first answer was applied when multiple letters were provided.
- Question 1.4.3 (a) & (b): Most candidates assumed the cell referred to was human, giving incorrect answers of 46 and 23 respectively.
- Question 1.5.1 (a): Translation and transcription were still confused by some candidates.
- Question 1.5.2 (b): Very few candidates answered correctly. This question required learners to work backwards—first determining the tRNA anticodon complementary to codon number 4, then deducing the DNA triplet complementary to that codon. The complexity justified the allocation of two marks.

**QUESTION 3**

**Provide suggestions for improvement in relation to Teaching and Learning.**

Nitrogenous Base Pairing

- Use hands-on models (DNA base-pairing cards or beads) to reinforce complementary strand construction.
- Incorporate step-by-step exercises where learners practice moving from template strand → complementary strand → mRNA.
- Emphasize rules of base pairing (A–T, C–G) through repeated drills and visual aids.
- Provide error analysis activities where learners identify and correct incorrect pairings

Dihybrid Cross Genotypes

- Teach dihybrid crosses using Punnett square scaffolding, starting with monohybrid crosses before progressing.
- Use colour-coded grids to show genotype combinations clearly.
- Reinforce the difference between genotype vs phenotype with multiple examples.
- Provide practice problems with increasing complexity, including guided peer marking to highlight common mistakes.

Sex-linked Inheritance (Dominant Allele)

- Introduce varied examples of sex-linked disorders, including both dominant and recessive cases.
- Use comparative tables to contrast dominant vs recessive inheritance patterns.
- Incorporate case studies or real-world examples (e.g., genetic conditions) to contextualize learning.
- Encourage learners to draw family pedigrees to visualise inheritance patterns.

Terminology and Spelling

- Spelling drills for key biological terms (peptide bond, double helix, locus, extinction).
- Use word walls or glossaries in classrooms for reinforcement.
- Encourage learners to create flashcards with definitions and correct spelling.
- Differentiate between similar terms (mitochondria vs mitochondrial DNA, stem cells vs stem cell research, centrosome vs centromere) using comparison charts.
- Provide mnemonics (e.g., "double helix = two spirals") to aid recall.

Spindle Fibres & Centrosome vs Centromere

- Use microscope images or animations to show spindle fibres during cell division.
- Reinforce spelling through dictation exercises and peer correction.
- Teach visual differentiation between centrosome and centromere using labelled diagrams.

Multiple Answers

- Train learners on exam technique: "Write only one answer unless asked for more."
- Practice short-answer drills where learners must give concise, single responses.

Chromosome Numbers

- Teach learners to identify the organism context before answering.
- Use comparative charts of chromosome numbers across species.
- Reinforce that not all questions refer to humans - practice with plant and animal examples.

Translation vs Transcription

- Use flow diagrams to show the sequence: DNA → mRNA (transcription) → protein (translation).
- Incorporate role-play activities where learners act as DNA, RNA, and ribosomes to simulate the processes.
- Provide practice questions that explicitly contrast transcription and translation

Working Backwards with Codons

- Scaffold problem-solving by teaching learners to move step-by-step backwards from codon → anticodon → DNA triplet.
- Use guided worksheets with partially completed examples to build confidence.
- Reinforce the importance of complementary base-pairing rules in both forward and backward exercises.
- Provide extra practice with multi-step genetics problems to strengthen reasoning skills.

**QUESTION 4**

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

1. Conceptual Understanding

- Learners often rely on memorisation rather than conceptual application. For example, in genetics questions (Q1.1.9, Q1.10, Q1.5.2), many struggled when asked to apply knowledge in unfamiliar contexts.
- Comment to Teachers: Incorporate more problem-solving and scenario-based exercises in class to strengthen conceptual transfer.
- Comment to Subject Advisors: Provide exemplar questions that require learners to apply knowledge beyond standard textbook examples.
- Comment to Teacher Development: Workshops should emphasise teaching strategies that move learners from rote learning to deeper understanding.

2. Terminology and Spelling

- Persistent spelling errors (e.g., peptide bond, spindle fibres, locus) caused learners to lose marks despite knowing the concepts.
- Comment to Teachers: Reinforce scientific vocabulary through spelling drills, glossaries, and peer correction activities.

- Comment to Subject Advisors: Encourage schools to adopt structured terminology lists and integrate spelling into assessments.
- Comment to Teacher Development: Training should highlight the importance of scientific literacy and strategies for supporting second-language learners.

3. Exam Technique

- Learners struggled with answering concisely (e.g., writing "W/Y" instead of one letter in Q1.4.2).
- Some assumed human context when not specified (Q1.4.3), showing a lack of careful reading.
- Comment to Teachers: Train learners in exam technique - reading instructions carefully, underlining key words, and checking context before answering.
- Comment to Subject Advisors: Provide diagnostic feedback to schools on common exam technique errors.
- Comment to Teacher Development: Include exam literacy as a focus area in professional development programmes.

5. Application of Scientific Skills

- Questions requiring backward reasoning (Q1.5.2) were particularly challenging.
- Learners struggled to link processes logically, e.g., codon → anticodon → DNA triplet.
- Comment to Teachers: Scaffold multi-step problem-solving exercises and provide guided practice.
- Comment to Subject Advisors: Share exemplar investigations and structured worksheets with schools.
- Comment to Teacher Development: Focus on teaching strategies for scaffolding complex reasoning tasks.

**SECTION B QUESTION 2**

| **QUESTION 1** |
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| **General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?** |
| The average candidate performance in Question 2 has declined by 7% when compared with performance in 2024. The highest mark obtained was 50/50 and the lowest mark was 1/50. Strong candidates found the question easy while the weaker learners struggled with explanation and application questions. The average performance in all sub-questions was below 60% with Q2.1 and Q2.2 being the most poorly performed sub-question at 48% and 43% respectively. Most of the candidates did very poorly in question 2.1.6 attaining an average of 0.06/3 marks i.e. 2% average. |

**QUESTION 2**

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

Learners struggled with questions that needed explanations and the application questions.

Question 2.1 – Meiosis and Chromosome Behaviour

- 2.1.4 (c): Learners confused the *process* of crossing over with its *importance*. Many wrote "it causes variation" or "exchange of genetic material" without explaining the mechanism.
- 2.1.5: Candidates often confused "single chromosome" with "single-stranded chromosome." While most identified homologous chromosome separation, they failed to explain how chromatids were formed.
- 2.1.6: This was the most poorly answered question with many candidates losing 3 marks. Many described non-disjunction leading to Down Syndrome, missing that the question focused on *sex chromosomes*. They referred to "extra chromosomes" but did not specify that the zygote will have an extra gonosome. Those candidates who scored a mark in this question got it for the first bullet of the answer, but failed to give an explanation, therefore losing 2 marks

Question 2.2 – DNA Profiling

- 2.2.3: Learners referred to using a DNA sample instead of DNA bands/bars. Others simply wrote "bands matched" without explaining the degree of similarity.
- 2.2.4: Some wrote "twin" without specifying type, showing limited understanding. Incorrect responses included "victim's bars match Suspect 1" or "suspect may be the victim."
- 2.2.5: While many answered correctly, errors included comparing *samples* instead of *DNA profiles*. Some excluded the mother when explaining inheritance, losing all marks. One learner incorrectly wrote about general uses of DNA profiling (e.g., identifying dead persons).
- 2.2.3: Learners referred to the *sample* instead of DNA bands/bars. Others simply wrote "bands matched" without explaining the degree of similarity.
- 2.2.4: Some wrote "twin" without specifying type of twin, showing limited understanding. Incorrect responses included "victim's bars match Suspect 1" or "suspect may be the victim."
- 2.2.5: While many answered correctly, errors included comparing *samples* instead of *DNA profiles*. Some excluded the mother when explaining inheritance, losing all marks. One learner incorrectly wrote about general uses of DNA profiling (e.g., identifying dead persons).

Question 2.3 – Pedigree and Genetic Disorders

- 2.3.1: Spelling errors such as *peditree* cost marks.
- 2.3.3: Few learners correctly identified the genotype of individual 5. Instead, they gave incorrect male genotypes such as $X^dX^d$ or $X^DY$ or $X^HXh$
- 2.3.4: Most lost marks by repeating that parents were heterozygous and CADASIL was

caused by dominant allele and incorrectly using child 7 to justify dominance. Others confused CADASIL with sex-linked disorders, referring to X chromosomes.

- 2.3.5: Some gave incorrect percentages (98%, 100%, 75%) instead of the expected probability.

Question 2.4 – Blood Groups

- 2.4.1: Incorrect answers included A, AB, or ethnic group labels.
- 2.4.2: Wrong notations of genotypes such as $i^Bi$, $iBi^O$, $i^Bi^B$ were common.
- 2.4.3: Most answered correctly, showing calculations which they used to get to their answer
- 2.4.4: Poorly answered overall. Learners confused co-dominance with blood groups rather than alleles or referred to children inheriting blood groups instead of alleles. Even those who lost marks often wrote $I^AI^B$ correctly.

Question 2.5 – Incomplete Dominance

- 2.5.1 & 2.5.2: Many confused incomplete dominance with co-dominance. Some described the general meaning of incomplete dominance without mentioning specific alleles for the given characteristic therefore losing marks. Others did not describe the intermediate phenotype as the golden coloured coat.
- 2.5.3 (a): Incorrect answers included cloning, biotechnology, genetic modification, fossil record, or monohybrid cross.
- 2.5.3 (b): Errors included writing "cream x cream," "yellow and white," or including "homozygous/pure breed" in phenotype descriptions.
- 2.5.4: While most completed the genetic cross correctly, many lost marks on the ratio. Errors included unsimplified ratios (2:2), incorrect ratios (1:1:1:1 or 4:4), or omission of the ratio. Some mislabelled P1 and F1/F2 generations or wrote "fusion" instead of fertilisation

**QUESTION 3**

**Provide suggestions for improvement in relation to Teaching and Learning.**

Crossing Over and Chromosome Behaviour (Q2.1.4–2.1.6)

- Improvement Strategies:
    - Use step-by-step diagrams and animations to show crossing over, emphasising process vs importance.
    - Reinforce correct terminology (chromosome vs chromatid; single vs double-stranded) through terminology drills.
    - Expose learners to different examples of non-disjunction (sex chromosome abnormalities like Turner's or Klinefelter's) to broaden understanding.

2. DNA Profiling (Q2.2)

- Improvement Strategies:
    - Use case studies (crime scene investigations, paternity tests) to show how DNA profiles are interpreted.

- Train learners to describe patterns precisely (e.g., "50% of child's bands match mother, 50% match father").
- Provide structured practice worksheets comparing DNA bands with guided explanations.

3. Pedigree Analysis and Genetic Disorders (Q2.3)

- Improvement Strategies:
  - Use pedigree chart exercises with varied disorders (dominant, recessive, sex-linked) to highlight differences.
  - Reinforce spelling of key terms through glossary work and peer correction.
  - Encourage learners to annotate pedigrees step-by-step, identifying genotypes before drawing conclusions.

Blood Groups and Co-Dominance (Q2.4)

- Error: Learners confused blood groups with alleles; misapplied co-dominance; wrote incorrect genotypes.
- Improvement Strategies:
  - Use blood group simulations (cards labelled $I^A$, $I^B$, i) to model inheritance.
  - Teach co-dominance explicitly with allele-focused examples (IAIB) rather than blood group names alone.
  - Provide practice problems with genotype-to-phenotype conversions.

Incomplete Dominance vs Co-Dominance (Q2.5)

- Improvement Strategies:
  - Use visual examples (snapdragon flower colours, coat colour in animals) to distinguish incomplete vs co-dominance.
  - Scaffold genetic crosses: start with monohybrid crosses, then progress to incomplete dominance examples.
  - Reinforce ratio calculation skills through step-by-step practice and peer marking.
  - Encourage learners to label generations correctly (P1, F1, F2) and use fertilisation terminology accurately.

**QUESTION 4**

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

Answering Style and Depth

- Many learners gave short, vague responses (e.g., "bands matched" or "variation occurs") without elaborating on the underlying processes.
- This suggests a tendency to rely on memorised phrases rather than demonstrating deeper understanding.
- Teachers should encourage learners to use full scientific statements and explain reasoning, not just keywords.

Data Handling and Ratios

- Many learners miscalculated or omitted ratios in genetic crosses,

- This highlights weaknesses in quantitative reasoning and data interpretation.
- Teachers should regularly integrate into their lessons activities that assess graph analysis, ratio calculation, and different calculations to be asked in Life Sciences as outlined in the 2023 diagnostic report.

Teacher Development Implications

- Teachers need support in designing assessments that mirror exam expectations (cognitive levels, application questions, scientific investigations).
- Subject advisors should provide diagnostic feedback loops—sharing common learner errors across districts to guide targeted interventions.
- Professional development should prioritise conceptual clarity in genetics, inheritance, and molecular biology, areas where learners consistently struggle.

**SECTION B QUESTION 3**

| **QUESTION 3** |
|---|
| **General comment on the performance of learners in the specific question. Was the question well answered or poorly answered?** |
| This was the most poorly answered question with an average of 46% based on the 100 sampled scrips. The learner performance varied from very high marks above 40 and even 50 marks to very low marks below 10 marks. |

| **Why was the question poorly answered? Also provide specific examples, indicate common errors committed by learners in this question, and any misconceptions.** |
|---|
| Q3.1 was the best-performing sub-question, with an average score of 53%.<br>• 3.1.1: Some candidates wrote only *binocular* instead of *binocular vision*, losing a mark as the full characteristic was required.<br>• 3.1.2: Generally well answered, though misconceptions such as "gaps between the jaws" were noted.<br>• 3.1.3: While most candidates correctly listed features of bipedalism, many struggled to explain their significance. For example, they incorrectly linked both the foramen magnum and the S-shaped spine solely to upright posture. In addition, explanations of the short, wide pelvis often omitted reference to support for the upper body.<br><br>Q3.2 showed mixed performance:<br>• 3.2.1 & 3.2.2: Well answered overall, but some candidates incorrectly wrote *Miss Ples* instead of *Mrs Ples*.<br>• 3.2.3: Mostly well answered, as the response was directly available from the table.<br>• 3.2.4: Poorly answered by many. Errors included incorrect numerator/denominator values, unnecessary multiplication by 100%, and failure to round off to two decimal places. Some candidates used the formula for percentage decrease, scoring only partial marks.<br>• 3.2.5: Weakly answered. Many referred to the skull instead of the cranium, failing to link cranial capacity to brain volume. |

- 3.2.6: Attempted by most learners, but many simply referred to "intelligence" without explaining that increased brain volume results in greater intelligence

Q3.3 highlighted issues with definitions and application:

- 3.3.1 (a): Well answered, but some wrote "same" instead of "similar," losing a mark.
- 3.3.1 (b): Most candidates gave the first part of the answer but omitted the second (i.e., organisms cannot interbreed).
- 3.3.1 (c): Generally correct, though some repeated "breeding at different times of the year," which was already provided, resulting in lost marks.
- 3.3.2: Mostly well answered, but some incorrectly gave "speciation" instead of "biogeography."
- 3.3.3: Many described speciation and scored up to 4 marks, but most omitted reference to a common ancestor. Some incorrectly identified the geographical barrier as "sea" or "ocean," which was not credited. Candidates needed to specify the event that split the common ancestor of ratites.

Q3.4 revealed difficulties with scientific investigation skills:

- 3.4.1: Many correctly identified the independent variable, but some incorrectly wrote "effect of food availability," which referred to the dependent variable (starvation resistance).
- 3.4.2: Poorly answered. Many wrote only "time taken for flies to die," omitting "80% of the flies" and "die from starvation."
- 3.4.3: Mostly well answered.
- 3.4.4: Some candidates confused validity with reliability, writing both terms. Many failed to explain why the investigation was valid, instead repeating the aim, which earned no marks.
- 3.4.5: Most candidates provided acceptable descriptions of results, with Marking Principle 16 applied to accommodate variations. However, some gave conclusions instead of descriptions, losing 2 marks.
- 3.4.6: Fairly well answered. Variations in language were accepted under Principle 16. However, candidates lost marks for stating that "the gene for starvation resistance was passed," which is incorrect since a gene can carry both favourable and unfavorable alleles. Others incorrectly claimed that all individuals in the next generation would inherit starvation resistance.

**QUESTION 4**

**Provide suggestions for improvement in relation to Teaching and Learning.**

**Q3.1 – Human Evolutionary Features**

- Teaching Strategies:
    - Reinforce complete terminology (e.g., binocular vision, not just binocular).
    - Use comparative diagrams of primate vs human skulls and spines to show structural differences.
    - Scaffold explanations: teach learners to link *feature → function → significance*
    - Practice short written exercises where learners must explain *why* a feature is significant, not just list it.

Q3.2 – Fossils and Cranial Capacity

- Teaching Strategies:
    - Use flashcards or timelines of key fossils with correct names and significance.
    - Provide step-by-step practice in percentage calculations, emphasising rounding rules.
    - Clarify anatomical terms with 3D models or labelled diagrams (skull vs cranium).
    - Encourage learners to explain cause-and-effect relationships (larger cranial capacity → increased intelligence).

**Q3.3 – Species Concepts and Speciation**

- Teaching Strategies:
    - Teach precise definitions using glossaries and peer correction.
    - Use role-play or case studies to illustrate species concepts (fertile offspring, reproductive isolation).
    - Provide map-based activities to distinguish biogeography from speciation.
    - Reinforce the importance of common ancestry in evolutionary explanations through phylogenetic trees**.**

Q3.4 – Scientific Investigations

- Teaching Strategies:
    - Use investigation templates where learners must identify variables, controls, and outcomes.
    - Train learners to read instructions carefully and include all required details (numerator, denominator, rounding).
    - Teach the difference between validity (measuring what is intended) and reliability (consistency of results) using everyday examples.
    - Practice distinguishing between results vs conclusions with sample investigations.
    - Reinforce genetics concepts: alleles vs genes, inheritance patterns, and variation in populations.

| QUESTION 4 |
| --- |
| **Describe any other specific observations relating to responses of learners and comments that are useful to teachers, subject advisors, teacher development etc.** |
| Learners are progressing but continue to struggle with terminology, exam technique, application in unfamiliar contexts, and data interpretation. Teachers should focus on scientific literacy, scaffolding complex reasoning, and exam skills, while subject advisors should reinforce these areas through resource sharing, diagnostic feedback, and targeted workshops. |