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MINISTER'S MESSAGE

The Class of 2018 sat for the National Senior Certificate (NSC) examinations in a year that the world united in celebrating the 100th anniversary of the birth of the icon, Nelson Rolihlahla Mandela. In his State of the Nation Address, the President of the Republic of South Africa, the honourable Cyril Matamela Ramaphosa acknowledged that in 'celebrating the centenary of Nelson Mandela we are not merely honouring the past, we are building the future'. The founding father of democracy in South Africa believed that 'education is the most powerful weapon which you can use to change the world' and that 'education is the great engine of development'. The centenary celebration of the birth of a profound struggle hero and global citizen, who left an indelible mark on shaping the freedom we enjoy today, is coated with a layer of gold by a 3% increase in the NSC pass rate from 75.1% in 2017 to 78.2% in 2018. I am pleased to release the 2018 *National Diagnostic Report on Learner Performance*. This report is in its eighth year of publication and serves as a comprehensive analysis of candidates' performance in the NSC examinations.

This Diagnostic Report provides teachers, subject advisors, curriculum planners and social partners with insight into learners' performance in the ten (10) key subjects, English First Additional Language and the twelve (12) official home languages currently offered in the NSC examinations. The Department of Basic Education (DBE) is offering a detailed analysis of learners' performance in each of the official home languages for the second time. In 2018, the first cohort of candidates sat for the NSC examination in South African Sign Language Home Language and this diagnostic report focuses on key observations in learner performance in this new subject. The diagnostic report is presented in two parts. Part 1 comprises the diagnostic reports of the 10 key subjects and Part 2 contains the diagnostic reports for English First Additional Language and the 12 home languages.

The pivotal purpose of the diagnostic report is to serve as a catalyst to improve the quality of teaching and learning through reflection and remediation at all levels of the system. The data and accompanying analyses that were prepared post the taking of the 2018 NSC examinations, have been used to identify strengths and weaknesses in candidates' knowledge and skills.

In the 2018 report a detailed per-question analysis of learners' responses is given for each of the 10 high-enrolment subjects: Accounting, Agricultural Sciences, Business Studies, Economics, Geography, History, Life Sciences, Mathematics, Mathematical Literacy and Physical Sciences. In Part 2 of this publication, a detailed per-question analysis of learners' responses is given for English First Additional Language and a detailed qualitative analysis of learners' responses to questions is given for each of the home languages.

Analyses conducted show the weaknesses in learners' responses in the different subjects. An analysis of the misconceptions or error patterns uncovered in the learners' responses can inform instructional practice. In response to weaknesses identified, the report further suggests remedial measures that should be adopted at school level, allowing teachers to identify the problem areas hindering effective teaching and learning, identifying the knowledge gaps and refining teaching strategies accordingly and considering information or approaches that can be integrated into teaching reform and academic improvement plans in the new academic year.

Teachers are encouraged to conduct and integrate the diagnostic analysis into their everyday teaching and assessment, so that the performance of learners in classroom-based tests and designated school-based assessment tasks are also analysed and the outcomes utilised to inform remediation.

In conjunction with the *National Diagnostic Report on Learner Performance*, the DBE will – through targeted interventions – continue to capacitate teachers to develop responsive and appropriate instructional programmes that will successfully address the areas of weakness identified in this report. I am confident that through this Diagnostic Report and the myriad of other interventions implemented in the system, there will be a positive impact on learner performance in 2019.

MRS AM MOTSHEKGA, MP
MINISTER OF BASIC EDUCATION

3 JANUARY 2019

CHAPTER 1

1.1 INTRODUCTION, SCOPE AND PURPOSE

The 2018 Diagnostic Report serves as a teaching and learning resource tool in the 10 high-enrolment subjects, namely English First Additional Language and the 12 official home languages. This is the fifth year that the NSC examinations are based on the *CAPS*. In 2018, South African Sign Language Home Language was introduced as an examinable subject and the first diagnostic report for the subject focuses on key observations in learner performance. It is essential that the 2018 diagnostic report should be used in conjunction with the 2014 to 2018 diagnostic reports for the 10 key subjects and English First Additional Language, and the 2017 diagnostic reports for Home Languages.

Once again, this report presents an evaluation of learner performance in the selected subjects and home languages by highlighting the areas of weakness in each of the subjects and articulating the remedial measures to be adopted at school level to improve performance in these subjects. The findings and recommendations are based on qualitative data that are drawn from the subject reports compiled by the chief markers, internal moderators and subject specialists post the marking process. In the 10 key subjects and English First Additional Language, quantitative data was also gathered from the analysis of 100 scripts per paper, per subject, randomly selected from each province.

As a result this *National Diagnostic Report on Learner Performance* provides teachers, subject advisors, curriculum planners and curriculum implementers with a picture of learner performance in each of the key subjects. The Diagnostic Report in each subject commences by presenting comparative data on the performance trends observed over a five-year period in the subject. In the 10 key subjects and English First Additional Language, it also provides an overall performance of candidates per question, per question paper, in each subject. Common errors, misinterpretations and misconceptions identified during marking and suggestions for improvement are also provided. The poor quality of answers provided by some candidates in certain subjects continues to suggest gaps in the scope of content coverage, teaching methodology and the content knowledge of some teachers.

Attempts have been made to track progress made in the subject and in content areas which were highlighted as problematic in previous years. Progress, or lack thereof, in the areas mentioned should determine the extent to which further interventions are necessary in 2019. This also suggests that continued reference to previous diagnostic reports is essential since the areas of weakness identified in previous years may still be applicable in certain cases. It is these recurrent areas of weakness that must become the baseline for intervention by subject advisory services in the new academic year.

It is envisaged that subject-based diagnostic analysis will be institutionalised within the pedagogical practice, not only at national level, but also at provincial, district and school levels. It is hoped that the diagnostic report will be seen as a key resource that will be utilised effectively by every Grade 12 teacher and subject advisor in 2019. Subject advisors are encouraged to mediate this key resource in their workshops with teachers in the new academic year.

The DBE and provincial education departments (PEDs) will monitor the distribution and utilisation of this report as well as feedback from teachers and subject advisors on the usefulness of these reports. Recommendations on how they could be improved will be solicited from all stakeholders.

1.2 METHODOLOGY

In the 10 high-enrolment subjects and English First Additional Language, 100 scripts per question paper were randomly selected from each province during the marking. These scripts included samples of low, medium and high achievement scores.

The internal moderators and chief markers analysed and noted learners' responses to each question. This entailed recording the marks obtained by learners from the 100 scripts on a per-question basis. The individual scripts were scrutinised to provide an in-depth understanding of the range of different responses and to note the strengths and weaknesses. Particular attention was given to common errors and misconceptions identified in the learners' responses.

Based on the analyses, a detailed explanation is provided per question/subquestion under the following three main headings:

Section 1: Performance Trends (2014–2018)

A comparative analysis is presented in this section of learner performance over the last five years in terms of the number of learners who wrote, the number and percentage of learners who achieved at 30% and above, and the number and percentage of learners who achieved at 40% and above. The information is represented by tables and graphs to enable easier interpretation of any trends, especially on changes over the medium term, as well as changes from year to year.

Performance distribution curves are also provided to present the distribution of learner scores in the last three examinations graphically. Any improvement or decline in the performance can be observed from the position of the 2018 graph, relative to previous years. If the 2018 graph slants to the right of the two previous graphs it suggests an improvement in performance, while a slant to the left indicates a decline in performance.

Section 2: Overview of Learner Performance

This section summarises the performance of learners in the question paper as a whole. It refers to generic areas of good performance or weakness and the possible reasons for these observations.

Section 3: Diagnostic Question Analysis

This includes the following:

- A graphical representation of the average percentage marks obtained per question;

- An analysis of the performance of learners in each specific question, stating whether the question was well answered or poorly answered (and the reason);

- Common errors and misconceptions that were identified in candidates' responses; and

- Suggestions for improvement in relation to teaching and learning, content and methodology, subject advisory support and provision and utilisation of LTSM.

- The reports from all nine provinces for each question paper, for each subject, were consolidated and the findings are summarised in this report. It is recommended that this report be read in conjunction with the November 2018 NSC question papers since particular references are made to specific questions in the respective question paper, in each subject. This will enable teachers to establish a baseline for the new cohort of Grade 12 learners in 2019; develop strategies for differentiated learning and provide a frame of reference for the development and design of school-based assessment during the course of the year.

1.3 LIMITATIONS

The diagnostic analysis of learner performance in this publication is only limited to the 10 subjects with high Grade 12 enrolments, English First Additional Language and the 12 official home languages. The remaining subjects will be covered in reports compiled by the provincial chief markers and internal moderators during the marking process. The DBE will endeavour to broaden the scope of the subject coverage in future.

The focus of this report is more qualitative than quantitative. The quantitative aspects are limited to the performance trends in each subject and the average performance per question in the 2018 examination papers. While further quantitative data would have been useful in providing feedback for the purpose of test development, this is not the intention of this report.

This report therefore provides a national summary of the areas of weakness. District specialists should not only refer to the provincial report, but must be encouraged to develop a district diagnostic report. Ultimately, there should also be a school diagnostic report, which focuses specifically on the areas of weakness at school level.

1.4 GENERAL FINDINGS AND AREAS OF CONCERN

The 2018 diagnostic reports for the 10 key subjects covered in this publication (Part 1), indicate that the pass rate has improved in five (5) of these subjects (Accounting, Economics, History, Mathematics and Physical Sciences) at the 30% and 40% levels. In Life Sciences, the pass rate has increased at the 30% level and in Agricultural Sciences and Mathematical Literacy, the pass rate has increased at the 40% level. However, the pass rate has declined to varying degrees at the 30% level in Agricultural Sciences, Business Studies and Geography. In the home languages (Part 2) the pass rate has improved at the 40% level in Afrikaans, IsiNdebele, Siswati and Tshivenda; remained the same in two home languages (Sesotho and Sepedi) and declined to varying degrees in five home languages (English, IsiXhosa, IsiZulu, Setswana and Xitsonga).

Five years after the implementation of the *Curriculum and Assessment Policy Statement (CAPS)* in Grade 12 the standard and quality of the NSC examinations, based on the *CAPS*, is considered to be stabilising. In most subjects there was an improvement in the quality of the learners' responses in the 2018 NSC examinations. Moreover, it is imperative that we reflect on, and learn from, the performance of candidates of the 2018 NSC examinations.

The following areas of concern were identified in past diagnostic reports and they are, once again, highlighted as concerns in the 2018 NSC examinations:

- In 2017, new prescribed literature was introduced in the home languages and in 2018 it was evident during the marking of learners' scripts that many candidates still do not have a solid understanding of the themes, plot, motifs, characters and literary devices. In most home languages the vast majority of candidates either misinterpreted or gave limited responses to higher-order questions. There is therefore a need to enhance thinking in an abstract context.

- In new subjects, such as SASL HL, Technical Sciences, Technical Mathematics and the technologies, candidates' responses indicated that more effort needs to be invested to ensure that the class of 2019 has a firm understanding of new topics.

- It was further noted that in a number of schools the quality of learners' responses has improved. However, it is a cause for concern that in many schools learners had a mediocre understanding of subject matter and this translated into poor quality responses and misconceptions. This diagnostic report is geared towards addressing these concerns.

- However, in 2018 it was once again evident that candidates performed well in questions that required lower-order thinking skills and performed poorly in questions that demanded analytical, evaluative and problem-solving skills. In view of this, teachers are encouraged to expose learners to a wide array of exercises that also include questions that assess higher-order thinking skills.

- In addition to the above, it was also observed that in subjects that require the use of mathematical and calculation skills, candidates were severely disadvantaged by their lack of these cardinal skills.

- In most subjects, there was a lack of understanding and ability to apply subject terminology. Generally, poor language and poor reading skills have been illuminated as stumbling blocks in learner performance. It was noted that learners did not understand the meaning of a range of cognitive verbs used in questions. In view of this, integrated language teaching across the curriculum must be reinforced in all schools.

1.5 KEY RECOMMENDATIONS

1.5.1 Language in Teaching

The language classroom is not the only context where learners can improve their language skills. It must be stressed that language across the curriculum is a central part of the learning experience. Teachers in all subjects are encouraged to work collaboratively to integrate a school-based language strategy that aims to improve learner performance. In an effort to build learners' language proficiency and their confidence in decoding both the Language of Learning and Teaching (LoLT) and the Language of Assessment, teachers are encouraged to add their own language aspects as these apply within the context of their schools or classrooms. The following points serve as a guide to teachers:

- Firstly, it is imperative that learners must have a firm understanding of action verbs that are used in the phrasing of questions. It is also essential that learners understand the meaning of each action verb in its context and in terms of the cognitive demand that is expected.

- In line with the above point, subject terminology and definitions must be clearly understood by learners. A firm understanding of subject matter can only be guaranteed if learners understand terminology and concepts used in the subject.

- There needs to be greater emphasis on aspects of language competence and examination technique.

- Language and comprehension skills must be developed in each classroom, in all subjects.

1.5.2 Diagnostic Reports from 2014 to 2018

Diagnostic reports published from 2014 to 2018 are pertinent to gain a holistic grasp of learners' performance and to identify weaknesses in the teaching and learning of the 10 key subjects (Part 1). Part 2 of this diagnostic report, first published in 2017, will serve as a teaching and learning tool in the language classroom. Both Part 1 and Part 2 must be used to prepare the class of 2019 for the 2019 NSC examinations.

1.5.3 Past Question Papers

Past question papers should be used as a teaching and learning tool, but teachers need to guard against teaching to the paper. A question paper serves as one of the resources for revision purposes. It must be stressed that the *CAPS* and the examination guidelines for each subject must be followed to ensure that all topics are covered.

1.5.4 Integrated Intervention Strategies

Integrated intervention strategies must be used to address gaps in teaching and learning. Such strategies could include:

- Teachers from different schools in a given circuit or district could collaborate to support one another in mediating challenging topics to learners;

- Regular revision of challenging topics;

- Study groups could be formed and learners who have firmly grasped topics can support those who have a limited understanding of topics; and

- Teachers from different schools can build an item bank of higher-order questions and this bank can be used as a resource for revision purposes.

1.6 RESPONSIBILITIES

Provincial Education Departments:

- The desired destination of this report is the classroom. Therefore this report must be cascaded from provincial to district level and finally to the school.

Subject Advisors and District Officials

- Subject advisers at district level should convene workshops with the teachers under their jurisdiction and conduct on-site support visits.

- Subject advisers should also monitor the improvement plans of their teachers, looking specifically for the inclusion of recommendations emanating from the individual subject reports.

- District officials should closely monitor curriculum coverage to ensure that all the topics in a subject have been covered according to the Annual Teaching Plan (ATP). This will ensure that all topics receive due attention, allowing candidates to be better prepared for the examination.

- The monitoring process also needs to focus on the standard and quality of the assessment tasks used for SBA, as these tasks prepare learners for the NSC examinations. It also provides an opportunity for teaching and learning interventions to gain traction well before the NSC examinations take place.

Teachers

- As indicated in the diagnostic reports for each subject, merely recalling procedures or specific content on the part of learners will not enable them to respond fully to the demands of the question paper. Teachers should therefore ensure coverage of the curriculum and the full range of cognitive levels in their teaching and assessment strategies.

- Teachers must prepare learners adequately by creating learning opportunities to reflect, analyse and evaluate the content, in order to develop their holistic understanding and applied competence.

CHAPTER 2

ACCOUNTING

The following report should be read in conjunction with the Accounting question paper of the November 2018 examinations.

2.1 PERFORMANCE TRENDS (2014–2018)

Enrolment for the 2018 Accounting examination showed a noticeable decrease of 13 149 candidates when compared to that of 2017. The performance of candidates, however, shows a significant improvement as indicated by 72,5% achieving at the 30% level, with 48,6% being above the 40% level.

Table 2.1.1 Overall Achievement Rates in Accounting

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	125 987	85 681	68,0	55 837	44,3
2015	140 474	83 746	59,6	50 906	36,2
2016	128 853	89 507	69,5	57 914	44,9
2017	103 427	68 318	66,1	44 041	42,6
2018	90 278	65 481	72,5	43 831	48,6

The past five years show variable performance in the overall results. However, encouraging improvement has been noticed in the performance of candidates in certain aspects of the curriculum, such as Company Financial Statements, and topics that are not overly dependent on prior knowledge from previous grades, such as Manufacturing or Stock Valuation. It is apparent that candidates generally find the topic of Manufacturing the least demanding aspect of the curriculum and tend to be able to manage both the application and analytical aspects of this topic relatively well.

Certain topics, such as Reconciliations and Budgeting, require a solid foundation of the content and procedures covered in previous grades, and it is evident that many centres do achieve well in these topics, while others continue to reflect mediocre to poor performance. The perception in certain schools might well be that as this content is covered in previous grades teachers might consequently not devote sufficient time to revising and consolidating the application procedures in Grade 12. This compromises candidates' ability to subsequently analyse and interpret financial information on these topics in NSC papers.

It was evident that teachers and subject advisors continued to focus intervention strategies on specific topics or aspects that are relatively new to the Grade 12 curriculum, such as the Repurchase of Shares, Stock Valuation Methods, Interpretation and Problem-solving. Exemplar papers and questions from previous examinations are usually used as the main resources. These topics are generally well answered by most candidates, however, it remains a concern that Grade 10 and 11 topics might not receive a similar level of focus.

Graph 2.1.1 Overall Achievement Rates in Accounting (Percentage)

	2014	2015	2016	2017	2018
% achieved at 30% and above	68.0	59.6	69.5	66.1	72.5
% achieved at 40% and above	44.3	36.2	44.9	42.6	48.6
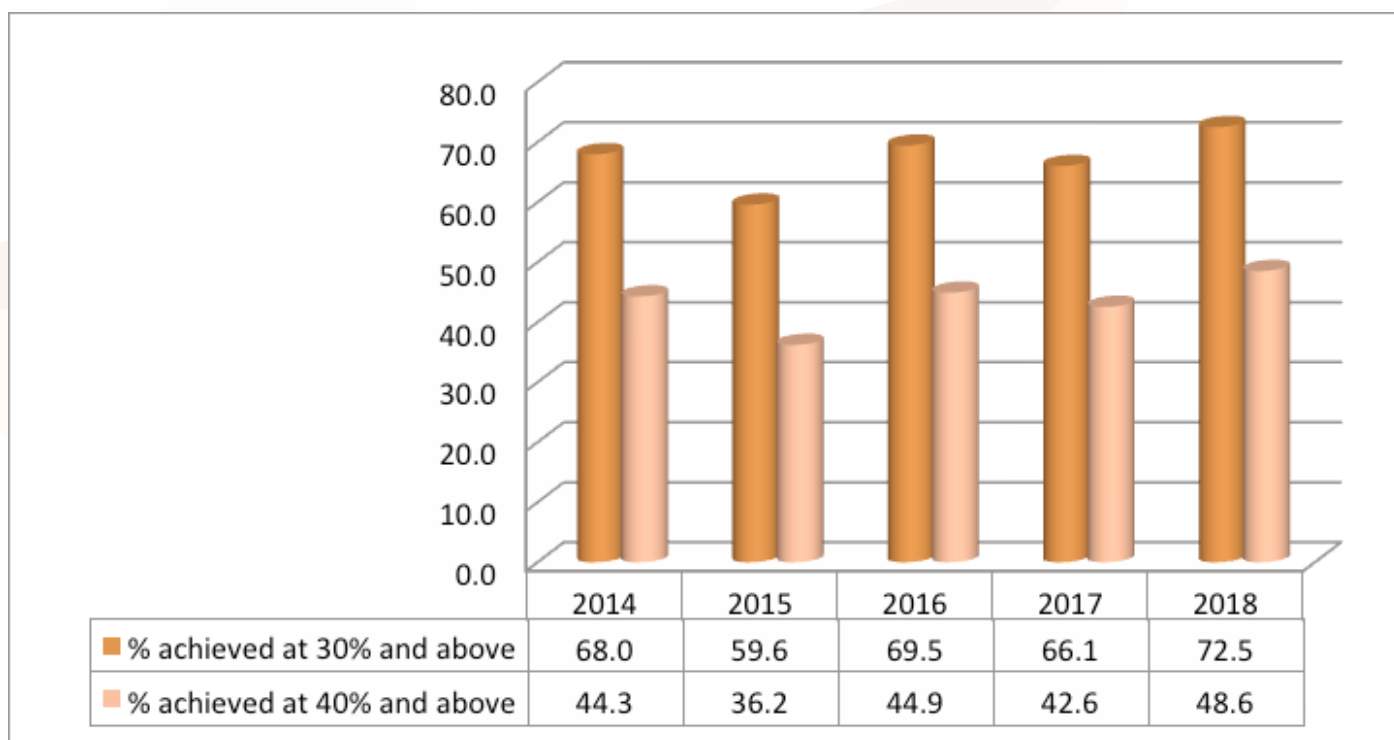
Graph 2.1.2 Performance Distribution Curves in Accounting (Percentage)

	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	1.2	11.3	19.5	23.7	17.1	11.0	6.7	4.6	3.5	1.4
2015	1.6	14.4	24.3	23.4	14.3	8.6	5.4	3.7	2.8	1.4
2016	1.1	9.7	19.7	24.5	17.5	10.9	6.8	4.6	3.3	1.8
2017	1.5	11.9	20.6	23.5	16.3	10.3	6.6	4.5	3.3	1.6
2018	1.0	8.8	17.6	24.0	18.1	11.7	7.8	5.3	3.9	1.8
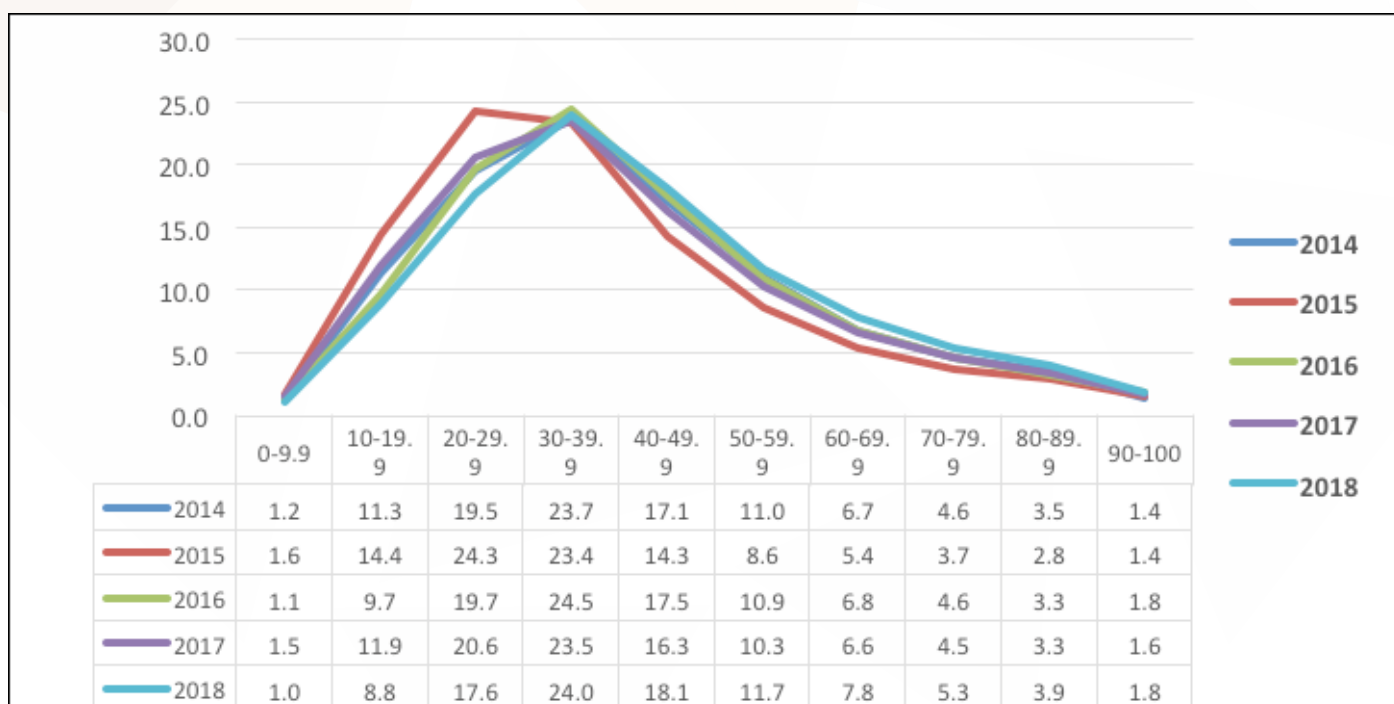
2.2 OVERVIEW OF LEARNER PERFORMANCE

General Comments

a. The performance of candidates in 2018 reflected a pleasing improvement in comparison to that of the previous year. This might well be due to the continued efforts by subject advisors and teachers, and the multiple examination opportunities offered to the weaker, progressed learners, who opt to write in June 2019.

b. Since 2008, examination papers have covered all topics outlined in the *CAPS*, at least in part. Creativity and innovation were introduced as part of the 30% higher-order questioning. This is an attempt to minimize the degree of predictability whilst maintaining the standard and quality of the paper.

c. Previous diagnostic reports have highlighted weaknesses and have proposed strategies that teachers and learners could use in their preparation for the NSC Accounting examination. Together with the many past examination papers, candidates and teachers have had access to extensive resource material which could be utilised in preparation for the November 2018 paper.

d. The exceptional performance and good quality of responses of candidates at a number of centres is evidence that teachers at these centres have planned well and have implemented the recommendations proposed in previous diagnostic reports. Their candidates illustrated the ability to address the requirements of the subquestions; to extract and use the relevant information appropriately and to manage their time effectively.

e. The poor results in many centres have exposed the fact that challenges in teaching and learning are still prevalent. Responses of candidates from these centres show poor planning and preparation. They lack basic mathematical and language skills and offer inappropriate responses to questions that involve the application of rules and procedures that were introduced at Grade 10 level.

f. All questions in an Accounting paper will comprise the three levels of difficulty as prescribed by the examination guidelines. The inability of weaker candidates to effectively deal with even the less challenging parts of questions, is a clear indication that the basic concepts and procedures were not properly addressed in class.

g. Factors that tend to contribute to poor performances by weaker candidates are:

*   **Poor mathematical and arithmetical ability:** An Accounting examination paper will contain several arithmetical calculations such as percentages and ratios. At times candidates may be required to formulate simple equations to solve certain problems. These skills are normally developed over time, from the early stages at school. Accounting requires a good understanding of the logic of these calculations. The correct use of positive/negative signs, rands/ cents, and the appropriate operations is essential and relevant across all topics of the syllabus.

*   **Poor comprehension skills and language barriers:** Candidates find it difficult to understand and address the requirements of questions adequately. Responses in several subquestions were not in line with the requirements of the questions. Weaker candidates provide incomplete or unclear responses and often quote the common options found in previous marking guidelines in situations where they are not relevant.

*   **Inability to identify relevant information to answer specific subquestions**: Accounting questions usually provide all the information after listing what is required. Weaker candidates are unable to identify the relevant information to answer specific questions, e.g. to calculate ROSHE, they would need the net profit after tax (from the Income Statement or the adjustments) and the Shareholders Equity (from the comparative Balance Sheets or the additional information). In commenting, they tend to provide less important or immaterial information to support their explanations, while ignoring more significantly relevant and pertinent information.

General Suggestions for Improvement

Poor results are often linked to poor planning. Teachers are advised to plan before the school year starts, due to the limited instruction time during each term. It is essential that they build the following practices into their work plans:

a. **Use past NSC papers**: Past question papers serve as one of many teaching and learning resources. They must be used in conjunction with textbooks, study guides, the *CAPS* document and examination guidelines, and for revision purposes. Every learner must have access to past examination papers, especially from November 2014 onwards as these are based on the current *CAPS* content including shares of no par value and the repurchase (buy-back) of shares. In addition, teachers should ensure that learners revise questions on Cash Budgets and Projected Income Statements in the context of companies, as stipulated for Grade 12 in the *CAPS*.

b. **Basic Concepts and the Accounting Equation**: Every topic should commence by revising or introducing the basic concepts and terminology pertaining to that topic. Prior knowledge must be established before engaging in Accounting applications in each topic.

    (i.)   Vital concepts are ingrained in the expanded Accounting equation:

        Assets + **E**xpenses + **D**rawings = **C**apital + **I**ncome + **L**iabilities.

        The process of conceptualising and understanding these concepts is more than merely rote-learning definitions. Concrete, practical examples must be constantly provided to further enhance understanding of the concepts.

    (ii.)   It is necessary that learners understand the following:

        *   The structure and formats of all financial statements, and their progression from Grade 10;

        *   The difference between the balance sheet and revenue items or nominal accounts;

        *   The different categories or sections of the Balance Sheet; and

        *   The difference between operating, financing and investing activities.

This knowledge will enable them to prepare and interpret the different financial statements more effectively.

a. **Revision of Relevant Grades 10 and 11 Content**: 20% of an examination paper may contain content from previous grades that is pertinent to Grade 12. Vital aspects from the previous grades that must be constantly reinforced in Grade 12, include the Disposal of Fixed Assets, Cash Budgets, Projected Income Statements, Cost Accounting and Reconciliations (i.e. bank, debtors and creditors). The tight time frames in Grade 12 do not allow for complete re-teaching of these topics, therefore it is advised that learners practise consolidation tasks at the end of Grade 11, or teachers should factor these aspects into their intervention programmes or the informal assessment programme.

b. **Internal Control and Ethical Issues**: This must not be done as a separate chapter but should be integrated across all topics at relevant and strategic points, after the logic and application of accounting processes in each topic are completed. Assessment activities are useful to cover this aspect of the syllabus. Robust class discussions will also contribute to a better understanding of the control measures.

c. **Enhancing Learners' Skills in Accurately Interpreting the Requirements of Specific Subquestions and Using Information that is Relevant**: Teachers need to address the language barriers and, as part of the language across the curriculum (LAC) initiative, are advised to read through and interpret the requirements of questions with learners. Learners should also be guided on how to utilise prior knowledge to identify information that is relevant to each subquestion. The use of tables and bullet points are acceptable and are often used to reduce written text.

d. **Time Management:** Training on time management must be an on-going process. This must apply to short summative informal activities, controlled tests and examinations. Examination questions provide time guides, and learners must practise the skill of adhering to the suggested time allocations. They must also be made aware that the mark allocation and the spaces provided in the answer book are good indicators of the amount of information needed.

e. **Comments, Evidence and Explanations:** Learners must be taught to express themselves clearly and succinctly where comments or explanations are required. They must not assume that a partial, simple or single-word response will be sufficient if an explanation is required. Learners should be made aware that they will often be required to quote figures or other evidence from the information provided, and that this cannot be omitted if full marks are to be awarded for an answer to a specific subquestion.

f. **The Importance of Formative Testing:** Short, informal formative tests must be used to build the confidence of learners in all topics. Self-marking or peer-marking allows learners to benefit from immediate feedback by gaining an understanding of the mark allocation, and by enabling them to promptly identify errors or valid alternative responses. The less challenging sections in each of the questions in the NSC Accounting papers can be used as 'confidence-boosters'. Formative tests can be used effectively to introduce new subtopics in the *CAPS*, e.g. Inventory Valuations, Repurchase (Buy-back) of Shares and Reconciliation with Creditors' Statements.

   (i) Recommendations:

   * Teachers are strongly advised to always consult past diagnostic reports as part of their planning process, to identify areas of concern and suggestions for improvement.

   * Teachers should ensure that they have a variety of resources in addition to a prescribed textbook. Other relevant resources should include study guides, *Mind the Gap*, past papers and current publications

2.3   DIAGNOSTIC QUESTION ANALYSIS

The graphs presented below are based on data from a random sample of candidates in the different provinces. They provide a clear picture of the general performance in each topic (Graph 2.3.1). This is useful in assessing the relative degrees of challenge of each question as experienced by candidates (Graph 2.3.2).

Graph 2.3.1 Average Marks per Question Expressed as a Percentage
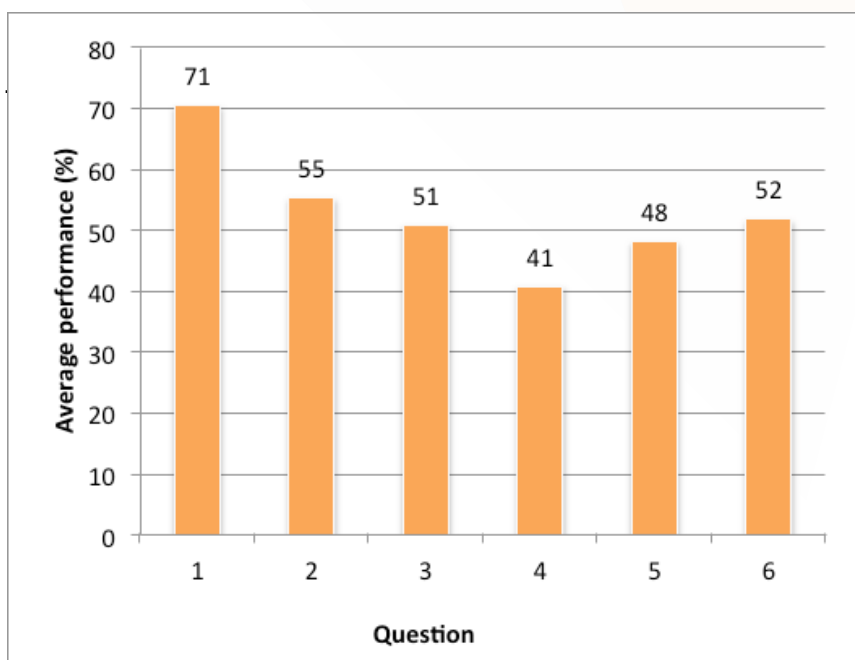
Q	Topics/Aspects
1	Manufacturing (Cost Accounting)
2	VAT & Creditors Reconciliation
3	Financial Statements & Audit Report
4	Cash Flow Statement & Interpretation
5	Inventory Valuation & Fixed Assets
6	Cash Budgets

The average marks per question indicate that the weaknesses and challenges of previous years are being addressed to some degree. Manufacturing/Cost Accounting (Q1) continues to be the best performing question and Interpretation of Financial Information (Q4) continues to be the most demanding question. The improvement in the VAT/Reconciliation question (Q2) and the Budget question (Q6) is commendable. It was also encouraging that candidates' responses to certain components of the Financial Statements question (Q3) and the Interpretation question (Q4) show positive trends.

Graph 2.3.2 Average Performance per Subquestion Expressed as a Percentage
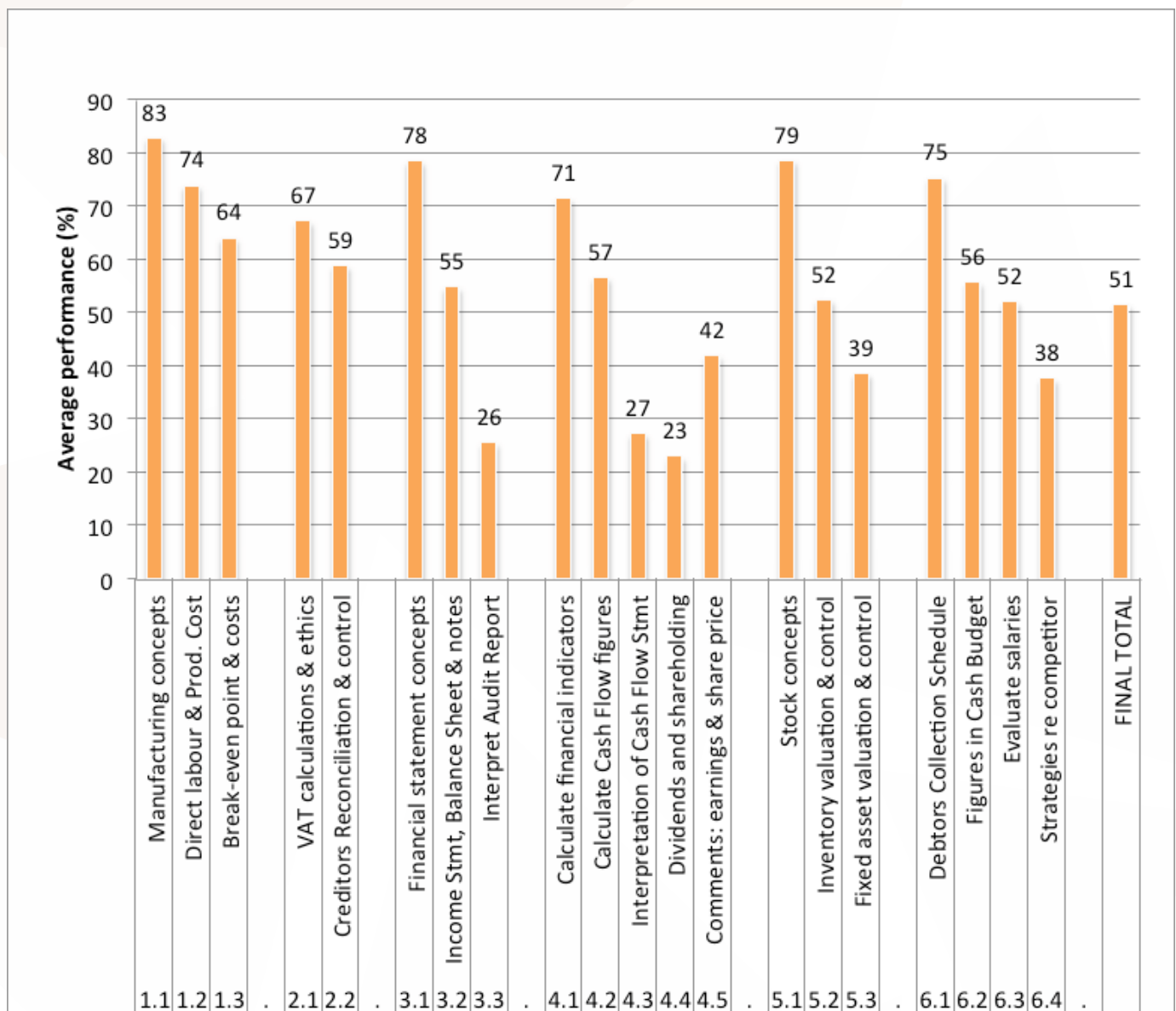
The average performance per subquestion illustrates that candidates are becoming more adept at taking advantage of the marks on offer in the lower- and middle-order range. Commenting, analysing and interpreting financial information still pose major difficulties. Subject advisors and teachers are urged to use this analysis when planning their intervention strategies, which should commence at the start of every year.

2.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS

QUESTION 1: MANUFACTURING

Candidates find this topic relatively easy as it comprises content that is manageable and predictable. They were able to take advantage of the easily obtainable marks by showing workings for direct labour cost, and for showing an understanding of the format of the Production Cost Statement (Q1.2.2; 12 marks).

The break-even point (Q1.3.1; 5 marks) was correctly calculated by many candidates. They were also able to comment appropriately on the level of production achieved in relation to the BEP (Q1.3.2; 6 marks).

Candidates were also proficient in offering valid reasons for the increase in direct material cost per unit (Q1.3.3). It must be noted that the explanations provided were the stereotypical responses found in many past years' exam papers. Such questions might not be considered as higher-order in future examination papers.

Common Errors and Misconceptions

a. The calculation of the direct labour cost (Q1.2.1; 9 marks) was intended to be an easy opening question. A large percentage of candidates did not realise that they needed to calculate the wages of 3 workers separately from the 4th worker, and they ended up with some complex calculations. Fortunately, the marking guideline made provision for many alternatives.

b. Regarding the adjustment to the factory overhead cost (Q1.2.2; 5 marks), many did not take into account the amount prepaid for insurance before calculating the $^4/_9$ part that was applicable to the factory.

c. In calculating the BEP, the factory overhead cost and the administration cost had to be added together to get the total fixed costs, and the final answer had to be represented as units.

d. Candidates who compared and commented on only the BEP or the level of production for both years, scored 3 marks of a possible 6 marks. A complete answer would have included a comparison of the BEP to units produced and sold.

Suggestions for Improvement

a. This question contained a small percentage of higher-order cognitive aspects and posed fewer challenges than the other questions in this paper. Examiners will always strive to introduce more creativity in order to balance the predictable nature of this question. Teachers are advised to provide a variety of examples to candidates to ensure that they understand the different questioning techniques on this topic.

b. A clear understanding of the different components of a manufacturing business (cost centres) is essential. This should be an extension of the concepts covered in Grade 11. Diagrams, video presentations and demonstrations should be used to enhance understanding of the relationship between the different processes within a manufacturing entity. Learners will then be better equipped to complete the different calculations relevant to the various departments.

c. Teachers are advised to encourage learners to read the requirements of questions carefully and to answer them precisely. With regard to the BEP, it is important to determine if one must comment on the BEP and the level of production, or if only a comparison of the BEP or the level of production for both financial years is sufficient to answer the question. Valid explanations will also provide further insight on whether the business is able to make a profit and whether this trend will continue in the future.

d. Short formative tests on specific aspects of the topic will serve as useful revision of work covered in Grades 10 and 11. They will also improve learners' skills in allocating and splitting expenses (costs) across the different cost components by using fractions, ratios and/or percentages. Year-end adjustments and reversals may also feature in these calculations, especially if these are not being tested in other parts of the examination paper.

e. In teaching the Production Cost Statement, teachers must emphasise and reinforce the format. It has become a trend to calculate a balancing figure on this statement; as such, learners must be taught to calculate the total cost of production of finished goods by using either the unit cost of production or the cost of sales and the finished goods stock account.

f. Analysis and interpretation in this topic focus mainly on unit costs. Teachers are advised to spend time discussing the increases or decreases in the fixed or variable costs associated with production and the effects thereof on the performance of the business. Class discussions, case studies and informal activities are useful in this regard. Learners should be encouraged to integrate their knowledge of current affairs as well as the content of related subjects such as Economics, Business Studies and Mathematics. It must be appreciated that textbooks alone will not be sufficient to broaden their understanding in this regard.

g. Teachers must also expose learners to the problem-solving potential of this topic, whereby information on different products is provided and learners are expected to identify problems and to offer solutions based on the figures or calculations from the table of information provided.

QUESTION 2: VAT AND CREDITORS' RECONCILIATION

The VAT question (Q2.1; 10 marks) focused on calculations ranging from the easy to the more challenging, applying the current standard VAT rate of 15%. Most candidates were able to achieve 8/10 marks. Many were not able to comprehend the adjustment for zero-rated items included in the VAT amount given (Q2.1.1(d); 4 marks).

The question on ethics (Q2.1.2; 4 marks) was well answered. Most candidates identified the scenario as being unethical and an attempt by the owner to defraud SARS. Some provided further valid explanations such as drawings or a reduction of capital.

The Creditors' Reconciliation (Q2.2.1; 13 marks) was generally well answered. This style of questioning has appeared in many past examination papers and teachers used it well in their preparation.

EFTs were an issue last year when they were used in the Bank Reconciliation question. This concept seems to have filtered into the teaching process, as most candidates showed an understanding of its use, advantages and disadvantages.

Common Errors and Misconceptions

a. A few candidates did not read the question correctly and did the VAT calculations using 14%. This would account for them losing up to 3 marks. It is a concern that these candidates were apparently not aware that the VAT rate has been increased to 15%.

b. Candidates were not expected to understand the VAT tax laws as these are consistently changing with every national budget speech. In fact, more items are now being added to the zero-rated basket. They were, however, expected to identify the unethical or fraudulent intentions of the owner's attempting to claim VAT input on a vehicle used for private purposes in the scenario.

c. In preparing the Creditors' Reconciliation, the weaker candidates did not show the (+) or (−) next to each amount. They also placed amounts in both columns and were penalised for superfluous entries.

d. While many of the candidates were able to offer valid reasons in favour of the use of EFTs, they failed to provide relevant internal control measures for this system to be effectively managed. They continued to provide the clichéd 'division of duties' and 'install cameras' which were not relevant in this case.

(a) Weaker candidates also stated that Vernon 'must be fired', although the question specifically stated that dismissal was not to be used as an option.

Suggestions for Improvement

a. Teachers are encouraged to keep up with current trends in all matters affecting the Accounting content. Learners are exposed to the news, media and many are familiar with the internet. Textbook activities and VAT questions from past papers must be adapted to the current rate of 15%.

b. Revision of percentage calculations must be on-going as they are relevant across all sections of the Accounting syllabus. Terms such as 'VAT-inclusive' and 'VAT-exclusive' must be clearly explained so that learners are aware of the different approaches to calculating the relevant VAT amounts.

c. The section on VAT lends itself to interesting scenarios to assess ethics and internal controls. Teachers must pay more attention to the nature of the actual activities or intentions of managers and owners in assessing the nature of the problems.

d. In teaching the Creditors' Reconciliation, it is important to firstly identify the supplier (creditor) from the business, as this will influence the effect of a debit or credit entry to either the creditors' ledger account or the statement. This topic involves comprehension of each transaction. Teachers are therefore advised to require learners to practise reconciliation skills at regular opportunities to ensure that they become familiar with the style and pattern of questioning.

e. Teachers should not become complacent about their learners becoming familiar with the reconciliation process. Past experience in NSC papers is that weaker candidates tend to provide satisfactory answers to debtors' or creditors' reconciliations but perform extremely poorly when a bank reconciliation is asked. Teachers are advised to stress the similarities among these three contexts and to ensure that regular revision occurs before internal examinations on each type of reconciliation are written.

f. Internal controls of cash, debtors and creditors will generally feature across all topics. Teachers are expected to have class discussions and to include these in almost all formal and informal assessment activities. This must be done on an on-going basis and not as a separate section of the syllabus.

g. Learners should also be made aware that ETFs or direct online payments have generally become the norm for businesses in making payments to employees, suppliers and service providers. Many businesses now make very little use of cheques.

QUESTION 3: COMPANY FINANCIAL STATEMENTS AND AUDIT REPORT

Financial statements comprising the Income Statement (Statement of Comprehensive Income) and Balance Sheet (Statement of Financial Position) are tested extensively in examination papers. The overall performance this year was consistent with that of previous years. Candidates were able to score the 'easier' marks but struggled with some of the adjustments, and in calculating the total dividends in the Retained Income Note and the short-term portion of the loan for the Balance Sheet.

The Audit Report was once again poorly answered. This question required explanations on different points in an audit report. Although the content tested over the years has been basically similar, candidates were challenged by the manner or style in which the questions were presented. A large number of candidates did not attempt this question, whilst others continued to provide inappropriate responses in an attempt to score part marks.

Common Errors and Misconceptions

a. Candidates were not able to calculate the total sales amount using the cost of sales, the mark-up % and the goods sold at below cost (Q3.2.1; 5 marks). They scored part marks for showing workings.

b. Only three year-end adjustments were asked, and these were poorly handled by the average to weaker candidates. They were not able to do the necessary calculations for rent expense, audit fees and directors' fees despite similar adjustments being questioned in previous examination papers. However, weaker candidates were able to score 2 marks out of 4, i.e. 1 mark on the pre-adjustment figure and 1 method mark for using the correct + or – operations to arrive at an answer for each expense.

c. The well-prepared candidates were able to see that the amount due to SARS must be added to the provisional tax amount to get the income tax amount for the year.

d. In working from the bottom of the statement, it was necessary to change the signs for income tax and interest expense before calculating the balancing figure for interest income.

e. With the opening and closing balances for the Retained Income Note given (Q3.2.2; 7 marks), candidates had to calculate the total dividends and the final dividends (as balancing figures). This calculation (for 2 marks) was not well answered due to the inappropriate use of the correct operations.

f. In completing the Equity and Liabilities section of the Balance Sheet, candidates experienced difficulty in calculating the short-term portion of the loan but scored the method mark for transferring their incorrect answers to Current Liabilities.

g. Many also failed to transfer the expenses accrued/payable calculated in the Income Statement, to Trade and other Payables.

h. It was evident from the responses of candidates to the questions on the Audit Report that teachers did not pay much attention to this topic, as they assumed that there are limited ways in which this can be tested.

Suggestions for improvement

a. The Income Statement and Balance Sheet have been alternated in all previous examination papers since 2008 and teachers have an ample supply of resource material to prepare learners for these topics of the syllabus.

b. A solid foundation of basic accounting concepts, elements of the Accounting equation and the double-entry principle is necessary for success at Grade 12 level. The formats of financial statements are introduced in Grade 10. These must be revised and reinforced in Grades 11 and 12. Teachers must also be mindful of the changes that must be implemented in the later grades.

c. It is essential that the expanded Accounting equation, (A+E+D=L+C+I) be fully understood from as early as the GET phase. Revision in Grade 10 should focus on the different types of accounts, whether they have debit or credit balances, and where they feature on financial statements.

d. Due to the regularity at which these topics are examined, teachers and subject advisors are urged to consult, and take note of the recommendations made in previous diagnostic reports when planning their intervention strategies.

e. Short, regular formative testing on calculations and adjustments, such as those mentioned above, in the context of Q3.2.1, can be conducted without the need to prepare the financial statements. A collaborative learning approach can be implemented on a piecemeal basis, with a focus on one or two adjustments, progressing from the relatively easy adjustments to the more challenging or complex calculations.

f. It must be appreciated that testing financial statements at Grade 12 level will be more demanding, requiring insight and analytical skills to work from any point, using financial indicators and balancing figures to complete the statements.

g. With reference to the Audit Report, teachers must recognise the limited content. Coverage of this content should not be time-consuming. Teachers must ensure that learners are exposed to different examples of audit reports, i.e. unqualified, qualified and disclaimers. These can be obtained from past NSC papers, textbooks, published financial statements in the financial press or the internet. Q3.3 is ideally suited for a short collaborative task in the classroom on an audit report. Teachers are advised to use small group discussions on this task, and then consolidate the knowledge through a plenary session with all learners in the class.

h. Learners must engage meaningfully with each paragraph in a standard unqualified audit report, to understand the need for each paragraph, and to appreciate the differences that could exist if an independent auditor is not able to issue an unqualified opinion. Learners should appreciate the considerable training and skill required of auditors, as well as the onerous responsibilities that auditors are expected to discharge. Recent reported cases have tarnished the reputations of high-profile auditing firms. These scenarios can be used as prime examples for learners to understand the nature of unethical and unprofessional conduct.

QUESTION 4: CASH FLOW STATEMENT AND INTERPRETATION OF FINANCIAL INFORMATION

The question comprised the calculation of financial indicators; calculation of specific amounts for the Cash Flow Statement; interpretation of cash flow information; analysis of and commentary on dividends, returns and majority shareholding and reporting on investment decisions.

Candidates generally performed well in certain aspects of the question that predictably featured in all previous examination papers. As usual, the question covered a variety of interpretative subquestions that required supporting figures in the explanations. These were generally well answered by the good candidates. Weaker candidates continued to be challenged with this section of the topic.

Most candidates were proficient in performing the calculations for financial indicators (Q4.1; 10 marks) and for amounts for the CFS (Q4.2; 11 marks). Interpretation and explanations on Cash Flow Statement information (Q4.3; 18 marks) were poorly answered. This was disappointing as numerous questions on directors' decisions reflected in the Cash Flow Statement have been asked in previous papers. Candidates also found it difficult to calculate interim dividends paid (Q4.4.1; 6 marks).

With regard to the decision to invest in fixed property, candidates easily identified the increase in sales and the decrease in the mark-up percentage as contributing factors to the success of this decision (Q4.5.1; 6 marks). They were also able to score valuable marks by quoting the relevant figures in providing advice to the CEO (Q4.5.2; 9 marks).

Common Errors and Misconceptions

a. The calculation of the fixed assets sold (Q4.2.3; 5 marks) and total interim dividends (Q4.4.1; 3 marks) required candidates to extract the relevant amounts from the Cash Flow Statement (Information C). This was a different way of presenting information and was not familiar to the average candidate, who often engages in rote-learning with little understanding of the concepts.

b. In commenting on the improvement in cash and cash equivalents, the majority of candidates did not comment on **both** financial years, and as such, only obtained 2 out of the 3 marks. They understood the net change in CCE as the calculation has often been asked in previous papers.

c. Many of the candidates did not fully understand the difference between **total** capital employed and **return** on capital employed. They confused these two concepts in Q4.3.2. This was surprising as the total capital employed is always used as the denominator to the calculation of the return on capital employed, a financial indicator that is sometimes tested.

d. Understanding the concept of majority shareholding is still a problem for many candidates. They were not able to calculate the additional shares Dudu needed to buy, which had to be more than 50% of the total issued share capital.

e. With regard to the investment in property, many candidates failed to relate this decision to sales and were awarded part marks for general relevant comments made.

f. A general challenge in this question was the manner in which the information was presented. On closer inspection, all past examination papers follow a standard layout of providing the Income Statement, comparative Balance Sheet and a list of financial indicators. This was the case in this question. The only innovation was the introduction of the comparative Cash Flow Statement, which was intended to constitute the higher-order aspect of the question. The well-prepared candidates were not deterred by this addition.

Suggestions for Improvement

a. As suggested in all previous diagnostic reports, an introduction of the Cash Flow Statement must focus on the inflow and outflow of cash and the change in the bank (cash) balance. Essentially, this is a reflection of items that would appear in the CRJ and CPJ.

b. Teachers are advised to introduce the sections of the Cash Flow Statement separately and to conduct regular class discussions on the figures that must be calculated for each section. This will serve to develop an understanding of the logic of this statement and will further enhance learners' ability to understand its relationship to the other financial statements. For example, movement of bank balances from overdraft to positive would reflect an inflow of cash; and increases in loans and share capital would be used as sources of funding and income tax and dividends paid would represent necessary outflow of cash.

c. Examination papers will either require candidates to complete the CFS by calculating the missing amounts or they may require calculations of specific amounts, to assess learners' knowledge of the subsections within the CFS. Teachers must train learners on where to obtain the relevant information, e.g. to calculate income tax paid, they will need to look at the SARS (income tax) balances on the Balance Sheet, and the total income tax amount from the Income Statement. Using short informal testing on specific sections in isolation will help to develop confidence in identifying appropriate figures and in practising the correct use of brackets to indicate outflows.

d. A good understanding of the figures in the CFS is necessary to calculate the fixed assets sold and the total interim dividends, e.g. learners know that total dividends paid is equal to the opening balance for shareholders for dividends plus the interim dividends paid. Using this information, they should be able to calculate the missing amount.

e. Questions on interpretation of financial information would generally comprise:

* Evaluation of a company's results over time, in which case answers should involve comparing and quoting of trends from one year to the next; or

* Evaluation of a company's performance against set targets, e.g. gross profit percentage; or

* Evaluation of more than one company, in which case, answers could involve specific comparisons and quoting of indicators of each company.

f. In teaching this section, teachers must always encourage learners to quote the relevant figures and financial indicators as these will always support their explanations; they may also emphasise or imply the trend. Debates and discussions must be included in the teaching process; this will bring more learners into the learning process, offering different interpretations and suggestions to the same problems.

g. Learners need to understand the logic underlying each financial indicator. For example, liquidity is the ability of a company to settle short-term debts and, therefore, the current assets and current liabilities must be considered. Inserting figures into a rote-remembered formula serves no positive educational purpose, as learners will not be able to offer meaningful interpretations of the results. It is, therefore, important that formative class tests should cover both the calculation and the purpose of financial indicators. A data sheet (if provided) will still require candidates to know the names and purpose of financial indicators.

h. The different scenarios in the paper in respect of Dudu's shareholding and the investment in fixed property to improve sales provided opportunities for an extension of possible responses beyond the interpretation of the standard financial indicators. Teachers need to exercise their creativity and interrogate the information presented. This can form the basis for interesting case studies and projects.

i. Reliance on previous examination papers is essential in obtaining valid information on a variety of questioning techniques. It must be noted that examiners will always explore new and innovative ways of extending the candidates' insight on financial information that falls within the scope of the syllabus.

j. Teachers are strongly advised to devote time in class to focusing on the purpose and interrelationship of the four main components of financial information provided in a question of this nature. This is to assist learners with the developing of the skill of readily identifying the information relevant to the subquestion, in contrast to a time-consuming exercise of studying or inspecting all the figures in every set of documents provided. Essentially, this is the skill of how to read financial statements and indicators strategically, intelligently and efficiently. This skill separates capable learners of the subject from average learners.

INCOME STATEMENT (Statement of Comprehensive Income)	CASH FLOW STATEMENT	BALANCE SHEET (Statement of Financial Position)	FINANCIAL INDICATORS

A questioning approach, with class collaboration, starting from the basic purposes of the various documents should be used, developing to further reflection on the specific information provided or needed. Here are a few examples:

• What is the purpose of each of the above items? Learners should appreciate the links between the three financial statements, e.g. Sales will be an income item in the Income Statement; the cash sales component will affect the cash in the Cash Flow Statement; credit sales not yet settled by customers will affect trade and other receivables in the Balance Sheet; and ultimately, Sales will also affect several of the financial indicators.

• In which parts of the statement/s would you find non-current and current assets and liabilities, income, expenditure, share capital, retained income, income tax, and interest? If this is clearly understood, learners will enhance their proficiency levels in the subject.

• In which statement(s) would you find information on loans and repayment of loans?

• In which statement(s) would you find information on how to calculate earnings or dividends per share?

- In which statement(s) would you find information of unsold stock on hand and information on how to calculate the number of days the stock is expected to last?

- In which statement(s) would you find information on capital employed, financial gearing and risk?

As a result of the classroom discussions that should ensue from a motivated class, learners would be in a better position to verbalise their own thoughts on these concepts, thereby gaining further insight into the various concepts and greater confidence in navigating their way through the inter-connected set of financial statements.

QUESTION 5: INVENTORY VALUATION AND FIXED ASSETS

This question comprised Stock Valuation (Q5.2) and Fixed Assets (Q5.3). Candidates generally performed well in this question. Although there were some challenging calculations, the majority of candidates were able to score the easily obtainable marks in each subquestion.

The stock valuation method tested the FIFO method. Candidates had to calculate the closing stock, number of missing items and the stock holding period.

Many candidates provided practical reasons for either having too much, or insufficient stock (Q5.2.3; 4 marks). Statements such as 'the goods will reach their sell-by dates' or 'they will get rotten' were accepted as valid alternatives.

With regard to the Fixed Assets (Q5.3.1; 17 marks), the question required candidates to show all workings in determining the missing figures on the note, rather than completing the note by filling in the missing figures. In this way, part-marks could be awarded for the more difficult calculations.

With regard to the revaluation of Fixed Assets (Q5.3.3; 2 marks), most candidates correctly cited the historical cost concept (GAAP). Although the marking guidelines provided an option for revaluation at fair value (IFRS), this was not evident in many of the scripts sampled.

Common Errors and Misconceptions

a. In calculating the value of the closing stock (Q5.2.1; 5 marks), the weaker candidates did not take into account the items returned from the latest purchases.

b. Calculating the stock-holding period (Q5.2.3; 6 marks) required candidates to calculate the cost of sales. A few candidates calculated the cost of sales only, but did not realise that this must be used as the denominator. Some candidates used the number of units sold and months to do this calculation and confused monetary values with units.

c. In calculating the amounts for the Fixed Assets Note, candidates were not able to recognise that the computers were approaching the end of their estimated useful life and could not be depreciated by more than their current carrying value (Q5.3.1(ii);2 marks). This principle was also tested in 2017.

d. Weaker candidates were not able to calculate the total depreciation on equipment (Q5.3.1(iii); 5 marks), or the carrying value of the vehicle sold (Q5.3.1(iv); 5 marks).

Suggestions for Improvement

a. Teachers must introduce this topic by revising the stock systems (i.e. perpetual and periodic) covered in Grade 11. They should then proceed to explain the three valuation methods and their relevance to different types of products. A variety of questions must be provided to illustrate the difference in calculating the value of the closing stock. Short summative tests, extracted from previous exam papers, are useful in this regard.

b. In addition to practising the calculations (i.e. cost of sales, gross profit and missing items), teachers must also introduce the financial indicators that relate to stock and encourage class discussions on stock control and stock management. This will further enhance the point that financial indicators and interpretation are not confined to company accounting but can be spread across the examination paper.

c. The same approach as suggested above (i.e. revision of Grade 10 and 11 content) must be used in dealing with the calculations relevant to fixed assets. It is a major concern to note that Grade 12 candidates struggle with these calculations, particularly as this topic is first introduced in Grade 10 through the calculation of depreciation and extended into Grade 11.

d. Teachers must recognise their resistance to address this topic and should provide many examples for practice. By including this topic with the Income Statement and the Balance Sheet, learners will see the broader application of this information, and not view it as an isolated topic.

e. It must also be note that the Grade 12 syllabus emphasises interpretation and control of assets. Case studies and assignments are useful in communicating this content.

QUESTION 6: BUDGETING

The first part of this question followed the trend of previous examination questions on budgets. It comprised:

• Preparing the Debtors' Collection Schedule (Q6.1; 7 marks);

• Calculating specific amounts for the Cash Budget (Q6.2; 9 marks); and

• Calculating and commenting on the increase in salaries (Q6.3; 5 marks).

These were generally well answered by the average and stronger candidates who prepared well using the many examples from previous NSC papers.

The second part of this question comprised a problem-solving scenario. It required candidates to assess the effect of the new competitor; identify changes implemented by the owner and comment on the success or failure of the decisions taken. Essentially, candidates had to interact with the actual and budgeted figures and quote relevant figures to support their explanations (i.e. deep problem-solving).

This question required insight and an understanding of the budgetary process and was accessible to all candidates. It was satisfactorily answered.

Common Errors and Misconceptions

a. With regard to the Debtors' Collection Schedule (Q6.1; 7 marks), the common problem was the calculation of the discount that was offered for receipts in the month of sale. A recommended approach is to first calculate the total percentage expected and then multiply by 95% if a 5% discount is offered.

b. Calculating and using percentages continue to be a problem. Candidates do not know the different approaches that must be used, such as 100/175 for cost of sales, 175/100 for sales and 60/40 if the 40% is given.

c. It is a major concern that many weaker candidates could not perform a basic Grade 9 calculation, i.e. the percentage increase in salaries (Q6.3; 5 marks).

d. In analysing actual figures against budgeted figures, terms such as *overspent, underspent, under-budgeted* and *over-budgeted* are inappropriately or incorrectly used in comments.

e. Many candidates fail to see how certain accounts are related, such as sales and commission expense, and to note how changes in one will affect the other.

f. They also did not quote figures in their explanations as required by the questions, or they tended to quote irrelevant figures.

Suggestions for Improvement

a. The Grade 11 *CAPS* relates to preparation and presentation of the Cash Budget and the Projected Income Statement. The Grade 12 *CAPS* emphasises analysis and interpretation of that information. Whilst it is essential that the Grade 11 content be consolidated in Grade 12 to develop proficiency in identifying and calculating relevant figures, teachers are encouraged to spend time to improve learners' confidence in interpreting budget information.

b. In developing the mathematical skills of learners, especially calculations using percentages, teachers must provide regular examples. Constant short tests which may be repetitive, are useful in this regard.

c. Quite often, the average/weaker learners cannot interpret a question from given information. Teachers are advised to engage in differentiated support, paying special attention to these learners. It may be necessary to read a specific question and the relevant information with them. Learners can then answer the question and corrections should be done in class. It is recommended that questions such as Q6 be used for discussions in class so that learners are exposed to the logic and variety of possible responses.

d. Teachers are advised to impress upon learners that in the assessment of variances, they should not restrict themselves to comments on whether or not an item is over- or under-budget. Instead, they should also assess the impact of the item on business operations and on related items of income or expenses.

CHAPTER 3

AGRICULTURAL SCIENCES

The following report should be read in conjunction with the Agricultural Sciences question papers of the November 2018 NSC examinations.

3.1 PERFORMANCE TRENDS (2014–2018)

The number of candidates who wrote the Agricultural Sciences examination in 2018 decreased by 3 231 in comparison to that of 2017. The performance of the candidates in 2018 compared to in 2017 reflects a slight decrease at the 30% level from 70,4% to 69,9%, but a slight increase at the 40% level from 39,9% to 41,8%, which is still 11,1% lower than the highest pass rate recorded in 2014.

Table 3.1.1 Overall Achievement in Agricultural Sciences

Year	No. Wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	78 063	64 486	82,6	41 280	52,9
2015	104 251	80 125	76,9	46 895	45,0
2016	106 454	80 225	75,4	47 362	44,5
2017	98 522	69 360	70,4	39 353	39,9
2018	95 291	66 608	69,9	39 800	41,8

From 2014 to 2017, there has been a gradual decline in the overall results. However, a slight improvement has been noticed in 2018, particularly in certain main content areas, such as animal nutrition, agricultural management and production systems and topics, which are not overly dependent on prior knowledge from previous grades. The perception might well be that teachers and subject advisors devoted their time to the content areas that realised improvement.

It has also been observed that specific content areas introduced into the *CAPS* in recent years have been answered well by candidates. This could be due to the detailed attention that teachers devoted to new content that has been incorporated into the curriculum. The fodder flow programme and production systems are prime examples of this.

Graph 3.1.1 Overall Achievement in Agricultural Sciences (Percentage)

	2014	2015	2016	2017	2018
■ % achieved at 30% and above	82.6	76.9	75.4	70.4	69.9
■ % achieved at 40% and above	52.9	45.0	44.5	39.9	41.8
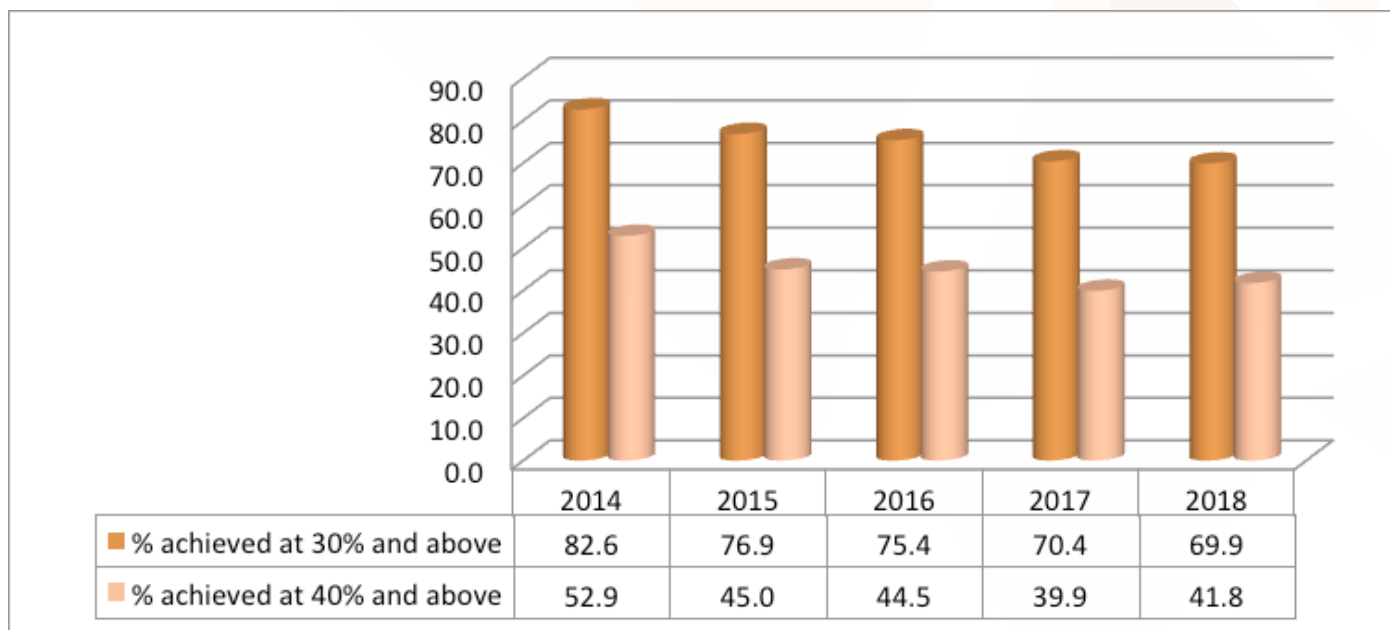
Graph 3.1.2 Performance Distribution Curves in Agricultural Sciences (Percentage)

	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	0.0	2.5	14.9	29.7	26.6	16.0	7.3	2.5	0.5	0.0
2015	0.1	4.0	19.1	31.9	24.7	13.2	5.2	1.6	0.3	0.0
2016	0.1	4.7	19.8	30.9	24.3	13.0	5.3	1.6	0.3	0.0
2017	0.1	6.7	22.8	30.5	22.0	11.6	4.6	1.4	0.3	0.0
2018	0.2	8.1	21.8	28.1	20.6	12.2	5.9	2.4	0.6	0.0
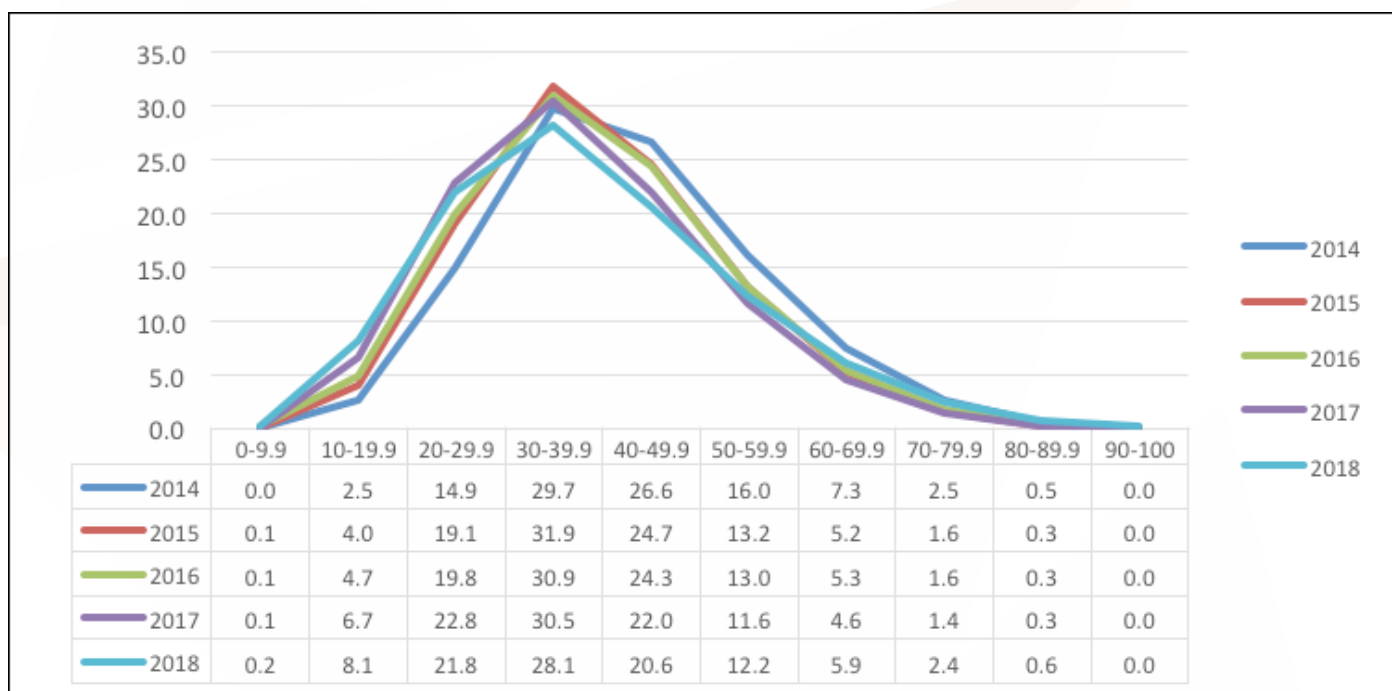
3.2 OVERVIEW OF LEARNER PERFORMANCE

General Comments for Paper 1 and Paper 2

This report contains comments on specific questions that proved difficult for candidates, as well as suggestions to rectify this. However, there are several factors that generally contribute to poor subject knowledge and poor performance by many candidates in the NSC Agricultural Sciences papers. These factors include a lack of basic knowledge of concepts and terminology applicable to the subject; the inability of candidates to address the specific requirements of each question and a lack of arithmetical, application and analytical skills.

The following general recommendations, which were applicable in 2017, are applicable to both papers:

a. **The importance of formative testing:** Short, informal, formative tests must be used to build the confidence of learners in all topics. Self-assessment and peer assessment allows learners to benefit from immediate feedback by gaining an understanding of the mark allocation and by enabling them to promptly identify errors or valid alternative responses.

b. **Basic concepts & terminology:** Learners need to understand and explain basic concepts and terminology in order to engage effectively with each topic. The process of conceptualizing and understanding these concepts is more than merely rote-learning definitions. Terminology needs to be emphasised on a regular basis and should form an integral part of teaching and learning. Teachers are advised to make the teaching of terminology interesting to learners by integrating word puzzles in the teaching, learning and assessment process. Learners should also be encouraged to prepare a glossary or concept bank of subject terminology. Teachers are advised to use the following strategies to improve the teaching of basic concepts and terminology:

•   Illustrate the meaning of new concepts and terms by using them in sentences and in short scenarios.

•   Identify new terms in every lesson, write them on the board and elaborate on the meaning and context of each.

- Encourage learners to identify new terms during lessons and to find their meanings in dictionaries or textbooks.

- Learners should compile a glossary at the back of their notebooks, i.e. a list of new terms per topic, with a brief but clear definition next to each term. A separate notebook for this purpose may also be kept. By the end of the year, all learners should have a comprehensive glossary of all the relevant terms.

- Include Agricultural Sciences terminology in all informal assessment tasks daily.

- The distinction between challenging or confusing terminology could be illustrated or explained on class posters so that learners could be exposed to this on a regular basis.

c. **Enhancing learners' skills in accurately interpreting specific subquestions and using information that is relevant:** It is essential that learners have a good understanding of these verbs. This is emphasised in the examination guidelines. Weaker candidates underachieve in the NSC examinations because they do not properly answer the specific questions and subquestions that are asked. Learners must be taught the meaning of the action words that are commonly used in the papers. Teachers are strongly advised to expose learners to key verbs such as 'comment', 'justify' and 'suggest'. Teachers are advised to use several past NSC papers that assess the same topic using different action words. These verbs should be included in both informal and formal assessment. This will enable learners to form a better understanding of the requirements of each question.

d. **Skills to be assessed:** Assessment should be of such a nature that it challenges the learners' ability to think beyond that which is simply presented in the textbooks. Learners need to be skilled in the application of knowledge. Analytical skills of learners need to be developed through data response questions.

e. **Real-life scenarios:** Learners show a serious lack of application skills which indicates a lack of depth in their subject knowledge. Learners need to be exposed to more real-life agricultural situations to enhance intensive learning. Where a practical demonstration is not possible, videos, magazines or internet articles can be productively used to illustrate aspects of the various topics more meaningfully. Teachers are advised to include scenarios and short statements when administering informal and formal assessment. They should first read and analyse scenarios with the learners before reading and analysing the questions which follow. Learners may be requested to formulate their own questions based on the scenario which would help them to have a better understanding of the rationale behind scenarios. Teachers should then develop structured follow-up questions.

f. **Enhancing arithmetical and mathematical skills:** Examination papers in Agricultural Sciences contain many arithmetical or mathematical processes, e.g. drawing graphs, calculating percentages or calculating units of measurement. Learners also seem to lack appreciation of the magnitude of the various units such as tons and kilograms. Regular, informal tasks on calculations incorporating these concepts are essential. It is of concern that some Grade 12 candidates cannot confidently handle these basic applications or calculations such as dividing by 1 000 to convert kilograms to tons. Teachers must not assume that learners have successfully engaged with these skills in other subjects or that learners have successfully transferred these skills from other subjects into the study of Agricultural Sciences.

g. **Use of past NSC papers:** Learners must have access to past examination papers but they should also be alerted to the limitations of past papers. It should be noted that, although past papers may cover the same content, they may have different foci, e.g. a question which asks for a *comment* requires a different response to a question which asks for *a justification* or *suggestion*.

h. **Reference to the *CAPS*, examination guidelines and previous diagnostic reports:** Teachers must teach and assess all content prescribed in the *CAPS* and examination guidelines. There might be topics that have not been covered in recent question papers, but they remain important content topics to be taught holistically. It is also imperative that teachers take note of comments and recommendations in previous diagnostic reports.

3.3 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General Comments

a. The performance of candidates in Q1 and Q2 has improved in comparison to that of 2017.

b. Performance in Q3 has declined from 47% to 39% in Q3. This may be attributed to handling facilities. Candidates showed an inability to identify the facilities, equipment and housing, their design features and purposes.

c. Performance in Q4 on *animal reproduction*, was like that of previous cohorts. However, the majority of candidates did not perform well in the reproductive cycle of a cow and male reproductive system. They also failed to interpret the hormone levels controlling the oestrus cycle.

d. Follow-up questions requiring motivation or justification are still poorly answered by the majority of candidates, indicating that candidates are not really exposed to these types of questions in the classroom.

General Suggestions for Improvement

a. Teachers should use the *CAPS* and 2017 examination guidelines when teaching and assessing formally and informally.

b. Informal assessment tasks should include subquestions where handling facilities and housing are included. Learners should be exposed to these facilities and livestock housing.

c. Teachers should assess learners on data response questions to improve learner ability to interpret questions.

d. Teachers need to be empowered in the English Across the Curriculum (EAC) programme to integrate English skills in the teaching, learning and assessment of the subject.

3.4 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 1

The following graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Figure 3.4.1: Average Marks per Question Expressed as a Percentage in Paper 1
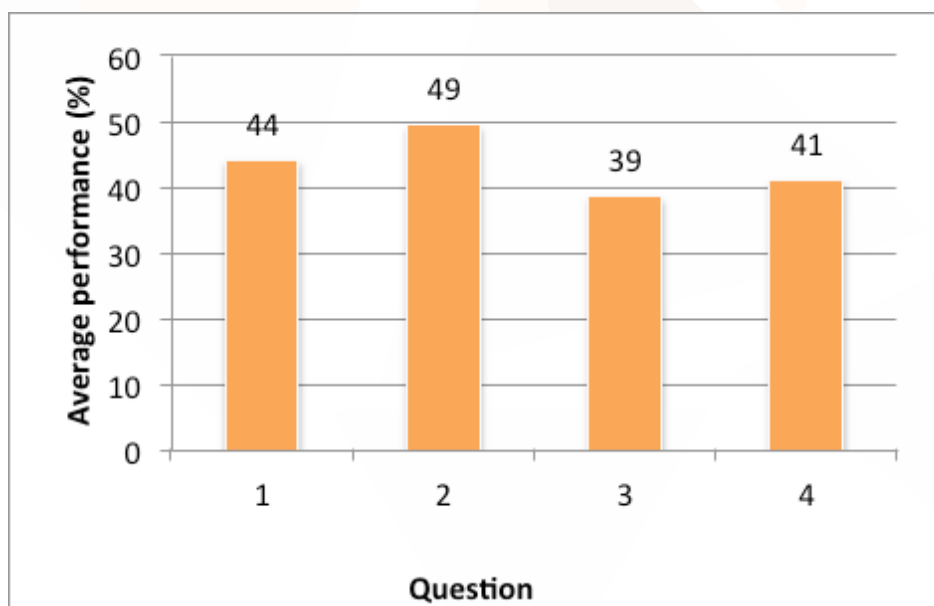
Q	Topic
Q1	Short questions
Q2	Animal nutrition
Q3	Animal production, protection & control
Q4	Animal reproduction

Figure 3.4.2 Average Marks per Subquestion Expressed as a Percentage in Paper 1
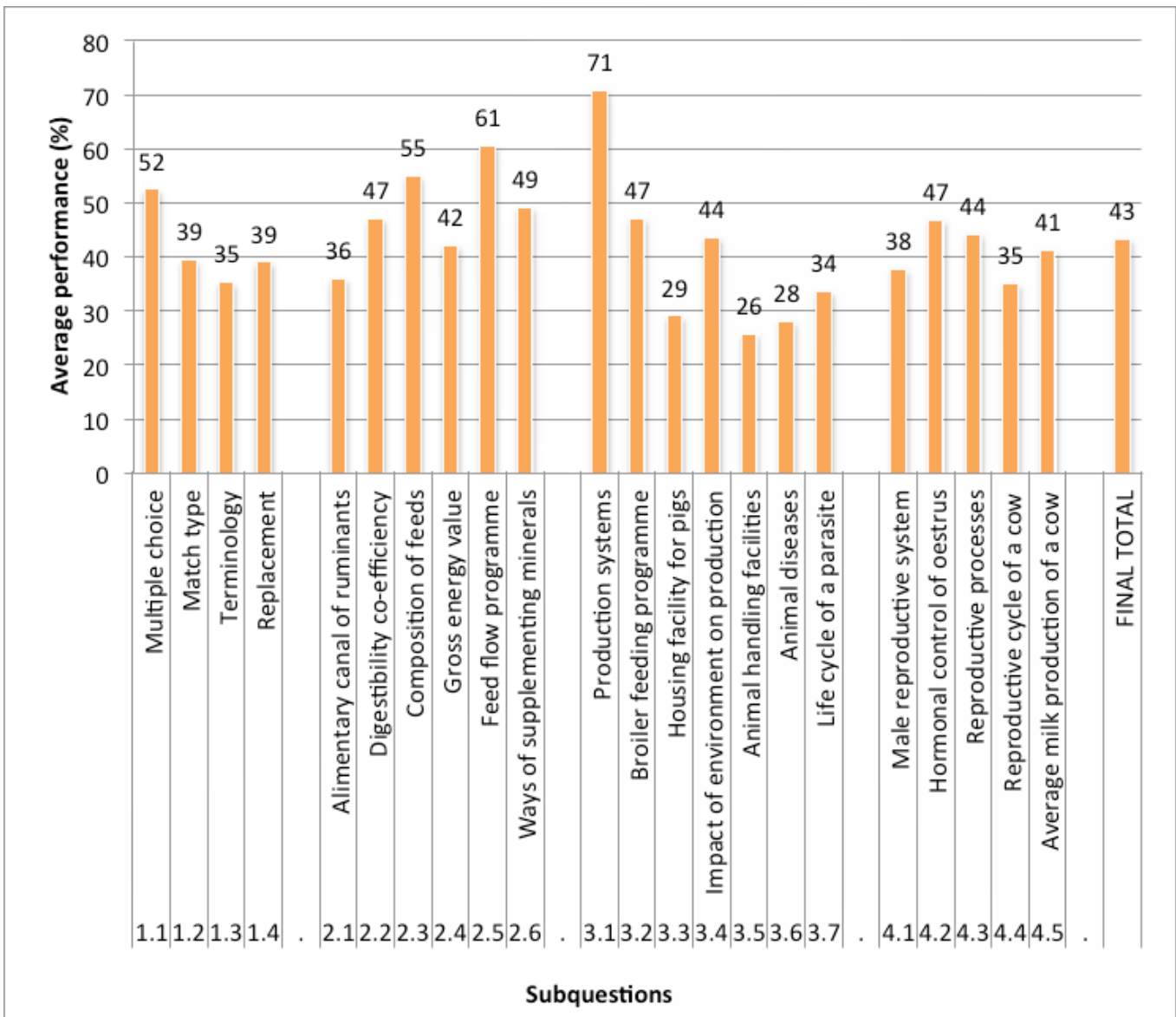
3.5 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 1

QUESTION 1: SHORT QUESTIONS (ANIMAL SCIENCES)

There has been an improvement in the answers for Q1.1 and Q1.2 in 2018. Many candidates seemed to be better prepared for the two questions than in the previous years but some are still guessing that they resort to giving responses in a particular pattern. They still disregard the instruction of writing A ONLY, B ONLY BOTH A AND B OR NONE even though it has been asked for some time now. Q1.3 and Q 1.4 on subject terminology is still a problem for the candidates based on the responses given for questions Q1.3.1, Q1.3.2, Q1.3.4, Q1.4.1 and Q1.4.3. It is evident that candidates are still struggling with terminology even though this has been raised in the past. This lack of terminology knowledge had an influence on questions such as Q3.3 to Q3.7.

Common Errors and Misconceptions

a. In Q1.1.2, some candidates failed to identify the volatile fatty acid; they were unable to make the correct combination of butyric, propionic and acetic as volatile fatty acids.

b. Q1.1.4 posed a challenge to the majority of candidates. They were unable to relate the chemical compound ATP with active transportation which supplies energy as opposed to diffusion where no carrier molecule is required.

c. Many candidates had challenges with all multiple-choice questions that had a combination of distractors, as in Q1.1.5, Q1.1.7 and Q1.1.9.

d. The performance in Q1.1.9 was even worse where the majority seemed unfamiliar with the correct sequence of milk release.

e. In Q1.3.1, *parakeratosis* was spelled incorrectly. Some candidates spelled the word *paralysiketosis*. In Q1.4.1 some candidates spelled 'Pearson' as Person'. Q1.4.4 rendered 'Dystocia' as 'Distocia' and 'Mesoderm' as 'Mezoderm' or 'Mexoderm' in Q1.4.5.

f. Some candidates had a challenge to give the correct response to '*nipple drinkers*' in Q1.3.2. Instead they referred to them as '*drinking troughs*, *pig drinkers*, *nozzle drinker*'. The reason might be that not all textbooks have the required information.

g. In Q1.3.4, some candidates confused 'Meiosis' with 'Mitosis' or 'Meiosis 2' which is the same as 'Mitosis'.

h. A number of candidates could not give the male reproductive cell in Q1.3.5. They wrote the process as 'spermatogenesis' instead.

i. Due to language barriers some candidates wrote 'infection' instead of 'infectious', a term for diseases that are transmissible. Others wrote 'Zoonotic' which refers to those diseases that are transmitted from animals to humans.

Suggestions for Improvement

a. Teachers need to compile a list of the terminology sourced from a variety of textbooks before starting a new topic. This will help learners to familiarise themselves with the terms or concepts of that particular content area.

b. Both subject advisors and teachers should compile a document that explains the common action words and the expected responses.

c. Development of interesting games like word puzzles, identification cards and PowerPoint presentations for the teaching of key concepts and improving the spelling should be considered.

d. The use of electronic technology, such as smart boards and the internet, could be utilised to improve the learners' reading abilities.

e. Teachers should train learners on how to identify the main phrases in the question in order to relate with the content learnt in order to respond accordingly.

f. Teachers should form a cohesive unit in their clusters for support to address challenging topics.

g. Provinces, together with teachers, need to prepare revision packs of all the topics which must be continuously used as informal tasks, in class revision sessions and as mock examinations, addressing the understanding of concepts

QUESTION 2: ANIMAL NUTRITION

Common Errors and Misconceptions

a. In Q2.1.1, some candidates could not identify the parts of the ruminant stomach as presented in the pictures. That affected them in subsequent questions.

b. Some candidates wrote the functions of rumen microbes instead of the requirements thereof in Q2.1.4.

c. Many candidates were unable to apply their knowledge with regard to the implications of the calculated value in Q2.2.2.

d. The majority of candidates could not classify the feed as a roughage in Q2.2.3. They just wrote 'hay' which is an example of roughage.

e. In Q2.3.2 and Q2.3.3, some candidates' responses indicated an inability to apply knowledge. They could not associate a feed with a narrow NR to be rich in proteins, therefore suitable for growing animals.

f. Some candidates showed a lack of application in constructing a relationship between the crude fibre content and the digestibility of a feed in Q2.3.4.

g. A number of candidates gave the correct figures but the incorrect units (kg) in Q2.5.3, even though the answer was in the table.

h. Candidates did not follow the instructions on the flow of energy of the 1 kg feed; instead they used a 5 kg feed (Q2.4.3).

i. In Q2.6, ways of supplementing minerals, were also not well-attempted by some candidates. They did not seem to understand the reason behind supplementing minerals.

Suggestions for Improvement

a. It is advised that different diagrams of alimentary canals should be taught simultaneously. A variety of textbooks and other resources should be used in this regard.

b. Pictures and posters that display the internal structures of the complex stomach could be of assistance to learners in understanding the parts and their functions better.

c. Carefully planned practical investigations and questionnaires will assist learners to develop an in-depth understanding of the content.

d. Explanation of concepts to learners for better understanding and the implication of the results after calculation, is important

e. Giving more exercises with different scenarios to learners is imperative in making them aware of the importance of following instructions.

f. Teachers are encouraged to give regular informal assessments on calculations and units of measurement.

g. Teachers need to train learners on the drawing of graphs and the guidelines on how to mark graphs should be explained.

QUESTION 3: ANIMAL PRODUCTION, PROTECTION AND CONTROL

Common Errors and Misconceptions

a. In Q3.1.1, some candidates used words such as *external* and *internal* instead of *extensive* and *intensive.*

b. Some candidates' responses were generalised in Q3.1.2. They wrote more about money or costs instead of how much capital is invested.

c. In Q3.2.2, some candidates could not correlate the feed programme presented in the table to support the higher protein in growth stage B. Instead they copied what was presented or gave irrelevant responses.

d. Many candidates did not understand the question in Q3.2.3. They included the nutrition which was an exception in the question. It showed a lack of analysis to give an accurate response.

e. Most candidates struggled to identify the facility in Q3.3.1. They gave responses such as *crush for pigs*, *pig facility*, *creep feeding facility*. They were then unable to respond correctly to design features even though the question led them to prevent piglets from getting hurt.

f. In Q3.3.3, the majority of candidates struggled to name the equipment or materials used in pig houses for heating and insulation of cold floors. They gave responses such as *lights and lamps* for Q3.3.3(a), *floor rugs*, *blankets*, *mats* for Q3.3.3(b) with a few exceptions who wrote *rubber mats*.

g. Some candidates could not pick the key condition impacting negatively on production in Q3.4.1 directly from the scenario. They wrote *hot or cold conditions*, without specifying the severity of the weather condition as *adverse weather condition.*

h. In Q3.4.3, the majority of candidates did not read the question that referred to extensive conditions thoroughly. They rendered responses such as *air conditioners or fans* for (a) and heaters for (b).

i. Some candidates had problems in identifying the facilities in Q3.5. They were also unable to differentiate between a *holding pen* and a *holding shed*. They also could not give the design features of a *crush*. They were also unable to give the purpose of a head clamp. This showed a lack of exposure to handling facilities and equipment.

j. Many candidates could not identify the animal diseases in Q3.6. They also failed to identify the mode of transmission and symptoms. Some wrote direct contact for *TB* and *red water*. In some instances, they wrote *tick* instead of *blue tick*.

k. In Q3.7.4, some candidates confused the role of the state to that of a farmer in controlling the spread of tapeworm. Their responses included deworming, vaccination and quarantining.

Suggestions for Improvement

a. Teachers should emphasise the different techniques, tools or structures utilised to handle farm animals. This will be achieved by exposing learners to demonstrations of the actual devices.

b. Learners should be encouraged to have access to these tools, equipment and facilities through the internet, periodicals and magazines.

c. Teachers should emphasise the impact of diseases and parasites on production enterprises, they should not just focus on the types of diseases and parasites.

d. Teachers are encouraged to ensure that the specific roles of the state and of the farmer are clearly demarcated from any other measure to control diseases and parasites.

e. Intensified revision of the work using charts and tables on diseases and parasites is necessary as the information is vast and might cause confusion.

QUESTION 4: ANIMAL REPRODUCTION

Common Errors and Misconceptions

a. In Q4.1.3, some candidates could not give the congenital defect. This means that they did not understand that such defects are inherited or born with. They responded with broken penis, injuries and diseases, among others.

b. Many candidates were unable to distinguish between infertility and sterility. Instead they gave the congenital defects of the testes such as *cryptorchidism* in Q4.1.4.

c. In Q4.2.3, some candidates wrote the general signs of oestrus, such as bellowing, drop in milk production, rather than the visible signs.

d. The majority of candidates could not arrange the reproductive processes in chronological order in Q4.3.1. They did not comply with the requirements of the question. They rewrote the letters in chronological order (A, B, C, D and E) and then the perfect order of appearance in words.

e. Most candidates failed to identify the month in Q4.4.1. They opted for June since pregnancy started in that month.

f. In Q4.4.2, most candidates could not apply themselves as to why the cow may not conceive. They responded with *the cow was already pregnant* or *it is on dry period*. All those showed a lack of analysis, comprehension and application skills.

g. Most candidates wrote *lactation*, *gestation* and even *pregnancy* for Q4.4.4 instead of *parturition*.

h. In Q4.5.1, some candidates associated the sixth month with June. The question had no indication of calendar months meaning the sixth month could be any month.

i. The majority of candidates wrote their own observations on milk production, fat content and crude fibre content in.Q4.5.4. They failed to show the relationship between *crude fibre* and *fat content*.

Suggestions for Improvement

a. In the teaching of the reproductive processes, learners should be taught that anything that is visible is what can be seen in a real-life situation. Teachers are therefore encouraged to make arrangements with institutions where these processes are practised so that learners can observe them.

b. In presenting the oestrus cycle, synchronization of oestrus cycle, artificial insemination, stages of pregnancy, embryo transfer, parturition and other reproductive processes, teachers should use flow diagrams, projections and schematic representations to identify key characteristics, hormones and processes as indicated in 2017.

c. Teachers must clearly differentiate between *sterility* and *infertility* in both male and female animals as well as the causes.

d. Learners must be drilled through assessment tasks to adhere to instructions.

3.6   OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General Comments

a. In general the performance of candidates indicates an improvement in the use of subject terminology. The graph on average per question reflects an improvement in 2018 when compared to 2017 for QUESTION 1. This is a question mainly on terminology. Despite the improvement, the majority of candidates struggled with Q1.4, which is a replacement question. There are still instances where candidates simply answer the question by indicating TRUE or FALSE. The question requires that candidates replace the incorrect word to make the statement TRUE.

b. Q4 on genetics was poorly answered. This was due to unsatisfactory answers on breeding systems (Q4.2), genetically modified organisms (Q4.3) and patterns of inheritance (Q4.5).

c. There was also poor performance in questions on land as a production factor (Q3.1 and Q3.2).

General Suggestions for Improvement

a. As stated in 2017, the teaching of genetics should be enhanced by providing practical examples within the learning site, such as plants, flowers and livestock. There should also be integration with Life Sciences, as genetics is taught comprehensively in Life Sciences.

b. Teachers must still ensure that all topics stipulated in the *CAPS* are comprehensively covered. Learners should also be encouraged to undertake a questioning approach, to learn from real-life situations and to undertake informal extra research.

c. A mind map should be used to introduce each content topic with reference to the *CAPS* instead of the textbooks.

d. Strategies to enhance learners' skills in understanding terminology, and mathematical and arithmetical calculations and procedures have been covered in this report. These strategies are particularly relevant to topics covered in this paper.

3.7   DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

The following graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Figure 3.7.1: Average Marks per Question Expressed as a Percentage in Paper 2
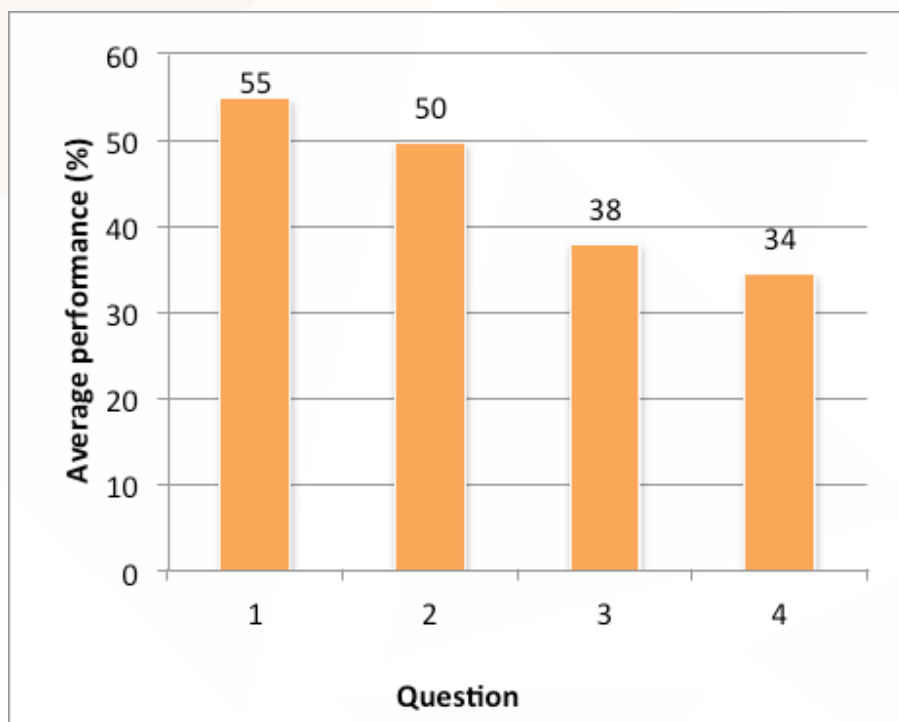
Q	Topic
Q1	Short questions
Q2	Agricultural Management and Marketing
Q3	Production Factors
Q4	Agricultural Genetics

Figure 3.7.2:Average Marks per Subquestion Expressed as a Percentage in Paper 2
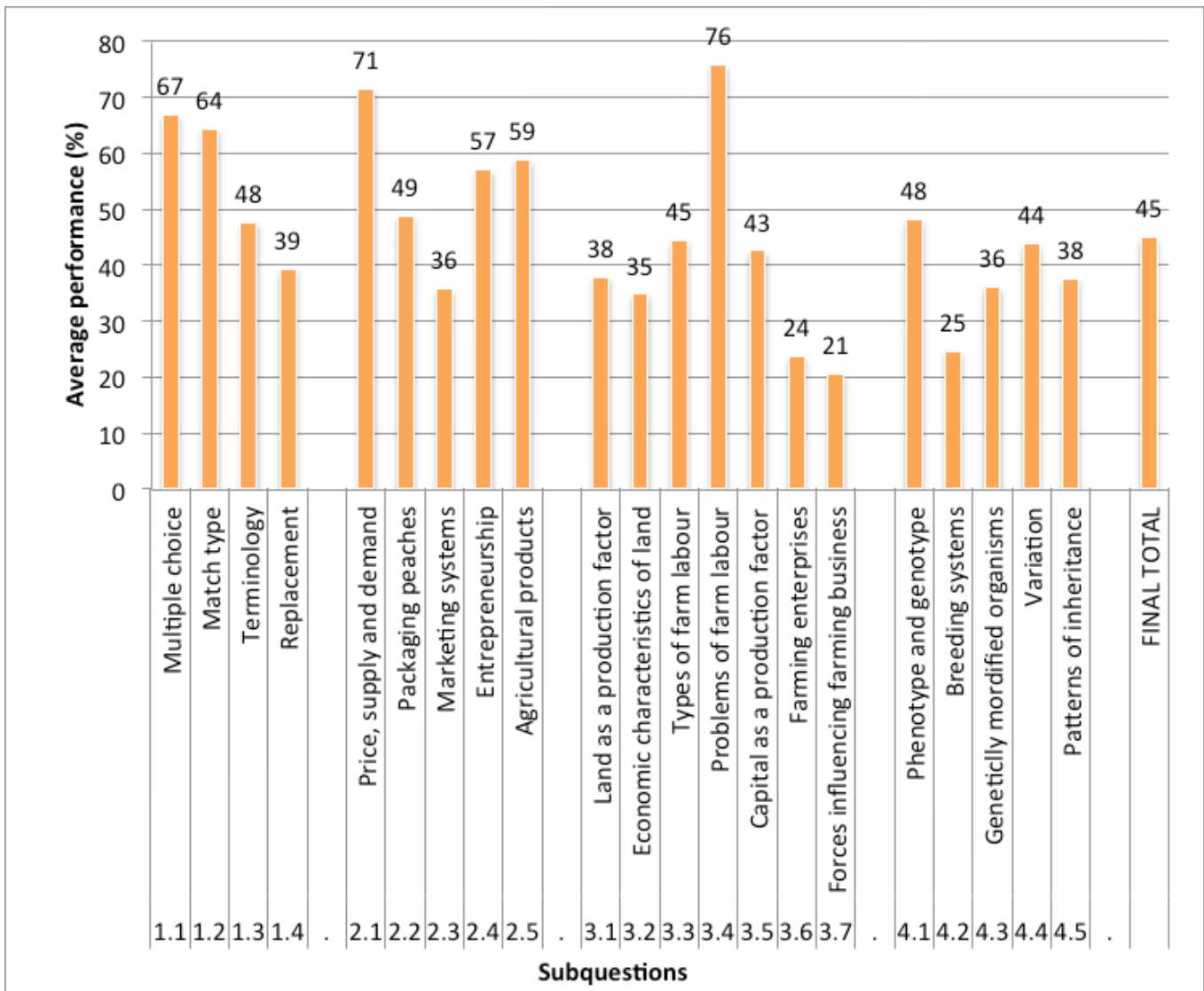
3.8 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

QUESTION 1: SHORT QUESTIONS (AGRICULTURAL MANAGEMENT AND GENETICS)

Common Errors and Misconceptions

a. In Q1.1.1, some candidates confused *business plan* with the *SWOT analysis* tool.

b. Although the calculation in Q1.1.5 was simple, some candidates found it difficult to arrive at the correct answer. Some candidates could not choose the correct use of long-term credit in Q117.

c. In Q1.2.3, many candidates confused *credit* with *savings* as an internal source of capital. They actually overlooked *internal* as a key word.

d. Many candidates responded to Q1.3.1 as *niche marketing* instead of *market segmentation*. It was evident that candidates had challenges with the terminology.

e. Many candidates provided answers like *heterozygous* and *homozygous* instead of *hybrid* in Q1.3.3.

f. In Q1.4, some candidates still responded by writing TRUE or FALSE instead of providing a word that would make the statement TRUE.

g. Poor performance in Q1.4.1 was because candidates confused *distribution* with *transportation*.

h. In Q1.4.5, spelling was a challenge to learners, e.g. *ativism* instead of *atavism*.

Suggestions for Improvement

a. Teachers should provide enough time for learners to debate and hone subject terminology.

b. Various games should be infused into the teaching of some concepts, e.g. word puzzles.

c. Learners should be encouraged to write a glossary of the various concepts pertaining to the subject.

d. Teachers should guide learners sufficiently on how to respond to 'replacement' questions. This can be done through class and speed tests.

QUESTION 2: AGRICULTURAL MANAGEMENT AND MARKETING

Common Errors and Misconceptions

a. Some candidates started with either *demand* or *supply* instead of the *price* in Q2.1.2. *Demand and supply* depend on the *price* and not vice versa. Some would define the three concepts to show relationship.

b. In Q2.2.1, instead of writing *packaging*, some candidates wrote responses like *production* and *processing*.

c. Poor performance was observed in Q2.3.1 as candidates' responses indicated that they did not understand the free marketing system. They could not relate the channels of free marketing with the statements given.

d. In Q2.3.4, candidates were expected to compare co-operative and free marketing systems with reference to price. Their comparison was general and some went to the extent of defining the concepts.

e. Q2.5.1 required candidates to draw a bar graph on plant products only; instead, they plotted animal products on the graph. They also struggled to provide the correct calibration for both axes.

Suggestions for Improvement

a. Teachers are advised to assess learners on *demand*, *supply* and *price* through graphs and relationships.

b. It is very important to teach content holistically and not per topic (in a vacuum). This enable learners to see the connection between different topics relating to the same content, e.g. the marketing chain should be taught in conjunction with marketing functions such as packaging, transportation, processing and storage (retailing).

c. Using real-life scenarios in the teaching of marketing systems (i.e. free marketing and cooperative marketing systems) will enable learners to describe the size of the target market.

d. When teaching the drawing of a graph, it is important that learners are made aware that the independent variable should always be on the x-axis and the dependent variable should be on the y-axis. When drawing the graph, the following criteria should be taken into consideration:

* Correct heading

* Type of graph (bar/line)

* X-axis correctly labelled

* Y-axis correctly labelled

* Correct units on both axes

* Accuracy

QUESTION 3: PRODUCTION FACTORS

The performance of candidates in Q3.1 and Q3.2 on land as a production factor was not satisfactory. This was also evident in Q3.6 (risk management strategies) and Q3.7 (forces influencing the farming business).

Common Errors and Misconceptions

a. Many candidates confused the economic functions of land, as seen from the two pictures with economic characteristics of land in Q3.1.1

b. In Q3.1.3, some candidates failed to see the benefit of land in sourcing finance and that it can be bought and sold instead of indicating that it acted as collateral.

c. Some candidates found it difficult to associate economic characteristics of land with the given statements in Q3.2.

d. In Q3.5.4, a few candidates failed to use the correct formula to calculate profit. Instead of subtracting expenditure from income some multiplied, and others divided.

e. Some candidates wrote *specialisation* instead of *hedging* as the risk management strategy described by the statement in Q3.6.1.

f. Poor performance in Q3.7.1 was because most of the candidates struggled to give examples of external factors affecting the farming business.

g. In Q3.7.2, some candidates failed to provide the sources of risks as described by the given statements.

Suggestions for Improvement

a. In teaching, learning and assessment of production factors (land, labour, capital and management) all aspects and labour contracts should be considered, as prescribed by the *CAPS* policy document.

b. Interpretation of graphs and the application of knowledge should be emphasised through regular integration into informal assessments.

c. Teachers should regularly assess learners on the calculation of profit and hone the understanding of the concept which will help with the comprehension of the formula.

QUESTION 4: BASIC AGRICULTURAL GENETICS

Common Errors and Misconceptions

a. In Q4.1.2, some candidates failed to provide a *phenotypic ratio* that indicated the colour. They wrote 3:1 instead of 3 white: 1 brown.

b. The majority of the candidates failed to identify the different breeding systems in Q4.2.1. Instead of identifying the breeding systems represented, they identified letters in the illustration.

c. Candidates failed to read and understand the flow chart in Q4.2.2. They interpreted progeny E as a pure breed instead of a hybrid.

d. In Q4.3.3, many candidates responded by giving the general negative effects of GMO rather than the negative *impact* of GM crops on the environment.

e. Poor performance in Q4.4.1 and Q4.4.2 was because some candidates identified characteristics in the scenario instead of types of variation.

Suggestions for Improvement

a. Teachers should give special attention to basic crossings, genetic concepts and terminology in their teaching of basic genetics.

b. Different breeding systems should be taught to learners, using real-life agricultural examples. Learners should also be taken to breeding stations for practical exposure. Teachers are encouraged to teach these systems concurrently and to use illustrations. In this way, learners will be able to understand the concepts better and to differentiate between the different systems.

c. Teachers should emphasize that any letter of the alphabet can be used to represent the gametes and that they should use letters when plotting the gametes in the Punnet square.

d. Subject advisors should conduct content workshops to address shortcomings in the content area related to genetics.

CHAPTER 4

BUSINESS STUDIES

The following report should be read in conjunction with the Business Studies question paper of the November 2018 examinations.

4.1   PERFORMANCE TRENDS (2014–2018)

The number of candidates who wrote the Business Studies examination in 2018 decreased by 12 710 candidates compared to the number in 2017. The performance of candidates in Business Studies has been on the decline in the past five years and has dropped from 77,9% in 2014 to 64,9% in 2018 at the 30% level; and from 53,8% to 40,1% at the 40% level. Although there were aspects of the paper that reflected positive progress, the general decline in performance remains a cause for concern and requires creative strategies to halt and reverse this trend.

Table 4.1.1 Overall Achievement Rates in Business Studies

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	207 659	161 723	77,9	111 743	53,8
2015	247 822	187 485	75,7	127 453	51,4
2016	234 894	173 195	73,7	116 225	49,5
2017	204 849	139 386	68,0	87 535	42,7
2018	192 139	124 618	64,9	77 105	40,1

The past five years have reflected a gradual decline in the overall results. It was envisaged that candidates' performance will improve in 2018 since many questions were repeated from past NSC papers even though the phrasing of these questions was different in the 2018 paper. Candidates were expected to perform well on topics such as Business Role and Business Ventures as these topics are considered to be less challenging than Business Environments and Business Operations. It is also noticeable that legislation poses a challenge to many candidates since they are expected to analyse/evaluate the impact of the Acts on businesses and make recommendations for improvement. This topic is perceived as the most challenging in grade 12 and it covers15% of the syllabus and legislation overlaps to Business operations.

Other topics that demand a solid foundation of the content and procedures covered in previous grades, such as forms of ownership and quality of performance, show mediocre progress. The perception might be that as this content is covered in previous grades, teachers consequently do not devote sufficient time to review such topics in Grade 12. This compromises candidates' ability to analyse and apply knowledge on these topics in the NSC papers.

Teachers and subject advisors tend to focus their intervention strategies on specific topics or aspects that are new to the Grade 12 syllabus, such as legislation, business strategies, leadership styles and theories, and total quality management (TQM). Exemplar papers and questions from previous papers are usually used as the main resources. These topics are generally well answered by most candidates, however, it is a concern that topics covered in Grades 10 and 11 do not appear to receive a similar level of focus.

Graph 4.1.1 Overall Achievement in Business Studies (Percentage)

	2014	2015	2016	2017	2018
■ % achieved at 30% and above	77.9	75.7	73.7	68.0	64.9
■ % achieved at 40% and above	53.8	51.4	49.5	42.7	40.1
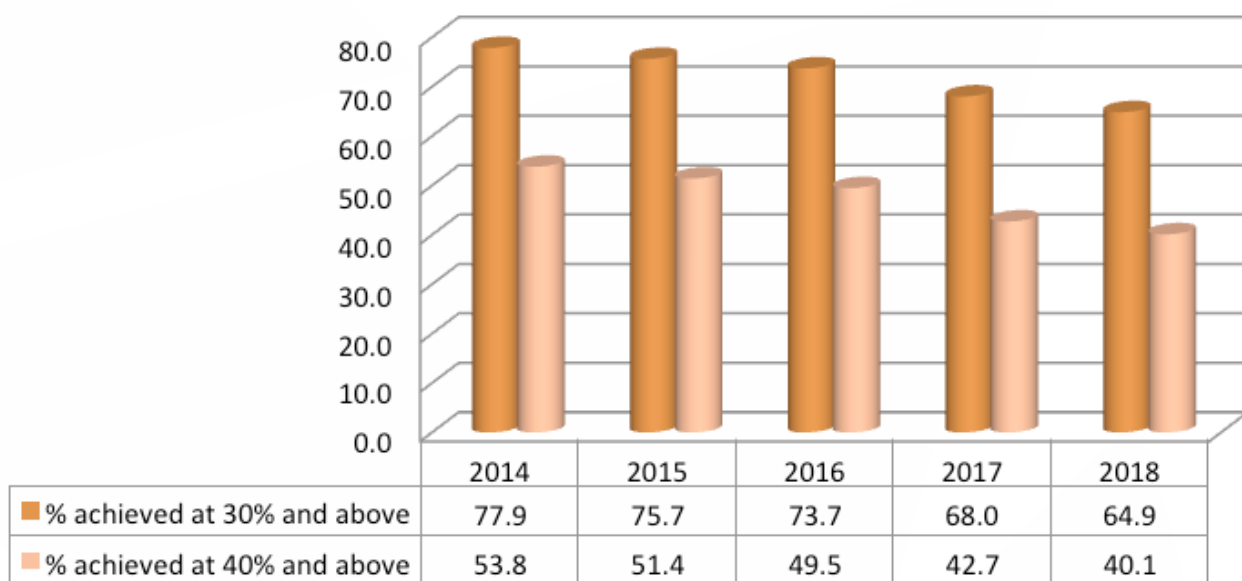
Graph 4.1.2 Performance Distribution Curve in Business Studies (Percentage)

	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	0.3	6.1	15.8	24.1	21.2	15.6	9.5	5.0	2.1	0.4
2015	0.6	6.9	16.8	24.2	20.7	14.8	8.9	4.6	1.9	0.4
2016	0.9	8.2	17.2	24.3	20.5	14.2	8.3	4.4	1.8	0.4
2017	0.9	10.3	20.8	25.3	18.9	12.4	7.1	3.3	1.0	0.1
2018	1.5	12.2	21.4	24.7	17.8	11.3	6.4	3.2	1.2	0.2
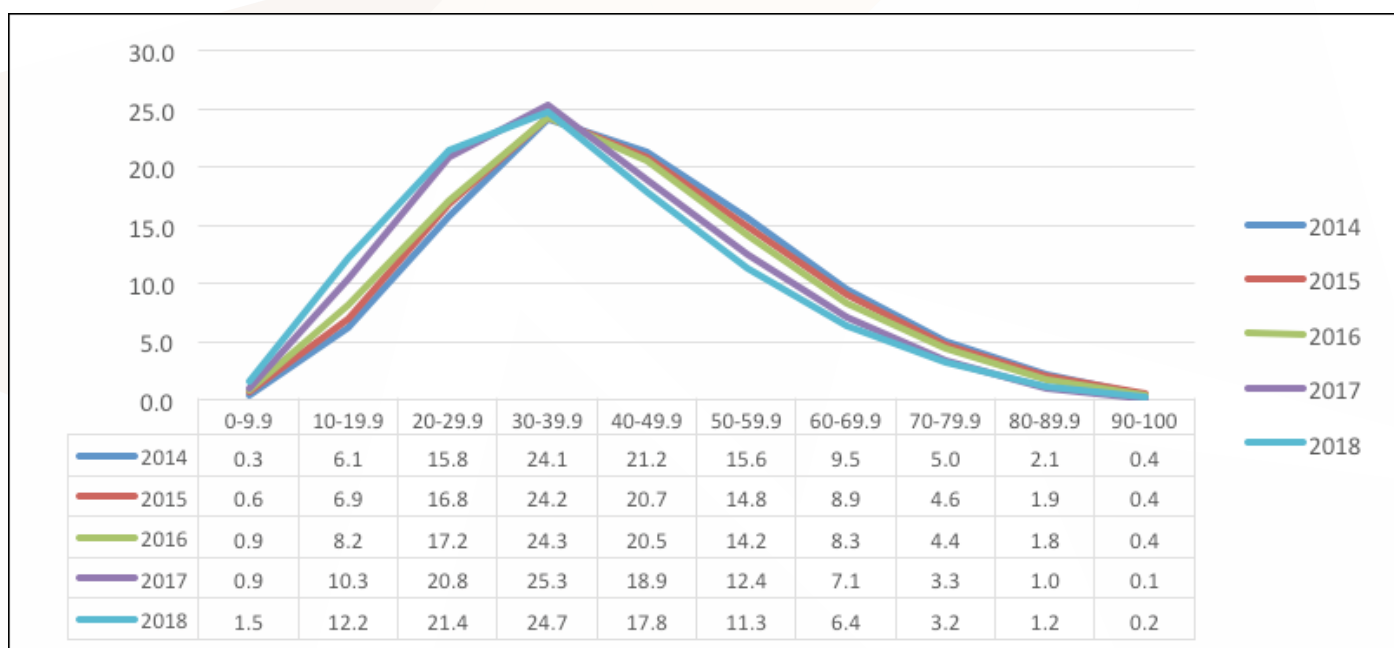
4.2 OVERVIEW OF LEARNER PERFORMANCE

General Comments

a. Some candidates did not answer SECTION A even though this was compulsory. Others gave two answers instead of one and they were penalised for this error.

b. There were some candidates who did not perform well because they failed to follow instructions, e.g. answering four questions instead of three in SECTION B and one question in SECTION C instead of two.

c. Those candidates who wrote incomplete quotes or rephrased sentences from scenarios were penalised.

d. Many candidates were unable to identify concepts from scenarios. This negatively affected their responses to follow-on questions, and they subsequently lost the marks.

e. Many candidates wrote vague and incomplete responses to questions that required full sentences.

f. While some candidates obtained marks for factual aspects in the essay questions, many did not receive credit for their analysis/interpretation. Vague and incomplete facts were evident in subquestions that required a greater depth of understanding, reasoning and application.

g. Candidates did not perform well in questions that have appeared regularly in previous examination papers but that were phrased differently in the 2018 NSC papers. Examples of these questions are: Q3.3, Q4.3, Q4.6, Q5.3 and Q6.3.

h. In SECTION B, many candidates had difficulty in responding to questions that required application of knowledge and insight. It appeared that they had not been exposed to indirect higher-order questions during the academic year. Examples of such questions are Q2.6 which required identification of relevant legislation (i.e. the specific Act) in addition to the evaluation of the impact of the Act on businesses; and Q4.3 which required identification of stages of team development from a scenario in addition to discussion of other stages.

i. Many candidates could not answer Q4.5. This was a question that was asked for the first time in the 2018 NSC papers. It appears that candidates relied heavily on past papers or that this topic was not adequately assessed during the academic year.

General Suggestions for Improvement

a. SECTION A questions should form an integral part of both informal and formal assessment. As there is only one correct answer to the questions in SECTION A, learners may not choose more than one option. Learners who provide more than one option are not credited with marks.

b. Learners must be exposed to the structure of the paper as per *Circular S7 of 2013*. The structure of the mid-year and preparatory examinations must be in accordance with this structure. They should be advised on how to identify the specific requirements for each section and how to structure their responses accordingly.

c. It must be emphasised that scenarios should be included in both formal and informal assessment tasks. Learners must be advised to quote in full sentences to avoid losing marks unnecessarily.

d. Learners should be advised about the purpose of scenarios in the question paper, e.g. to identify concepts, challenges and to make recommendations. It is therefore imperative that learners should not only understand concepts but must also be able to identify these from given scenarios/statements.

e. Teachers are advised to refer to notes 13.1 and 13.2 of the 2018 November marking guidelines (p. 6). These notes should be pasted in learners' books as they guide them on how to respond to instructional verbs, as well as to the nature and context of each question.

f. Learners must become familiar with the marks allocated to insight in essay questions. Teachers are advised to demonstrate the marking of essay questions and the allocation of marks to *layout*, *analysis*, *synthesis* and *originality* (LASO). This may motivate learners to write full sentences and to aim to obtain at least 16 or more marks for each essay in SECTION C.

g. Teachers are requested to refrain from over-reliance on previous examination papers. They should phrase questions differently or develop new questions that assess the same topic. They must refer to 13.1 and 13.2 (2018 November marking guidelines) as a guide for setting questions.

h. There needs to be greater emphasis on the learning of appropriate terminology related to the various topics. Teachers should use the following strategies to improve the teaching of terminology:

* Illustrate the meaning of new terms by using them in sentences and in short scenarios.

* Identify new terms in every lesson; write them on the board and elaborate on the meaning and context of each.

* Encourage learners to be attentive during lessons; to spot new terms and to find their meanings in a dictionary or textbook. This may form the basis of an informal class 'competition'.

* Include Business Studies terminology in all informal assessment tasks on a daily basis.

* The meanings of verbs that are commonly used in Business Studies should be mediated and pasted in the learners' books.

* Copies of examination guidelines must be given to the learners. They must also be advised of the requirements or expectations of key verbs in each subtopic.

4.3 DIAGNOSTIC QUESTION ANALYSIS

The following graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degree of challenge of each question, as experienced by candidates.

Graph 4.3.1 Average Marks per Question Expressed as a Percentage
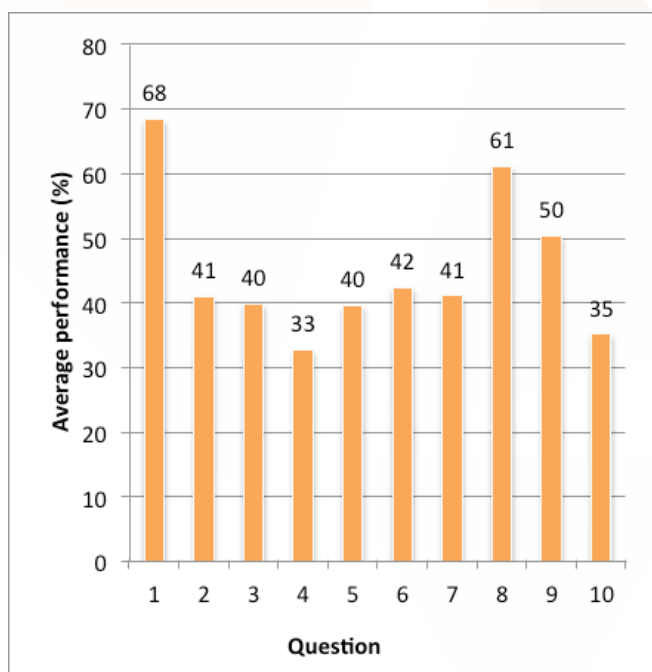
SECTION A: COMPULSORY	
Q1	Multiple choice, choosing correct words and matching columns
SECTION B: CHOICE QUESTIONS	
(ANY THREE)	
Q2	Business Environment
Q3	Business Ventures
Q4	Business Roles
Q5	Business Operations
Q6	Miscellaneous
SECTION C: CHOICE QUESTIONS	
(ANY TWO)	
Q7	Business Environment: Legislation
Q8	Business Ventures: Investments and forms of ownership
Q9	Business Roles: CSR and CSI
Q10	Business Operations: Quality of performance

Figure 4.3.2 Average Marks per Subquestion Expressed as a Percentage
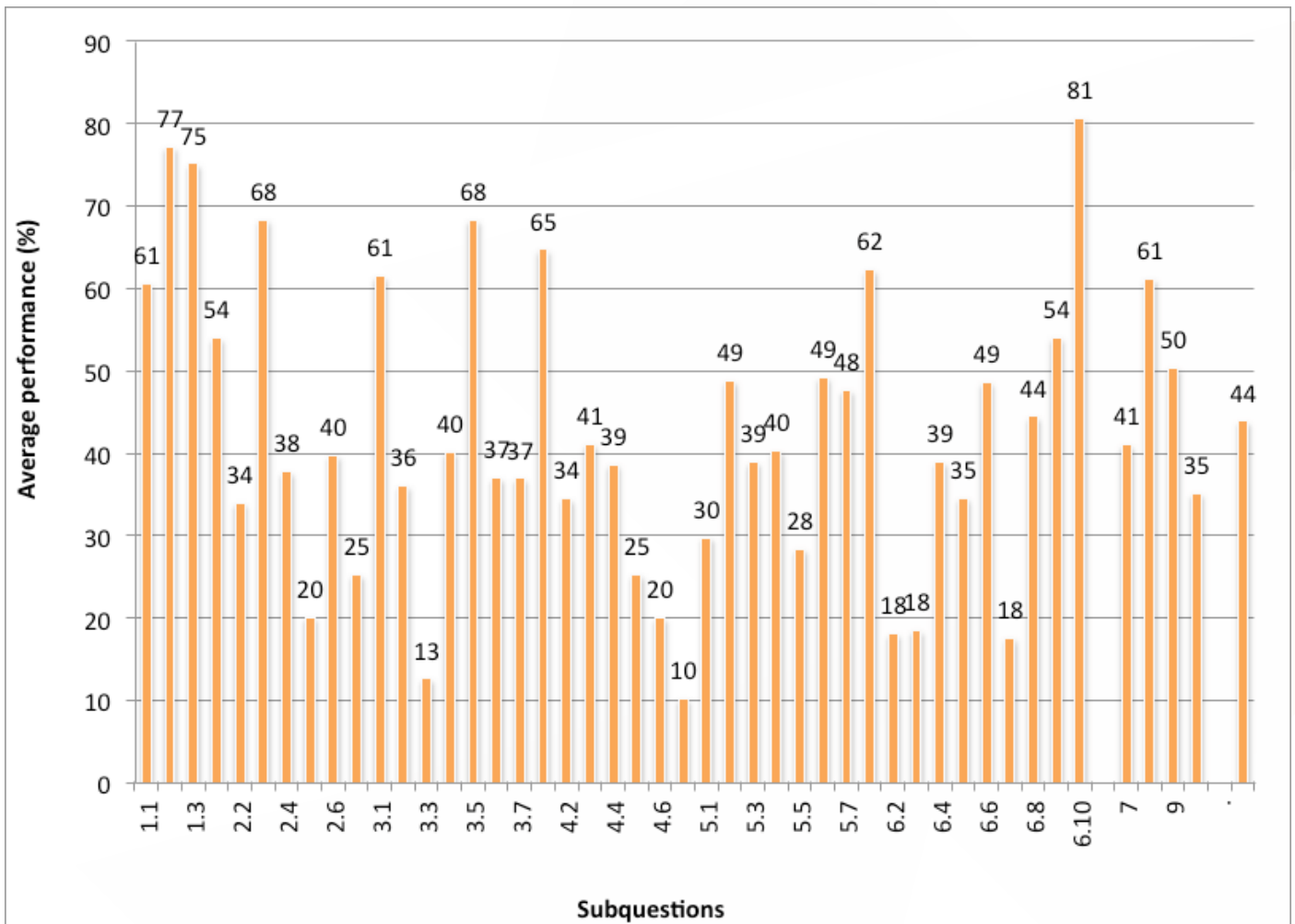
	Topics/Aspects			Topics/Aspects			Topics/Aspects
1.1	Multiple choice		4.1	Causes of conflict		6.1	PESTLE elements
1.2	Missing words		4.2	Benefits of diversity		6.2	Intensive strategies
1.3	Match columns		4.3	Team development stages		6.3	State-owned companies
2.1	BBBEE		4.4	Creative thinking		6.4	Insurance concepts
2.2	SETAs		4.5	Force-field analysis		6.5	Unfair advertising
2.3	Business sectors		4.6	Difficult personalities		6.6	Problem-solving
2.4	Diversification		4.7	Social rights		6.7	Pricing goods in rural areas
2.5	BCEA		5.1	Internal recruitment		6.8	Placement
2.6	EEA		5.2	Induction		6.9	Salary determination
2.7	Strategy evaluation		5.3	Interviews		6.10	Employment contracts
3.1	Insurable risks		5.4	Job description & spec.		7	Legislation
3.2	Ordinary shareholders		5.5	TQM elements		8	Investment & ownership
3.3	Leadership theory		5.6	Impact of TQM		9	CSR & CSI
3.4	Forms of ownership		5.7	Quality management		10	Quality of performance
3.5	Interest calculation						
3.6	Insurance principles						
3.7	Visual aids						

4.4 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS

SECTION A: MULTIPLE-CHOICE/SHORT ANSWER QUESTIONS

QUESTION 1: COMPULSORY (MULTIPLE CHOICE, CHOOSING CORRECT WORDS AND MATCHING ITEMS)

The performance of candidates in this question ranged from excellent to moderate. Some candidates chose incorrect answers because they could not respond to questions that required them to apply knowledge and insight.

Common Errors and Misconceptions

a. In Q1.1.2, many candidates could not identify the correct answer for Porter's Five Forces model from the option given. They still lack the ability to apply knowledge and use critical thinking and analysis skills to answer higher-order questions.

b. Many candidates were able to identify the insurance concept that was applicable to the given statement in Q1.1.5. They confused the word 'excess' with 'interest'.

c. In Q1.1.6, some candidates confused the bureaucratic with the autocratic leadership style.

d. The majority of candidates could not identify the correct King Code principle from the given statement in Q.1.8. They confused transparency with responsibility.

e. In Q1.2.1, many candidates' responses were based on a business plan instead of a strategy. It appears that the word 'plan' in the statement might have misled them not to read the complete statement.

f. In Q1.2.4, many candidates confused fringe benefits with compulsory benefits.

g. In Q1.3.3, the meaning of inclusivity was confused with the meaning of discrimination.

h. Candidates' performance was disappointing in Q1.3.4 as they confused the concepts of a conflict and a grievance.

i. Many candidates did not know the selection procedure in Q1.3.5 even though this question was asked in the 2017 NSC paper.

Suggestions for Improvement

a. Teachers must include short scenarios and statements in SECTION A so that learners acquire problem-solving and analytical thinking skills. Subject advisors should develop question banks on SECTION A questions.

b. Learners must be informed that each subquestion in SECTION A has a distractor and that they have to be well conversant with content. Teachers and subject advisors must include a distractor for each subquestion in SECTION A. This must be done in both formal and informal assessment tasks.

c. Learners must be able to explain and identify insurance concepts that are stated in the 2017 examination guidelines. Examples/Copies of insurance contracts may be used to enhance understanding.

d. Teachers must use key words that provide a clear distinction between bureaucratic and autocratic leadership styles, e.g. the word 'procedure' should be used to differentiate between these leadership styles.

e. The meaning of transparency, sustainability and responsibility should be well explained before learners are taught how businesses should apply these principles for good co-operate governance.

f. Learners must be encouraged to read and understand the requirements of each question before formulating answers.

g. It should be noted that the Unemployment Insurance Fund (UIF) is the only compulsory benefit when compared to other types of fringe benefits. This must be emphasised during teaching and learning.

h. The main aim of inclusivity is to ensure that the workplace represents the demographics of the country and that businesses do away with discrimination.

i. It should be noted that a grievance involves one employee who has a complaint while conflict involves two people in the workplace. Practical examples and demonstrations should be used to illustrate the difference between these concepts.

j. Note that the selection procedure takes place after the recruitment procedure. Learners must be able to differentiate between these procedures.

SECTION B: LONGER AND PARAGRAPH QUESTIONS, USING CASE STUDIES AND INFORMATION (THREE QUESTIONS TO BE ANSWERED)

QUESTION 2:   BUSINESS ENVIRONMENT

The performance of candidates who attempted this question varied from average to poor, as content in this main topic tends to be abstract e.g. legislation, business sector and strategies.

Common Errors and Misconceptions

a. In Q2.1, some candidates could list only ownership and management, they could not list other pillars of BBBEE. They were expected to perform well in this question as this was an essay question in November 2017 NSC paper.

b. In Q2.2, many candidates confused the role of SETAs with either the purpose or advantages of the Skills Development Act. This question remains a challenge as it has been asked in many previous NSC/SC papers.

c. In Q2.3, some candidates could not quote directly from the given scenario and some quotes were incomplete. Others could not link the business environment to the challenges from the given scenario or could not link the extent of control of each of the identified business environments. Others provided strategies that businesses could use to deal with the given challenges. This could be attributed to the inability to understand the requirements of the question.

d. In Q2.4, some candidates wrote only on types of diversification strategies, they could not describe each type, while others simply explained types of defensive strategy, possibly due to the fact that these strategies have been asked many times in past exam papers. Some candidates gave examples of diversity issues which do not form part of business environments. Others confused the meaning of concentric diversification with horizontal diversification. It could have been that types of diversification strategies may not have been adequately assessed during the academic year.

e. In Q2.5, many candidates' responses were based only on the provisions of the BCEA instead of on the purpose. Some responses were based either on the Employment Equity Act or the Labour Relations Act. Some candidates explained the impact of BCEA as protecting employee rights in the workplace.

f. Although many candidates could identify the Employment Equity Act in the given scenario in Q2.6.2, they could not evaluate the impact of this Act on businesses. Many candidates provided one-word answers, such as discrimination, unfair treatment and equality. Some confused the EEA with COIDA as the scenario makes reference to 'people with disability'. This was not read in context.

g. Many candidates performed well in Q2.7 even though some candidates confused the steps in strategy evaluation with either problem-solving steps or the strategic management process. Candidates were expected to perform very well in this question since this topic has been assessed in many NSC past papers.

Suggestions for Improvement

a. Teachers must be aware of two options of BBBEE pillars and use practical examples/newspaper article when explaining the implications of these pillars on businesses. It should be noted that only one of the options must be taught. Learners may be required to visit businesses and interview managers on the extent in which they comply with BBBEE.

b. It should be noted that SETAs are the implementers of the SDA as they put systems in place to ensure that the Act is effectively implemented. Learners must know that SETAs do not train employees, they provide accreditation for skills development facilitators. Subject advisors should conduct a workshop on the Skills Development Act and highlight the importance of SETAs in supporting this Act.

c. Learners must be taught how to analyse scenarios before attempting to answer questions. Teachers must identify key words from scenarios that will guide learners on how to respond to the requirements of questions. Teachers are requested to read scenarios with the learners and request them to formulate their own questions based on these scenarios then give them structured follow-up questions. Incorrect quotes should be penalised during the academic year.

d. Practical examples and demonstrations must be used when teaching business strategies. Learners can be requested to visit shopping centres/malls and identify types of business strategies and motivate or justify their answers. Subject advisors should encourage Professional Learning Committees (PLC) to focus on this topic during their meetings. Twinning of schools can also be encouraged to share good practices on how to teach and assess business strategies.

e. A clear distinction must be made between the BCEA and the EEA. The former regulates the basic conditions of employment and guards against labour exploitation, while the latter promotes fair treatment and equal opportunities in the workplace.

f. Learners can only be well conversant with the impact of the EEA on businesses if the purpose of the EEA is well explained. They can be encouraged to suggest the impact of this Act on businesses before this is explained in detail.

g. Teachers are advised to teach legislations in a tabular format, i.e. including the purpose, impact, penalties and compliance. This will give learners an opportunity to understand the differences between various Acts.

h. Learners must be discouraged from writing one-word answers as they need to clearly outline, explain, suggest or advise businesses on the steps that they should follow when evaluating a strategy. Learners should be informed that formulating the strategy and implementing the strategy will no longer be accepted as part of the steps in evaluating a strategy in 2019.

QUESTION 3: BUSINESS VENTURES

Performance of candidates ranged from average to poor. Candidates were expected to perform better on this question as only one part had not been asked in previous papers.

Common Errors and Misconceptions

a. Although candidates performed well in Q.3.1, some confused examples of insurable risk with either types of insurance or insurable interest. This question has been asked in many previous NSC papers.

b. Many candidates provided general statements on the rights of ordinary shares in Q3.2. Others confused these rights with human rights in the workplace. Some wrote about the characteristics of ordinary shares. It could have been that candidates were not familiar with this question as it has been asked in the NSC exam paper for the first time .

c. In Q3.3, candidates could not identify the situational leadership theory from the given statement. This question was confused with either laissez-faire leadership style or transactional leadership style. This affected candidates' responses to follow-on questions, however, concessions were made for responses that were similar to the situational leadership theory. This has been the first time that this question has been phrased in this manner, and candidates may not have been exposed to the different ways in which this question can be assessed.

d. Q3.4 was well answered as it was covered in Grades 10 and 11. However, some candidates confused companies with the private and public sector.

e. In Q3.5, many candidates used an incorrect formula to calculate simple and compound interest, but the final answer was correct in both options. Others used the maths formula to calculate simple and compound interest. Some switched the formulae, while others could not complete full calculations as their final answer included the principal amount and interest which made the calculation incomplete.

f. Some candidates lost marks for using incorrect terminology in Q3.5.3, e.g. 'high profit' instead of 'higher interest'.

g. In Q3.6, many candidates could name only the principles of insurance, but they could not explain the meaning of each principle despite the fact that this question has been asked in recent past NSC papers. Others mentioned an average clause as a principle while some confused the question with the differences between over-insurance and under-insurance.

h. Although candidates performed well in Q3.7, some wrote 'pamphlets and printed copies' instead of 'hand-outs' as a type of visual aid that was applicable to the scenario.

i. In Q3.7.2, some candidates provided general responses on the impact of hand-outs. Some gave the advantages of a projector and not of the hand-outs. The majority of candidates failed to score maximum marks because they could not identify the visual aids in Q3.7.1.

j. In Q3.7.3, many candidates provided incomplete and vague responses. Some confused this question with factors that must be considered either before or during the presentation.

Suggestions for improvement

a. A clear distinction must be made between the insurable risk and types of insurance. Learners must know that businesses insure their assets due to the nature and type of risks involved. Learners must be able to name types of risks instead of giving examples of assets that can be insured.

b. Teachers should refrain from over-relying on past papers as a degree of innovation with new questions or context may be found in future papers. The rights of ordinary shares must also be taught and assessed adequately during the academic year. Learners must be requested to make a comparison between the rights of ordinary and preference shares to avoid confusing these rights. This can be done by using two columns that shows rights of these types of shares.

c. Teachers should include direct and indirect questions when assessing leadership theories. Different scenarios/ statements should be developed when assessing leadership theories.

d. Teachers are advised to take note of the changes in legislation regarding the establishment of profit companies especially the private company and public company. It is advisable that learners must be requested to do research on profit companies in terms of similarities and differences of these companies. Subject advisors should distribute recent information on forms of ownership.

e. Teachers are advised to use the Business Studies formula when teaching simple and compound interest. Learners must know that compound interest will always yield higher returns as interest is accrued. The correct terminology must be taught to avoid losing marks, e.g. interest versus profit.

f. Relevant examples and demonstrations must be used when teaching principles of insurance. Identify key words that will enable learners to remember the explanation of each principle. Furthermore, teachers are advised to use two columns that distinguish between principles and types of insurance so that learners are able to make a clear distinction between these concepts.

g. The impact of all types of visual aids stated in the 2017 Examination Guidelines Page 18 should receive attention during the academic year. Learners could be requested to make a presentation using any visual aid, while others can be asked to evaluate the impact of this visual aid to enhance understanding. It should be noted that the use of visual aids enhances effective presentation of business information.

h. Teachers should clearly distinguish between factors to be considered *before*, *during* and *after* a presentation. When making class notes on presentations three columns for *before*, *during/while* and *after* on one page should enable learners to understand the various processes of presentations. Learners must use full sentences when suggesting factors to earn full marks. Vague or one-word answers should be avoided as it cannot be linked clearly to the *before*, *during* or *after* stages of the presentation. Verbs that must be used when assessing presentations should include *outline*, *explain*, *discuss*, *describe*, *suggest* and/or *recommend*.

QUESTION 4: BUSINESS ROLES

This question was popular but it was poorly answered by many candidates.

Common errors and misconceptions

a. Although Q4.1 was well answered, some candidates provided general responses even though this question had been asked on several occasions in previous NSC papers.

b. In Q4.2, many candidates confused the benefits of diversity with either the advantages of creative thinking or ways in which businesses can deal with diversity issues in the workplace. Some responses were based on the benefits of EEA on businesses. They were expected to perform well in this question as it has been asked in the NSC/SCE papers regularly.

c. Some candidates could not identify the stages of team development from the given scenario in Q4.3.1. They lost marks on the motivation as this depended on the correct identification of each stage. Those who were able to identify the stages of team development from the scenario did not provide full quotes and they were penalised for this error. It was envisaged that candidates will perform better in this question since this topic has been assessed in different ways in past exam papers.

d. In Q4.3.2, many candidates were able to name other stages of team development, but they could not explain the meaning of each stage. Others repeated the stages in Q4.3.1 for which they did not earn marks. The adjourning/mourning stage was seldom identified, and some candidates mentioned only two instead of three other stages.

e. In Q4.4, many candidates provided vague/incomplete and one-word answers on the advantages of creative thinking in the workplace. Some simply discussed the importance of brainstorming or problem-solving steps.

f. In Q4.5, the majority of candidates could not explain how businesses could apply the force-field analysis technique to solve complex business problems. Some confused this technique with Kurt Lewin's 3-step change model. Some explained how businesses can apply brainstorming in the workplace. Others either explained the meaning or advantages of force-field analysis. The reason for poor performance can be attributed to the fact that candidates were probably not familiar with this question as it has been asked for the first time.

g. In Q4.6.1, many candidates were able to identify an aggressive person from the scenario, but they could not identify the 'expert'. They lost marks for motivation as this depended on the correct identification of the type of difficult personality.

h. In Q4.6.2, many candidates could not recommend a strategy to deal with each difficult personality. Some provided negative strategies such as 'fire or suspend them' which will not solve the problem.

i. In Q4.7, many candidates' responses were based on social rights of the citizen instead of the employees. They also provided vague and incomplete responses. Some confused social rights with either human or cultural rights in the workplace.

Suggestions for Improvement

a. Learners must be able to name and explain causes of conflict in the workplace. Practical examples can be given to enhance understanding. Scenarios/Statements can be used to assess learners understanding of the causes of conflict in the workplace.

b. Learners must be well conversant with ways in which businesses can deal with diversity issues so that they can be able to outline/discuss the benefits of diversity in the workplace. The benefits should not be confused with cultural rights. It should be emphasised that a diverse workforce has many advantages for businesses rather than employees.

c. Learners must be exposed to different ways of assessing the stages of team development, e.g. statements/ scenarios and direct questions could be used as an assessment method. This should form an integral part of formal and informal assessment tasks.

d. Teachers are advised to identify key words such as 'unique', 'complex' and 'productivity' that could assist learners to form statements on the advantages of creative thinking in the workplace. Creative thinking should enable businesses to have a competitive advantage over their competitors. It is imperative for learners to know that creative thinking also benefits employees.

e. Teachers are advised to teach learners the application and impact of problem-solving techniques that are outlined in the 2017 exam guidelines. Different methods of assessment must be administered during the academic year.

f. Learners must be taught the types of difficult personalities that have appeared in past NSC examinations e.g. November 2015, Q6.4. They should be able to suggest appropriate strategies to deal with each type of difficult personality. Learners must be advised to refrain from suggesting negative strategies as this is not corrective but punitive. Indirect questions must be asked to enable learners to apply knowledge.

g. Social rights must be explained within a business context and that the aim is to ensure that employees' wellbeing is taken into consideration. Teachers should make use of newspaper articles on businesses that promote social rights in the workplace to enhance understanding.

QUESTION 5: BUSINESS OPERATIONS

Performance of candidates in this question ranged from average to poor, although this topic only consists of two subtopics. Many candidates chose this question because most of the subquestions were in the previous question papers.

Common Errors and Misconceptions

a. In Q5.2, many candidates provided vague responses to the purpose of induction. Some provided vague and incomplete responses while others confused this question with the benefits of induction.

b. Many candidates were able to quote directly from the scenario in Q5.3.1. However, some lost marks due to incomplete or rephrased quotes. Others did not provide the quote verbatim from the scenario. Some misinterpreted the question and included the first sentence in the scenario as part of the role of the interviewer as the question might not have been read properly.

c. In Q5.3.2, some candidates confused the role of the interviewer when preparing for an interview and in conducting an interview.

d. In Q5.4, some candidates could not provide a detailed description of the differences between job description and job specification. Some used examples to explain the differences between these concepts. Others confused job specification with the screening and the selection procedure.

e. Candidates had difficulty to identify the TQM elements in the given scenario in Q5.5.1. Some could identify only total client satisfaction, not identify continuous improvement to processes and systems.

f. In Q5.5.2, candidates did not evaluate the impact of TQM on large businesses and provided incomplete and vague responses. The responses for the impact of total client satisfaction were based on the benefits to customers instead of businesses. Others chose two instead of one TQM element resulting in only the first one being considered.

g. In Q5.7, candidates provided general statements on the benefit of a good quality management system. Some repeated facts using different expressions, while others could not write full statements.

Suggestions for Improvement

a. Teachers are advised to use two columns when explaining the concept 'induction'. Learners must be able to link each purpose of induction with the benefit of induction, e.g. improve skills through in-service training (purpose). The benefit of this is that the employee increases productivity.

b. Learners should understand the concept of interviewer and interviewee clearly. Teachers are advised to use a three-column table with the role of interviewer in two columns and that of the interviewee in the third column. It should be noted that the role of the interviewer is twofold, i.e. before and during, while the role of the interviewee is only during the interview. Role play should also enhance learners' understanding and insight into this topic. Note that responses such as 'dress code' and 'research on the business' will not be accepted as roles of the interviewee during the interview.

c. Teachers should explain the job analysis components clearly. The recruitment process can be executed successfully by compiling a clear job description (list of duties, etc.) followed by a job specification (list of qualifications and skills) in accordance with the requirements of the vacancy. Practical examples should be used to illustrate the differences between these concepts. Key words can also be used to assist learners with formulating full sentences on the differences between these concepts.

d. Teachers should use practical examples/demonstrations of the impact of TQM elements on large businesses. Learners must know that these elements are meant to benefit businesses after customer needs are satisfied beyond their expectations. Learners should be able to explain how large businesses use these elements to get things right the first time. Learners must be advised to read each question properly and follow instructions.

e. The benefits of a good quality management system should rather be explained from a business point of view than the benefits to employees. Learners should be encouraged to write full sentences to show the benefit/advantage/positive aspects of each fact.

QUESTION 6: MISCELLANEOUS

This question covered all four main topics. This posed a challenge to candidates who did not study the entire curriculum. Responses ranged from average to poor as candidates could not answer all the subquestions.

Common Errors and Misconceptions

a. Q6.1 was answered well even though some candidates confused the social factors with economic factors. The phrasing of this question could have contributed to this confusion.

b. In Q6.2, many candidates could not explain the advantages of integration strategies despite the fact that this question has been asked several times in past exam papers. Some either explained the meaning of intensive or discussed the types of intensive strategies that were not asked in this question.

c. In Q6.3, many candidates confused state-owned companies with either the role of the government in the economy or the importance of the public sector. Some responses were based on the advantages of a public company.

d. Candidates could not identify 'average clause' in Q6.4.1. This was confused with under-insurance even though this question was asked in the 2017 November paper.

e. Many candidates provided one fact on the meaning of average clause in Q6.4.2. Some provided one-word answers.

f. In Q6.4.3, candidates provided vague, incomplete and general responses on the advantages of insurance. Some confused insurance with investment. Some wrote the advantages of insurance for individuals.

g. Although Q6.5 was answered well, some candidates confused the examples of unfair advertising with unethical business practices. Others misinterpreted the question by giving the examples of the different methods of advertising, e.g. advertising on posters, radio.

h. In Q6.6, many candidates were able to identify the empty-chair technique and Delphi technique from given statements. However, some confused the nominal-group technique with brainstorming. This could have been because they did not read the statement properly.

i. Candidates were not familiar with strategies to deal with the pricing of goods in rural areas in Q6.7. Some mentioned different types of business strategies while others provided negative strategies on how businesses can deal with pricing in the rural areas. Others explained the meaning of pricing in rural areas and penalties for non-compliance with the NCA.

j. In Q6.8, many candidates had difficulty in defining the term 'placement', and some responses were based on the recruitment procedure when signing an employment contract and induction.

k. Although many candidates performed well in Q6.9, some could explain only the meaning of two salary determination methods but could not name the methods. Some used incorrect spelling such as 'pie meal' instead of 'piecemeal'. Some confused salary determination methods with salaries and wages. Candidates were expected to perform well in this question as it was asked in 2016 and 2017 November NSC papers.

Suggestions for improvement

a. Teachers should teach different types of business strategies using practical examples of each. Once learners understand each strategy, they will be able to discuss or explain its effectiveness in addressing the challenges posed by business environments. The advantages of each strategy are imbedded in the reason(s) why businesses use it successfully.

b. It should be emphasised that state-owned companies also form part of profit companies. This means that although prices are reasonable, they also make profits which are used to benefit the country.

c. Although the average clause applies to property/assets that are underinsured, this clause assists insurance companies in calculating the amount of loss that must be paid to the insured in the event that goods/assets are under-insured. Learners must know the implication of the average clause to the insured. This means that the insured will assume part of the risk that is not insured.

d. Learners must be able to write full statements on the advantages of insurance for businesses. Teachers must explain how insurance protects businesses and supports this by giving practical examples.

e. A clear distinction should be made between the nominal-group technique and brainstorming. It should be noted that although these problem-solving techniques are almost similar, the former requires each team member to first generate ideas (nominal) then share his/her ideas with others (group) hence is it called nominal-group technique.

f. Learners must be encouraged to recommend correctional and positive strategies that are developmental rather than punitive of nature.

g. Placement takes place after the successful/selected candidate has been offered a job. Learners must know the importance of ensuring that skills and qualifications of new employees are in line with the requirement of the job. Reference must be made to the word 'successful/selected candidate' as this clearly indicates that placement takes place after recruitment.

h. The differences between piecemeal and time-related salary determination methods should be explained in terms of how businesses determine the remuneration to be paid to employees. The amount paid will be informed by either the tasks to be completed (piecemeal) or a tariff based on time (per hour/per day/per week, etc.).

SECTION C: ESSAY QUESTIONS (TWO QUESTIONS TO BE ANSWERED)

QUESTION 7:   BUSINESS ENVIRONMENT: LEGISLATION

Responses ranged from average to poor. Candidates could not answer all the subquestions. This question contained four bulleted subquestions which were asked in several past papers. Many candidates got confused between CPA and NCA as the first three questions were based on CPA and last one was on NCA.

Common Errors and Misconceptions

a. In Q.7.1, some candidates repeated the words that were used in the question paper, e.g. the Acts protect consumers against unfair business practices.

b. In Q7.2, many candidates wrote consumer rights under the purpose of the CPA. Some responses were based on the purpose of the NCA.

c. In Q7.3, candidates confused the impact of the CPA with the NCA, while others wrote about consumer rights. It appears that they were more exposed to consumer rights than to the purpose and the impact of CPA on businesses.

d. In Q7.4, the right to privacy and confidentiality was confused with human rights in the workplace. The right to fair value was confused with ethics in advertising.

e. In Q.7.5, some candidates recommended ways businesses can comply with the NCA instead of penalties for non-compliance. Many responses were limited to 'the business will be fined or face imprisonment for non-compliance'.

Suggestions for Improvement

a. Learners should be taught that the introduction and conclusion must be based on any of the subquestions that are asked in the paper. They should not repeat facts from either the question paper as an introduction and/or conclusion.

b. Teaching and learning should be informed by the *CAPS* and the 2017 exam guidelines. Teachers must cover all aspects that must be taught in each Act and these subtopics must be equally assessed during the academic year.

c. A clear distinction should be made between the CPA and NCA. The former applies to all businesses and compels businesses to sell safe products while the latter only applies to businesses that sell goods on credit.

d. Learners must be advised not to confuse the right to privacy and confidentiality in terms of the CPA with human rights in the workplace, even though the heading of these rights are almost similar. This must be explained within the context of each subtopic.

e. Teachers are advised to elaborate on penalties businesses may face for non-compliance. This subtopic must be adequately assessed during the academic year. Learners may be requested to bring articles of businesses that were charged for non-compliance.

QUESTION 8:   BUSINESS VENTURES: INVESTMENTS AND FORMS OF OWNERSHIP

This question was a popular choice in SECTION C. Performance ranged from excellent to fair. All subquestions have appeared in various past papers.

Common Errors and Misconceptions

a. Although Q.8.3 was well answered, some candidates mentioned only types of preference shares but could not explain the meaning of each preference share. Some provided vague and incomplete responses on each. Some confused types of preference with types of shares.

b. In Q8.4, some candidates provided silent responses on the impact of RSA Retail Savings Bonds as these responses did not indicate the positives and/or negatives. Candidates were only awarded one mark for vague and incomplete statements. Others viewed this investment option as benefiting the government instead of encouraging savings by the public.

c. In Q8.5, many candidates were able to explain how management contributes to the success and/or failure of partnerships, but they could not do the same with legislation as criterion that contributes to the success and/or failure of a partnership. Legislation was viewed in the light of various Acts that impact on businesses.

Suggestions for Improvement

a. A clear distinction should be made between different types of shares with specific reference to the meaning of 'preference' and 'ordinary' shares. Learners should not only list or name different types of preference shares, they should be able to explain the meaning of each type of preference shares. Practical examples and demonstrations should be used to enhance understanding.

b. Learners must be encouraged to justify the reasons why RSA Retail Savings Bonds have some advantages and/or disadvantages for investors. Practical examples can be given to justify their argument.

c. All criteria that contribute to the success and/or failure of all forms of ownership must be covered in detail. It is important that teachers recap the characteristics, and advantages and disadvantages of each form of ownership before teaching the criteria that will contribute to the success or failure of each form of ownership. In so doing, learners will find it easier to explain how these criteria contribute to success or failure. It is also worth noting that the advantages and disadvantages of each form of ownership can be used as a point of departure to explain how each criterion contributes to success or failure of the forms of ownership.

QUESTION 9:   BUSINESS ROLES: SOCIAL RESPONSIBILITY, CSR AND CSI

Reponses to this question ranged from average to fair. The question consisted of four subquestions that have all appeared in past NSC exams.

Common Errors and Misconceptions

a. In Q9.2, many candidates could not explain the differences between CSR and CSI even though this question has been asked in previous NSC exam papers. Others used examples of CSI projects to distinguish between these concepts. Some use CSR components and CSI focus areas to explain the differences.

b. In Q9.3, candidates' responses were also based on examples of CSI projects instead of explaining the impact of CSR on communities, while some responses were based on the impact of CSR on businesses.

c. Although Q9.4 was well answered, some candidates could not provide three strategies to deal with unemployment. Many candidates provided more strategies on how businesses can deal with HIV/Aids as a socio-economic issue.

d. In Q9.5, the majority of candidates gave examples of CSI projects instead of suggesting ways in which businesses could contribute to the well-being of communities. Others repeated strategies to deal with HIV/Aids and unemployment even though they were instructed to exclude these strategies. Others wrote on different types of socio-economic issues and gave recommendations for each.

Suggestions for Improvement

a. It should be noted that CSR is a broader concept that involves all business stakeholders. Businesses must first develop policies and CSR programmes then develop a plan on how these programmes will be translated into action. CSR programmes are implemented through CSI projects which only involve communities. Learners must be requested to visit large companies and to do research on the CSR programmes/initiatives and projects that are currently taking place to enhance understanding.

b. Businesses are supposed to measure the impact of CSI projects on communities. Therefore, learners must be able to explain the impact of these projects on communities rather than giving examples.

c. Teachers must suggest various strategies to deal with unemployment as socio-economic issues. Subject advisors must ensure that these strategies are adequately assessed during the academic year.

d. The rationale behind improving the wellbeing of communities is that business projects should be meaningful to communities. Learners must be able to suggest ways in which businesses can make a meaningful contribution to communities rather than giving examples.

QUESTION 10: BUSINESS OPERATIONS: QUALITY OF PERFORMANCE

The responses of candidates to this question ranged from fair to poor. This question consisted of four subquestions which have appeared in various past papers.

Common Errors and Misconceptions

a. In Q10.2, few candidates were able to elaborate on the meaning of quality assurance. Many candidates provided only one instead of three facts. Some responses were vague and incomplete. Candidates were expected to perform better in this question as it has been asked in past papers.

b. In Q10.3, candidates had difficulty in explaining the differences between quality management and quality performance. Some did not attempt to answer this question. Others confused this with the differences between quality assurance and quality control as these concepts have been asked in past papers.

c. In Q10.4, the quality indicators of business functions remain a challenge as many candidates only provided one-word answers. Others explained the different levels of management.

d. In Q10.5, many candidates provided negative instead of positive responses on this question. It could have been that the word 'impact' confused them as it may mean either positive and/or negative. However, the last part of the question indicated that only positive responses were required. Some candidates wrote about the total quality management (TQM) elements which were not asked in this question.

Suggestions for Improvement

a. Learners must be encouraged to go beyond providing one fact to explain the meaning of quality assurance. Key words such as 'pre-set standards, right the first time' can be used to remind learners of each fact and to use these to write full sentences.

b. Teachers should use key words to distinguish between quality management and quality performance, e.g. the former requires management to design tools/techniques that will be used to improve the quality of a product. Quality performance measures the output of each department. This means that total performance depends on quality management, e.g. guidance from management. Subject advisors must encourage PLC leaders to discuss this during their meetings and share good practices.

c. Teachers should not focus only on the TQM elements and quality concepts when teaching Business Operations. It is imperative that learners are able to suggest quality indicators for each business function. Quality indicators are strategies that are implemented, monitored and executed to ensure quality in the respective business department or function. These are practical in nature.

d. It is imperative that learners must first understand the impact of TQM elements on large businesses before they are taught the impact of TQM on the reduction of the cost of quality. Teachers are advised to request learners to link each TQM element with the impact on reducing the cost of quality. This may enhance understanding.

CHAPTER 5

ECONOMICS

The following report should be read in conjunction with the Economics question papers (1 and 2) of the November 2018 Examination.

5.1 PERFORMANCE TRENDS (2014–2018)

The number of candidates who wrote the Economics examination in 2018 decreased by 13 627 candidates compared to the number in 2017. The 2018 performance reflected further improvement on the pleasing results of 2017, with 73,3% of candidates achieving at the 30% level and 44,8% achieving at the 40% level.

Table 5.1.1: Overall Achievement Rates in Economics Papers 1 and 2

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	137 478	94 779	68,9	53 294	38,8
2015	165 642	112 922	68,2	64 780	39,1
2016	155 908	101 787	65,3	56 794	36,4
2017	128 796	91 488	71,0	55014	42,7
2018	115 169	84 395	73,3	51 609	44,8

Over the years there has been an improvement in the writing of essays, the open-ended questions that involved the application of knowledge and in the drawing of graphs. However, there are certain areas that require more attention for the results to improve in a meaningful way.

A thorough understanding of all concepts in all topics will greatly enhance performance in both papers, as they form the basis of understanding questions at the various cognitive levels. This has a direct impact on SECTION A, SECTION B where concepts are tested as definitions, and in SECTION C where concepts form part of the introduction of the essay. An excellent knowledge of economic terminology results in correct interpretation and answering of indirect questions in SECTIONS B and C. One of the challenges in achieving this is that teachers need to reinforce concepts through regular testing in class.

It is imperative that the content of all topics is covered adequately and timeously to ensure sufficient time for revision. When teachers fall behind in content coverage, they tend not to teach topics under economic pursuits and/or contemporary economic issues thoroughly. Candidates who attempt questions on these topics perform poorly in comparison to other topics. Teachers should structure assignments, projects and case studies in Grades 10 and 11 on difficult topics of Grade 12, e.g. competition and collusion, tourism, economic and social indicators, to promote acquisition of some basic knowledge when these topics are discussed in Grade 12. This is also an area in which teachers must also be supported.

While there has been an improvement in the drawing of graphs, the technical aspects need to be reinforced, e.g. the correct shape, positioning and labelling of cost and revenue curves in the perfect and imperfect markets. Teachers need to teach graphs by drawing the cost and revenue curves step by step. As each step is done it needs to be explained. While the teacher draws it first, learners draw step by step in their workbooks. Emphasis must be placed on the average cost curve (i.e. 'smile') which must always be drawn before the marginal cost curve (i.e. 'tick'). This will ensure that the MC always intersects the AC at its minimum point. It is extremely important that teachers realise that there is an integration of topics in Grades 10 to 12. Graphs should already have been discussed in the necessary detail in Grades 10 and 11 to ensure a full understanding thereof in Grade 12.

Simple calculations and formulae need to be reinforced and assessed regularly as these skills are tested frequently in the NSC examination papers, e.g. national account aggregates, moving averages, tax burden, the multiplier, BoP, exchange rates, profit and loss, production cost, CBA, percentage changes and the inflation rate.

Graph 5.1.1 Overall Achievement Rates in Economics Papers 1 and 2 (Percentage)

	2014	2015	2016	2017	2018
■ % achieved at 30% and above	68.9	68.2	65.3	71.0	73.3
■ % achieved at 40% and above	38.8	39.1	36.4	42.7	44.8
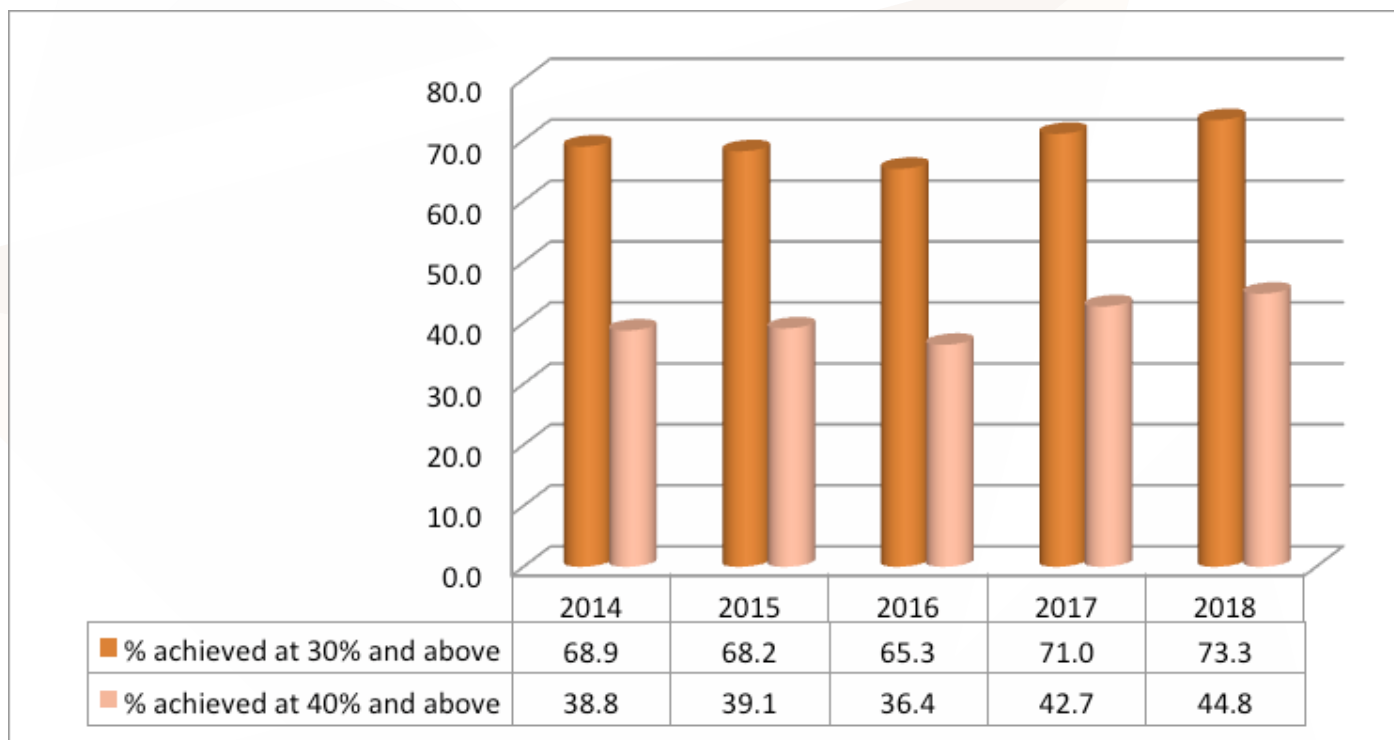
Graph 5.1.1 Performance Distribution Curves in Economics (Percentage)

	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	0.1	7.8	23.1	30.2	19.8	10.8	5.1	2.2	0.8	0.2
2015	0.1	7.9	23.8	29.1	20.1	11.2	5.0	2.1	0.6	0.1
2016	0.2	9.5	25.0	28.9	18.3	10.0	4.9	2.2	0.8	0.2
2017	0.4	7.8	20.7	28.3	20.5	12.0	6.1	2.9	1.1	0.2
2018	0.6	7.1	19.0	28.5	21.8	12.8	6.4	2.8	1.0	0.2
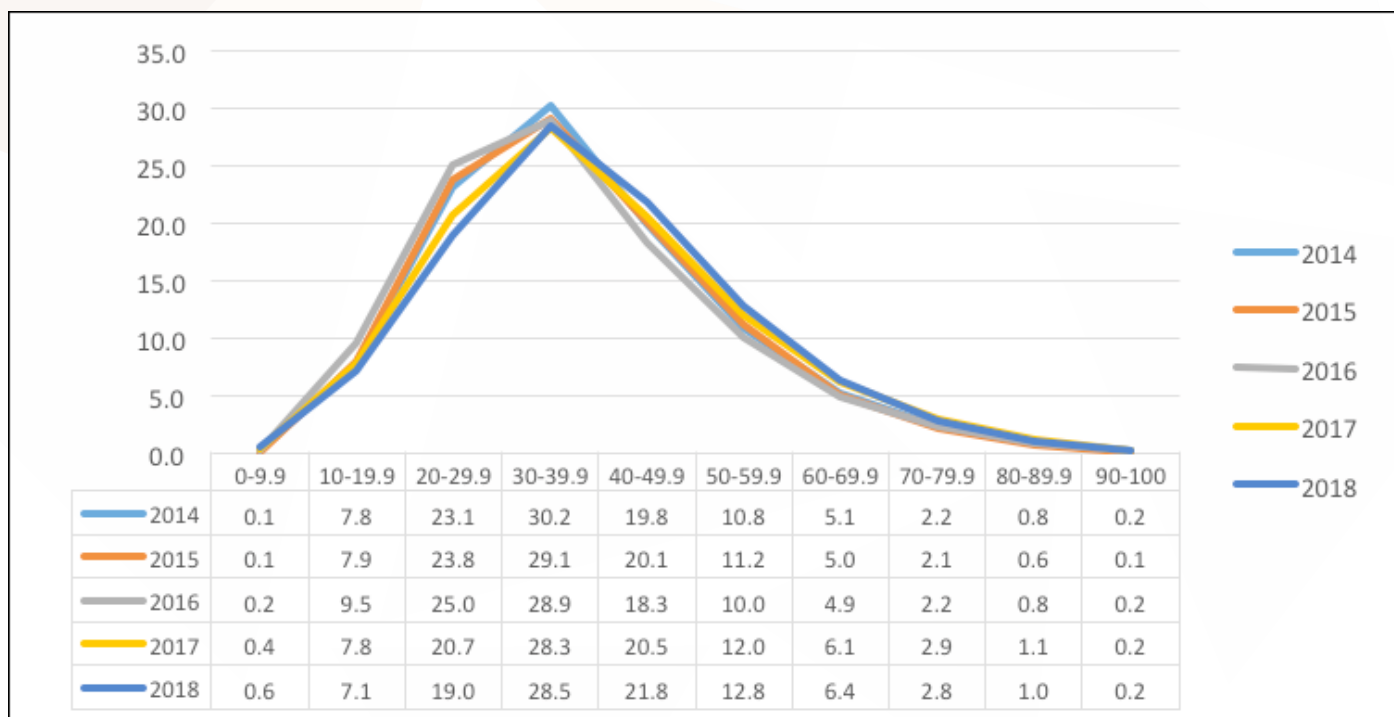
5.2 OVERVIEW OF LEARNER PERFORMANCE: PAPERS 1 AND 2
General Comments

a. A good understanding of tables, extracts, news articles, figures and graphs assisted with the improvement in the performance of many candidates. Candidates were able to complete each paper within the allocated time.

b. The main reasons for underperformance were the following:

* Skills: Poor language skills made it difficult for candidates to express themselves, especially in paragraph-type questions which formed a large part of the question paper. Most candidates were not able to solve problems, give their own opinions or evaluate data connected to their study material. Candidates also lacked basic knowledge of the general economic issues of the day.

* Content coverage: It is evident from the poor performance of many candidates that their teachers did not cover some of the topics. Basic economic concepts/terminology seemed to be lacking among many candidates and there was a lack of knowledge on current economic topics. For example:

  - Paper 1: Q2.2.5: What can the South African Reserve Bank do to strengthen the value of the rand against the dollar? Q3.2.3: What positive impact will globalisation have on the North-South divide?

  - Paper 2: Q6: Evaluate the success of indigenous knowledge systems in promoting tourism in South Africa. Q4.3.5: How will conservation benefit the people living near the rhino habitat?

* Exposure to different types of questions: Skilled learners can write essays and paragraphs and offer their opinions with confidence. These learners can focus on the information that is relevant to the answering of each question. Teachers play a crucial role in the moulding of their learners to deal with a variety of questions with different cognitive verbs, such as why, how and what and the unlocking of knowledge in a variety of ways. A variety of higher-order thinking skills should be developed in the context of the subject content being taught. Learners should be challenged to solve everyday problems experienced in their own communities. For example:

  - Paper 1. Q3.5: Evaluate the potential success of special economic zones in South Africa. Q4.5: How can developing countries ensure the survival of labour intensive industries in a global economy?

  - Paper 2. Q2.5: Evaluate the impact of collusion on the economy.Q4.5: How can South Afri can households contribute to a lower inflation rate?

* Language ability: Although language deficiency is still a drawback for many second-language candidates, many centres in deep rural areas have excellent results compared to others experiencing similar circumstances. Teaching should take place in such a way that learners understand the content.

General Suggestions for Improvement

Teachers are advised to build the following practices into the work plan for the year:

a. **Use of past NSC and *CAPS* exemplar papers:** In preparation for the 2019 year-end papers, all learners should use past papers selectively for the final examinations (2015–2018) and supplementary examinations (2016–2019) for clear guidance. Teachers should build their own confidence in their ability to deal with each topic in the classroom situation and to assist learners through their teaching. Furthermore, teachers should use the 2017 examination guidelines as support material when it comes to the scope and depth of content and how to assess learners' understanding of the specific content matter. In cases where old question papers are used for teaching and learning, these should be *CAPS* compliant and aligned to the changes made in the 2017 examination guidelines. Using previous marking guidelines is good as a revision tool but not as a teaching tool. Interpretation of questions is critical. Content should be assessed in line with the examination guidelines continually.

b. **Basic concepts:** Teachers should ensure that learners understand basic concepts and terminology before engaging in their applications. More time should be spent on improving the reading skills of second-language learners. Learners' understanding of terminology should be assessed on a continuous basis. *Mind the Gap* explains all relevant concepts in detail. A quiz bowl, crosswords or team challenges may be interesting tools to assess knowledge of economic concepts. Classwork or homework on definitions will ensure that learners stay familiar with these basic concepts.

c. **Requirements of questions:** Teachers should ensure that learners understand the requirements of common questions in future NSC examination papers. For example, if a question requires the drawing or analysis of a well-labelled graph, this must be done to earn the relevant marks for example:

    *   Paper 1 (related to the Laffer curve): What effect will a decrease in the tax rate from 65% to 45% have on tax revenue?

    *   Paper 2: With the aid of a well-labelled graph (cost and revenue curves), explain the shut-down point for the individual firm in a perfect market./With the aid of graphs, briefly explain how price is determined for an individual producer in a perfect market.

Teachers should familiarise their learners with the new phrasing of questions, e.g. the *what*, *why* and *how* type of higher-order questions. Learners should be guided by the mark allocation in terms of the depth of the answer required. With regard to higher-order questions (especially Q2.5, Q3.5, Q4.5 and the additional part of the essay questions), a candidate needs to read the question carefully and highlight the key issues required. Reading the question again will ensure greater accuracy in the candidates' response. Responses need to be formulated and the question should be checked again constantly to ensure the response logically suits it. It is not wise to respond immediately after the initial reading of the question. Time must be taken to understand the question clearly, for example:

    *   Paper 1: Most candidates struggled to answer the more indirect way of questioning in the data base questions and expected answers to appear in the data given.

    *   Paper 2: Candidates had to discuss the success of the competition policy in South Africa, but instead de scribed the aims of the competition policy.

d. **Comments and explanations:** Teachers should equip learners with the relevant skills needed to express themselves clearly where comments or explanations are required. Learners need guidance on how to express the opinions that are relevant to the context. Refer to the examination guidelines where typical higher-order questions are provided, e.g.:

    *   Paper 1: Evaluate South Africa's trade policy of import substitution.

    *   Paper 2: How effective are the South African government's interventions with regard to environmental sustain ability?

e. **The importance of formative testing:** Teachers should build the confidence of learners through the use of short informal formative tests and tasks. Small formative assessment tasks should be used to ascertain whether candidates are able to apply their knowledge, placing emphasis on their own opinion and understanding. This will force learners to take ownership of the learning process (refer to the examination guidelines: Use a diagram and discuss the cycle length, amplitude and the trend line as features underpinning forecasting*).*

f. **The structure of the paper:**

* **SECTIONS A AND B:** The demands of these sections should be explained to learners to enable them to organise their answers properly. Leaving lines between subsections, using the correct numbering system and not omitting question numbers are examples of issues that make assessment more effective.

* **SECTION C (Essay):** Teachers must stress the importance of the layout of the essay, i.e. introduction, body (main and additional part) and a conclusion. There should be a clear distinction between the various aspects with line spacing between them. Using subheadings is crucial as this earns marks and provides structure to the response. Learners should structure the essay according to the outline provided in the question paper.

* Learners must be made aware that no marks will be earned if any part of the introduction or body is included in the conclusion. It should include the learner's own opinion, an alternative viewpoint, and any fact to support the body or a summary of the discussion.

* Teachers must allow learners the opportunity to practise the answering of essay questions. When a topic or chapter is finished, an essay question should be given as a test or homework. If given as homework, the essay can be assessed in terms of the following important aspects (detailed assessment is not necessary):

- Relevant introduction

- Subheadings in the main part

- The appropriateness of the additional part

- Relevant conclusion

* Teachers are advised to use a variety of textbooks to prepare notes that supplement material available to learners.

5.3 DIAGNOSTIC QUESTION ANALYSIS OF PAPER 1

The following graph is based on data from a random sample of candidates. While this graph may not reflect national averages accurately, it is useful to assess the relative degrees of challenge of each question as experienced by candidates.

The average performance in Q3 was disappointing and reflected a decline from that of 2017. The performance in Q6 improved significantly, while that of the other questions improved slightly or remained consistent with that of 2017.

Figure 5.3.1 Average Marks per Question Expressed as a Percentage

Q	Topic/Aspect
1	Objective questions
2	Macroeconomics
3	Economic pursuits
4	Macro & Pursuits
5	Macroeconomics
6	Economic pursuits
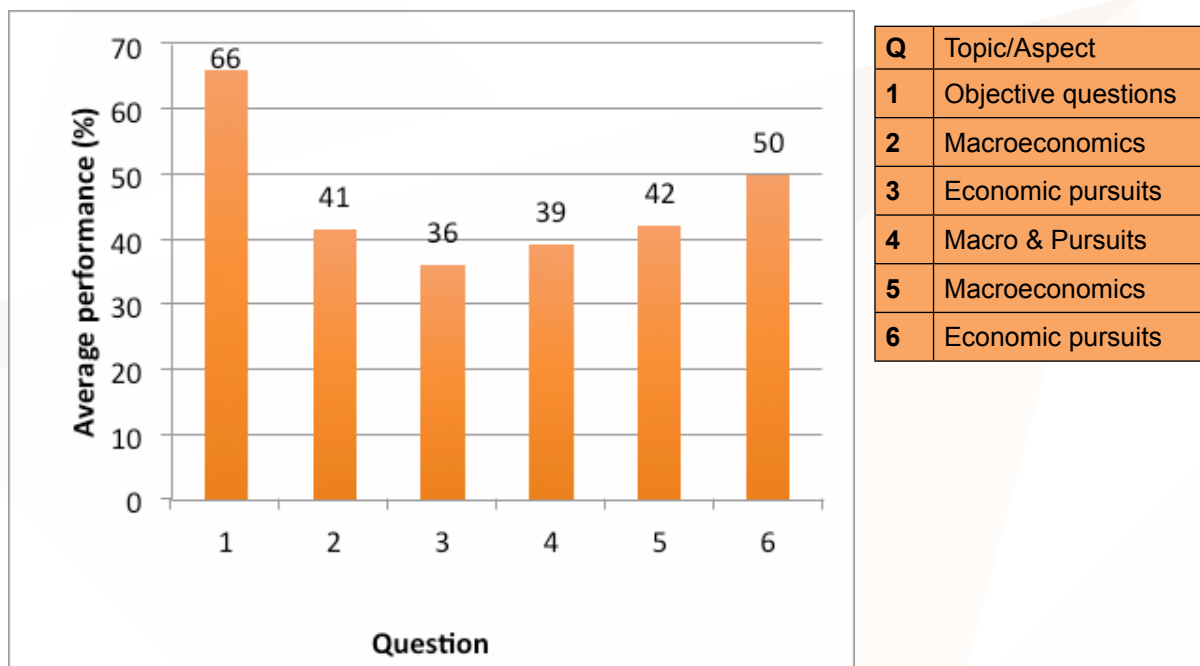
Figure 5.3.2 Average Marks per Subquestion Expressed as a Percentage
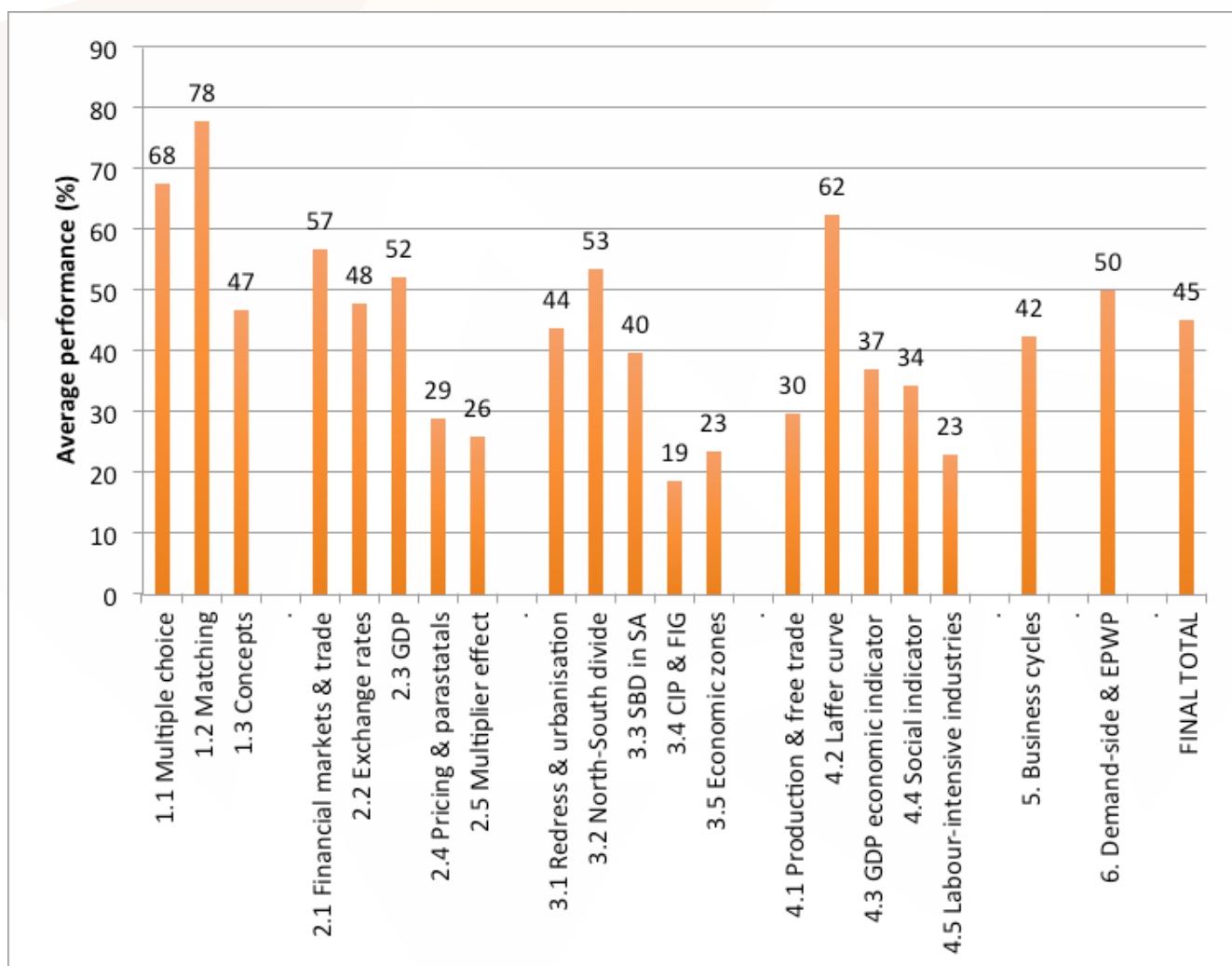
5.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: MACROECONOMICS AND ECONOMIC PURSUITS

Most candidates performed well in Q1. The performance of learners ranged from excellent to poor. Some candidates attained full marks and others did not even attempt to answer some of the questions. This question was compulsory.

Common Errors and Misconceptions

a. In Q1.2, candidates had to match an Economics term with given statements. In some cases they left out certain answers by mistake or changed their original answers without cancelling the first one. Generally, a lack of content knowledge impaired candidates' performance. Candidates could not match the correct answers for *System of National Accounts* and *production price index*. Poor performances were recorded for Q1.2.2, and Q1.2.8.

b. In Q1.3, candidates had to give an Economics term for a given statement but they provided an abbreviation instead. Overall the performance was very poor and the marking guidelines accepted only the correct answer with no abbreviations or examples. When candidates provided more than one answer they were subsequently awarded no marks.

c. In Q1.3.5, candidates confused repo rate and interest rates and Q1.3.2 was a good example of typical answers from candidates reflecting broad knowledge, not in-depth knowledge, of the subject matter. In Q1.3.4, candidates did not know the difference between economic growth and economic development.

Suggestions for Improvement

a. Q1 assesses both *Macroeconomics* and *Economic Pursuits.* Candidates' performance in this question gives a clear indication of their subject knowledge. It is imperative that learners first attempt to determine the correct answer to a multiple-choice question before considering the given options. Furthermore, the format of SECTION A should be explained to learners to enable them to organise their answers correctly. In light of this, candidates need to follow instructions such as answering Q1 in the answer book and leaving lines between subsections, using the correct numbering system, and not omitting question numbers. This will facilitate the marking of scripts. The confidence of learners should be built by spending more time on the understanding of economic terminology, definitions and concepts to ensure expanded knowledge over the broad spectrum of the subject.

b. Teachers should expose learners to basic economic concepts through short formative tests on basic concepts. Candidates should answer all items in Q1.1 and Q1.2 where the options are provided. Learners should also concentrate on more detailed preparation in respect of concepts and terminology to ensure that they attain higher marks for Q1.3. Teachers should start lessons by testing the previous day's concepts.

c. Although multiple-choice questions provide possible answers, they require full content knowledge. Constant revision of terminology is strongly advised.

d. Difficult topics should be the centre of discussions, e.g. graphs reflecting movement on foreign exchange markets and different strategies and policies.

QUESTION 2: MACROECONOMICS

Common Errors and Misconceptions

a. Candidates could not name two financial markets in the circular flow model in Q2.1.1 and wrote on different types of markets found in Microeconomics instead. In Q2.1.2, candidates responded by giving one-word answers such as positive or negative instead of answering the question in a full sentence.

b. Many candidates could not find the answers to Q2.2.1 and Q2.2.2 in the graph due to the indirect manner in which it was presented.

c. In Q2.2.5, candidates were not able to explain what the South African Reserve Bank could do to strengthen the value of the rand against the dollar.

d. Candidates performed poorly in Q2.3.5 where they were expected to calculate the gross domestic product at market prices. Many candidates were awarded no marks because they just copied the data given in the question paper.

e. Candidates failed to show how the multiplier effect could influence the government to create more jobs (see Q2.5).

Suggestions for Improvement

a. It is extremely important that learners should be prepared on the whole syllabus and not only parts thereof. Knowledge of the *latest* statistical data made available from the SARB (on national account aggregates) and Stats SA, should be studied in detail to ensure that learners know exactly how to prepare themselves thoroughly for the final examination. Candidates should be able to use the information provided to answer questions appropriately (see Q2.3.5 for the calculation of the gross domestic product at market prices). Teachers should provide learners with additional notes on the financial account of the balance of payments (BoP).

b. There is a clear shift towards the candidate's own opinion, interpretation and problem-solving skills as part of data response questions (Q2.2.4, Q2.2.5 and Q2.3.4). A variety of cartoons, extracts from newspapers and magazines and graphs/tables should be discussed in class. Learners should be exposed to current economic issues and they should be guided in their answers. Learners should be encouraged and taught how to apply and contextualise their theoretical knowledge, general observation and critical thinking in real-life economic situations, e.g. the reaction of the value of the South African rand to an increase in the demand for US$.

c. Learners should be exposed to advanced paragraph-type questions (see Q2.5) and guided on how to use the calculated figures and apply them in the creation of more jobs by government. The importance of a detailed analysis of graphs and its influence on the foreign exchange market must be clearly explained during the teaching and learning process (see Q2.2.1 to Q2.2.5). Small formative assessment tasks should be used to ascertain whether candidates are able to apply their knowledge, place emphasis on their own opinions and understanding.

d. Candidates should read questions carefully to determine what is expected from them. For example, in Q2.5 candidates ignored the second part of the question.

QUESTION 3: ECONOMIC PURSUITS

Common Errors and Misconceptions

a. Many candidates misinterpreted the data-response questions. Most questions demanded thorough reading and interpretation. Candidates found opinion-based questions challenging. They could not name the redress policies (Q3.1.1) and mentioned any policy, strategy or initiative. Language still seems to be a barrier and candidates lose marks due to poor command of the language and not explaining concepts fully. Many responses are mainly generic and completely void of economics.

b. In Q3.2.5, weaker candidates could not explain the impact of globalisation on the North-South divide and failed to associate content learnt and its contextualisation. This indicated a lack of general knowledge and interpretation skills, which was also evident in Q3.3.1, Q3.3.2, Q3.3.4 and Q3.3.5.

c. It could be assumed that current economic issues are not discussed in many classes. Candidates' responses were too generic and lacked factual knowledge (see Q3.4). Candidates could not briefly discuss the impact of the *Critical Infrastructure Programme and Foreign Investment Grant on industrial development in South Africa*.

d. In Q3.5, candidates were unable to evaluate the potential success of special economic zones in South Africa in sufficient detail to earn marks and gave generic information.

Suggestions for Improvement

a. The main problem seems to be a lack of applying factual knowledge to solve typical day-to-day problems experienced in economies worldwide. The reason might be an insufficient variety of classroom assessment forms.

b. Formative tests should be used to ensure that learners understand and are able to define what is meant by *basic prices, North-South divide, an economically active population*, *globalisation* and the impact of small business development on the economy.

c. Additional learning material should be given to learners during the academic year. Data provided in data-response questions should be read thoroughly before candidates attempt to answer any questions. A general complaint is that candidates do not know whether the answer appears in the extract or whether they should give their own opinions. If candidates had studied the extracts in Q3.2 and Q3.3, they would have been able to find possible answers to Q3.2.1, Q3.2.2, Q3.3.1 and Q3.3.2.

d. More case-study questions should be discussed in class and given as homework activities. Debates and presentations of certain topics should be conducted regularly. Teachers ought to include the why, which, how, when, whom types of questions to teach learners to think beyond typical textbook knowledge.

e. In Q3.5, most candidates merely listed the benefits of *Special Economic Zones*, without evaluating the success thereof. Deeper thinking skills should be developed during teaching and learning, encouraging learners to ask why and how something can be achieved.

QUESTION 4: MACROECONOMICS AND ECONOMIC PURSUITS

Common Errors and Misconceptions

a. Most candidates performed poorly in Q4.1.1 where they listed any indicator instead of production indicators. Some candidates gave generic information and could not apply their knowledge about why developed countries favour the idea of free trade(see Q4.1.2).

b. In Q4.2.5, many candidates could not determine what consequences a 1% VAT increase could have on the different role players in the South African economy.

c. Most candidates could not answer the database questions, Q4.3.1 to Q4.3.5, correctly. Interpretation of data seems to be a major stumbling block for learners. Learners lack insight into current economic affairs and questions on issues concerning everyday life (see Q4.3.3 and Q4.3.5).

d. The responses to Q4.4 were poor mainly because candidates showed a general lack of content knowledge on *health as a social indicator*. This middle-order question was cited in the examination guidelines of 2017 as part of a possible essay.

e. In Q4.5, most candidates struggled to apply their knowledge on how developing countries could ensure the survival of labour-intensive industries in a global economy. They focused mainly on labour intensive industries, but their answers lacked context.

Suggestions for improvement

a. Teachers should use a variety of resource materials to prepare learners adequately for the examinations. Current economic issues should be used as examples to illustrate the subject in context. Economics in the classroom should be linked to economics in real life by exposing learners to actual data, graphs and statistics. Teachers should ensure that learners know what is expected of them when a command verb (e.g. argue, analyse, differentiate) is part of a question. Learners lack insight into current economic affairs and should be guided to answer questions on issues concerning everyday life. Learners should rely on application of knowledge in answering the two 1-mark questions as part of the data base questions (see Q4.3.1 and Q4.3.2).

b. Learners should be prepared to select questions from both SECTION B and SECTION C. It happens too often that all of the questions in SECTION B are answered. Instructions need to be explained to learners.

c. Learners need to be prepared to answer higher-order questions. Teachers should ensure that learners know what is expected of them, based on the depth of knowledge explained in the examination guidelines of 2017.

QUESTION 5:   MACROECONOMICS

Common Errors and Misconceptions

Most candidates provided detailed discussions on the indicators, despite this being excluded from the question. They also listed the other features underpinning the forecasting of business cycles in broad terms. The additional part of the essay, where candidates had to present methods to ensure price stability to prevent extreme fluctuations in business cycles was not dealt with in sufficient detail.

Suggestions for improvement

a.   It is important that subject advisors supplement content on this topic through teacher development workshops.

b.   Teachers are urged to use the 2017 examination guidelines which clearly indicate all possible essay questions for the next three years. These essays should be prepared in advance to ensure excellent marks in the introduction and main parts of the essays.

c.   Teachers should encourage learners to read questions carefully before they respond in writing.

d.   Teachers should expose learners to numerous question papers to enable wider awareness of different types of questioning. Learners should be exposed to questions on all levels of difficulty during class activities, tests and internal examinations.

e.   Over and above literal reading of texts, learners need to be guided on how to read between the lines, infer and evaluate texts, and use their own words to express their views.

QUESTION 6: ECONOMIC PURSUITS

Common errors and misconceptions

a.   Many candidates discussed the demand-side approach in promoting economic growth as part of the smoothing of cycles (Business Cycles under Macroeconomics) and added the supply-side approach and economic paradigm.

b.   The additional part, which demanded higher cognitive thinking skills, was poorly answered by most candidates and referred only to the definition of the EPWP.

Suggestions for Improvement

a.   Teaching on these topics should be done holistically. Learners should be guided to discuss each fact in detail. This will ensure that they do not omit any crucial aspect of the answer. Focus should be on areas that can cause confusion.

b.   Basic content should not only be covered, but should also be linked to the creativity of learners in the practical implementation of each topic. Case studies and class discussions can be used gainfully in this regard. Candidates need to improve their evaluation skills. Knowledge about recent developments can assist in making the module more interesting.

c.   Formative tests should be used to ensure that learners are able to understand and discuss all relevant topics. All content for the year should be taught well in advance to ensure enough time for revision. Learners should keep abreast of current news pertinent to aspects of Economics and regularly discuss this in class.

5.5 DIAGNOSTIC QUESTION ANALYSIS OF PAPER 2

The following graph was based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

The performance in SECTION A remains the same as that in 2017. In SECTION B, candidates generally performed poorly in Q2 and Q4, while a slight improvement was noted in Q3. An improvement was noted in SECTION C when compared to 2017. Q6, which was based on Contemporary Economic Issues, showed a great improvement in performance.

Figure 5.5.1 Average Marks per Question Expressed as a Percentage
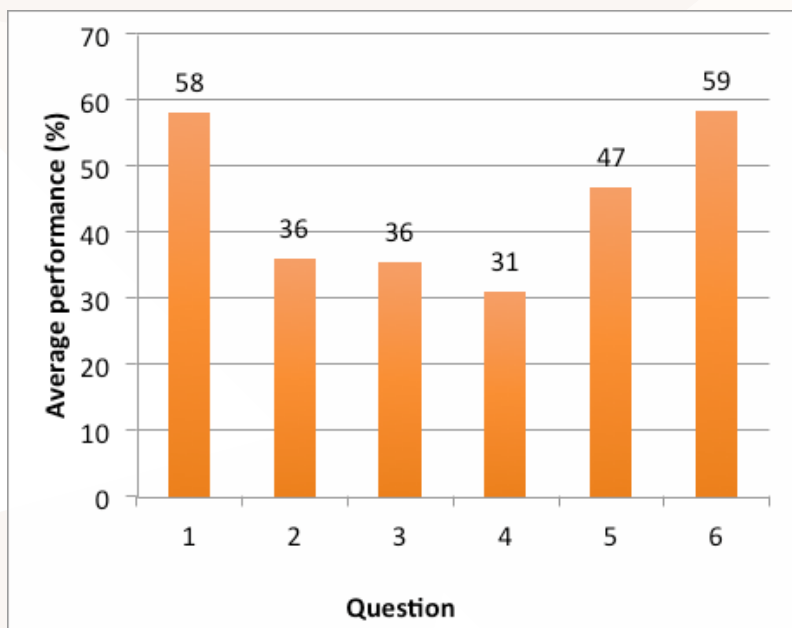
Topics	
Q1	Objective questions
Q2	Micro-economics
Q3	Contemporary economic issues
Q4	Micro-economics & Contemporary economic issues
Q5	Micro-economics
Q6	Contemporary economic issues

Figure 5.5.2 Average Marks per Subquestion Expressed as a Percentage
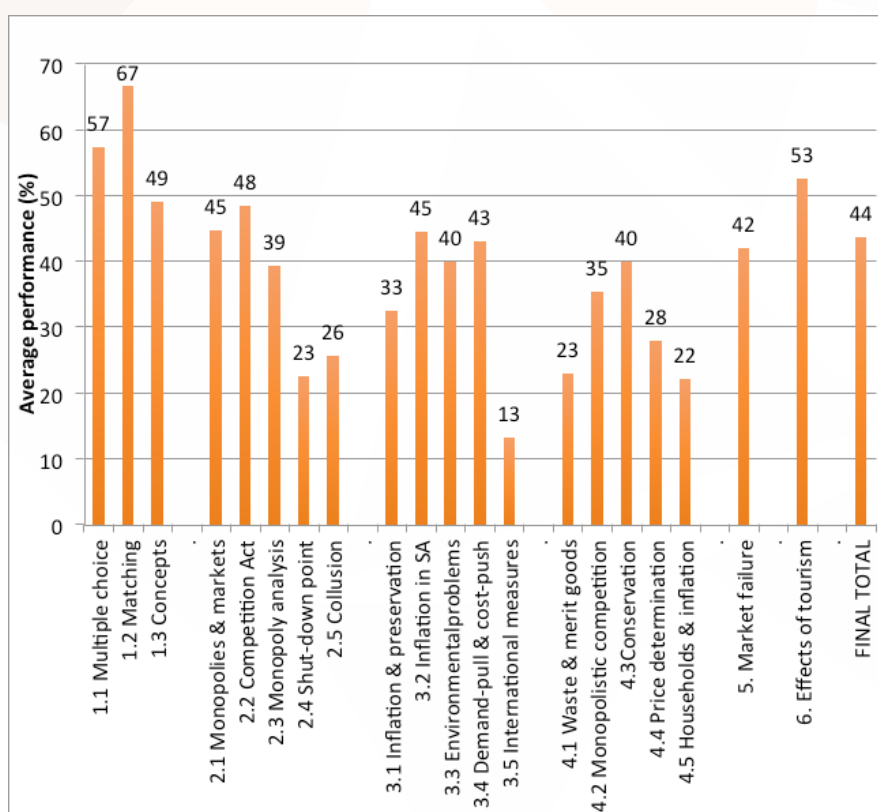
5.6 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MICRO-ECONOMICS AND CONTEMPORARY ECONOMIC ISSUES

Common Errors and Misconceptions

a. This section was answered well. Economic concepts were properly understood by most learners as they managed to obtain maximum marks. This shows a great improvement in the understanding of the concepts included in Q1.3 which were generally done poorly in previous examinations.

b. In Q1.1, candidates omitted answers which then resulted in incorrect numbering. In some cases more than one answer was provided.

c. Candidates performed poorly in questions related to micro-economics. In Q1.1.1, candidates failed to differentiate between average and marginal costs. In Q1.1.3, they could not provide the nature of the product traded in pure oligopoly. In Q1.1.8, candidates failed to differentiate between marketable and taxable permits.

d. In Q1.2.2, candidates confused explicit costs with total revenue greater than total costs as a matching item.

e. Most candidates could not answer Q1.3.3 as they confused marginal revenue with marginal cost. It is evident that they did not know the difference between revenue and costs. In Q1.3.5, cultural tourism was confused with ecotourism. In Q1.3.6, renewable resources were confused with reusable and recycling.

Suggestions for Improvement

a. In Q1.1, learners should write down only the letter (A, B, C or D) of their choice next to the question number. If they prefer to write the answer out in full, they should not omit any part of the response. It is imperative that learners first attempt to determine the correct answer to multiple-choice questions before considering the given options. Candidates must be made aware that no marks will be awarded when they provide more than one answer to a short question. It is important that candidates cancel an incorrect answer in Q1.1 and Q1.2 and write the correct one next to it, instead of writing over the incorrect answer.

b. Definitions and concepts should be emphasised. Using a glossary should form the basis of teaching and learning in Economics.

c. Revision by means of short, regular formative tests on basic concepts is advised. Learners should be encouraged to make a list of the key concepts of each topic especially in Micro-economics.

QUESTION 2: MICRO-ECONOMICS

Common Errors and Misconceptions

a. This question was generally answered poorly, with the interpretation of the graph being a particular challenge.

b. In Q2.2, the majority of candidates misinterpreted the role of the Competition Appeal Court and instead explained the aim of the Competition Policy generally. In Q2.2.5, many candidates referred to the aims instead of discussing the successes of the competition policy.

c. In Q2.3.1, many candidates could not indicate the selling price of the monopoly. In Q2.3.2, many candidates indicated 'e' or 'a' as the loss minimising point. It was clear that learners were not familiar with the term 'loss minimising point'. Many candidates could not answer Q2.3.4. Candidates referred to definition and characteristics of the monopolist instead of the equilibrium position. Many candidates could answer Q2.3.5 but did not give the minus sign to indicate a loss (i.e. –R5 000). There was confusion in the application of the formula, i.e. TR–TC = profit.

d. Q2.4 was poorly answered. Many candidates drew the graph indicated in Q2.3 and thought that they could derive the shut-down point from this graph. The question, however, was based on an individual firm in a perfect market. Another common error in the graph was the drawing of the MC curve in relation to the AC curve. The graph did not show the MC curve intersecting the AC curve at its minimum point. This would tend to distort the interpretation of the graph.

e. Candidates misinterpreted Q2.5 and discussed collusion in general. Many candidates also referred to the different types of collusion and did not focus on the evaluation of the impact of collusion on the economy.

Suggestions for Improvement

a. Teachers should teach the Competition Act in detail and must emphasise the role of the different institutions in regulating competition. Investigations by the Competition Commission into anti-competitive behaviour by firms should be discussed. This can be researched by learners as a task and discussed in the class to expose to different examples.

b. Learners must be exposed to more evaluation-type questions and emphasis must be placed on the requirements of the cognitive verb, i.e. the positive and negative aspects.

c. When interpreting the graph, the 'loss minimising point' seemed to confuse learners. When teaching the graphs on perfect and imperfect markets, learners should focus on the equilibrium position (point) of the firm (i.e. where MR=MC). Teachers must emphasise that this point will determine the profit or loss position of a firm. This point can be regarded as the profit maximising point in the case of economic profit, a break-even point in the case of normal profit, and a loss minimising point in the case of an economic loss. It would be misleading to learners to generalise MC=MR as the profit maximising point only.

d. Learners need to be careful of how they present their final calculations. A figure showing a loss must be accompanied by a negative sign. If it appears without the negative sign, then the word 'loss' should accompany the figure. Teachers should expose learners to the two methods of calculating profit or loss.

e. Teachers should focus consistently on the content and graphs in micro-economics from Grade 10 to Grade 12 to reinforce the various concepts covered. Teachers must emphasise the different cost and revenue curves under the various market structures and the purpose and shape of the curves. Regular practice in the drawing of this, sets a sound foundation for the drawing of the various equilibrium positions encountered in Grade 12.

f. Teachers should explain to learners that graphs are middle-level type of questioning (i.e. application), which will be part of Q2.4, Q3.4 and Q4.4 of Microeconomics.

g. The graphical representation of the short-run and long-run equilibrium position in perfect markets and imperfect markets must be emphasised. Learners need to understand why the difference exits in the positioning of the curves.

h. Class and homework exercises should be used productively to provide practice in drawing graphs. In addition, a formal or informal spot test on the drawing of graphs could be conducted to improve understanding.

i. Teachers need to focus on the application of knowledge in their assessment tasks. Learners should not merely recall information but should be able to apply critical thinking skills.

j. Learners need to be aware of the specific requirements of a higher-order question. In addition teachers need to assess higher-order questions appropriately, so that learners clearly understand the mark allocation. Mere listing of facts without an explanation in context will earn only 2 marks.

QUESTION 3: CONTEMPORARY ECONOMIC ISSUES

Common Errors and Misconceptions

a. In Q3.1.2, most candidates confused preservation, conservation and environmental sustainability.

b. Q3.2.5 was poorly answered. Some candidates seemed to argue that price stability would lead to low inflation, while the question already implied that the inflation was low. Some candidates merely used the question in their answers, while others used clichéd words, such as economic growth, job creation and low prices, without substantiating their answers.

c. In Q3.3.5, candidates provided other public-sector measures to sustainable development rather than focusing on environmental subsidies. Many failed to supply practical examples and incorrectly referred to subsidies given to producers as the means to lower the cost of production in general.

d. Q3.5 was poorly answered with most candidates providing irrelevant responses. They also could not analyse and reason out the failure of international measures to reduce the effect of climate change.

Suggestions for Improvement

a. The teaching of contemporary economic issues is imperative and basic concepts need to be emphasised.

b. Learners must be exposed to more data-response questions (i.e. 4-mark questions) that require application skills. The understanding of key concepts is necessary to interpret the questions. Such questions should be discussed in class with emphasis on the relevant data to address the requirements of the question. Logical reasoning would enable the learner to earn marks especially if they understand the question.

c. When teaching Economics a crucial element of teaching is to get learners to think laterally about the topic. Teachers must relate the different topics to the real world, where possible, to help learners prepare for higher-order questions. Learners must practice evaluating, assessing or critiquing issues or topics whenever possible.

d. Topics such as inflation, tourism and environmental sustainability would readily relate to topical newspaper articles and statistics. Teachers are encouraged to make reference to this data in their teaching. Data-response questions should not merely require learners to copy answers from the given data. Learners should be able to apply the data in the appropriate context.

QUESTION 4: MICRO-ECONOMIC/CONTEMPORARY ECONOMIC ISSUES

Common Errors and Misconceptions

a. In Q4.1.1, learners failed to give correct examples of hazardous waste. Responses included litter and paper.

b. In Q4.1.2, candidates described merit goods or compared them to demerit goods.

c. Responses to Q4.2.5 included economic profit disappearing due to an increase in costs and explanation of the characteristics of a monopolistic competitor. Some candidates incorrectly assumed that if economic profit disappears in the long run, a loss will result.

d. In Q4.3, some candidates did not understand what rhino poaching is and could not determine the reason for rhino poaching. In Q4.3.3, many candidates provided similar responses by confusing the concept of biodiversity with preservation, conservation and environmental sustainability. Most learners appeared to be confused by Q4.3.5 and presented responses that were vague and did not relate the benefit of households.

e. In Q4.4, many candidates failed to draw the correct graph and labelling was also incorrect. Many candidates included cost curves which were also incorrectly labelled. In most cases only one graph was drawn, usually for the individual firm. Some even inappropriately copied the graph from Q2.3. Candidates who drew the graphs correctly often failed to explain how price was determined for the individual producer.

f. In Q4.5, candidates lost marks because they listed facts without explaining in full sentences. Most did not elaborate or substantiate how households contribute to a lower inflation rate. Responses often related to what the authorities can do to lower the repo rate.

Suggestions for Improvement

a. Teachers must discuss concepts thoroughly by giving examples where possible. This improves the understanding of the topic. Concepts should be related to the real world for learners to appreciate and understand the topic. For example, in teaching the concept 'conservation', a link must be drawn as to how this is done in the real world, and particularly in South Africa.

b. Teachers must continuously assess the drawing and interpretation of graphs via data-response questions in order to improve understanding and performance of these challenging aspects of Micro-economics.

c. Higher-order questions should be discussed with learners in terms of the interpretation and expectations of a question. The marking of these responses in a class test or homework exercise must correspond with the expected response. This will enable learners to gain skills in answering such questions appropriately.

QUESTION 5: MICRO-ECONOMICS

In general, the level of performance in response to the question was poor to satisfactory. This particular essay was not popular as learners continually avoid essays incorporating graphs.

Common Errors and Misconceptions

a. There were many instances where the introduction was vague or had little relevance to the specific topic. In the main part candidates did not present their answers in terms of the structure expected.

b. Candidates did not correctly draw and label the demand and supply curves and were unable to distinguish between demand and supply which is a basic Grade 10 skill. There was a lack of reference points, e.g. maximum price and not indicating the new quantity demanded and supplied.

c. Many candidates could not draw producer subsidies, maximum prices and minimum wages graphs accurately. The curves were labelled incorrectly which resulted in incorrect explanations.

d. In the additional part many candidates could not interpret and explain the negative externality graph. They focused on the explanation of negative externalities in general.

e. Although guided in the question paper as to what a conclusion should entail, the writing of a relevant conclusion is challenge for most candidates.

Suggestions for Improvement

a. Teachers must test learners regularly on essay questions by focusing more on the structure.

b. Teachers are encouraged to get learners to practice the drawing of graphs and to assess their own accuracy in the labelling of curves.

c. As practice, learners should be given graphs depicting the various concepts or equilibrium positions and be required to provide the explanation for the graph. This could be done as a specific task to improve their ability to interpret graphs. Learners must be reminded that for the minimum wages graph, the vertical axis should be wages and not price, while the horizontal axis represents labour and not quantity.

d. Subject advisers/Cluster leaders must provide adequate support and materials that would help teachers to deal with challenging topics such as graphs.

e. Teachers must ensure that learners are able to interpret questions correctly to avoid irrelevant information in their responses. Teachers are encouraged to expose learners to different questions on the same topic and guide them on the interpretation of questions. In this regard, learners should practice how to structure responses to questions based on key issues.

QUESTION 6: CONTEMPORARY ECONOMIC ISSUES

In general, the level of performance in response to the question was satisfactory to good. This essay was very popular.

Common Errors and Misconceptions

a. Many candidates used outdated, incorrect or misinterpreted statistics and confused the benefits of tourism with the effects of tourism.

b. Candidates often failed to explain facts in more detail and were awarded only 8 marks for listing and examples.

c. In the additional part most candidates did not understand the question and only gave examples of heritage sites and tourist attraction areas.

Suggestions for improvement

a. All content should be completed timeously so that there is time for revision. There is a tendency for teachers to rush through the last few modules and not to spend as much time on contemporary economic topics. Teachers need to plan properly so that each topic is given adequate attention.

b. In the conclusion, learners should be taught how to structure a response in support of or against the facts mentioned in the main part.

c. Basic content should not only be covered, but also linked to the creativity of learners in the practical application of each topic.

CHAPTER 6

GEOGRAPHY

The following report should be read in conjunction with the Geography question papers of the November 2018 examinations.

6.1   PERFORMANCE TRENDS (2014–2018)

The number of candidates decreased by 7 150 relative to the 2017 enrolment. The general performance of candidates declined slightly this year as indicated by 74,2% of candidates achieving 30% and above, with 46,7% achieving 40% and above. The pass rate at both of these levels is the lowest performance recorded in the last five years.

Table 6.1.1 Overall Achievement Rates in Geography

Year	No. Wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	236 051	191 966	81,3	127 358	54,0
2015	303 985	234 208	77,0	153 212	50,4
2016	302 682	231 641	76,5	145 726	48,1
2017	276 771	212 954	76,9	138704	50,1
2018	269 621	200 116	74,2	126 011	46,7

Graph 6.1.1 Overall Achievement in Geography

	2014	2015	2016	2017	2018
■ % achieved at 30% and above	81.3	77.0	76.5	76.9	74.2
■ % achieved at 40% and above	54.0	50.4	48.1	50.1	46.7
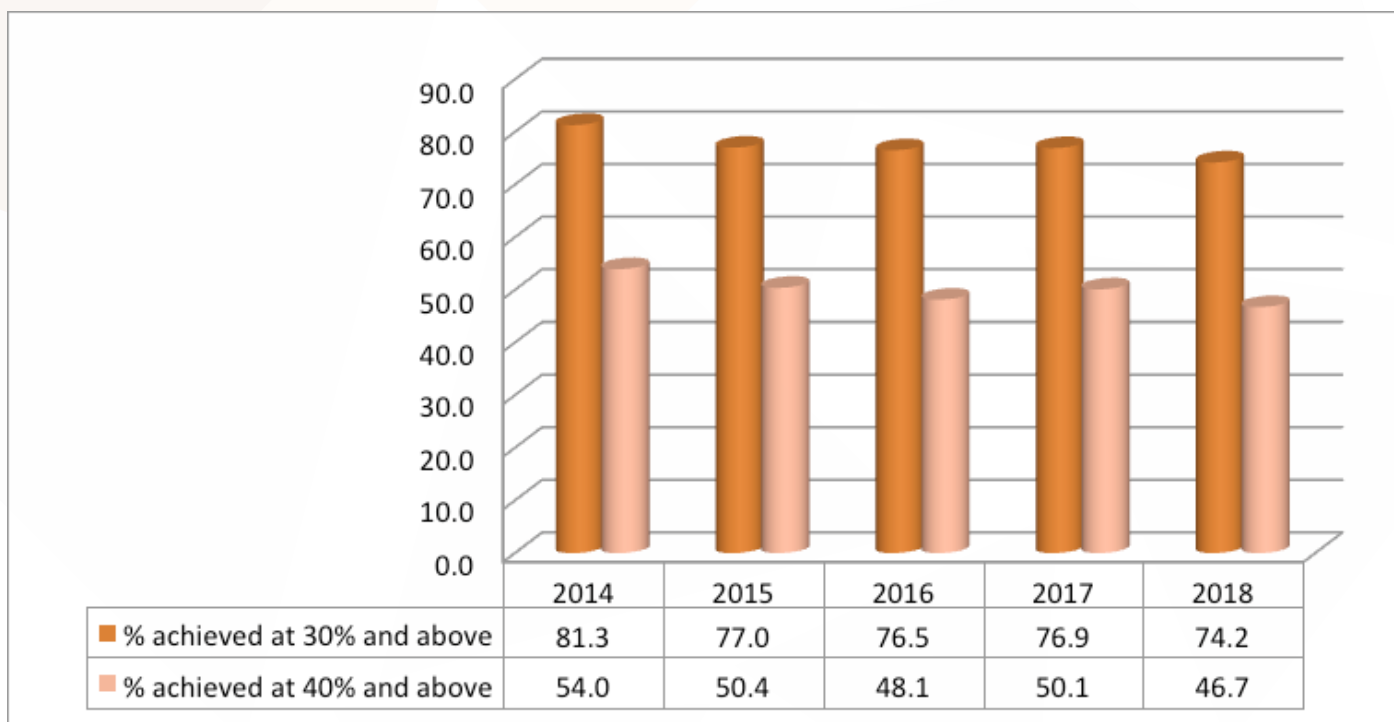
Graph 6.1.2 Performance Distribution Curves in Geography

	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	0.2	3.7	14.8	27.4	24.7	15.8	8.4	3.5	1.3	0.2
2015	0.2	5.7	17.1	26.6	22.5	14.8	7.9	3.6	1.3	0.2
2016	0.1	4.9	18.4	28.4	22.7	13.8	7.1	3.2	1.2	0.1
2017	0.3	5.9	16.9	26.8	22.8	14.8	7.8	3.4	1.1	0.2
2018	0.3	7.0	18.5	27.5	21.9	13.7	7.0	3.0	1.0	0.1
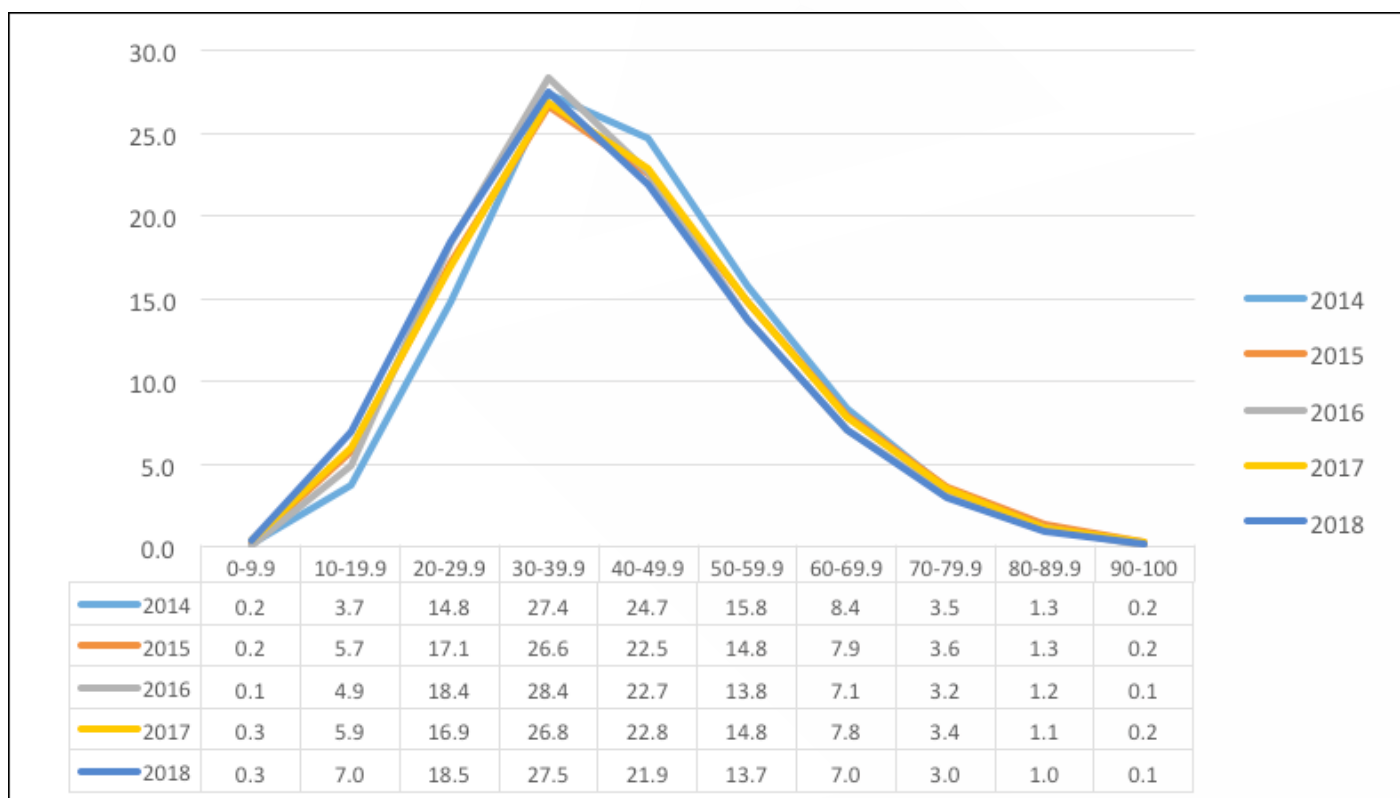
From the above graphs, it is evident that there has been a disappointing decline in the performance of candidates in 2018.

6.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General Comments

Many similar points were raised in the Diagnostic Report of 2017, yet it is felt that these remain areas of concern in the context of the 2018 NSC paper and should be emphasised once again.

a. Candidates experienced challenges with middle- and higher-order questions.

b. There were several quality responses to the question paper where good levels of understanding of geographical processes were evident. However, there were still many candidates who struggled to answer some of the questions set, even at the lower order.

c. Many candidates are still not applying command/action words such as 'analyse', 'outline', 'discuss' and 'comment on'. They simply 'list' or 'name' when a discussion is required.

d. Short objective questions: Candidates performed well in these questions. A variety of short objective type questions were used, e.g. multiple-choice questions, matching items, choose one term in brackets and matching the descriptions to the labels.

e. Two- to four-mark questions: These data-response type questions, where a discussion and detailed reference were required, were often poorly answered. In many cases candidates were unsure whether a one-word answer or longer phrase was required as the response. It appears that many candidates did not know when to give causes, effects and solutions when responding to these questions. Only a handful of answers demonstrated an understanding of command/action words like 'evaluate', 'suggest' and 'account for'.

f. Paragraph style questions: These questions were mostly of a medium- and -higher order. In many cases these questions were poorly answered. It is evident that candidates were not taught the necessary skills to interpret and answer these types of questions. In some cases the candidates' paragraphs were very long and sometimes the correct content was only found in the last few lines after sifting through much irrelevant information. Some candidates did not always heed the command words used in these questions, resulting in them being poorly answered.

g. Most candidates do not have a sound knowledge of the basic geographical concepts. For that reason many candidates experienced difficulty in answering questions that included basic geographic concepts. If the candidate does not know/understand the basic geographic concept, he/she will not be able to answer those questions that require an in-depth knowledge of the topic. Some examples are *katabatic wind* (1.4.1), *drainage density* (1.5), *moisture front* (2.3.1), *deforestation* (2.6.1), *pollution dome* (2.4.1), *urbanisation* (3.3.1) and *rural-urban fringe* (3.4.1).

h. Most of the topics in the *CAPS* were covered.

General Suggestions for Improvement

a. Candidates continue to struggle with those action words that demand a higher cognitive level of thinking. Questions containing these action words should be answered in full sentences, showing a clear knowledge and understanding of geographical content. The action words listed in the table below are commonly used in Geography examination papers. Note that this is not a comprehensive list of action words.

Table 6.2.1 Action Words and their Expected Responses

| VERB	MEANING
Account	to answer for – explain the cause of – so as to explain why
Analyse	to separate, examine and interpret critically
Annotate	to add explanatory notes to a sketch, map or drawing
Comment	to write generally about
Compare	to point out or show both similarities and differences
Construct	to draw a shape
Describe	to list the main characteristics of something - give an account of
Develop	to successfully develop and create a new method/idea
Differentiate	to show the difference between things
Discuss	to examine by means of argument, presenting both sides and reaching a conclusion
Distinguish	to recognise the difference between things
Draw	to show by means of a sketch
Evaluate	to make an appraisal or express an opinion concerning the value - to define, analyse and discuss
Explain	to make clear, interpret and spell out the material you present
Illustrate	to show what something is like - to show that something is true
Justify	to prove or give reasons for decisions or conclusions, using logical argument
Outline	give a summary, using main points and leaving out minor details
Predict	to say what you think will happen - to foretell - to say in advance
Prioritise	to place in order of importance
Propose	to suggest a plan - to make a formal suggestion
Recommend	to advise that something should be done
Report	to produce an official statement or written document
Sketch	to illustrate with a simple drawing
Solve	to find a solution to something that is causing difficulties
Suggest	to propose an explanation or solution
Support	to show that an idea/statement is true
Verify	to check/prove that something is correct
Write	to create a formal document

b. Two- to four-mark questions require interpretation techniques. Candidates cannot merely reproduce knowledge gained in the classroom. Responses should be well thought-out and adapted to the source given.

c. Learners should be taught the skill of paragraph writing. These questions usually require critical and analytical thinking, which place them on a higher level of cognitive thinking. Although it is expected of candidates to answer these questions in full sentences, the answer should be to the point and focus on the intent of the question. Candidates should limit their answers to the prescribed EIGHT lines. It is useful in a paragraph-style question to underline the following: the main topic of the question, the action word and the focus areas of the question. Candidates do not adhere to the action word and often tend to list or mention only. Many questions requiring paragraphs contain two components or issues that must be addressed or referred to, and this should be done in equal parts. Candidates should learn to provide and discuss two points for each of the two issues. This will assist them not to repeat facts. Poor punctuation makes it difficult for markers to mark these questions effectively. Regular practice of paragraph writing in short informal and formal tests, as well as in internal examinations, will allow the learners to improve these skills and be confident when attempting these questions.

d. Teachers must ensure that learners know all the geographical concepts/definitions required by having the learners compile a glossary of terms in their notebooks for easy reference. Learning geographical concepts/definitions will assist learners in extending their geographical vocabulary.

e. When a geographical problem is studied, learners should study the causes and effects as well as possible solutions thereof. An in-depth knowledge of such issues is required by the teacher, and this might involve informal research on the part of the teacher.

f. Geography is an ever-changing subject. The urban and economic environment is constantly changing. Teachers are therefore encouraged to collect resources on an ongoing basis and be aware of current events that are taught in Grade 12. These should then be incorporated into lessons to ensure that lessons are topical and relevant to learners. As life-long learners, teachers must stay abreast of new developments in their subject.

g. Teachers must use source-based questions in class assignments, tests and examinations. They must make use of relevant and recent resources from the internet and avoid using only sources that appear in textbooks and are familiar to learners. Teachers should focus on the interpretation of diagrams, sketches, photographs, cartoons and graphical data. The learners should be taught how to draw on information from these different sources. Teachers and learners must be aware that different sources may also be combined for examination purposes.

h. Teachers should be fully aware of the relevant subject content to be taught by constantly referring to the CAPS document and the Examination Guidelines. For 2019 the following core industrial areas must be studied: PWV/Gauteng and Port Elizabeth-Uitenhage/Nelson Mandela Metropole. For 2019 the Saldanha Bay IDZ and case studies of the Platinum SDI and the Richards Bay SDI must be studied. Prescribed textbooks do not contain the subject content mentioned above and teachers should therefore do research on these topics. All topics mentioned in the CAPS and examination guidelines are not always dealt with in-depth in the various prescribed textbooks and teachers should therefore consult more than one textbook if possible. Information provided in the various textbooks is not always geographically sound and, when in doubt, teachers must do extended research on the topic.

i. Teachers should provide each learner with a copy of the examination guidelines, highlighting the content that will be taught. This can be used as a checklist to ensure that all content is covered and to assist in preparing for tests/examinations.

j. To improve learner performance, teachers must refer to previous examination papers as a guide to ensure that the standard of questions used in the assessment at school level is appropriate. This would also assist teachers to acquaint candidates with the style of question-setting and how questions are scaffolded, from those testing lower-order cognitive skills, to the higher-order questions, testing more advanced thinking skills. Previous question papers must not, however, be used as a predictability tool.

k. Teachers must ensure that the distribution of marks in the internal assessment tasks is according to the requirements in the CAPS document. The weighting is 25% lower order, 50% middle order and 25% higher order. If too many lower-order questions are asked in the internal assessment conducted at school, learners will not be exposed to the higher-order questions that are asked in the final examination and will therefore have a false notion of the level of performance required to achieve.

l. Teachers are encouraged to use a variety of new, interesting and current sources on which to base their questions. If sources are derived solely from the textbook in use at a particular school, learners are not exposed to unseen new sources that they might come across in an external examination. Exposing learners to new sources continually, trains them to critically analyse any sources to which they are exposed.

m. No credit should be given for simple single-word responses when a full explanation is required.

n. Teachers must note that the short subjective questions (15 marks) at the beginning of each of the 4 questions are not necessarily going to test low-order thinking skills and straight-forward recall only. Some questions might require a higher level of cognitive thinking.

o. YouTube live feeds, Xtremepapers.com, Mind the Gap, Telematics, Radio Sonder Grense revision programme, Teletutor, revision programmes on the SABC and working through previous question papers are useful tools to explain and revise important geographical concepts.

6.3   DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 1

The following graph is based on data from a random sample of 100 candidates per province. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Graph 6.3.1 Average Performance per Question Expressed as a Percentage: Paper 1
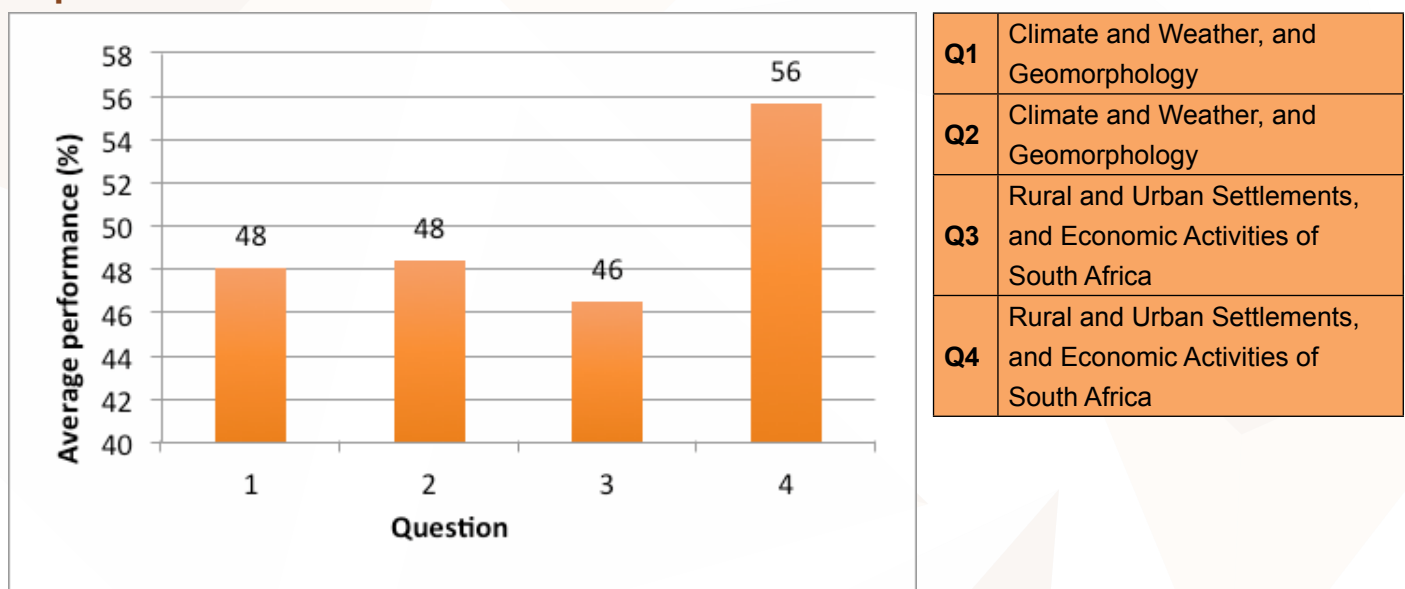
Q1	Climate and Weather, and Geomorphology
Q2	Climate and Weather, and Geomorphology
Q3	Rural and Urban Settlements, and Economic Activities of South Africa
Q4	Rural and Urban Settlements, and Economic Activities of South Africa

Graph 6.3.2 Average Marks per Subquestion Expressed as a Percentage: Paper 1

Bar graph of Average performance (%) per Subquestion:

Subquestion	Label	Value
1.1	Anticyclones	79
1.2	River capture	63
1.3	Mid-latitude cyclone	49
1.4	Valley climates	45
1.5	Drainage density	35
1.6	Cross-profiles	44
2.1	Tropical cyclone	75
2.2	Fluvial landforms	68
2.3	Line thunderstorms	35
2.4	Pollution dome	32
2.5	River rejuvenation	42
2.6	River management	62
3.1	Settlement patterns and shapes	61
3.2	Sectors of South Africa's economy	76
3.3	Level and rate of urbanisation	37
3.4	Rural-urban fringe	37
3.5	Beef cattle farming	44
3.6	East London IDZ	45
4.1	Street patterns	68
4.2	Gold mining	69
4.3	Public transport as an economic injustice	59
4.4	Water as a social injustice	65
4.5	PWV/Gauteng Industrial Region	41
4.6	International Trade	50
	FINAL TOTAL	50

6.4   ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: CLIMATE AND WEATHER, AND GEOMORPHOLOGY

Common Errors and Misconceptions

a. In Q1.4.4, candidates struggled to account for the low temperature on the valley floor. This is one example where candidates struggled to heed the action word, and answered the question incorrectly. Candidates lack topic knowledge of this basic geographical content.

b. Poor performance was noted in Q1.4.6. Candidates could not provide *adapted farming techniques* to adjust to the temperature changes on the valley floor. This was considered as being set outside the *CAPS* and examination guidelines. Candidates did not concentrate on adaptations on the valley floor and referred to moving the farming activities away from the valley floor. The word 'adapt' was not clearly understood by all candidates.

c. The link between human activities and an increase in drainage density could not be identified in Q1.5.4. Candidates failed to apply their content knowledge to respond to the question effectively. Many candidates did not write a paragraph discussing the impact of human activities on drainage density, but rather just mentioned them.

Suggestions for Improvement

a. Q1.4.4: Learners must have a clear understanding that during winter months the atmosphere is colder than during summer months. Air will be heavier and denser and therefore the subsidence along the valley slope will be much greater. There still seems to be a misunderstanding of the different types of air movement in a valley. Although the focus is on anabatic and katabatic winds in Grade 12, it is confused with valley and mountain winds. The illustration below shows the difference between these various types of air movements in a valley.
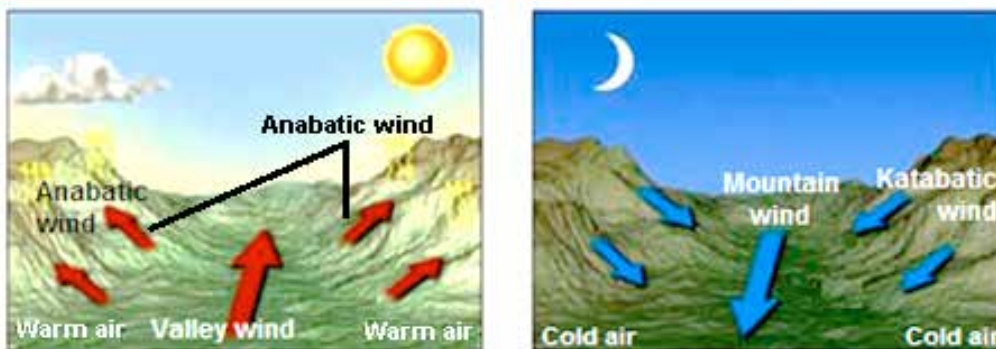
Note the difference between an anabatic wind and a valley wind, and a katabatic wind and a mountain wind. These types of tertiary/local winds are often confused with one another. An anabatic wind blows upwards along the slopes of a valley. A valley wind also blows upwards, but it blows upwards along the valley floor. A katabatic wind blows downwards along the slopes of a valley. A mountain wind also blows downwards, but it blows downwards along the valley floor. Q1.4.6: The CAPS and examination guidelines do not refer to farming techniques specifically. However, the impact of valley climates on farming infers that one should also consider farming techniques. Teachers should be aware that a deeper understanding of topics is necessary, even if it is only superfluously mentioned in the CAPS and examination guidelines.

b. Q1.5.4: Relationships between human activities and the impact thereof should be emphasised in the classroom. Learners must be able to describe the cause and effect of humans on the environment (Q2.5.5) was poorly understood.

QUESTION 2: CLIMATE AND WEATHER, AND GEOMORPHOLOGY

Common Errors and Misconceptions

a. Candidates displayed a lack of content knowledge on line thunderstorms in Q2.3. There was a poor understanding of the source of moisture for the development of a line thunderstorm (Q2.3.4) and why there is a thicker band of clouds to the east of the moisture front. Candidates could also not differentiate between line thunderstorms and isolated thunderstorms.

b. Poor performance was noted in Q2.5. Candidates displayed little understanding of the concept river rejuvenation. They struggled to define the term correctly (Q2.5.1), and did not understand the conditions responsible for the process (Q2.5.2). The role of river rejuvenation in changing the fluvial features found in the lower course of the river (Q2.5.5).

Suggestions for Improvement

a. Q2.3: Learners need to understand that line thunderstorms are a combination of thunderstorms that are linked and stretch from the northwest to the south-east across the interior of South Africa. It develops along the moisture front from where warm, moist air from the northeast and cold, dry air from the southwest meet. The diagram below shows the position of the moisture front across the interior of the country. It also shows the source of moisture for the development of line thunderstorms. Note the occurrence of the line thunderstorms to the east of the moisture front. The warm, moist air that is forced to rise is on the eastern side of the moisture front.

Development of line thunderstorms
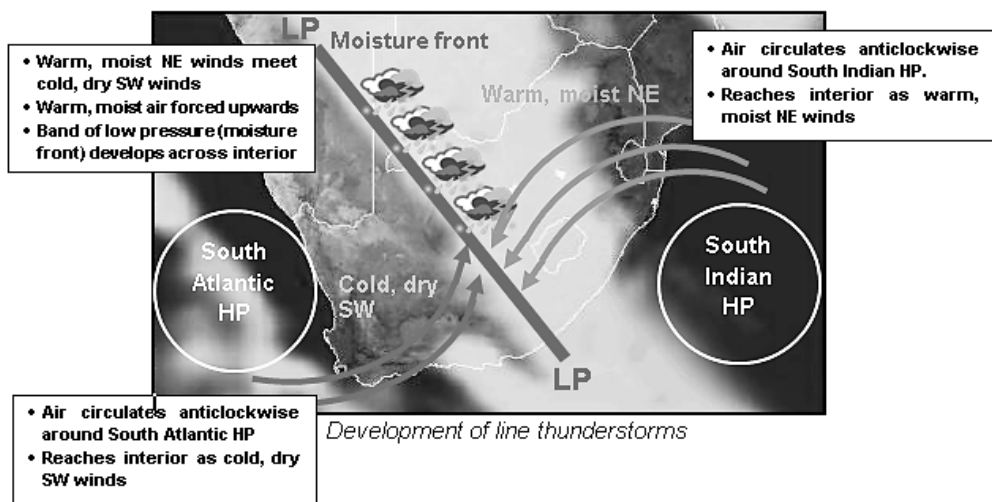
Q2.5: For rejuvenation to take place, the river must gain energy. Once it has gained energy the river will start to erode **downwards** once again. When defining the term rejuvenation, it is important that learners must include the words 'downward erosion'. Rejuvenation will impact on the fluvial landforms downstream of the point of rejuvenation. Therefore, it will result in deepening of a meander. The meander will become incised or entrenched. Where the river flows in a valley, it will cut deeper into the valley floor, and a new valley will develop on the existing valley floor. The existing valley floor will remain behind as terraces. The above factors hamper the development of infrastructure such as building bridges. The development of infrastructure will be costly. The diagram below shows the various features of river rejuvenation.
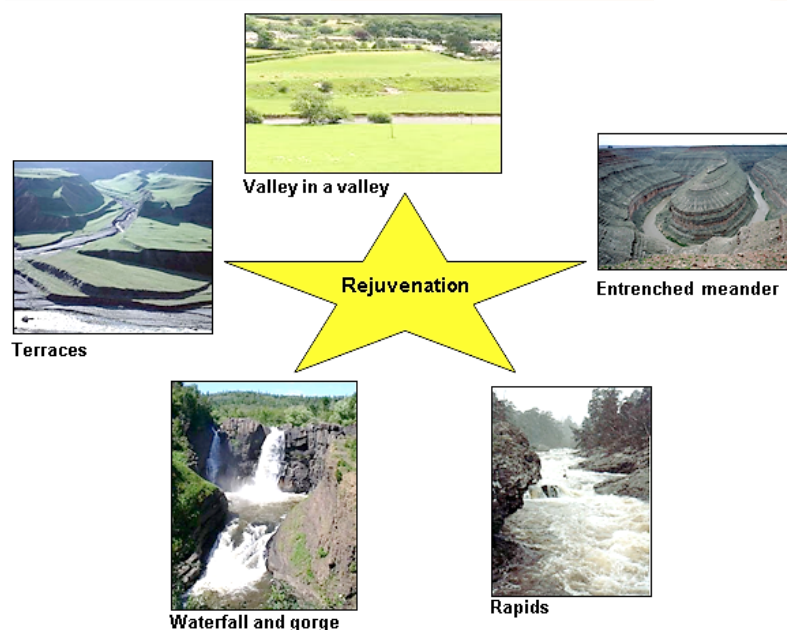
QUESTION 3: RURAL AND URBAN SETTLEMENTS, AND ECONOMIC GEOGRAPHY OF SOUTH AFRICA

Common Errors and Misconceptions

a. Q3.4 on the rural-urban fringe was poorly answered. Many candidates struggled to determine why the rural-urban fringe is becoming more urban in nature (Q3.4.3) and why more urban development is taking place in this land-use zone (Q3.4.5). Most of them did not understand the concept of a 'gated community', even though it was explained in the annexure and in the question (Q3.4.4).

b. As there is a lack of content on beef cattle farming in most textbooks, candidates did not perform well in Q3.5. Providing measures as to how the quality of South Africa's farmers expertise can produce higher quality beef cattle, was beyond the scope of most candidates. Candidates specifically struggled to provide factors that prevent South Africa from becoming more competitive as a beef exporter.

Suggestions for Improvement

a. Q3.4: As the urban areas become more overcrowded, counter-urbanisation is taking place. Many people are leaving cities as air and noise pollution, overcrowding, congestion and crime, amongst others, are increasing. Their first point of call would be the rural-urban fringe where there is a more rustic atmosphere. However, this results in this land-use zone becoming more urban in nature, as urban functions will follow the people moving to the rural-urban fringe (commercial decentralisation). Developers will, therefore, explore the options of housing developments in the rural-urban fringe as space is available and land is cheaper on the outskirts of the city. Inhabitants of the rural-urban fringe will object, as the rustic rural atmosphere will now change. Ecosystems and biodiversity will be affected. It will also increase air and noise pollution, waste disposal and traffic, to name but a few. Developers usually look at the development of 'gated communities'. The latter is an enclosed housing development with controlled access. Many amenities such as schools, recreational facilities and basic shopping facilities are found inside the gated communities. The photographs below show the entrance to a gated community, and what the inside of a gated community looks like. These are usually high-income residential areas.

b. Q3.5: Beef cattle farming is not well-covered in most textbooks. The same can be said for maize farming and sugar-cane farming, the two other farming activities that must be studied. It is therefore important that teachers do research on these farming activities in South Africa, and use it as case studies when teaching. Generally, the following headings can be used:

* Where in South Africa
* Climatic conditions required
* Factors favouring the farming activity
* Factors hindering the farming activity
* The role of small and large scale farmers
* Contribution to South Africa's economy

QUESTION 4: RURAL AND URBAN SETTLEMENTS, AND ECONOMIC GEOGRAPHY OF SOUTH AFRICA

Common Errors and Misconceptions

a. Despite the fact that the PWV/Gauteng Industrial Region is often examined, candidates performed poorly in Q4.5. Candidates could not link the PWV/Gauteng Industrial Region as the preferred destination of international investors (Q4.5.2). Q4.5.4 was a higher cognitive level question which required candidates to demonstrate their understanding of the relationship between energy provision and labour and the processing of copper in the PWV/Gauteng Industrial Region in the future. The link between this industrial region and the Phalaborwa SDI might have confused some of the candidates.

Suggestions for Improvement

a. In studying any one of the core industrial regions, learners must be made aware of the raw materials supporting industrial development in the region, as well as the industrial products manufactured there. In the case of Gauteng, the major supply of copper comes from the Phalaborwa SDI. The factors that favour the development of any one of the core industrial areas must be studied. These factors will also have an influence on international traders. Should factors be favourable for further industrial development in a specific region, international investors would be attracted to the region as well. As the PWV/Gauteng Industrial Region is already established as an industrial region, it will attract international investors.

The provision of energy and labour is key to the further development of an industrial region. As our coal resources become depleted, industries will struggle to continue with manufacturing processes. The same can be said during times of load shedding. Production decreases and industries will lose income. Labour shortages will reduce production. Constant labour disputes and industrial action impact negatively on production, and consequently a loss of income. More skilled labourers are needed and this increases the production cost of industries. Teachers must be aware of the changes in the economic climate of South Africa, as these will have a major impact on industrial development in the PWV/Gauteng as well as the other core industrial areas of South Africa.

6.5   DIAGNOSTIC QUESTION ANALYSIS OF PAPER 2

The graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Graph 6.5.1 Average Performance per Question Expressed as a Percentage: Paper 2
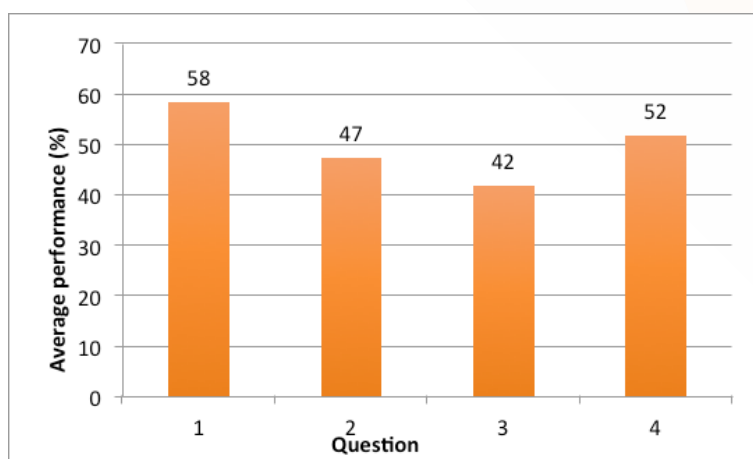
Q1	Multiple Choice
Q2	Map Calculations and Techniques
Q3	Application and Interpretation
Q4	Geographical Information Systems

Graph 6.5.2 Average Marks per Subquestion Expressed as a Percentage: Paper 2
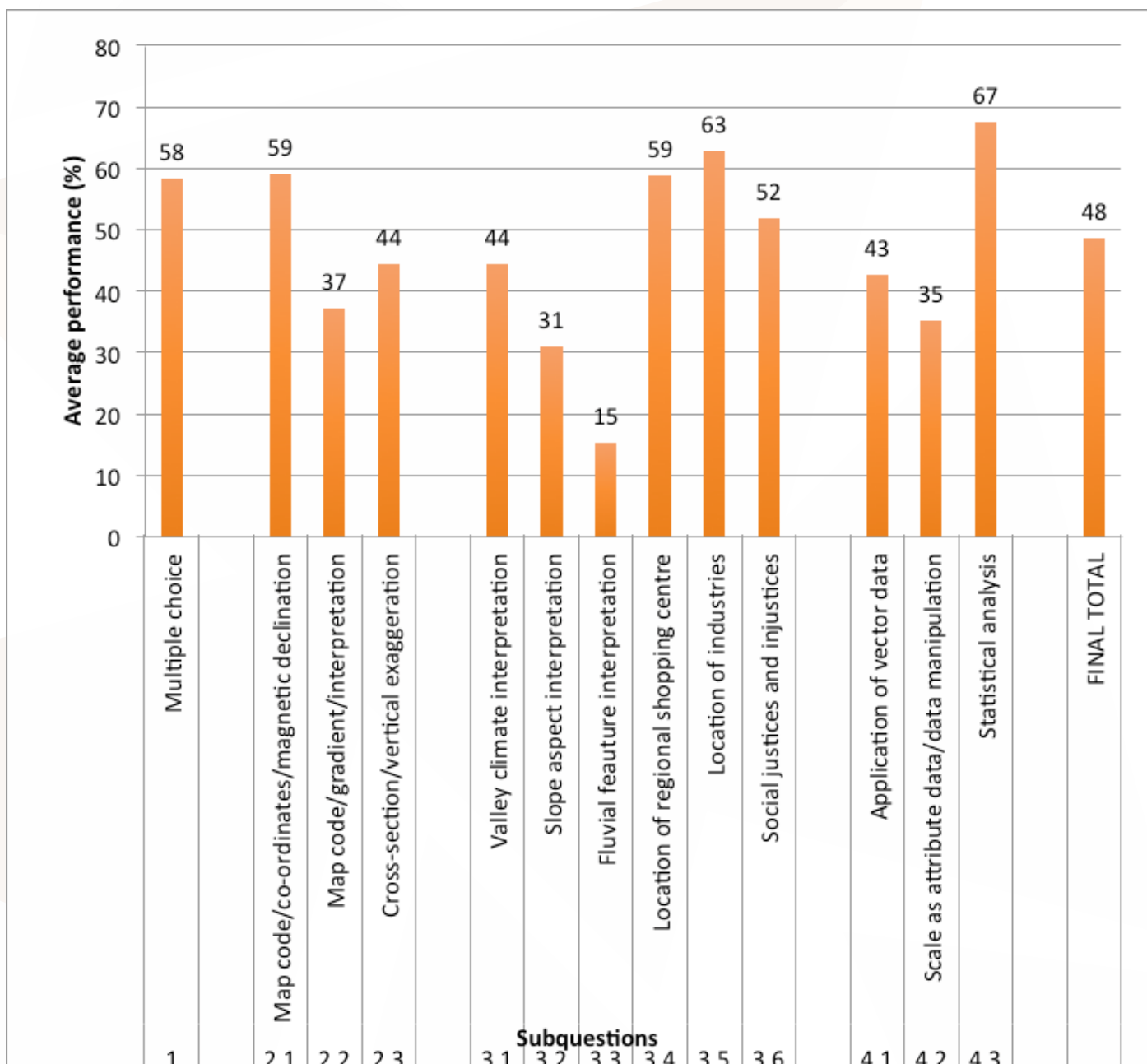
6.6 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General Comments

a. Middle- to high-order questions continue to be a great challenge to the candidates. Action words are not understood correctly. Many candidates did not know how to approach those questions in which they did not understand what was expected of them.

b. Candidates are disadvantaged because they do not read instructions, or fail to use the given information in support of their responses.

c. An improvement in the basic knowledge of calculations is noted.

d.   The integration of theory and mapwork skills cannot be emphasised enough. Learners must be made aware that Geography Paper 1 and Paper 2 are interrelated and not two separate entities. When certain concepts are taught in the theory section of Geography, this knowledge should be applied in the mapwork paper.

e.   The fundamental knowledge of GIS has improved.

General suggestions for improvement

a.   The area covered by the orthophoto map is usually indicated as a red demarcated area on the topographic map. Learners must be made aware that even though the actual orthophoto map and the topographic map are similar in size, the orthophoto map represents a much smaller landscape than the topographic map. Understanding the concept of scale is important. The topographic map has a scale of 1 : 50 000 while the orthophoto map has a scale of 1 : 10 000. This means that the orthophoto map will show a feature to be 5 times larger than the same feature on the topographic map.

b.   Learners must be taught to recognise subtle differences in the options given in a multiple-choice question. Teachers should be trained in the correct way of setting multiple-choice questions. Both teachers and learners should be aware that the multiple-choice questions are not only testing simple recall, but can include middle- and high-order cognitive skills testing.

c.   The theory of Climatology, Geomorphology, Settlement and Economic Geography of South Africa must be taught by integrating content with topographic maps and orthophoto maps of South Africa.

d.   The integration of theory and mapwork is essential and must be taught concurrently. Teachers should also emphasise the importance of using the correct geographic terminology in tests and examinations. For example, candidates often use words such as 'left' and 'right' instead of 'north', 'south', 'east' or 'west'.

e.   Information about the height (altitude) of various places on the topographic and orthophoto map can be obtained from several sources: contour lines, spot heights, trigonometrical beacons and bench marks. Height on both the topographical and orthophoto maps is expressed in metres above sea level.

f.   The index contour line is the darker line that indicates the whole number value, for example, the 1 000 m contour line (block A2). Every 5th line is an index line as the contour interval on a topographic map is 20 m. This can assist learners when plotting cross-sections or determining the height above sea level of features.

g.   Teachers must be trained in mapwork calculation techniques and GIS. When teaching calculations, a step by step correct geographical method should be followed. Teachers are encouraged to consult the examination guidelines in this respect. Marking of calculations in tests and internal examinations should be done as prescribed in the examination guidelines for consistency with the external examinations.

h.   Learners must know that to identify a human-made and/or natural feature on an orthophoto map, the same feature must be located and verified on the topographic map first. It is therefore important that the orthophoto map and the topographic map be correctly orientated. Once this has been done, learners must find similar-looking features on both the orthophoto map and the topographic map as points of orientation. Learners must be reminded that the distances between features on the orthophoto map will be much greater than the distances between the same two features on the topographic map, as the scales of the two maps differ.

i.   Learners must understand that human-made features tend to have a more regular shape than a natural feature.

j.   All schools should have a variety of topographic maps and orthophoto maps available as invigilators are instructed to collect these resources at the end of the examination. Teachers should use these resources and examination papers for practise in class. All NSC examination papers can be used for revision in class was the content remains the same. However, previous question papers must not be used as a predictability tool. Paper 2 allows for creativity and teachers and candidates alike must expect new approaches in the examination.

k. Teachers must give regular exercises to improve map reading and interpretation skills.

l. Learners should have a good knowledge of aerial photography which covers identifying human features on the orthophoto map using texture, tone, shadow and shape.

m. Learners need to be able to interpret the length and direction of shadows from buildings/trees on the orthophoto map to determine the time of day the aerial photograph was taken. Learners must understand that the closer to midday the photograph is taken, the shorter the shadow will be as the sun is almost directly overhead. The direction in which the shadows fall indicates whether the photograph is taken before or after 12:00 (midday). Shadows fall south-west if the photograph is taken before 12:00, and north-east if the photograph is taken after 12:00. This question is often asked as a multiple-choice question.

n. Learners must be able to use their knowledge of contour patterns from Grade 10 to identify various landforms like the butte asked in Q1.13: They must be able to identify steep and gentle slopes, convex and concave slopes, based on their understanding of the patterns formed by the contour lines on the map. This knowledge can also be used to identify the different courses of a river: where the contour lines are closer together the middle course is identified and where the contour lines are further apart the lower course is evident.

o. The level of predictability regarding certain topics in mapwork is low as the choice of the topographic map and associated orthophoto map will determine which topics can be tested. Teachers and learners therefore need to cover all the content thoroughly.

p. Teachers are reminded to encourage learners to always read through the general information, review the maps and make use of the translations at the front of the question paper. Often answers to questions come from this information.

6.8 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

Common Errors and Misconceptions

a. Q1.5 was answered well by most English candidates, but the Afrikaans candidates struggled as there was no translation of brickworks in the translations at the front of the answer book.

b. Many candidates did not select green belt as the correct land-use zone in Q1.6, instead they chose the rural-urban fringe. The concept of a green belt as a land-use zone is mentioned in the examination guidelines.

c. Candidates had to use both the orthophoto map and the topographic map in Q1.7 to select the correct human-made feature. This tested the candidates' skill of finding feature 2 on the orthophoto map and then on the topographic map, before looking at the conventional signs reference to identify the feature.

d. The Afrikaans candidates struggled with selecting the correct option in Q1.8. In English the word 'uniform' was used, but in Afrikaans the word 'konstant' was used instead. Afrikaans candidates were not familiar with this term.

e. Q1.11 proved to be ambiguous and as a result both options B and D were accepted.

f. In Q1.12, candidates were directed to block H8 to examine the canal which carries the water in the river. The answer to the question asked was to be found in the adjacent block, H7. Some candidates spent much time trying to locate a feature in block H8.

g. It was noted in Q1.13 that candidates found it difficult to see the contour line pattern and identify the landform required in the Swartkop area in block F1. This was due to a fair amount of text partially covering the area.

h. In Q1.14, candidates found it difficult to give the general direction of the flow of the river.

Suggestions for Improvement

a. Teachers need to make learners aware that multiple-choice questions are application questions and as such they must make use of the resources provided: General information on Pietermaritzburg, the English terms and their Afrikaans translations, both the topographic and orthophoto maps and any other introductory paragraphs to various questions.

b. All questions should be attempted as there is no negative marking.

c. When learners place the letter depicting the most correct option in the block opposite the question, they are encouraged to use uppercase. This is recommended so that it is clear which letter they have selected. Uppercase **A**, **B**, **C** and **D** are more easily discernible.

d. If the learner wishes to change the option they have selected, they may cross it out and clearly write their new choice next to the block.

e. Teachers must make learners aware that most of the answers to the multiple-choice questions are found in the resources, e.g. in Q1.1 the answer was found in the general information. Teachers and learners might need to make a paradigm shift as it is a misconception that multiple-choice questions are only lower-order questions. Q1.7 and Q1.8 and Q1.14 are examples of middle-order questions with a high degree of difficulty.

f. The concept of a *green belt* as a land-use zone was tested in Q1.6 Definition. 'A green belt is a policy and land-use zone designation used in land-use planning to retain areas of largely undeveloped wild or agricultural land surrounding or neighbouring urban areas.' [Wikipedia]

g. Learners must familiarise themselves with the latitudinal and longitudinal parameters of the topographic map which are clearly indicated on the map.

h. One of the key mapwork skills tested in every examination is the measurement of true bearing which is measured with a protractor. This can be tested in Q1 or as part of the magnetic bearing calculation in Q2.

Measuring true bearing:

1. You first need to locate the two places between which you are required to measure the true bearing.

2. Join them up with a light pencil line. Then draw in your true north line from the feature that you are measuring from.

3. When measuring true bearing, the protractor is held with the 0° line at the top.

4. You then measure clockwise from north, round to where your line intersects with the protractor. If the angle is less than 180° then the position of the protractor remains as in diagram A.

5. If the angle is greater than 180° the protractor needs to be repositioned as in Diagram B. Remember to add the 180° to the final bearing you read from the base of the protractor; from south to west clockwise.

A

Measuring bearings…

Find the bearing of B from A.

• Place your protractor over the north line with 0° at the top.

• Give the answer as a three-figure bearing

The bearing of B from A is 135°.

B

Measuring bearings…

Find the bearing of A from B.

• Place your protractor over the north line with 0° at the bottom.

• Because you are measuring clockwise you need to measure the exterior angle.

• The angle has gone past 180° so you will need to add your measurement to 180°

[https://www.slideshare.net/adamharbott/bearings-lesson]

i. Learners must use the conventional signs reference on the side of the topographic map to identify features on the map. It can be that the learner is asked to identify a feature on the orthophoto map, but to do so they must first consult the topographic map and identify the same feature there. Then the learner needs to use the conventional signs reference to confirm the feature. Q 1.7 is a good example of this. To get to the correct answer, you could not just read from the orthophoto map, you had to identify that feature on the topographic map where it is indicated with a **W**. Then you needed to consult the conventional signs reference to see that it is in fact a shopping complex. The **W** symbol indicates a 'store' or 'winkel' in Afrikaans.

j. The conventional signs reference also provides more detail with regards to the type of feature, for example types of road indicated on the topographic map. It is not sufficient to just say it is a road but rather to qualify what type of road it is.

k. There are several techniques that a learner can use to determine the direction of flow of a river. The most obvious way to determine the direction of flow of a river is to locate a dam wall on the river. In Q1.14 there was no dam wall to use as a reference. In this case, the learner could look at the contour patterns. Where the contour lines point towards the highest value line (higher ground), the river will then flow down that valley.
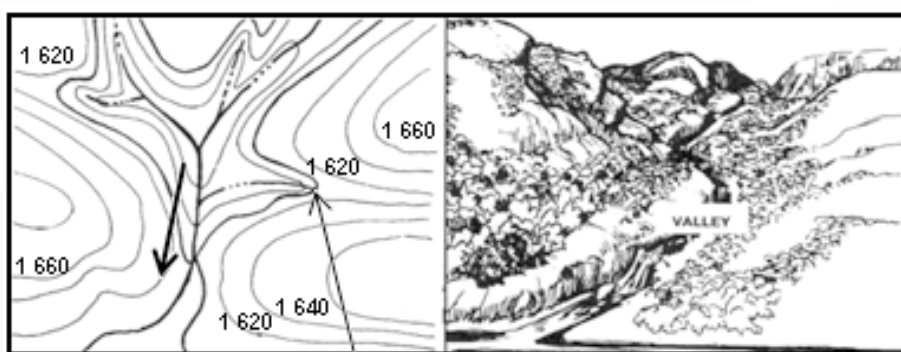
Contour line points towards higher ground

One could also consider looking at the values of spot heights, trigonometrical beacons or bench marks along the banks of the river or roads close by.

QUESTION 2: MAP CALCULATIONS AND TECHNIQUES

Common Errors and Misconceptions

a. Many candidates struggled to correctly calculate the grid reference/co-ordinates for Town Hill in Q2.1.2. Most candidates could arrive at the correct degrees and minutes but very few could calculate the seconds correctly and give the correct direction.

b. Q 2.2.1 was difficult for the candidates even though the same skill that was tested in Q2.1.1 was tested here but this time on the orthophoto map. There is a similar index/code on the orthophoto map that gives the number of the map directly to the east or west of the map being tested.

c. Candidates continue to struggle to calculate the average gradient of a part of the mapped area despite it being asked in the more accepted format as opposed to 2017. They were given the height of the contour line but needed to find the height of the trigonometrical beacon. Many candidates gave the number of the trigonometrical beacon as the height instead of the actual height given below in metres. Measuring accurately with a ruler continues to be problematic. One of the skills required in mapwork is accuracy of measurement.

d. Q2.2.3 was not answered well. Here the candidate had to follow a curved route along the Voortrekker Wagon Hiking Trail. They were asked to describe the route interpreting the contour lines with regards to steepness of gradient. Many candidates wrote about what they saw along the hiking trail, instead of the gradient.

e. In Q2.3.1 and Q2.3.2, candidates had to refer to cross-sections **X** and **Y** and apply their knowledge of vertical exaggeration to say which one shows the largest exaggeration. Candidates struggled to interpret and explain how in cross-section **Y** the features were easier to identify as the vertical exaggeration was greater.

Suggestions for Improvement

a. Determining the grid reference/co-ordinates of a place on the topographic map requires learners to use the grids indicating latitude and longitude on the map. The map number for Pietermaritzburg is 2930CB. The 29 indicates the line of latitude and the 30 indicates the line of longitude. When giving the grid reference/co-ordinates the learner is expected to give the degrees (°), minutes (') and seconds ('') and the direction for each co-ordinate. For example, if the learner was asked to determine the grid reference/co-ordinates for the middle of the dam in block B3 on the topographic map they would do so as follows. Firstly, you draw in the line of latitude (horizontal line) and then the line of longitude (vertical line) so that both cut through the grids on the outside of the actual map. One always starts with reading off the line of latitude first: 29°31' and then you need to accurately calculate the seconds. This is done by measuring the length of the full minute, e.g. 2,4 cm. You then measure the part of the minute you have used from the start of the minute to the line you have drawn, e.g. 0,4 cm. You can then do a proportional calculation to determine the seconds.

Example: $\dfrac{0.4 \text{ cm}}{2.4 \text{ cm}} \times 60$ (to convert the part of the minute into seconds)

= 10''
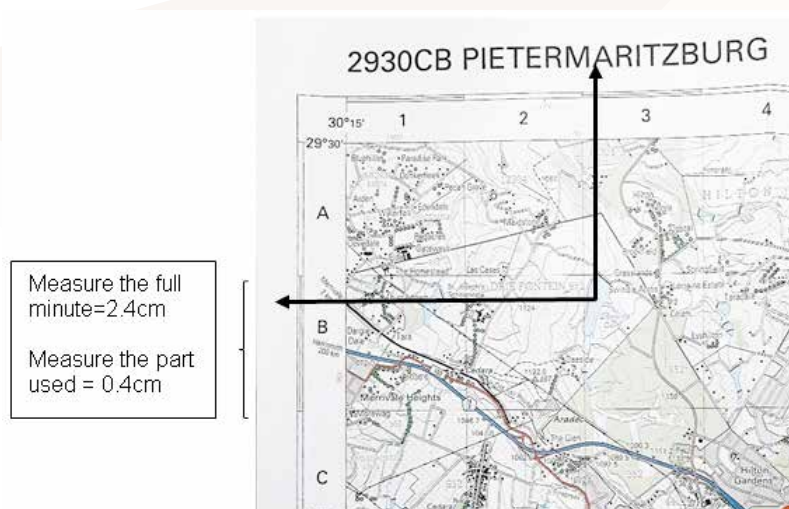
Your final answer for latitude is then 29°31'10''S. Repeat the process for the longitudinal co-ordinates and use east as your direction. You need to calculate accurately as you are only allowed a 1'' range either way in your final answer.

b. Learners are familiar with the topographic map index/code which appears on the map which was asked in Q2.1.1. On the orthophoto map there is a similar orthophoto map index/code which requires the same skill to read off the answer to Q2.2.1. Refer to the example of the Pietermaritzburg orthophoto map index grid. The darker block in the centre shows the location of the map 2930CB 8 for Pietermaritzburg. The question required the learner to write down the index/code for the map that the tourist would use to hike the trail which is to the west. The learner simply needs to locate the correct block and write down the map number in that block.

2930 CB 8

INDEX TO SHEETS INDEKS VAN VELLE
29°30'

2930CB2	2930CB3	2930CB4
2930CB7	2930CB8	2930CB9
2930CB12	2930CB13	2930CB14

c. With regard to all calculations and reading of heights off both the topographic and orthophoto maps it is vital that the unit of measurement or direction must be indicated in the final answer for the full mark to be awarded. It is good practice for teachers to insist on this in both informal and formal assessments to train the learners well.

d. The acceptable range with regards to measurements is normally 1 mm (distance) or 1'' (co-ordinates) on either side of the correct answer.

e. All steps are awarded marks for the various calculations, therefore learners must be trained to work through all steps for each calculation and not just give a final answer. If that is the case, only the mark for the final step will be awarded. Teachers are asked to engage with the format of and mark allocation of all possible calculations to be tested.

f. Learners find it difficult to convert map distances to real distances using the scale of the map. The topographic map has a scale of 1:50 000 (1 cm on the map represents 50 000 cm in reality) and an orthophoto map which has a scale of 1:10 000 (1 cm on the map represents 10 000 cm in reality). It is mathematically incorrect to say that 1 cm = 50 000 cm.

g. Teachers need to ensure that learners can construct cross-sections which allow one to use the contour lines to show the shape of a feature from the side.

h. When constructing a cross-section, the vertical scale is exaggerated. The vertical scale is usually provided. This is known as vertical exaggeration and can be calculated as such. The answer which is expressed as, e.g. 25 times, means that the cross-section has been exaggerated by that amount. The feature would not be as tall. Vertical exaggeration is calculated to show the difference in relief.

i. Vertical exaggeration of cross-sections makes it easier to interpret the landscape for the following reasons:

  * If a cross-section is not vertically exaggerated it will almost appear as a flat line;

  * To represent the topography of the landscape;

  * To emphasise vertical features which are too small to identify relative to the horizontal scale;

  * By increasing the vertical exaggeration the topography and gradient can be seen more clearly;

  * Specific features are more recognizable/clearer;

  * A larger exaggeration creates a clearer impression of the landscape; and

  * Height differences between features can be clearly identified.

QUESTION 3 : APPLICATION AND INTERPRETATION

Common Errors and Misconceptions

a. In Q 3.1.1, many candidates did not select the correct local wind as a katabatic wind.

b. Candidates could not explain how the wind mentioned in Q3.1.1 could result in frost (Q3.1.2). They were not able to explain that temperatures must drop below 0 °C (freezing point) for frost to form.

c. Many candidates found it difficult to relate the concept of aspect of slope and how it influenced the site of the high-income residential area at 6 in Q3.2.1.

d. The candidates struggled to relate the impact of natural vegetation on land values in residential areas **5** and **6** respectively in Q3.2.3.

e. Q 3.5 and Q3.6 were the only linked questions in this question paper. Responses to Q3.5 were fair, whereas in Q 3.6 many candidates did not know what a quarry was. The concepts of 'social justice' and 'social injustice' were foreign to many candidates.

Suggestions for Improvement

a. With regard to Q3.1.1, please refer to the Paper 1 discussion on anabatic and katabatic winds.

b. Teachers should thoroughly cover all aspects of valley climates including the climatic conditions resulting in the formation of frost. Frost can only occur when temperatures drop below freezing point at the bottom of the valley due to cold dense air sinking onto the valley floor.

c. Teachers need to teach learners how aspect of slope results in different heating abilities, causing the north-facing slopes in the southern hemisphere to be warmer (Q3.2.1). This in turn influences where settlement occurs. These slopes are favoured by high-income residential areas as they are warmer.

d. The natural vegetation would increase the aesthetic beauty of an area thereby increasing the land value (Q3.2.3). Areas that have more natural vegetation, like parks and green belts, will have a cleaner environment which increases the land value. Vegetation also regulates the temperature of the surrounding area.

e. Q3.3 referred to the different stream channel patterns above and below the Gordon Falls. This is a high-order question which required the learner to use the topographic map to comment on the change in gradient and width of the river channel above and below the waterfall. The candidates were not supposed to refer to the different courses of a river.

f. Concepts like *market-orientated* and *resource-orientated industries* discussed in Q3.5 need to be extensively covered in the classroom. It is good practice to provide learners with actual examples of different types of industries to assist their understanding of these concepts.

g. Q3.6 looked at the impact of a quarry close to a residential area. It seems that many learners do not know what a quarry is. A quarry is an excavation which occurs on the surface of the earth, in most cases to extract a mineral or stone that is close to the surface. Quarries are part of environmental despoliation as they destroy the natural environment and habitat of plants and animals. Usually once the mineral or stone has been removed it is left bare and scars the landscape. The land value around this area decreases because of the activity. There is much air and noise pollution, water sources can become contaminated and safety is an issue.

QUESTION 4:   GEOGRAPHICAL INFORMATION SYSTEMS (GIS)

Common Errors and Misconceptions

a. Candidates could identify the type of vector data indicated by the secondary road in Q4.1.1 but could not explain the relevance of using vector data on a topographic map in Q4.1.2.

b. Q4.2.2 was not answered well as many candidates could not make the link between the relevance of scale when facing a geographical query/problem like a veld fire.

c. A number of candidates were unable to suggest ways in which the scale of the topographic map and orthophoto map could be manipulated in order to integrate the two maps. The concepts of *data manipulation* and *data integration* are foreign to many candidates.

Suggestions for Improvement

a. The relevance of using vector data on a topographic map is to standardise the data. In this way you can use the conventional sign reference to refer to features on a map. It makes the interpretation of data easier and helps one to obtain data quicker. It assists with data layering and provides true shapes and distances of spatial features.

b. The need to understand scale when facing a *geographical problem* or *query* (Q4.2.2), like a veld fire, is important. One can use scale to determine the full extent of a problem, how far away the problem is, how far rescue workers must travel to get to the problem, and so forth. The scenario used in the examination was one of a veld fire, but could, for example, also be related to flooding or soil erosion.

c. Concepts like *data manipulation* and *data integration* must not only be taught as definitions, but also be practically asked in informal and formal testing situations. In the 2018 question paper the examiners used the concept of scale to test data manipulation and data integration.

d. Teachers should not only teach the GIS concepts but also the application and relevance thereof in real world situations. It is a good idea to gather all the NSC and SC question papers from the past 5 years and create a bank of typical questions that can be asked. These can be used in informal tasks in the classroom and adapted for examination purposes. This will prepare the learners well for the final examinations.

CHAPTER 7

HISTORY

The following report should be read in conjunction with the History question papers of the November 2018 NSC examinations.

7.1   PERFORMANCE TRENDS (2014–2018)

The number of candidates who wrote the History examination in 2018 increased by 6 868 candidates in comparison to that of 2017. This year there was an improvement in the performance of candidates as indicated by 89,7% of candidates achieving at the 30% level, with 72,6% achieving at the 40% level.

Table 7.1.1 Overall Achievement in History

Year	No. Wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	115 686	99 823	86,3	76 904	66,5
2015	154 398	129 643	84,0	97 646	63,2
2016	157 594	132 457	84,0	101 347	64,3
2017	147 668	127 031	86,0	99 669	67,5
2018	154 536	138 570	89,7	112 266	72,6

It is evident from the statistics that the numbers of candidates taking History as a subject in the FET phase has increased significantly since 2014. Simultaneously, there has been a significant, consistent and gradual improvement in the quality of candidates' performance. It is gratifying to note that candidates are being taught the prescribed content in both Papers 1 and 2 and this is apparent in the number of candidates who responded to specific choice questions.

However, in SECTION A of both question papers (source-based questions), it was clear that many candidates were still unable to answer higher-order questions (e.g. interpretation, analysis, compare, contrast, usefulness and reliability of evidence in sources). Furthermore, a significant number of candidates could not write coherent paragraphs.

In SECTION B of the question papers (essay questions), a large number of candidates displayed good content knowledge but were incapable of taking a stance and developing an independent line of argument. Many essays lacked introductions and conclusions.

Teachers must make a concerted effort to ensure that the prescribed content is taught in a user-friendly manner and this must be underpinned by the requisite historical skills to ensure a further improvement in the overall pass rate.

Graph 7.1.1 Overall Achievement in History (Percentage)

	2014	2015	2016	2017	2018
■ % achieved at 30% and above	86.3	84.0	84.0	86.0	89.7
■ % achieved at 40% and above	66.5	63.2	64.3	67.5	72.6
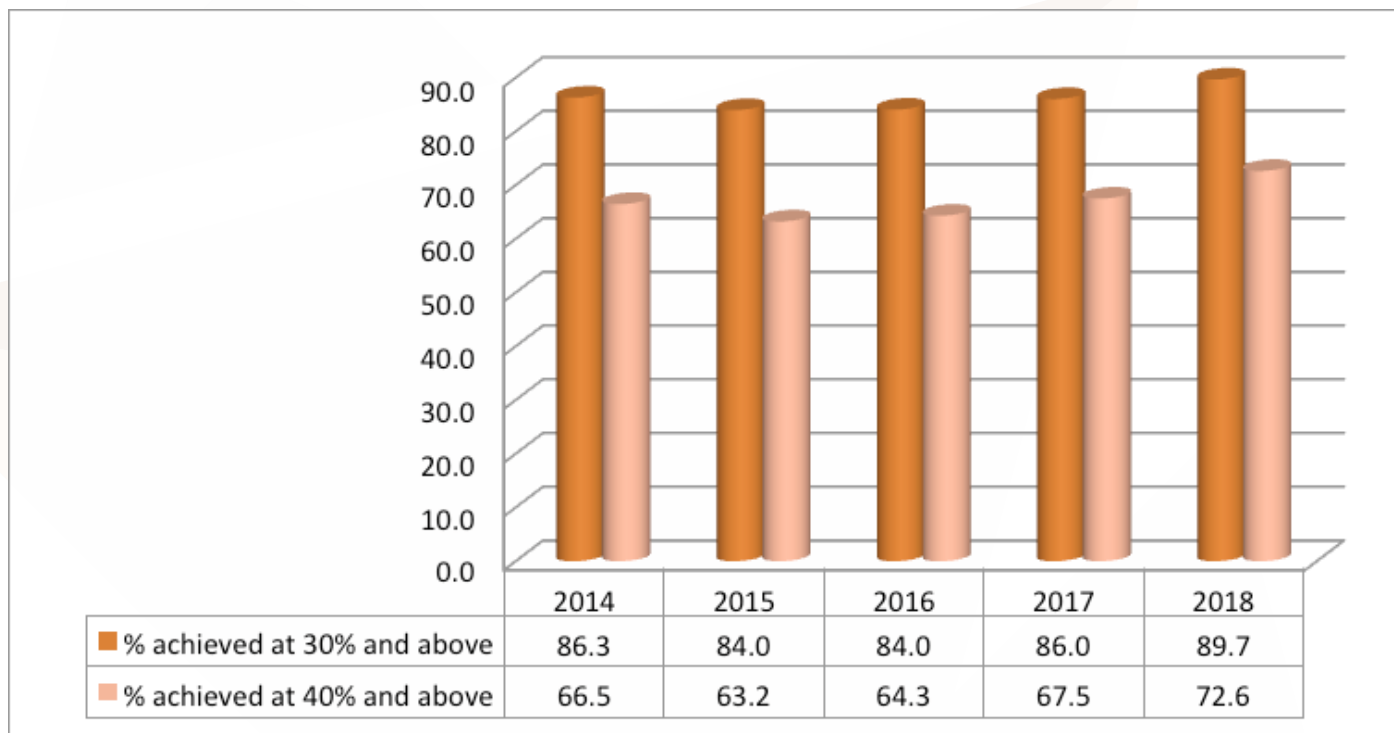
Graph 7.1.2 Performance Distribution Curves in History (Percentage)

	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	0.1	2.9	10.6	19.8	23.1	19.2	12.8	7.2	3.3	0.8
2015	0.2	3.9	11.9	20.7	22.7	18.5	11.9	6.5	3.0	0.6
2016	0.2	3.9	11.8	19.7	21.8	18.8	12.8	7.1	3.1	0.6
2017	0.2	3.3	10.5	18.5	21.7	19.1	14.0	8.2	3.7	0.8
2018	0.1	2.1	8.2	17.0	21.9	21.3	15.6	8.9	4.0	0.9
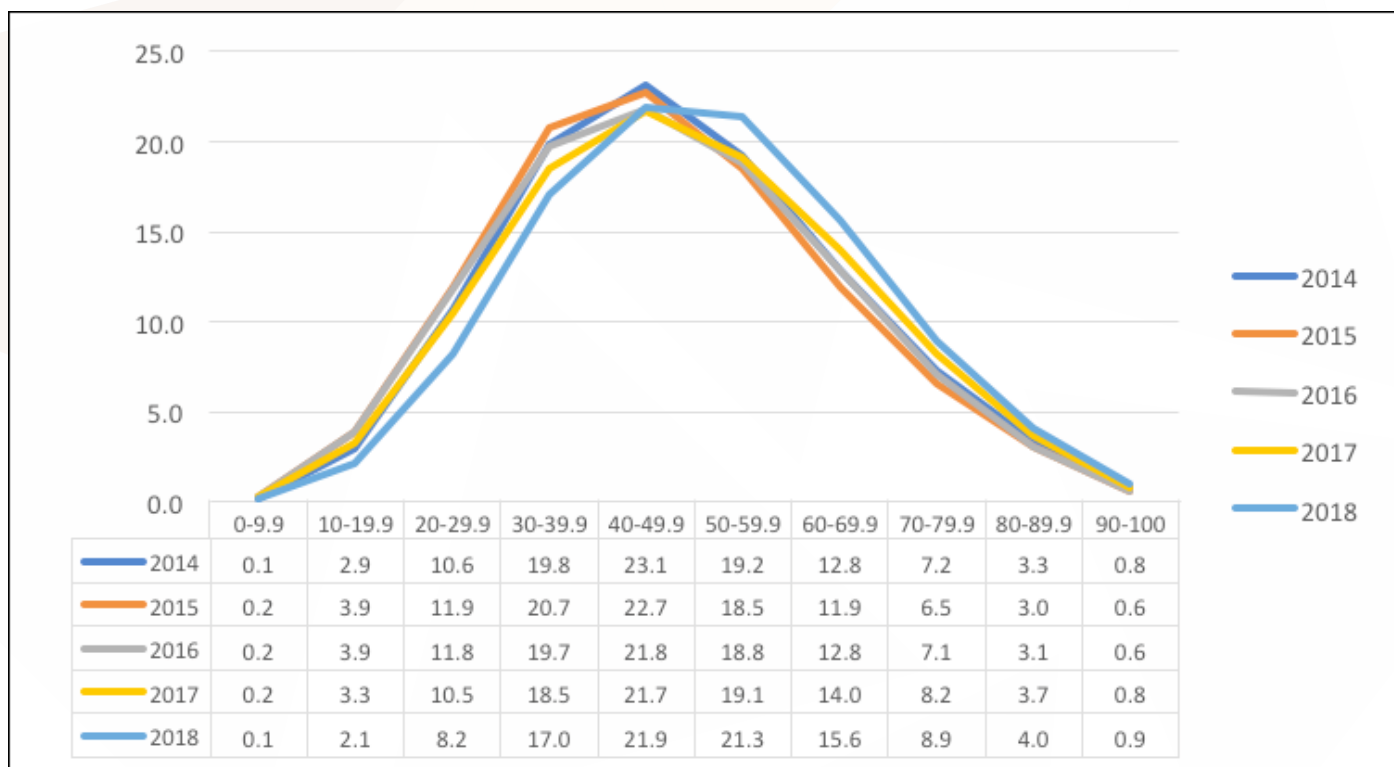
7.2   OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

a.   In the main, candidates' performance in this question paper ranged from fair to good. It was evident that some candidates lacked relevant content knowledge in specific topics (e.g. Independent Africa: Case Study – Angola and Comparative Study – the Congo and Tanzania).

b.   In SECTION A: SOURCE-BASED QUESTIONS, several candidates were unable to extract, select, interpret, analyse, evaluate and synthesise information from the sources that were provided. As a result, responses to specific higher-order questions, where candidates were required to compare and ascertain the usefulness of sources, were generally unsatisfactory.

c.   A significant number of candidates were unable to use the relevant information from the sources and their own knowledge to effectively write a well-structured paragraph.

d.   In SECTION B: ESSAY QUESTIONS, a large number of candidates demonstrated an understanding of the content knowledge but were unsuccessful in selecting, organising and connecting relevant information to support their line of argument to answer the question posed.

7.3   DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 1

The following graph is based on data that was gathered from a random sample of candidates' scripts. While this graph might not accurately reflect the national averages, it serves as a useful tool in analysing how candidates performed in specific choice questions.

Figure 7.3.1 Average Marks per Question Expressed as a Percentage: Paper 1

Q1	The Cold War: Containment and Brinkmanship: The Cuban Missile Crisis
Q2	Independent Africa: Case Study – Angola
Q3	Civil Society Protests from the 1950s to the 1970s: The Black Power Movement
Q4	Case Study – China
Q5	Independent Africa: Comparative Case Study – The Congo and Tanzania
Q6	Civil Society Protests from the 1950s to the 1970s: The Civil Rights Movement
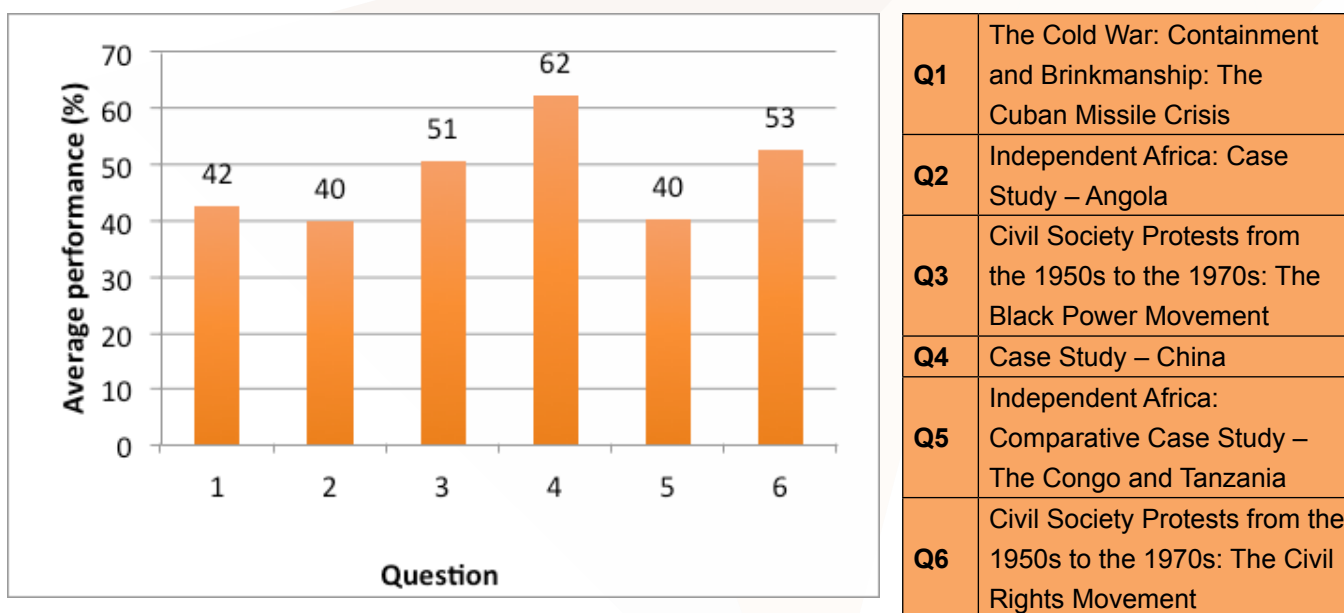
Figure 7.3.2: Average marks per sub question expressed as a percentage: Paper 1
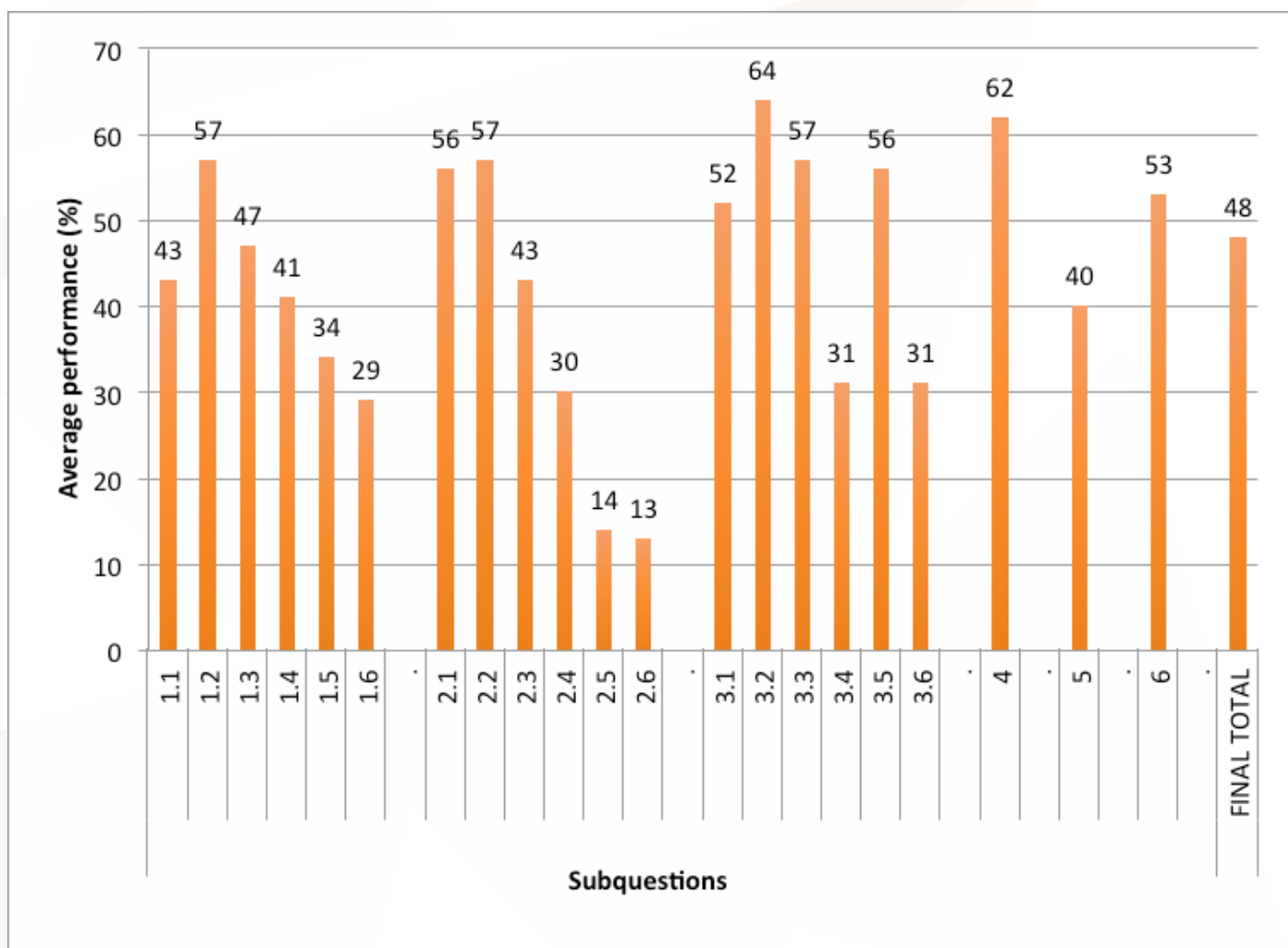
7.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

SECTION A: **SOURCE-BASED QUESTIONS**

QUESTION 1: **THE COLD WAR: CONTAINMENT AND BRINKMANSHIP: THE CUBAN MISSILE CRISIS**

A significant number of candidates attempted this question. Overall, the performances ranged from fair to satisfactory.

Common Errors and Misconceptions

a. In Q1.1.3, it was evident that many candidates were unable to make a valid comment regarding what was implied by the statement, 'We're eyeball to eyeball and I think the other fellow just blinked', in the context of the deployment of Soviet missiles to Cuba.

b. In Q1.2.3, a number of candidates could not explain why Khrushchev was prepared to support a decision 'within the framework of the Security Council' regarding Cuba.

c. In Q1.4.2, a large number of candidates failed to explain why the Americans considered the International Committee of the Red Cross as a suitable agent for the inspection of 'Cuba-bound cargoes'.

d. In Q1.6, several candidates were unsuccessful in using the information in the relevant sources and their own knowledge to effectively write an organised paragraph, explaining how the Soviet Union and the United States of America responded to the deployment of missiles to Cuba in 1961.

QUESTION 2:   INDEPENDENT AFRICA: CASE STUDY – ANGOLA

Very few candidates attempted this question. Generally, the performances ranged from poor to satisfactory.

Common Errors and Misconceptions

a. In Q2.1.2, a large number of candidates were unable to comment on why Vorster defended South Africa's involvement in Angola.

b. In Q2.3.2, several candidates found it difficult to ascertain whether an historian would find the information in the source useful when researching the outcome of the Battle of Cuito Cuanavale.

c. In Q2.5, the differences in the information in Sources 2C and 2D regarding the outcome of the Battle of Cuito Cuanavale were not well explained.

d. In Q2.6, several candidates failed to use the information in the relevant sources, and their own knowledge, to effectively write a coherent paragraph explaining the role that foreign powers played in the Battle of Cuito Cuanavale.

QUESTION 3:   CIVIL SOCIETY PROTESTS FROM THE 1950s TO THE 1970s: THE BLACK POWER MOVEMENT

A large number of candidates attempted this question and performances ranged from fair to good.

Common Errors and Misconceptions

a. In Q3.4, many candidates were unable to determine how the information, regarding Angela Davis, in Source 3B differed from the evidence in Source 3C.

b. In Q3.5.4, the majority of candidates could not comment on the usefulness of the information in the source regarding the Black Panther Party.

c. Q3.6 was generally poorly answered by a number of candidates who were unsuccessful in using the information in the relevant sources and their own knowledge to effectively write a well-structured paragraph, explaining the influence that the philosophy of Black Power had on African Americans in the 1960s and 1970s.

SECTION B: ESSAY QUESTIONS

QUESTION 4: CASE STUDY – CHINA

The performance of candidates, who attempted this question, ranged from satisfactory to good.

Common Errors and Misconceptions

a. It was evident that a few candidates were unable to explain to what extent Mao Zedong's policies of the Great Leap Forward and the Cultural Revolution were successful in transforming Communist China between 1957 and 1969. They were not able to sustain the line of argument throughout the essay.

b. A number of candidates' introductions to this essay question contained irrelevant background information. In addition, the content was largely descriptive, there was little attempt to develop a line of argument and to draw convincing conclusions.

QUESTION 5: INDEPENDENT AFRICA: COMPARATIVE CASE STUDIES – THE CONGO AND TANZANIA

This question was attempted by few candidates. Generally, the performances ranged from poor to satisfactory.

Common Errors and Misconceptions:

a. Most candidates were unable to critically discuss how Mobutu Sese Seko (the Congo) and Julius Nyerere (Tanzania) addressed the economic and political challenges that confronted their respective countries after attaining independence in the 1960s.

b. A large number of candidates wrote narrative essays on how Mobutu Sese Seko and Julius Nyerere addressed the challenges that faced their respective countries instead of a comparative analysis. Essays lacked introductions and there was little attempt to draw valid conclusions.

QUESTION 6: CIVIL SOCIETY PROTESTS FROM THE 1950s TO THE 1970s: THE CIVIL RIGHTS MOVEMENT

A large number of candidates attempted this question. Performances ranged from satisfactory to good.

Common Errors and Misconceptions

a. Although many candidates took a stance, they were unable to support and sustain their line of argument. They struggled to demonstrate how the other forms of protests contributed to the fight against discrimination in the United States of America in the 1960s.

b. A few candidates wrote narrative essays which lacked a clear line of argument and persuasive conclusions.

7.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

a. Generally candidates' performances in this question paper ranged from fair to good.

b. In SECTION A: SOURCE-BASED QUESTIONS, it was evident that a large number of candidates were unable to extract, select, interpret, analyse, evaluate and synthesise information from the sources that were provided. In addition, candidates were unable to define concepts in historical context, compare perspectives and ascertain the usefulness of evidence in sources.

c. The majority of candidates were unable to use relevant information from the sources and their own knowledge to effectively write an organised and coherent paragraph.

d. In SECTION B: ESSAY QUESTIONS, several candidates had the requisite content knowledge but were unable to use the content effectively to answer the question posed. They struggled to correctly select, organise and connect relevant information to support their line of argument.

7.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

The following graph is based on data that was gathered from a random sample of candidates' scripts. While this graph might not accurately reflect the national averages, it serves as a useful tool in analysing how candidates performed in specific choice questions.

Figure 7.6.1: Average Marks per Question Expressed as a Percentage: Paper 2

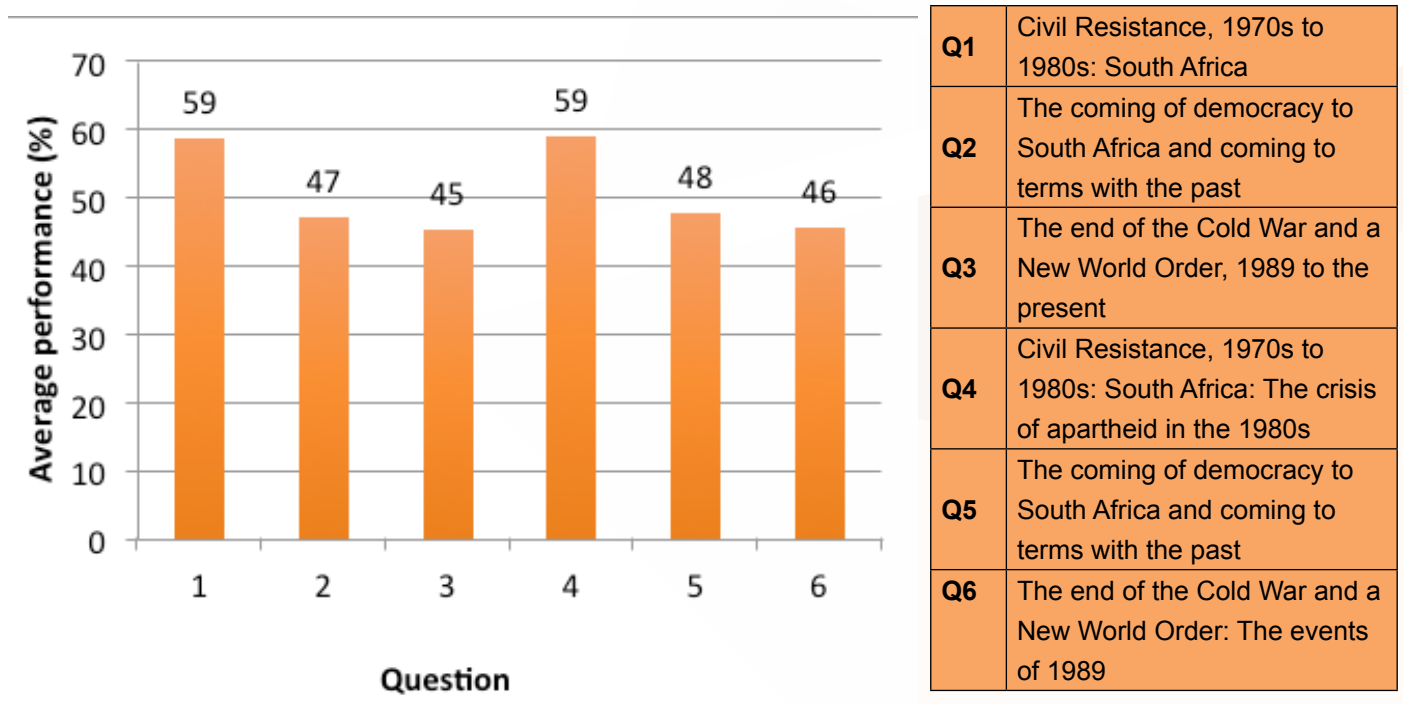|	
Q1	Civil Resistance, 1970s to 1980s: South Africa
Q2	The coming of democracy to South Africa and coming to terms with the past
Q3	The end of the Cold War and a New World Order, 1989 to the present
Q4	Civil Resistance, 1970s to 1980s: South Africa: The crisis of apartheid in the 1980s
Q5	The coming of democracy to South Africa and coming to terms with the past
Q6	The end of the Cold War and a New World Order: The events of 1989

Figure 7.6.2: Average Marks per Subquestion Expressed as a Percentage: Paper 2
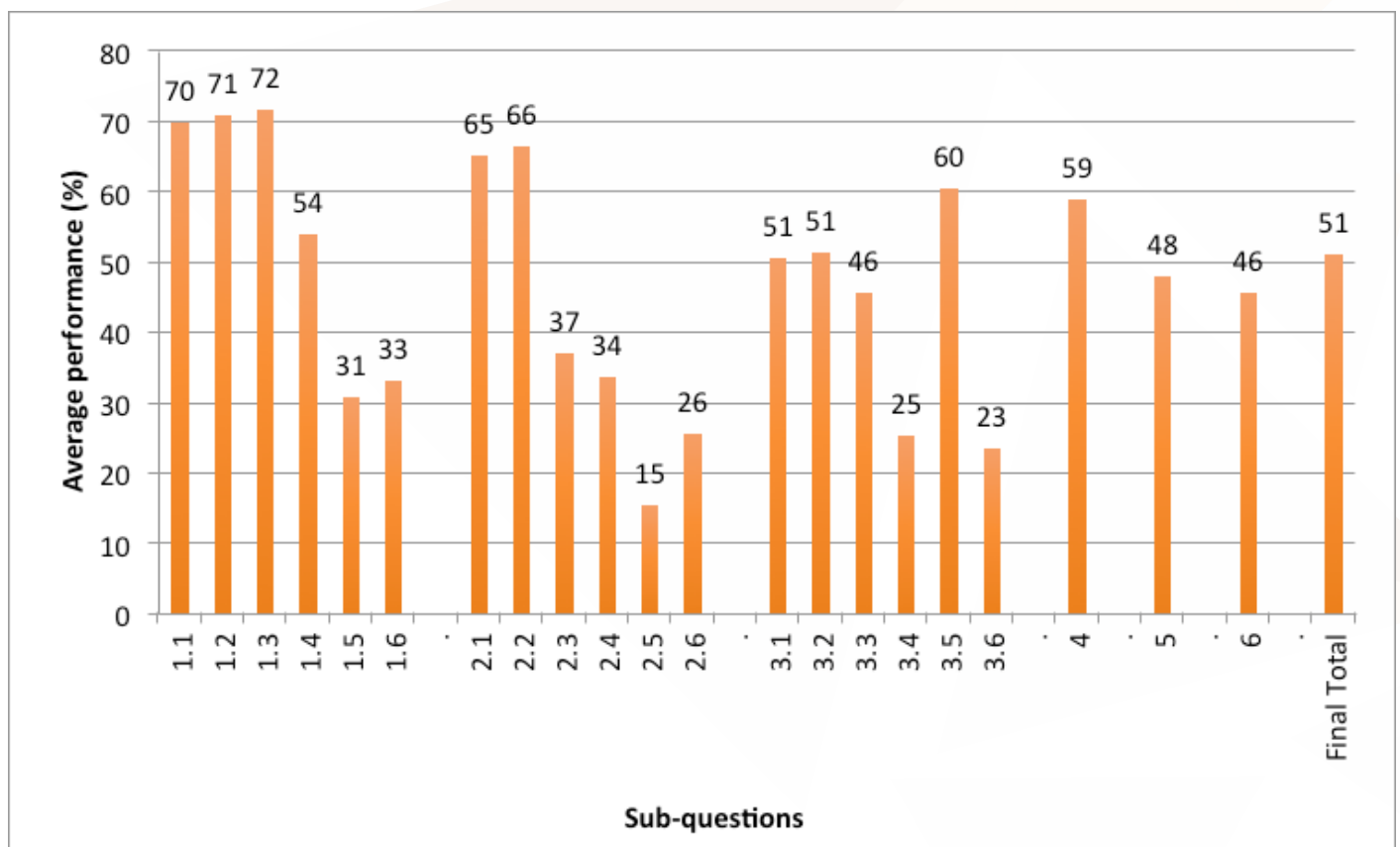
7.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

SECTION A: SOURCE BASED QUESTIONS

QUESTION 1: CIVIL RESISTANCE, 1970s TO 1980s: SOUTH AFRICA

A large number of candidates attempted this question and performances ranged from fair to good.

Common Errors and Misconceptions

a. In Q1.1.4, several candidates were unable to comment on how activists from the Black Consciousness Movement intended to break the 'yoke of oppression' in South Africa.

b. In Q1.3.2, many candidates found it difficult to use the information in the source and their own knowledge to explain why Sam Nzima did not stop to help Hector Pieterson.

c. In Q1.5, a large number of candidates struggled to compare the evidence in Sources 1C and 1D regarding Sam Nzima's role during the Soweto Uprising of 1976.

d. In Q1.6, several candidates were unsuccessful in using the information in the relevant sources and their own knowledge to effectively write a cogent paragraph on how the philosophy of Black Consciousness influenced South African students in the 1970s.

QUESTION 2: THE COMING OF DEMOCRACY TO SOUTH AFRICA AND COMING TO TERMS WITH THE PAST

A significant number of candidates attempted this question and their performances ranged from poor to satisfactory.

Common Errors and Misconceptions

a. In Q2.1.2 (b), a number of candidates were unable to explain how the fears of the ANC were dealt with by the TRC.

b. In Q2.1.3, many candidates could not define the term *reconciliation* in the context of the TRC. Candidates gave vague and generalised responses.

c. In Q2.3.2, several candidates found it difficult to ascertain the usefulness of the source regarding the circumstances under which Rick Turner was killed.

d. In Q2.5.2, many candidates struggled to comment on why Zapiro made reference to 'VLAKPLAAS' in the cartoon.

e. In Q2.6, most candidates were unsuccessful in using the information in the relevant sources and their own knowledge to effectively write a coherent paragraph on whether the Truth and Reconciliation Commission helped victims of political crimes to find closure.

QUESTION 3: THE END OF THE COLD WAR AND A NEW WORLD ORDER, 1989 TO THE PRESENT

Very few candidates answered this question and performances ranged from fair to good.

Common Errors and Misconceptions

a. In Q3.2.2, a large number of candidates were unable to explain why SACTWU disagreed with the Cape Clothing Association's comments regarding job losses in the clothing and textile industry.

b. In Q3.4, candidates could not compare evidence presented in Sources 3B and 3C. They failed to explain how the information in these sources supported each other regarding job losses in South Africa's clothing and textile industry.

c. In Q3.6, a significant number of candidates were unsuccessful in writing a logical paragraph explaining how globalisation contributed to job losses in the South African clothing and textile industry after 1990.

SECTION B: ESSAY QUESTIONS

QUESTION 4:   CIVIL RESISTANCE, 1970s TO 1980s: SOUTH AFRICA – THE CRISIS OF APARTHEID IN THE 1980s

The performances of candidates in this question ranged from fair to good.

Common Errors and Misconceptions

a. The candidates that attempted this question were unable to critically discuss the various forms of international resistance which contributed to the demise of the apartheid regime in the 1980s.

b. A significant number of candidates could not demonstrate how the various forms of international resistance led to the demise of the apartheid regime. They wrote narrative accounts which did not address the demands of the question.

QUESTION 5:   THE COMING OF DEMOCRACY TO SOUTH AFRICA AND COMING TO TERMS WITH THE PAST

This was a very popular question and candidates' performances ranged from poor to good.

Common Errors and Misconceptions

a. A large number of candidates were unable to state whether they agreed or disagreed with the statement nor could they support their line of argument with relevant historical evidence.

b. There was a tendency to narrate the various turning points that occurred in South Africa between 1990 and 1994, without taking a stance and supporting a line of argument (i.e. the role of Nelson Rolihlahla Mandela).

QUESTION 6:   THE END OF THE COLD WAR AND A NEW WORLD ORDER: THE EVENTS OF 1989

A few candidates attempted this question and performances ranged from poor to satisfactory.

Common Errors and Misconceptions

a. Many candidates were unable to explain to what extent the fall of the Berlin Wall in 1989 paved the way for the National Party and the African National Congress to begin talks.

b. Candidates merely wrote narrative essays, without taking or sustaining a line of argument.

7.7 SUGGESTIONS FOR IMPROVEMENT IN BOTH PAPER 1 AND PAPER 2

Teachers should:

a. Ensure that learners are provided with the necessary historical skills, such as the definition of concepts in historical context, extraction, interpretation, analysis, ascertaining the reliability, limitations and usefulness of historical sources. These foundational historical skills must be underpinned with the teaching and learning of the prescribed content.

b. Expose learners to a variety of sources and the related source-based skills such as interpreting, analysing, evaluating, comparing, contrasting and ascertaining the limitations, usefulness and justification of such sources. Learners should be taught the relevant themes, using interactive, user-friendly teaching methodology, relevant notes so that they have an in-depth understanding of the content focus areas. Refer to past NCS question papers for practical examples as to how these difficult historical skills can be taught.

c. Sharpen paragraph-writing skills by ensuring that learners do the following:

   * Read the question and underline the key words;

   * Study all sources and have a thorough understanding of them;

   * Underline the key words in the written sources and incorporate them in writing   their paragraphs;

   * Do not copy directly from the sources but use their own words, e.g. 'According to Source 1A …';

   * Ensure that responses are to the point by structuring short sentences to frame the paragraph; and

   * Always make reference to the question when writing a paragraph.

d. Develop the requisite essay-writing techniques by:

   * Coaching learners on how to unpack the question posed;

   * Underlining the key words in the question. If the question demands that a stance be taken, this must be stated in the introduction;

   * Using the PEEL writing template below to teach learners how to write an argumentative essay:

     - **Point:** State the point by indicating a line of argument.

     - Each paragraph should include a point that sustains the major point (line of argument) that was made   in the introduction.

     - **Explanation:** Explain the point or line of argument by demonstrating how it relates to the question posed (line of argument).

     - **Example (Evidence):** Select appropriate evidence to support the line of argument.   Relevant examples should be given.

     - **Link:** Ensure that the line of argument is linked in a logical and coherent manner;

e. Ensure that the prescribed content, as contained in the *CAPS* and the 2017 examination guideline document, is covered comprehensively.

f.   Make an effort to expose learners to innovative, relevant and user-friendly resources as well as examination techniques.

g.   Practice source-based, paragraph and essay writing skills by working with past NSC (*CAPS*) compliant question papers.

h.   Attend content and assessment workshops, to firstly, familiarise themselves with the requirements and demands of the *CAPS* and the 2017 examination guideline document and secondly, to use recent and relevant teaching and learning methods in classrooms.

i.   Undertake the necessary research on the latest historical trends in the teaching and learning of history.

j.   Interact with relevant resources such as books, historical journals, internet sites, DVDs, YouTube videos, Google, SA History Online (SAHO), the History Channel, television news channels, South African Society for History Teaching (SASHT) and newspapers in order to meaningfully convey the prescribed content to learners.

Subject Advisors should:

a.   Plan, prepare and conduct intensive content and assessment workshops on problematic areas as contained in this report with FET History teachers.

b.   Conduct assessment training on how to mark higher-order source-based questions (usefulness, compare and paragraph writing) and essay questions. Sample learner responses should be used to train teachers on how to correctly use the levels rubric and matrix to assess paragraphs and essays.

c.   Develop appropriate resource material with which both teachers and learners can interact.

d.   Workshop teachers on challenging topics identified in the 2018 NSC examinations.

Teacher development should:

a.   Ensure that new teachers are supported and guided on pedagogical, content and teaching methodology.

b.   Assist teachers on how to plan, prepare and present interactive History lessons.

c.   Prepare educators to implement the English Across the Curriculum (EAC).

CHAPTER 8

LIFE SCIENCES

The following report should be read in conjunction with the Life Sciences question paper of the November 2018 examinations.

8.1   PERFORMANCE TRENDS (2014–2018)

The number of candidates who wrote the Life Sciences examination in 2018 decreased by 8 433 when compared to that of 2017. The performance of the candidates in 2018 shows a slight improvement at the 30% level from 74,4% to 76,3% and a slight decrease at the 40% level from 52,1% to 51,7%. The pass rate at the 30% level represents the highest pass rate in the last five years.

Table 8.1.1 Overall Achievement Rates in Life Sciences

Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	284 298	209 783	73,8	139 109	48,9
2015	348 076	245 164	70,4	160 204	46,0
2016	347 813	245 157	70,5	157 224	45,2
2017	318 474	236 809	74,4	166 071	52,1
2018	310 041	236 584	76,3	160 208	51,7

Over the years there has been an improvement in the writing of essays and the drawing of graphs. Some of the skills in graph drawing such as using an appropriate scale as well as the logical arrangement of ideas in essay writing still remain a challenge.

A strengthening of content knowledge, in topics such as Reproduction in Paper 1 and Genetics and Evolution in Paper 2, will greatly enhance the performance in the subject. Reproduction covers 45 marks out of 150 in Paper 1 and Genetics and Evolution cover 110 out of 150 marks in Paper 2.

One of the challenges in improving performance is that there are many teachers who are not confident in especially genetics and evolution. Teacher workshops should focus strongly on these topics. In addition, Evolution is scheduled for late in the third term. Most teachers who lag behind in the teaching of other topics in the year end up with too little time to do justice to this topic.

Another area of poor performance remains the questions on scientific investigations as evidenced once again in Papers 1 and 2 of 2018. If this area can be strengthened from the earlier grades, performance can improve. This is also an area in which teachers must first be supported.

Graph 8.1.1 Overall Achievement Rates in Life Sciences (Percentage)

	2014	2015	2016	2017	2018
■ % achieved at 30% and above	73.8	70.4	70.5	74.4	76.3
■ % achieved at 40% and above	48.9	46.0	45.2	52.1	51.7
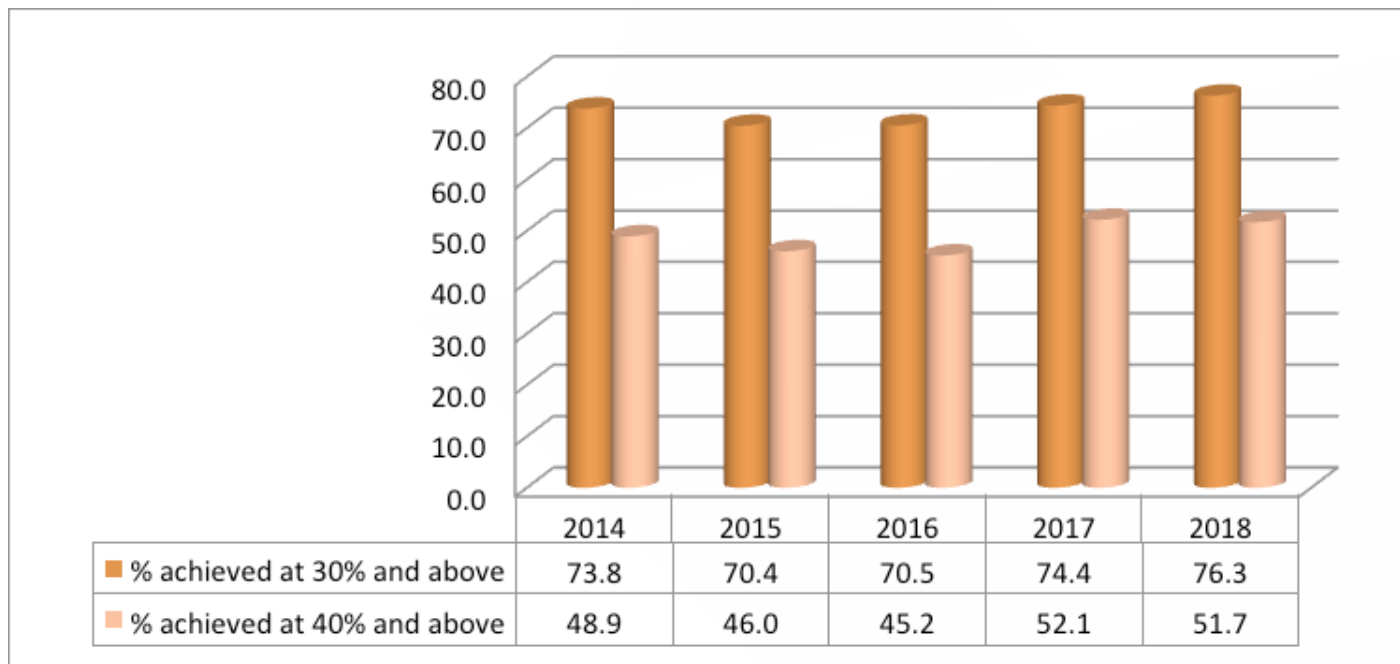
Graph 8.1.2 Performance Distribution Curves in Life Sciences (Percentage)

	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	0.1	6.5	19.6	24.9	19.2	13.1	8.1	5.2	2.8	0.5
2015	0.1	8.3	21.1	24.4	18.2	12.5	7.9	4.8	2.3	0.4
2016	0.1	7.7	21.7	25.3	18.5	12.0	7.5	4.5	2.3	0.4
2017	0.3	7.8	17.6	22.2	19.2	14.4	9.5	5.9	2.8	0.4
2018	0.1	5.6	18.0	24.6	20.6	14.6	9.0	5.1	2.1	0.3
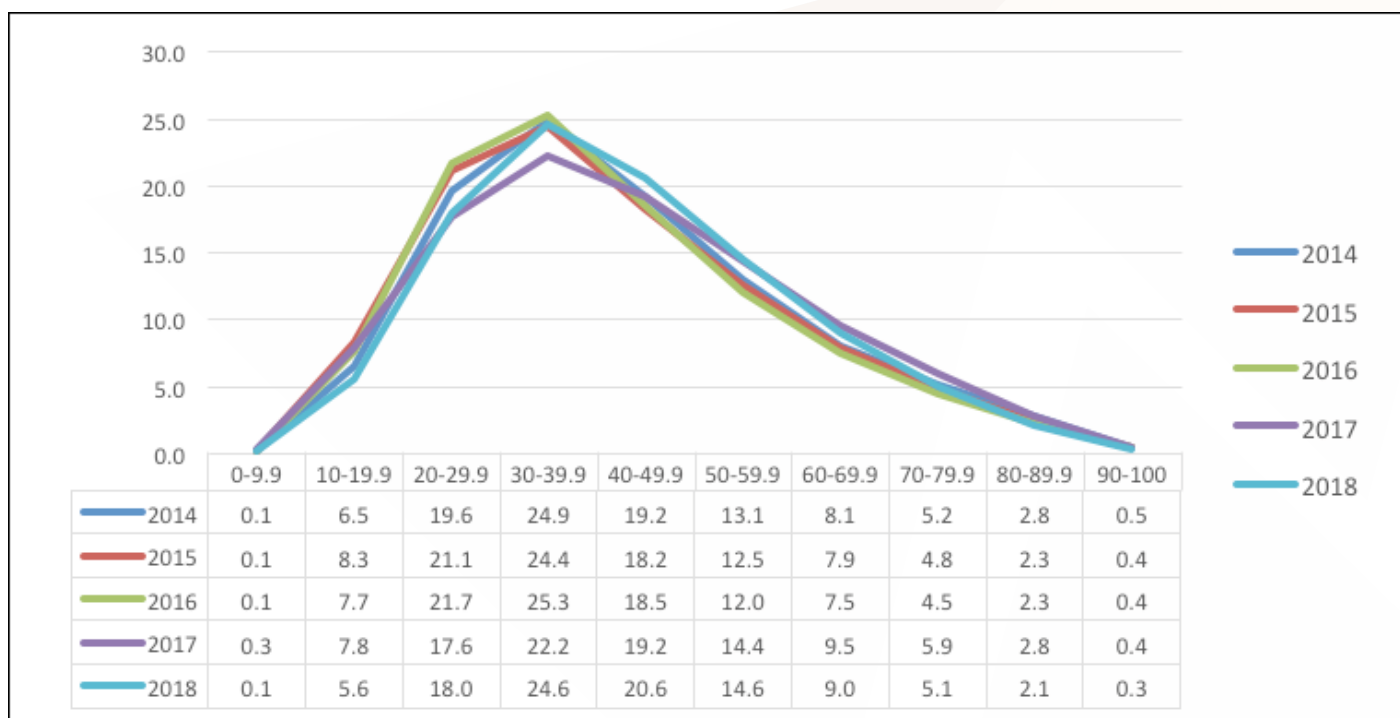
8.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General Comments

a. Some candidates were not familiar with basic terminology in the different topics. This resulted in poor performance, even in the lower-order questions.

b. Poor performance is still being recorded in questions based on scientific investigations despite the support provided in the diagnostic reports of previous years.

c. There was also poor performance in homeostasis as well as making drawings in meiosis.

d. The candidates' performance indicates that the work on environmental studies, which was taught in Grade 11, was not revised properly or covered again in Grade 12.

e. Since textbooks do not always carry accurate information, teachers should always be guided by the CAPS and examination guideline documents for Life Sciences.

8.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 1

The graph below is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Graph 8.3.1 Average Marks per Question Expressed as a Percentage: Paper 1
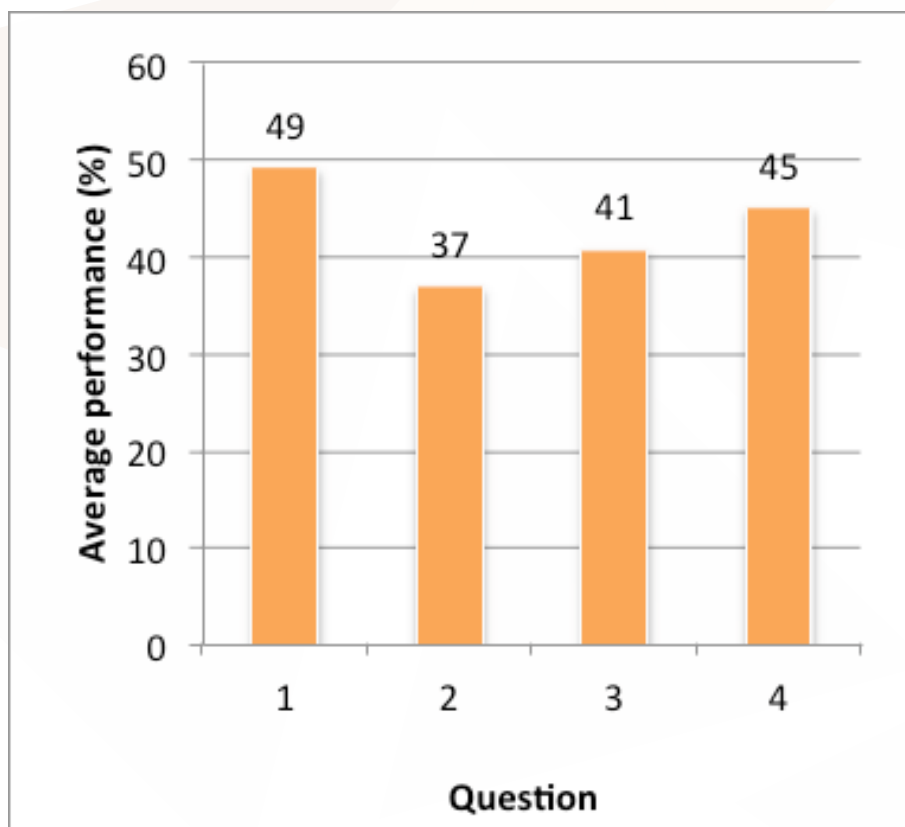
Q1	Multiple Choice, Terminology, Matching Items, Foetal development and Homeostasis
Q2	Meiosis, Reproduction and the Ear
Q3	Auxins, Reflex Action, Insulin and Temperature Regulation
Q4	Human Impact

Graph 8.3.2: Average Performance per Subquestion: Paper 1
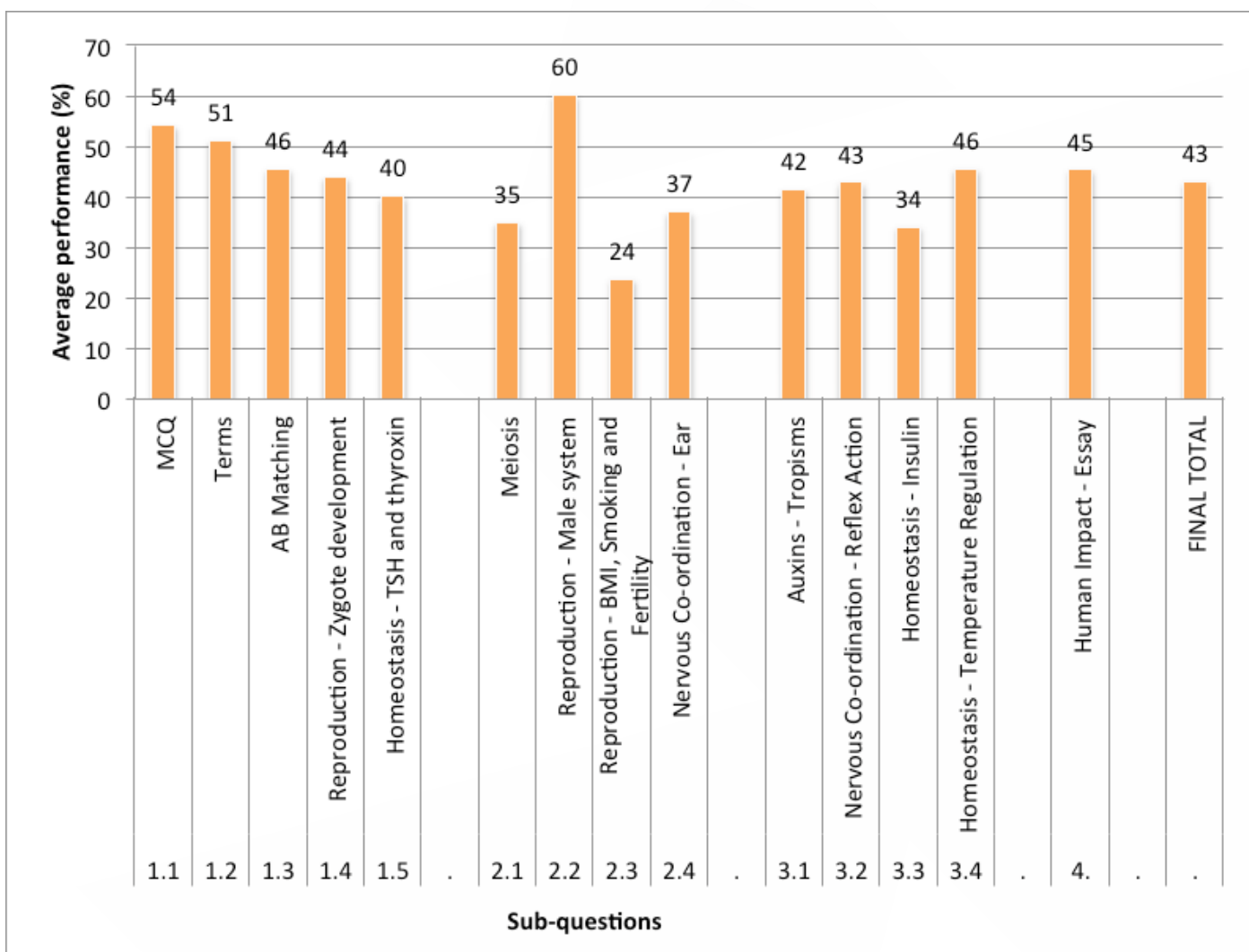
The worst performance by candidates was recorded in the subquestions on reproduction (based on an investigation), insulin and meiosis.

8.4   ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1:   MULTIPLE CHOICE, TERMINOLOGY, MATCHING ITEMS, FOETAL DEVELOPMENT AND HOMEOSTASIS

Common Errors and Misconceptions

a. In Q1.1, candidates lost marks since they were unable to apply knowledge in multiple-choice items that assessed higher cognitive skills such as in Q1.1.7, Q1.1.8 and Q1.1.10.

b. In Q1.2, biological terms remain problematic for many candidates. From the answers provided, it was evident that candidates confused the following terms:

*   Altricial and precocial

*   Cerebrum and cerebellum

*   Choroid and chorion

*   Corpus callosum and corpus luteum

c. In Q1.3, candidates were not able to differentiate between the following:

*   Prophase I and Prophase II: Protein synthesis only occurs in Prophase I and not in Prophase II

*   Astigmatism and cataract

*   Ovipary and ovovivipary

d. Many candidates lost marks in Q1.4 due to a lack of knowledge of the stages in the development of the foetus after fertilisation has taken place. In Q1.4.2, candidates identified meiosis rather than mitosis as the type of cell division represented. Candidates were not able to differentiate between the functional and non-functional extra-embryonic membranes associated with the human foetus in Q1.4.3. Hence, some responses were allantois and yolk sac instead of the chorion and the amnion.

    In Q1.4.6, candidates lost marks when they gave the answers 46 + 1 or 23 + 24 whereas the answer was 47. The final answer was required and not a calculation that would lead to the final answer.

e. Candidates provided the name of the hormone when the name of the gland was required and vice versa.

Suggestions for Improvement

a. There needs to be a greater emphasis on the teaching and learning of appropriate terminology related to the various topics, together with the correct spelling of these terms. Teachers should use various strategies to improve the teaching of terminology, many of which have been outlined in the Diagnostic Reports of the previous years.

b. A concerted attempt should be made to differentiate between closely related terms.

c. Learners must be taught to follow the instructions as prescribed in Q1.3. Answers should be written as A only (not A), B only (not B), both A and B (not A + B; A, B; A and B or A/B). Teachers should enforce this in all assessment activities at school.

d. Since human reproduction is a topic that makes up about a third of Paper 1, learners must have a thorough knowledge of the following essential aspects of the topic in order to be successful:

*   Structure of male and female reproductive systems (Assessed in Q1.4.5 and Q2.2.5)

*   Changes during puberty (assessed in Q2.2.1)

*   Menstrual cycle under hormonal control (assessed in Q1.1.1)

*   Fertilisation (assessed in Q1.4.1)

*   Events after fertilisation leading to foetal development (assessed in Q1.4)

*   Role of the extra-embryonic membranes and the placenta (assessed in Q1.1.5 and Q1.4.3)

e. The role of mitosis and meiosis in reproduction must be clarified so that learners do not confuse these two types of cell division as it relates to the topic.

f. It should be emphasised that in humans the allantois and yolk sac are non-functional since the functions of nutrition, gas exchange and excretion are now carried out by the placenta.

g. Certain sections of work, especially those that involve structure (such as the male and female reproductive systems) and processes (such as the process of fertilisation or the development of the foetus after fertilisation), are best taught using diagrams.

h. Teachers should give learners multiple opportunities to label drawings and write in the functions next to the labels. The blank diagrams found in the Mind the Gap study guide will prove useful in this regard.

i. In order to organise information for better storage and retrieval, tables are a useful tool. A table should be developed of the glands of the endocrine system, the hormones they produce and the functions of each hormone. This could assist in ensuring that learners do not confuse the name of the gland with the name of the hormone.

j. Q1.5 assessed candidates' knowledge of the negative feedback mechanism between TSH and thyroxin. Learners are also required to know the negative feedback mechanisms that assist in homeostasis with regard to CO_2 levels, salt levels, water levels, glucose levels and temperature regulation.

The *Mind the Gap* study guide presents a useful format for recording, understanding and recalling the different negative feedback mechanisms using a generic format. It consists of the following steps:

Step 1: An imbalance occurs

Step 2: A control centre is stimulated

Step 3: Control centre responds

Step 4: Message sent to target organ(s)

Step 5: The target organ responds

Step 6: It opposes/reverses the imbalance

Step 7: Balance is restored

If we apply this to the negative feedback mechanism that restores thyroxin levels when it is too low, the steps are then made specific as follows:

Step 1	The thyroxin level in the blood decreases
Step 2	The pituitary is stimulated
Step 3	Pituitary gland increases its secretion of TSH
Step 4	TSH travels by the blood to the thyroid gland
Step 5	TSH stimulates the thyroid gland to increase its secretion of thyroxin
Step 6	The thyroxin level in the blood increases
Step 7	and returns to normal

These steps can be applied in a similar way to the other negative feedback mechanisms.

QUESTION 2: MEIOSIS, REPRODUCTION AND THE EAR

Common Errors and Misconceptions

a. In Q2.1.1, many candidates were not able to correctly identify the phases of meiosis represented in the diagram. This is evidence that they are not able to recognise the events of each phase. In some cases, for example, they identified the phase in diagram A as prophase II rather than prophase I. This indicates that they are not aware of the differences between meiosis I and meiosis II.

b. The poor performance in Q2.1 was mainly due to Q2.1.2, which required a drawing of the gametes that result from the cell in diagram C. Many candidates lost marks because they:

  *   Drew two separate nuclei without cell membranes, thereby not representing cells

  *   Drew one cell or four cells instead of two cells

  *   Drew the chromosomes incorrectly in terms of number, size and shading

  *   Drew replicated chromosomes with centromeres instead of unreplicated chromosomes

  *   Provided incorrect labels

c. Q2.2 was the best answered question. Where the performance of candidates was poor, it is because they were unable to:

  *   Access the required information from the extract for Q2.2.2 and Q2.2.4

  *   Provide the percentage expressed to two decimal places but rounded it off to a whole number instead

  *   Relate the problem of undescended testes to its influence on the optimum temperature required for sperm production

d. Q2.3 was the worst answered question and this could be linked to poor scientific investigation skills relating to:

  *   Experimental design

  *   Identification of independent and dependent variables

  *   Reliability and validity

  *   Reading from a graph

  *   Doing a calculation

e. Q2.3.4 required the identification of a factor that was kept constant. This type of question requires the identification of factors other than the independent variable(s) that may influence the results/dependent variables. Many candidates were unable to do this. Many candidates did not receive credit for factors that should be kept constant, since the question asked for factors that were kept constant.

f. In Q2.3.5 which was based on reliability, learners provided generic answers that may not be related to the data or the specific context of the investigation. For example, increasing sample size did not apply since no information was given to indicate that a larger sample was used in the other country. Candidates were not able to identify from the information provided that the investigation was repeated and that it produced similar results. Based on the information provided in Q2.3.6 this was the factor that increased the reliability of the results of the investigation.

g. In Q2.4.1 candidates often lost marks because of incomplete answers, for example they stated that:

    *   Part A transmits sound waves but did not indicate that this is towards the tympanic membrane

    *   Part E equalizes pressure but did not indicate that this is on both sides of the tympanic membrane

    *   Part F releases pressure but did not indicate that this is from the inner ear

h. In Q2.4.2, candidates seemed unable to differentiate amongst a stimulus, sound waves, vibrations, pressure waves and an impulse and thus used these terms in the wrong context.

i. Candidates were required to *explain* the effect if the receptors were damaged not just state the effect. As a result, many candidates simply wrote hearing will be impaired without describing the cause and thus only received one of the 3 marks.

j. Most candidates were not able to write an account on the amplification of sound. They identified the parts involved but not the features of the parts that made amplification possible.

k. Some candidates had no knowledge of how balance is maintained by the cristae of the semi-circular canals or they provided a full account of balance that also included the role of the maculae of the sacculus and utriculus when this was not relevant.

Suggestions for Improvement

a. Teachers should use strategies that would familiarise learners with the sequence of phases in meiosis as well as the defining events of each phase. The defining events must be observed in the form of diagrams. Blank diagrams from the Mind the Gap study guide could be used. The diagrams in the first column should first be labelled by the learners. Thereafter the defining characteristics of each phase should be written alongside the diagram for each phase. This is a more active form of learning rather than giving learners a sheet where all this information already appears. Another strategy is the use of cards, each of which has a diagram of one of the phases. The cards are then given to learners in a jumbled order for them to sequence. Once this is done, they are required to identify each phase with observable reasons. In addition to the above, the corresponding phases of meiosis I and meiosis II can be placed alongside each other (e.g. prophase I next to prophase II) so that differences can be observed between corresponding phases of meiosis I and meiosis II.

b. Questions on the drawing of diagrams representing different phases of meiosis have appeared in many past examination question papers. Teachers should collate 4-5 such questions from past examination papers to provide practice for learners. In this way learners can master this skill in different contexts.

c. Teachers should help learners differentiate amongst the terms replicated chromosome, unreplicated chromosome, chromatid and daughter chromosome as follows:

Term	Description
Unreplicated chromosome	This refers to a chromosome as it appears before DNA replication takes place.
Replicated chromosome	This refers to a chromosome as it appears after DNA replication takes place. Because of DNA replication all chromosome material is doubled. Hence, each replicated chromosome is made up of two chromatids, joined by a centromere.
Chromatid	This refers to each of the two threads of a replicated chromosome.
Daughter chromosome	This refers to each chromatid after it splits from its sister chromatid during anaphase II and is moving towards the poles.

d. Give learners more practice in questions based on an extract. As an *English Across the Curriculum* strategy, this can be done in the form of a listening exercise where the teacher reads an extract based on the relevant topic after learners have read the questions based on the extract. Learners then answer the questions in writing. Alternatively, it could be done as a reading exercise where learners read the questions first and then the extract. Thereafter, they answer the questions in writing.

e. From the earlier grades, learners should be exposed to scientific investigations, both hands-on and minds-on. Through these investigations learners should become familiar with:

* The aim of an investigation

* Hypothesis formulation

* Experimental design

* Identification of independent and dependent variables

* Reliability

* Validity

* Representing data in tables and graphs

* Interpreting data in tables and graphs

* Doing calculations

* Making conclusions

f. When there are questions on reliability and validity, learners must check if these are asked in the context of what was already done as opposed to what should be done in future to increase reliability and validity. If the question asks *what was done* – then the answer or a clue to the answer will come from the information contained in the question. If the question asks *what should be done* – then the answer must be formulated by the learner. It cannot come from the information contained in the question.

g. In the process of hearing, learners need to know that *sound* coming from a source is the *stimulus*. This stimulus moves as *sound waves* from the source through the auditory canal until it reaches the tympanic membrane. From here the stimulus of sound moves as *vibrations* through the tympanic membrane, ossicles and oval window. When the vibrations pass into the endolymph of the inner ear then the stimulus is in the form of *pressure waves* which then stimulate the organ of Corti. This is when the stimulus is converted into an *impulse* which can be transmitted to the cerebrum.

h. When answering questions based on hearing, learners must state that the impulse is transmitted by the auditory nerve to the cerebrum (not just 'brain'). In the same way, when answering questions based on balance, learners must state that the impulse is transmitted by the auditory nerve to the cerebellum (not just 'brain').

i. Teachers must emphasise that the parts involved in amplification are the tympanic membrane, the ossicles and the oval window. The following features of the structures involved help in the amplification process:

* The sound vibrations move from the large tympanic membrane to the smaller oval window

* The ossicles that transmit the vibrations decrease in size from the hammer to the anvil to the stirrup

    The above features concentrate/intensify the sound vibrations causing it to be amplified.

j. For the process of balance, learners must clearly understand the separate role of the cristae and maculae so that they give both aspects if a general account on balance is required or the relevant part when only one aspect is asked for. The following table may help in this regard.

Part of ear	Receptors	Stimulus
Semicircular canals	Cristae	Changes in speed and direction
Sacculus and utriculus	Maculae	Changes in the position of the body

When the above receptors are stimulated the stimulus is converted into an impulse that is transmitted through the vestibular branch of the auditory nerve to the cerebellum. Here the impulse is interpreted and impulses are sent to the muscles of the body (the effectors) to restore balance.

QUESTION 3   AUXINS, REFLEX ACTION, INSULIN AND TEMPERATURE REGULATION

Common errors and misconceptions

a. In Q3.1.4, candidates provided very poorly constructed explanations for the growth response represented. Some provided an explanation involving phototropism whereas it should have been explained in terms of geotropism.

b. Some candidates did not receive full credit in Q3.2.7 since they assumed that pathway B was a reflex action. A careful study of the diagram would have revealed that the impulse is being transmitted to the brain. Fortunately, they could obtain at least 4 of the 6 marks since there was an overlap between pathway A involving a reflex action and pathway B.

c. In Q3.3.2, many candidates were not able to analyse new information provided in the form of graphs to make comparisons regarding many small meals versus a few large meals. Whereas the question asked for the comparison to focus on the effect on insulin levels, candidates were giving differences based on glucose levels.

    In addition, some learners lost a mark since they did not present the differences in the form of a table. Suitable answers could have been obtained by comparing the following:

    * Maximum insulin concentration

    * Minimum insulin concentration

    * Frequency of rise and fall in insulin concentration

    * Range of insulin concentration fluctuation

    * Minimum insulin concentration in relation to minimum level of glucose

d. In Q3.3.3, candidates were not able to link the eating habit (few large meals versus many small meals) to the resulting glucose level in the blood and hence the amount of insulin required to restore glucose levels to normal.

e. Many candidates answered the question in the opposite and did not obtain credit. They explained why the skin temperature of person B was lower rather than explain why the skin temperature of person A was higher.

Suggestions for improvement

a. The definition of a tropism as well as the definitions of phototropism (with light as the stimulus) and geotropism (with gravity as the stimulus) should be clearly outlined to learners.

It is also important to emphasise that auxins have opposite effects in stems and roots, e.g. a high concentration of auxins in the stems promote growth and that a low concentration of auxins in the roots inhibit growth.

Also important is that bending occurs in plant organs when the auxin concentration is different on two sides of a stem or on two sides of a root.

b. A better understanding of negative feedback mechanisms can be achieved using the 7-step process described earlier in this report under Question 2 and which is also elaborated in the *Mind the Gap* study guide under the section on homeostasis.

In addition, when the homeostatic control of glucose level is being studied, teachers should link this to the condition of diabetes.

c. Topics such as temperature regulation should be taught with the use of diagrams. In this way learners will become familiar with the parts involved and will be able to differentiate between diagrams showing temperature control on a hot day versus a cold day, based on observable features.

QUESTION 4   ESSAY ON HUMAN IMPACT

Common errors and misconceptions

a. In the essay in Q4, many candidates did not present their answers clearly under the following expected headings:

* Effect of human activities on global warming

* Impact of global warming on weather patterns

* How weather changes affect food security

b. Candidates often lost the mark for:

* Relevance by including irrelevant information such as ozone depletion, eutrophication and acid rain.

* Logical sequence since they did not present information in a logical fashion. The information was not provided clearly under each of the expected headings.

* Comprehensiveness by answering one or two aspects of the essay in detail or by answering all three parts but not in sufficient detail.

Suggestions for improvement

a. Teachers should offer more opportunities for learners to write answers in essay form. They should inform learners that the essay in Life Sciences does not require an introduction and a conclusion.

b. Greater exposure to answering paragraph-type questions will be a useful step to prepare learners for the writing of essays.

c. Teachers should use the current and past examination essay questions as examples to effectively teach learners the skill of interpreting the question to determine what is required. Key words in the question should be underlined.

d. Learners should be reminded that synthesis is made up of three parts: relevance, logical sequence and a comprehensive answer. The allocation of the synthesis marks should be explained to them and used from Grades 10 to 12.

e. Subject advisors should train teachers on the application of the criteria for synthesis. This can be done by giving different teachers the same sample script to mark to which synthesis marks are allocated. This should be followed by a discussion with reasons on whether the answer in the sample script should be awarded a mark for each aspect of synthesis.

8.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General comments

a. Many candidates were not familiar with basic terminology in the different topics. This resulted in poor performance even in lower-order questions.

b. Some candidates had problems distinguishing between action verbs, especially between *describe* and *explain*.

c. Certain problem areas mentioned in previous reports, for example investigations which form part of the work throughout the year, remain a challenge to some candidates.

d. Candidates' performance indicates that they are still experiencing difficulty in certain aspects of meiosis, genetics and evolution.

e. Since textbooks do not always carry accurate information, teachers should always be guided by the *CAPS* and *Examination Guideline* documents for Life Sciences.

8.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

The following graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Graph 8.6.1   Average marks per question expressed as a percentage: Paper 2
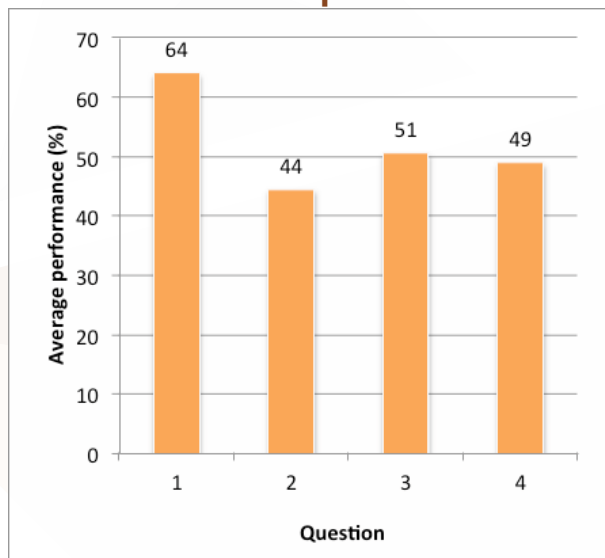
Q1	MCQ, Terms, AB Matching, DNA & Meiosis, Phylogenetic Tree
Q2	Meiosis, Genetics
Q3	Human Evolution, Natural Selection, Evolution in Current Times
Q4	RNA & Protein Synthesis - Essay

Graph 8.6.2   Average performance per subquestion: Paper 2
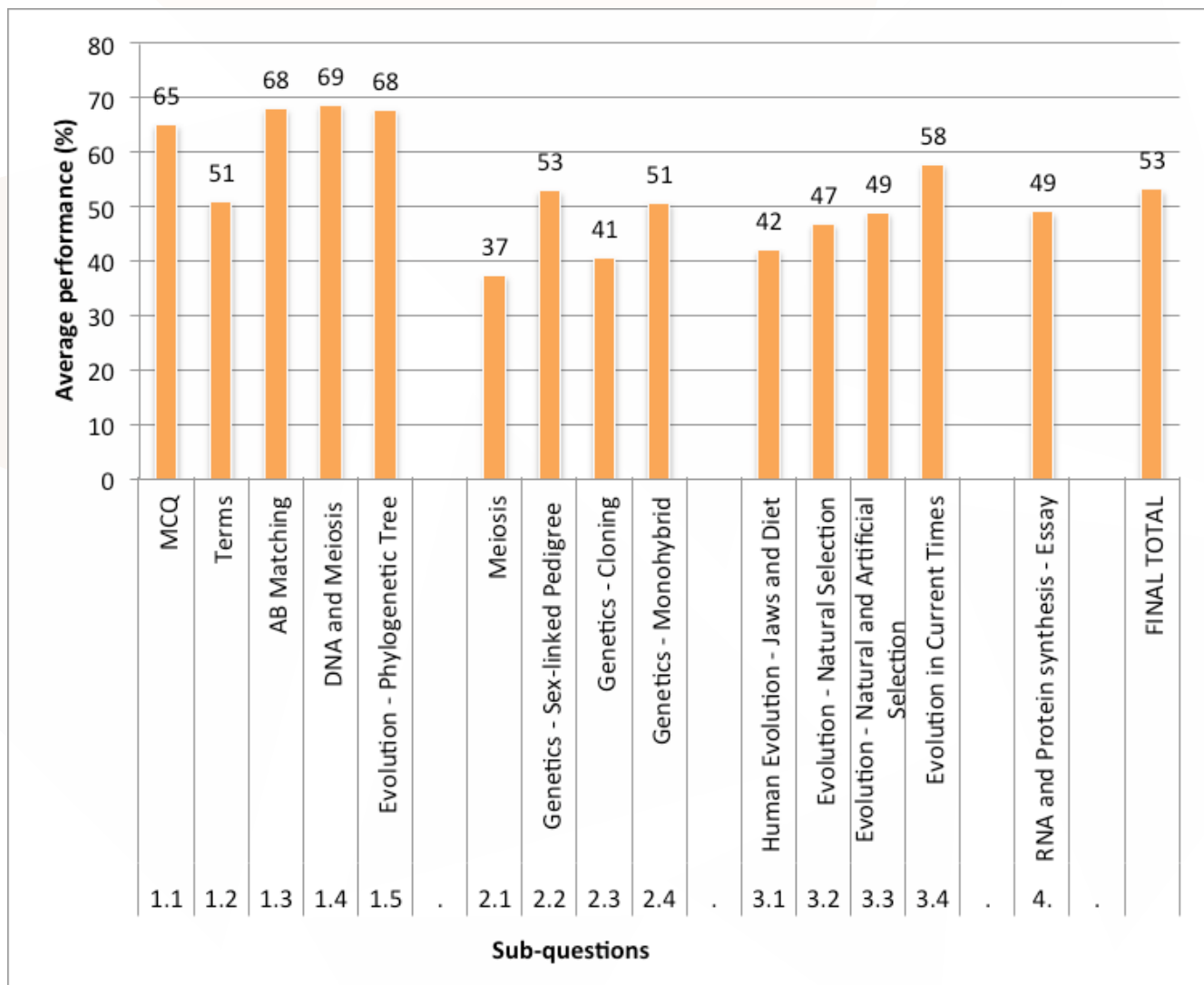
The worst performance by candidates was recorded in Q2.1 on meiosis, Q2.3 on cloning and Q3.1 on human evolution. The best performance was recorded in Q1.

8.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1 MULTIPLE CHOICE, TERMINOLOGY, MATCHING ITEMS, DNA AND CHROMOSOMES AND PHYLOGENETIC TREE

Common errors and misconceptions

a. In Q1.2, candidates experienced difficulty with the correct spelling of biological terminology. Poor spelling often changes the meaning of the term causing candidates to lose marks.

b. Some candidates could not differentiate between different terms e.g. genotype and gene pool instead of genome; multiple alleles instead of alleles.

c. In Q1.2.4, candidates incorrectly noted natural selection as the process whereby new species are formed. The correct answer was speciation. Allopatric speciation was not accepted as this term refers to a specific type of speciation. This once again attests to the poor attention paid to the teaching and learning of terminology.

d. Some candidates lost marks in Q1.4.2 because they could not provide the correct answer for the number of chromosome pairs found in a normal human somatic cell. They gave the answer as 46 and was not credited. The question asked for the answer in pairs and hence the only answer was 23 pairs.

e. In Q1.4.3, some candidates gave the letter and name when the question asked for only the letter. In cases where the candidates gave the name only and not the letter, they were not credited.

f. In Q1.5.3, candidates could not differentiate between a pedigree diagram and phylogenetic tree.

Suggestions for improvement

a. There needs to be a greater emphasis on the teaching and learning of appropriate terminology related to the various topics, together with the correct spelling of these terms. Teachers should use various strategies to improve the teaching of terminology which have been outlined in the Diagnostic Reports of the previous years.

b. Teachers must use the correct terminology when teaching and incorrect spelling must not be credited from the onset of studying Life Sciences. Poor spelling often changes the meaning of a term and may result in the loss of marks.

c. Learners must follow the instructions as prescribed in Q1.3. Answers should be written as A only (not A), B only (not B), both A and B (not A + B; A, B; A and B or A/B). Teachers should enforce this in all assessment activities at school.

d. Teachers should clearly clarify differences between related terminologies e.g. alleles and multiple alleles; haemophilia and haemophiliac; genome, gonosome and genes.

e. Teachers should give learners multiple opportunities to label drawings and write in the functions next to the labels. The blank diagrams found in the *Mind the Gap* study guide will prove useful in this regard.

QUESTION 2 MEIOSIS, SEX-LINKED PEDIGREE DIAGRAM, CLONING AND MONOHYBRID CROSS

Common errors and misconceptions

a. In Q2.1, candidates who lacked basic knowledge of concepts such as *non-disjunction*, *Down syndrome* and *crossing-over,* performed poorly in this question as the question expected candidates to apply their knowledge and use their reasoning skills in answering the questions on the above-mentioned concepts.

b. Candidates could identify that non-disjunction occurred but most attributed this to anaphase II instead of anaphase I which was not the case in this question, given the nature of shading of the chromosomes.

Instead of explaining that non-disjunction of a homologous pair resulted in two chromosomes moving to one pole and none moved to the other pole, they just repeated the question and mentioned that were two chromosomes in the two cells and none in the other two cells which is already shown in the diagram.

c. In Q2.1.2, candidates had to describe how *Down syndrome* may result if gamete A was involved in fertilisation. They did not read the introductory sentence and question and incorrectly identified gamete A as a female gamete although it was mentioned in the introductory sentence that the diagrams represented the distribution of chromosome pair 21 at the end of meiosis in a human male.

Many could not identify that gamete A had 24 chromosomes (or an extra chromosome at pair 21) and that when gamete A fused with a normal ovum it would lead to a zygote with 3 chromosomes at position 21 instead of two.

They did not explain how three copies of chromosome 21 was a result of the fusion of the abnormal sperm cell with a normal ovum at fertilisation.

d. Some candidates failed to explain in Q2.2.2, how individual number 5 inherited the disorder. Instead, they described the mother's genotype and why she has the disorder without understanding that if she has two recessive alleles (X^dX^d), her son will inherit the X^d allele from his mother. Learners wasted time explaining about the father's genotype. Some also used the terms *allele, gene* and *chromosome* interchangeably and therefore incorrectly.

e. Candidates could not reason in Q2.3.3 that an ear cell was used in the *cloning* of the calf because an ear cell is a somatic/diploid cell and contains all the genetic information and that an ovum is a haploid cell which contains only half of the genetic information.

They only referred to the somatic cell of a donor being removed instead of the nucleus of the somatic cell and the nucleus of the ovum being removed. Some confused cloning in Q2.3.4 with genetic engineering and were referring incorrectly to stem cells being used.

f. In Q2.4.3, they confused *Mendel's Law of Dominance* with the required *Law of Segregation.* They also confused *alleles* and *genes*. Most candidates referred to two alleles instead of two alleles for a trait and also wrote that the chromosome pairs/ chromosomes separated instead of separated during meiosis.

g. Some candidates still used their own letters for the genotype in Q2.4.4 and therefore lost marks. Care must be taken on the position of *meiosis* and *fertilisation* in the format of a genetic cross.

Suggestions for improvement

a. Teachers must encourage learners to clearly state every fact and not only mention an extra chromosome without indicating in gamete A or at position 21.

b. Careful attention to defining the term 'cloning' as well as the details of the process of cloning is recommended. The memorandum can be used as a guideline here for a short, concise and precise summary of the cloning process.

Learners must be given more practice in writing information in paragraph form especially for the different processes encountered in the various topics.

c. Learners often use the terms chromosome, chromatid, replicated chromosome, unreplicated chromosome and daughter chromosome in the incorrect context. Refer to the suggestions for improvement under Q2 of Paper 1 for a clarification of these terms.

d. Teachers should use the memorandum to teach a concise description of the process of cloning, as well as for stating Mendel's Law of Segregation.

QUESTION 3   HUMAN EVOLUTION, NATURAL SELECTION, NATURAL AND ARTIFICIAL SELECTION AND EVOLUTION IN CURRENT TIMES

Common errors and misconceptions

a. In Q3.1.1, instead of giving observable differences in the jaw of the chimpanzee and Homo sapiens, some candidates referred to more and less prognathous when this feature was not observable in the given diagram.

Some candidates gave differences between the pelvis of the chimpanzee and Homo sapiens, which indicates that they did not read the question carefully.

b. Many candidates failed to provide a definition for transitional species (Q3.1.3(a)) and they did not include intermediate characteristics in their explanation. As a result, they struggled to provide the structural features to support *Australopithecus* as a transitional species between the chimpanzee and Homo sapiens in Q3.1.3 (b).

They also compared different features, for example, teeth in one species and jaw shape in the other species as opposed to looking at a common feature in all three species e.g. considering the shape of the palate in Australopithecus and comparing it to that of the chimpanzee and Homo sapiens.

c. In Q3.2.2, some candidates gave a general explanation of Darwin's theory of evolution through natural selection without referring to the king snakes and hence lost most of the marks.

d. Some candidates could not extract information from the graph and conduct the necessary calculation to determine the percentage increase in the oil content.

e. Some candidates were still confused as to how to identify the independent and dependent variables. This shows that these candidates did not refer to the aim of the investigation to determine the two variables.

Even when the variables were correctly identified, the answers were incomplete and consequently they lost marks. They gave answers such as herbicide instead of type of herbicide and time instead of time it takes to develop resistance to herbicide.

f. In Q3.4.4, many candidates could not apply their knowledge about validity and reliability.

g. Some candidates drew a line graph or a bar graph, thus losing most of the 6 marks in Q3.4.5.

Many candidates did not use a ruler to draw the bars and as a result a mark was lost for scaling which includes the width of the bars and the spaces between the bars.

Suggestions for improvement

a. Learners should be made aware that questions should be read carefully before attempting to answer them.

b. Teachers need to provide learners with more data response questions to practice on and should include at least one of these types of questions in each test. Newspaper articles or internet websites such as *Science Daily* have good resource material that could be used to train learners on comprehension skills.

c. Examination techniques should be considered and taught to learners by teachers. For example, if asked for a comparison in a question, be sure to refer to both organisms given in the question in your answer. Learners must be taught to compare features directly, where the same feature is written in both columns of the table in directly the same row, with just the difference between the feature being given.

d. The concept of transitional species should be emphasised in Grade 10 when learners are taught History of Life, where the *Archeopteryx* is a transitional fossil between reptiles and birds.

e. Learners must be taught to refer to the specific example provided when explaining natural selection in an application question, rather than providing a general account on natural selection. The table below shows how a general account can be made more specific.

General account on natural selection (As required in a Level A recall question)	Specific account on natural selection (As required in a Level C application question)
There is variation in the offspring✓	There is variation in the colour of kingsnakes✓
Some have favourable characteristics✓	Some kingsnakes are bright in colour✓/resemble the coral snakes
Some have unfavourable characteristics✓	Some kingsnakes are dull in colour✓
Those with unfavourable characteristics die✓	Those with dull colours are killed✓ by predators
Those with favourable characteristics survive and reproduce✓	Those with bright colours are not eaten✓/they survive and reproduce
They pass the allele for the favourable characteristic to their offspring✓	They pass the allele for bright colour to their offspring✓
In this way the proportion of offspring with favourable characteristics increase over many generations✓	In this way the proportion of offspring with bright colours increase over many generations✓

f. Learners should be taught how to do percentage increase calculations using the following formula: (new value minus old value) divided by the old value x 100.

g. Dependent and independent variables must be identified from the aim of an investigation and must be written in full. Do not use column headings from a table as a primary way of identifying the dependent variable. The column heading may not correctly reflect the dependent variable – it may sometimes be a way of measuring the dependent variable. For example, a table may have information on the 'number of bubbles released by a plant per minute' but this is simply a measure of the rate of photosynthesis which is the actual dependent variable.

h. Teachers must encourage learners to read the given text with understanding, and even underline the important information to note, before attempting to answer the questions. Learners *must study the information and data first before attempting the questions.* Independent and dependent variables should be identified from the aim of the investigation.

i. Teachers need to teach learners to differentiate between validity and reliability in scientific investigations, because the principles of validity and reliability are fundamental cornerstones of the scientific method.

j. Drawing of graphs in grade 10, 11 and 12 cannot be over-emphasised. Teachers should provide learners with the marking criteria that will be used to mark the graph. In this way, learners will become familiar with the different components of graph drawing for which they will receive credit.

QUESTION 4   RNA AND PROTEIN SYNTHESIS

Common errors and misconceptions

a. Candidates described the whole process of transcription. They discussed protein synthesis in general without focusing directly on the involvement of the different types of RNA in protein synthesis. This showed that the learners lack the skill of extracting core information relevant to the question. They merely wrote everything they knew about the question and this led to many learners losing the mark for relevance when awarding the synthesis mark.

b. The candidates' responses also displayed a lack of planning in terms of structuring their essays, for instance when discussing RNA structure the plan should have included the general structure of RNA, then the structure of messenger RNA and transfer RNA. This would have guided them on the second part of the essay to focus only on the involvement of the different types of RNA in protein synthesis instead of explaining the entire process.

c. Many candidates used the terms nucleotides and nitrogenous bases in the incorrect context. They also associated the terms codons and anticodons with the incorrect type of RNA.

d. A large number of candidates only stated that RNA has the nitrogenous base uracil instead of thymine, but did not give the other 3 nitrogenous bases, and so could not be credited with a mark.

e. Candidates incorrectly identified the *peptide* bond as occurring between mRNA and tRNA, instead of being between adjacent amino acids. They also incorrectly identified the bond as being a polypeptide bond.

f. Several candidates compared DNA and RNA which also caused them to lose the mark for relevance.

g. Some candidates wrote key words instead of writing full sentences.

h. Candidates also lost the mark for logical sequence where they muddled the involvement of the different types of RNA in protein synthesis. For example, they wrote on translation first and then on transcription.

Suggestions for improvement

a. Teachers need to emphasise to learners that the format of the Life Sciences essay is not similar to that of a 'language essay', i.e. there is no need for an introduction and conclusion.

b. The skill of writing an essay should start from Grade 10. Teachers must give essay questions on each chapter as practice and also review answers until the skill is mastered.

c. Learners should be guided on how to break down the question into the different sections by identifying what is being asked. They should be taught to write each section as a separate paragraph and stick to the section within that paragraph to obtain the mark for logic and relevance.

d. Teachers should emphasise the importance of *logic* in essays where *processes* are involved. Events must be presented in the correct sequence to obtain credit for logical sequence.

e. Teachers should use the current and past examination essay questions to effectively teach learners the skill of interpreting the question to determine what is required. Key words in the question should be underlined.

f. Teachers must use the *Mind the Gap* study guide to assist learners in the use of mind maps in the planning of an essay.

g. Learners should be reminded that synthesis is made up of three parts: relevance, logical presentation and a comprehensive answer. The allocation of marks for synthesis should be explained to them and implemented from grades 10 to 12.

CHAPTER 9

MATHEMATICAL LITERACY

The following report should be read in conjunction with the Mathematical Literacy question papers of the November 2018 Examination.

9.1 PERFORMANCE TRENDS (2014 – 2018)

The overall performance at 30% and above declined slightly to 72,5% but the achievement at 40% and above has improved very slightly to 45,4 % in 2018 as compared to 2017.

Table 9.1.1 Overall achievement rates in Mathematical Literacy

Year	No. Wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	312 054	262 495	84,1	185 528	59,5
2015	388 845	277 593	71,4	172 214	44,3
2016	361 948	257 926	71,3	167 811	46,4
2017	313 030	231 230	73,9	140 991	45,0
2018	294 204	213 225	72,5	133 568	45,4

Figure 9.1.1 Overall achievement rates in Mathematical Literacy

	2014	2015	2016	2017	2018
% achieved at 30% and above	84.1	71.4	71.3	73.9	72.5
% achieved at 40% and above	59.5	44.3	46.4	45.0	45.4
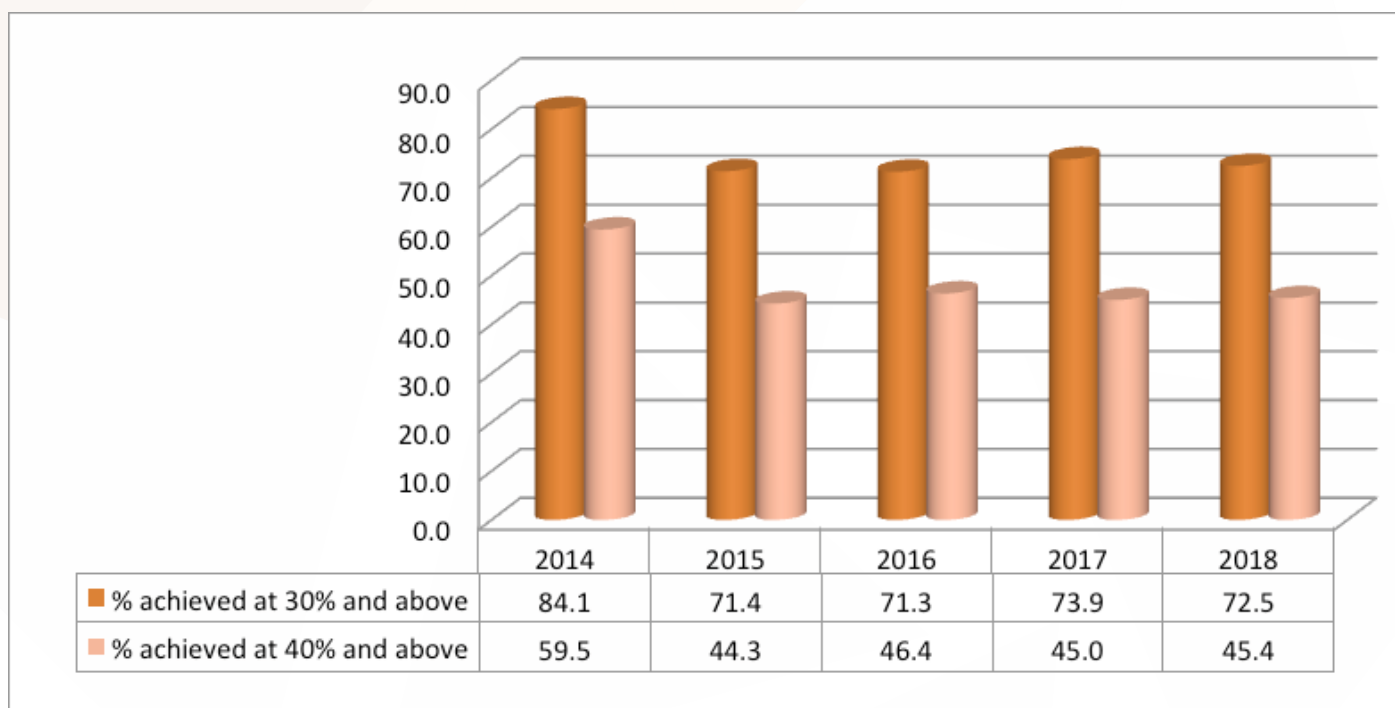
Figure 9.1.2 Performance distribution curves in Mathematical Literacy

	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	0.3	3.8	11.8	24.7	25.2	16.5	10.0	5.4	2.1	0.3
2015	1.4	9.6	17.6	27.1	19.8	12.1	7.1	3.7	1.4	0.2
2016	1.3	9.4	18.0	24.9	20.8	13.1	7.6	3.7	1.1	0.1
2017	0.3	6.1	19.8	28.8	21.4	13.2	7.1	2.8	0.6	0.0
2018	0.6	7.3	19.6	27.1	20.1	12.8	7.6	3.6	1.2	0.1
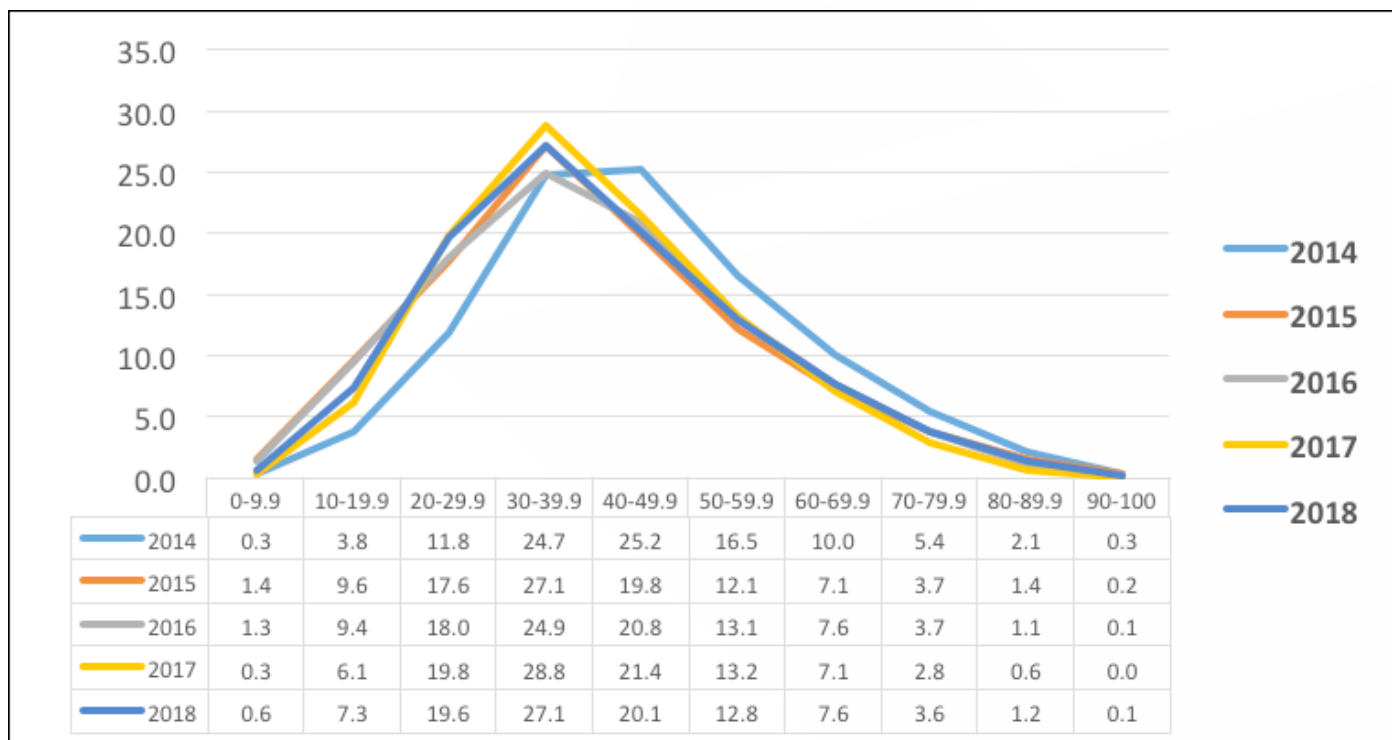
9.2   GENERAL COMMENTS ON PAPER 1 AND PAPER 2

a. **Terminology**: Learners must be taught definitions of common terms used in Mathematical Literacy e.g. 'inflation' and 'perimeter'. Learners should compile a glossary at the back of their notebooks i.e. a list of new terms per topic, with a brief, but clear definition next to each term. A separate note book for this purpose may also be kept. By the end of a year, all learners should have a comprehensive glossary of all the relevant terms.

b. **Enhance learners' skills in accurately interpreting specific questions and using information that is relevant**: Teachers are advised to read through and interpret the requirements of each question with learners. Learners should also be guided on how to extract relevant information from the context and to identify the information that is relevant to each sub-question. Tables are often used to reduce written text.

c. **Use past NSC papers:** Firstly, it must be noted that past question papers serve as one of many teaching and learning resources. It must be used for revision purposes only. Past papers cannot replace the CAPS document and Examination Guidelines. Every learner must have access to past examination papers. Teachers can adapt certain questions, especially questions that include working with large numbers. Secondly, teachers should ensure that learners revise questions that define mathematical terms, especially those questions that define terms in each context.

d. **The importance of formative testing:** Short, informal formative tests must be used to build the confidence of learners in all topics. If learners do their own corrections, it allows them to have immediate feedback and to gain an understanding of the mark allocation. The less challenging sections in each of the questions in the NSC Mathematical Literacy papers can be used as 'confidence-boosters'. Formative tests can be used to great effect to introduce new subtopics in CAPS, such as *personal income tax* and *box-and-whisker plots*.

e. **Previous recommendations**: Teachers should use past Diagnostic Reports to establish if there are topics or concepts that are repeatedly indicated as problematic to most learners. For example, it has been noted over time that learners' basic mathematical knowledge is problematic; this includes learners' inability to work with big numbers.

9.3   OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1
General comments

a.   The 2018 question paper was set according to the new guideline document; consequently, Q1 is entirely based on short contexts, with all questions pitched at   level 1.

b.   Teachers are advised to use the SC Mathematical Literacy Paper 1 (June 2017), NSC Mathematical Literacy Paper 1 (November 2017), SC Mathematical Literacy Paper 1 (June 2018) and the NSC Mathematical Literacy Paper 1 (November 2018) as exemplars for 2019 Mathematical Literacy learners.

9.4   DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 1

The following graph is based on data from a random sample of candidates. While this graph may not accurately reflect national averages, it is useful in assessing the relative degree of challenge of each question as experienced by candidates.

Figure 9.4.1 Average percentage performance per question for Paper 1

Q	Content
Q1	Short contexts
Q2	Finance
Q3	Measurement
Q4	Maps and Plans
Q5	Data Handling
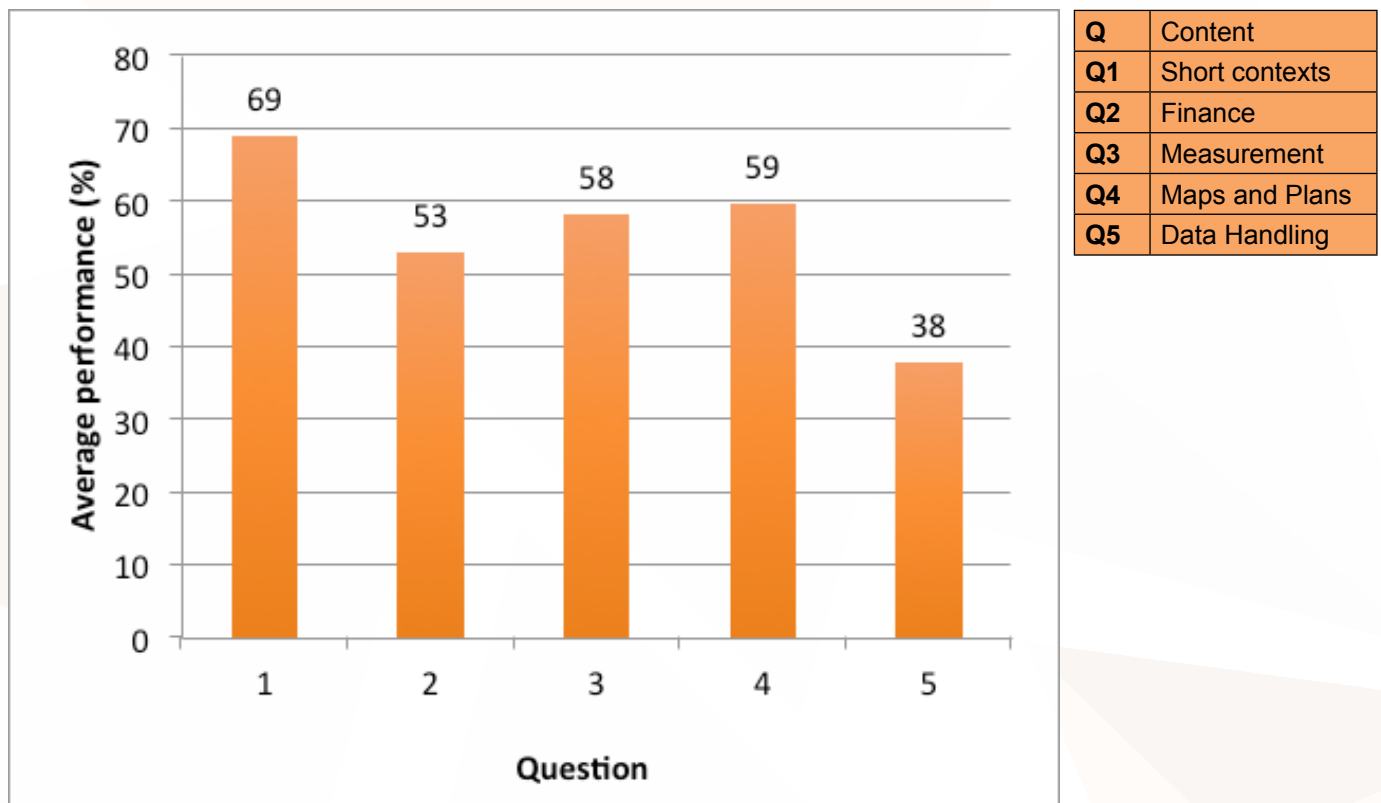
Figure 9.4.2 Average percentage performance per sub-question for Paper 1
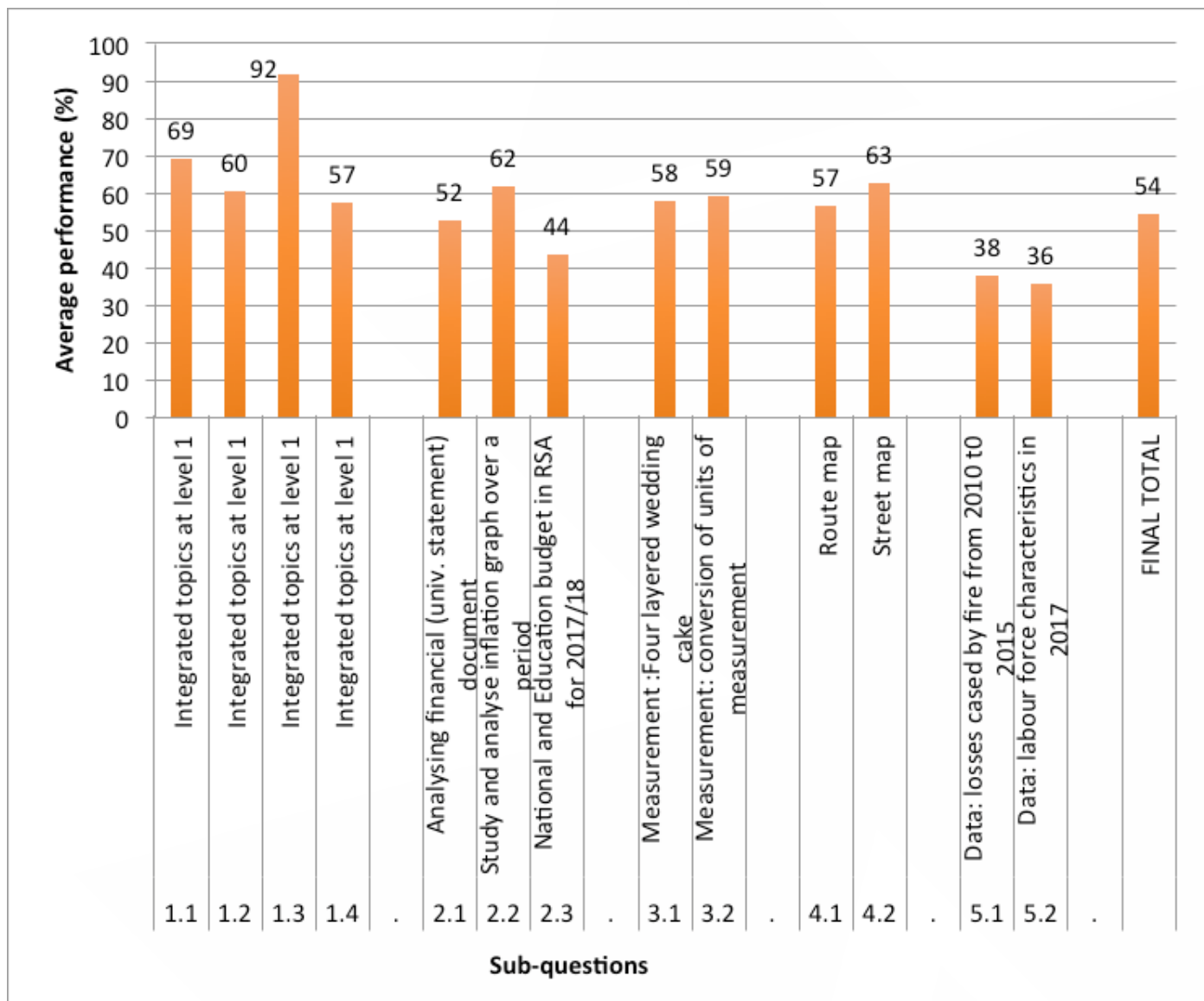
9.5 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 1

The change in the sequence of questions still benefits candidates, with Q1 based on short level 1 contextual questions. This contributed to the improvement in the overall results in Mathematical Literacy in 2018.

QUESTION 1: SHORT CONTEXTS (INTEGRATED LEVEL 1 QUESTIONS ONLY)

Candidates performed well in this question.

Common errors and misconceptions

a. Most candidates struggled to give the correct answer; most learners wrote Friday or 3 days in Q1.1.1.

b. In Q1.1.3, candidates struggled to make a connection that 50% is (½) half price.

c. Conversion is still a challenge for most candidates in Q1.1.4. They could not recognize the 'NOTE: 1 litre = 1 000 ml', thus divided/ multiplied by 100 / 1 000.

d. In Q.1.1.5, the 'NOTE' stating that all amounts given including the discount, was ignored by a few candidates.

e. In Q1.1.6, some candidates struggled to write the data in descending order. They still confused the two terms i.e. ascending and descending order.

f. In Q1.2.2, some candidates could not read the temperature between 40 ^{0}C and 50 ^{0}C on the thermometer. They gave 40^0 C instead of 44^0 C as an answer.

g. In Q1.2.3, the meaning of *scale,* in context, was not provided by most candidates. They mixed the units in their definition of scale.

h. In Q1.3.3, most candidates did not know which operation to use when finding *difference*. They added the two values instead of subtracting the two values.

i. In Q1.4.1a, many candidates confused time with duration. They gave 12:00 as an answer instead of 12 hours.

Suggestions for improvement

a. Teachers should incorporate more shopping leaflets, from stores, when selecting material to teach the topic of *personal finance*. This will enable learners to extract relevant information from leaflets with ease.

b. Percentages, proper fractions and decimal fractions need to be revised on a regular basis, in Grade 12. Understanding conversion from percentages to proper fractions (and vice versa), will assist learners to know that 50% and a ½ have the same numerical value.

c. The assumption that learners should have mastered converting units of measurement in lower grades is a fallacy. Converting units of measurement within the metric system should be practised by learners on a regular basis during contact time.

d. Teachers should allocate time, in class, to allow learners to develop the skill of extracting information from a given context.

e. Mathematical terms like *ascending* and *descending* should be visible to learners, in a classroom, on wall charts. Informal testing items must include the testing of elementary mathematical terms.

f. Teachers, where possible, should use kitchen scales, thermometers and other measuring apparatus in the classroom when teaching measurement in the FET phase. Learners will gain practical experience when taking readings from a variety of instruments.

g. Teachers need to incorporate the number scale on a map, drawing, etc in number and word formats, e.g. 1:25; *one unit on the drawing represents twenty-five units, in reality.*

h. The meaning of *difference* in a mathematical context is to *subtract*. Teachers should emphasise that, 'difference' in the context of Mathematical Literacy has the same meaning as to 'subtract'.

i. Differences between time and duration need to be emphasised in class by the teacher.

QUESTION 2: FINANCE (UNIVERSITY ACCOUNT STATEMENT; INFLATION; NATIONAL BUDGET)

This is the longest question in the paper, and the performances of learners in this question were satisfactory and an improvement on 2017's sample.

Common errors and misconceptions

a. Most candidates in Q2.1.1, Q2.2.1 and Q2.3.2 could not explain the meanings of the terms *interest*, *inflation* and *budget* within the given context.

b. In Q2.2.4, many candidates were confused by the answer of 29 000%. They divided it by 1 000 to get to 29% or divided by 100 to get to 290%. They seem to believe that percentage increase is a number less than 100 or 300.

c. Several candidates were not able to determine the cost price in Q2.2.5. They increased the amount by multiplying by 17,5% instead of dividing by 117,5%. They failed to handle this question as a VAT inclusive question.

d. Throughout Q2, candidates could not read the correct values from a given table. A total of eleven marks was awarded in this question for reading correct values from a table.

Suggestions for improvement

a. Learners should be afforded opportunities to define terms in their own words, as part of assessment. This will also ensure conceptual understanding.

b. Teachers should emphasize that a percentage increase can be greater than 300%. Learners should do exercises where answers for percentage increase is greater than 300%.

c. Teachers must draw similarities between a question like Q2.2.5 and a VAT inclusive/VAT exclusive question.

d. Teachers must provide learners with opportunities to extract information from tables as often as possible.

QUESTION 3: MEASUREMENT (VOLUME; AREA; PERIMETER; CONVERSIONS: METRIC AND IMPERIAL; TIME)

There was an improvement in the performances of the candidates, in this topic, in the 2018 examination.

Common errors and misconceptions

a. In Q3.1.1, candidates could add all the correct values, but conversion was incorrect from cm to mm. They either multiplied/divided by 100 / 1000.

b. In Q3.1.2a, many candidates continue to confuse the concepts of *radius* and *diameter*. They divided the radius by two instead of multiplying by 2 to determine the diameter.

c. Some candidates found it difficult to substitute the correct values into a given formula, in Q3.1.2b.

d. In Q3.1.3, candidates could not define the term *perimeter*.

e. In Q3.1.4, most candidates could not find the correct width on a 3-D shape. Instead, they used the height of the cylindrical shapes.

Suggestions for improvement

a. Teachers should provide learners with conversion tables or methods like 'King Henry Died a Miserable Death Called Measles' (KHDAMDCM) when doing conversions from one unit of measurement to another.

b. Meaning of mathematical terms such as radius and diameter should be reinforced on a regular basis.

c. Teachers should provide learners with enough exercises on how to substitute correct values from tables (correct columns) into a given formula.

d. Teachers should encourage learners to write a glossary at the back of their books of the different terms' meanings as they complete each topic.

QUESTION 4:   MAPS AND PLANS (ROUTE/STREET MAP; TIME; PROBABILITY)

Candidates' performances in this question was satisfactory. This reflected an improvement in relation to previous years' performances.

Common errors and misconceptions

a. In Q4.1.1, some candidates provided a set of directions instead of the general direction.

b. In Q41.5, most candidates struggled to calculate the actual distance using the scale. Some common errors were: candidates could not measure the correct distance on the map and they could not do the scale calculation correctly.

c. Many candidates could not convert hours to minutes in Q4.2.4.

Suggestions for improvement

a. Learners need more practice on questions involving general direction questions and questions on a given set of directions. The difference between these two types of questions needs to be emphasised by the teacher when teaching maps.

b. Teachers should note that when a scale is given, there is every chance that some actual measurement will be done. Therefore, learners should be afforded the opportunity to use their rulers in class to measure classroom items (books, pens, pencils, etc.) on a regular basis.

c. Drilling on time conversion must be given special attention in class or in intervention programmes.

QUESTION 5: DATA HANDLING (BAR GRAPHS; PROBABILITY; MEASURES OF CENTRAL TENDENCIES)

This question required candidates to interpret tables with large numbers.

Common errors and misconceptions

a. Most candidates did not write the value in millions, in Q5.1.1 and Q5.1.4. They just copied the table values.

b. In Q5.1.2, several candidates could not calculate the final answer. They could not interpret the thousand separator on their calculators.

c. Many candidates divided the table values and ignored the zeros in Q5.1.4.

d. In Q5.2.1, most candidates could not define the term *unemployment*.

Suggestions for improvement

a. A careful reading of tables is a crucial skill in solving mathematical problems. Teachers should give learners enough opportunities, during contact time, to practise and develop this skill.

b. Teachers must incorporate large numbers in their lessons, across all topics in Mathematical Literacy. It is advisable that every assessment (formal or informal) task should involve a problem on big numbers so that learners can familiarise themselves with them.

c. Teachers should encourage learners to write a glossary of the different terms' meanings, at the back of their books, as they complete each topic.

9.6   OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General comment

The performances of candidates were like those recorded in the past. -

9.7   ANALYSIS OF LEARNERS' PERFORMANCE IN INDIVIDUAL QUESTIONS IN   PAPER 2

The following graph is based on data from a random sample of candidates. While this graph may not accurately reflect national averages, it is useful in assessing the relative degree of challenge of each question as experienced by candidates.

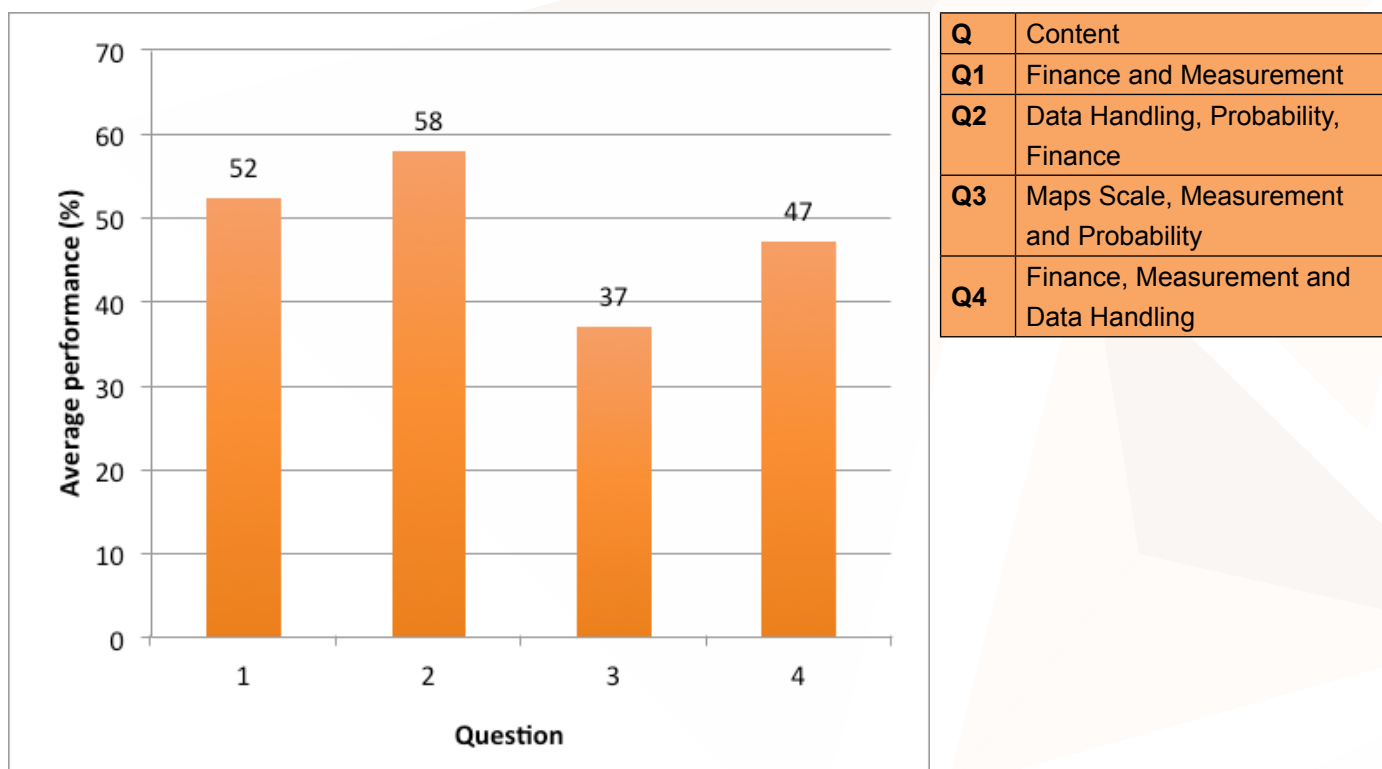## Figure 9.7.1 Average percentage performance per question

Q	Content
Q1	Finance and Measurement
Q2	Data Handling, Probability, Finance
Q3	Maps Scale, Measurement and Probability
Q4	Finance, Measurement and Data Handling

Figure 9.7.2 Average percentage performance per sub-question in paper 2
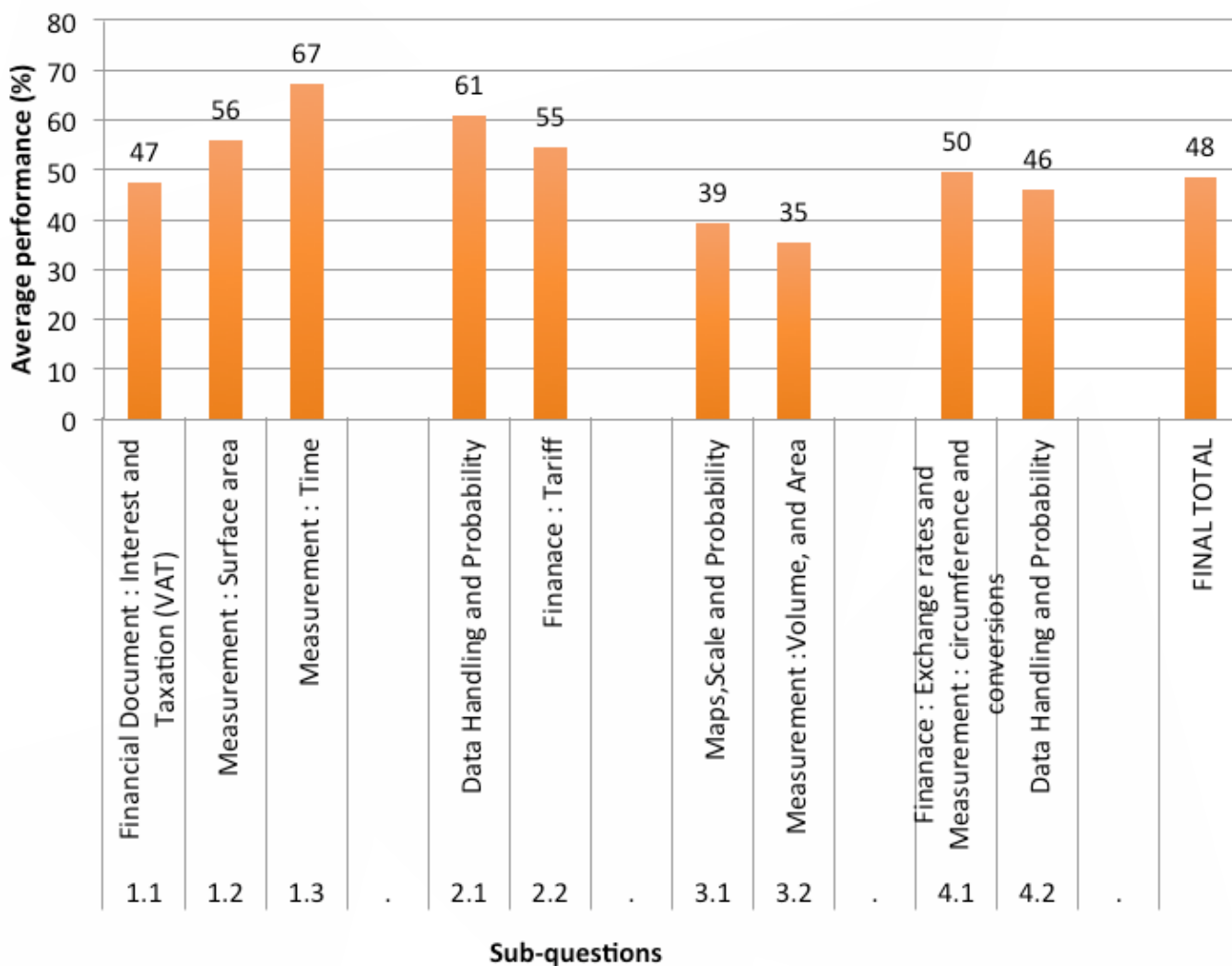
9.8 ANALYSIS OF LEARNER PERFORMANCE IN INDIVIDUAL QUESTIONS IN PAPER 2

QUESTION 1: QUOTATION; SURFACE AREA; COST; TIME

Common errors and misconceptions

a. (a) In Q1.1.1, some candidates could not use the discount and selling prices as fractions to determine the percentage.

b. (b) In Q1.1.2, some candidates took the Total Due and divided it by 1,14 to find the value, exclusive of VAT.

c. (c) In Q1.1.3, many candidates didn't know what 'smash and grab' film was because the context was unfamiliar to them.

d. In Q1.1.4, most candidates struggled to grasp the concept that there are three periods involved. They still opted to use the compound interest formula despite this not being allowed by CAPS.

e. In Q1.1.5, most candidates did not explain the mistake made by the dealer, when calculating the new selling price. However, they calculated the new selling price correctly.

f. In Q1.2.1, some candidates did not increase the surface area by 2%. Therefore, they were unable to calculate the correct number of litres of paint required. Candidates were unable to round in context e.g. Litres of paint sold in 5l required = $\frac{6,00421776}{0.25}$ = 24,0168710 ≈ 24l, whereas it should have been 25l.

g. In Q1.3, most candidates did not add the second 20 minutes for applying the second coat.

Suggestions for improvement

a. Teachers should emphasise different ways to calculate percentages.

b. Learners must be taught to spend more time on reading the correct values from a table/graph.

c. Learners must master substitution skills through regular practice. Learners should be made aware of not changing signs when a formula is given.

d. Learners must be exposed to activities which will require them to find errors across all the topics such as Finance, Measurement, etc.

e. Learners should be taught that one cannot buy paint in portions, but rather in tins.

f. Working with time scenarios and being able to add and subtract time, using hours and minutes and a combination of both must be taught.

g. Teachers should refrain from using the compound interest formula.

QUESTION 2:   DATA ANALYSIS; UBER TRAVEL COST

Common errors and misconceptions

a. In Q2.1.1, some candidates used incorrect data instead of the % change column. They swopped values and this led to a positive answer. They struggled to arrange negative and positive values that were mixed. Some arranged the negative numbers as follows: –1; –2; –5; –12 instead of –12; –5; –2; –1

b. In Q2.1.2, some candidates referred the trend as increase without referring to the product and the period.

c. In Q2.1.3, a few candidates could mention two different products but did not give the explanation to support the statement.

d. In Q 2.1.4, most candidates were not aware that the data could not be presented in one single pie chart.

e. In Q2.1.5, candidates were unable to plot negative values.

f. In Q2.2.1, the incorrect formula was used to calculate the value of B. Candidates also added all the cost values on the table for column UberLUX.

g. In Q2.2.2, candidates did not know when to multiply or to divide. In some cases, candidates wrote: $4,65 × $0,90 as opposed to $4,65/0,90.

h. In Q2.2.3, most candidates used 1,9 hours instead of 69 minutes.

i. In Q2.2.4, understanding a cancellation fee posed a challenge, as candidates lacked exposure to or experience of the Uber context.

Suggestions for improvement

a. Teachers should give learners sufficient exercises on how to substitute correct values from tables (correct columns) into a given formula.

b. Learners should be exposed to questions working with two or more formulae.

c. Teachers should reinforce questions where learners are required to decrease or increase values by a percentage.

d. Learners should be made aware of the impact that the choice of a sample has on the reliability of the data.

e. Teachers must expose learners to questions on the organisation and representation of data. Graphs with different scales should be assessed regularly to train learners to read values or plot the points on the grid.

f. Learners should be taught how a trend should be described.

QUESTION 3:   MAP ANALYSIS; MEASUREMENT; LAYOUT ANALYSIS

Common errors and misconceptions

a. In Q3.1.1, candidates could not identify the number of stations that only had only coke and water.

b. In Q3.1.2, some candidates were unable to give the correct direction and gave 'South' as their answer.

c. In Q3.1.3, candidates could not explain that the height is increasing from the start mark to 10 km. Some candidates could not identify the lowest and highest height. If they did, they could not simplify the ratio as 1: …

d. In Q3.1.4, although the explanation for cut-off times were given, candidates could not explain the reason for cut-off times.

e. In Q3.1.5, most candidates only gave one calculation and concluded without comparing the speed of the two runners.

f. In Q3.2.1, candidates failed to subtract the inner diameter. Some simply worked with 31,2 (the diameter) and not the radius. A further challenge posed by this question was the changing of the subject of the formula. Few learners could do this correctly.

g. In Q3.2.2, interpretation of the context of modelling and packaging proved to be beyond the grasp of many candidates.

h. In Q3.2.3, the length occupied by 4 buckets was not calculated. The formula for the percentage increase was not given.

Suggestions for improvement

a. Learners must be aware that especially in Paper 2, they may not always be provided with formulae.

b. Learners should be exposed to a variety of contexts when dealing with calculations of surface area, perimeter, volume and costs.

c. Teachers should emphasise the concepts of *radius*, *diameter* and other terms related to measurements. The difference between these terms should clearly be communicated and learnt.

d. Learners should be exposed to different methods of conversion to understand the concept of converting different units of measurement.

e. Teachers should expose learners to various formulae where the unknown is not necessarily the subject of the formula, e.g. finding the radius using the formula for calculating the volume of a cylinder.

QUESTION 4:   TICKET COSTS; CURRENCY CONVERSION; DATA ANALYSIS

Common errors and misconceptions

a. In Q4.1.1, candidates omitted the discount for online tickets. Some candidates divided instead of multiplied when converting to Rand.

b. In Q4.1.2, some candidates only divided by 3,28 and left their answer as is. The concept of rounding off to the nearest metre was ignored in some instances.

c. In Q4.2.1, candidates confused the number format in the final answer.

d. In Q4.2.2, some candidates did not add the total for East and West Midlands.

e. In Q4.2.3, most candidates incorrectly included the 2010 data instead of starting from 2011. This led to incorrect totals.

f. In Q4.2.4. the Inter Quartile Range question proved to be challenging as:

   *   The data was not arranged;

   *   The wrong set of data was used;

   *   The candidates could not identify the quartiles;

   *   The range was calculated.

g. In Q4.2.5, most candidates with a language barrier struggled to express their views in words.

h. In Q4.2.6, most candidates did not even attempt this question – many of those who tried, either got it wrong or scored a few marks. Two unknowns were a serious challenge as well as the *mean* concept.

Suggestions for improvement

a. Teachers should teach learners first to make sense of the information before attempting the questions.

b. Learners must be taught to look at how values are allocated, e.g. 115,3 thousand OR 115 300. Learners should not give answers in decimals.

c. Teachers should not just focus on the calculation of the mean with a normal data set. They should give learners more challenging sums regarding this topic.

d. Teachers should explain (and demonstrate with examples from past papers) the meaning of the word *hence* as it has been observed that some candidates did not link the previous question to the next one.

e. Learners should be trained to perform calculations involving ratios and emphasis should be placed on the following aspects:

   *   Convert between different forms of a ratio;

   *   Different formats for expressing ratios;

   *   Why no units are included in a ratio.

f. Teachers should encourage candidates to use the LOLT always during the lessons. Scenarios should be discussed and critically analysed during lessons to give learners the opportunity to think critically and develop analytical and problem-solving skills.

CHAPTER 10

MATHEMATICS

The following should be read in conjunction with the Mathematics question papers of the November 2018 Examinations.

10.1 PERFORMANCE TRENDS (2014–2018)

The number of candidates who wrote the Mathematics examination in 2018 decreased by 11 245 in comparison to that of 2017. The performance of the candidates in 2018 reflects a noticeable improvement at the 30% level from 51.9% in 2017 to 58,0% in 2018 and a fair improvement at the 40% level from 35.1% in 2017 to 37,1% in 2018. The performance at both these levels in 2018 represents the best performance recorded in the last five years.
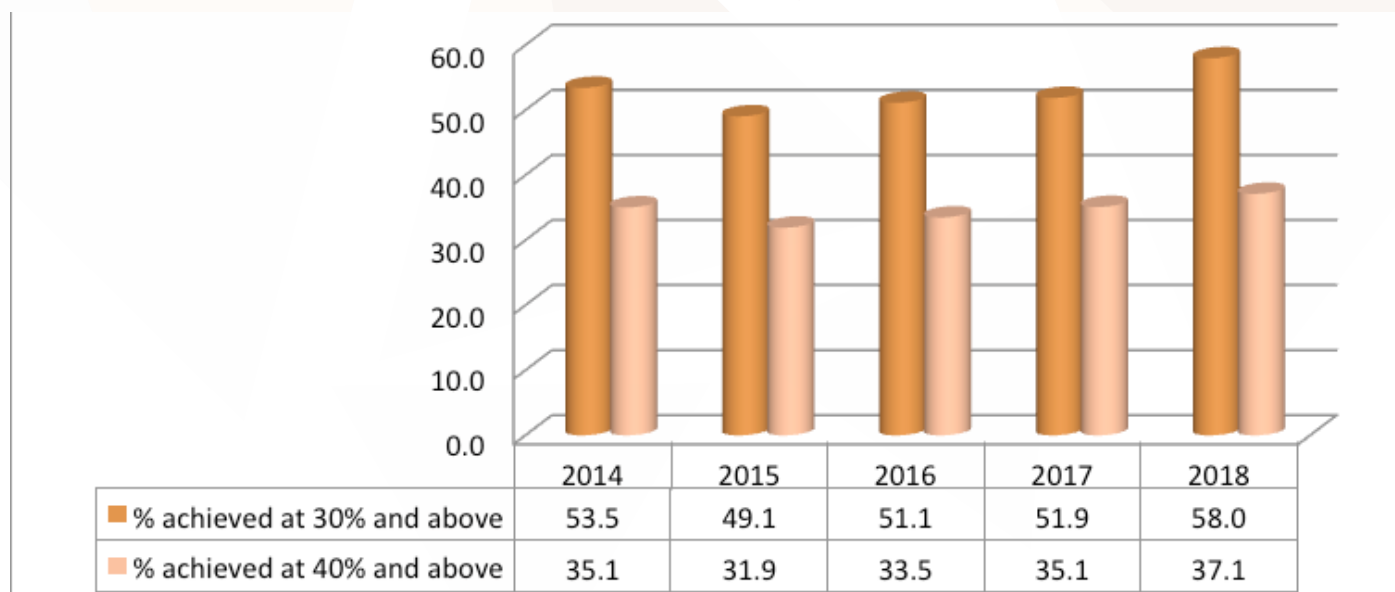
Table 10.1: Overall achievement rates In Mathematics

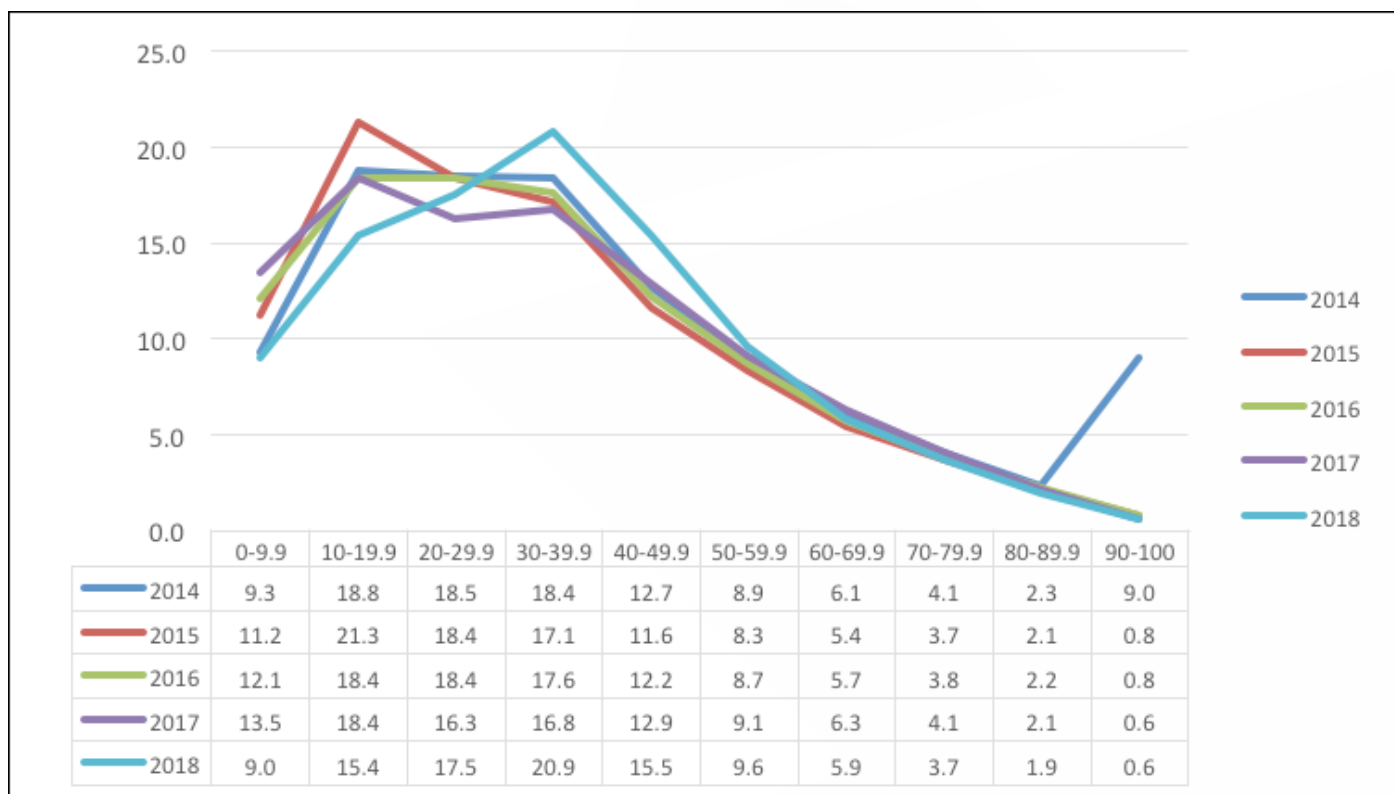| Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	225 458	120 523	53,5	79 050	35,1
2015	263 903	129 481	49,1	84 297	31,9
2016	265 912	136 011	51,1	89 119	33,5
2017	245 103	127 197	51,9	86 096	35,1
2018	233 858	135 638	58,0	86 874	37,1

There has been steady improvement in performance over the last few years, suggesting that there is now some degree of stability in the subject after the introduction of the CAPS curriculum. The increase in the number of candidates who answer the knowledge and routine questions correctly indicate that teachers and candidates are familiar with the manner in which the curriculum will be assessed and the degree of challenge expected in the examination. Also pleasing to note is the improved performance in answering routine questions in the new topics, namely, Probability and Euclidean Geometry.

Performance will be further enhanced if attention is given to the following areas: strengthening the content knowledge in Trigonometry and learners' exposure to complex and problem solving type questions. Learners need to be exposed to complex questions and problem solving across all topics in the curriculum. This should start in earlier grades.

Graph 10.1.1: Overall achievement rates in Mathematics (percentage)

	2014	2015	2016	2017	2018
% achieved at 30% and above	53.5	49.1	51.1	51.9	58.0
% achieved at 40% and above	35.1	31.9	33.5	35.1	37.1

Graph 10.1.2: Overall achievement rates In Mathematics (percentage)

|	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	9.3	18.8	18.5	18.4	12.7	8.9	6.1	4.1	2.3	9.0
2015	11.2	21.3	18.4	17.1	11.6	8.3	5.4	3.7	2.1	0.8
2016	12.1	18.4	18.4	17.6	12.2	8.7	5.7	3.8	2.2	0.8
2017	13.5	18.4	16.3	16.8	12.9	9.1	6.3	4.1	2.1	0.6
2018	9.0	15.4	17.5	20.9	15.5	9.6	5.9	3.7	1.9	0.6

10.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

a. It was evident, from the marking process, that many candidates were better prepared to answer the routine questions and scored some marks in the majority of the questions. This is very encouraging going forward.

b. The algebraic skills of the candidates are poor. Most candidates lacked fundamental and basic mathematical competencies which could have been acquired in the lower grades. This becomes an impediment to candidates answering complex questions correctly.

c. Whilst calculations and performing well-known routine procedures form the basis of answering questions in a Mathematics paper, deeper understanding of definitions and concepts should not be overlooked.

## 10.3 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 1

The following graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Figure 10.3.1 Average percentage performance per question for Paper 1
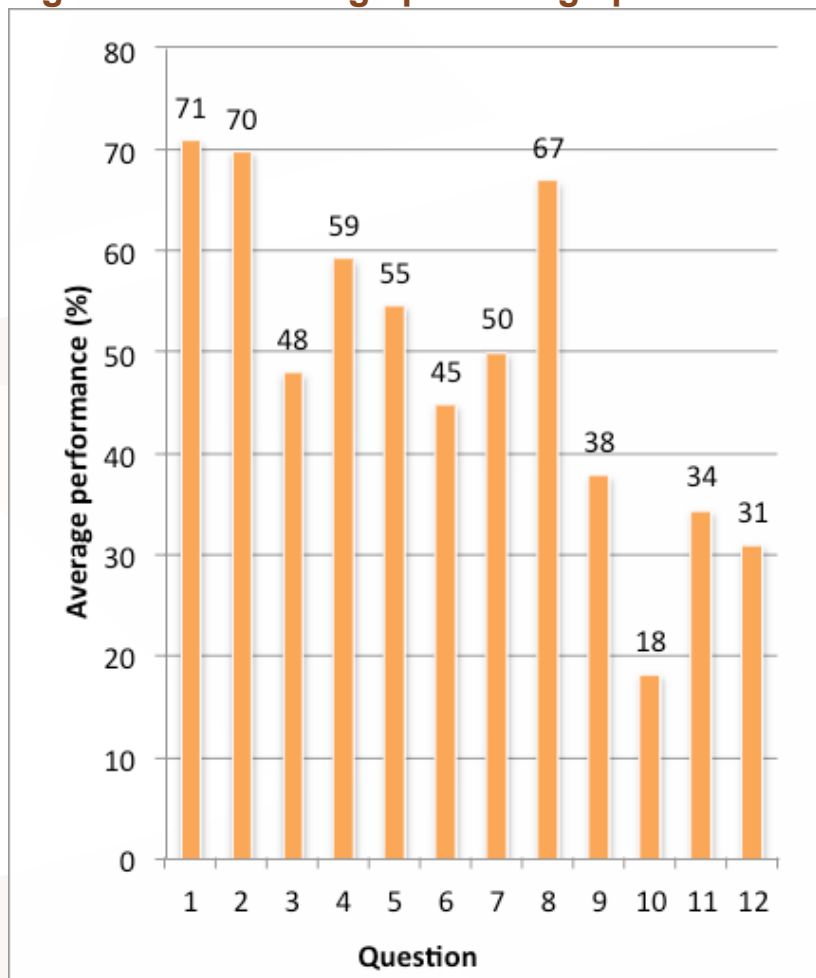
Q1	Equations, Inequalities and Algebraic Manipulation
Q2	Number Patterns & Sequences
Q3	Number Patterns & Sequences
Q4	Functions and Graphs
Q5	Functions and Graphs
Q6	Functions and Graphs
Q7	Finance
Q8	Calculus
Q9	Calculus
Q10	Calculus – Application in optimisation
Q11	Counting Principles
Q12	Probability

Figure 10.3.2 Average percentage performance per sub-question for Paper 1
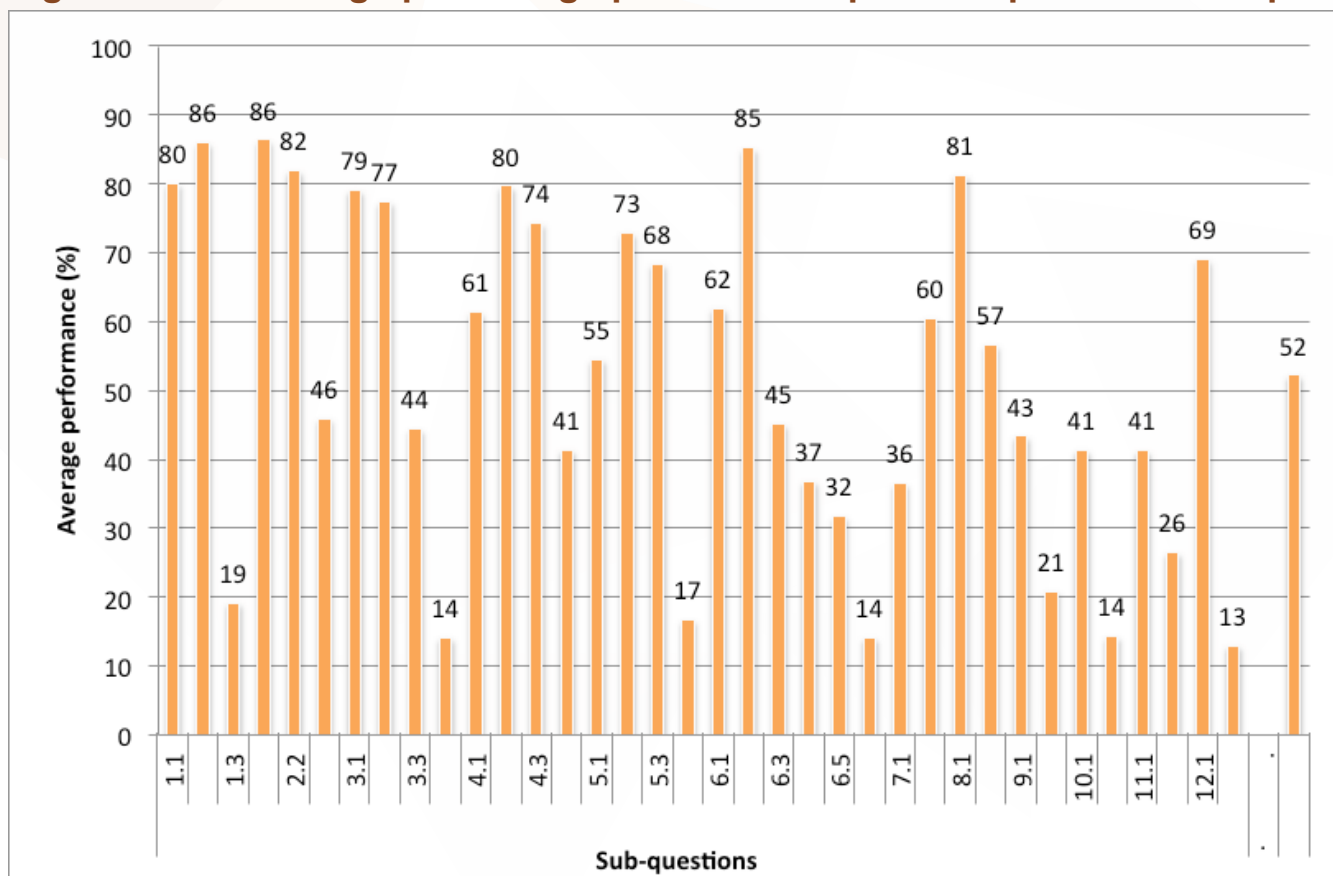
10.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: ALGEBRA

Common errors and misconceptions

a. In answering Q1.1.1, some candidates factorised the quadratic expression incorrectly, i.e. they factorised it as $(x+3)(x+1) = 0$ instead of $(x-3)(x-1) = 0$.

   Teachers need to emphasise the importance of the sign of the middle term in factorising quadratic equations. Some candidates made errors when writing down the solutions, e.g. $x - 1 = 0 \Rightarrow x = -1$.

b. Writing down the quadratic formula correctly and correct substitution therein remain problematic among some candidates. Some candidates wrote the quadratic formula incorrectly, e.g. $x = \dfrac{b \pm \sqrt{b^2 - 4ac}}{2a}$

   or $x = \dfrac{-b \pm \sqrt{b^2 + 4ac}}{2a}$ or $x = -b \pm \dfrac{\sqrt{b^2 + 4ac}}{2a}$ .Such candidates lost marks for an incorrect formula. Incorrect rounding still poses a challenge.

c. In Q1.1.3, many candidates were able to factorise the expression but could not solve the inequality. Many candidates treated the inequality in the same way that they treat an equation. They have the misconception that if $a.b > 0$, then $a > 0$ or $b > 0$. This led to them writing answers that did not make sense, e.g. $x > -2 \text{ or } x > 5$ or $-2 > x > 5$. Candidates also showed little or no understanding of the set builder or interval notation. Some candidates drew a parabola with all the correct information but were unable to write down the solution.

d. The use of the words and *or* are not understood.

e. Most candidates had some idea that they had to square both sides of the equation in Q1.1.4. However, they made several errors in doing so, e.g. $3x = x^2 - 8x + 16$ or $9x = x^2 + 16$. Some candidates incorrectly transposed the 3 to the RHS, i.e. they changed to . Very few candidates checked if the solutions obtained were valid in the original equation.

f. In Q1.2, some candidates wrote $-y = 2 - 3x$ and then substituted *y* with $2 - 3x$. Some candidates made mistakes in simplifying. A few candidates chose to make *x* the subject of the formula, i.e. $x = \dfrac{y + 2}{3}$. This made answering

   the question more complex and very few were able to correctly solve for *x* and *y*.

g. Candidates had very little idea on how to answer Q1.3. This question revealed that candidates lack conceptual understanding of the laws of exponents. Candidates were unable to use the given information to simplify $\dfrac{\left[3^{x-1}\right]^3}{\sqrt{5}^{\sqrt{p}}}$ without using a calculator.

Suggestions for improvement

a. Skills learnt in earlier grades should be revised from time to time. These skills are essential to solving many questions in Grade 12. Learners must be reminded to use the information sheet for the correct formula.

b. Whilst a calculator may provide learners with the answers to a question, it is imperative that the learners understand the background to these answers. Answers, on their own, are meaningless in the context of concepts.

c. Teachers should teach factorisation intensively. Writing a quadratic equation in standard form means to make the RHS of the equation equal to 0.

d. When dealing with surd equations, learners should be reminded that we need to square both sides of the equation in order to maintain the balance. We do not square the radical parts of the equation only. Teachers must emphasise that implicit restrictions are placed on surd equations and learners should continue to test whether their answers satisfy the original equation.

e. In teaching inequalities, integrate algebra with functions so that learners have a visual understanding of inequalities. Stress the meaning of the inequality signs in the teaching of both algebra and functions. Demonstrate different methods to solve inequality problems so that learners can choose the method they understand best.

f. Teachers should explain the difference between *and* and *or* in the context of inequalities. Learners cannot use these words interchangeably as they are very different in meaning.

g. Rounding off should be clearly understood by learners and rounding off instructions should be emphasised in class-based assessments. Teachers are advised not to condone errors due to rounding in school-based assessment tasks.

QUESTION 2:   PATTERNS

Common errors and misconceptions

a. Despite the question stating that the number pattern in Q2.1 was quadratic, some candidates treated the number pattern as linear. Their answer to Q2.1.1 was 36. These candidates then went on to calculate the answer to Q2.1.2 using $T_n = a + (n-1)d$, the n-th term formula for an arithmetic number pattern.

b. In calculating the value of b in Q2.1.2, some candidates used $2a + b = 1$ instead of $3a + b = 1$. There was confusion between the fact that the second difference of a quadratic number pattern is equal to $2a$ and the formula to calculate the value of b.

c. A few candidates assumed that T_n was 20 instead of n being 20. These candidates then attempted to calculate the value of n in Q2.1.3.

d. In Q2.2, some candidates made $n = -140$ instead of $T_n = -140$. Others equated T_n to zero. Many candidates wrote $T_n = 35 + (n-1) - 7$ instead of $T_n = 35 + (n-1)(-7)$. This poor notation often led to incorrect simplification and candidates arriving at the incorrect answer. Some candidates failed to change the sign when transposing a term across the equal sign.

e. Many candidates failed to read the question correctly and overlooked the fact that they needed to equate the sum of the first n terms of the arithmetic sequence to the n-th term of the quadratic sequence. Instead they equated the n-th term of the linear sequence to the n-th term of the quadratic sequence. Some candidates arrived at the correct answers but failed to reject $n = \dfrac{2}{13}$. Candidates who expanded both number patterns were confused about the answer as S_4 of the linear pattern was also equal to 98.

Suggestions for improvement

a. While teaching this section, teachers should emphasise the difference between the *position* and the *value* of a term in a sequence. Learners must be taught to read the questions carefully so that they do not confuse what is required of them. Remind learners that n cannot be a negative number, zero or a fraction.

b. Learners need to analyse the type of sequence they are working with and which formulae are applicable to it. Teach learners how to identify whether the question requires the learner to calculate the value of the n-th term or the sum of the first n terms.

QUESTION 3: PATTERNS

Common errors and misconceptions

a. Instead of using the sum to infinity formula in Q3.1, some candidates either used the S_n or T_n formula. Some candidates substituted correctly into the correct formula, but poor manipulation skills resulted in them arriving at a = 12 or a = –3 instead of a = 6.

b. In Q3.2, a fair number of candidates used the S_n formula instead of the T_n formula.

c. Q3.3 revealed that many candidates had difficulty in interpreting sigma notation. Many candidates used $r = 2$ instead of $r = \frac{1}{2}$. Some candidates displayed a lack of insight in simplifying exponential expressions, e.g. $3\left[1-\left(\frac{1}{2}\right)^n\right]=3\left[\frac{1}{2}\right]^n=\left(\frac{3}{2}\right)^n$.

d. Most of the candidates who attempted Q3.4 worked with an individual term in each series instead of working with the sum of the given series. Very few candidates had any idea of what was expected of them.

Suggestions for improvement

a. Attention needs to be paid to simplification and manipulation of expressions. Learners need to be made aware that a coefficient cannot be multiplied into an exponent, for example $3\left(\frac{1}{2}\right)^4 \neq \left(\frac{3}{2}\right)^4$.

b. Attention needs to be paid to the basics in number patterns. The concept of sum of terms needs to be explained. This topic is not merely about using a formula to obtain an answer, but it requires a deeper understanding of concepts.

c. Teachers need to clarify that sigma notation is a short-hand notation for the sum of a series of terms.

d. Expose learners to 'unseen' type questions where unfamiliar patterns are formed. Convince them that these are generally easy to solve.

e. Teachers should consult the array of different questions in sequences.

QUESTION 4: FUNCTIONS (INVERSE OF PARABOLA)

Common errors and misconceptions

a. In Q4.1, many candidates could not identify that f^{-1} was a function. They had very little idea of the concept of a function and which relations are functions.

b. In Q4.3, some candidates used the coordinates of R and not P to determine the value of a. They failed to realise that a is a variable in the function f and R is a point on f^{-1}. Poor simplification of exponents resulted in $\left(-6\right)^2 = -36$.

c. Many candidates gave an answer involving logs in Q4.4. To these candidates, the inverse of any function is a log function. In some instances, candidates displayed poor algebraic manipulation. From $x = -\frac{1}{3}y^2$, candidates wrote $y^2 = -\frac{1}{3}x$ or $y^2 = 3x$ instead of $y^2 = -3x$. Some candidates ignored the restriction on the original function and gave the final answer as $y = \pm\sqrt{-3x}$ instead of $y = -\sqrt{-3x}$.

Suggestions for improvement

a. Teachers should pay attention to the concepts and definitions when teaching functions and inverses.

b. Emphasis should be placed on the fact that the inverse of a function is the reflection of the original function about the line $y = x$.

c. Attention should be paid to the inverses of the linear function and the quadratic function and not only to the inverse of the exponential function.

d. In dealing with functions and inverses, learners should be exposed to instances where there is a restriction placed on the domain of the given function.

QUESTION 5:   FUNCTIONS (HYPERBOLA)

Common errors and misconceptions

a. Some candidates could not state the domain of the hyperbola. Candidates were unable to differentiate between $x \in R$ and $x \in R, x \neq 1$. Some candidates did not know the difference between the domain and the range and gave the answer in terms of y.

b. In Q5.2, some candidates wrote down $p = 1$ and $q = 0$. These candidates failed to realise that the asymptotes are straight lines and that the equations of the asymptotes are therefore the equations of a horizontal and vertical line. Therefore, the equations of the asymptotes should be of the form $x = \ldots$ and $y = \ldots$. Candidates also had difficulty in identifying the x-axis as the horizontal asymptote.

c. Some candidates used their calculators to establish points through which the graph should pass. However, they had very little idea of the shape of the hyperbola and randomly joined the points. Many candidates only drew one 'arm' of the hyperbola. Some candidates drew the asymptotes but drew graphs that were passing through the asymptotes. These candidates have very little knowledge of what an asymptote is.

d. Although a sketch was required in Q5.3, candidates failed to label critical points on the graph. They did not label the x and y intercepts as well as where the asymptotes passed the axes.

e. Very few candidates were aware that they had to use the graph to answer Q5.4. Candidates did not realise that $f'(x)$ represented the gradient of f. Many candidates attempted to solve this inequality algebraically. Not only did this waste a lot of time, but they did not arrive at the correct answer after much working.

Suggestions for improvement

a. Teachers should spend some time explaining exactly what is meant by the domain and range of a function. Teach learners how to determine the domain and range of a function from its equation and its graph.

b. In respect of the hyperbola and exponential function, learners should be taught how to identify the asymptotes from the equation and from the graph. The horizontal asymptote of these functions has the equation $y = q$.

c. Initially, learners should be encouraged to sketch graphs by using the point-by-point plotting method. However, the characteristics and features of each graph should be noted. After much practice, learners should be able to draw a sketch graph by only displaying the key features of the function.

d. When discussing how the different parameters affect a basic graph, teachers should link this to transformation. In this way, learners will develop a visual understanding of how each parameter affects the basic graph.

QUESTION 6:   FUNCTIONS (PARABOLA AND STRAIGHT LINE)

Common errors and misconceptions

a. Many candidates started Q6.1 by writing down the given equation $g(x) = x + 1$. Then they concluded that $m = 1$ and $c = 1$. Some candidates just wrote $m = 1$ without any calculation. These candidates failed to realise that they had to calculate the values of m and c from the graph.

b. In Q6.2, some candidates omitted the '= 0' from their solution. They were penalised for not making y = 0 in this question. Some candidates factorised incorrectly.

c. In answering Q6.3, many candidates calculated the y-intercept instead of the y-coordinate of the turning point. They then gave the range as $y \geq -3$ instead of $y \geq -4$. Poor or incorrect use of interval notation was observed in this question.

d. Very few candidates knew how to work with the vertical distance between the two graphs. When answering Q6.4.1, some candidates assumed that M is the reflection of C about the axis of symmetry. This resulted in the *x*-coordinate of M being –2. They then used this fact to state that OT = 2. This is not a valid solution. Other candidates assumed that OT = TA = 1 and then also concluded that the *x*-coordinate of M is –2. Again, this is not a valid solution. Given that the *x*-coordinate of M is –2, many candidates concluded that OT = –2. They failed to realise that the length of a line segment cannot be a negative value.

e. Candidates did not realise that they had to use $g(x) = x + 1$ to calculate the coordinates of N.

f. In Q6.5, many candidates calculated the derivative of *f*. They knew that the derivative is the gradient of the tangent. However, they then equated the derivative to 0 instead of 1.

g. Most candidates did not know what was expected as an answer in Q6.6. Very few candidates realised that the answer to Q6.6 was connected to the answer in Q6.5.

Suggestions for improvement

a. Learners need to be reminded that when they are required to 'prove that' or 'show that', they cannot use what is given to come to that conclusion.

b. Teachers should remind learners not to assume any information unless it is given. Learners must take note that diagrams are not drawn to scale.

c. The correct notation for intervals must be emphasised. This must be taught from Grade 10. Learners should be able to translate fluently from set builder notation to interval notation and vice-versa.

d. Learners need more exposure to questions that require interpretation of graphs.

e. When teaching graph interpretation, discuss aspects like calculating the distance between the two graphs for some value of *x*, points of intersection, whether two graphs will intersect or not, equations of tangents and the relationship between the roots of an equation and graphs.

QUESTION 7:   FINANCE

Common errors and misconceptions

a. In Q7.1.1, many candidates did not take into account that the compounding period was quarterly. They could not link *in three months' time* with quarters. Hence, they used incorrect values for i, r and n. Some candidates used the compound interest formula. They did not realise that there were recurring payments and therefore the future value annuity formula should apply.

b. Many candidates ignored the fact that the withdrawal of R100 000 will also affect the amount of interest earned over the four-year period. They merely subtracted R100 000 from the future value calculated in Q7.1.1.

c. In Q7.2.1, some candidates confused the value of *P* with the value of *x*. They substituted R1 500 000 for the value of *x* in the present value annuity formula and then attempted to calculate the value of *P*. Some candidates used *i* = 0,105 instead of $\frac{0,105}{12}$ and used *n* = 20 instead of 240.

d. In attempting to calculate the balance outstanding in Q7.2.2, some candidates used *n* = 144 in the present value annuity formula or they used *n* = 96 in the method of (loan +interest) – (payments + interest). Candidates could not differentiate between the number of payments outstanding and the number of payments already made and which value is applicable in which method.

Suggestions for improvement

a. Finance should be taught with more insight and not merely the substitution of values into a formula. In this regard, explaining each problem with aid of a timeline assists in creating a visual picture of what is transpiring in the problem.

b. Learners need deeper insight into the relevance of each of the formulae and under which circumstances it can be used. The variables in each formula must be explained. More practice in Financial Mathematics is necessary so that learners can distinguish between the different formulae.

c. Financial Mathematics requires two crucial skills which are often neglected by learners. These are reading skills and calculator skills. The learners must read the Financial Mathematics question very carefully and make sure that they understand what is asked. They need to be alert to certain key words that give an indication of which formula is applicable in the question. Calculator work is essential when doing financial maths and this should be practised

QUESTION 8:   CALCULUS

Common errors and misconceptions

a. In Q8.1, candidates made simplification or notational errors.

Many candidates made the following notational errors: $f(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ or $\lim_{h \to 0} = \frac{f(x+h) - f(x)}{h}$ or $\frac{\lim_{h \to 0} f(x+h) - f(x)}{h}$

Some candidates made the following notational error: instead of writing $2x$ as the answer. Some candidates left out the 5 when determining $f(x+h)$. Some candidates left out he brackets when determining $f(x+h) - f(x)$.

b. In Q8.2.1, a number of candidates gave the derivative of $3x^3$ as $6x^2$ instead of $9x^2$. Many candidates omitted the derivative of x from the answer. These candidates found the derivative of x to be 0 instead of 1.

c. In Q8.2.2, many candidates calculated the derivative of the RHS to be $2x^2 - 2x$. They failed to realise that they had to first factorise both sides, then determine an expression for y in terms of x and only then could they determine the derivative of y.

Suggestions for improvement

a. Emphasis should be placed on the use of correct notation when determining the derivative, either when using first principles or the rules.

b. Teachers should explain the need for use of brackets when determining the derivative from first principles. There is a difference between $\lim_{h \to 0}(2x + h)$ and $\lim_{h \to 0} 2x + h$. In the first instance we are determing the limit of the quantity within the brackets whilst in the second we are determining the limit of only $2x$. The answer to the first limit is $2x$ and the answer to the second limit is $2x + h$.

c. Teachers should explain the meaning of the notation $\frac{dy}{dx}$, namely it is the instruction to determine the derivative of y with respect to x. This should remind learners that y must be the subject of the formula of an expression in x before we can determine the derivative.

QUESTION 9:   CALCULUS (GRAPHICAL APPLICATION)

Common errors and misconceptions

a. In Q9.1.1, many candidates were unable to use the information given in the question. The majority used the x and y-intercepts to set up two equations and then attempted to solve these equations. This did not provide enough information to calculate the three unknowns. Many candidates did not understand the implication of a cubic function having a turning point on the x-axis, i.e. the function has a repeated root for this x-intercept.

b.   In Q9.1.2, some candidates did not equate the derivative to zero when calculating the *x*-coordinates of the turning points. Some candidates could solve $3x^2 + 2x - 16 = 0$ by using factorisation. Others could not calculate $g\left(-\frac{8}{3}\right)$ correctly.

c.   Many candidates were able to determine the second derivative and calculate the *x*-coordinate of the point of inflection but were unable to comment about the concavity at *x* = 0. This indicates that candidates have a limited understanding of the concept of concavity.

d.   In Q9.2, many candidates drew the graph of some cubic function having two turning points, passing the *y*-axis at 27 and passing the *x*-axis at 3. Candidates could not interpret the given information correctly, namely that *g* is concave up to the left of *x* = 3 and *g* is concave down to the right of *x* = 3. They also failed to interpret that the *g* had a point of inflection at *x* = 3.

Suggestions for improvement

a.   When teaching graphs of cubic functions, teachers should also include those that have one stationary point.

b.   The concept of concavity should be taught more thoroughly. Learners should be taught exactly what is meant by concave up and concave down. Learners should also be taught how to determine the concavity at a point using the second derivative. If a function is concave up on an interval, then $f''(x) > 0$ meaning positive (+ve) and if a function is concave down on an interval then $f''(x) < 0$ meaning negative (-ve).

c.   Expose learners to higher-order thinking questions and interpretation of graphs. Initially teachers should assist learners in understanding what is being asked, what it looks like on the picture and which *x*-values are relevant to the interval required in the solution.

QUESTION 10:   CALCULUS (OPTIMISATION APPLICATION)

Common errors and misconceptions

a.   In Q10.1, some candidates gave the answer as 2 : 3 instead of 3 : 2.

b.   Very few candidates attempted Q10.2. Most candidates were unable to determine the base and height of the parallelogram in terms of *t*. Some candidates worked with what was given, i.e. BC = (5 − *t*) and AG = *t*. Some candidates calculated the area of ΔABC but did not relate it to the area of the parallelogram DECF.

c.   Some candidates equated the expression of the area to zero instead of the expression of the derivative of the area to zero.

Suggestions for improvement

a.   Optimisation provides an ideal opportunity for the real-world application of Mathematics. Therefore, it is very likely that a question on optimisation will involve integration with other topics in Mathematics. Among others, it could involve measurement and Euclidean geometry.

b.   It is not possible for a teacher to cover every possible context in preparation for an examination. Teachers should therefore focus on the skills required for learners to successfully answer a question on optimisation.

c.   Teachers should ensure that there is enough time for learners to understand the application of Calculus fully.

QUESTION 11: COUNTING PRINCIPLES

Common errors and misconceptions

a. In Q11.1, some candidates could not understand the process of selecting digits for a code and the implication of digits being repeated in the code. Some gave the answer as 5^7 instead of 7^5. They confused the number of options with the number of digits. Some candidates did not count the number of digits correctly, i.e. from 3 to 9 is 7 digits. They used the number of digits as 9 in their calculations.

b. In Q11.1.2, some candidates applied the rule without real understanding. As a result, they gave an answer of 7! instead of 7 x 6 x 5 x 4 x 3.

c. In Q11.2, some candidates gave the answer as 2! x 7! X 1!. These candidates did not know the difference between the number of options and the number of different arrangements of the number of options. Some candidates misinterpreted 'the code is divisible by 5' to mean that the number of codes was divided by 5. Some ignored the fact that this code could only comprise 3 digits.

Suggestions for improvement

a. The section on the fundamental counting principle needs to be taught as clearly and simply as possible, using diagrams to explain scenarios. Choose practical scenarios to demonstrate the concepts of 'repetition is allowed' and 'repetition is not allowed'. Learners will then be able to relate to these concepts.

b. Teachers should refrain from teaching rules to different situations, rather aim at reasoning out the calculations are required to answer the question.

c. Teachers should only introduce factorial notation once learners have a good understanding of the fundamental counting principle.

QUESTION 12: PROBABILITY

Common errors and misconceptions

a. In Q12.1, some candidates confused mutually exclusive events with independent events. Some candidates had little idea of the notation and substituted P(A) with P(0,45). Some candidates used the formula P(A or B) = P(A) + P(B) – P(A and B) but did not realise that P(A and B) = 0. Consequently, they were unable to calculate the value of *y*. Some candidates rounded off the answer of 0,29 to 0,3 although there was no need to round off the answer.

b. In Q12.2, very few candidates were able to draw the tree diagram for dependent events. Some candidates attempted to use a formula without really understanding how it applied to the situation, e.g. P(A) x P(B) = P(A and B). Language was a barrier to answering this question.

Suggestions for improvement

a. When teaching Probability, emphasis should be placed on the understanding of the concepts like mutually exclusive events, independent events and complementary events.

b. The formulae in this section should not be an abstract idea. Teachers should explain these formulae in the context of Venn diagrams.

c. Tree diagrams are a useful tool to visualise compound events. Tree diagrams also assist learners in understanding the sequence of events. Teachers should make greater use of tree diagrams when dealing with questions that involve compound events. These should include independent events and dependent events.

10.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

a. Individual performance in the paper varied from very poor to excellent. However, there seems to be a slight improvement in the overall performance in this paper.

b. Candidates' performance improved in data handling and Euclidean geometry in 2018 compared to previous years.

c. Integration of topics is still a challenge to many candidates. Mathematics cannot be studied in compartments and it is expected that candidates must be able to apply knowledge from one section to another section of work.

d. It is evident that many of the errors made by candidates in answering this paper have their origins in a poor understanding of the basics and foundational competencies taught in the earlier grades.

e. Candidates struggled with concepts in the curriculum that required deeper conceptual understanding. Questions where candidates had to interpret information or provide justification, presented the greatest challenge.

f. In general, candidates need to exercise caution with algebraic manipulation skills since overlooking certain basic principles or practices results in the unnecessary loss of marks. Although the calculator is an effective and necessary tool in Mathematics, learners appear to believe that the calculator provides the answer to all their problems. Some candidates need to realise that conceptual development and algebraic manipulation are often impeded as a result of the dependence on the calculator.

g. Candidates need to read the questions with due diligence. By glossing over questions, candidates overlook critical information about the questions.

10.6 DIAGNOSTIC QUESTION ANALYSIS FOR PAPER 2

The following graph was based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Figure 10.6.1   Average percentage performance per question for Paper 2
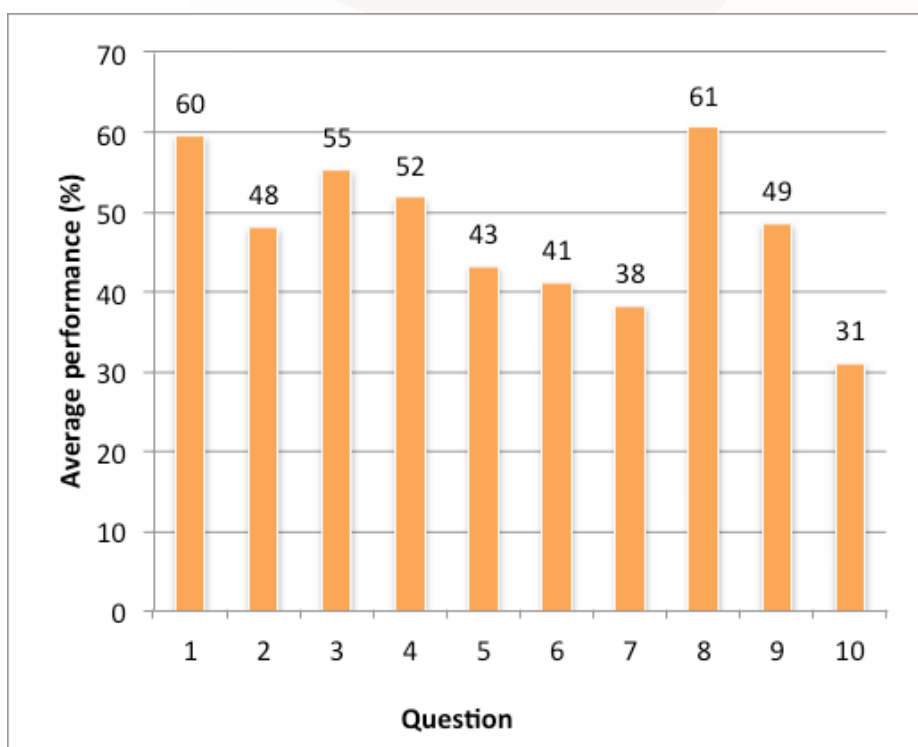
Q1	Data Handling
Q2	Data Handling
Q3	Analytical Geometry
Q4	Analytical Geometry
Q5	Trigonometry
Q6	Trigonometry
Q7	Trigonometry
Q8	Euclidean Geometry
Q9	Euclidean Geometry
Q10	Euclidean Geometry

Figure 10.6.2   Average percentage performance per sub-question for Paper 2

Figure 10.6.2   Average percentage performance per sub-question for Paper 2
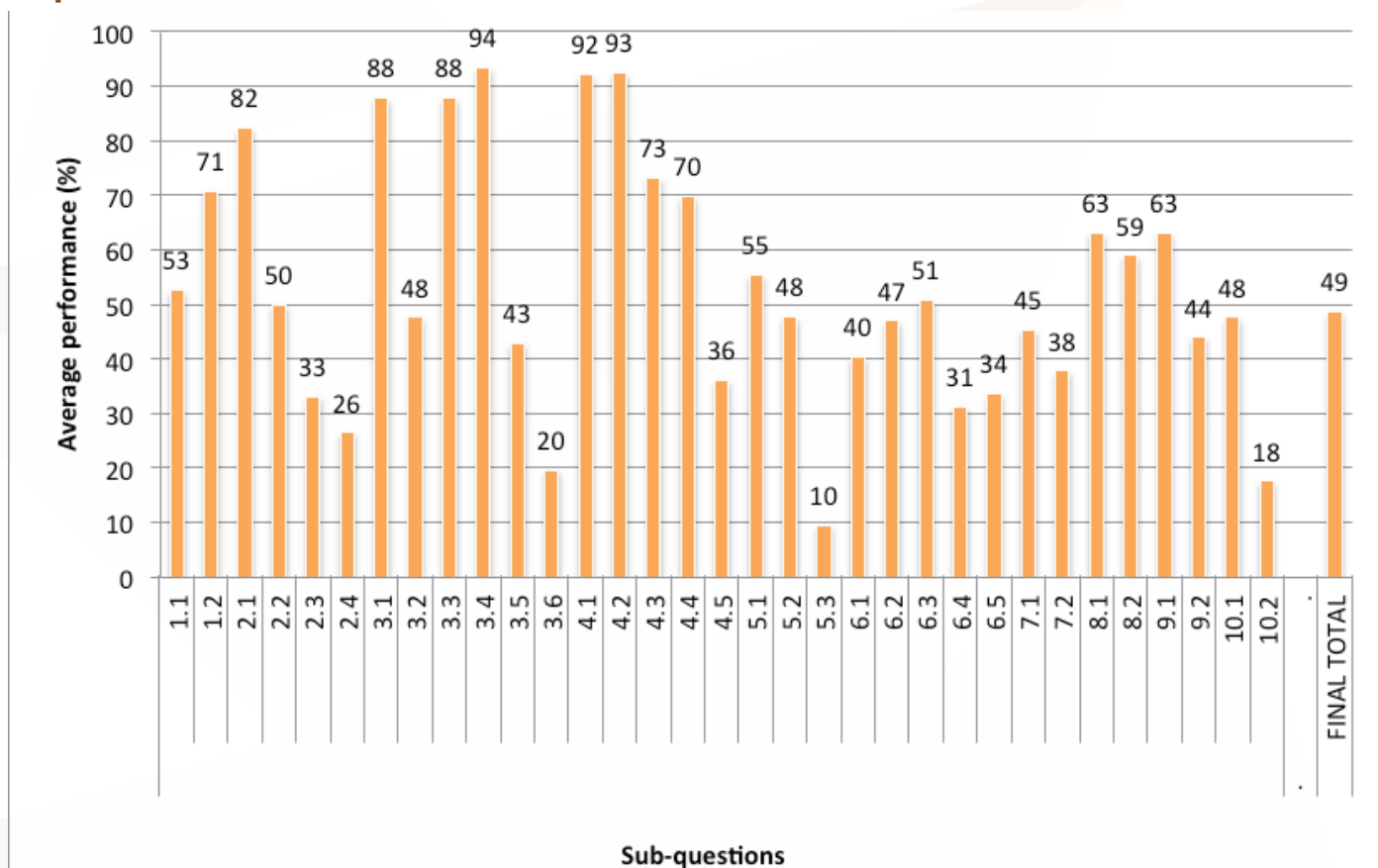
10.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1:   DATA HANDLING

Common errors and misconceptions

a. In Q1.1.2, candidates had difficulty in reading the modal class from the ogive as no frequency table was given. Candidates gave single point values as answers instead of an interval.

b. In answering Q1.1.4, many candidates read off the value of 126 correctly but did not subtract this from 140. Some candidates were not able to read off from the ogive.

c. In Q1.1.5, candidates did not realise that the 75th percentile was the same as the third quartile. Many candidates confused the position with the required value. They calculated the position to be 105 and did not do any further calculations.

d. Candidates did not use the ogive to calculate the first quartile in Q1.1.6. Again, many of them only calculated the position of the first quartile instead of its value. Some candidates did not know how to calculate the inter-quartile range. Many candidates wrote the answer as IQR $= \frac{3}{4}(n+1) - \frac{1}{2}(n+1)$.

e. Although Q1.2.1 was well answered, some candidates entered incorrect values into the calculator and others rounded off their answers incorrectly. Candidates could not distinguish between the s_x and s_x functions on the calculator.

f. Q1.2.2 was very poorly answered because candidates could not differentiate between variation and standard deviation. Many commented on the total amount of tips received rather than the variation in the tips received.

Suggestions for improvement

a. It is insufficient to teach just routine procedural calculations when teaching Data Handling and Statistics. Learners need to be exposed to interpreting the data and making conclusions based on their interpretation of the situation.

b. Learners should be given multiple opportunities to practice calculator skills. Learners need to be made aware that the operation procedure varies from one brand of calculator to the next. It is in their interest to use the same brand regularly.

c. Teachers should explain each definition or concept in detail. They should also use diagrams and pictures in explaining these concepts. Teachers should encourage learners to create a 'terminology' book. Learners should write down the definition or meaning of each concept in this book. Teachers should reinforce these definitions or concepts by asking learners to explain them each time the definition or concept is encountered in class.

d. For extended opportunities, learners should be able determine the five-number summary from the ogive and hence construct a box-and-whisker diagram for the data.

e. Teachers should bring real-life scenarios into the classroom for discussion, interpretation and evaluation.

QUESTION 2:   DATA HANDLING

Common errors and misconceptions

a. In Q2.1, some candidates incorrectly wrote 255 since it was the highest speed recorded.

b. In Q2.2.1, candidates had to choose which of the given correlation coefficients closely matched the given scatter plot. Many were at a loss in answering this question. Some just wrote positive correlation as the answer. In Q2.2.2, many candidates were unable to motivate their choice of answer in Q2.2.1. This suggests that candidates have no real visual understanding of correlation coefficient.

c. In answering Q2.3, candidates could not contextualise their response in relation to height and speed. The most common answer was that as the height increased, the speed increased. Some candidates resorted to a direct proportion response. These responses speak to the trend in the data rather than the association between the variables. A few candidates responded that height does not depend on speed. These candidates confused the independent variable with the dependent variable.

d. Q2.4 was very poorly answered as candidates could not relate the equation of the least squares line to the real-life context. Some candidates indicated that the line could not pass through zero with no further mention about the context.

Suggestions for improvement

a. Teachers should explain the different concepts that learners will encounter in this topic. Poor understanding of these terms is a contributing factor to learners' confusion.

b. Exposure to questions of an interpretive nature cannot be over-emphasised. This should form an integral part of the teaching and learning of this topic. Learners should be encouraged to answer different types of questions in data handling to improve their performance.

c. It is insufficient to calculate the equation of the least squares regression line and the value of the correlation coefficient. Learners must be able to interpret the calculated values. They must be able to estimate the value of the correlation coefficient from the scatterplot and vice versa. Likewise, learners must be able to estimate the gradient of the least squares regression line from the general trend in the data.

d. Teachers should encourage learners to verbalise their findings. This will assist learners in responding to questions in which they are required to provide explanations.

QUESTION 3:   ANALYTICAL GEOMETRY

Common errors and misconceptions

a. In Q3.1.1, some candidates were still unable to use the gradient formula correctly e.g. $m = \dfrac{x_2 - x_1}{y_2 - y_1}$ instead of $m = \dfrac{y_2 - y_1}{x_2 - x_1}$. Others made incorrect substitutions into the correct formula: they swapped the *x* and *y* values in the formula.

b. Whilst Q3.1.2 was answered very well, some candidates stopped after calculating the acute angle of $q = 56{,}31°$ or $\theta = -56{,}31°$.

c. In Q3.2, some candidates assumed that $K\hat{P}O = 45°$ and used this assumption to calculate the gradient of KL. Others assumed that the gradient was positive. Some even assumed that KL $\perp$ KN.

d. Although the gradient of the line required in Q3.3 was given in Q3.2, a fair number of candidates went about calculating the gradient again. This resulted in a waste of time. Some candidates used the gradient of KN instead of the gradient of KL.

e. Q3.5.1 and Q3.5.2 were very poorly answered since candidates assumed that P is the midpoint of KL. Some candidates used circular reasoning, i.e. they used the properties of a parallelogram even though this was not given. Candidates who used translation as a method of calculating the possible coordinates of L failed to realise that they also assumed that KLMN was a parallelogram.

f. In answering Q3.6, some candidates used the formula: area = $\dfrac{1}{2}$ base x height without recognising that the height was unknown in this triangle. As point T was not given in the diagram, many candidates made assumptions about the length of KT. Other candidates used the incorrect sides in the correct area formula.

Suggestions for improvement

a. Substitution into the formula remains a problem. Learners should first write down the coordinates and then substitute them into the formula.

b. Teachers should encourage learners to write down the values that they have already calculated (lengths, angles and gradients) on the diagram. This will assist learners in answering follow-up questions.

c. To answer questions in analytical geometry well, learners should master the properties of quadrilaterals and triangles.

d. Teachers should first revise work done in earlier grades in a specific topic before starting with the same topic at Grade 12 level.

e. Learners should be encouraged to show all the steps in the working. Continual practice should remedy the basic errors that learners make.

f. Learners should refrain from making assumptions about features in a question. These need to be proved first before the results can be used in an answer.

g. The different topics in Mathematics should be integrated. Learners must be able to establish the connection between Euclidean geometry and Analytical geometry.

QUESTION 4: ANALYTICAL GEOMETRY

Common errors and misconceptions

a. In Q4.2, some candidates substituted incorrectly, e.g. $\sqrt{(6+3)^2+(5+1)^2}$. Those who substituted correctly went on to perform incorrect calculations, e.g. $\sqrt{(6-3)^2+(5-1)^2} = \sqrt{3+4} = \sqrt{7}$.

b. In Q4.4, candidates were unable to state the theorem correctly. Some used the word 'line' in the reason instead of 'tangent'.

c. In answering Q4.5.1, many candidates did not indicate that $F\hat{H}J$ was right angled and proceeded to apply the Theorem of Pythagoras to ΔFHJ. Given that FH : GH = 1 : 2, some candidates assumed that FH = 1 unit.

d. Some candidates could not write down the equation of the circle correctly. They wrote the equation as $(x+m)^2+(y+n)^2 = 100$ instead of $(x-m)^2+(y-n)^2 = 100$. Others were confused as to whether they should use r or r^2 in the equation of the circle.

e. In Q4.5.3, many candidates simply substituted x = 22 into $(x-m)^2+(y-n)^2 = 100$. This led to a breakdown. Some tried to use translation to obtain the coordinates of G. Many candidates failed to realise that G and K lie in the same horizontal plane.

Suggestions for improvement

a. Teachers should encourage learners to identify the centre and the radius of a circle in the form $(x-a)^2+(y-b)^2 = r^2$ They should use the following to establish the coordinates of the centre: . Therefore the coordinates of the centre $\begin{matrix} x-a=0 \\ x=a \end{matrix}$ and $\begin{matrix} y-b=0 \\ y=b \end{matrix}$ are (a ; b).

b. Teachers need to revise the concept of perpendicular lines and gradients, in particular that the tangent is perpendicular to the radius at the point of contact.

c. Teachers are encouraged to use the list of acceptable statements for theorems that are published in the *Examination Guidelines*.

d. Learners must be taught to refrain from assuming facts that are not given. The Theorem of Pythagoras can only be applied to a right-angled triangle. If no right-angle is given, learners must first prove that the triangle is right angled.

e. Teachers should ensure that they expose learners to assessments that integrate Analytical geometry and Euclidean geometry. Learners must also be exposed to higher order questions in class and in school-based assessment tasks.

QUESTION 5: TRIGONOMETRY

Common errors and misconceptions

a. In Q5.1.1, candidates failed to realise that point P was in the second quadrant. They calculated the value of *k* as 2 instead of –2. Other candidates did not calculate the square root of 4.

b. Candidates showed lack of knowledge of reduction formula when answering Q5.1.2(a). Many did not recall that the cosine ratio is negative for an angle in the third quadrant. Some candidates did not know the difference between an angle and the value of the trigonometric ratio, e.g. $-\cos\theta = -\cos\left(-\dfrac{2}{\sqrt{5}}\right)$. Some candidates attempted to answer this question by using the compound angle formula for cos(A + B). However, after expanding they did not know what to do next.

c. Some candidates were unable to write down the expansion for sin(A + B) correctly despite the expansion being given on the information sheet.

d. Many candidates used compound angle expansions to answer Q5.1.2(c) instead of using the calculator as instructed in the question. This resulted in a loss of time. Some candidates applied the distributive law to eliminate the brackets: $\tan(2\theta - 40^\circ) = \tan 2\theta - \tan 40^\circ$. Other candidates used $q = 26,57^\circ$ instead of $q = 153,43^\circ$.

e. Poor algebraic skills were evident in the answers to Q5.2. Most candidates found the LCD but were unable to simplify the fraction correctly thereafter. The most common simplification errors were that candidates were unable to square a binomial correctly and that they failed to take into account the negative in between the fractions in the original question. Others omitted the LCD in subsequent steps.

f. Q5.3 was very poorly answered by most candidates with many not attempting it at all. Some only showed the expansion for the first three terms and were unable to see the pattern. Those who expanded the sum completely, went on the apply either the arithmetic of geometric sum formulae. Many candidates failed to see the co-functions in the expansion, i.e. $\cos^2 52^\circ = \sin^2 38^\circ$.

Suggestions for improvement

a. Learners must take cognisance of the instructions in the question. When a question states 'without using a calculator', it is expected that learners should use other methods that do not require the use of a calculator . If they ignore this instruction, then they will be penalised.

b. Learners need to learn the reduction formulae and know which formula to use in the given situation. They must take cognisance of the quadrants when determining the signs of trigonometric ratios.

c. Teachers should advise learners to show all steps when working with reduction formulae. Marks are not awarded to candidates who make errors with the signs.

d. Learners should master fundamental algebraic manipulation. These skills are integral in simplifying trigonometric expressions.

e. Learners need exposure on the simplification of expressions containing double and compound angles. Examples should include variables for angles as well as specific angle values. Learners need to be encouraged to use brackets, especially when there is a difference of two trigonometric ratios containing compound angles.

f. Teachers should ensure that learners are revising the Grade 11 Trigonometry regularly in the Grade 12 year.

QUESTION 6:   TRIGONOMETRY

Common errors and misconceptions

a. In Q6.1, many candidates gave the answer as 180°, the period of the graph of $y = \tan x$. They were unable to establish the effect that the co-efficient of $\frac{3}{2}$ had on the graph.

b. In Q6.2, some candidates were able to establish the equation but were unable to solve it. They attempted to simplify the equation by dividing both sides by $\frac{3}{2}$. This was incorrect. Other candidates were able to calculate the reference angle but were unable to calculate the size of t in the different quadrants. Candidates also did not provide the general solution as required. Some candidates obtained the correct solutions in the different quadrants but did not divide the general solution part by $\frac{3}{2}$. Their solution would read: $t = 90^\circ + k.180^\circ; k \in Z$, which was incorrect.

c. Candidates had difficulty in establishing the shape of the negative tan graph. They had little idea how the other parameters changed the graph.

d. Many candidates were unable to answer Q6.4 because they either did not draw the graph in Q6.3 or they drew the graph incorrectly. Some candidates tried to solve a trigonometric inequality as shown below.

$$-2\tan\frac{3}{2}x > 2$$

$$\tan\frac{3}{2}x > -1$$

$$\frac{3}{2}x > 45^\circ$$

$$x = 90^\circ$$

e. In Q6.5, most candidates indicated that the graph was translated 60°.

Suggestions for improvement

a. When teaching trigonometric graphs, teachers should start first with the original graphs: $y = \sin x$, $y = \cos x$ and $y = \tan x$ using point by point plotting and identify important features of these graphs. Then they should introduce the parameters a, p and q as well as their effects. Also highlight how the graph changes shape when a is a negative value.

b. It is common practice for learners to use calculators to sketch graphs. Hence, they do not pay attention to certain critical features of these graphs. Although learners are expected to produce a sketch graph, there is still a high degree of accuracy required of them.

c. Teachers should provide learners with exercises where they draw graphs and also translate and reflect these graphs. Learners should also be exposed to exercises in which they have to interpret graphs and read of solutions from the graphs.

d. When discussing the transformation of trigonometric graphs, learners must be alerted to how the critical features and characteristics of the basic graph change for each transformation. In this way, they will be able to visualise the effect of a, p, q and k on the basic function.

e. Teachers must pay careful attention when dealing with horizontal translations of trigonometric graphs.

QUESTION 7:   TRIGONOMETRY

Common errors and misconceptions

a. In Q7.1, candidates failed to make the link between the angle of elevation and the angle of depression. Hence, they failed to establish that $A\hat{B}D = 30^\circ$. Some candidates wrote down incorrect ratios, e.g. $\cos 2x = \dfrac{h}{AB}$. Some candidates attempted to use the Theorem of Pythagoras. Others assumed that $B\hat{A}D = x$. Some candidates stated that AB = 3h – h = 2h.

b. In Q7.2, many candidates correctly used the cosine formula but failed to make the double angle substitution thereafter. Some candidates failed write down the cosine formula correctly, i.e. they left out the squares. Few candidates made an incorrect substitution into the cosine formula, e.g. $3h^2$ instead of $(3h)^2$. Other candidates used the sides of incorrect triangles, e.g. ΔBDC instead of ΔABC which did not lead them to the solution. Candidates demonstrated poor algebraic manipulation skills when squaring terms and removing brackets.

Suggestions for improvement

a. Teachers need to develop strategies to be used when solving right-angled triangles and triangles that are not right-angled. Teach learners the conditions that decide which rule should be used to solve the question.

b. Learners must refer to the formula sheet to ensure that formulae are copied correctly.

c. In Grades 10 and 11, learners should be exposed to problems that involve a combination of shapes in 2-D. This should develop the skill of identifying common sides and angles in composite shapes.

d. It is also useful for learners to draw 3-D shapes. This will give them the opportunity to understand the different perspectives involved.

e. Learners should be encouraged to highlight the different triangles using different colours. This would allow them to identify the common sides and angles.

f. Teachers should show learners how to deconstruct composite shapes into several triangles.

g. Initially, expose learners to numeric questions on solving 3-D problems. This makes it easier for learners to develop strategies on how to solve such questions. Once learners have gained confidence with numeric type questions, they should then be exposed to non-numeric and higher order questions.

QUESTION 8:   EUCLIDEAN GEOMETRY

Common errors and misconceptions

a. In Q8.1.1 to Q8.1.4, candidates either lost marks for incorrect or incomplete reasons or for naming angles incorrectly. In Q8.1.2, some candidates failed to identify the angle in the semi-circle. Candidates failed to mention which lines are parallel when the corresponding angles are equal.

b. Many candidates were unable to answer Q8.1.5 correctly. They made the following assumptions: $\hat{R} + \hat{N} = 90^{\circ}$, $\hat{N}_2 = \hat{M}_1 = 66^{\circ}$ with the reason: tan-chord theorem or $\hat{M}_2 = \hat{R}$ with the reason: angles in the same segment. These led to breakdowns in the answer. Many candidates did not recognise that RON was an isosceles triangle.

c. In Q8.2.1, many candidates gave the reason as proportional intercept theorem or midpoint theorem instead of the opposite sides of a rectangle are parallel. These candidates did not recognise that ABCD was a rectangle.

d. In answering Q8.2.2, some candidates assumed that AGH was an isosceles triangle. Some candidates knew that they had to use the proportional intercept theorem but got confused when writing the proportion and wrote $\frac{20}{15} = \frac{DM}{21}$ instead. Other candidates did not write down the reason. Some got to the point of showing that AC = 28 but could not use the properties of a rectangle to conclude that DM = 14.

Suggestions for improvement

1. Learners must not make any assumptions about the diagrams as these are not drawn to scale.

2. Learners should be encouraged to scrutinise the given information and the diagram for clues about which theorems could be used in answering the question.

3. Teachers must cover the basic work thoroughly. An explanation of the theorem should be accompanied by showing the relationship in a diagram.

4. Learners are encouraged to use the list of reasons provided in the Examination Guidelines.

5. Teachers need to insist that learners name the angles correctly. The fact that learners are naming angles incorrectly at Grade 12 level indicates that this issue has not been dealt with effectively in earlier grades.

6. Learners should be taught that all statements must be accompanied by reasons. It is essential that the parallel lines be mentioned when stating that corresponding angles are equal, alternate angles are equal, the sum of the co-interior angles is 180° or when stating the proportional intercept theorem.

QUESTION 9:   EUCLIDEAN GEOMETRY

Common errors and misconceptions

a. In Q9.1, many candidates did not write down or show the construction on the diagram whilst some constructed the lines but did not label the angles as $\hat{O}_1$ and $\hat{O}_2$. However, these candidates went on to refer to $\hat{O}_1$ and $\hat{O}_2$ in their proof. This constituted a breakdown. Some candidates stated that $\hat{J} = 2\hat{O}_1$ and $\hat{L} = 2\hat{O}_2$ instead of $2\hat{J} = \hat{O}_1$ and $2\hat{L} = \hat{O}_2$.

b. In Q9.2.1, some candidates did not name the angles correctly, e.g. $\hat{B}$ instead of $\hat{B}_2$. Other candidates did not provide reasons for statements. Candidates were unable to identify that BDRT was a cyclic quadrilateral.

c. It was not given that SCBD was a cyclic quadrilateral. However, some candidates used the properties of a cyclic quadrilateral in answering Q9.2.2. Candidates showed little understanding of the difference between a *theorem* and its *converse*. They used the reason 'exterior angle of a cyclic quadrilateral' when proving that SCDB is a cyclic quadrilateral. Instead the reason should have been 'converse exterior angle of cyclic quadrilateral'.

d. In Q9.2.3, candidates failed to show that $\hat{B}_1 + \hat{B}_2 \neq 90^0$ and therefore SD could not be a diameter. Some assumed that $\hat{B} = 90°$. Others indicated that $\hat{C} = 70^0 \neq 90^0$ without realising that C is not part of the circle passing through BDS.

Suggestions for improvement

a. Analyse the given information to identify which theorems can be used.

b. Learners should be taught that all statements must be accompanied by reasons.

c. Learners should be discouraged from writing correct statements that are not related to the solution. No marks are awarded for statements that do not lead to solving the question.

d. Learners should be taught to use acceptable reasons in Euclidean geometry. Teachers should explain the difference between a theorem and its converse. They should also explain the conditions for which theorems are applicable and when the converse will apply.

e. Learners need to be advised that success in answering Euclidean geometry comes from regular practice, starting off with the easy and progressing to the difficult.

QUESTION 10:   EUCLIDEAN GEOMETRY

Common errors and misconceptions

a. Some candidates could not provide the correct reasons in Q10.1.1. They also made several irrelevant statements. Many failed to state that $\hat{A}_1 = 90° \square x$ or that $\hat{A}_1 = \hat{A}_2$. These statements were crucial in solving this problem. Some candidates assumed that MC was a tangent.

b. In Q10.1.2, candidates proved the two triangles congruent instead of proving them similar. Some candidates did not name the angles correctly, e.g. $\hat{A} = \hat{C}$ instead of $\hat{A}_2 = \hat{C}_2$.

c. In Q10.2.1, some candidates started with the given statement but found it difficult to complete the solution. Others proved that several pairs of triangles were congruent, but this did not lead to the solution. A few candidates resorted to using the Theorem of Pythagoras. Some used the similar triangles but did not write down the correct ratios.

d. Many candidates could not make the link with Trigonometry to solve Q10.2.2. Majority of the candidates had no idea where to start.

Suggestions for improvement

a. More time needs to be spent on the teaching of Euclidean geometry in all grades.

b. Learners need to be told that there is no short-cut to mastering the skills required in answering questions on Euclidean geometry. This requires continuous and deliberate practice.

c. Learners need to be made aware that writing correct, but irrelevant, statements will not earn them any marks in an examination. Learners must refrain from making assumptions.

d. Learners need to be exposed to questions in Euclidean geometry that integrates Trigonometry.

CHAPTER 11

PHYSICAL SCIENCES

The following report should be read in conjunction with the Physical Sciences question papers of the November 2018 examinations.

11.1 PERFORMANCE TRENDS (2014–2018)

The number of candidates who wrote the Physical Sciences examination in 2018 decreased by 7 242 in comparison to that of 2017. The performance of the candidates in 2018 reflects a tremendous improvement at the 30% level to 74,2% and at the 40% level to 48,7%.
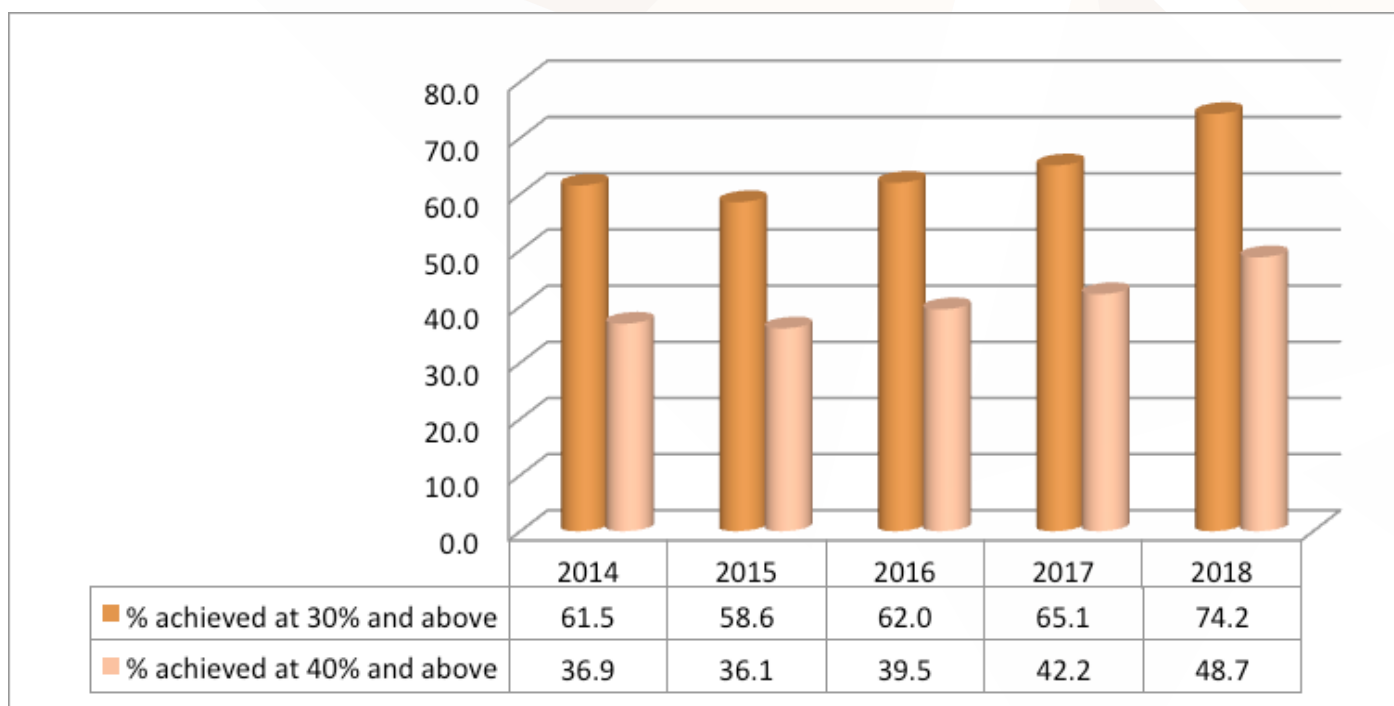
Table 11.1.1 Overall Achievement Rates in Physical Sciences

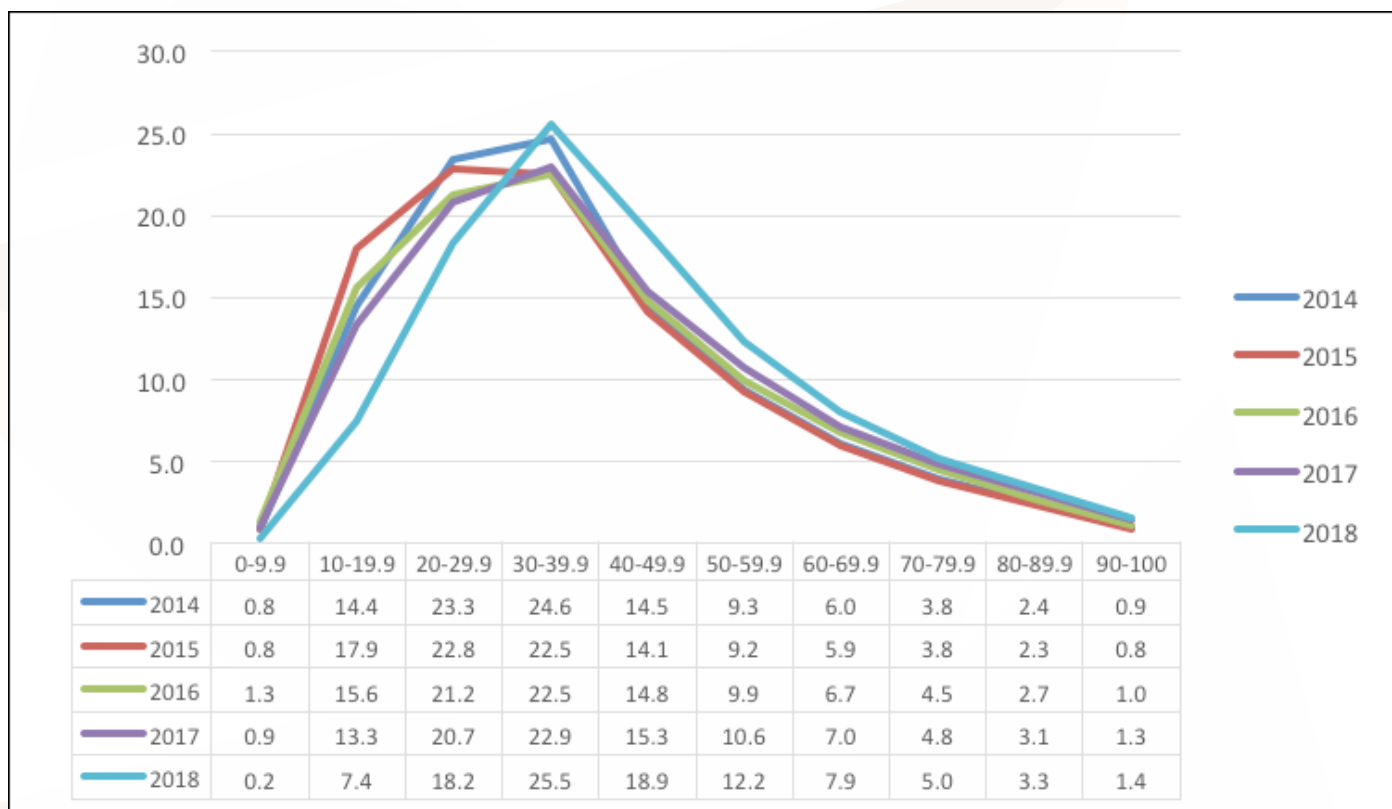| Year	No. wrote	No. achieved at 30% and above	% achieved at 30% and above	No. achieved at 40% and above	% achieved at 40% and above
2014	167 997	103 348	61,5	62 032	36,9
2015	193 189	113 121	58,6	69 699	36,1
2016	192 710	119 467	62,0	76068	39,5
2017	179 561	116 862	65,1	75 736	42,2
2018	172 319	127 919	74,2	84 002	48,7

The tremendous improvement in the performance of candidates in 2018 can be attributed to the stability in the curriculum and both teachers and candidates becoming familiar with the assessment style of the subject.

However, there is still room for improvement in the performance of the candidates if the challenges surrounding problem-solving skills, mathematical skills, conceptual understanding and integration of topics are addressed. In this regard, integrated problem solving must become an integral part of teaching and learning.

Graph 11.1.1 Overall Achievement Rates in Physical Sciences (Percentage)

	2014	2015	2016	2017	2018
% achieved at 30% and above	61.5	58.6	62.0	65.1	74.2
% achieved at 40% and above	36.9	36.1	39.5	42.2	48.7

Graph 11.1.2 Performance Distribution Curves in Physical Sciences (Percentage)

	0-9.9	10-19.9	20-29.9	30-39.9	40-49.9	50-59.9	60-69.9	70-79.9	80-89.9	90-100
2014	0.8	14.4	23.3	24.6	14.5	9.3	6.0	3.8	2.4	0.9
2015	0.8	17.9	22.8	22.5	14.1	9.2	5.9	3.8	2.3	0.8
2016	1.3	15.6	21.2	22.5	14.8	9.9	6.7	4.5	2.7	1.0
2017	0.9	13.3	20.7	22.9	15.3	10.6	7.0	4.8	3.1	1.3
2018	0.2	7.4	18.2	25.5	18.9	12.2	7.9	5.0	3.3	1.4

11.2 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 1

General Comments

a. The multiple-choice questions (Q1) and questions on Newton's Laws of Motion, Vertical Projectile Motion and Electrodynamics (Q2, Q3 and Q10) were generally well answered.

b. Grade 11 work is poorly understood. Grade 11 work should be included in classwork, homework and tests in Grade 12.

c. Questions pertaining to pure recall of content were very poorly answered. Teachers are advised to use many short informal assessment tasks to reinforce basic concepts and principles, e.g. short speed tests (± 10 minutes). This can be used to good effect in content relating to definitions and laws listed in the *CAPS* and the examination guideline.

d. Learners are still struggling with drawing and labelling free-body diagrams correctly. The drawing of free-body diagrams is central to solving problems involving forces acting on objects and teachers should therefore ensure that learners are able to draw free-body diagrams for such problems in classwork, homework and tests.

e. Interpretation of graphs is a challenge for many learners. Problem-solving exercises that involve graphs should be done in a variety of topics. Identification of the variables in relation to the equation describing the graph should be stressed. The scale of graphs, gradient, ordered-pairs and *x* and *y*-intercepts need to be emphasised within problem-solving in science contexts.

f. Some learners still cannot work with scientific formulae correctly. Teachers should emphasise the use of the relevant formula provided on the formula sheet, correct substitution and providing the answer with the correct unit and direction if required.

g. The application of mathematical principles is still a challenge for many learners. Learners should be given a variety of problem-solving activities that involve mathematical knowledge pertaining to simultaneous equations, quadratic equations, binomials, factorisation, trigonometry and graphs in classwork, homework, tests and examinations.

h. Problem-solving activities where different knowledge areas are integrated should be given to learners.

i. Teachers should include at least two conceptual questions on all topics in Physics in classwork and homework exercises each week. This will assist learners to have a deeper understanding of Physics concepts.

11.3 DIAGNOSTIC QUESTION ANALYSIS OF PAPER 1

The following graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Graph 11.3.1 Average Marks per Question Expressed as a Percentage: Paper 1
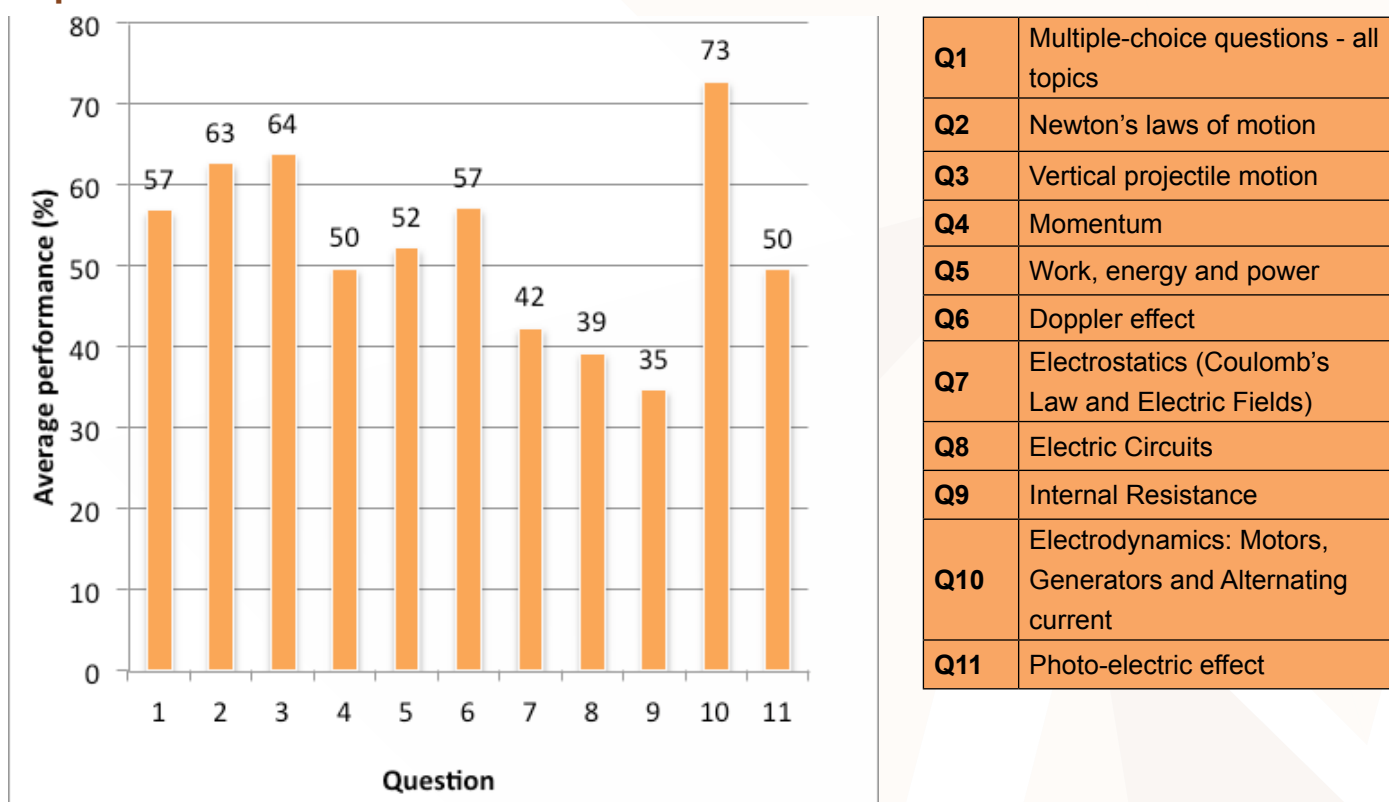
Q1	Multiple-choice questions - all topics
Q2	Newton's laws of motion
Q3	Vertical projectile motion
Q4	Momentum
Q5	Work, energy and power
Q6	Doppler effect
Q7	Electrostatics (Coulomb's Law and Electric Fields)
Q8	Electric Circuits
Q9	Internal Resistance
Q10	Electrodynamics: Motors, Generators and Alternating current
Q11	Photo-electric effect

There was an improvement in performance in the multiple-choice questions (Q1) and in three topics, viz. Newton's Laws of Motion (Q2), Vertical Projectile Motion (Q3) and Electrodynamics (Q10) when compared to 2017.

Graph 11.3.2 Average Marks per Subquestion Expressed as a Percentage: Paper 1
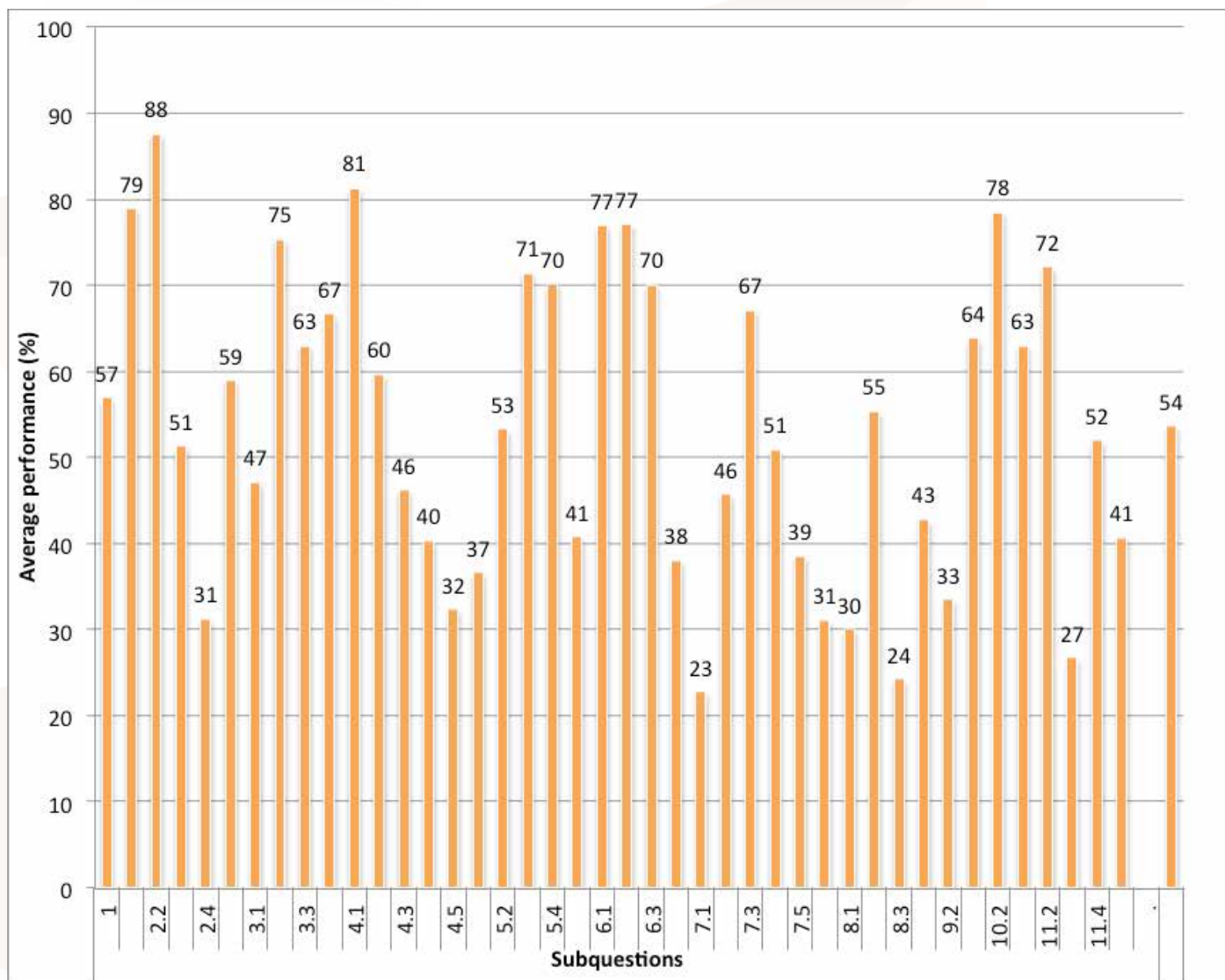
11.4 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 1

QUESTION 1: MULTIPLE CHOICE

Common Errors and Misconceptions

a. In Q1.2, many candidates did not realise that the force that the scale exerts on the person is equal to the scale reading which must increase to accelerate the person upwards.

b. In Q1.4, candidates failed to integrate their mathematical skills with the scientific concepts viz. velocity, momentum and kinetic energy. They also neglected the vector nature of momentum.

c. Most candidates were not able to reason correctly with the formula $P = \dfrac{V^2}{R}$ for series and parallel circuits consisting of identical resistors in Q1.8.

Suggestions for Improvement

a. This question tested understanding of concepts and the principles and laws that must be demonstrated through logical reasoning and not by engaging in lengthy calculations. During teaching and learning, carefully selected concrete examples must be worked out to demonstrate these laws, followed by generalizations and the making of predictions. Learners should also be exposed to more multiple-choice questions, which must be analysed to expose popular wrong choices, find out reasons for the choices, and in the process, identify and address omissions, gaps and misconceptions.

b. Learners must also be encouraged to refer to the formula sheet because it gives the summaries of laws and principles.

QUESTION 2: NEWTON'S LAWS OF MOTION

Common Errors and Misconceptions

a. Candidates omitted key words in their definition, especially the word 'resultant/net'. Instead of 'net force' many of the candidates simply wrote 'force'.

b. Quite a number of candidates used the phrase: 'the net force is directly proportional to the acceleration and inversely proportional to the mass of the object'.

c. Many candidates labelled their free-body diagram incorrectly.

d. Candidates lack of understanding of the term 'equilibrium' was quite evident in this question. They did not understand the key words that define equilibrium, viz. acceleration, velocity and net force.

e. Candidates did not realise that they were supposed to use the x-component of T in their calculation of the frictional force.

f. Candidates did not use the formula sheet to check relationships between variables, and to identify key variables and the effects of their changes on the physical quantity in question. The answers provided to Q2.4 were mostly vague, and not based on the relationships between variables.

Suggestions for Improvement

a. Teachers should stick to and emphasise the definitions in the examination guidelines.

b. The importance of drawing free-body diagrams correctly and their usefulness in problem solving must be emphasised.

c. In questions where more variables are involved, learners must be taught to work out reasons/explanations logically, by writing down formulae containing the physical quantity in question, identifying variables in the formulae, tracing how each variable changes, and then deducing the effect on the physical quantity in question.

QUESTION 3: VERTICAL PROJECTILE MOTION
Common Errors and Misconceptions

a. Many candidates failed to identify the gravitational force (which is always acting downwards) as the only force that was acting on the ball.

b. Graph sketching skills of many candidates was quite poor.

c. The candidates experienced problems with the signs of velocity and acceleration in their substitutions into the relevant equations of motion.

Suggestions for Improvement

a. Learners must be advised to start every calculation in mechanics, especially vertical motion, by indicating the sign convention at the beginning of the problem. Emphasise that the direction of gravitational acceleration does not change in a question, it remains constant.

b. They must be taught the equations of motion in Physics and how these equations are related to the equations in Mathematics.

Straight line graph (velocity-time graph)

$y = mx + c$

$v_f = a\Delta t + v_i$

Parabola (Position-time graph)

$y = ax^2 \quad (+ bx + c)$

$y_f = \frac{1}{2} a(\Delta t)^2 (+ v_i \Delta t + y_i)$

Hyperbola

$k = xy$ **y** inversely proportional to **x**, k is constant

$F_{net} = ma$ **a** inversely proportional to **m**, F_{net} is constant

c. The slope/gradient of graphs must be explained in terms of the physical quantity it represents as well as its significance in explaining the relationships between physical quantities.

QUESTION 4: MOMENTUM

Common Errors and Misconceptions

a. The word 'speed' instead of 'velocity' was mistakenly used by candidates to define momentum. Some omitted the key word 'product' from the definition of momentum and some used the term 'sum' instead of 'product'.

b. Use of the formula $\Delta p_{girl} = \Delta p_{parcel}$ instead of $\Delta p_{girl} = -\Delta p_{parcel}$

c. Many candidates failed to provide the units and direction in their final answers.

d. A number of candidates could not identify or differentiate between the initial and final velocities and could not apply the sign convention appropriately.

Suggestions for Improvement

a. Expose learners to a variety of contexts for problem solving involving collisions and explosions, focusing on one or a few skills at a time, such as interpreting the context and identifying relevant formulae while explaining why others cannot apply.

b. Use the data sheet and formula sheet throughout the year.

QUESTION 5: WORK, ENERGY AND POWER

Common Errors and Misconceptions

a. Some candidates could not properly define non-conservative force while some omitted key words in their definition, e.g. omitting the word 'work' and using 'force'.

b. Most candidates could not determine whether F is a non-conservative force or not.

c. Many candidates defined the work-energy theorem incorrectly viz. the net work done is 'directly proportional to' instead of 'equal to the change in kinetic energy'.

Suggestions for Improvement

a. Carefully selected examples and assessment tasks must also be used to facilitate the understanding of why certain forces are classified as conservative or non-conservative.

b. When using $W_{nc} = \Delta U + \Delta K$ or $W_{net} = \Delta K$ learners **must draw a force diagram** to identify the forces acting in the direction of motion to determine the number of forces causing the net work to be done.

c. When calculating ΔK learners used $\frac{1}{2} \, \mathbf{m}(\mathbf{v}_f - \mathbf{v}_i)^2$ instead of $\frac{1}{2} \, \mathbf{m}(\mathbf{v}_f^2 - \mathbf{v}_i^2)$.

QUESTION 6: DOPPLER EFFECT

Common Errors and Misconceptions

a. A number of candidates struggled to state the definition correctly. Some key terms in the definition were omitted. The key phrases omitted by the candidates were: change in frequency; relative motion.

b. Many candidates related the change in the pitch of sound to the loudness of the sound. Loudness of sound is related to amplitude and not frequency.

c. In Q6.3, some candidates used the equation $c = f\lambda$ instead of the equation $v = f\lambda$. Further, some candidates substituted the speed of light instead of the speed of sound to determine the frequency of the sound.

d. In Q6.4, candidates incorrectly used the time travelled by patrol car in x metres as the period of the sound wave and hence calculated the frequency using this time.

In addition, many candidates substituted the wrong value for the observed frequency (f_L). in the Doppler equation. From this it can be deduced that they did not understand the meaning of the statement, 'the driver … hears a sound with frequency of 50Hz lower than the sound emitted by the alarm'.

Suggestions for Improvement

a. Teachers need to source and expose learners to questions that require them to solve for different variables instead of always solving for the frequency of the detected sound or the velocity of the sound source or of the listener.

b. Revise the use of the wave equation: $v = f\lambda$

QUESTION 7: ELECTROSTATICS (COULOMB'S LAW AND ELECTRIC FIELDS)

Common Errors and Misconceptions

a. Many candidates treated the net/total charge as the sum of two instead of three charges in Q7.1.

b. In Q7.2, candidates did not use the given information that all the charges were identical after contact. As a result, they drew field patterns for two opposite charges or for one charge only rather than for two equal charges. In addition, the directions of the field lines were omitted and some even drew magnetic field patterns.

c. Candidates confused Coulomb's Law with Newton's Law of Universal Gravitation in Q7.3.

d. In Q7.4 candidates swopped/mixed the formulae for E and F; $F = k\dfrac{Q}{r^2}$ and $E = k\dfrac{Q_1 Q_2}{r^2}$.

e. Many candidates failed to realise that the simplest method to calculate the net electric field at a point in Q7.5, when you have the net force at that point was to use the equation $F = Eq$.

f. Many candidates in Q7.6 did not realise that an electron has mass and when electrons are transferred during contact, mass is gained by a sphere.

g. Candidates failed to identify the charge creating/causing the electric field and the charge experiencing the electric field.

Suggestions for Improvement

a. Teachers need to emphasise to learners that calculations of net electrostatic force and electric field are similar in terms of their vector considerations.

b. Teachers need to clarify the distinction between the two equations i.e. $E = \dfrac{F}{q}$ and $E = \dfrac{kQ}{r^2}$.
Learners need to understand and correctly identify the charges represented by q and Q in these two equations.

c. Expose learners to vector diagrams (1D and 2D) and vector triangles when working with forces (electrostatic, gravitational when determining the resultant of forces acting on a body) and net electric fields.

QUESTION 8: ELECTRIC CIRCUITS

Common Errors and Misconceptions

a. In Q8.1, many candidates were not scientifically correct in explaining what an emf of 12 V of a battery means. They were:

   * Not able to relate the terms 'maximum/greatest' or 'open circuit' when referring to 12 V

   * Not able to relate the terms 'energy/work done per unit/coulomb charge' when referring to 12 J

b. Candidates had problems applying the basic principles of series and parallel circuits.

c. Candidates had great difficulty in relating the influence of the parallel branch of resistors on the total external resistance and the relationship between emf, V_{ext} and V_{int}.

Suggestions for Improvement

a. Although the principles of series and parallel circuits are taught from Grade 9, the basic principles have to be revisited and practiced constantly.

b. Compare parallel and series circuits when the cells have no internal resistance as opposed to when the cells have internal resistance.

c. Teachers need to get learners to conduct practical work involving series and parallel circuits and to make observations and calculations regarding resistance, current, emf and potential difference regarding these circuits. These informal practical activities can be used as teaching tools for electric circuits.

QUESTION 9: ELECTRIC CIRCUITS (INTERNAL RESISTANCE)

Common Errors and Misconceptions

a. Candidates failed to recognise that the given equation, $R = \frac{\varepsilon}{I} - r$, was in the form of a linear equation, dealt with in Mathematics. If they did, they would have answered the question quite easily as it required them to determine the intercept on the y axis of the graph (-r) and the emf, which was the gradient in the equation.

b. Several candidates also failed to see that entries on the x-axis were $\frac{1}{I}$. This meant that if they chose to use the equation, $\varepsilon = I(R + r)$, they had to select the appropriate points and then take the inverse of these points on the x-axis.

Suggestions for Improvement

a. The experiment on internal resistance must get the necessary attention. Make sure that the graph drawn is also mathematically understood. This means that learners must also be able to write the equation of the graph and be able to identify the variables in the equation as relevant physical quantities that apply.

b. Refer to alternative graphs to the one presented in this paper. Expose learners to graphs in general. Also ensure that learners use two sets of coordinates (i.e. two ordered pairs) for calculating the gradient.

c. Teachers must assist learners to understand the x and y variables, x-intercept, y-intercept and gradient and gradient in terms of physical quantities. Give learners exercises involving graphs on all knowledge areas in Physics. Learners should do at least two problem-solving activities involving graphs on any topic in Physics each week.

QUESTION 10: ELECTRODYNAMICS

Common Errors and Misconceptions

a. Many candidates had difficulty in applying the right-hand rule or Fleming's right-hand rule for the generator in the diagram, in Q10.1.1.

Suggestions for Improvement

a. Emphasise the use of subscripts in the formulae when rms calculations are done.

b. Teachers should show learners the workings of an AC and DC generator using demonstration models of generators or also by allowing learners to build small generators that work.

QUESTION 11: PHOTO-ELECTRIC EFFECT

Common errors and misconceptions

a. Although the definition of work function in Q11.1 was answered well, some candidates forfeited marks due to one or more of the following reasons:

* Omitting the words 'electrons' and/or 'energy' and/or 'minimum'

* Defining threshold frequency instead

b. Some candidates who chose the correct metal from the table in Q11.2 forfeited the mark for the reason because they did not compare the threshold frequencies of the two metals.

c. Many candidates failed to analyse the data to do an appropriate calculation in Q11.3. Other common errors were:

* Omitting a conclusion regarding the reading on the ammeter

* Giving a correct conclusion from an incorrect answer or without a proper calculation

d. In Q11.4, the calculation of the kinetic energy was well attempted by many candidates.

   Common errors were:

* Omitting the subscript *max* in the formula: $E = W_0 + K_{max}$.

* Incorrect units at the final answer

* Using the information given for circuit B instead of that for circuit A

* Incorrect mathematics in the calculation

e. Most candidates did not know that a change in intensity of light will not affect the maximum kinetic energy of the ejected electrons in Q11.5.

Suggestions for Improvement

a. Teachers should use computer simulations (e.g. Phet) when teaching the photo-electric effect. This will assist to improve learners' understanding of the concept.

b. Learners should be given a variety of problem solving exercises at cognitive levels 3 and 4 as both classwork and homework.

c. Teachers should also give learners conceptual questions on all topics in Physics as classwork and homework. This will assist learners to understand concepts and to express themselves

## 11.5 OVERVIEW OF LEARNER PERFORMANCE IN PAPER 2

General Comments

a. Q2 assessed knowledge and skills learnt in the prescribed experiment on the preparation of esters and was not answered as expected. Practical work seemed to be neglected in most schools.

b. Questions on chemical equilibrium (Q6) and fertilisers (Q10) were poorly answered. Most candidates had a poor understanding of Le Chatelier's principle resulting in poor performance in Q6. Most candidates-struggled to answer the calculation in Q10.

c. Questions pertaining to pure recall of content were answered very poorly. Teachers are advised to use more short informal assessment tasks in order to reinforce basic concepts and principles, e.g. short speed tests (± 10 minutes). This can be used to good effect in content relating to definitions and laws listed in the *CAPS* and the examination guidelines.

d. Grade 11 work (Stoichiometry) is poorly understood. Grade 11 work should be included in classwork, homework and tests in Grade 12.

## 11.6 DIAGNOSTIC QUESTION ANALYSIS OF PAPER 2

The following graph is based on data from a random sample of candidates. While this graph might not accurately reflect national averages, it is useful in assessing the relative degrees of challenge of each question as experienced by candidates.

Graph 11.6.1 Average Marks per Question Expressed as a Percentage: Paper 2
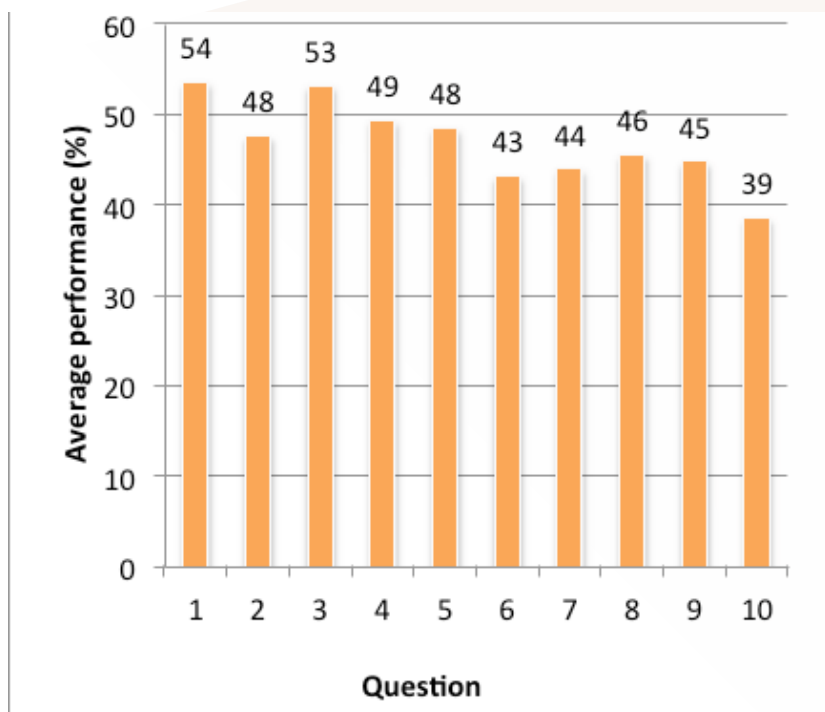
Q1	Multiple-choice questions; all topics
Q2	Preparation and nomenclature of esters
Q3	Physical properties of organic compounds
Q4	Organic reactions
Q5	Reaction rate & stoichiometry
Q6	Chemical equilibrium
Q7	Acids and bases & stoichiometry
Q8	Galvanic cells
Q9	Electrolytic cells
Q10	Fertilisers

Graph 11.6.2 Average Marks per Subquestion Expressed as a Percentage: Paper 2
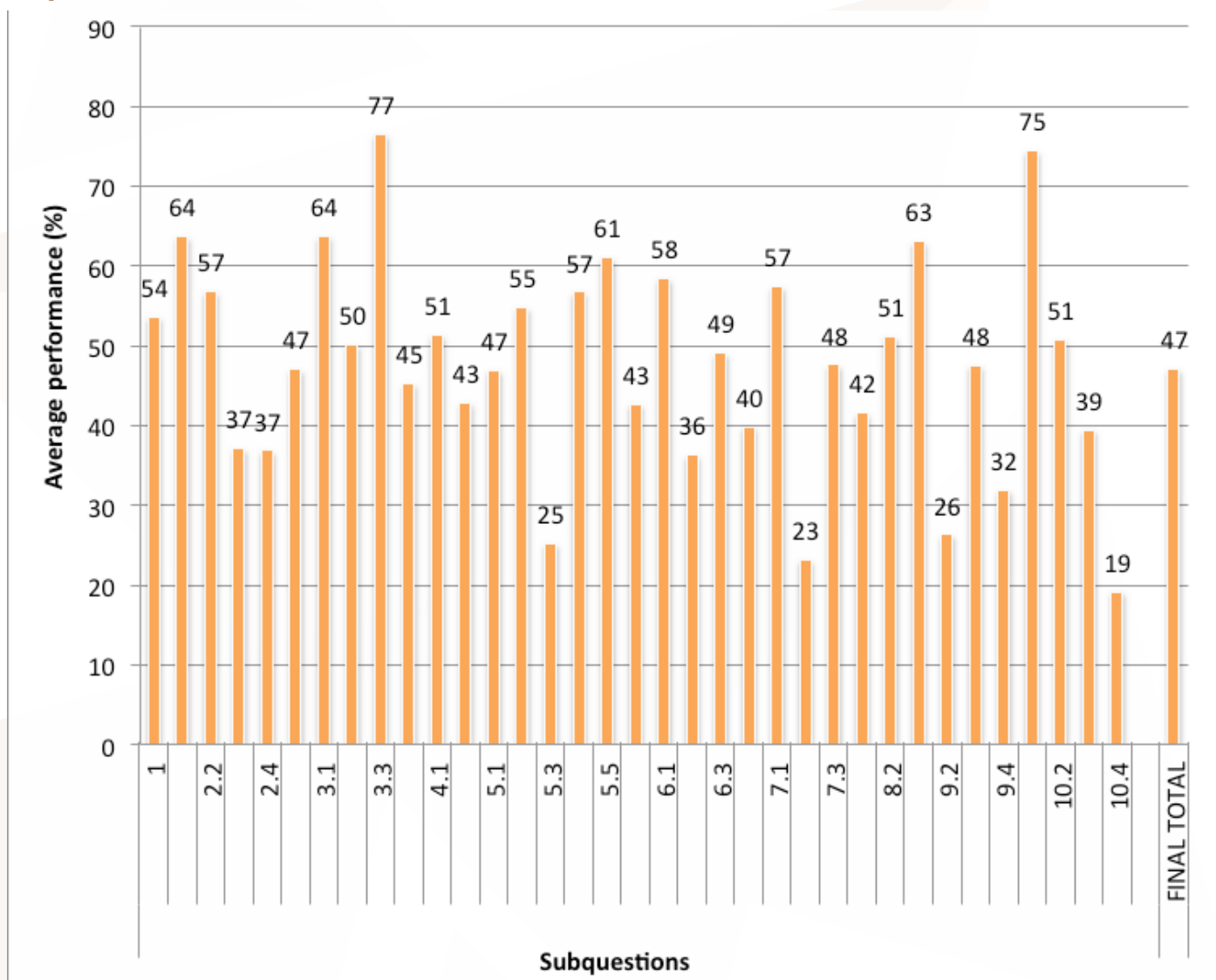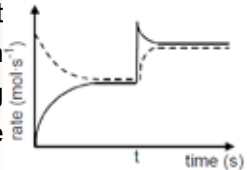

11.7 ANALYSIS OF LEARNER PERFORMANCE IN EACH QUESTION IN PAPER 2

QUESTION 1: MULTIPLE-CHOICE QUESTIONS

a. In Q1.4, candidates failed to find the correct description of activation energy, i.e. the minimum energy required to cause effective collisions. For a reaction to take place, molecules must collide effectively and not just collide as represented by distractor B which was the most common incorrect choice.

b. Many candidates had misconceptions regarding the definition of chemical equilibrium in Q1.5 and 'the forward reaction is equal to the reverse reaction' was the incorrect choice made by most.

c. In Q1.6, candidates could not interpret the rate versus time graph correctly due to one or more of the following misconceptions:

  * The dotted line on a graph is always the reverse reaction.

  * An increase in temperature increases the rate of only the endothermic reaction.

  * An increase in temperature increases the rate of only the forward reaction.

d. Many candidates failed to interpret the K_c values and to link them to the extent of ionisation of the acids in Q1.7, to allow them to arrange acids in order of increasing strength.

e. In Q10, candidates failed to identify the stage in which the catalyst is used in the Contact process.

Suggestions for Improvement

a. Learners should understand the meaning of definitions rather than just memorising them. This will enable them to interpret questions in which definitions are assessed using different wording than in formal definitions. Time should be spent on the importance of key words, as well as their meaning, in definitions.

b. In graphs of reaction rate or chemical equilibrium versus time, the dotted line does not necessarily represent the reverse reaction. Learners should be taught that the graph with the highest initial rate represents the forward reaction. For example, in the accompanying graph the dotted line represents a higher initial rate than the solid line and thus the dotted line represents the forward reaction.

c. The difference between the effect of temperature on reaction rate (how fast) and on chemical equilibrium (how much) should be emphasised. An increase in temperature increases the rate of any reaction regardless of whether it is exothermic or endothermic. However, an increase in temperature increases the rate of the endothermic reaction more than that of the exothermic reaction and therefore an increase in temperature favours the endothermic reaction.

d. The meaning of a low or high value of the equilibrium constant (K_c) for acids and bases should be addressed. If K_c > 1 for the ionisation of an acid, this acid is a stronger acid than the acid formed as one of the products.

e. Subject advisors are advised to prepare a booklet containing multiple-choice questions on different topics from different sources such as previous NSC and provincial papers, and text books. Strategies to deal with multiple-choice questions, like comparison and elimination, should be discussed in cluster meetings to assist teachers to help learners in tackling multiple-choice questions.

f. Learners should be encouraged to learn the conditions of all the reactions as well as the reactions themselves.

QUESTION 2: PREPARATION AND NOMENCLATURE OF ESTERS

Common Errors and Misconceptions

a. Candidates referred to the test tube instead of its contents in Q2.1 as a reason why the test tube is heated in a water bath. Many candidates indicated that the carboxylic acid, instead of the alcohol, is flammable.

b. Failure to recognise the experimental setup illustrated as that of the preparation of an ester resulted in incorrect answers in Q2.2.1, Q2.2.2 and Q2.2.3. In Q2.2.3 spelling was also a problem.

c. Determination of the molecular formula from an empirical formula in Q2.3 is a concept from Grades 10 and 11 and most candidates did not know how to solve the problem. Apart from not knowing that the product is an ester, other common errors were:

* Incorrect or no calculation of the molar mass of C_4H_8O

* Drawing of the structural formula of a carboxylic acid

* Giving a molecular formula of an alkane or an alcohol

* Giving the general formulae of an alkane, an alkene or alcohols

d. In Q2.4, candidates did not know that it should be an *ethyl ester* because the alcohol used in the experiment is *ethanol*. Some candidates used a number when writing the IUPAC name of the ester to indicate the ethyl substituent on the molecule in question e.g. 1-ethyl hexanoate.

e. A 5th bond was used around the C atom of the functional group or bond lines between carbon atoms were omitted when drawing the structural formula of the carboxylic acid in Q2.5.

Suggestions for Improvement

a. Practical work forms an important part of the teaching of the subject. Teachers are advised to expose learners to practical work and safety precautions related to particular experiments.

b. Molecular formulae and the mole concept should form part of daily assessments throughout the chemistry topics.

c. IUPAC rules for the naming of products formed in reactions should be emphasised.

QUESTION 3: PHYSICAL PROPERTIES OF ORGANIC COMPOUNDS

Common Errors and Misconceptions

a. Candidates omitted one or more of the key words in the definition of *boiling point* in Q3.1. Common errors were:

    *   Vapour pressure and atmospheric pressure are at equilibrium.

    *   It is a point where vapour pressure equals atmospheric pressure.

    *   The temperature when liquid turns into a gas.

b. In Q3.2.1, candidates wrote the name of the homologous series (carboxylic acids) instead of the name of the functional group namely the *carboxyl gr*oup. Another common incorrect answer was *carbonyl group.*

c. Some candidates included a number for the functional group in the IUPAC name of the carboxylic acid, e.g. *1-propanoic acid*, in Q3.2.2.

d. Many candidates showed poor understanding of the term *functional isomer* in Q3.2.3 and wrote the structural formula of compound B instead of that of its functional isomer.

e. In Q3.3, candidates made general statements on the relationship between boiling point and vapour pressure instead of being specific when giving a reason. For example, instead of giving 'lowest boiling point' as the reason why compound A has the highest vapour pressure, many stated that 'as boiling point decreases, vapour pressure increases'.

f. In Q3.4.1, most candidates wrote that both compounds have the 'same intermolecular forces' or 'both have hydrogen bonding' as the reason for the comparison being fair. To compare the boiling points of the two compounds (which is determined by the strength of intermolecular forces), the molecules should be of similar size. The two compounds have the same molecular mass which indicates similar size.

g. For a reason as to why compound X is a primary alcohol in Q3.4.2 many candidates wrote that 'the –OH group is bonded to only one carbon atom' instead of 'the –OH group is bonded to a carbon atom that is bonded to only one other carbon atom'. Some candidates referred to *it* instead of to the *–OH group* and forfeited the mark.

h. In the explanation of the difference in boiling points between compounds **B** and **X** in Q3.4.3, many candidates omitted one or more of the four steps needed in the explanation. Common errors were:

* Omitting the comparison between the number of sites for hydrogen bonding in the two compounds

* Carboxylic acids have hydrogen bonding and alcohols have dipole-dipole forces

* Carboxylic acids have a double bond and alcohols have a single bond

* Not specifying whether intermolecular forces in compound B are stronger than those in compound X

* Compound B needs more energy instead of compound B needs more energy to overcome intermolecular forces

* Using abbreviations such a HB for hydrogen bonding

Suggestions for Improvement

a. Learners should be taught to write definitions correctly including all necessary key words. Informal tests should be used to assess definitions on a weekly basis.

b. Learners should be made aware that a direct proportionality between two variables implies that a graph plotted of the two variables on the x and y axis respectively will be a straight line through the origin. If the vapour pressures of substances are plotted against the inverse of the boiling points of the substances, it will not be a straight line through the origin. Therefore, it is incorrect to state that 'vapour pressure is inversely proportional to boiling point'. Learners should rather be taught that 'substances with high boiling points have low vapour pressures or when boiling point increases, vapour pressure decreases'.

c. When explaining the difference in strength of intermolecular forces in a carboxylic acid and an alcohol, learners should be taught that the carboxylic acid has two 'sites' and NOT two 'sides' for hydrogen bonding. Furthermore the carboxylic acid does not have a double bond and the alcohol a single bond. The comparison is that 'the carboxylic acid has two sites for hydrogen bonding and the alcohol has one site for hydrogen bonding'.

d. IUPAC rules should be emphasised regularly. Learners should be made aware that a number is not used to indicate the position of the carboxyl group when naming carboxylic acids.

QUESTION 4: REACTIONS OF ORGANIC COMPOUNDS

Common Errors and Misconceptions

a. Instead of the definition of a *homologous series* in Q4.1.1, many wrote the definition of a *functional group*.

b. Some candidates wrote the formula of the inorganic compound in Q4.1.3 as *BrH* instead of *HBr*.

c. Instead of the structural formula of the POSITIONAL isomer of 2-bromobutane in Q4.1.4, candidates drew the structural formula of 2-bromobutane. Such candidates either did not know the meaning of *positional isomer* or else they did not read the question properly. Other common errors were:

* Using br or BR instead of Br as the symbol for bromine

* Using Br_2 as substituent on C1

* Omitting H atoms

* Using h instead of H as symbol for hydrogen

d. Candidates experienced difficulty in writing a balanced equation for the combustion reaction in Q4.1.5. Common errors were:

* Incorrect balancing

* Incorrect molecular formula for pentane

* Writing of the structural formula or condensed structural formula of pentane

* Incorrect products, e.g. organic compounds other than CO_2 and H_2O

e. The definition of cracking in Q4.1.6 was poorly answered. Most candidates omitted one or more key words in the definition. The following incorrect or partially correct definitions were used:

* 'Longer chains are broken into shorter chains' instead of 'longer hydrocarbon/ alkane chains are broken into shorter chains'

* 'Hydrocarbons are broken into smaller hydrocarbons' instead of 'long chain hydrocarbons/alkanes are broken into smaller hydrocarbons'

f. Instead of butan-2-ol as the IUPAC name in Q4.2.1, the following incorrect or partially incorrect IUPAC names were used: but-2-ol; butan-1-ol; buta-2-nol; butanol.

g. Many of those who drew the structural formula of an alkene in Q4.2.2 placed the double bond between C1 and C2 (1 out of 2 marks) instead of between C2 and C3. Other common errors were:

* Drawing the structural formula of an incorrect alkene e.g. ethene

* Drawing the structural formula of butan-2-ol/compound R which is the reactant

* Writing phosphorous (from H_3PO_4) as part of the structural formula

Suggestions for Improvement

a. Learners should be taught that the products in any complete combustion reaction are CO_2 and H_2O. Then they can at least obtain one mark if they cannot write the correct molecular formula of the organic compound.

b. Learners should have ample exercises in drawing structural formulae from names of molecules and vice versa. Booklets containing a variety of molecules should be developed and learners should draw molecules as part of homework, self-study and classwork.

c. The correct writing of formulae of inorganic molecules should be emphasised.

QUESTION 5: REACTION RATE

Common Errors and Misconceptions

a. In Q5.1, candidates had a poor understanding of the concepts *independent variable, dependent variable* and *controlled variable* which are taught from grade 10.

b. The definition of reaction rate is still a challenge to many candidates (Q5.2). Key words in the definition such as *per unit time* and *change* were often omitted. Common incorrect definitions were:

* The rate at which reactants are changed into products (no mentioning of amount, volume, mass, concentration)

* The speed at which reactants convert to products

c. In Q5.3, candidates failed to realise that the only difference between experiment 2 and experiment 4 was the volume (in excess) of HCℓ. Therefore the average reaction rate and thus the reactions times would be the same.

The most common incorrect answers were:

* 7 s (half of 14 s)

* 28 s i.e. 14 s x 2, possibly because the volume of acid in experiment 4 was double that in experiment 2

d. Most candidates obtained marks for the interpretation of the Boltzmann distribution curves in Q5.4, but failed to give correct reasons for their answers.

e. The calculation of the average rate of the reaction in Q5.6 was a challenge to many candidates. Common errors were:

* Substituting the mass of Zn in the numerator when calculating the reaction rate

* Calculating the concentration of Zn using the volume of acid and then using this concentration to calculate reaction rate

* Swapping the initial and final moles of Zn and/or swapping the initial and the final times

* Obtaining a negative answer for reaction rate

Suggestions for Improvement

a. When calculating reaction rate for a reaction using the number of moles of reactants, the following expression should be used: Average rate = $-\left(\frac{\Delta n}{\Delta t}\right) = -\left(\frac{n_f - n_i}{t_f - t_i}\right)$

The number of moles of reactants decreases because reactants are used and therefore $n_f - n_i$ will be negative. The minus sign ensures that a positive value is obtained for reaction rate.

When calculating reaction rate for a reaction using the number of moles of products, the following expression should be used: Average rate = $-\left(\frac{\Delta n}{\Delta t}\right) = -\left(\frac{n_f - n_i}{t_f - t_i}\right)$. The number of moles of products increases because products are formed and $n_f - n_i$ will be positive.

QUESTION 6: CHEMICAL EQUILIBRIUM

## Common Errors and Misconceptions

a. Candidates who did not obtain full marks for stating Le Chatelier's principle in Q6.1, omitted one or more of the following keywords: When the 'equilibrium is disturbed', the system will 're-instate a new equilibrium' by 'opposing the disturbance'.

b. In the explanation using Le Chatelier's principle in Q6.2, many candidates could not identify the forward reaction as endothermic. Other common errors were:

   * Omitting the statement that a decrease in temperature will favour the exothermic reaction

   * Not stating that the reverse reaction is favoured

c. Most candidates could not apply Le Chatelier's principle in Q6.3.1 to a situation where the pressure of a gas increases due to a decrease in volume.

d. Many candidates missed the effect of an increase in pressure due to a decrease in volume of a gas on the rate of the forward and reverse reactions in Q6.3.3. Due to the increase in concentration, the rates of both reactions will increase.

e. The K_c calculation in Q6.4 was poorly answered due to one or more of the following reasons:

   * Not using 20% of X to find the moles of $[N_2O_4]$ that have reacted

   * Using the 20% of X as the amount left at equilibrium instead of the amount used

   * Ignoring the 20% of X

   * No K_c expression (Note that $\frac{[Products]}{[reactants]}$ is NOT a K_c expression!)

   * Incorrect K_c expression e.g. $\frac{[2NO_2]}{[N_2O_4]}$ or $\frac{[N_2O_4]}{[NO_2]^2}$

   * Splitting the N_2O_4 into N_2 and O_4 resulting in three columns in the table followed by the following K_c expression: $= \frac{[2NO_2]}{[N_2O_4]}$

Suggestions for Improvement

a. Content and methodology training of teachers on the application of Le Chatelier's principle will assist inexperienced teachers to teach this topic. Experienced teachers can also share methodology in the teaching of the topic with others.

b. More emphasis should be placed in class on explanations requiring Le Chatelier's principle. Learners struggle to express themselves when explaining in terms of Le Chatelier's principle. They should be exposed to more exercises to practise such explanations.

c. When explaining whether a reaction is exothermic or endothermic, the following steps are important:

Example: $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ $\Delta H < 0$
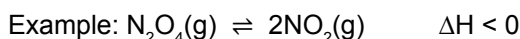
1. Identify the disturbance e.g. a decrease in temperature

2. State the effect of the disturbance on the system e.g. a decrease in temperature favours the exothermic reaction.

3. State which reaction will be favoured when opposing the disturbance e.g. the reverse reaction will be favoured.

4. State, if required, the effect of the above on the number of moles of products/reactants e.g. the number of moles   of N2O4 will increase.

d. Teachers should avoid the use of $K_c = \frac{[\text{Products}]}{[\text{reactants}]}$ in class. Use chemical equations to teach the writing of K_c expressions.

e. For learners to clearly understand the above calculations, it might be prudent to use excess and limiting reagents as a precursor to dynamic chemical equilibrium to help learners track and calculate the moles in excess and the limiting moles.

QUESTION 7: ACIDS AND BASES

Common Errors and Misconceptions

a. Instead of the definition of *an* acid in terms of the Lowry-Brønsted theory in Q7.1.1, many gave the definition in terms of the Arrhenius theory.

b. In Q7.1.3, most candidates assumed that H_2O acts as ampholyte in the ionisation of sulphuric acid without looking at its role in the given reactions. Some of those who knew that the ampholyte is HSO_4^-, omitted the charge on the ion.

c. Common errors when stating the definition of hydrolysis in Q7.2.1 were:

   * The salt dissolves in water instead of reacts with water

   * The salt ionises in water (a salt already consists of ions)

d. In Q7.2.2, very few candidates wrote the equation of a hydrolysis reaction to show how $CaCO_3$ neutralises the acid. Most of those who attempted the equation, did not write an equation in which one the ions of the salt (CO_3^{2-}) reacts with water, but $CaCO_3$ itself was reacted with water instead. Other errors were:

   * Using *dissolves* instead of the keyword *reaction* in the definition

   * Stating that hydrolysis is the dissolution/ionisation/dissociation of a salt in water

   * Stating the definition of neutralisation instead

e. Many candidates could not use their calculators correctly to calculate $[H_3O^+]$ from pH in Q7.3.1. Common errors were:

   * Using an incorrect pH formula e.g. pH = -log[OH⁻]

   * Using round brackets instead of square brackets in the pH formula

   * Omitting the + on H_3O^+ in the pH formula

* Omitting the pH formula and just starting with 5 = -log[H_3O^+]

* Omitting the unit (mol·dm^{-3}) or using an incorrect unit (mol·dm^3)

* Obtaining 0,69 which is the log of 5 after substituting 5 for pH in a correct formula

f. Most candidates skipped one or more steps in the calculation in Q7.2.3.

Some candidates used the ratio H_3O^+ : H_2O = 2 : 3 and then the ratio
CaO : H_2O = 1 : 3 from the reaction given instead of the ratio H_3O^+ : CaO = 2 : 1. Such candidates multiplied by 3 and then later divided by 3 and thus still obtained the correct answer, but sometimes used the concentration of water to arrive at n(CaO). Common errors were:

* Using an incorrect formula e.g. $n = \dfrac{V}{V_m}$ Skipping the subtraction
  step i.e. $n(H_3O^+)_{reacted} = n(H_3O^+)_{initial} - n(H_3O^+_4)_{final}$

* Swapping the initial and final moles of H_3O^+ when subtracting - a negative answer should have been obtained

* Using the final number of moles of H_3O^+ given in the paper as the number of moles that have reacted

* Calculating the mass of H_3O^+ and CaO and then applying mole ratios on the masses

* Using the initial concentration of H_3O^+ to calculate the concentration of water

Suggestions for Improvement

a. Teachers need support in the teaching of hydrolysis of salts. Very few candidates could answer the question on hydrolysis.

b. When teaching hydrolysis, learners should be taught to split the given salt into ions and then each ion should be reacted with water. For example, when $CaCO_3$ undergoes hydrolysis the following steps should be followed to determine whether an acidic or basic solution will form:

* Determine the two ions in the salt e.g. in $CaCO_3$ i.e. Ca^{2+} and

* The positive ion (Ca^{2+}) comes from a base and the negative ion () comes from an acid. Determine the base and acid that can be used to prepare the salt, for example: - the acid is H_2CO_3 which is a weak acid Ca^{2+} - the base is $Ca(OH)_2$ which is a strong base(From this, learners can already deduce that only the will undergo hydrolysis as it comes from a weak acid. Ca^{2+} will not undergo hydrolysis as it comes from a strong base.)

* Determine the ion that will undergo hydrolysis:

  - A weak acid ionises incompletely and therefore its negative ion will hydrolyse: + H_2O ⇌ H_2CO_3 + OH^-

     When the negative ion reacts with water, OH^- is always one of the products.H_2CO_3 is a weak acid and is incompletely ionised. Therefore undergoes hydrolysis.

  - A strong base dissociates completely and therefore its ion will not hydrolyse.

     If the ion reacts with water, a strong base will be the product and will immediately dissociate because a strong base is completely ionised/dissociated. The following reaction will not take place and therefore Ca^{2+} will not undergo hydrolysis.

     Ca^{2+} + $4H_2O$ ⇋ $Ca(OH)_2$ + $2H_3O^+$
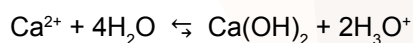
     When the positive ion reacts with water, H_3O^+ is always one of the products.

* After determining the ion that will undergo hydrolysis i.e. in this case, the reaction of this ion with water should be written down as the hydrolysis reaction. $+ H_2O \rightarrow H_2CO_3 + OH^-$

* The product of this reaction (OH^- or H_3O^+) should be used to explain whether hydrolysis of the salt forms an acidic or basic solution. In this case OH^- is formed and therefore the solution will be basic and will neutralise an acid.

c. Ensure learners know how to use their calculators to calculate $[H_3O^+]$ from the pH.

d. Learners should be taught to label formulae when doing multistep calculations e.g. when calculating the number of moles of H_3O^+, the formula should be as follows: $n(H_3O^+) = cV$.

QUESTION 8: REDOX REACTIONS AND GALVANIC CELLS

Common Errors and Misconceptions

a. Some candidates wrote that 'oxidation is reduction of electrons' in Q8.1.1. Reduction is an ambiguous term to use in this context! It can mean electrons get less which implies a loss of electrons, but in this context reduction is also a gain of electrons. Common errors when writing the definition of oxidation in Q8.1.1 were:

* Oxidation is a gain of electrons

* Oxidation is a substance that is oxidised or a substance that loses electrons

b. In Q8.1.2, many candidates used the Fe/Fe^{2+} instead of the Fe/Fe^{3+} half-reaction. The question stated that iron(III) ions are formed when iron rusts. Common errors were:

Most negative reduction potential Using $Fe \rightarrow Fe^{2+} + 2e^-$ instead of $Fe \rightarrow Fe^{3+} + 3e^-$

Strongest reducing agent
* Using the reduction half-reaction i.e. $Fe^{3+} + 3e^- \rightarrow Fe$

* Using double arrows in the correct half-reaction i.e. $Fe \rightleftharpoons Fe^{3+} + 3e^-$

* Writing and incomplete half-reaction e.g. $Fe \rightleftharpoons F^{3+} + 3e^-$

c. The use of the Table of Standard Reduction Potentials in Q8.1.4 is still poorly understood by many candidates. Many still have the perception that if an element is a weak reducing agent, it implies that the element is a strong oxidising agent. Therefore, statements like Fe has a stronger reducing ability and Cu has a stronger oxidising ability, therefore Fe will be oxidised and Cu will be reduced' were often made. Common incorrect or partially incorrect explanations were:

* The iron nail has a higher oxidising ability than the copper and the iron nail will react with oxygen and be oxidised.

* Copper is a stronger oxidising agent than Fe and Fe will be reduced

* Fe is a stronger reducing agent than O_2 and Fe will be oxidised

    NOTE: O_2 is an oxidising agent and not a reducing agent.

d. Although they were not required to show the two half-reactions in Q8.2.1, many candidates wrote the correct half-reactions, but failed to combine them to obtain a balanced cell reaction. Answers of most candidates showed lack of understanding of the use of the Table of Standard Reduction Potentials. For example, some candidates used the Cu/Cu^{2+} half-reaction as the oxidation Q8.2.1 and then as the reduction when calculating the cell potential in Q8.2.2 Common errors were:

* Using the two metals as reactants or as products e.g.

    $2Fe + 3Cu \rightarrow 3Cu^{2+} + 2Fe^{3+}$

* Swapping the reactants and products e.g. $3Cu + 2Fe^{3+} \rightarrow 3Cu^{2+} + 2Fe$

* Writing the cell notation instead of the cell reaction

e. Common errors when calculating the cell potential in Q8.2.2 were:

* Using abbreviations in the formula e.g. $E_{cell} = E_{red} - E_{ox}$ or using an incorrect formula e.g. $E_{cell} = E_{oxidation} - E_{reduction}$

* Using the reduction potential of the Fe^{2+}/Fe half-reaction (-0,44 V) instead of that of the Fe^{3+}/Fe half-reaction

* Using the reduction potential of the Cu^{+}/Cu^{2+} half-reaction (+0,52 V) instead of that of the Cu^{2+}/Cu half-reaction

* Swapping the reduction potential of the anode with that of the cathode when substituting

* Omitting the unit in the final answer

Suggestions for Improvement

a. The Table of Standard Reduction Potentials is still not well understood by most learners. Time should be spent in class to thoroughly explain how to use the table to determine relative strengths of oxidising and reducing agents in order to decide which substance will be oxidised and which one will be reduced. A weaker reducing agent is NOT a strong oxidising agent!

Learners should be taught that oxidising agents are listed to the left in the Table of Standard Reduction Potentials and reducing agents to the right (see the section of Table 4B below).

Section of the TABLE OF STANDARD REDUCTION POTENTIALS (4B)

Most negative reduction potential / Weakest oxidising agent	$Ni^{2+} + 2e^- \rightleftharpoons Ni$ $-0,27$	Most negative reduction potential / Strongest reducing agent
	$Sn^{2+} + 2e^- \rightleftharpoons Sn$ $-0,14$	
	$Pb^{2+} + 2e^- \rightleftharpoons Pb$ $-0,13$	
	$Fe^{3+} + 3e^- \rightleftharpoons Fe$ $-0,06$	
	$2H^+ + 2e^- \rightleftharpoons H_2(g)$ $0,00$	
	$S + 2H^+ + 2e^- \rightleftharpoons H_2S(g)$ $+0,14$	
	$Sn^{4+} + 2e^- \rightleftharpoons Sn^{2+}$ $+0,15$	
Most positive reduction potential / Strongest oxidising agent	$Cu^{2+} + e^- \rightleftharpoons Cu^+$ $+0,16$	Most positive reduction potential / Weakest reducing agent
	$SO_4^{2-} + 4H^+ + 2e^- \rightleftharpoons SO_2(g) + 2H_2O$ $+0,17$	
	$Cu^{2+} + 2e^- \rightleftharpoons Cu$ $+0,34$	
	$2H_2O + O_2 + 4e^- \rightleftharpoons 4OH^-$ $+0,40$	
	$SO_2 + 4H^+ + 4e^- \rightleftharpoons S + 2H_2O$ $+0,45$	

b. Content training for teachers on how to explain the use of the Table of Standard Reduction Potentials to learners is essential. Learners continually fail to use the table correctly.

c. Terms such as reduction, reducing agent, oxidation and oxidising agent need to be understood well. For example a reducing agent is a substance that causes reduction of another substance whilst it is oxidised or loses electrons.

QUESTION 9: ELECTROLYTIC CELLS

Common Errors and Misconceptions

a. In Q9.1, some candidates confused an electrolytic cell with a galvanic cell whilst others thought electrical energy is transferred to mechanical energy.

b. Most candidates failed to write a correct formula for a suitable electrolyte in the cell in Q9.2.

c. Many candidates could not identify the cathode in Q9.3, but wrote the correct half-reaction. They knew reduction takes place at the cathode, but either did not read the question properly or did not realise that copper is deposited on the cathode which is electrode B.

d. In Q9.4, candidates again failed to use the Table of Standard Reduction Potentials to compare the relative strengths of reducing agents. Pt and Ag are weaker reducing agents than Cu and will not be oxidised to Pt^{2+} and Ag^+ respectively, whilst Fe, Co and Ni are stronger reducing agents than Cu and will be, together with Cu, oxidised at the anode to form Fe^{2+}, Co^{2+} and Ni^{2+}.

Suggestions for Improvement

a. Learners should be supplied with a summary of the five different types of electrolytic cells prescribed. Ensure that learners understand the reactions at the electrodes in these cells. The five types are: electrolysis of concentrated NaCℓ, electrolysis of concentrated CuCℓ2, the aluminium cell, an example of the cell used for electroplating and the purification of copper.

b. The galvanic cell and the electrolytic cell should be contrasted so that learners can see the differences and similarities between the two cells.

c. The use of the Table of Standard Reduction Potentials should also be emphasised when teaching electrolytic cells.

d. Teachers should ensure that learners understand the differences between galvanic and electrolytic cells.

QUESTION 10: FERTILISERS

Common Errors and Misconceptions

a. Spelling was a huge problem in Q10.1.1 and Q10.1.2. Instead of Haber process the following names were often used: *Hamba, Heyber, Hamper, Harbour* Instead of Ostwald process the following were often used: *Ostwalt, Oswayd, Oshwald*

b. In Q10.2.2, many candidates failed to give the correct catalyst used in the Haber process. Common incorrect answers were: *Pt; H_2SO_4; V_2O_5*

c. Most candidates could not write the correct equation for the reaction of NH_3 to form ammonium sulphate in Q10.3. Common errors were:

* Using $(NH_3)_2SO_4$ or NH_3SO_4 or NH_4SO_4 as the formula for ammonium sulphate instead of $(NH_4)_2SO_4$

* Incorrect balancing

* Adding an extra product to the equation

a. The calculation in Q10.4 was poorly answered. Many candidates did not use the molar masses of the three substances in the bag in their calculations and obtained zero. Common errors were:

* Calculating some of the molar masses incorrectly

* Failure to calculate the correct ratio

* Failure to calculate the mass of each primary nutrient using the molar mass of each

* Using the number of moles instead of masses to calculate the NPK ratio

Suggestions for Improvement

a. More attention should be given to fertilisers as a topic. Learners should be encouraged to study the topic as they can obtain marks easily if they know their work.

b. The mole concept and stoichiometry should form part of daily assessment across all chemistry topics.

c. Teachers are encouraged to ensure that enough time is set aside to teach this topic.